Cover Sheet: Request 14084

Marine Sciences CLAS

Info

Process	Degree|New|Ugrad/Pro|Existing Type|State-funded|Residential
Status	Pending at FAC - Faculty Senate Steering Committee
Submitter	Joel H Brendemuhl brendj@ufl.edu
Created	7/18/2019 11:30:17 AM
Updated	10/15/2019 4:26:07 PM
Description of request	The B.S. in Marine Sciences degree program replaces the Interdisciplinary Studies-Marine Sciences major specializations that have been offered in parallel since 2012 through the Colleges of Liberal Arts and Sciences (CLAS) and Agricultural and Life Sciences (CALS) at the University of Florida (UF). Presently we have 120 undergraduates who are declared majors in the Interdisciplinary Studies Marine Sciences major between the two colleges. Our collaboratively administered Marine Sciences major is multi-disciplinary and broad in scope; every student takes courses across the fields of biology, chemistry, geology, and physics of marine, estuarine, and coastal environments, as well as the conservation and management of marine resources. Our interdisciplinary approach allows students to tailor a curriculum that suits their interests and career goals by emphasizing the physical or biological sciences (CLAS track) or the fields of ecology, conservation, and management (CALS track). Catalog copy included with critical-tracking for semesters 6-8.

Actions

Step	Status	Group	User	Comment	Updated
Department	Approved	CLAS - Marine Sciences	Margaret Fields		7/19/2019
Appendix A_ Mar Sci_2020 - Upload File.xlsx CVs_2020.pdf					7/18/2019 7/18/2019
College	Approved	CLAS - College of Liberal Arts and Sciences	Margaret Fields		8/1/2019
Signed Appendix B.pdf					7/30/2019
OIPR	Recycled	PV - Office of Institutional Planning and Research	Thomas Rush	Recycled back on behalf of Griffith,Casey Todd	8/8/2019
No document changes					
College	Approved	CLAS - College of Liberal Arts and Sciences	Margaret Fields		8/8/2019
No document changes					
OIPR	Approved	PV - Office of Institutional Planning and Research	Cathy Lebo		9/20/2019
MAR Sci_2020 - CLAS - v2.docx					9/20/2019
AP for Undergraduate Affairs	Approved	PV - APUG Review	Casey Griffith		9/24/2019
No document changes					
University Curriculum Committee	Commented	PV - University Curriculum Committee (UCC)	Lee Morrison	Added to the October agenda. If approved at this meeting, this will go into effect for the Summer B 2020 term with the publication of the 2020-2021 undergraduate catalog.	10/10/2019
No document changes					

Step	Status	Group	User	Comment	Updated
University Curriculum Committee	Approved	PV - University Curriculum Committee (UCC)	Casey Griffith		10/15/2019
CLAS Marine Sciences_catalog_copy_tracked_changes_10_10_19.docx					10/10/2019
Faculty Senate Steering Committee	Pending	FAC - Faculty Senate Steering Committee			10/15/2019
No document changes					
Faculty Senate					
No document changes					
Academic Affairs					
No document changes					
Board of Trustees					
No document changes					
Board of Governors					
No document changes					
Academic Affairs Notified					
No document changes					
Office of the Registrar					
No document changes					
OIPR Notified					
No document changes					
Student Academic Support System					
No document changes					
Catalog					
No document changes					
Academic Assessment Committee Notified					
No document changes					
College Notified					
No document changes					

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Marine Sciences | CLAS

major

- Home
- Undergraduate Catalog
- Colleges and Schools
- Liberal Arts and Sciences, College of
- Marine Sciences CLAS

Oceans are an important facet of our global environment: covering more than 70 percent of the Earth's surface, oceans provide us with food, transport, and resources and they play a significant role in controlling climate. However, the world's oceans remain largely unexplored below the surface, making them one of the last great frontiers for scientific discovery. Marine environments are inherently dynamic and governed by a broad suite of interactive biological, chemical, and physical processes.

About this Program

- **College:** Liberal Arts and Sciences
- **Degree:** Bachelor of Science
- **Credits for Degree:** 120
- **Related Marine Sciences Programs**

To graduate with this major, students must complete all university, college, and major requirements.

Overview

The university promotes an interdisciplinary approach to marine science education and research to prepare students for rewarding academic and professional careers. This major, offered cooperatively with the College of Agricultural and Life Sciences, lets students tailor a curriculum that suits their interests and career goals.

The curriculum provides the core scientific and quantitative skills necessary for success. Lower-division courses build a strong foundation in basic sciences and math while upper-division courses provide opportunity for specialization. Students in the College of Liberal Arts and Sciences (CLAS) complete an upper-division core that integrates the physical and biological sciences, mathematics, and engineering. They work closely with a faculty advisor to create an individualized curriculum of at least 12 credits of approved electives; this plan must be approved by the program's undergraduate coordinator before the student has earned 70 credits.

Coursework for the Major

The major requires 63-67 credits of coursework completed with minimum grades of C. At least 30 credits of coursework in the major must be completed at UF.

Required Coursework

Course List

Code	Title	Credits
BSC 2010	Integrated Principles of Biology 1	4
& 2010L	and Integrated Principles of Biology Laboratory 1	
BSC 2011	Integrated Principles of Biology 2	4
& 2011L	and Integrated Principles of Biology Laboratory 2	
CHM 2045	General Chemistry 1	4
& 2045L	and General Chemistry 1 Laboratory	
CHM 2046	General Chemistry 2	4
& 2046L	and General Chemistry 2 Laboratory	
GLY 3083C	Fundamentals of Marine Sciences	3
GLY 4726	Geochemical Oceanography	3
MAC 2311	Analytic Geometry and Calculus 1	4

MAC 2312	Analytic Geometry and Calculus 2	3-4
or STA 2023	Introduction to Statistics 1	
OCE 1001	Introduction to Oceanography	3
Select one:		8-10
Option One		
PHY 2053	Physics 1	
& 2053L	and Laboratory for Physics 1	
PHY 2054	Physics 2	
& 2054L	and Laboratory for Physics 2	
Option Two		
PHY 2048	Physics with Calculus 1	
& 2048L	and Laboratory for Physics with Calculus 1	
PHY 2049	Physics with Calculus 2	
& 2049L	and Laboratory for Physics with Calculus 2	
ZOO 4403C	Marine Biology	4
PCB4460	Marine Ecology	3
or FAS 4270	Marine Ecological Processes	
Marine sciences core elective		3-4
Approved marine sciences electives [1]		12
Total Credits		62-66

[1] 12 credits of approved marine sciences electives, approved by the undergraduate coordinator before the student has earned 70 credits. Electives may be chosen from the Approved Electives tab.

Critical Tracking

Critical Tracking records each student's progress in courses that are required for entry to each major. Please note the critical-tracking requirements below on a per-semester basis.

For degree requirements outside of the major, refer to CLAS Degree Requirements: Structure of a CLAS Degree .

For the purposes of critical-tracking, associated lecture and lab courses are considered one critical-tracking course (e.g., BSC 2010 / BSC 2010L = 1 critical-tracking course).

Equivalent critical-tracking courses as determined by the State of Florida Common Course Prerequisites may be used for transfer students.

Semester 1

- Complete OCE 1001 and 1 critical-tracking course from BSC 2010 / BSC 2010L , BSC 2011 / BSC 2011L , CHM 2045 / CHM 2045L , CHM 2046 / CHM 2046L , MAC 2311 , PHY 2053 / PHY 2053L (or PHY 2048 / PHY 2048L), PHY 2054 / PHY 2054L (or PHY 2049 / PHY 2049L)
- 2.5 GPA required for all critical-tracking courses
- 2.0 UF GPA required

Semester 2

- Complete 2 additional critical-tracking courses

- 2.5 GPA required for all critical-tracking courses
- 2.0 UF GPA required

Semester 3

- Complete 1 additional critical-tracking course
- 2.5 GPA required for all critical-tracking courses
- 2.0 UF GPA required

Semester 4

- Complete 2 additional critical-tracking courses
- 2.5 GPA required for all critical-tracking courses
- 2.0 UF GPA required

Semester 5

- Complete all 8 critical-tracking courses
- 2.5 GPA required for all critical-tracking courses
- 2.0 UF GPA required

Semester 6

- Complete FAS4270 or PCB4460 *Marine Ecology*
- 2.0 UF GPA required

Semester 7

- Complete General Education Course
- 2.0 UF GPA required

Semester 8

- Complete all remaining General Education requirements
- 2.0 UF GPA required

Model Semester Plan

Students are expected to complete the writing requirement while in the process of taking the courses below. Students are also expected to complete the general education international (GE-N) and diversity (GE-D) requirements concurrently with another general education requirement (typically, GE-C, H, or S).

To remain on track, students must complete the appropriate critical-tracking courses, which appear in bold. These courses must be completed by the terms as listed above in the Critical Tracking criteria.

This semester plan represents an example progression through the major. Actual courses and course order may be different depending on the student's academic record and scheduling availability of courses. Prerequisites still apply.

Plan of Study Grid

	Semester One	**Credits**
CHM 2045	General Chemistry 1	
& 2045L	and General Chemistry 1 Laboratory (**Critical Tracking** ; State Core Gen Ed Physical Sciences)	4
IDS 1161	What is the Good Life (Gen Ed Humanities)	3
Select one:		4
MAC 2311	Analytic Geometry and Calculus 1 (**Critical Tracking**)	
MAC 1147	Precalculus Algebra and Trigonometry (State Core Gen Ed Mathematics)	
OCE 1001	Introduction to Oceanography (**Critical Tracking** ; Gen Ed Physical Sciences)	3
	Credits	14

Semester Two

CHM 2046	General Chemistry 2	
& 2046L	and General Chemistry 2 Laboratory (**Critical Tracking** ; Gen Ed Physical Sciences)	4
Select one:		3-4
Elective		
MAC 2311	Analytic Geometry and Calculus 1 (if needed)	
State Core Gen Ed Composition ; Writing Requirement		3
State Core Gen Ed Humanities		3
State Core Gen Ed Social and Behavioral Sciences		3
	Credits	16-17

Semester Three

BSC 2010	Integrated Principles of Biology 1	
& 2010L	and Integrated Principles of Biology Laboratory 1 (**Critical Tracking** ; Gen Ed Biological Sciences)	4
GLY 3083C	Fundamentals of Marine Sciences (Gen Ed Physical Sciences)	3
Select one:		3-4
MAC 2312	Analytic Geometry and Calculus 2	
STA 2023	Introduction to Statistics 1 (Gen Ed Mathematics)	
Elective (3000 level or above, not in major)		3
Gen Ed Humanities		3
	Credits	16-17

Semester Four

BSC 2011	Integrated Principles of Biology 2	
& 2011L	and Integrated Principles of Biology Laboratory 2 (**Critical Tracking** ; Gen Ed Biological Sciences)	4
Select one:		4-5
PHY 2053	Physics 1	
& 2053L	and Laboratory for Physics 1 (**Critical Tracking** ; Gen Ed Physical Sciences)	
PHY 2048	Physics with Calculus 1	
& 2048L	and Laboratory for Physics with Calculus 1 (**Critical Tracking**)	
Elective (3000 level or above, not in major)		3
Gen Ed Social and Behavioral Sciences		3
	Credits	14-15

Semester Five

Select one:		4-5
PHY 2054	Physics 2	
& 2054L	and Laboratory for Physics 2 (**Critical Tracking** ; Gen Ed Physical Sciences)	
PHY 2049	Physics with Calculus 2	

PHY 2049		
& 2049L	and Laboratory for Physics with Calculus 2 (**Critical Tracking**)	
ZOO 4403C	Marine Biology	4
Elective		3
Foreign language		5
	Credits	16-17
	Semester Six	
GLY 4726	Geochemical Oceanography	3
PCB4460	**Marine Ecology**	**3-4**
or FAS 4270	**or Marine Ecological Processes**	
Gen Ed Composition; Writing Requirement		3
Foreign language		5
	Credits	15
	Semester Seven	
Approved elective		3
Electives (3000 level or above, not in major)		6
Marine sciences core elective		3-4
Gen Ed Social and Behavioral Sciences		**3**
	Credits	15-16
	Semester Eight	
Approved electives		9
Elective		3
Elective (3000 level or above, not in major)		3
	Credits	15
	Total Credits	120

1 Select MAC 1147 if needed.

Approved Electives

Marine Sciences Core Elective

Course List

Code	Title	Credits
Select one:		3-4
GLY 2010C	Physical Geology (Gen Ed Physical Sciences)	
GLY 2100C	Historical Geology (Gen Ed Physical Sciences)	
GLY 3074	Oceans and Global Climate Change (Gen Ed Physical Sciences) [1]	
GLY 3105C	Evolution of Earth and Life (Gen Ed Physical Sciences) [1]	
GLY 3202C	Earth Materials [1]	
EGN 4932	Special Topics (Physical Oceanography) [1]	

[1] These courses cannot count as marine sciences core electives and approved electives.

Approved Marine Sciences Electives

Course List

Code	Title	Credits
Select 12 credits (minimum):		12
EGN 4932	Special Topics (Physical Oceanography) [1]	
ESC 3075	Deltas and Humans	
FAS 4202C	Biology of Fishes	
FAS 4305C	Introduction to Fishery Science	
FAS 4405	Aquariums, Water and Aquaculture	
FAS 4932	Topics in Fisheries and Aquatic Sciences (Marine Adaptations)	
GLY 3074	Oceans and Global Climate Change (Gen Ed Physical Sciences) [1]	
GLY 3105C	Evolution of Earth and Life (Gen Ed Physical Sciences) [1]	
GLY 3202C	Earth Materials [1]	
GLY 3603C	Paleontology	
GLY 4450	Geophysics	
GLY 4552C	Sedimentary Geology	
GLY 4734	Coastal Morphology and Processes	
-	-	
GLY 4930	Special Topics in Geology (Estuarine Systems)	
OCE 3016	Introduction to Coastal and Oceanographic Engineering	
ZOO 4205C	Invertebrate Biodiversity	

[1] These courses cannot count as marine sciences core electives and approved electives.

Additional Electives | With Instructor Permission

Course List

Code	Title	Credits
EOC 6196	Littoral Processes	3
EOC 6934	Adv Topics Coast and Oc	3
FAS 5276C	Fld Ecol Aquat Organ	4
GLY 5255	Organc Geochem/Geobio	3
FAS 6171	Applied Phycology	3
GLY 5558C	Sedimentology	3
GLY 5736	Marine Geology	3
GLY 5786L	Topics Field Geol (Bahamas)	2
GLY 6075	Glob Climate Change	3
GLY 6425	Tectonics	3

GLY6726	Chemical Biomarkers in Aquatic Ecosystems (instructor permission required).	
GLY 6932	Special Topics (Chemical Biomarkers in Aquatic Ecosystems)	3
OCP 6050	Physical Oceanography	3
OCP 6168	Data Analysis Techniq	3
OCP 6295	Estuar/Shelf Hydro 1	3
ZOO 4926	Special Topics in Zoology (Biology of Sea Turtles)	1-4
ZOO 6456C	Ichthyology	4

Academic Learning Compact

This interdisciplinary studies major provides integrative understanding of the basic concepts, theories and observational findings related to marine materials and processes, geologic time, the diversity of marine life, the structure and function of marine organisms and ecosystems and marine resource management.

The marine sciences major is administered jointly by the College of Agricultural and Life Sciences and the College of Liberal Arts and Sciences and utilizes faculty, courses and resources of the Fisheries and Aquatic Sciences Program (CALS), the Department of Geological Sciences (CLAS), the Department of Biology (CLAS), and the Department of Civil and Coastal Engineering (Herbert Wertheim College of Engineering).

Before Graduating Students Must

- Achieve a passing score on the subject test. The content of the examination has been reviewed and approved by the Marine Sciences Committee.
- Achieve a passing score on the analytical skills test. The content of the examination has been reviewed and approved by the Marine Sciences Committee.
- Achieve a passing score on the bioethics quiz. The content of the examination has been reviewed and approved by the Marine Sciences Committee.
- Achieve a passing score on the scientific literacy paper. This paper is assessed using a rubric that has been reviewed and approved by the Marine Sciences Committee.
- Complete requirements for the baccalaureate degree, as determined by faculty.

Students in the Major Will Learn to

Student Learning Outcomes (SLOs)

Content

1. Demonstrate competence in the basic terminology, concepts, methodologies and theories used within the marine sciences.

Critical Thinking

2. Analyze information in the marine sciences and develop reasoned solutions to problems using the processes and applications of scientific inquiry.
3. Discriminate ethical behavior from unethical behavior in scientific research.

Communication

4. Communicate knowledge, ideas and reasoning clearly, effectively and objectively in written or oral forms appropriate to the marine sciences.

Curriculum Map

I = Introduced; R = Reinforced; A = Assessed

Academic Learning Compact 4

Courses	SLO 1	SLO 2	SLO 3	SLO 4
GLY 3083C	I	I	I	I
GLY 4726	R	R	R	R
OCE 1001	I		I	I

ZOO 4403C	R	R	R	R
ZOO 4926 (Marine Ecology) or FAS 4720 (Marine Ecological Processes)	A	A	A	A

Assessment Types

- Marine sciences subject and analytical skills tests
- Bioethics quiz
- Scientific paper

DAMIAN C. ADAMS

EDUCATION

Ph.D., Food and Resource Economics	University of Florida, 2007
M.Phil., Environmental Policy	University of Cambridge, 2004
J.D./M.A.B., Law & Agribusiness	University of Florida, 2001
B.S. *summa cum laude*, Economics	University of Florida, 1997

PROFESSIONAL EXPERIENCE

2016 - present: Associate Professor, Natural Resource Economics and Policy, School of Forest Resources and Conservation, and Food and Resource Economics Department, University of Florida, Gainesville, FL.

Affiliate faculty status: Florida Climate Consortium, School of Natural Resources and the Environment, Tropical Conservation and Development Program, UF Water Institute.

2010 - 2016: Assistant Professor, Natural Resource Economics and Policy, School of Forest Resources and Conservation, and Food and Resource Economics Department, University of Florida, Gainesville, FL. 2010 – 2016.

2007 - 2010: Assistant Professor, Natural Resource and Environmental Economics, Department of Agricultural Economics, Oklahoma State University, Stillwater, OK.

AWARDS

2017 - 2019 UF Term Professorship
2016 USDA-NIFA Partnership Award for Mission Integration
2016 NACTA Educator Award
2015 UF Excellence Award for Assistant Professors (awarded to top 10 Asst. Profs. at UF)
2015 UF-IFAS Early Career Scientist Award
2013, 2015 UF-IFAS High Impact Research Publication Award
2011 Outstanding Faculty Award, Forestry Graduate Student Organization, University of Florida
2011 1st place poster, Society of American Foresters National Convention
2008 Outstanding Dissertation Award, American Agricultural Economics Association, Honorable Mention
2007 Prochaska Outstanding Doctoral Dissertation Award, Food & Resource Economics, University of Florida

SELECT FUNDED PROJECTS (of $26.7 million total)

Duration	Short Title	Funding Source	Total Amount	Collaborators	Role
2017-2022	Agricultural Water Security through Sustainable Use of the Floridan Aquifer: An Integrated Assessment of Economic and Environmental Impacts	USDA – NIFA	$5,000,000	Graham, Kaplan, et al.	Co-PI
2017-2020	Ecosystem service tradeoffs, landowner incentives, and optimal policy design to promote sustainable Longleaf Pine agroecosystems	USDA – NIFA	$499,729	Dwivedi, Lal, Susaeta	PI
2017-2018	The emerging Cuba-U.S. plant pest pathway: Assessing Cuban pest threats, institutional capacity, and economic impacts	USDA – APHIS	$208,274	Hulcr, Soto, et al.	PI
2017-2018	Ecosystem service tradeoffs and management dynamics in restored ecosystems	UF – IFAS Ordway Swisher Biological Station	$116,352	Vogel, Susaeta, Cohen, Bacon	Co-PI
2016-2017	Potential tree pest invasions from Cuba: Pest diversity, economic assessment of threat, and Cuban policy analysis	USDA – APHIS	$228,000	Hulcr, Soto, et al.	PI

2016-2017	Removing a key barrier to the use of a critical climate change mitigation tool: Economic modeling of longleaf pine market value and ecosystem services	UF – IFAS	$145,660	Cohen, Ober, et al.	PI
2016-2018	Manipulating Plant Species Composition and Livestock Grazing to Enhance Ecosystem Services in Southeastern Grasslands	USDA– NIFA	$500,000	Dubeux, Mackowiak, Sollenberger, et al.	Co-PI
2015-2016	Assessment of Feasible Forest Water Yield Program Features and Landowner Preferences	University of Florida-IFAS	$49,971	n/a	PI
2015-2016	Consumer Preferences for Ecosystem Services from Urban Forest Landscapes	USDA – McIntire-Stennis	$42,695	Escobedo, Koeser, Khachatryan	Co-PI
2011-2016	Integrating research, education and extension for enhancing southern pine climate change mitigation and adaptation	USDA–NIFA	$19,976,825	Martin, Monroe, Peter, et al.	Co-PI

SERVICE (EXAMPLES)

Editor-in-Chief (2017 - present), Editorial Board Member (2016 - present), and Guest Editor (2015, 2017), *Forests*; Editorial Advisory Board member, *Global Change Biology Bioenergy*, 2014 - 2017; Associate Editor, *Lake and Reservoir Management.*

Co-director, ProForest (Proactive Forest Health and Resilience) Initiative, 2017-present

Co-director, Conserved Forest Ecosystems: Outreach and Research Cooperative, 2012 - present

Ecosystem Services Working Group, US Forest Service, 2014 - present

Peer review panelist: National Science Foundation – INFEWS, 2017; Netherlands Organisation for Scientific Research – VENI program, 2016; Genome Quebec, 2015, 2016; National Estuarine Research Reserve System Science Collaborative, 2015; USDOE-BPA, 2015; UF-IFAS Opportunity Seed Fund, 2015 - 2016; Swiss Federal Institute of Technology Zurich, 2013; USDA-NIFA Threshold in Agroecosystems, 2011; Management in Agroecosystems, 2011; Southern Sustainable Agriculture Research & Education Grant, 2011

Shared governance: UF Provost Committee on Academic Integrity, 2017; UF Faculty Senate, 2016 - present; CALS Scholarship and Leadership Awards Committee, 2015 - present; UF Sustainability Committee, 2014 - present; SFRC Graduate Student Symposium, organizer and faculty advisor 2014-present; Environmental Science General Education Course Committee, 2014; UF Hydrologic Sciences Academic Cluster Faculty Committee, Hydrologic Policy representative, 2013 - present; Scholarship & Awards Committee, UF-SFRC, 2012 - present; Distance Education Committee, UF-SFRC, 2012 - present; University Curriculum Committee, 2011 - 2014; Undergraduate Programs Committee, UF-SFRC, 2011 - 2013; Faculty Advisory Committee, UF School of Forest Resources & Conservation, 2011 - 2013;University Committee on Committees, chair, 2011; member, 2011 - 2012; Forestry Graduate Student Organization, advisor 2010 - present; Honor Marshall and CALS Banner Bearer, Advanced Degrees and Undergraduate Graduation Ceremonies, 2010-2011

Other committee service: UF Water Institute Symposium Committee, chair *Water security*, 2013; Loop Legislative Internship Selection Committee, 2011 - present; Tropical Conservation and Development Field Grants Selection Committee, 2011-2012; Truman Scholar Finalist Interview Panel, UF, 2011

Reviewer for 44 scholarly journals

TEACHING

AEB3450 Intro. to Natural Resource & Env. Econ., FNR 4623 Integrated Nat. Res. Mgt., FNR4660 Natural Resource Policy & Econ., FOR4905/6905 Nature of Running, FOR6669 Policy & Econ. of Nat. Res.

ADVISING

PhD: Chair (2 current, 4 graduated), Member (7 current, 2 graduated), External (2 graduated); MS: Chair (15 current, 4 graduated), Member (4 current, 4 graduated); Postdoctoral: 4 current

SELECT PUBLICATIONS (OF 58 referred journal publications, 75 other publications) (* Denotes advisee)

Prior, K.M.*, Adams, D.C., Klepzig, K.D., and Hulcr, J. When does invasive species removal lead to ecological recovery? Implications for management success. *Biol. Invasions* (forthcoming).

Susaeta A.*, **Adams, D.C.**, and Gonzalez-Benecke, C. Economic vulnerability of southern US slash pine forests to climate change. *J. Forest Econ.* 28: 18-32.

Kreye, M.*, Pienaar, E., Soto, J.*, and **Adams, D.C.** Creating Voluntary Payment Programs: Effective Program Design and Ranchers' Willingness to Conserve Florida Panther Habitat. *Land Econ.* 93(3): 459-480.

Johnson, S.A.*, Ober, H.K., and Adams, D.C. 2017. Are Keystone Species Effective Umbrellas for Habitat Conservation? A Spatially Explicit Approach. *J. Nat. Cons.* 37: 47-55.

Susaeta, A.*, **Adams, D.C.**, Soto, J.R.*, and Hulcr, J. Timber-based economic impacts of a novel invasive wood-boring beetle (Acanthotomicus sp.) that kills American sweetgum. *J. Econ. Entom.* 110(4): 1942-1945.

Susaeta A.*, **Adams, D.C.**, Gonzalez-Benecke, C., and Soto, J.* 2017. Economic feasibility of managing loblolly pine forests for water production under climate change in the Southeastern United States *Forests* 8(3): 83-98

Susaeta A.*, Soto, J.*, **Adams, D.C.**, and Hulcr,J. 2016. Pre-invasion economic assessment of invasive species prevention: A putative ambrosia beetle in Southeastern loblolly pine forests. *J. Env'l Mgt.* 183(3): 875-881.

Susaeta A.*, **Adams, D.C.**, Carter, D., Gonzalez-Benecke, C., and Dwivedi, P. 2016. Technical, allocative, and total profit efficiency of loblolly pine forests under changing climatic conditions. *For. Pol. & Econ.* 72: 106-114.

Kreye, M.*, **Adams, D.C.**, Soto, J.*, and Escobedo, F.J. 2016. Does policy process influence public values for forest-water resource protection in Florida? *Ecol. Econ.* 129: 122-131.

Soto, J.S.*, **Adams, D.C.**, and Escobedo, F.J. 2016. Landowner Attitudes and Willingness to Accept Compensation from Forest Carbon Offsets: Application of Best-Worst Choice Modeling in Florida USA. *For. Pol. & Econ.* 63: 35-42.

Susaeta, A.*, Soto, J.R.*, **Adams, D.C.**, and Allen, D.L.* 2016. Economic Sustainability of Payments for Water Yield in Slash Pine Plantations in Florida. *Water* 8: 382-398.

Susaeta A.*, Carter, D., **Adams, D.C**., and Dwivedi, P. 2016. Climate Change and Ecosystem Services Output Efficiency in Southern Natural Loblolly Pine Forests. *Env'l Mgt.* 58: 417-430.

Soto, J.S.*, Escobedo, F.J., **Adams, D.C.**, and Blanco, J. 2016. A Distributional Analysis of the Socio-Ecological and Economic Determinants of Forest Carbon Stocks. *Env. Sci. & Pol.* 60: 28-37.

Susaeta A.*, Carter, D., Chang, S.J., and **Adams, D.C.** 2016. A generalized Reed model with application to wildfire risk in even-aged Southern United States pine plantations. *For. Pol. & Econ.* 67: 60-69.

Nettleman, C. A., Abd-Elrahman, A., **Adams, D.C.**, Fik, T., Ruppert, T., Barnes, G., & Dewitt, B. 2016. A GIS based model of rolling easement policies in Pinellas County and Sarasota County, Florida. *Ocean & Coastal Mgt.* 132: 143-154.

Penca, C.*, **Adams, D.C.**, and Hulcr, J. 2016. The Cuba-Florida Plant-Pest Pathway. *Insecta Mundi* 6: 485-494.

Bowers, A., Monroe, M.M., and **Adams, D.C.** 2016. Finding the common ground of climate change. *Env. Comm.* 10: 656-670.

Escobedo, F.J., **Adams, D.C.**, and Timilsina, N. 2015 Urban forest structure effects on property value. *Ecos. Services* 12: 209-217.

Monroe, M.C., Plate, R.R., **Adams, D.C.**, and Wojcik, D.J. 2015. Harnessing Homophily to Improve Climate Change Education. *Env'l Ed. Res.* 21(2): 221-238.

Susaeta, A.I.*, Carter, D.R., and **Adams, D.C.** 2014. Sustainability of forest management under changing climatic conditions in the southern United States: Mitigation strategies, economic rents and carbon sequestration. *J. Env'l Mgt.* 139C: 80-87.

Susaeta, A.I.*, Carter, D.R., and **Adams, D.C.** 2014. Impacts of Climate Change on Economics of Forestry and Adaptation Strategies in the Southern United States. *J. Ag. & Appl. Econ.* 46(2): 257-272.

Boyer, C.N., **Adams, D.C.**, and Borisova, T. 2014. Drivers of Price- and Non-Price Conservation: An Application of Predictive Models to the Southern US. *J. Ag. & Appl. Econ.* 46(1): 41-56.

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Professional Preparation

University of British Columbia	Marine Biology	BSc. 1993
University of British Columbia	Zoology	MSc. 1999
University of British Columbia	Zoology	PhD. 2010
University of British Columbia	Global Ecosystem Modeling	March 2010-December 2010

Appointments

2011-Present	Associate Professor University of Florida
2004-2010	Sessional Lecturer University of British Columbia
2001-2003	Fulltime Lecturer University of British Columbia

Recent Publications

Ducharme-Barth, N. D., Shertzer, K. W., & Ahrens, R. N. (2018). Indices of abundance in the Gulf of Mexico reef fish complex: A comparative approach using spatial data from vessel monitoring systems. *Fisheries Research*, *198*, 1-13.

Camp, E.V., Ahrens, R.N.M., Lorenzen, K., and Crandal Chelsey. (2017). Angler travel distances: implications for place based approaches to marine recreational fisheries governance. *Marine Policy*.

Ducharme-Barth, N. D., & Ahrens, R. N. (2017). Classification and analysis of VMS data in vertical line fisheries: incorporating uncertainty into spatial distributions. *Canadian Journal of Fisheries and Aquatic Sciences*, *74*(11), 1749-1764.

Maite Pons, M., Branch, T.A., Melnychuk, M.C., Jensen, O.P., Brodziak, J., Fromentin, J.M., Harley, S.J., Haynie, A.C., Kell, L.T., Maunder, M.N., Parma, A.M., Restrepo, V.R., Sharma, R., Ahrens, R., and Hilborn, R. (2017). Effects of biological, economic and management factors on tuna and billfish stock status. *Fish and Fisheries*. *18:1-21.*

Camp, E.V., Larkin, S., Lorenzen, K., and Ahrens, R.N.M. (2016). Trade-offs between socioeconomic and conservation management objectives in stock enhancement of marine recreational fisheries. *Fisheries Research. 186:446-459*.

Jiorle, R.P. , Ahrens, R.N.M., and Allen, M.S. (2016). Assessing the utility of a smartphone app for recreational fishery catch data. *Fisheries. 41:758-766.*

Matthias, B.G., Ahrens, R.N.M., Allen, M.S., Lombardi-Carlson, L.A. and Fitzhugh, G.R. (2016). Comparison of growth models for sequential hermaphrodites by considering multi-phasic growth. *Fisheries Research*, 179, 67-75.

Camp, E.V., Ahrens, R.N.M., Allen, M.S.and Lorenzen, K. (2016). Relationships between angling effort and fish abundance in recreational marine fisheries. *Fisheries Management and Ecology. 23:264-275*

Clarke, T.M., Espinoza, M., Ahrens, R., and Wehrtmann, I.S. (2016). Elasmobranch bycatch associated with the shrimp trawl fishery off the Pacific coast of Costa Rica, Central America. *Fishery Bulletin*, 114, 1-17.

Synergistic Activites

- 2013, 2015 National Oceanographic and Atmospheric Association Recruitment, Training, and Research Program (NOAA-RTR) Graduate Workshop. A component of the NOAA RTR program to involve exceptional graduate students from across the nation in research related to all facets of marine resource management. As an instructor, I help to structure and teach a two-weeklong intensive workshop that 8 students were invited to. The ultimate goal of the workshop was to expose student to the multi-facets (biology, economics and social impact) inherent in managing natural resources. In 2013 the workshop focused on a research interest of mine the Gulf sturgeon. In 2015 the workshop focused on the refinement of an EwE model to explore option for lionfish management on the West Florida Shelf.
- 2011-2015 National Oceanographic and Atmospheric Association Recruitment, Training, and Research Program (NOAA-RTR) Undergraduate Workshop. A component of the NOAA RTR program is to expose exceptional undergraduate students from across the nation to the role that population dynamic play in the management of marine populations. As an instructor I help to structure and teach a weeklong intensive workshop that 15-17

students are invited to. The ultimate goal of the workshop is to provide students with a clear picture of what a career as an assessment scientist would be like.

- 2012 Restoration of Gulf sturgeon as potential BP mitigation option. I provided an analysis of the gulf sturgeon population response to management options for habitat restoration on the Pearl and Bougue-Chitto Rivers to a panel of trustees from state and federal agencies
- 2012 I conducted an intensive one-week course in fisheries ecology and stock assessment for 11 select undergraduate and graduate students from the University of Costa Rica. During the week, students experienced 10-hour days and content that roughly equaled a semester's worth of graduate level fisheries science.

Collaborators & Other Affiliations

Collaborators and Co-Editors

Allen , M.S. (UF), Barbieri, L. (Florida FWRI), Beard, T.D. Jr (USGS), Bolden, S.K. (NOAA-NMFS), Camp, E.V. (UF), Carvalho, F. (NOAA-NMFS), Christensen, V. (UBC), Clarke, T. (Universidad de Costa Rica), Espinoza, M. (Universidad de Costa Rica), Hazin, F. (Departamento de Pesca Brazil), Kerns, J. A. (Wisconsin Cooperative Fishery Research Unit), Leber, K.M. (Mote Marine Laboratory), Lorenzen, K. (UF), Maunder, M. (IATTC), McCallister, M. (UBC), Murie, D. (UF), Netherland, M.D. (US Army Engineer Research and Development Center), Pine, W.E. (UF), Ponciano, J.M. (UF), Rudd, M.B. (UW), Walters, C.J. (UBC), Wehrtmann, I. (Universidad de Costa Rica), Crandal, C. (UF), Maite Pons (UW), M., Branch, T.A. (UW), Melnychuk, M.C. (UW), Jensen, O.P. (Rutgers), Brodziak, J. (NOAA), Fromentin, J.M.(Ifremer), Harley, S.J. (SPC-OFP), Haynie, A.C. (NOAA), Kell, L.T.(ICCAT), Maunder, M.N.(IATTC), Parma, A.M. (Centro Nacional Patagonico), Restrepo, V.R. (ISSF), Sharma, R. (IOTC), Hilborn, R. (UW)

Graduate Advisors and Postdoctoral Sponsors

Walters, C.J. (University of British Columbia) - *Graduate Advisors* , Christensen, V. (University of British Columbia) - *Graduate Advisors, Postdoctoral Sponsors*

Thesis Advisor and Postgraduate-Scholar Sponsor

Matthias, B. (University of Minnesota Duluth), Ducharme-Barth, N. (University of Florida), Moreau, C. (DFO-MPO), Jackson, J. (Comcast), Wilson, J. (BTT), Rudd, M. (University of Washington), Siders, Z. (University of Florida), Carvalho, F. (NOAA-NMFS), Olson, E. (NA), Jiorle, R. (Virginia Marine Resources Commission),Melissa Price (University of Florida), Nelly Kadagi (University of Florida), Chris Swanson (UF-FWRI), Claudia Friess (University of Florida), Grant Scholten (University of Florida)

I am or have charied: 3 PhDs and 11 Masters, Co-chaired 4 PhDs and 1 Masters. I am or have been a member of 9 PhDs and 4 Masters.

Curriculum Vitae

Shirley M. Baker

Professional Preparation:

College or University	Department and/or Major	Dates Attended	Degree
College of William and Mary	Marine Science	1988-1994	Ph.D.
University of Oregon	Biology	1986-1888	M.S.
Seattle Pacific University	Biology	1982-1986	B.S.

Appointments:

Dates	Organization	Position
2008-pres	University of Florida/IFAS	Associate Professor
1999-2008	University of Florida/IFAS	Assistant Professor
1996-1999	SUNY Stony Brook	Research Assistant Professor
1993-1996	Macalester College	Visiting Assistant Professor
1988-1993	Virginia Institute of Marine Science	Graduate Research Assistant
1986-1988	University of Oregon	Graduate Teaching Fellow
1986	BioMed Research Laboratory	Fisheries Biologist

Selected Publications (of 50 total):

Lorenzen, K., C. Ainsworth, **S. Baker**, L. Barbieri, E. Camp, J. Dotson, and S. Lester. 2017. Climate Change Impacts on Florida's Fisheries and Aquaculture Sectors and Options for Mitigation. *In* Florida's Climate; Changes, Variations, & Impacts. E.P. Chassignet, J.W. Jones, V. Misra, and J. Obeysekera (eds). Florida Climate Institute, Gainesville. Pages 427-456.

Lopeztegui-Castillo, A., **S.M. Baker**, Y. Garcés-Rodríguez, R. Castelo-Báez, N. Castro-Graña, and A. Artiles-Valor. 2014. Spatial and temporal patterns of the nonnative green mussel *Perna viridis* in Cienfuegos Bay, Cuba. Journal of Shellfish Research 33: 273-278

McFarland, K., **S. Baker**, P. Baker, M. Rybovich, and A K. Volety. 2014. Temperature, salinity, and aerial exposure tolerance of the invasive mussel, *Perna viridis*, in estuarine habitats: Implications for spread and competition with native oysters, *Crassostrea virginica*. Estuaries and Coasts Published online: 25 October. PDF 10 pages.

Anderson, J.A., **S.M. Baker**, G.L. Graham, M.G. Haby, S.G. Hall, L. Swann, W.C. Walton, and C.A. Wilson. 2013. Effects of Climate Change on Fisheries and Aquaculture in the Southeast USA. *In* Climate of the Southeast United States: Variability, Change, Impacts, and Vulnerability. K.T. Ingram, K. Dow, L. Carter, and J. Anderson (eds). Island Press, Washington DC. Pages 190-209.

Joyner-Matos, J., J. Andrzejewski, L. Briggs, **S.M. Baker**, C.A. Downs and D. Julian. 2009. Assessment of cellular and functional biomarkers in bivalves exposed to ecologically relevant abiotic stressors. Journal of Aquatic Animal Health 21: 104-116.

Scarpa, J., **Baker, S.**, Sturmer, L., and Laramore, S. 2009. Triploid hard clams evaluated for Florida aquaculture. Global Aquaculture Advocate Magazine, Mar/Apr: 48-50.

Sturmer, L.N., J. Nunez, R. Creswell, and **S.M. Baker**. 2009. The Potential of Blood Ark and Ponderous Ark Aquaculture in Florida. Florida Sea Grant Technical Paper, TP-169, 81 pp.

Baker, P., J.D. Austin, B.W. Bowen and **S.M. Baker**. 2008. Range-wide population structure and history of the northern quahog (*Merceneria merceneria*) inferred from mitochondrial DNA sequence data. ICES Journal of Marine Science 65: 155-163.

Bergquist, D.C., D. Heuberger, L.N. Sturmer, and **S.M. Baker**. 2008. Continuous water quality monitoring for the hard clam industry in Florida, USA. Environmental Monitoring and Assessment 148:409-419.

Phlips, E.J., **S.M. Baker**, K. Black and N. Dix. 2008. Effects of hard clam (*Mercenaria mercenaria*) high density culture on water quality in a shallow semi-restricted bay. Florida Scientist 71: 330-340.

Weber K., Sturmer, L. N., Hoover, E., and **Baker, S.** 2007. The role of water temperature in hard clam aquaculture. University of Florida IFAS Extension, Electronic Data Information Source, EDIS FA151:1-9.

Baker, S. M., Baker, P. K., Heuberger, D., and Sturmer, L. N. 2005. Short-term effects of rapid salinity reduction on seed clams. Journal of Shellfish Research 24(1):29-34.

Levinton, J.S., J.E. Ward, S.E. Shumway, and **S.M. Baker**. 2001. Feeding Processes of Bivalves: Connecting the Gut to the Ecosystem. *In* Organism-Sediment Interactions. S. Woodin (ed). University of South Carolina Press, Columbia, South Carolina. Pages 385-400.

Teaching and mentoring:

1) Marine Adaptations, 3 credits, offered annually for graduate, undergraduate, and distance education students

2) Natural Resources in a Changing Climate, 3 credits, offered annually to graduate and distance education students

3) Guest lectures in Advanced Aquaculture, Introduction to Aquaculture, Aquatic Wildlife Health Issues, Invasion Ecology of Aquatic Animals, and Introduction to Fish and Aquatic Invertebrate Histological Interpretation

4) Supervision of graduate students: 7 MFAS, 8 MS, 2 PhD

5) Student committees: 24 PhD, 17 MS, 5 MFAS

6) Faculty advisor, Marine Sciences major, 100+ undergraduate students

Curriculum Vitae

Donald C. Behringer

A. Professional Preparation:

Undergraduate Institution	Major	Degree & Year
University of Florida	Zoology	B.S. 1991
Graduate Institution	Major	Degree & Year
Old Dominion University	Ecological Sciences	Ph.D. 2003
Postdoctoral Institution	Area	Inclusive Dates
Old Dominion University	Ecology	2003-2004

B. Appointments:

Associate Professor (tenured) (2014 – present), Fisheries and Aquatic Sciences, Univ. of Florida

US-UK Fulbright Scholar (2015 – 2016), Univ. of Exeter, UK

Assistant Professor (2010 – 2014), Fisheries and Aquatic Sciences, Univ. of Florida

C. Peer-reviewed publications:

Recent publications (since 2012):

Butler IV, M.J., Behringer, D.C., and M.M. Valentine. 2017. Commercial sponge fishery impacts on the population dynamics of sponges in the Florida Keys, FL (USA). *Fisheries Research* 190: 113-121.

Baeza, J.A. and D.C. Behringer. 2017. Small-scale spatial variation in population- and individual-level reproductive parameters of the blue-legged hermit crab *Clibanarius tricolor*. *PeerJ* 5:e3004; DOI 10.7717/peerj.3004.

Truelove, N.K., Kough, A.S., Behringer, D.C., Paris, C.B., Box, S.J., Preziosi, R.F., and M.J. Butler IV. 2017. Biophysical connectivity explains population genetic structure in a highly dispersive marine species. *Coral Reefs* 36: 233–244.

Behringer, D.C. and J.E. Hart. 2017. Competition with stone crabs drives juvenile spiny lobster abundance and distribution. *Oecologia* 184: 205-218.

Truelove, N.K., Behringer, D.C., Butler IV, M.J., and R.F. Preziosi. 2016. Isolation and characterization of eight polymorphic microsatellites for the spotted spiny lobster, *Panulirus guttatus*. *PeerJ* 4:e1467; DOI 10.7717/peerj.1467.

Butler, M.J. IV, Behringer, D.C., Dolan, T.W. III, Moss, J., and J. Shields. 2015. Host behavior suppresses a marine epizootic. *PLOS One* DOI: 10.1371/journal.pone.0126374.

Gutzler, B.C., Butler IV, M.J., and D.C. Behringer. 2015. Casitas: a location-dependent ecological trap for juvenile Caribbean spiny lobsters, *Panulirus argus*. *ICES Journal of Marine Science* 72: i177-i184.

Spanier, E., Lavalli, K.L., Goldstein, J.S., Groeneveld, J.C., Jordaan, G.L., Jones, C.M., Phillips, B.F., Bianchini, M.L., Kibler, R.D., Díaz, D., Mallol, S., Goñi, R., van der Meeren, G.I., Kleiven, A.R., Agnalt, A., Behringer, D.C., Keegan, W.F., and A. Jeffs. 2015. A concise review of lobster utilization by worldwide human populations from pre-history to the modern era. *ICES Journal of Marine Science* 72: i7-i21.

Kough, A.S., Paris, C.B., Behringer, D.C., and M.J. Butler IV. 2015. Modeling the spread and connectivity of waterborne marine pathogens: the case of PaV1 in the Caribbean. *ICES Journal of Marine Science* 72: i139-i146.

Truelove, N., Griffiths, S., Phil, M., Ley-Cooper, K., Azueta, J., Majil, I., Box, S., Behringer, D.C., Butler IV, M.J., and R.F. Preziosi. 2015. Genetic evidence from the spiny lobster fishery supports international cooperation among Central American marine protected areas. *Conservation Genetics* 16: 347-358.

Baeza, J.A., Dickson, M.D., Squibb, R., Anderson, J.R., and D.C. Behringer. 2014. Aspects of the

reproductive biology of a heavily traded ornamental shrimp, *Lysmata boggessi* (Crustacea, Decapoda, Caridea), in the southeastern Gulf of Mexico. *Journal of the Marine Biological Association of the United Kingdom* 94: 141-149.

Moss, J., Behringer, D.C., Shields, J.D., Baeza, J.A., Aguilar-Perera, A., Bush, P.G., Dromer, C., Herrera-Moreno, A., Gittens, L., Matthews, T.R., McCord, M.R., Schärer, M.T., Reynal, L., Truelove, N., Butler IV, M.J. 2013. Distribution, prevalence, and genetic analysis of *Panulirus argus* Virus I from the Caribbean Sea. *Diseases of Aquatic Organisms* 104: 129-140.

Anderson, J.R. and D.C. Behringer. 2013. Spatial dynamics in the social lobster *Panulirus argus* in response to diseased conspecifics. *Marine Ecology Progress Series* 474: 191-200.

Anderson, J.R., Spadaro, A.J., Baeza, J.A., and D.C. Behringer. 2013. Ontogenetic resource allocation shifts in defensive structures of the Caribbean spiny lobster, *Panulirus argus* (Latreille, 1804). *Biological Journal of the Linnean Society* 108: 87-98.

Baeza, J.A., Anderson, J.R., Spadaro, A.J., and D.C. Behringer. 2012. Sexual dimorphism, allometry, and size at first maturity of the Caribbean King Crab, *Mithrax spinosissimus*, in the Florida Keys. *Journal of Shellfish Research* 31: 909-916.

Behringer, D.C., Butler, M.J. IV, and G.D. Stentiford. 2012. Disease effects on lobster fisheries, ecology, and culture: overview of DAO Special 6. *Diseases of Aquatic Organisms* 100: 89-93.

Stentiford, G.D., Neil, D.M., Peeler, E., Shields, J.D., Small, H.J., Flegel, T.W., Vlak, J., Jones, B., Morado, F., Moss, S., Lotz, J., Bartholomay, L., Reantaso, M., Behringer, D.C., Hauton, C., and D.V. Lightner. 2012. Disease will limit future food supply from the global crustacean fishery and aquaculture sectors. *Journal of Invertebrate Pathology* 110: 141-157.

Barbour, A.B., Adams, A.J., Yess, T., Behringer, D.C., and R.K. Wolfe. 2012. Comparison and cost-benefit analysis of PIT tag antennae resighting and seine-net recapture techniques for survival analysis of an estuarine-dependent fish. *Fisheries Research* 121-122: 153-160.

Behringer, D.C. 2012. Diseases of wild and cultured juvenile crustaceans: insights from below the minimum landing size. *Journal of Invertebrate Pathology* 110: 225-233.

Moss, J., Butler, M.J. IV, Behringer, D.C., and J.D. Shields. 2012. Genetic diversity of the Caribbean spiny lobster virus, *Panulirus argus* virus 1, and the discovery of PaV1 in lobster post-larvae. *Aquatic Biology* 14: 223-232.

Behringer, D.C., Butler, M.J. IV, Shields, J.D., and J. Moss. 2012. PaV1 infection in the Florida Spiny Lobster Fishery and its Effects on Trap Function and Disease Transmission. *Canadian Journal of Fisheries and Aquatic Sciences* 69: 136-144.

D. <u>Teaching:</u>

1. Marine Ecological Processes (FAS 4270/6272, 3 cr., each Fall, face to face and online)
2. Field Ecology of Aquatic Organisms (FAS 4932/5276C, 4 cr., each Summer A, team-taught)
3. UF in Cuba: Tropical Marine and Island Ecology (FAS 4932/6932, 4 cr, each Summer A)
4. Aquatic Animal Conservation Issues (VME 4906/VME 6934, 3 cr., yearly, team-taught)
5. Aquatic Wildlife Health Issues (VME 4013/6011, 3 cr., yearly, team-taught)

E. <u>Synergistic activities:</u>

1. Organize biennial spiny lobster workshops in the Florida Keys that bring together lobster fishermen, fishery managers, scientists, and the general public. The meetings facilitate a mutual exchange of information and help promote dialogue and instill trust between stakeholder groups.
2. Chair/co-chair of the biennial North Florida Marine Science Symposium (2010-present).
3. Technical advisory committee and advisory panel member for the Southeast Florida Coral Reef Initiative (SEFCRI) (FL Department of Environmental Protection/NOAA partnership).
4. Lead editor of book entitled Marine Disease Ecology to be published by Oxford University Press.

ANDREA DUTTON

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E-mail: adutton@ufl.edu
Citizenship: USA & Australia

Education

2003 **Ph.D.**, Dept. of Geological Sciences, Univ. of Michigan, Ann Arbor, MI, USA
2000 **M.S.**, Dept. of Geological Sciences, Univ. of Michigan, Ann Arbor, MI, USA
1995 **B.A.**, Amherst College, Amherst, MA, USA

Employment

2011 – present **Assistant Professor**, Dept. of Geological Sciences, University of Florida, Gainesville, FL, USA
2006 – 2010 **Research Fellow**, Research School of Earth Sciences, The Australian University, Canberra, ACT, Australia
2004 – 2006 **Postdoctoral Fellow**, Research School of Earth Sciences, The Australian University, Canberra, ACT, Australia
1997 – 2003 **Graduate Research Assistant and Instructor**, Department of Geological Sciences, University of Michigan, Ann Arbor, MI, USA
1995 – 1997 **Science Teacher**, St. Ann's School, Brooklyn Heights, NY, USA

Recent Awards and Honors

2016 **Fellow of the Geological Society of America**
2016 **University of Florida Term Professorship** (3-yr term)
2016 **Editors' Citation for Excellence in Refereeing for Paleoceanography**
2015 **Fellow of the Florida Climate Institute** (3-yr term)
2015 **Excellence Awards for Assistant Professors**
2015 **University of Florida Global Fellow** (1-yr term)

Professional Activites (selected examples from past several years)

2017-present **Contributing Author,** IPCC Special Report on Oceans & Cryosphere, Ch. 3
2017 **Workshop lead organizer**, PALSEA2 workshop, Playa del Carmen, Mexico
2017 **Scientific Organizing Committee**, SCAR workshop, Trieste, Italy
2017 **Session Convenor**, PAGES Open Science Meeting, Zaragoza, Spain
2017-present **Scientific Committee,** Center for Hydro-Generated Urbanism
2016 **Panellist,** NSF Proposal Review Panel
2016 **Organizing Committee**, PALSEA2 and HOLSEA workshop, Mt. Hood, Oregon
2015-present **Editorial Board,** *Quaternary Geochronology*
2015-present **Steering Committee** Quaternary Interglacials (QUIGs), a PAGES working group
2015 **Organizing Committee,** PALSEA2 workshop, Tokyo, Japan
2014-2017 **Editorial board**, *Climate of the Past*

Current Research Funding

NSF-EAR-IF (9/17-9/19) *Early Career: Acquisition of a MC-ICP-MS for Research and Education in U-series Geochemistry and Applications in Geoscience* ($**693,780**) Role: Lead PI.
NSF-OCE, P2C2 (6/17-5/19), *Collaborative Research: P2C2 - Reconstructing rates and sources of sea-level change over the last ~150 thousand years from a new coral database* (Total Budget: **$505,294**; Dutton portion: **$108,538**), Role: Co-PI
NSF-OCE, MGG (5/16-5/18), *Rates, timing, & nature of sub-orbital sea-level change during MIS 5e* (Total Award: **$503,904**). Role: Lead PI (Sole PI).

Current Research Funding (continued)

NSF-DIBBs (9/14-8/17) *CIF21 DIBBs: Cyberinfrastructure for Interpreting and Archiving U-Series Geochronologic Data* (Total award: **$579,763**; Dutton subaward: **$87,121**). Role: Co-PI.

Publications (selected examples from last three years) #denotes student author

1. #Chutcharavan, P.M., **Dutton, A.,** Ellwood, M.J. (2018) Seawater $^{234}U/^{238}U$ recorded by modern and fossil corals, *Geochimica et Cosmochimica Acta*, 224, 1-17.
2. Otto-Bliesner, B., Braconnot, P., Harrison, S.P., Lunt, D.J., Abe-Ouchi, A., Albani, S., Bartlein, P.J., Capron, E., Carlson, A.E., **Dutton, A**., Fischer, H., Goelzer, H., Govin, A., Haywood, A., Joos, F., Legrande, A.N., Lipscomb, W.H., Lohmann, G., Mahowald, N., Nehrbass-Ahles, C., Peterschmidt, J-Y., Pausata, F.S.-R., Phipps, S., and H. Renssen. (2017) Two Interglacials: Scientific Objectives and Experimental Designs for CMIP6 and PMIP4 Holocene and Last Interglacial Simulations, *Geoscientific Model Dev.*, 10, 1-25.
3. #Skrivanek, A., **Dutton, A.,** Stemman, T., K. Vyverberg, J. Mitrovica (2017) Evidence of tectonism based on differential uplift of the Falmouth Formation of Jamaica, *Geological Society of America Bulletin*, 129, doi: /10.1130/B31796.1
4. #Sanborn, K., Webster, J.M., Yokoyama, Y., **Dutton, A.,** Braga, J.C., Clague, D.A., Paduan, J.B., Wagner, D., Rooney, J.J., Hansen, J.R., Eggins, S.M. (2017) New evidence of Hawaiian coral reef drowning in response to meltwater pulse 1-A, *Quat. Sci. Reviews*, 175, 60-72.
5. Valle-Levinson, A., **Dutton, A.,** Martin, J.B. (2017) Spatial and temporal variability of sea-level rise hotspots over the eastern United States, *Geophysical Res. Lett.*, 44, 7876-7882.
6. Woo, H.B., Panning, M., Adams, P., **Dutton, A.** (2017) Flexural Isostasy of the Carbonate Platform in North central Florida, *Geochemistry, Geophysics, Geosystems*, 18, 1-13.
7. **Dutton, A.,** Rubin, K., McLean, N., Bowring, J., Bard, E., Edwards, R.L., Henderson, G.M., Reid, M., Richards, D.A., Sims, K.W.W., Walker, J.D., Yokoyama, Y. (2017) Data Reporting Standards for Publication of U-series Data for Geochronology and Timescale Assessment in the Earth Sciences, *Quaternary Geochronology*, 39, 142-149.
8. Dechnik, B., Webster, J.M., Webb, G.E., Nothdurft, L., **Dutton, A.,** Braga, J.-C., Zhao, J-X., Duce, S., Sadler, J., (2017) The evolution of the Great Barrier Reef during the Last Interglacial Period, *Global and Planetary Change*, 149, 53-71.
9. Khan, N. S., Ashe, E., Horton, B.P., **Dutton, A.,** Kopp, R.E., Brocard, G., Engelhart, S., Hill, D., Peltier, W.R., Vane, C.H., Scatena, F.N. (2017) Holocene sea-level database for the Caribbean region, *Quaternary Science Reviews*, 155, 13-36.
10. Petersen, S.V., **Dutton, A**., Lohmann, K.C (2016) End-Cretaceous extinction in Antarctica linked to both climate change and bolide impact, *Nature Communications*, **7**, Article 12079.
11. Hibbert, F.D., Rohling, E.J., **Dutton, A.,** #Chutcharavan, P.M. Zhao, C., Williams, F. (2016) Coral indicators of past sea-level change: a global repository of U-series dated benchmarks, *Quaternary Science Reviews*, **145**, 1-56.
12. Puga-Bernabéu, A., Webster, J. M., Braga, J. C., Clague, D.A., **Dutton, A.,** Eggins, S., Fallon, S., Jacobsen, G., Paduan, J.B., Potts, D.C. (2016) Morphology and evolution of drowned carbonate terraces during the last two interglacial cycles, off Hilo, NE Hawaii, *Marine Geology*, **371**, 57-81.
13. **Dutton, A**., Carlson, A., Clark, P.U., DeConto, R., Horton, B. P., Long, A., Milne, G., Rahmstorf, S., Raymo, M. E. (2015) Sea-level rise due to polar ice-sheet mass loss during past warm periods, *Science,* **349**.
14. **Dutton, A.,** Webster, J., Zwartz, D., Lambeck, K., and B. Wohlfarth. (2015) Tropical tales of polar ice: Evidence of last interglacial polar ice sheet retreat recorded by fossil reefs of the granitic Seychelles islands, *Quaternary Science Reviews*, **107**, 182-196.

Branco Weiss Society in Science Fellowship
Dr. Michael A. Gil

Curriculum Vitae: Michael A. Gil

Employment

National Science Foundation (USA) Postdoctoral Research Fellow — Davis, California, USA
Department of Environmental Science & Policy, University of California — *March 2016 – present*

Education

University of Florida (UF), Ph.D., Biology, Advisor: Craig W. Osenberg — 2015
University of Texas at Austin (UT), B.S., Biology, Magna Cum Laude, Honors in Biology — 2008
Sea Education Association (SEA) Semester at Woods Hole, Dean's Scholar — 2007

Publications

(=co-lead author, ♦international collaborator, †advised undergraduate student, ^graduate student)

Peer-reviewed, published or in press:

Gil, M.A.= and A.M. Hein=. 2017. Social interactions among grazing reef fish drive material flux in a coral reef ecosystem. *Proceedings of the National Academy of Sciences*. 114(18):4703-4708. *Featured as issue cover [Earth.com, International Business Times, Public Now, Axios, ScienceDaily]

Gil, M.A.Δ 2017. YouTube videos of 'research in action' foster diverse public interest in science. *Ideas in Ecology & Evolution*. 10(1), ISSN 1918-3178.

Gil, M.A.^, J. Zill†, and J.M. Ponciano. 2017. Context-dependent landscape of fear: algal density elicits risky herbivory in a coral reef. *Ecology* 98:534–544. [ScienceDaily, Science Newsline, R&D].

Zill, J.†, **M.A. Gil**^ and C.W. Osenberg. 2017. When environmental factors become stressors: interactive effects of vermetid gastropods and sedimentation on corals. *Biology Letters*, 13, 3.

Gil, M.A.^, Emberts, Z. ^, Jones, H.^, and St. Mary, C. 2017. Social information on fear and food drives animal grouping and fitness. *The American Naturalist* 189:227–241. [AmNat News, The Cal Aggie]

Gil, M.A.^, S. Goldenberg♦^, A. Ly Thai Bach♦^, S.C. Mills♦, and J. Claudet♦. 2016. Interactive effects of three pervasive marine stressors in a post-disturbance coral reef. *Coral Reefs* 35:1281-1293. [UC Davis, PeterSaleBooks.com]

Pfaller, J.B.^ and **M.A. Gil**^. 2016. Sea turtle symbiosis facilitates social monogamy in oceanic crabs. *Biology Letters.* 12, 9. [Popular Science, New Scientist, Phys Org, mental_floss, Nat Sci News, UCD]

Gil, M.A.^ and J.B. Pfaller^. 2016. Oceanic barnacles act as foundation species on plastic debris: implications for marine dispersal. *Scientific Reports* 6:19987. [Science Friday, Discover Magazine, ScienceDaily, Europa Press, Science et Vie Junior, Santa Cruz Sentinel]

Gil, M.A.^, J. Jiao^, and C.W. Osenberg. 2016. Enrichment scale determines herbivore control of primary producers. *Oecologia*: 180:833-840. [Huffington Post, Science World Report, Futurity, Phys Org, Tampa Bay Newswire, University of Florida News]

Gil, M.A.^, B. Renfro†, B. Figueroa-Zavala♦, I. Penié♦, and K. Dunton. 2015. Rapid tourism growth and declining coral reefs in Akumal, Mexico. *Marine Biology* 162:2225-2233.

Gil, M.A.^ 2013. Unity through nonlinearity: A unimodal coral-nutrient interaction. *Ecology* 94:1871-1877. **Honorable Mention,"Best Student Paper", UF Department of Biology, Spring 2014*

Stier, A. C.=^, **M. A. Gil**=^, C. S. McKeon=^, S. Lemer♦^, M. Leray♦^, S. C. Mills♦, and C. W. Osenberg. 2012. Housekeeping mutualisms: Do more symbionts facilitate host performance? *PLoS ONE* **7**:e32079.

Peer-reviewed, in review:

Gil, M.A.Δ, A.M. Hein, O. Spiegel Δ, M.L. Baskett, and A. Sih. Social information can link individual behavior to ecological dynamics. (In review: *Trends in Ecology & Evolution).*

Jiao, J.^, S. Pilyugin, **M.A. Gil** and C.W. Osenberg. Mobility affects consumer-resource interactions across space and time. (in review: *The American Naturalist*).

Thesis and Technical Reports:

Gil, M.A. 2015. Context dependence in effects of nutrient enrichment on tropical coral reefs. Ph.D. Dissertation. Department of Biology, University of Florida.

Mutchler, T., **M.A. Gil**, and K.H. Dunton. 2009. Investigating the response of seagrass meadows to environmental stressors: Quantifying the effect of grazing and nutrient enrichment on seagrass growth & tissue nutrient content. Jobos Bay National Estuarine Research Reserve, Puerto Rico.

Montagna, P.A., T. Palmer, **M.A. Gil**, E. Hill, B. Nicolau, and K.H. Dunton. 2009. Response of the Nueces estuarine marsh system to freshwater inflow: An integrative data synthesis of baseline conditions for faunal communities. Coastal Bend Bays & Estuaries Program, Inc.

Curriculum Vitae: Michael A. Gil

Gil, M.A., K. H. Dunton, S. V. Schonberg, K. Jackson, and P. A. Montagna. 2008. Establishment of Wet and Dry Periods in the Nueces Delta for Examination of Temporal and Spatial Patterns in Emergent Vegetation and Benthic Macrofauna. Coastal Bend Bays & Estuaries Program, Inc.

Gil, M.A. 2008. Spatial variation in test size of the pteropods *Limacina inflata* and *Limacina trochiformis* in relation to pH across the eastern equatorial Pacific. *In:* Student Research Reports: S-214, Sea Education Association, P.O. Box 6, Woods Hole, MA 02543.

Gil, M.A., K. Jackson, and S. Moorhead. 2007. Little Bay Project Summary. City of Rockport, TX.

Popular articles:

Gil, M.A. 2016. Sail away from plastic seas – with science. Ocean Watch Magazine. November issue. Published by Sailors for the Sea. http://sailorsforthesea.org/programs/ocean-watch/sail-away-plastic-seas-%E2%80%93-science

Gil. M.A. 2016. Sailing, science, and saving the world. Reach: US Sailing's STEM Education Initiative. http://reach.ussailing.org/sailing-science-and-saving-the-world/

Gil, M.A. and T. Bottenus. 2012. A hitchhiker's guide to the North Pacific Subtropical Gyre. Shipboard Journal article for the Plastics at SEA 2012 Expedition. http://www.sea.edu/plastics/journal/november_3_day_32

Gil, M.A. 2012. Science needs you! (really): The importance of critical thinking in the Communication Age. Shipboard Journal article for the Plastics at SEA 2012 Expedition. http://www.sea.edu/plastics/journal/october_10_day_8

Previous Professional Experience

University of California Berkeley, Gump Research Station	Mo'orea, French Polynesia
Graduate Researcher, coral reef ecology	*May 2010-Aug. 2015*
Centre de Recherches Insulaires et Observatoire de l'Environment (CRIOBE, French Research Station)	Mo'orea, French Polynesia
Graduate Researcher; Lead on French-American collaboration	*Jan., June-Aug. 2013*
Plastics @ SEA 2012: North Pacific Plastics Expedition	N. Pacific Subtropical Gyre
Volunteer Researcher & Outreach Writer/Photographer	*Oct.-Nov. 2012*
Ocean Bridges, French-American Workshops 2010 & 2011	Mo'orea, French Polynesia
Graduate Researcher; participant and collaborator	*Summers 2010 & 2011*
Jobos Bay National Estuarine Research Reserve	Aguirre, Puerto Rico
Post-Baccalaureate Researcher, seagrass ecology	*May-June 2009*
University of California Berkeley, Gump Research Station	Mo'orea, French Polynesia
Post-Baccalaureate Researcher, coral reef ecology	*April 2009*
University of Texas at Austin, Marine Science Institute	Port Aransas, Texas, USA
Post-Baccalaureate Researcher, salt marsh ecology	*June-Sept. 2008*
University of Texas at Austin, Department of Integrative Biology	Austin, Texas, USA
Undergraduate Research Assistant, freshwater ecology	*Sept.-Dec. 2006, Jan.-May 2008*
SEA Semester at Woods Hole, Expedition: Mexico to Tahiti	Woods Hole, USA & South Pacific
Undergraduate Researcher, biological oceanography	*Oct. 2007-Jan. 2008*
University of Texas at Austin, Marine Science Institute	Port Aransas, Texas, USA
Undergraduate Researcher, seagrass ecology	*June-July 2007*
University of Texas at Austin & **Centro Ecológico Akumal**	Akumal, Mexico
Undergraduate Researcher/Student, seagrass/reef ecology	*April-June 2007*
Lizard Island Research Station	Lizard Island, Australia
Undergraduate Researcher/Student, coral reef ecology	*May-June 2005*

Presentations

2016-17	24 presentations, including 22 invited oral presentations, 14 delivered to public audiences in Thailand, Aruba, Tanzania (TED Global), and the US
2015	2 oral presentations, including PhD exit seminar and invited keynote talk for coral reef stakeholders at the Caribbean Sailing Association meeting in St. Maarten
2014	9 presentations, including 3 oral and 2 poster presentations at national conferences (Society of Integrative and Comparative Biology, Gordon Predator-Prey Conference, Benthic Ecology Meeting, Western Society of Naturalists)

Curriculum Vitae: Michael A. Gil

2013 5 presentations, including 2 invited oral presentations and 1 oral presentation at a national conference (Benthic Ecology Meeting)

2007-12 7 presentations, including 4 oral presentations at national conferences (Florida Marine Biology Symposium, Benthic Ecology Meeting, Western Society of Naturalists) and 1 oral presentation at a Southeast Texas regional water management meeting

Teaching

Marine Ecology in Mo'orea (2014) and in Akumal (2016) University of Florida
Instructor *Summer 2014 & Spring 2016*
Research-intensive field-based course for undergraduate and graduate students

Marine Botany in Akumal, Mexico University of Texas at Austin
Co-instructor *Summers 2011, 2013, 2015, 2017*
Research-intensive field-based course for undergraduate and graduate students

Foundations and Frontiers in Ecology University of Florida
Co-organizer and Instructor *Fall 2012*
Graduate discussion on the milestones and cutting-edge works within core topics in ecology

General Ecology Laboratory University of Florida
Instructor (3 sections) *Fall 2010 & 2015*
Teaches upper-division undergrads how to design, carry out and present empirical research

Integrative Principles of Biology II Laboratory University of Florida
Instructor (3 sections) *Spring 2010*
Core biology laboratory for biology majors: organismal physiology & pop./community ecology

Mentoring Highlights

- Served as primary research mentor for 35 undergraduate students from UT & UF (including 24 female, 4 Hispanic, and 1 Pacific Islander)
- Advised 6 student conference presentations (UT & UF) and an undergraduate research thesis (UT)
- Advised students on successful applications for two National Science Foundation (USA) Graduate Research Fellowships, awarded to Julie Zill (U. of Hawai'i at Mānoa) and Corinne Fuchs (U. of California, Santa Barbara); and a UF University Scholarship, awarded to Noah Hackney
- Delivered 6 discussion panels and presentations on science careers beyond college/university

Science Communication & Public Outreach

SciAll.org, Mass science communication campaign, *Creator* *Sept. 2015-present*
Website and associated YouTube channel (http://www.youtube.com/sciallorg) featuring 'science behind the scenese', intended to popularize science across a broad, international public audience

MarineBio.org, **Conservation Society**, *Contributing Photographer* *Nov. 2016-present*
Nonprofit promoting education of ocean science and conservation: http://marinebio.org/gallery/

mikegil.com, **Professional research website and blog**, *Creator* *Oct. 2011-present*
Connecting the public with my field research through writing, photography, and videography (see associated YouTube channel: http://www.youtube.com/mikegilofficial)

School Exchange & Journal, Plastics @ SEA, *Writer and Photographer* *Oct.-Nov. 2012*
Answered science questions from 11 participating K-12 schools and contributed to North Pacific Expedition Journal to "bring the public along" on the adventure (http://sea.edu/plastics)

Service (Community)

Gator Nation Conservation, *Founder/President* Gainesville, Florida, USA
Student service organization: park cleanups, invasive removals *Sept. 2009-Dec. 2010*

Aquarena Spring Diving for Science Program, *Volunteer SCUBA Diver* San Marcos, Texas, USA
Maintained habitat at for federally endangered species *March-Aug. 2008*

Tribeta Biological Honor and Service Society, *Member* Austin, Texas, USA
Habitat cleanups, charity meal preparation for families *Oct. 2006-May 2008*

12th Annual Lake Travis Underwater Cleanup, *Organizer* Austin, Texas, USA
Largest SCUBA/shoreline cleanup in Texas *Sept. 2006*

Curriculum Vitae: Michael A. Gil

SERVICE (UF DEPARTMENT OF BIOLOGY)

2014-15 Biology Graduate Student Association (BGSA) Graduate Representative
2013-14 BGSA Vice President (elected; represented graduate students at faculty meetings)
2012-13 Undergraduate Research Assistantship Program (URAP) coordinator and judge
2010-13 BGSA Green Rep. (liaison between Dept. and UF Office of Sustainability)
2010-11 BGSA Graduate Research Forum Committee (organized weekly graduate seminar)
2010-11 BGSA Welcoming Committee (organized event to welcome Dept. back for new year)

SERVICE (SCIENTIFIC PEER REVIEW)

Ecology ♦ Journal of Ecology ♦ Oikos ♦ Marine Ecology – Progress Series ♦ Science of the Total Environment ♦ Journal of Experimental Marine Biology and Ecology ♦ Journal of Fish Biology

SYNERGISTIC ACTIVITIES

Learning Assistantship Program, *Dept. of Biology, University of Florida* — Gainesville, Florida, USA
Contributed active learning activities in community ecology for UF undergraduate student-led teaching program for general biology — *Spring 2015*

Connection Storymaker Workshop, *Society for Integrative & Comparative Bio.* — Austin, Texas, USA
Randy Olson-led group honed storytelling skills for science communication — *Jan. 2014*

HONORS

2017 Named a TED Fellow [UF, UC Davis, SEA, Fast Company]
2014 Honorable Mention, UF Dept. of Biology "Best Student Paper": Gil, M.A. 2013. *Ecology*.
2013 Science outreach video "Want to Be a Marine Biologist?" selected 'Best of Winner', Midway Atoll, Papahānaumokuākea Marine National Monument
2012 1st Place, Best Oral Presentation at the 41st Annual Benthic Ecology Meeting in Norfolk, Virginia
2008 UT Dean's Honored Graduate (highest honor awarded by College to <1% of class)
2008 Inducted into Sigma Xi, Scientific Research Society
2008 Second Place in Biology, Best Student Poster at UT Undergraduate Research Forum
2008 UT Distinguished College Scholar for GPA/coursework years 2005-06, 2006-07, 2007-08
2007 Induction into the Phi Beta Kappa Society

FELLOWSHIPS, SCHOLARSHIPS, AND GRANTS

2018 National Geographic Society grant for research in Thailand ($20,520)
2015 NSF Postdoctoral Research Fellowship in Biology (March 2015-Feb. 2018; $138,000 USD)

Graduate school (totaling over $270,000 USD):

2013 Carl Storm Underrepresented Minority Fellowship for Gordon Research Conference ($600)
2013 NSF award for participation in the 2014 Gordon 'Predator-Prey' Research Conference ($200)
2012 Chateaubriand Fellowship, Embassy of France for research in French Polynesia ($10,000)
2011 NSF Graduate Research Fellowship International Travel Award ($1,000)
2011 Florida Sea Grant Nutrient Dynamics Fellowship ($19,000)
2011 Ed Stolarz Memorial Fellowship in Marine Biology ($1,500)
2010 UF Graduate Student Council Travel Awards for Spring 2011-13 ($750)
2010 Ocean Bridges II Fellowship, for French-American research in French Polynesia ($5,500)
2010 NSF Southeast Alliance for Graduate Education and the Professorate ($650)
2010 UF Department of Biology Student Travel Award for Fall 2010 ($100)
2010 NSF Graduate Research Fellowship ($122,500)
2009 Ocean Bridges II Fellowship, for French-American research in French Polynesia ($9,000)
2009 UF Alumni Fellowship ($100,000)

Undergraduate education (totaling over $67,000 USD):

2007 SEA Dean's Scholarship and Tuition Award (merit-based awards; $10,000)
2007 Phi Beta Kappa, Alpha of Texas Award of Distinction ($500)
2006 Presidential Endowed Scholarship for Natural Sciences (UT; $2,500)
2005 UT Coop GOES Scholarship for Study Abroad in Australia (2005) & Mexico (2007; each $1,000)
2004 Haraldson Foundation Scholarship (full, four-year tuition scholarship; $23,000)
2004 Institute of Hispanic Culture of Houston Scholarship (academic merit based; $1,000)

Joan C. Herrera, Ph.D.

Employment (recent)

- Instructor, Department of Biological Sciences, University of Florida St. Petersburg (2014-present)
- Adjunct Assistant Professor/Visiting Lecturer, University of Florida (1998-2008; 2015-present)
- Curator of Collections, Fish and Wildlife Research Institute, Florida Fish and Wildlife Conservation Commission (2008–2014)
- Curatorial Assistant, Invertebrate Paleontology, Florida Museum of Natural History (2001-2002)
- Marine Exhibits Consultant, Florida Museum of Natural History (2000-2002)

Education

- Ph.D. August 1998, University of Florida, Zoology
- M.Ed. December 1985, University of Florida, Secondary Science Education and Curriculum
- B.S. August 1978, University of Florida, Animal Science

Scholarships, Awards and Honors (selected)

- Courtesy Assistant Curator, Florida Museum of Natural History, University of Florida (2011-present)
- Full Curator, Encyclopedia of Life (2011-present)
- University of Florida Anderson Scholar Faculty Honoree (2004)
- Yardley Dissertation Fellowship, College of Liberal Arts and Science, University of Florida (1996)
- William W. Behrens, Jr./Florida Institute of Oceanography Award for outstanding student presentation in Marine Science/Oceanography at the Florida Academy of Sciences (1995)

Grants (selected)

- University of South Florida St. Petersburg, Online Course Development for BSC 2010. ($8,000) 2017-2018.
- NMFS, NOAA: Southeastern Area Monitoring and Assessment Program. ($1,500,000/5 years) PI 2008-2011, PM 2011-2014.
- ESA-NOAA: Monitoring and mapping of threatened acroporid corals in U.S. jurisdiction: Development of a multi-state conservation program. (1,350,000/3 years) PM 2010-2013.
- SWG, USFWS: Historical and Modern Patterns of Biodiversity in Coral Reefs with an Emphasis on Species of Greatest Conservation Need. ($63,498.00) PI 2010-2012
- CWT, WFF: Accessing the wealth of data buried in the Fish and Wildlife Research Institute's biological specimen collection. ($15,000) 2009-2010

Presentations and Invited Lectures (selected)

- West Florida Shelf Asteroidea – 50 years post-Hourglass Cruises. Herrera, J.C., J.C. Cobb and J.M. Lawrence. North American Echinoderm Conference, Pensacola, FL (June, 2014)
- Specimen Information Services research incorporating SEAMAP data. Fisheries Independent Monitoring Annual Meeting, Florida Fish and Wildlife Conservation Commission, Fish and Wildlife Research Institute, St. Petersburg, FL (February, 2013)
- Marine Quest, Florida Fish and Wildlife Conservation Commission, Fish and Wildlife Research Institute, St. Petersburg, FL (Annually 2008-2014)
- Distribution of *Luidia clathrata* and *Luidia lawrencei* (Echinodermata: Asteroidea) in the Gulf of Mexico and the western Caribbean. John Lawrence, Alicia Duran Gonzales, Francisco Solis Marin, and Joan Herrera. First Annual Latin American Echinoderm Congress, Puerto Madryn, Argentina. (Presented by John Lawrence, November, 2011)

Publications (selected)

- Cobb, Janessa.C., John M. Lawrence, Joan C. Herrera, Karen Lopez & Daniel Janies. (in preparation) A new species of *Astropecten* (Echinodermata: Asteroidea: Paxillosida: Astropectinidae) and a new comparison of the *Astropecten* species from the Gulf of Mexico and the East Florida Shelf. *Zootaxa.*
- Lawrence, John M., Janessa C. Cobb and Joan C. Herrera. (accepted with revision) Synonymy of *Astropecten nitidus* Verrill, 1915 with *Astropecten cingulatus* Sladen, 1883 and *Astropecten comptus* Verrill, 1915 with *Astropecten articulatus* (Say, 1825). *Bulletin of the Peabody Museum of Natural History.*
- Lawrence, John M., Janessa Cobb, Joan C. Herrera, Alicia Duran-Gonzalez and Francisco A. Solís-Marín. (in press) Morphological comparison of *Astropecten cingulatus* and a new species of *Astropecten* (Paxillosida, Astropectinidae) from the Gulf of Mexico. *Zootaxa.*
- Herrera J., K. Netchy K. and T. Dix. (2013). Historical and Modern Patterns of Biodiversity in Coral Reefs with an Emphasis on Species of Greatest Conservation Need, Final Report, Florida Fish and Wildlife Conservation Commission, Fish and Wildlife Research Institute, Saint Petersburg, FL, USA: 434.
- Lawrence, John M., Alicia Durán-González, Francisco A. Solís-Marín, Joan Herrera, and Carlos Renato R. Ventura. (2013) Distribution of *Luidia clathrata* and *Luidia lawrencei* (Echinodermata: Asteroidea) along the coast of the western Atlantic Ocean, the Gulf of Mexico and the Caribbean Sea. *Cahiers de Biologie Marine*, 54: 525-529.
- Valdes, Angel, Ulysses Gatdula, Nancy Sheridan and Joan Herrera. (2011) Multi-dataset revision of two uncommon species of Chromodorididae (Mollusca: Nudibranchia from the Gulf of Mexico with the description of a new taxon. (*American Malacological Bulletin*, 29: 51-62).
- Lawrence, J.M., J. Herrera and J. Cobb. (2004). Vertical posture of the clypeasteroid sand dollar *Encope michelini*. (*Journal of the Marine Biological Association*, 84: 407-408).
- Lawrence, J.M. and J. Herrera. (2000). Stress and deviant reproduction in echinoderms. (*Zoological Studies*, 39(3): 151-176).

Biographical Sketch

JOHN M. JAEGER
Associate Professor
Department of Geological Sciences, University of Florida, P.O. Box 112120
Gainesville, FL 32611-2120
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email: jmjaeger@ufl.edu

(a) Professional Preparation

Humboldt State University	Arcata, CA, USA	Oceanography	B.Sc. 1991
SUNY Stony Brook	Stony Brook, NY, USA	Marine Environmental Science	M.Sc., 1993
SUNY Stony Brook	Stony Brook, NY, USA	Geological Oceanography	Ph.D., 1998
Lehigh University	Bethlehem, PA, USA	Geology Post-Doc.	1998-1999

(b) Appointments

2007-Present, Associate Professor, University of Florida
2000-2007, Assistant Professor, University of Florida

(c) Publications

Five Relevant Papers

Jaeger, J.M., and Koppes, M.N., (2015), The role of the cryosphere in source-to-sink systems: Earth Science Reviews, p. 1–34, doi: 10.1016/j.earscirev.2015.09.011.

Gulick, S.P.S., Jaeger, J.M., Mix, A.C., et al., (2015), Mid-Pleistocene climate transition drives net mass loss from rapidly uplifting St. Elias Mountains, Alaska: Proceedings of the National Academy of Sciences, p. 201512549–6, doi: 10.1073/pnas.1512549112.

Villaseñor, T., Jaeger, J.M., and Foster, D.A., (2016), Linking Late Pleistocene alpine glacial erosion and continental margin sedimentation: Insights from $^{40}Ar/^{39}Ar$ dating of silt-sized sediment, Canterbury Basin, New Zealand: Earth and Planetary Science Letters, v. 433, p. 303–316, doi: 10.1016/j.epsl.2015.11.008.

Villaseñor, T., J.M. Jaeger, K. Marsaglia and G.H. Browne, (2015). Evaluation of the relative roles of global versus local sedimentary controls on Middle - Late Pleistocene formation of continental margin strata, Canterbury Basin, New Zealand. Sedimentology, doi:10.1111/sed.12181.

Montelli, A., Gulick, S.P.S., Worthington, L.L., Mix, A.C., Davies-Walczak, M., Zellers, S.D., and Jaeger, J.M., (2017). Late Quaternary glacial dynamics and sedimentation variability in Bering Trough, Gulf of Alaska. Geology, doi:10.1130/G38836.1.

Five Additional Papers

Mehta, A. J., Jaeger, J. M., Boz, Z., & Khare, Y. P. (2018). Multiphase Layering and Mobility of Suspended Fine Sediment in Lake Apopka, Florida, 6(2), 433–445. doi.org/10.2495/CMEM-V6-N2-433-445.

Marsaglia, K.M., G. H. Browne, S.C. George, D. Kemp, J.M. Jaeger, D. Carson, M. Richaud and IODP Expedition 317 Scientific Party, (2017). The Transformation of Sediment into Rock: Insights from IODP Site U1352, Canterbury Basin, New Zealand. Journal of Sedimentary Research, DOI: 10.2110/jsr.2017.15.

Meridth, L. N., E. J. Screaton, J. M. Jaeger, S. R. James, and T. Villaseñor (2017), The impact of rapid sediment accumulation on pore pressure development and dehydration reactions during shallow

subduction in the Gulf of Alaska, Geochem. Geophys. Geosyst., 18, 189–203, doi:10.1002/2016GC006693.
Cui, X., T.S. Bianchi, J.M. Jaeger, R.W. Smith, 2016. Biospheric and petrogenic organic carbon flux along southeast Alaska. Earth and Planetary Science Letters, v. 452, p. 238–246. 10.1016/j.epsl.2016.08.002.
Jaeger, J.M. and Kramer, B., 2013. A continental shelf sedimentary record of Little Ice Age to modern glacial dynamics: Bering Glacier, Alaska, 2013. Continental Shelf Research. DOI: 10.1016/j.csr.2013.03.011.

(d) Synergistic Activities

- U.S. Advisory Committee for Scientific Ocean Drilling, Member, (2012-2015)
- U.S. Advisory Committee for Scientific Ocean Drilling, Chair, (2013-2016)
- NSF GeoPRISMS Steering and Oversight Committee, 2010-2013
- IODP Science Steering and Evaluation Panel, 2006-2009
- Member of Coastal Community Resiliency Initiative Focus Group, Department of Economic Opportunity, State of Florida, (2012-present)

BIOGRAPHICAL SKETCH

MATTHEW CHARLES SMITH
Senior Lecturer
University of Florida Dept. of Geological Sciences
241 Williamson Hall, Box 112120
Gainesville, FL 32611
(352) 392-2106, mcsmith@ufl.edu

Professional Preparation

1999	Ph.D. in Geology/Geochemistry, University of Florida, 1999..
1993	Master of Science in Geology, University of Florida, 1993.
1989	B.S. in Geology (minor in Oceanography), University of New Hampshire, 1989.

Appointments

2011-present	Senior Lecturer, Dept.of Geological Sciences, University of Florida, Gainesville, FL.
2007- 2011	Lecturer, Department of Geological Sciences, University of Florida, Gainesville, FL.
2003-2007	Visiting Lecturer, Dept. of Geological Sciences, University of Florida, Gainesville, FL.
2001-2003	Education Programs Manager, American Geological Institute, Alexandria, Virginia.
1999-2001	Postdoctoral Researcher in Igneous Petrology and Isotope Geochemistry, University of Hawaii School of Ocean and Earth Science and Technology.

Courses Taught

Introduction to the Geological Sciences (GLY1000), Introduction to Oceanography (OCE1001), Introduction to Earth Science (ESC1000), Geology of Florida Lab (GLY1150L), Physical Geology (GLY2010C), Environmental and Engineering Geology (GLY2030C), Earth Materials Special Topics (GLY4930), Igneous and Metamorphic Petrology (GLY4310C), Introduction to Earth Materials (GLY3202C), Geological Field Methods (GLY4750L), The Geology of Florida (GLY4155C), Topics in Earth and Space Science for Teachers (GLY6932).

Recent Awards and Honors

2017	UF Online Education Excellence Award
2017	UF College of Liberal Arts and Sciences Teacher of the Year Award, 2016-2017.
2016	UF Online Education Excellence Award
2014	Nominated for UF College of Liberal Arts and Sciences Teacher of the Year Award
2012	Teacher of the Year (as voted on by UF Geological Sciences graduating Class).

Current Grant Funding-None

Service to Profession (past 10 years)

2016-present	Advisory board member for NSF-funded Geoscience Engagement and Outreach (GEO-paths) grant (UF-Santa Fe College collaborative grant). PIs-Heidi Lannon (SFC), Kathryn Stofer (UF).
2015-present	CLAS Faculty collaborator on MSP Grant *U-FUTuRES 2: University of Florida Unites Teachers to Reform Education in Science* , UF PIs L.F. Hayes and R.M. Pringle, UF College of Education. (https://education.ufl.edu/science-education/u-futures/)
2012-2014	CLAS Faculty collaborator on MSP Grant *U-FUTuRES: University of Florida Unites Teachers to Reform Education in Science* , UF PIs L.F. Hayes and R.M. Pringle, UF College of Education.(https://education.ufl.edu/stem/ufutures/)
2011	Associate Editor and activity reviewer for On the *Cutting Edge Collection on Teaching Petrology in the 21st Century* https://serc.carleton.edu/NAGTWorkshops/petrology/index.html
2009-2010	CLAS Faculty collaborator on MSP Grant: *Florida PROMiSE: Partners to Rejuvenate & Optimize Mathematics and Science Education*, UF PIs: S.J. Pape and M.J.

Koroly, (https://vivo.ufl.edu/display/n335099263, http://www.csl.usf.edu/ourwork/data/9Florida-PROMiSE.pdf)

2007-2008 Supervisory Committee Member and contributing author for "Exploring Science Content", UF PIs: C. Cavanaugh and K. Dawson, UF College of Education.(https://etc.usf.edu/reports/union1/index.html)

5 Most Recent Refereed Publications (self = bold, graduate student = g, other = &)

Perfit, M.R., Wanless, V.D., Ridley, W.I., Klein, E., **Smith, M.C.**, Hinds, J.S.[g], Kutza, S.[g], and Fornari, D.J. (2012) EPR ISS Lava Geochemistry –2 decades of comprehensive sampling and 2 eruptions. *Oceanography*, 25-1, 89-93.

Schmitt, A.K., Perfit, M.R., Rubin, K.H., Stockli, D.F., **Smith, M.C.**, Cotsonika[g], L.A., Zellmer, G.F., Ridley, W.I., Lovera, O.M. (2011) Rapid cooling rates at an active mid-ocean ridge from zircon thermochronology, *Earth Planet. Sci. Lett.* **302**, 349-358.

Ridley, W.I., Perfit, M.R. , **Smith, M.C.** and Fornari, D. (2006), Magmatic Processes In Developing Oceanic Crust Revealed In A Cumulate Xenolith Collected At The East Pacific Rise, 9º 50'N., *Geochemistry, Geophysics and Geosystems*, *Vol. 7, Q12O04,* DOI 0.1029/2006GC001316, 12 December, 2006, 1-25.

Zimmerman, A. R. and **Smith, M.C.** (2006), Engaging Today's Students in Earth Science 101, Eos Trans. AGU, 87(34), doi: 10.1029/2006EO340003, 339-344.

Rubin, K.H., van der Zander, I.[p], **Smith, M.C.** and Bergmanis, E.C.[g] (2005), Minimum speed limit for ocean ridge magmatism from ^{210}Pb-^{226}Ra-^{230Th} disequilibria, *Nature*, 437, 534-538, DOI: 10.1038/nature03993.

Field Experience

2016 Petrochemist and dive participant aboard the RV Atlantis, Siqueiros Fracture Zone, OASIS (Off-Axis Seamount Investigations at Siqueiros) cruise.

1995 Petrochemist and dive participant aboard the RV Atlantis II, Juan de Fuca Ridge (JdFR), NOAA Vents cruise Leg 1 (voyage 132-09).

1994 Petrochemist and camera pilot aboard the NOAA ship Discoverer, JdFR, NOAA Vents cruise Leg 1 (voyage DI-94-03).

1994 Petrochemist aboard RV Atlantis II, JdFR, (voyage 131-18).

1994 Scientific personnel and dive participant aboard the RV Atlantis II and DSV ALVIN, East Pacific Rise (EPR) at 9°-10°N, AdVenture IV cruise (voyage 131-14).

1993 Scientific personnel aboard the NOAA ship Discoverer, JdFR, NOAA Vents cruise Leg 2.

1992 Petrochemist aboard the RV Atlantis II, EPR at 9°-10°N, AdVenture III cruise (voyage 131-11).

1991 Petrochemist and dive participant aboard the RV Atlantis II and DSV ALVIN, JdFR, NOAA Vents cruise Leg 2 (voyage 125-29).

1991 Scientific personnel and dive participant aboard the RV Atlantis II and DSV ALVIN, EPR at 9°-10°N, AdVenture cruise (voyage 125-24).

1990 Scientific personnel RV Atlantis II, NOAA Vents cruise on the Juan de Fuca Ridge, Leg 3 (voyage 125-11).

1990 Scientific personnel and camera pilot aboard the NOAA ship Discoverer, JdFR, NOAA Vents cruise Leg 2 (voyage DI-90-03).

1988 Two months field work in intertidal and shallow subtidal zones, Shoals Marine Lab, Appledore Island, NH.

1988 One month field work studying sedimentation processes in tidal mud flats, Jackson Estuarine Laboratory, Durham, NH.

1988 One month mapping and sampling in Maine for senior thesis.

1988 Two weeks mapping and sampling offshore in Maine aboard the R.V. Jere Chase

Biographic Sketch **William F. Patterson III**

Contact Information:

Fisheries and Aquatic Sciences Program
School of Forest Resources and Conservation
University of Florida
Gainesville, FL 32611

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Fax: (352) 392-1707
e-mail: will.patterson@ufl.edu

Professional Preparation:

University of Virginia	History	B.A., 1991
Old Dominion University	Biological Sciences	M.S., 1995
University of South Alabama	Marine Sciences	Ph.D., 1999
Louisiana State University	Oceanography	Post-Doc, 1999-2001

Positions Held:

2016-	Associate Professor, Fisheries and Aquatic Sciences, University of Florida
2011-2016	Associate Professor, Department of Marine Sciences, University South Alabama
2007-2011	Associate Professor, Department of Biology, University of West Florida
2004-2007	Assistant Professor, Department of Biology, University of West Florida
2001-2003	Asst. Research Professor, Department of Marine Sciences, U. of South Alabama

Selected Publications:

Chagaris, D.D., S. Binion, A. Bodanoff, K. Dahl, J. Granneman, H. Harris, J. Mohan, M. Rudd, M. Swenarton, R. Ahrens, W.F. Patterson III, J. Morris, and M. Allen. 2017. Modeling management strategies to mitigate invasive lionfish impacts on the West Florida Shelf ecosystem. *Fisheries* 42:421-431.

Dahl, K.A., W.F. Patterson III, A. Robertson and A.C. Ortmann. 2017. DNA barcoding significantly improves resolution of invasive lionfish diet in the northern Gulf of Mexico. *Biological Invasions* 6:1917-1933.

Murawski, S.A., J.W. Fleeger, W.F. Patterson III, C. Hu, K. Daly, I. Romero, and G.A. Toro-Farmer. 2016. How did the Deepwater Horizon oil spill affect coastal and continental shelf ecosystems of the Gulf of Mexico? *Oceanography* 293:160–173.

Dahl, K.A, W.F. Patterson III, and R.A. Snyder. 2016. Experimental assessment of lionfish removals to mitigate reef fish community shifts on northern Gulf of Mexico artificial reefs. *Marine Ecology Progress Series* 558:207-221.

Barnett, B.K., W.F. Patterson III, T.D. Kellison, S.B. Garner and A.M. Shiller. 2016. Nursery sources of red snapper (*Lutjanus campechanus*) off the southeastern USA simulated with otolith chemical signatures. *Marine and Freshwater Research* 67: 992–1001.

Addis, D.T., W.F. Patterson III and M.A. Dance. 2016. The potential of unreported artificial reefs to serve as refuges from fishing mortality for Gulf of Mexico reef fishes. *North American Journal of Fisheries Management* 36:131-139.

Tarnecki, J.H and W.F. Patterson III. 2015. Changes in red snapper diet and trophic ecology in the northern Gulf of Mexico following the Deepwater Horizon Oil Spill. *Marine and Coastal Fisheries* 7:135-147.

Patterson, W.F., III, J.H. Tarnecki, D.T. Addis, and L.R. Barbieri. 2014. Reef Fish community structure at natural versus artificial reefs in the northern Gulf of Mexico. *Proceedings of the Gulf and Caribbean Fisheries Institute* 66:4-9.

Patterson III, W.F., J.H. Cowan, Jr., D.A. Nieland, and G.R. Gitzhugh, editors. 2007. *Population*

Ecology and Fisheries of U.S. Gulf of Mexico Red Snapper. American Fisheries Society Symposium 60. Bethesda, Maryland. 361 pp.
Garner, S.B. and W.F. Patterson III. 2015. Direct observation of charterboat effort, catch, and discarding of northern Gulf of Mexico reef fishes. *US Fishery Bulletin* 113:157-166.
Patterson, W.F., III. 2007. A review of Gulf of Mexico red snapper movement studies: Implications for population structure. *American Fisheries Society Symposium 60*:221-236.

Synergistic Activities in the Last 5 Years:

Grant Funding: Florida Institute of Oceanography (FIO), Florida Fish and Wildlife Conservation Commission, Florida Fish and Wildlife Research Institute, Gulf of Mexico Research Initiative; MS/AL Sea Grant, NOAA-NMFS Marine Fisheries Initiative, NOAA-NMFS Cooperative Research Program, National Science Foundation, Pew Oceans-Lenfest, USA Center for Resiliency; Appointed Member, Gulf of Mexico Fishery Management Council's Standing Scientific and Statistical Committee (Chair 2013-15); *ad hoc* reviewer for 18 journals, two book publishers, and seven grant programs; Member, Editorial Board for *Reviews in Fisheries Science and Aquaculture* and Associate Editor for *Gulf of Mexico Science*.

Collaborators in the Last 5 Years:

Mike Allen, UF; Robert Allman, NMFS; Luiz Barbieri, FWRI; Beverly Barnett, NMFS; Jane Caffrey, UWF; Shannon Calay, NMFS; John Carlson, NMFS; Dave Chagaris, UF; Zhongxing Chen, Harvard; Jim Cowan, LSU; Phil Darby, UWF; Doug DeVries, NMFS; Gary Fitzhugh, NMFS; John Gold, TAMU; David Hollander, USF; Walter Ingram, NMFS; Margaret James, UF; Andy Kane, UF; Allan Koenig, USGS; Sue Lowerrie-Barbieri, Behzad Mamoudi, FWRI; FWRI-UF; John Mareska, AL MRD; Steve Murawski, USF; Bill Patterson, University of Saskatchewan; Clay Porch, NMFS; Jay Rooker, TAMU; Alan Shiller, USM; Tom Shirley, TAMU-CC; Richard Snyder, UWF; Dave Wells, TAMU

Graduate and Post-Graduate Advisors:

Ray Birdsong (MS), Cynthia Jones (MS), Jim Cowan (PhD), Chuck Wilson (Post-Doc)

Advisees:

Post-doctoral Fellows: Steven Garner (UF, 2017-)
Graduate Students (Committee Chair): Erin Bohaboy (UF, 2017-); Beverly Barnett (UF, 2016-); Gracie Barnes (USA, 2015-17), Kristen Dahl (UF, 2012-), Steven Garner (USA, 2012-), Justin Lewis (USA, 2012-2016), Michael Norberg (USA, 2012-15), Joshua Neese (UWF, 2010-13), Joseph Tarnecki (UWF, 2010-13), Rachel Scharer (UWF, 2009-12), Carrie Fioramonti (UWF, 2009-12), Cecelia Lounder (UWF, 2006-09), Kate Shepard (UWF, 2006-08), Dustin Addis (UWF, 2005-08), Beverly Barnett (UWF, 2005-2008), Suzanne Gibson (UWF, 2004-08), Michael Dance (UWF, 2004-2007), Nicole Morris (UWF, 2004-07), Sarah Jeffers (UWF, 2004-07), Craig Newton (USA, 2002-07), Todd Clardy (USA, 2002-06)
Graduate Students (Committee Member): Devon Pharo (UF, 2016-), Holden Harris (UF, 2016-), Elizabeth Simpson (USF, 2015-), Kayla DaCosta (USA, 2014-), Kristin Hannan (USA, 2013-16), Trey Spearman (USA, 2013-15), Crystal Hightower (USA, 2010-2013), Meagan Schrandt (USA, 2010-15), Andrea Kroetz (2010-15), Marshall Johnson (USA, 2011-13), Rachel Anderson (NOVA Southeastern, 2007-09), Kelly Robinson (USA, 2008-12), Michelle Zapp (LSU, 2005-2011), Morgan Kilgour (TAMU-CC, 2004-07), David Wells (LSU, 2003-07), Kevan Gregalis (USA, 2003-06)
Undergraduate Students: Mentored 14 undergraduate Directed Studies, NSF Research Experience for Undergraduates, or Honor's Thesis Students since 2010.

CURRICULUM VITAE **GUSTAV PAULAY**

a) Professional preparation

B.S. Biology, 1979, Yale University, magna cum laude, with distinction in biology
Ph.D. Zoology, 1988, University of Washington
Postdoctoral Fellow, 1990-1991, Dept. of Paleobiology, National Museum of Natural History

b) Professional appointments

2006-	Curator, Florida Museum of Natural History, University of Florida
2006-	Adjunct Professor, Dept. of Biology, University of Florida
2007-09	University of Florida Foundation Research Professor
2003-06	Associate Curator, Florida Museum of Natural History, University of Florida
2003-06	Adjunct Associate Professor, Dept. of Biology, University of Florida
2000-03	Assistant Curator, Florida Museum of Natural History, University of Florida
2000-03	Adjunct Assistant Professor, Dept. of Biology, University of Florida
1997-00	Director, Marine Laboratory, University of Guam
1996-00	Associate Professor, Marine Laboratory, University of Guam
1991-96	Assistant Professor, Marine Laboratory, University of Guam

c) Five relevant products

Whelan, N.V., Kocot, K.M., Kohn, A.B., Moroz, T.P., Mukherjee, K., Williams, P., Paulay, G., Moroz, L.M., Halanych, K.M. 2017. Phylogenomics uncovers Evolutionary Transitions in Ctenophora. *Nature Ecology Evolution* DOI: 10.1038/s41559-017-0331-3

Miller, A., Kerr, A., Paulay, G., Reich, M., Carvajal, J., Wilson, N., Rouse, G. 2017. Molecular Phylogeny of Extant Holothuroidea (Echinodermata). *Molecular Phylogenetics and Evolution* 111: 110-131

Kirkendale, L., Paulay, G. 2017. Photosymbiosis in Bivalvia. In: Treatise of Invertebrate Paleontology. Treatise Online Part N, Revised, Volume 1, Chapter 9, No 89: 1-31. DOI: https://doi.org/10.17161/to.v0i0.6554

O'Loughlin, P.M., Harding, C., Paulay, G. 2016. The sea cucumbers of Camden Sound in northwest Australia, including four new species (Echinodermata: Holothuroidea). *Memoirs of Museum Victoria* 75:7-52

Michonneau, F., Paulay, G. 2014. Revision of the genus *Phyrella* (Holothuroidea: Dendrochirotida) with the description of a new species from Guam. *Zootaxa* 3760 (2): 101–140

Five additional products

An, J., Paulay, G. 2017. A new genus and two new species of Argeiinae (Crustacea: Isopoda: Bopyridae) from the Indo-west Pacific. *Journal of Natural History* 51:405-420

DiBattista J.D., Choat, J. H., Gaither, M.R., Hobbs, J-P.A., Lozano-Cortés, D.F., Myers, R.F., Paulay, G., Rocha, L.A., Toonen, R.J., Westneat, M.W., Berumen, M.L., 2016. On the origin of endemic species in the Red Sea. *Journal of Biogeography* 43:13-30

Duffy, J.E., Amaral-Zettler, L.A., Fautin, D. G., Paulay, G., Rynearson, T., Sosik, H.M., Stachowicz, J.J. 2013. Envisioning a National Marine Biodiversity Observation Network. *BioScience* 63: 350-361, DOI: 10.1525/bio.2013.63.5.8

Evans, N., Paulay, G. 2012. Barcoding methods for invertebrates. In: W.J. Kress & D.L. Erickson (eds). DNA barcodes: methods and protocols. Humana Press, New York. pp. 47-77

O'Loughlin, P.M., Paulay, G., Davey, N., Michonneau, F. 2011. The Antarctic Region as a marine biodiversity hotspot for echinoderms: diversity and diversification of sea cucumbers. *Deep Sea Research II* 58: 264-275

d) Synergistic activities

Marine biodiversity surveys: A major long-term goal of my lab and our collection is to document the littoral marine biota, especially of the tropics and coral reefs, in collaboration with a large network of engaged systematists. To this end we pursue field work broadly across the tropics, collect specimens, tissues, and images of most macroinvertebrate phyla, and make these collections and information broadly available through rapid curation, digitization and online access. We are involved in several large-scale (i.e., >500 spp/effort) marine biodiversity surveys. Major surveys include: 1) Guam (Paulay 2003; 5640 species), 2)

BioCode Moorea (http://www.mooreabiocode.org/, >4000 species), 3) CoML-CReefs survey of French Frigate Shoals, Lizard Island, Heron Island, and Ningaloo (http://www.creefs.org/, >2000 species). 4) BIOTAS survey of SW Indian Ocean (>1000 species). 5) Saudi Red Sea, in collaboration with KAUST (>1500 species). 6) Verde Island Channel Philippines, in collaboration with the California Academy of Sciences (ongoing). 7+) smaller efforts in Oman, Maldives, Ryukyus, Hong Kong, Micronesia, Fiji, N and S Line Islands, New Caledonia, St. Martin, Florida, British Columbia, Washington, Panama, French Guiana, etc.

Collection development: I increase the utility and accessibility of invertebrate collections at the FLMNH, by increasing holdings, soliciting researchers to study and improve identifications, and making collection information broadly available. Holdings are augmented through field surveys (above), and by rescuing and incorporating quality relinquished collections. Collection data are made available over the web (http://specifyportal.flmnh.ufl.edu/iz/, also through https://www.idigbio.org/); the >580,000 lots accessible electronically represent the third largest such resource globally for non-insect invertebrates. With NSF support we have eliminated all research collection backlog, are fully databased, and currently process ~20,000 lots per year. A Sloan Foundation-funded effort has led to subsampling ~25,000 samples representing many of the sequencable species in the collection, transfer of all subsamples to a cryogenic facility developed with NSF support, sequencing ~15,000 samples for COI, and making these publicly available through Barcode of Life Data Systems (BOLDSystems). The Moorea Biocode project has similarly funded sequencing ~8,000 samples for COI across all invertebrate phyla collected there. The collection is heavily used through visits and loans by traditional and molecular systematists alike (5-10,000 specimens loaned and 30-40 research visitors hosted annually).

Biodiversity informatics: I facilitate the development of online taxonomic resources. I am on the Steering Committee of the World Register of Marine Species, chair their Image and Award working groups, and serve as taxon editor for Holothuroidea (http://www.marinespecies.org/aphia.php?p=taxdetails&id=123083). The latter covers all 2500+ described species of sea cucumbers, all based on original descriptions. We are expanding this with the World Register of Deep-Sea Species to include images, distributional, and biological data (http://www.marinespecies.org/deepsea/). We have also created an echinoderm project on iNaturalist (http://www.inaturalist.org/projects/echinoderms), engaging with the public to assemble image and distributional data. Started two years ago, iNat echinoderms now has >450 members and >4000 observations.

Summary Vitae

NAME: Edward J. Phlips
POSITION: Professor
TELEPHONE: 352-273-3603
FAX: 352-846-1088
E-MAIL: phlips@ufl.edu

PROFESSIONAL ADDRESS:
Dept. of Fisheries and Aquatic Sciences
7922 N.W. 71st Street
Gainesville, Florida 32653

EDUCATION:

University	Major	Dates	Degree
University of Miami, RSMAS	Marine Biology	1977-81	PhD
University of Miami, RSMAS	Biological Oceanogr.	1972-76	MS
University of California, SD	Biology	1968-72	BA

PROFESSIONAL EXPERIENCE
(A) Positions:

Dates	Organization	Position
2004-current	University of Florida	Professor
2001-04	University of Florida	Professor & Graduate Coordinator
1994-00	University of Florida	Associate Professor & Graduate Coordinator
1988-93	University of Florida	Assistant Professor
1983-87	University of Florida	Assistant Research Scientist
1981-83	University of Miami (R.S.M.A.S.)	Post-doc

CURRENT TEACHING: Current graduate level class on Applied Phycology (FAS 6176) and graduate/undergraduate class on Algae Biology and Ecology (FAS4932/6176).

GRADUATE STUDENT ADVISEMENT - Served on 118 graduate student committees, including 38 as Chair (23 MS and 15 PhD).

CONTRACTS AND GRANTS as PI – Total - $10,817,794.

REPRESENTATIVE RECENT PUBLICATIONS – Of 136 total.

Phlips, E. J., S. Badylak, M. Christman, J. Wolny, J. Garland, L. Hall, J. Hart, J. Landsberg, M. Lasi, J. Lockwood, R. Paperno, D. Scheidt, A. Staples, K. Steidinger,. 2011. Scales of variability of harmful algae blooms in the Indian River Lagoon, Florida, USA. Harmful Algae 10:277-290.

Havens, K. E., J. R. Beaver, D. A. Casamatta, T. L. East, R. T. James, P. McCormick, E. J. Phlips and A. J. Rodusky. 2011. Hurricane effects on the planktonic food web of a large subtropical lake. Journal of Plankton Research 33:1081-1094.

Yilmaz, M. and E. J. Phlips. 2011. Toxicity and genetic diversity of *Cylindrospermopsis raciborskii* in Florida, USA. Lake and Reservoir Management 27:235-244.

Phlips, E. J., S. Badylak, J. Hart, D. Haunert, J. Lockwood, H. Manley, K. O'Donnell, D. Sun, P. Viveros and M. Yilmaz. 2012. Climatic influences on autochthonous and allochthonous phytoplankton blooms in a subtropical estuary, St. Lucie Estuary, Florida, USA. Estuaries and Coasts 35:335-352.

Foss, A. J., E. J. Phlips, M. Yilmaz and A. Chapman. 2012. Characterization of paralytic shellfish toxins from *Lyngbya wollei* dominated mats collected from two Florida springs. Harmful Algae 16:98-107.

Badylak, S., E. J. Phlips and A. L. Mathews. 2014. *Akashiwo sanguinea* (Dinophyceae) blooms in a sub-tropical estuary: An alga for all seasons. Plankton and Benthos Research 9:1-9.

Phlips, E. J., S. Badylak, M. Lasi, R. Chamberlain, W. Green, L. Hall, J. Hart, J. Lockwood, J. Miller and J. Steward. 2015. From red tides to green and brown tides: Bloom dynamics in a restricted subtropical lagoon under shifting climatic conditions. Estuaries and Coasts 38:886-904 (DOI:10.1007/s12237-014-9874-6).

Mathews, A. L., E. J. Phlips and S. Badylak. 2015. Modeling phytoplankton productivity in a shallow microtidal sub-tropical estuary. Marine Ecology Progress Series 531: 63-80.

Hart, J. A., E. J. Phlips, S. Badylak, N. Dix, K. Petrinec, A. L. Mathews, W. Green and A. Srifa. 2015. Phytoplankton biomass and composition in a well-flushed sub-tropical estuary: The contrasting effects of hydrology, nutrient loads and allochthonous influences. Marine Environmental Research 112:9-20.

Phlips, E. J. 2015. Phytoplankton blooms. In: M. Kennish (Ed.). Encyclopedia of Estuaries. Springer, Dordrecht, The Netherlands. Pp. 493-494. ISBN:978-94-017-8800-7.

Badylak, S., E. J. Phlips, N. Dix, J. Hart, A. Srifa, D. Haunert, Z. He, J. Lockwood, P. Stofella, D. Sun, and Y. Yang. 2016. Phytoplankton dynamics in a subtropical tidal creek: Influences of rainfall and water residence time on composition and biomass. Marine and Freshwater Research 67:466-482 (dx.doi.org/10.1071/mf14325).

Srifa, A. E. J. Phlips, M. F. Cichra and J. C. Hendrickson. 2016. Phytoplankton dynamics in a sub-tropical lake dominated by cyanobacteria: Cyanobacteria 'like it hot' and sometimes dry. Aquatic Ecology 50:163-174. (dx.DOI.org/10.1007/s10452-016-9565-4).

Nelson, N., R. Muñoz-Carpena and E. J. Phlips. 2017. A novel quantile method reveals spatiotemporal shifts in phytoplankton bloom descriptors between bloom and non-bloom conditions in a subtropical estuary. Marine Ecology Progress Series 567:57-78. Doi.org/10.3354/meps12054.

ANDREW R. ZIMMERMAN - CIRRICULUM VITAE
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241 Williamson Hall, P.O. Box 112120, Gainesville, FL 32611
phone: (352) 392-0070 fax: (352)392-9294
e-mail: azimmer@ufl.edu

Professional Preparation

The University of Chicago	Geological Sciences,	B.A. Honors 1987
The University of Michigan	Marine Geochemistry	M.S. 1989
College of William and Mary-Virginia Institute of Marine Science	Marine Geochemistry	Ph.D. 2000

Appointments

Associate Professor	University of Florida	2011 - present
Assistant Professor	University of Florida	2004 - 2011
Postdoctoral Research Associate	Pennsylvania State University	2002 - 2003

Website: https://people.clas.ufl.edu/azimmer/ Google Scholar Link

RESEARCH

Research Specialty

Examinations of organic matter-mineral-microbe interactions and carbon cycling in soil, sediments, surface and ground water, in the present and through the geological past. Fire-produced organic matter cycling (black carbon) in the environment, biochar and contaminant sorption and degradation.

Selected Recent Refereed Publications

Bostick, K.W., Zimmerman, A.R., Hatcher, P., Mitra, S., and A.S. Wozniak (submitted). Production, Composition, and Detection of Pyrogenic Dissolved Organic Matter from Various Biochars and Environmentally-aged Charcoals. Frontiers in Earth Science: Biogeoscience.

Zimmerman, A.R. and S. Mitra (2017). Trial By Fire: On the terminology and methods used in pyrogenic organic matter research. Frontiers in Earth Science. 5:95.

Stubbs,E. A., Zimmerman, A. R., Warner, L. A., and B. E. Myers (2017). Reflection on a Multidisciplinary Collaboration to Design Climate Change Core Curriculum. Journal of Environmental Studies and Sciences. DOI 10.1007/s13412-017-0451-8

Mays, J. L., Brenner, M; Curtis, J, Curtis, K.V., Hodell, D.A., Correa-Metrio, A., Escobar, J., Dutton, A.L., Zimmerman, A. R., and T. P. Guilderson (2017). Stable carbon isotopes (δ13C) of total organic carbon and long-chain n-alkanes as proxies for climate change in a sediment core from Lake Petén-Itzá, Guatemala. Journal of Paleolimnology, 57: 307-319.

Canuel, E. A., G. Brush, T. M. Cronin, R. Lockwood, A. R. Zimmerman (2017). Paleoecology studies in Chesapeake Bay: A model system for understanding interactions between climate, anthropogenic activities and the environment. In, Gibson, Saunders, Gell, and Tibby eds. Chapter 15, Application of Paleoenvironmental Techniques in Estuarine Studies. Volume 20.

Zengel, S., Jennifer Weaver, Steven C. Pennings, Brian Silliman, Donald R. Deis, Clay L. Montague, Nicolle Rutherford, Zachary Nixon, and Andrew R. Zimmerman (2016). Five Years of Deepwater Horizon Oil Spill Effects on Marsh Periwinkles (Littoraria irrorata). Marine Ecology Progress Series. doi: 10.3354/meps11827.

Jin, J., Zimmerman, A.R., Norton, S.B., Annable, M.D. and W.G. Harris (2016). Arsenic release from Floridan Aquifer rock during incubations simulating aquifer storage and recovery operations. Accepted. *Science of the Total Environment* 551–552: 238–245.

Kupryianchyk, D., Hale, S., Zimmerman, A. R., Harvey, O., Rutherford, D., Abiven, S., Knicker, H., Schmidt, H-P., Rumpel, C., and G. Cornelissen (2016). Sorption of hydrophobic organic compounds to a diverse suite of carbonaceous materials with emphasis on biochar *Chemosphere* 144: 879-887.

Jin J., Zimmerman, A. R., Martin, J. B., and M.B. Khadka (2015). Spatiotemporal variations in carbon dynamics during a low flow period in a carbonate karst watershed, Florida, USA. Biogeochemistry, 122: 131-150.

Leorri, E., Zimmerman, A.R., Mitra, S., Christian R. R., and A. Cearreta (2014). A 700 year record of combustion-derived pollution in northern Spain. *Science of the Total Environment; 470–471: 240–247.*

Mukherjee, A., Lal, R., Zimmerman, A.R. (2014). Effects of biochar and other amendments on the physical properties and greenhouse gas emissions of an artificially degraded soil. Science of the Total Environment, 487: 26–36.

Mahmoudi, N., Porter, T.M., Zimmerman, A.R., Fulthorpe, R.R., Kasozi, N., Silliman, B.R. and G.F. Slater (2013). Rapid degradation of *Deepwater Horizon* spilled oil by indigenous microbial communities in Louisiana salt marsh sediments. Environ. Sci. Technol. 47: 13303−13312.

Mukherjee, A., Zimmerman, A.R. (2013). Organic carbon and nutrient release from a range of laboratory-produced biochars and biochar-soil mixtures. *Geoderma*, 193-194: 122–130

Silliman, B. R, van de Koppel, J., McCoy, M. W., Diller, J., Kasozi, G. N., Earl, K., Adams, P. N., A.R. Zimmerman (2012). Degradation and resilience in Louisiana salt marshes after the BP–Deepwater Horizon oil spill. Proc. of the Nat. Academy of Sciences. 109: 11234-11239.

TEACHING

Courses Taught

OCE 1001: Introduction to Oceanography
IUF2100: Climate Change Science and Solutions
GLY 2038: Sustainability and the Changing Earth
GLY 5255: Organic Geochemistry and Geobiology

HONORS

- 2017-2018 Colonel Allen R and Margaret G. Crow Term Professor Award, University of Florida.
- Award of Commendation for exemplary service to the students of the Alachua County Public Schools. June 9, 2016.

SELECTED ACTIVITIES

Symposia Convener:

- The role of fire in the carbon cycle: quantification and characterization of emissions, fluxes and sequestration potential. American Geophysical Union, Fall 2016 Meeting, San Francisco, CA.
- Using Paleo- and Modern Observations to Improve Understanding of Climate Projections, Environmental Change, and Biomass Burning. American Geophysical Union Fall 2011 Meeting, San Francisco, CA.

2) Department Public School Outreach Coordinator (Geogators: Founder). In the past year we delivered 28 separate earth science lessons, reaching a total of 858 students. More than half of these were at underserved public schools with high proportions of minority students.
3) Developing and researching use of computer-integrated student response systems for use in General Education Earth Science classrooms.
4) University of Florida Oil Spill Task Force – co-chair (2010).
5) International Biochar Initiative (IBI) Biochar Panel: 'Expert Panel to Develop Stable Biochar Carbon Test Methodology for a Carbon Market Protocol' (June – November, 2013).

Board of Governors, State University System of Florida

Request to Offer a New Degree Program

(Please do not revise this proposal format without prior approval from Board staff)

University of Florida	**Fall 2020**
University Submitting Proposal	**Proposed Implementation Term**
College of Liberal Arts and Sciences	**Geological Sciences and Biology**
Name of College(s) or School(s)	**Name of Department(s)/ Division(s)**
Marine Sciences	**Marine Sciences**
Academic Specialty or Field	**Complete Name of Degree**
30.3201	
Proposed CIP Code	

The submission of this proposal constitutes a commitment by the university that, if the proposal is approved, the necessary financial resources and the criteria for establishing new programs have been met prior to the initiation of the program.

Date Approved by the University Board of Trustees

Signature of Chair, Board of Trustees **Date**

Provide headcount (HC) and full-time equivalent (FTE) student estimates of majors for Years 1 through 5. HC and FTE estimates should be identical to those in Table 1 in Appendix A. Indicate the program costs for the first and the fifth years of implementation as shown in the appropriate columns in Table 2 in Appendix A. Calculate an Educational and General (E&G) cost per FTE for Years 1 and 5 (Total E&G divided by FTE).

Implementation Timeframe	Projected Enrollment (From Table 1)			Projected Program C (From Table 2)		
	HC	FTE		E&G Cost per FTE	E&G Funds	Contract & Grants Funds
Year 1	120	120		$2997	$359,600	$0
Year 2	128	128				
Year 3	137	137				
Year 4	141	141				
Year 5	144	144		$2831	$409,103	$0

Note: This outline and the questions pertaining to each section must be reproduced within the body of the proposal to ensure that all sections have been satisfactorily addressed. Tables 1 through 4 are to be included as Appendix A and not reproduced within the body of the proposals because this often causes errors in the automatic calculations.

Introduction

I. Program Description and Relationship to System-Level Goals

A. Briefly describe within a few paragraphs the degree program under consideration, including (a) level; (b) emphases, including majors, concentrations, tracks, or specializations; (c) total number of credit hours; and (d) overall purpose, including examples of employment or education opportunities that may be available to program graduates.

a. Level:

Bachelor of Science in Marine Sciences.

b. Emphases, including majors, concentrations, tracks, or specializations:

The B.S. in Marine Sciences degree program replaces the Interdisciplinary Studies-Marine Sciences major specializations that have been offered in parallel since 2012 through the Colleges of Liberal Arts and Sciences (CLAS) and Agricultural and Life

Sciences (CALS) at the University of Florida (UF). Presently we have 120 undergraduates who are declared majors in the Interdisciplinary Studies Marine Sciences major between the two colleges. Our collaboratively administered Marine Sciences major is multi-disciplinary and broad in scope; every student takes courses across the fields of biology, chemistry, geology, and physics of marine, estuarine, and coastal environments, as well as the conservation and management of marine resources. Our interdisciplinary approach allows students to tailor a curriculum that suits their interests and career goals by emphasizing the physical or biological sciences (CLAS track) or the fields of ecology, conservation, and management (CALS track).

c. Total number of credit hours:

The total number of credit hours required is 120.

d. Overall purpose, including examples of employment or education opportunities that may be available to program graduates:

The overall purpose of this degree program is to provide a comprehensive marine sciences education at UF and to develop highly qualified leaders who will address critical state, national, and world coastal and marine challenges. Our interdisciplinary approach to marine science education provides students with core scientific and quantitative skills for success and prepares students for a variety of rewarding academic and professional careers related to marine sciences. Employment and education opportunities are available to graduates in a wide variety of fields, including the physical sciences (e.g., marine geology, physical oceanography, ocean and coastal engineering, climatology, non-renewable resource exploration, hydrogeology), the biological sciences (e.g., marine biology, natural resource management, environmental restoration, aquaculture, aquatic animal medicine), human dimensions (e.g., education, outreach, tourism), policy and economics (e.g., hazard mitigation, ocean policy, law, insurance, fisheries economics), and quantitative sciences (e.g., stock assessment, population dynamics).

B. Please provide the date when the pre-proposal was presented to CAVP (Council of Academic Vice Presidents) Academic Program Coordination review group. Identify any concerns that the CAVP review group raised with the pre-proposed program and provide a brief narrative explaining how each of these concerns has been or is being addressed.

The Council of Academic Vice Presidents (CAVP) Academic Program Coordination review group discussed the degree program pre-proposal on April 14, 2017. The CAVP review group raised no concerns with the pre-proposed degree program; no official comments were recorded.

C. If this is a doctoral level program please include the external consultant's report at the end of the proposal as Appendix D. Please provide a few highlights from the report and describe ways in which the report affected the approval process at the university.

N/A

D. Describe how the proposed program is consistent with the current State University System (SUS) Strategic Planning Goals. Identify which specific goals the program will directly support and which goals the program will indirectly support (see link to the SUS Strategic Plan on the resource page for new program proposal). –

The mission of the State University System (SUS) includes the provision of undergraduate education of the highest quality to serve the needs of a diverse state and global society. UF, the flagship institution in the SUS, did not have a Marine Sciences degree program in support of this SUS mission, despite the needs and importance of Florida's diverse ocean economy, until 2012 when the Interdisciplinary Studies Marine Sciences major was introduced. The proposed Marine Sciences degree program develops students' knowledge, skills and aptitudes needed for success in the global society and marketplace and provides qualified graduates to help Florida's ocean economy employers prosper and grow. This degree program directly supports the Teaching and Learning SUS Strategic Planning Goals, including the points of emphasis - excellence, productivity, and strategic priorities, as listed below.

SUS Goal: Strengthen Quality and Reputation of Academic Programs and Universities

Development of the proposed Marine Sciences degree program will help propel UF into the top public undergraduate institutions for marine science education in the state and the nation. This major is in high demand and attracts high performing students. Therefore, the proposed Marine Sciences degree program will contribute toward the excellence performance indicators of national rankings and programs, as well as the proportion of freshmen in the top 10% of their graduating high school class.

SUS Goal: Increase Degree Productivity and Program Efficiency

Development of the proposed Marine Sciences degree program will elevate UF's teaching and learning productivity by attracting top students to UF from the state of Florida, the Southeastern US and the nation, thereby increasing the number of bachelor's degrees awarded. The proposed degree program will also contribute toward other productivity performance indicators, including average time to degree, 4-year graduation rates, and bachelor's degrees awarded to minorities. Since the initiation of the Interdisciplinary Studies - Marine Sciences major in 2012, students admitted as freshmen have completed their degrees in 3.8 years. In addition, the major attracts a high proportion of minority (20% identify as minority, 12% as Hispanic)

and female students (75%).

SUS Goal: Increase the number of degrees awarded in STEM areas

When we initially established the Interdisciplinary Studies major in Marine Sciences at UF in 2012, we recruited students from other programs within the university. Many of these students may have already been declared as, or contemplating declaring in, a STEM subject. However, in the past few years, we have noted a surge in the number of students who are being recruited externally and are attracted to coming to UF specifically because of the presence of the Marine Sciences major and in light of the reputation and growth in the major.

E. If the program is to be included in a category within the Programs of Strategic Emphasis as described in the SUS Strategic Plan, please indicate the category and the justification for inclusion.

The Programs of Strategic Emphasis Categories:

1. Critical Workforce:
   - Education
   - Health
   - Gap Analysis
2. Economic Development:
   - Global Competitiveness
3. Science, Technology, Engineering, and Math (STEM)

Please see the Programs of Strategic Emphasis (PSE) methodology for additional explanations on program inclusion criteria at the resource page for new program proposal .

This 30.3201 B.S. in Marine Sciences will directly address the goal of increasing the number of degrees awarded in STEM. The proposed degree program represents a holistic integration of STEM fields including biology, geology, chemistry, and physics, as well as statistics, economics, policy, human dimensions, and resource management. Therefore, this STEM degree program will provide students with the core scientific and quantitative skills necessary for career success and will prepare students for occupations related to marine sciences, including marine geology, marine biology, physical oceanography, ocean engineering, coastal engineering, natural resource management, environmental restoration, climatology, aquaculture, non-renewable resource exploration, hydrogeology, hazard mitigation, tourism, ocean policy, law, and insurance. These are critical STEM areas of interest to the State of Florida. In terms of economic impacts, more than 440,000 jobs are directly created by, or indirectly supported by, ocean resource use activities in Florida. The ocean economy contributes more than $35 billion (2011) to Florida's economy, or 5% of the state's GDP. The state's tourism, construction, and fisheries industries are all tied to aspects of ocean and coastal resources. Additionally, hundreds of miles of sandy beaches along the Florida coastline are a major draw for tourism, the state's number one industry.

F. Identify any established or planned educational sites at which the program is expected to be offered and indicate whether it will be offered only at sites other than the main campus.

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The degree program will be offered at the main campus of UF. Students will have the opportunity to study at marine field stations on both coasts of Florida; at the Nature Coast Biological Station in Cedar Key (Gulf Coast) and at the Whitney Laboratory for Marine Bioscience in Marineland (Atlantic Coast). Students will also have the opportunity to participate in a 4-day research cruise to the West Florida Shelf, onboard the Florida Institute of Oceanography (FIO) *R/V Hogarth,* as part of a 3-credit Field Marine Ecology course (FIO ship time and funding were secured for 2018 and 2019). Plans are underway to increase opportunities for students to study on board this state-of-the-art floating classroom. Study abroad courses in Cuba, Belize, San Salvador, Mexico, and the Bahamas are optional elective courses for the major.

Institutional and State Level Accountability

II. Need and Demand

A. Need: Describe national, state, and/or local data that support the need for more people to be prepared in this program at this level. Reference national, state, and/or local plans or reports that support the need for this program and requests for the proposed program which have emanated from a perceived need by agencies or industries in your service area. Cite any specific need for research and service that the program would fulfill.

Given the scale of importance of Florida's oceans and coasts to the state economy, training of students to enter the job market in marine science related positions plays a critical role in the vision of Florida's future. Job growth in some of these fields, e.g. marine geology, is expected to be more than 10% in the next decade. Current entry level salaries range from $35,360 to more than $70,720. Because of the diversity of jobs that marine science majors will be equipped to tackle, it is difficult to pinpoint specific job growth statistics in that area. Nonetheless, given that more than half of the state population lives in coastal counties, the nexus between the health and sustainability of coastlines, coastal ecosystems, and the coastal economy, this job sector is envisioned to grow significantly along with economic and population growth in the state of Florida.

B. Demand: Describe data that support the assumption that students will enroll in the proposed program. Include descriptions of surveys or other communications with prospective students.

The proposed degree program will replace the current Interdisciplinary Studies-Marine Sciences majors that have been offered in parallel through CLAS and CALS since 2012. These coordinated programs have shown impressive growth, with 120 students currently enrolled (20 in CLAS, 100 CALS). Therefore, we have already demonstrated high demand for a Marine Sciences degree program at UF and in the SUS.

C. If substantially similar programs (generally at the four-digit CIP Code or 60 percent similar in core courses), either private or public exist in the state, identify the institution(s) and geographic location(s). Summarize the outcome(s) of communication with such programs with regard to the potential impact on their enrollment and opportunities for possible collaboration (instruction and research). In Appendix C, provide data that support the need for an additional program.

The proposed Marine Sciences degree program does not duplicate other degree programs in the SUS. No degrees have been granted in the SUS under the CIP Code 30.3201 Marine Science (searchable data starts in 1991). Related degree programs exist at four SUS institutions: Florida Gulf Coast University BS in Marine Science (03.0205 Water, Wetlands and Marine Resource Management), Florida International University BS in Marine Biology (26.1302 Marine Biology and Biological Oceanography), University of West Florida BS in Marine Biology (26.1302), and Florida Gateway College BAS in Water Resources Management (03.0205). Department chairs and program directors at these institutions have been provided opportunities to submit input; no comments on the potential impact on their enrollment have been forthcoming (See attached documentation).

D. Use Table 1 in Appendix A (1-A for undergraduate and 1-B for graduate) to categorize projected student headcount (HC) and Full Time Equivalents (FTE) according to primary sources. Generally undergraduate FTE will be calculated as 30 credit hours per year and graduate FTE will be calculated as 24 credit hours per year. Describe the rationale underlying enrollment projections. If students within the institution are expected to change majors to enroll in the proposed program at its inception, describe the shifts from disciplines that will likely occur.

Please refer to Table 1, Appendix A for the undergraduate projected student headcount and FTE. These numbers are based on the current enrollment in the Interdisciplinary Studies Marine Sciences major as a starting point. Some growth is envisioned as the Interdisciplinary Studies major was originally populated from students in other degree programs who switched over to Marine Sciences, but now we are seeing recruitment of incoming (external) students into the major, based on the initial successes of the program. Modest growth is projected over the next 5 years, to level off at about 150 students.

E. Indicate what steps will be taken to achieve a diverse student body in this program. If the proposed program substantially duplicates a program at FAMU or FIU, provide, (in consultation with the affected university), an analysis of how the program might have an impact upon that university's ability to attract students of races different from that which is predominant on their campus in the subject program. The university's Equal Opportunity Officer shall review this section of the proposal and then sign and date Appendix B to indicate that the analysis required by this subsection has been completed .

It should be noted that the proposed BS degree program does not duplicate programs at FAMU or FIU. Both universities had the opportunity to provide statements of impact at the pre-proposal stage. Recruitment and retention of students in the Marine Sciences degree program will follow the same standard practices and procedures of all programs in both CLAS and CALS to ensure its full availability to the diverse student body at UF. Both colleges are committed to educating a diverse student body and are actively involved in college level and campus-wide programs to ensure this goal. Enrollment in our Interdisciplinary Studies - Marine Sciences major already encompass students of diverse ethnic backgrounds and the major consistently attracts a remarkably high number of female students.

Despite what is an already strong commitment to diversity, we will continue to strengthen our commitment to racial and gender diversity in our classrooms. For example, the School of Forest Resources and Conservation (SFRC), in which the CALS Marine Sciences degree program will be housed, has recently hired a second Undergraduate Academic Advisor and Recruiter. She focuses on engaging with a diverse population of potential freshmen, as well as current UF students interested in pursuing the Marine Sciences major. In addition, the Undergraduate Academic Advisor and Recruiter assists with retention communication, social media, and student tracking.

Faculty in both CLAS and CALS are committed to increasing diversity on campus and in our majors. For example, SFRC has a Diversity Task Force charged with developing methods to support a more diverse faculty and undergraduate student body. This committee actively includes and seeks the input of undergraduate students. Moreover, faculty members in both CLAS and CALS are actively engaged in programs such as UF's Minority Mentor Program, in recognition of the great importance of maintaining and promoting diversity. This type of service is, and will continue to be, actively encouraged and recognized.

III. Budget

A. Use Table 2 in Appendix A to display projected costs and associated funding sources for Year 1 and Year 5 of program operation. Use Table 3 in Appendix A to show how existing Education & General funds will be shifted to support the new program in Year 1. In narrative form, summarize the contents of both tables, identifying the source of both current and new resources to be devoted to the proposed program. (Data for Year 1 and Year 5 reflect snapshots in time rather than cumulative costs.)

In Table 2, we have summarized the funding sources for the degree program. Please note that, since we have already established the Marine Sciences program as an Interdisciplinary Studies major, no new faculty are required, and no

reallocation of resources is technically required. This proposal, instead, is to transition this high-enrollment Interdisciplinary Studies major over to its own degree program. Nonetheless, we have tabulated the costs associated with this degree program in Table 2, where the reallocated base in Year 1 is estimated at $354,600. The difference between Year 5 and Year 1 reflects 3% increases in salary per year and the addition of some teaching assistants to accommodate extra sections in some of the core courses required by the degree program. The reallocated base in Year 1 reflects a distribution between several different departments and colleges to provide the necessary instructional staff, as shown in Table 3. This reflects participation of faculty from the Departments of Geological Sciences, Biology, Coastal Engineering, FL Museum of Natural History, and the SFRC.

B. Please explain whether the university intends to operate the program through continuing education, seek approval for market tuition rate, or establish a differentiated graduate-level tuition. Provide a rationale for doing so and a timeline for seeking Board of Governors' approval, if appropriate. Please include the expected rate of tuition that the university plans to charge for this program and use this amount when calculating cost entries in Table 2.

The degree program will not be offered through continuing education on a cost-recovery basis. It will be a regular state funded UF degree program.

C. If other programs will be impacted by a reallocation of resources for the proposed program, identify the impacted programs and provide a justification for reallocating resources. Specifically address the potential negative impacts that implementation of the proposed program will have on related undergraduate programs (i.e., shift in faculty effort, reallocation of instructional resources, reduced enrollment rates, greater use of adjunct faculty and teaching assistants). Explain what steps will be taken to mitigate any such impacts. Also, discuss the potential positive impacts that the proposed program might have on related undergraduate programs (i.e., increased undergraduate research opportunities, improved quality of instruction associated with cutting-edge research, improved labs and library resources).

Funds for the new Marine Sciences degree program will be covered by the annual operating budgets of the participating departments, as provided by CLAS and CALS. There will be no negative impact on existing Interdisciplinary Studies - Marine Sciences majors; The Interdisciplinary Studies - Marine Sciences majors in CLAS and CALS will be closed, and these students moved into the new degree program, once it is approved and in place.

D. Describe other potential impacts on related programs or departments (e.g., increased need for general education or common prerequisite courses, or increased need for required or elective courses outside of the proposed major).

The impact of approximately 150 Marine Sciences students at UF by year five will be felt in participating departments. Other UF departments that will be affected include Chemistry, Mathematics, Physics, and Statistics. These departments teach many of the foundation courses in the physical sciences and mathematics for the degree program. Because it is anticipated that students in the Marine Sciences degree program would have otherwise selected a similar science offering at UF, these classes should experience only slightly increased enrollments. We do anticipate a sustained and potentially increased demand for the course "OCE 1001 Introduction to Oceanography," which is taught in the Department of Geological Sciences. OCE 1001 is a core course for the major, and one that serves to attract students to the Marine Sciences major. It is currently offered in the summer (online) and fall semesters, but not in spring.

E. Describe what steps have been taken to obtain information regarding resources (financial and in-kind) available outside the institution (businesses, industrial organizations, governmental entities, etc.). Describe the external resources that appear to be available to support the proposed program.

No such resources are specifically required for the degree program, but there are additional external opportunities that could enhance the undergraduate learning experience, as detailed in Section X. J.

IV. Projected Benefit of the Program to the University, Local Community, and State

Use information from Tables 1 and 2 in Appendix A, and the supporting narrative for "Need and Demand" to prepare a concise statement that describes the projected benefit to the university, local community, and the state if the program is implemented. The projected benefits can be both quantitative and qualitative in nature, but there needs to be a clear distinction made between the two in the narrative.

The proposed Marine Sciences degree program will benefit UF by attracting high performing students. In so doing, the proposed degree program will contribute to national productivity performance indicators, including average time to degree, 4-year graduation rates, and bachelor's degrees awarded to minorities, helping to propel UF into the top public undergraduate institutions for marine science education in the state and nation.

The proposed Marine Sciences degree program will benefit the State of Florida by producing graduates who are able to compete and succeed in a broad variety of marine science related positions in Florida, the nation, and beyond. Students graduating from this program will be well prepared for positions or pursuit of graduate degrees in marine geology, marine biology, physical oceanography, ocean engineering, coastal engineering, natural resource management, environmental restoration, climatology, aquaculture, non-renewable resource exploration, hydrogeology, hazard mitigation, tourism, ocean policy, law, and insurance. In Florida, more than 440,000 jobs are directly created by, or indirectly supported by, ocean resource use activities. The ocean economy contributes more than $35 billion (2011) to Florida's economy; the state's tourism, construction, and fisheries industries are all tied to aspects of ocean and coastal resources. Job growth in many of these fields is expected to increase nationally by more than 10% in the next decade. Our projected enrollment of approximately 150 students will help meet this demand for students with the necessary core scientific and quantitative skills

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V. Access and Articulation – Bachelor's Degrees Only

A. If the total number of credit hours to earn a degree exceeds 120, provide a justification for an exception to the policy of a 120 maximum and submit a separate request to the Board of Governors for an exception along with notification of the program's approval. (See criteria in Board of Governors Regulation 6C-8.014)

The Bachelor of Science degree in Marine Sciences will require 120 credit hours.

List program prerequisites and provide assurance that they are the same as the approved common prerequisites for other such degree programs within the SUS (see link to the Common Prerequisite Manual on the resource page for new program proposal). The courses in the Common Prerequisite Counseling Manual are intended to be those that are required of both native and transfer students prior to entrance to the major program, not simply lower-level courses that are required prior to graduation. The common prerequisites and substitute courses are mandatory for all institution programs listed, and must be approved by the Articulation Coordinating Committee (ACC). This requirement includes those programs designated as "limited access."

If the proposed prerequisites are not listed in the Manual, provide a rationale for a request for exception to the policy of common prerequisites. NOTE: Typically, all lower-division courses required for admission into the major will be considered prerequisites. The curriculum can require lower-division courses that are not prerequisites for admission into the major, as long as those courses are built into the curriculum for the upper-level 60 credit hours. If there are already common prerequisites for other degree programs with the same proposed CIP, every effort must be made to utilize the previously approved prerequisites instead of recommending an additional "track" of prerequisites for that CIP. Additional tracks may not be approved by the ACC, thereby holding up the full approval of the degree program. Programs will not be entered into the State University System Inventory until any exceptions to the approved common prerequisites are approved by the ACC.

The following list of prerequisites are required of both native and transfer students prior to entrance to the Marine Sciences major in either CLAS or CALS. They are the same as the approved common prerequisites for other STEM degree programs within the SUS.

MAC 2311 Analytic Geometry and Calculus 1
CHM 2045 & 2045L General Chemistry 1 and General Chemistry 1 Laboratory
CHM 2046 & 2046L General Chemistry 2 and general Chemistry 2 Laboratory
BSC 2010 & 2010L Integrated Principles of Biology 1 and Integrated Principles of Biology Laboratory 1
BSC 2011 & 2011L Integrated Principles of Biology 2 and Integrated Principles of Biology Laboratory 2

The UF Marine Sciences curriculum (CIP 30.3201) also requires completion of **OCE 1001 Introduction to Oceanography** by both native and transfer students, prior to entrance to the major in either CLAS or CALS. This course substitutes for GLY 1000/1000C Physical Geology, a prerequisite under the CIP 30.0205 Marine Science. The UF Marine Sciences Committee asserts that requirement of OCE 1001 Introduction to Oceanography contributes to success in upper division marine sciences courses by providing students with a foundation in not only the physical and geological characteristics of the Earth, but also the biological characteristics of the marine realm, the role of the ocean in shaping the global Earth environment, and an awareness of the ocean influence on human well-being.

The CLAS track requires both **PHY 2053 & 2053L Physics 1 with Laboratory for Physics 1** and **PHY 2054 & 2054L Physics 2 with Laboratory for Physics 2** *or* both **PHY 2048 & 2048L Physics with Calculus 1 and Laboratory for Physics with Calculus 1** and **PHY 2049 & 2049L Physics with Calculus 2 and Laboratory for Physics with Calculus 2** prior to entrance to the Marine Sciences major. PHY 2053 & 2053L is an approved common prerequisite for other STEM degree programs within the SUS. The CLAS track requires two semesters of Physics and provides the option of Physics with Calculus, as justified by the track's greater emphasis on the physical, mathematical, and engineering sciences.

The CALS track requires **PHY 2004 & 2004L Applied Physics 1 and Laboratory for Applied Physics 1**. This course serves the CALS students entering the fields of ecology, conservation, and management by emphasizing the practical applications of basic physics, including the mechanics of motion, forces, energy, momentum, wave motion and heat. PHY 2053 & 2053L Physics 1 with Laboratory for Physics 1 and PHY 2054 & 2054L Physics 2 with Laboratory for Physics 2 are required for the pre-vet curriculum and will substitute for the CALS track physics requirement.

B. If the university intends to seek formal Limited Access status for the proposed program, provide a rationale that includes an analysis of diversity issues with respect to such a designation. Explain how the university will ensure that Florida College System transfer students are not disadvantaged by the Limited Access status. NOTE: The policy and criteria for Limited Access are identified in Board of Governors Regulation 6C-8.013. Submit the Limited Access Program Request form along with this document.

N/A

C. If the proposed program is an AS-to-BS capstone, ensure that it adheres to the guidelines approved by the Articulation Coordinating Committee for such programs, as set forth in Rule 6A-10.024 (see link to the Statewide Articulation Manual on the resource page for new program proposal). List the prerequisites, if any, including the specific AS degrees which may transfer into the program.

N/A

Institutional Readiness

VI. Related Institutional Mission and Strength

A. Describe how the goals of the proposed program relate to the institutional mission statement as contained in the SUS Strategic Plan and the University Strategic Plan (see link to the SUS Strategic Plan on the resource page for new program proposal).

Our proposed degree program in Marine Sciences supports the UF and SUS missions by providing premier undergraduate education to develop highly qualified leaders who will address critical state, national, and world challenges. This degree program specifically supports the goal of the 2025 System Strategic Plan to increase the number of degrees awarded in STEM disciplines of strategic emphasis. Additionally, this degree program brings together faculty from different departments and colleges within the university, facilitating increased research collaboration and research opportunities for students, another Strategic Priority for a Knowledge Economy of the SUS mission statement.

B. Describe how the proposed program specifically relates to existing institutional strengths, such as programs of emphasis, other academic programs, and/or institutes and centers.

The proposed interdisciplinary program will be collaboratively administered through CLAS and CALS and efficiently leverages the faculty, courses, and resources of the Departments of Geological Sciences and Biology, and the Fisheries and Aquatic Sciences program of the SFRC to provide a comprehensive marine sciences education at UF. Though UF is strong in the Marine Sciences, the faculty are spread between different colleges and departments. This major will help to better establish this presence on campus by uniting faculty and students engaged in Marine Sciences. This program will also take advantage of multiple UF coastal research stations and has a strong potential to interact with the UF Climate Institute, Water Institute, Emerging Pathogens Institute (EPI), the Land Use and Environmental Change Institute (LEUCI), and the FIO.

C. Provide a narrative of the planning process leading up to submission of this proposal. Include a chronology in table format of the activities, listing both university personnel directly involved and external individuals who participated in planning. Provide a timetable of events necessary for the implementation of the proposed program.

The planning of this program was thorough and comprehensive and dates to Fall 2010. In response to student interest, the CLAS Departments of Biology and Geological Sciences and the CALS SFRC-Fisheries and Aquatic Sciences independently began working on plans to develop an interdisciplinary marine sciences program. In cross-college discussions, it became evident that we were well-poised to offer a dynamic cross-college major, combining our disciplines and maximizing our teaching resources. Faculty members of the departments formed committees to develop curricula for Interdisciplinary Studies tracks in Marine Sciences. The committees worked quickly and presented plans to their respective faculties and college curriculum committees in Fall 2011, gaining approval. On December 20, 2011, the UF

University Curriculum Committee approved the proposal for the Interdisciplinary Studies - Marine Sciences major in CLAS and CALS. The first students were accepted into the major in Summer 2012.

Enrollment in the Interdisciplinary Studies - Marine Sciences major grew, providing incentive to develop the major into stand-alone degree programs in CLAS and CALS. Accordingly, a reorganized Marine Sciences Committee worked on a pre-proposal document throughout 2016-2017. The Board of Governors Council of Academic Vice Presidents work group discussed the pre-proposal for a BS in Marine Sciences on April 14, 2017, passing it with no concerns.

Planning Process

Date	Participants	Planning Activity
10-11-10	CLAS faculty, administrators	Discussed creation of Marine Sciences Interdisci major
10-14-10	CLAS and CALS faculty	Discussed integration of Marine Sciences Interdi major curriculum across colleges
3-16-2011	Faculty of Dept. of Biology and Dept. Geological Sciences	Approve to go ahead with development of the m
4-21-2011	Fisheries and Aquatic Sciences Program Advisory Committee, Fisheries and Aquatic Sciences faculty	Discussed need for Marine Sciences major
4-25-2011	CALS and CLAS faculty, staff, administrators	Discussed cross-college Interdisciplinary Studies Marine Sciences
9-27-11	School of Forest Resources and Conservation faculty, administrators	SFRC committee formed to develop curriculum track
10-10-11	CLAS Curriculum Committee	Approved CLAS Marine Sciences Interdisciplina Major proposal
11-1-2011	School of Forest Resources and Conservation Undergraduate Programs Committee	Approved CALS Marine Sciences Interdisciplina Major proposal
11-10-2011	School of Forest Resources and Conservation faculty	Approved CALS Marine Sciences Interdisciplina Major proposal

11-18-2011	CALS Curriculum Committee	Approved CALS Marine Sciences Interdisciplina proposal
12-20-2011	University Curriculum Committee	Approved cross-college Interdisciplinary Studies Marine Sciences
2-29-2012	CALS and CLAS faculty, staff	Cross-College Marine Sciences Committee form
4-22-2013	Deans of CALs and CLAS	Requested provost place Marine Sciences BS on Plan
3-24-2017	Marine Sciences Committee	Submitted Pre-proposal to UF Provost
4-14-2017	Board of Governors Council of Academic Vice Presidents work group	Discussed and passed Pre-proposal

Events Leading to Implementation

Date	Implementation Activity
Fall 2019	Submission to Colleges/UCC
Winter 2019	Submission to Senate, Provost
Spring 2020	BOT approval and BOG notification
Fall 2020	First enrollment, Current Interdisciplinary students change to new degree program

VII. Program Quality Indicators - Reviews and Accreditation

Identify program reviews, accreditation visits, or internal reviews for any university degree programs related to the proposed program, especially any within the same academic unit. List all recommendations and summarize the institution's progress in implementing the recommendations.

Accreditation by an outside agency is not required. Instead, the degree program will be reviewed periodically by external experts and stakeholders and monitored by the UF Marine Sciences Committee, composed of faculty and staff from CLAS and CALS.

VIII. Curriculum

A. Describe the specific expected student learning outcomes associated with the proposed program. If a bachelor's degree program, include a web link to the Academic Learning Compact or include the document itself as an appendix.

Student Learning Outcomes (SLOs):

1. Demonstrate competence in the basic terminology, concepts, methodologies and theories used within the marine sciences.
2. Analyze information in the marine sciences and develop reasoned solutions to problems using the processes and applications of scientific inquiry.
3. Discriminate ethical behavior from unethical behavior in scientific research.
4. Communicate knowledge, ideas and reasoning clearly, effectively and objectively in written or oral forms appropriate to the marine sciences.

CLAS Academic Learning Compact: https://catalog.ufl.edu/UGRD/colleges-schools/UGLAS/IS_BS07/#academiclearningcompacttext

CLAS Academic Learning Compact: https://catalog.ufl.edu/UGRD/colleges-schools/UGAGL/IDS_BS17/#academiclearningcompacttext

B. Describe the admission standards and graduation requirements for the program.

There are no admission standards that are different for this particular degree program, relative to the normal admission standards. The degree program requires 60-67 credits of coursework completed with a minimum grade of C. At least 30 credits of coursework must be completed at UF. Students must also meet standard graduation requirements at the university and college levels.

C. Describe the curricular framework for the proposed program, including number of credit hours and composition of required core courses, restricted electives, unrestricted electives, thesis requirements, and dissertation requirements. Identify the total numbers of semester credit hours for the degree.

The proposed degree program requires 60-67 credits of coursework in the major and 120 total credit hours. The CLAS and CALS tracks were developed in parallel and are complementary; the curriculum provides the core scientific and quantitative skills necessary for success. Lower-division courses build a strong foundation in basic sciences and math while upper-division courses provide opportunity for specialization.

Students in CLAS complete an upper-division core that integrates the physical and biological sciences, mathematics, and engineering. They work closely with a faculty advisor to create an individualized curriculum of at least 12 credits of approved electives.

Students in CALS complete an upper-division core that concentrates on biological and ecological marine science essentials while also giving students a critical understanding of how statistics and economics are integrated into marine science and resource management. Students work closely with a faculty advisor to create an individualized curriculum plan of at least 18 approved elective credits and 15-16 hours of planned credits. These can include courses on resource management, human

dimensions, conservation, quantitative population assessment and others.

D. Provide a sequenced course of study for all majors, concentrations, or areas of emphasis within the proposed program.

Sequenced course of study for the CLAS track in the proposed degree program:

Semester 1

- **CHM 2045 & 2045L General Chemistry 1 and General Chemistry 1 Laboratory** (Critical Tracking; State Core Gen Ed Physical Sciences)
- **IDS 1161 What is the Good Life** (Gen Ed Humanities)
- Select one: **MAC 2311 Analytic Geometry and Calculus 1** (Critical Tracking), **MAC 1147 Precalculus Algebra and Trigonometry** (State Core Gen Ed Mathematics)
- **OCE 1001 Introduction to Oceanography** (Critical Tracking; Gen Ed Physical Sciences)

Semester 2

- **CHM 2046 & 2046L General Chemistry 2 and General Chemistry 2 Laboratory** (Critical Tracking; Gen Ed Physical Sciences)
- Select one: Elective **, MAC 2311 Analytic Geometry and Calculus 1 (** if needed)
- State Core Gen Ed Composition; Writing Requirement
- State Core Gen Ed Humanities
- State Core Gen Social and Behavioral Sciences

Semester 3

- **BSC 2010 & 2010L Integrated Principles of Biology 1 and Integrated Principles of Biology Laboratory 1** (Critical Tracking; Gen Ed Biological Sciences)
- **GLY 3083C Fundamentals of Marine Sciences** (Gen Ed Physical Sciences)
- Select one: **MAC 2312 Analytic Geometry and Calculus 2, STA 2023 Introduction to Statistics 1** (Gen Ed Mathematics)
- Elective (3000 level or above, not in major)
- Gen Ed Humanities

Semester 4

- **BSC 2011 & 2011L Integrated Principles of Biology 2 and Integrated Principles of Biology Laboratory 2** (Critical Tracking; Gen Ed Biological Sciences)
- Select one: **PHY 2053 & 2053L Physics 1 and Laboratory for Physics 1** (Critical Tracking; Gen Ed Physical Sciences), **PHY 2048 & 2048L Physics with Calculus 1 and Laboratory for Physics with Calculus 1** (Critical Tracking)
- Elective (3000 level or above, not in major)
- Gen Ed Social and Behavioral Sciences

Semester 5

- Select one: **PHY 2054 & 2054LPhysics 2 and Laboratory for Physics 2** (Critical Tracking; Gen Ed Physical Sciences), **PHY 2049 & 2049L Physics with Calculus 2 and Laboratory for Physics with Calculus 2** (Critical Tracking)
- **ZOO 4926 Special Topics in Zoology (Marine Ecology)** or **FAS 4270 Marine Ecological Processes**
- Elective
- Foreign language

Semester 6

- **GLY 4726 Geochemical Oceanography**
- **ZOO 4403C Marine Biology**
- Gen Ed Composition: Writing requirement
- Foreign language

Semester 7

- Approved elective
- Electives (3000 level or above, not in major)
- Marine sciences core elective
- Gen Ed Social and Behavioral Sciences

Semester 8

- Approved electives
- Elective
- Elective (3000 level or above, not in major)

Sequenced course of study for the CALS track in the proposed degree program:

Semester 1

- **CHM 2045 & 2045L General Chemistry 1 and General Chemistry 1 Laboratory** (Critical Tracking; State Core Gen Ed Biological and Physical Sciences)
- **IDS 1161 What is the Good Life** (Gen Ed Humanities)
- **OCE 1001 Introduction to Oceanography** (Critical Tracking; Gen Ed Biological Sciences and Physical Sciences)
- State Core Gen Ed Social and Behavioral Sciences
- Elective

Semester 2

- **CHM 2046& 2046L General Chemistry 2 and General Chemistry 2 Laboratory** (Critical Tracking; Gen Ed Biological Sciences and Physical Sciences)
- **MAC 2311 Analytic Geometry and Calculus 1** (Critical tracking; State Core Gen Ed Mathematics)
- State Core Gen Ed Composition; Writing Requirement
- State Core Gen Ed Humanities

Semester 3

- Select one: **AEB 3103 Principles of Food and Resource Economics, ECO 2023 Principles of Microeconomics, ECO 2013 Principles of Macroeconomics** (Gen Ed Social and Behavioral Sciences)
- **BSC 2010 & 2010L Integrated Principles of Biology 1 and Integrated Principles of Biology Laboratory 1** (Critical Tracking; Gen Ed Biological Sciences and Physical Sciences)
- Gen Ed Composition; Writing Requirement
- **MAC 2312 Analytic Geometry and Calculus 2** (recommended elective)

Semester 4

- **BSC 2011 & 2011L Integrated Principles of Biology 2 and Integrated Principles of Biology 2 Laboratory** (Critical Tracking; Gen Ed Biological Sciences and Physical Sciences)
- **PHY 2004 & 2004L Applied Physics 1 and Laboratory for Applied Physics 1** (Critical Tracking; Gen Ed Biological Sciences and Physical Sciences)
- **STA 2023 Introduction to Statistics 1** (Gen Ed Mathematics)
- **FAS 2024 Global and Regional Perspectives in Fisheries (** Recommended elective)

Semester 5

- **AEC 3030C Effective Oral Communication** or **SPC 2608 Introduction to Public Speaking**
- Select one: **FNR 3410C Natural Resource Sampling** , **STA 3024 Introduction to Statistics 2, STA 4210 Regression Analysis, STA 4222 Sample Survey Design**
- **CHM 2200 & 2200L Fundamentals of Organic Chemistry and Fundamentals of Organic Chemistry Laboratory** (recommended electives)
- Elective

Semester 6

- **FAS 4932 Topics in Fisheries and Aquatic Sciences** (Biology and Ecology of Algae)
- **GLY 3083C Fundamentals of Marine Sciences** (Gen Ed Biological and Physical Sciences)
- **ZOO 4205C Invertebrate Biodiversity**
- Approved electives

Semester 7

- Select one: **AEC 3033C Research and Business Writing in Agricultural and Life Sciences** (Writing Requirement), **ENC 2210 Technical Writing** (Writing Requirement), **ENC 3254 Professional Writing in the Discipline** (Writing Requirement)
- **FAS 4202 Biology of Fishes**
- Selection one: **FAS 4270 Marine Ecological Processes, ZOO 4926 Special Topics in Zoology** (Marine Ecology)
- **FNR 4660 Natural Resource Policy and Economics**
- Elective

Semester 8

- Approved electives
- Electives

E. Provide a one- or two-sentence description of each required or elective course.

CLAS track

CLAS Required Courses

BSC 2010 Integrated Principles of Biology 1. The first of a two-semester sequence that prepares students for advanced biologi courses and allied fields. Studies the origin of life systems; of biological molecules and organization of living things at the subcel cellular and organismic levels; and of the activities of living forms in obtaining and utilizing energy and materials in growth, mai and reproduction.
BSC 2010L Integrated Principles of Biology Laboratory 2 . Laboratory experiments designed to accompany BSC 2010.
BSC 2011 Integrated Principles of Biology 2. The second of a two-semester sequence that prepares students for advance sciences courses and allied fields. Examination in living things of the principles of information storage, transmission and utiliz cell, organism and population levels; of the mechanisms of evolutionary change in the diversification of living things and their l population growth and regulation; and of energy flow and biogeochemical cycling in the biosphere.
BSC 2011L Integrated Principles of Biology Laboratory 2 . Laboratory experiments designed to accompany BSC 2011.
CHM 2045 General Chemistry 1. Stoichiometry, atomic and molecular structure, the states of matter, reaction rates and equilil
CHM 2045L General Chemistry 1 Laboratory. Laboratory experiments designed to reflect the topics presented in CHM 2045
CHM 2046 General Chemistry 2. Acids and bases, additional aspects of chemical equilibria, thermodynamics, electrochemist ions and descriptive chemistry.
CHM 2046L General Chemistry 2 Laboratory. Laboratory experiments designed to reflect the topics presented in CHM 2046
FAS 4270 Marine Ecological Processes. The ecology of marine organisms and habitats with focus on how general ecologica and those unique to the marine environment, drive patterns and processes.
GLY 3083C Fundamentals of Marine Sciences. Introduces the basic disciplines of marine sciences, including geology, chemis biology and conservation, with an emphasis on marine research. Includes three mandatory Saturday field trips.
GLY 4726 Geochemical Oceanography. Focuses on chemical properties and processes in the oceans, exploring the lin chemistry, biology, geology, and global change within a marine context. Topics include elemental composition and biogeochemical cycles, chemical and isotopic tracers, chemistry of marine sediments, and oceanic uptake of anthropogenic carbc

IDS 1161 What is the Good Life. Examines the enduring question, "What is the Good Life", from the perspectives of the Topics include the cost of the good life, how people have chosen to live as members of local and global communities, and conc expressions of beauty, power, love, and health.

MAC 1147 Precalculus algebra and Trigonometry. College algebra, functions, coordinate geometry, exponential and functions, and trigonometry.
MAC 2311 Analytic Geometry and Calculus 1. Introduces analytic geometry; limits; continuity; differentiation of trigonometric, exponential and logarithmic functions; applications of the derivative; inverse trigonometric functions; d introduction to integration; and the fundamental theorem of calculus.

MAC 2312 Analytic Geometry and Calculus 2. Techniques of integration; applications of integration; differentiation and in inverse trigonometric, exponential and logarithmic functions; sequences and series.
OCE 1001 Introduction to Oceanography. Explores the geological, physical, and biological characteristics of Earths ma Includes discussion of scientific methods, the history of oceanography, and emphasizes understanding of the mutual interactic humans and the ocean.
PHY 2048 Physics with Calculus 1. The first of a two-semester sequence of physics for scientists and engineers. The co Newtonian mechanics and includes motion, vectors, Newton's laws, work and conservation of energy, systems of particles equilibrium, oscillations and waves.
PHY 2048L Laboratory for Physics with Calculus 1. Laboratory experience for PHY 2048 illustrating the practical app Newtonian mechanics.
PHY 2049 Physics with Calculus 2. The second of a two-semester sequence of physics for scientists and engineers. Conte Coulomb's law, electric fields and potentials, capacitance, currents and circuits, Ampere's law, Faraday's law, inductance, equations, electromagnetic waves, ray optics, interference and diffraction.
PHY 2049L Laboratory for Physics with Calculus 2. Laboratory experience for PHY 2049 illustrating the practical app Coulomb's law, electric fields and potentials, capacitance, currents and circuits, Ampere's law, Faraday's law, inductance, equations, electromagnetic waves, ray optics, interference and diffraction.
PHY 2053 Physics 1. First semester of introductory physics de-emphasizing calculus. Structure and properties of matter; dynamics and statics; momentum and energy; rotation, elasticity; vibration; fluids; temperature and expansion, heat transf behavior of gases; wave motion and sound.
PHY 2053L Laboratory for Physics 1. Laboratory experience for PHY 2053 illustrating the practical applications of the st properties of matter; kinematics, dynamics and statics; momentum and energy; rotation, elasticity; vibration; fluids; temp expansion, heat transfer, thermal behavior of gases; wave motion and sound.
PHY 2054 Physics 2. Second semester of introductory physics de-emphasizing calculus. Electric charge, fields an electromagnetism, applied electricity; geometrical optics, wave optics, applied optics; electrons and photons; atoms and nuclei.
PHY 2054L Laboratory for Physics 2. Laboratory experience for PHY 2054 illustrating the practical applications of electric c and circuits; electromagnetism, applied electricity; geometrical optics, wave optics, applied optics; electrons and photons; atoms
STA 2023 Introduction to Statistics 1. Graphical and numerical descriptive measures. Simple linear regression. Basic probabili random variables, sampling distributions, central limit theorem. Large and small sample confidence intervals and significan parameters associated with a single population and for comparison of two populations. Use of statistical computer software ar applets to analyze data and explore new concepts.

ZOO 4403C Marine Biology. Survey of major marine taxa, systematics of local marine fauna and flora, with familiarization o environment. Laboratory emphasizes field work and independent projects.
ZOO 4926 Special Topics in Zoology (Marine Ecology). Provides students with a conceptual understanding of ecology with on marine community ecology in tropical coral reefs. Immerses students in field research, from conceptualization to final produc presentations and reports.

CLAS Core Electives

EGN 4932 Special Topics (Physical Oceanography). Covers selected, rotating topics in physical oceanography.
GLY 2010C Physical Geology. Materials, structures and surface features of the earth and processes which have produced th laboratory demonstrations and experiences.
GLY 2100C Historical Geology. Evolution of the earth and its life, including the major physical events and evolutionary chang in the geologic past. Related laboratory, demonstrations and exercises.
GLY 3074 Oceans and Global Climate Change. Examines the role the oceans play in determining climate and regulating gl change on a range of timescales from decades to millions of years.
GLY 3105C Evolution of Earth and Life. Advanced examination of the geologic history of planet earth with an emphas America.
GLY 3202C Earth Materials. Overview of the origin and occurrence of earth materials with a particular emphasis on the identi classification of minerals and rocks. Activities involve lecture and a fully integrated laboratory component where students learn and classify minerals and rocks through both macroscopic and microscopic investigation.

CLAS Approved Electives

EGN 4932 Special Topics (Physical Oceanography). Covers selected, rotating topics in physical oceanography.

ESC 3075 Deltas and Humans. Examines the historical relationship between humans and deltas, outlining possible coastal plans in response to sea level rise.
FAS 4202C Biology of Fishes. The general biology of fishes, with emphasis on trends in their evolution, integrative and ser physiology, feeding ecology, reproduction, growth and population dynamics as they relate to fisheries.
FAS 4305C Introduction to Fishery Science. Principles of fish management in freshwater and marine systems. Includ laboratory techniques for aquatic habitat and fishery resource assessment, aquaculture practices and consideration of contem pertinent to sport and commercial uses of renewable fisheries resources.
FAS 4405 Aquariums, Water and Aquaculture. Culture methods of fish and shellfish, species selection, biological and e principles, case histories and future trends.

FAS 4932 Special Topics in Fisheries and Aquatic Sciences (Marine Adaptations)**.** Examines and compares the adaptations of marine, coastal, and estuarine organisms to environmental conditions.
GLY 3074 Oceans and Global Climate Change. Examines the role the oceans play in determining climate and regulating g change on a range of timescales from decades to millions of years.
GLY 3105C Evolution of Earth and Life. Advanced examination of the geologic history of planet earth with an empha America.
GLY 3202C Earth Materials. Overview of the origin and occurrence of earth materials with a particular emphasis on the ider classification of minerals and rocks. Activities involve lecture and a fully integrated laboratory component where students lea and classify minerals and rocks through both macroscopic and microscopic investigation.

GLY 3603C Paleontology. Investigation of the history of life on earth, including aspects of invertebrate and vertebrate micropaleontology and paleobotany.
GLY 4450 Geophysics. Introduces the basic types of geophysical data used to characterize the subsurface. Learn about seisı and reflection, gravity, magnetics, heat flow and electromagnetic methods.
GLY 4552C Sedimentary Geology. Basic disciplines important in understanding the origin and classification of sedin including sedimentary petrology, sedimentology and stratigraphy.
GLY 4734 Coastal Morphology and Processes. Examines the nature and variety of coastal processes, and the origin and m environmental changes along coasts, including human activities in the coastal zone.

GLY 4930 Special Topics in Geology (Estuarine Systems). Lecture, conferences, or laboratory sessions covering selected top interest in modern geology.
OCE 3016 Introduction to Coastal and Oceanographic Engineering. Introduces important coastal and oceanograph Geophysical fluid motions; waves and tides; air-sea interaction; pollutant transport; coastal hydraulic and sedimentary processe
ZOO 4205C Invertebrate Biodiversity. Comparative biology of invertebrates, emphasizing morphology, evolution, eco history.

CLAS Additional Electives, with Instructor Permission

EOC 6196 Littoral Processes. Shoreline developments; nearshore hydrodynamics; sediment transport phenomena by wav methods of determining littoral transport quantities; effects of groins, jetties, and other coastal structures on littoral processes.
EOC 6934 Advanced Topics in Coastal and Oceanographic Engineering. Waves; wave-structure interaction; coastal stru structures; sediment transport; instrumentation; advanced data analysis techniques; turbulent flow and its applications.
FAS 5276C Field Ecology of Aquatic Organisms. Understanding principles of fish and shellfish ecology through field stud study in lakes, rivers, and coastal marshes to gain understanding of how fish and shellfish interact with their environment. Requ field trips.

FAS 6176 Algae Biology and Ecology. Covers the biology and ecology of aquatic algae, including evolution, classificati photosynthesis, growth, and reproduction. Emphasis on the ecological role of algae in different aquatic ecosystems, their impa applications.
GLY 5255 Organic Geochemistry and Geobiology. Theory, practice, and methods of organic geochemistry, organic biogeoc geomicrobiology.
GLY 5558C Sedimentology. Lecture and discussion of major sedimentary processes active in coastal and continental margin s on relating processes with sedimentary facies. Class work augmented with frequent field trips.
GLY 5736 Marine Geology. Detailed introduction to the origin and evolution of ocean basins, ocean margins, and oceanic s microfossils, including a paleoceanographic history of the marine realm.
GLY 5786L Topics in Field Geology (Bahamas) . Visits to selected sites and regions of outstanding geologic value and intere
GLY 6075 Global Climate Change: Past, Present, and Future. Evolution of the Earth's climate through geologic tir discussion of modern climatology and methods of paleoclimate interpretations.
GLY 6425 Tectonics. Evolution and formation of mid-ocean ridges, seamounts, hot spots, island arcs, back-arc basins, pas and mountain chains.

GLY 6932 Special Topics in Geology (Chemical Biomarkers in Aquatic Systems). Lectures, conferences, or laboratory sess selected topics of current interest in modern geology.
OCP 6050 Physical Oceanography. Structure of ocean basins; physical and chemical properties of seawater; basic physical oceanography; ocean current; thermohaline effects; numerical models; heat budget.
OCP 6168 Data Analysis Techniques for Coastal and Ocean Engineers. Data editing, fundamentals of spectral analysis, s surface signal analysis, directional spectral analysis.

OCP 6295 Estuarine and Shelf Hydrodynamics 1. Kinematics and dynamics of estuaries, small scale motions, tidal hy nontidal circulations, shelf waves, estuary and shelf interactions, mathematical models.

ZOO 6456C Ichthyology. Examines the diversity of fishes in the southeastern U.S. with an emphasis on Florida. In phylogenetic relationships and identification, lectures, labs and research will emphasize the morphological, behavioral, a adaptations of fishes living in different environments.

ZOO 6406 Biology of Sea Turtles. All aspects of biology of sea turtles and how their biology effects their conservation.

CALS track

CALS Required Courses

AEB 3103: Principles of Food and Resource Economics. Introduces the field of food and resource economics, the p economics as applied to agriculture, and the economic problems of the agricultural industry and the individual farmer.

AEC 3030C Effective Oral Communication. Strategies and techniques for effective presentations in the food, agricultural resource professions. Emphasis on oral and visual techniques for formal and informal situations including leadership and group s

AEC 3033C Research and Business Writing in Agricultural and Life Sciences. Establishes the importance of effective con to success in both the educational and professional environments; emphasizes writing as a primary form of communication; e elements of effective written communication in organizational and scholarly areas; and explores the causes of ineffective writing correct them.

BSC 2010 Integrated Principles of Biology 1. The first of a two-semester sequence that prepares students for advanced biologi courses and allied fields. Studies the origin of life systems; of biological molecules and organization of living things at the cellular and organismic levels; and of the activities of living forms in obtaining and utilizing energy and materials in growth, r and reproduction.
BSC 2010L Integrated Principles of Biology Laboratory 1. Laboratory experiments designed to accompany BSC 2010.
BSC 2011 Integrated Principles of Biology 2. The second of a two-semester sequence that prepares students for advance sciences courses and allied fields. Examination in living things of the principles of information storage, transmission and utiliz cell, organism and population levels; of the mechanisms of evolutionary change in the diversification of living things and their l population growth and regulation; and of energy flow and biogeochemical cycling in the biosphere.

BSC 2011L Integrated Principles of Biology Laboratory 2. Laboratory experiments designed to accompany BSC 2011.
CHM 2045 General Chemistry 1 . Stoichiometry, atomic and molecular structure, the states of matter, reaction rates and equilil
CHM 2045L General Chemistry 1 Laboratory. Laboratory experiments designed to reflect the topics presented in CHM 2045
CHM 2046 General Chemistry 2. Acids and bases, additional aspects of chemical equilibria, thermodynamics, electrochemist
ions and descriptive chemistry.
CHM 2046L General Chemistry 2 Laboratory. Laboratory experiments designed to reflect the topics presented in CHM 2046

ECO 2013 Principles of Macroeconomics. The nature of economics, economic concepts and institutions; growth, unempl
inflation; money and banking; economic policies; and the international economy.

ECO 2023 Principles of Microeconomics. Theories of production, determination of prices and distribution of income in re
unregulated industries. Attention is also given to industrial relations, monopolies and comparative economic systems.

ENC 2210 Technical Writing. Surveys the forms and methods of communication used in business, industry and governmen
nonformal and formal reports, letters, resumes and proposals.

ENC 3254 Professional Writing in the Discipline. A communication course adjusted to a specific professional discipline, the
be determined by need. Covers major elements of organizational communication with emphasis on composition of reports, prop
and memos, manuals, and oral presentations. Course materials and assignments are relevant to the specific discipline.
FAS 4202C Biology of Fishes. The general biology of fishes, with emphasis on trends in their evolution, integrative and sens
physiology, feeding ecology, reproduction, growth and population dynamics as they relate to fisheries.
FAS 4270 Marine Ecological Processes. The ecology of marine organisms and habitats with focus on how general ecologica
and those unique to the marine environment, drive patterns and processes.
FAS 4932 Topics in Fisheries and Aquatic Sciences (Biology and Ecology of Algae). Management, use, and control of fre
marine algae and aquatic microorganisms. Overview of associated products, processes, and problems and economic implications
FNR 3410C Natural Resource Sampling. Basic concepts of sampling. Design of cost-effective sample surveys. Sampling n
applicable to natural resources: simple random, stratified, systematic, multi-phase and multi-stage. Cluster sampling, ratio, reg
difference estimation. Line transects. Computer simulation of sampling methods. Introduces remote sensing, geographic infor
global positioning systems
FNR 4660 Natural Resource Policy and Economics. Factors in evolution of forest, range, and wildlife natural resources ad
and policies in the United States; policy components; policy formation, implementation, change processes; and economic
evaluating the effectiveness of policies
GLY 3083C Fundamentals of Marine Sciences. Introduces the basic disciplines of marine sciences, including geology, chemis
biology and conservation, with an emphasis on marine research.

IDS 1161 What is the Good Life. Examines the enduring question, "What is the Good Life?" from the perspectives of the
Topics include the cost of the good life, how people have chosen to live as members of local and global communities, and conc
expressions of beauty, power, love and health.
MAC 2311 Analytic Geometry and Calculus 1. Introduces analytic geometry; limits; continuity; differentiation of
trigonometric, exponential and logarithmic functions; applications of the derivative; inverse trigonometric functions; d
introduction to integration; and the fundamental theorem of calculus.
OCE 1001 Introduction to Oceanography. Explores the geological, physical, and biological characteristics of Earth's ma
Includes discussion of scientific methods, the history of oceanography, and emphasizes understanding of the mutual interactic
humans and the ocean.
PHY 2004 Applied Physics 1. Emphasizes the practical applications of basic physics to a range of professions, including a
agricultural sciences, building construction and forest resources. Mechanics of motion, forces, energy, momentum, wave motion
PHY 2004L Laboratory for Applied Physics 1. Laboratory experience illustrating the practical applications of basic physics, i
mechanics of motion, forces, energy, momentum, wave motion and heat.

SPC 2608 Introduction to Public Speaking. Theory and practice presenting public speeches, determining communication pu
adapting to organization, evidence, language and other message characteristics for designated audiences.
STA 2023 Introduction to Statistics 1. Graphical and numerical descriptive measures. Simple linear regression. Basic probabili
random variables, sampling distributions, central limit theorem. Large and small sample confidence intervals and significan
parameters associated with a single population and for comparison of two populations. Use of statistical computer software ar
applets to analyze data and explore new concepts.
STA 3024 Introduction to Statistics 2. An introduction to the analysis of variance. Nonparametric statistical methods and a
Analysis of count data: chi-square and contingency tables. Simple and multiple linear regression methods with applications.
STA 4210 Regression Analysis. Simple linear regression and multiple linear regression models. Inference about model para
predictions, diagnostic and remedial measures about the model, independent variable selection, multicolinearity, autocorr
nonlinear regression. SAS implementation of the above topics.
STA 4222 Sample Survey Design. An introduction to the design of sample surveys and the analysis of survey data, the course
practical applications of survey methodology. Topics include sources of errors in surveys, questionnaire construction, simp
stratified, systematic and cluster sampling, ratio and regression estimation, and a selection of special topics such as applicatior
control and environmental science.
ZOO 4205C Invertebrate Biodiversity. Comparative biology of invertebrates, emphasizing morphology, evolution, ecolo
history.
ZOO 4926 Special Topics in Zoology (Marine Ecology). Provides students with a conceptual understanding of ecology with a
on marine community ecology in tropical coral reefs. Immerses students in field research, from conceptualization to final produc
presentations and reports.

CALS Approved Electives

AEB 3450 Introduction to Natural Resource and Environmental Economics. Introduces natural and environmental resource
Emphasizes understanding economic concepts such as resource scarcity, market failure, externality, property rights and comm
resources and their application to studies of forest, land, water, energy and coastal resources.

CHM 2200 Fundamentals of Organic Chemistry. An elementary course embracing the more important aspects of organic
Intended for students in programs requiring only one semester of organic chemistry. Not intended for pre-med, pre-dentistry
students.

CHM 2200L Fundamentals of Organic Chemistry Laboratory. Organic laboratory experiments to accompany CHM 2200.

EGN 4932 Special Topics (Physical Oceanography). Structure of ocean basins; physical and chemical properties of seav
physical laws used in oceanography; ocean current; thermohaline effects; numerical models; heat budget.

FAS 2024 Global and Regional Perspectives in Fisheries. Fish biology, ecology and habitats relevant to fisheries on both a regional (Florida) scale. Follows the fisheries occurring from cold mountain rivers to the depths of the oceans, with special artificial reefs, fisheries bycatch and aquaculture). Intended for non-science and science majors.
FAS 4305C: Introduction to Fishery Science. Principles of fish management in freshwater and marine systems. Include laboratory techniques for aquatic habitat and fishery resource assessment, aquaculture practices and consideration of contemp pertinent to sport and commercial uses of renewable fisheries resources.
FAS 4405 Aquariums, Water and Aquaculture. Culture methods of fish and shellfish, species selection, biological and en principles, case histories and future trends.
FAS 4932 Topics in Fisheries and Aquatic Sciences (Advanced Open Water SCUBA)**.** Recreational SCUBA training and ex accordance with the National Association of Underwater Instructors (NAUI) standards.

FAS 4932 Topics in Fisheries and Aquatic Sciences (Applied Fisheries Statistics). Population sampling and estimation assumptions and robustness, mark-recapture, growth, and empirical modeling of populations.
FAS 4932 Topics in Fisheries and Aquatic Sciences (Field Ecology of Aquatic Organisms). Understanding principles of fish a ecology through field studies. Intensive study in lakes, rivers, and coastal marshes to gain understanding of how fish and shell with their environment.

FAS 4932 Topics in Fisheries and Aquatic Sciences (Invasion Ecology of Aquatic Animals). A comprehensive overview ecology, highlighting aspects related to aquatic animals, including ecological concepts and debates underlying this developing fie
FAS 4932 Topics in Fisheries and Aquatic Sciences (Marine Adaptations). Compares the physiological adaptations of mar and estuarine organisms to environmental conditions across levels of organization, from ecological and organismal to cellular an

FAS 4932 Topics in Fisheries and Aquatic Sciences (Science Diver). Scientific and research SCUBA training and exp accordance with the National Association of Underwater Instructors (NAUI) standards.
FNR 3410C Natural Resource Sampling. Basic concepts of sampling. Design of cost-effective sample surveys. Sampling n applicable to natural resources: simple random, stratified, systematic, multi-phase and multi-stage. Cluster sampling, ratio, reg difference estimation. Line transects. Computer simulation of sampling methods. Introduces remote sensing, geographic infor global positioning systems
FOR 3202 Society and Natural Resources. Local-to-global and individual-to-institutional perspectives on natural resou sustainability, diversity, and social change with consideration of potential paths for working with complex human and natu systems.

FOR 4941 Internship in Natural Resources. Supervision by a faculty member and a post-internship report are required.
GEO 4300 Environmental Biogeography. Description and explanation of spatial patterns of biodiversity and the underlying factors of human-environment interactions. Investigates past and present distributions of organisms and how patterns of en variation influence organisms. How biogeography is used to design nature reserves and how forecasting climate change may affe and explain human adaptations to environmental variability.
GIS 3072C Geographic Information Systems. Addresses GIS concepts, data sources, spatial references: GIS data modeling, n and editing; surface modeling; and vector and raster analysis. Provides practical examples, tutorials, and projects serving the natural resource management, and planning fields.
GLY 3074 Oceans and Global Climate Change. Examines the role the oceans play in determining climate and regulating gl change on a range of timescales from decades to millions of years.
GLY 4726 Geochemical Oceanography. Focuses on chemical properties and processes in the oceans, exploring the lin chemistry, biology, geology, and global change within a marine context. Topics include elemental composition and biogeochemical cycles, chemical and isotopic tracers, chemistry of marine sediments, and oceanic uptake of anthropogenic carbo
GLY 4734 Coastal Morphology and Processes. Examines the nature and variety of coastal processes, and the origin and mo environmental changes along coasts, including human activities in the coastal zone.

MAC 2312 Analytical Geometry and Calculus 2. Techniques of integration; applications of integration; differentiation and in inverse trigonometric, exponential and logarithmic functions; sequences and series.
OCE 3016 Introduction to Coastal and Oceanographic Engineering. Introduces important coastal and oceanographic Geophysical fluid motions; waves and tides; air-sea interaction; pollutant transport; coastal hydraulic and sedimentary processes.
PCB 4043C General Ecology. Ecological processes and organization in terrestrial and aquatic habitats. Laboratory and fie emphasize techniques of ecological analysis.
PCB 4674 Evolution. Processes and mechanisms of evolution, including population genetics, speciation, patterns of ev molecular evolution.
STA 3024 Introduction to Statistics 2. An introduction to the analysis of variance. Nonparametric statistical methods and a Analysis of count data: chi-square and contingency tables. Simple and multiple linear regression methods with applications.

STA 4210 Regression Analysis. Simple linear regression and multiple linear regression models. Inference about model para predictions, diagnostic and remedial measures about the model, independent variable selection, multicolinearity, autocorr nonlinear regression. SAS implementation of the above topics.
STA 4211 Design of Experiments. The basic principles of experimental design: analysis of variance for experiments with a s randomized blocks and Latin square designs: multiple comparison of treatment means; factorial and nested designs; analysis of response surface methodology.
STA 4222 Sample Survey Design. An introduction to the design of sample surveys and the analysis of survey data, the course practical applications of survey methodology. Topics include sources of errors in surveys, questionnaire construction, simp stratified, systematic and cluster sampling, ratio and regression estimation, and a selection of special topics such as application control and environmental science.
SYD 4510 Environment and Society. Social foundations of environmental problems and social responses to environme including contestation, conflicts and movements.
VME 4012 Aquatic Animal Conservation Issues. Controversial conservation issues surrounding aquatic species, from inve marine mammals.
VME 4013 Aquatic Wildlife Health Issues. Introduces the natural history, anatomy, physiology, behavior and health issue wildlife: marine mammals, sea turtles, crocodiles and some fish and invertebrates.
WIS 3553C Introduction to Conservation Genetics. Types of molecular polymorphisms found in nature, including h information is organized, what evolutionary and demographic forces act to shape genetic polymorphisms, and how and why useful in population conservation and management.
WIS 4203C Landscape Ecology and Conservation. Central constructs and methods of landscape ecology are applied to wild and conservation.
WIS 4501 Introduction to Wildlife Population Ecology. The dynamics and regulation of biological populations and life-histo
WIS 4523 Human Dimensions of Natural Resource Conservation. Local and international models are used to

WIS 4325 Human Dimensions of Natural Resource Conservation. Local and international models are used to p interdisciplinary overview of the theory and practice of conservation education, environmental communication and integrat management and conservation.
WIS 4601C Quantitative Wildlife Ecology. Concepts and applications of quantitative techniques in ecology and wildlife mana
ZOO 4403C Marine Biology. Survey of major marine taxa, systematics of local marine fauna and flora, with familiarization o environment. Laboratory emphasizes field work and independent projects.
ZOO 4405 Sea Turtle Biology and Conservation. The biology of sea turtles and their roles in marine ecosystems, focusing major issues in sea turtle biology and challenges in their conservation and management.

CALS Additional Electives, with Instructor Permission

FAS 6337C Fish Population Dynamics. Analyzing fish populations for management purposes. Methods for estimating populat parameters such as growth, recruitment, and mortality. Using population parameters and computer models to predict yield and ca composition, and bioenergetics approaches for fisheries management problems.

GLY 6075 Global Climate Change: Past, Present, and Future. Evolution of the Earth's climate through geologic time, inclu discussion of modern climatology and methods of paleoclimate interpretations.

OCP 6295 Estuarine and Shelf Hydrodynamics 1. Kinematics and dynamics of estuaries, small scale motions, tidal hydrodyn nontidal circulations, shelf waves, estuary and shelf interactions, mathematical models.

ZOO 6406 Biology of Sea Turtles. All aspects of biology of sea turtles and how their biology effects their conservation.

ZOO 6456C Ichthyology. Examines the diversity of fishes in the southeastern U.S. with an emphasis on Florida. In phylogenetic relationships and identification, lectures, labs and research will emphasize the morphological, behavioral, and adaptations of fishes living in different environments.

F. For degree programs in the science and technology disciplines, discuss how industry-driven competencies were identified and incorporated into the curriculum and indicate whether any industry advisory council exists to provide input for curriculum development and student assessment.

Industry-driven competencies were identified by external boards: The Biology Leadership Circle, the Geological Sciences External Advisory Board, and the Fisheries and Aquatic Sciences Program Advisory Council. Membership on these advisory councils includes industry, state, and federal agency leaders. Our curriculum and Student Learning Outcomes were developed to ensure that students receive exceptional training in the competencies identified by the councils, including professional communication, critical thinking, leadership, and ethical behavior. Annual Academic Assessment Reports evaluate student achievement in these areas and results are discussed within the Marine Sciences Committee (faculty from CLAS and CALS) and with the external boards to ensure that industry-driven competencies are successfully incorporated into the marine sciences curriculum.

G. For all programs, list the specialized accreditation agencies and learned societies that would be concerned with the proposed program. Will the university seek accreditation for the program if it is available? If not, why? Provide a brief timeline for seeking accreditation, if appropriate.

Accreditation by an outside agency is not required. The program will be periodically reviewed by external experts and monitored by the Marine Sciences Committee, composed of faculty from CLAS and CALS.

H. For doctoral programs, list the accreditation agencies and learned societies that would be concerned with corresponding bachelor's or master's programs associated with the proposed program. Are the programs accredited? If not, why?

N/A

I. Briefly describe the anticipated delivery system for the proposed program (e.g., traditional delivery on main campus; traditional delivery at branch campuses or centers; or nontraditional delivery such as distance or distributed learning, self-paced instruction, or external degree programs). If the proposed delivery system will require specialized services or greater than normal financial support, include projected costs in Table 2 in Appendix A. Provide a narrative describing the feasibility of delivering the proposed program through collaboration with other universities, both public and private. Cite specific queries made of other institutions with respect to shared courses, distance/distributed learning technologies, and joint-use facilities for research or internships.

The delivery of the proposed degree program will be primarily on the main campus, but will also include field trips and additional off-campus opportunities for study including the Semester of Immersion offered through the Department of Biology that includes numerous elective courses for the Marine Science degree. Several of the courses will also include online components to the coursework with some optional fully online courses. No new collaborations with other universities will be required to implement this degree program.

IX. Faculty Participation

A. Use Table 4 in Appendix A to identify existing and anticipated full-time (not visiting or adjunct) faculty who will participate in the proposed program through Year 5. Include (a) faculty code associated with the source of funding for the position; (b) name; (c) highest degree held; (d) academic discipline or specialization; (e) contract status (tenure, tenure-earning, or multi-year annual [MYA]); (f) contract length in months; and (g) percent of annual effort that will be directed toward the proposed program (instruction, advising, supervising internships and practica, and supervising thesis or dissertation hours).

See Table 4, Appendix A.

B. Use Table 2 in Appendix A to display the costs and associated funding resources for existing and anticipated full-time faculty (as identified in Table 4 in Appendix A). Costs for visiting and adjunct faculty should be included in the category of Other Personnel Services (OPS). Provide a narrative summarizing projected costs and funding sources.

See Table 2 in Appendix A .

C. Provide in the appendices the abbreviated curriculum vitae (CV) for each existing faculty member (do not include information for visiting or adjunct faculty).

Please see Appendix C.

D. Provide evidence that the academic unit(s) associated with this new degree have been productive in teaching, research, and service. Such evidence may include trends over time for average course load, FTE productivity, student HC in major or service courses, degrees granted, external funding attracted, as well as qualitative indicators of excellence.

The Department of Geological Sciences (CLAS) has 20 full time teaching and research faculty who are all involved with undergraduate and graduate education at some level. The Department offers BS and BA degrees in Geology and a BA degree in Environmental Geoscience. There are currently 66 residential undergraduate majors and 45 UF Online majors in the Department. The number of undergraduate majors has more than tripled since 2010. Well over half of the faculty in the department currently have external grant funding from state and federal agencies for research that totals about $5.5 million. Funding at this level has been steady for over 10 years.

The Department of Biology (CLAS) has 28 full time research and teaching faculty in Gainesville who are all involved with undergraduate and graduate education at some level. The Department offers BS and BA degrees in Biology and BS degrees in Botany and Zoology. There are currently 2243 residential undergraduate majors and 60 UF Online undergraduate majors in Biology, 35 in Botany and 87 in Zoology. The number of undergraduate majors in Biology has been climbing steadily, such that it is now the largest undergraduate major at UF. About 75% of the research faculty in the department currently have external grant funding from state and federal agencies for research that totals about $3.8 million.

The School of Forest Resources and Conservation (SFRC), in CALS, is comprised of three major programs, each with established majors: Forest Resources and Conservation (FRC), Fisheries and Aquatic Sciences (FAS), and Geomatics (GEM). The proposed Marine Sciences degree program is most closely aligned with the FAS program, though key elements of the others are pertinent. The SFRC has 47 tenure-track and 2 non-tenure track faculty who are state-funded and another 24 faculty who are either joint appointments with other UF departments or are grant-funded. Of all these, the FAS program has 24 tenure-track, 3 joint and 5 non-tenure track faculty. All School faculty are engaged in undergraduate and/or graduate education at some level. The School offers B.S. degrees in FRC, GEM and Natural Resource Conservation (NRC), and has been the home of the UF-CALS track of the Marine Sciences (MAR) major since its inception. Undergraduate enrollments in Fall 2017 were FRC=62, GEM=63, NRC=99, and MAR=95. Enrollments in all majors have increased over the past decade, substantially so for NRC and the CALS MAR track. Graduate enrollments (Ph.D., M.S. and non-thesis Masters) have similarly increased over the same period; in Fall 2017 total graduate enrollments were FRC=98, GEM=30, and FAS=80. The School also offers 9 graduate certificates online, with 139 active certificate students. The SFRC is now the second largest producer of student credit hours in UF's College of Agricultural and Life Sciences, among 16 departments and schools, up from ninth highest in 2008-2009. Total School expenditures for FY2017-2018 were $23.61 million, of which $13.13 million were appropriated and $7.43 million were federal and state grants. Grant expenditures since 2012 have varied annually between, $7.43 and $11.88 million.

X. Non-Faculty Resources

A. Describe library resources currently available to implement and/or sustain the proposed program through Year 5. Provide the total number of volumes and serials available in this discipline and related fields. List major journals that are available to the university's students. Include a signed statement from the Library Director that this subsection and subsection B have been reviewed and approved.

The Libraries of the University of Florida form the largest information resource system in the state of Florida. The libraries hold over 6,000,000 print volumes, 1,400,000 e-books, 170,000 full-text electronic journals, and 1000 electronic databases. The George A. Smathers Libraries of the University of Florida, a system of six research libraries, includes libraries for sciences, humanities & social sciences, architecture & fine arts, education and health sciences. The UF Levin School of Law supports a related, but independent law library. Books and periodicals, related to marine science are located primarily in the Marston Science Library.

Electronic Books, journals and many key databases, such as Web of Science, BIOSIS Citation Index, Proquest SciTech Collection and others, are available via the internet to UF students, faculty and staff. Many relevant databases are

multidisciplinary and are funded centrally. The UF libraries expend over $5 Million yearly on electronic resources. Listed below are some of the important journals available at UF for use by students pursuing a marine science degree:

- Biogeochemistry
- Coral Reefs
- Hydrobiologia
- Journal of Experimental Marine Biology and Ecology
- Marine Biodiversity Records
- Marine Biology
- Marine Biotechnology
- Marine Ecology
- Marine Environmental Research
- Marine Geology
- Nature
- Oceanography
- Paleoceanography
- Progress in Oceanography
- Science

All students, faculty, and staff may use interlibrary loan services. The Libraries hold memberships in a number of consortia, and in institutions such as the Center for Research Libraries, ensuring access to materials not held locally. A service, known as "Uborrow" allows UF patrons to easily borrow materials from any other Florida state university or college library. Library patrons initiate unmediated requests via a union catalog, and materials are delivered to Gainesville within a few days. Uborrow access is often faster (with a longer circulation period) than with traditional interlibrary loan.

With monies allocated through the Provost and the UF budgeting process, the library materials budget is determined by the Dean of Libraries in consultation with the Associate Dean for Scholarly Resources & Research Services and subject specialist librarians. The subject specialist for the biological/life sciences, with input from Department of Biology, the Department of Geological Sciences, and the School of Forest Resources and Conservation faculty, determines acquisition priorities for the year. Standing subscriptions to journal literature and databases make up the majority of purchasing. Online research guides for all UF disciplines and many specific topics are available from the library website http://library.ufl.edu. Many online tutorials for specific databases are also available. Additionally, the UF Libraries hosts workshops, lectures and events throughout the year.

B. Describe additional library resources that are needed to implement and/or sustain the program through Year 5. Include projected costs of additional library resources in Table 2 in Appendix A. Please include the signature of the Library Director in Appendix B.

No additional resources beyond the current allocation and normal growth in holdings already in place to support current programs are necessary to implement or sustain the undergraduate degree program in Marine Sciences.

C. Describe classroom, teaching laboratory, research laboratory, office, and other types of space that are necessary and currently available to implement the proposed program through Year 5.

The current Marine Sciences Interdisciplinary Studies major uses classroom space that is available within the participating departments and across campus, as necessary, for instructional purposes. This includes small (~20 people) to large (~200 people) classrooms, as well as instructional laboratory space. There are numerous research laboratories distributed across campus that are relevant to Marine Sciences as well as field-based research stations such as the Whitney Laboratory for Marine Bioscience on the Atlantic coast and the Seahorse Key Marine Laboratory and Nature Coast Biological Station on the Gulf coast. This diversity of strong research programs provides a wealth of opportunities to participate in research at the undergraduate level across a wide spectrum of marine science topics.

D. Describe additional classroom, teaching laboratory, research laboratory, office, and other space needed to implement and/or maintain the proposed program through Year 5. Include any projected Instruction and Research (I&R) costs of additional space in Table 2 in Appendix A. Do not include costs for new construction because that information should be provided in response to X (E) below.

N/A

E. If a new capital expenditure for instructional or research space is required, indicate where this item appears on the university's fixed capital outlay priority list. Table 2 in Appendix A includes only Instruction and Research (I&R) costs. If non-I&R costs, such as indirect costs affecting libraries and student services, are expected to increase as a result of the program, describe and estimate those expenses in narrative form below. It is expected that high enrollment programs in particular would necessitate increased costs in non-I&R activities.

N/A

F. Describe specialized equipment that is currently available to implement the proposed program through Year 5. Focus primarily on instructional and research requirements.

The teaching and research laboratories are well-equipped with the necessary equipment, instrumentation, and computers to carry out the coursework required towards the degree program, as well as providing additional opportunities for more in-depth

research experiences. We also have access to vessels to be used for instructional purposes to facilitate field studies. In summary, all major equipment is in place to support the new degree program and no new equipment will be required.

G. Describe additional specialized equipment that will be needed to implement and/or sustain the proposed program through Year 5. Include projected costs of additional equipment in Table 2 in Appendix A.

N/A

H. Describe any additional special categories of resources needed to implement the program through Year 5 (access to proprietary research facilities, specialized services, extended travel, etc.). Include projected costs of special resources in Table 2 in Appendix A.

N/A

I. Describe fellowships, scholarships, and graduate assistantships to be allocated to the proposed program through Year 5. Include the projected costs in Table 2 in Appendix A.

Students in the degree program will be eligible to compete for existing scholarships offered by both colleges.

J. Describe currently available sites for internship and practicum experiences, if appropriate to the program. Describe plans to seek additional sites in Years 1 through 5.

Internship programs currently available through the University of Florida, as well as state and federal partners, are ideally suited for undergraduate students in the Marine Sciences degree program. At the University, internships are potentially available through the IFAS Dean of Research Summer Internship program, the UF Whitney Laboratory, and the UF/IFAS Nature Coast Biological Station. In addition to UF sponsored programs, internships are available from:

- NOAA (https://coast.noaa.gov/fellowship/undgrad_opportunities.html), and
- FWC (http://myfwc.com/research/about/careers/internships-volunteers/opportunities),

and numerous opportunities collated by:

- Sea Grant (https://www.marinecareers.net/internships-and-fellowships).

APPENDIX B

Please include the signature of the Equal Opportunity Officer and the Library Director.

Signature of Equal Opportunity Officer	**Date**
Signature of Library Director	**Date**

This appendix was created to facilitate the collection of signatures in support of the proposal.
Signatures in this section illustrate that the Equal Opportunity Officer has reviewed section II.E of the proposal and the Library Director has reviewed sections X.A and X.B.

APPENDIX B

Please include the signature of the Equal Opportunity Officer and the Library Director.

Signature of Equal Opportunity Officer

7/26/19

Date

Signature of Library Director

7/17/19

Date

This appendix was created to facilitate the collection of signatures in support of the proposal. Signatures in this section illustrate that the Equal Opportunity Officer has reviewed section II.E of the proposal and the Library Director has reviewed sections X.A and X.B.

APPENDIX A

TABLE 4
ANTICIPATED FACULTY PARTICIPATION

Faculty Code	Faculty Name or "New Hire" Highest Degree Held Academic Discipline or Speciality	Rank	Contract Status	Initial Date for Participation in Program	Mos. Contract Year 1	FTE Year 1	% Effort for Prg. Year 1	PY Year 1	Mos. Contract Year 5	FTE Year 5	% Effort for Prg. Year 5	PY Year 5
A	Andrea Dutton, PhD Geological Sciences	Asst. Prof.	Tenure track	Fall 2020	9	0.75	0.71	0.53	9	0.75	0.71	0.53
A	John Jaeger, PhD Geological Sciences	Assoc. Prof.	Tenured	Fall 2020	9	0.75	0.29	0.22	9	0.75	0.29	0.22
A	Arnoldo Valle-Levinson, PhD Coastal Engineering	Professor	Tenured	Fall 2020	9	0.75	0.15	0.11	9	0.75	0.15	0.11
A	Andy Zimmerman, PhD Geological Sciences	Assoc. Prof.	Tenured	Fall 2020	9	0.75	0.14	0.10	9	0.75	0.14	0.10
A	Matt Smith, PhD Geological Sciences	Senior Lecturer	Non-tenure track	Fall 2020	9	0.75	0.07	0.05	9	0.75	0.07	0.05
A	Gustav Paulay, PhD Marine Biodiversity	Curator	Tenured	Fall 2020	12	1.00	0.46	0.46	12	1.00	0.46	0.46
A	Joan Herrera, PhD Marine Invertebrate Biology	Adjunct	Non-tenure track	Fall 2020	5	0.38	1.00	0.38	5	0.38	1.00	0.38
A	Mike Gil, PhD Marine Ecology	Adjunct	Non-tenure track	Fall 2020	5	0.38	0.20	0.08	5	0.38	0.20	0.08
A	Nicole Gerlach, PhD Biology	Lecturer	Non-tenure track	Fall 2020	9	0.75	0.10	0.08	9	0.75	0.10	0.08
A	Damian Adams, PhD Marine Policy & Economics	Asst. Prof.	Tenure track	Fall 2020	12	1.00	0.02	0.02	12	1.00	0.02	0.02
A	Rob Ahrens, PhD Quantitative Marine Fisheries	Asst. Prof.	Tenure track	Fall 2020	12	1.00	0.03	0.03	12	1.00	0.03	0.03
A	Daryl Parkyn, PhD Biology of Marine Fishes	Research Assoc.	Non-tenure track	Fall 2020	12	1.00	0.15	0.15	12	1.00	0.15	0.15
A	Ed Phlips, PhD Phytoplankton Ecology	Professor	Tenured	Fall 2020	12	1.00	0.06	0.06	12	1.00	0.06	0.06
A	Don Behringer, PhD Marine Ecology	Assoc. Prof.	Tenured	Fall 2020	12	1.00	0.09	0.09	12	1.00	0.09	0.09
A	William Patterson, PhD Marine Fisheries Ecology	Assoc. Prof.	Tenured	Fall 2020	12	1.00	0.03	0.03	12	1.00	0.03	0.03
A	Shirley Baker, PhD Invertebrate Biology	Assoc. Prof.	Tenured	Fall 2020	12	1.00	0.10	0.10	12	1.00	0.10	0.10
	Total Person-Years (PY)							**2.49**				**2.49**

Faculty Code		Source of Funding	PY Workload by Budget Classsification Year 1		Year 5
A	Existing faculty on a regular line	Current Education & General Revenue	2.49		2.49
B	New faculty to be hired on a vacant line	Current Education & General Revenue	0.00		0.00
C	New faculty to be hired on a new line	New Education & General Revenue	0.00		0.00
D	Existing faculty hired on contracts/grants	Contracts/Grants	0.00		0.00
E	New faculty to be hired on contracts/grants	Contracts/Grants	0.00		0.00
		Overall Totals for **Year 1**	**2.49**	**Year 5**	**2.49**