



**Performance Report for Cooperative Agreement No: NA16SEC4810007
for the Period from September 1, 2016 to February 28, 2017**

(Revised June 23, 2017)

University of Maryland Eastern Shore

Living Marine Resources Cooperative Science Center

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I. Accomplishments

There is the option to indicate “not yet started” and include the expected start date in this section. *NOTE: Images, tables, charts, or other graphics may be submitted in support of the Accomplishments section.*

What are the major goals of the project?

The major goals of the LMRCSC are grouped as educational, research, and administrative goals.

Education Goals:

1. Prepare the future workforce for marine and fisheries sciences through the relevant degree programs.
2. Strengthen collaborations across partner universities and professional networks to enhance academic programs in marine and fisheries sciences

Research Goal:

3. Develop an exemplary capacity for scientific collaborations among partner institutions in the NOAA relevant fields of marine and fisheries sciences

Administration Goals:

4. Organizational excellence for effective and efficient management of the programs and activities of the Center
5. Effectively communicate the activities and accomplishments of the Center
6. Assess and evaluate the Center’s goals and objectives

What was accomplished under these goals (recipient must provide information for the 4 categories below)?

1. Major Activities:

Education Goals:

Student Recruitment Activities: The Center used this reporting period to engage in recruitment activities using various strategies including, but not limited to attending professional meetings such as the American Indian Science and Engineering Society (Nov. 10-13, 2016), College/Career Pathways to Success Night at Wor-Wic Community College, MD (Nov. 17, 2016), and UMES Open House (Dec. 2, 2016). Flyers with information on Graduate Assistantships at the LMRCSC were also disseminated to students who previously participated in the UMES REU program which resulted in three of them applying to UMES for graduate school at the LMRCSC. One of them was accepted and enrolled in the program in spring 2017. The other two are awaiting the outcome of their applications with a proposed start date of fall 2017 or spring 2018. Two LMRCSC scientists at UMES (Brad Stevens and Joe Pitula) have continued to serve on the admissions committees of the USM MEES program. This helps for recruitment of students to the LMRCSC. This reporting period was also used to conduct recruitment of rising sophomores for summer experiential training at the LMRCSC.

Training and Preparation of students for careers in marine and fisheries science:

The Center used this reporting period to plan for workshops that will be offered to students including the “Literacy in NOAA mission related disciplines: A cohort experience” workshop that will be offered for one week, and Data management workshop that will be offered to students in fall 2017. Graduate students in the program have begun to take classes including courses offered at the Center to enable them to acquire core competencies in marine and fisheries science.

The Center has supported transitioning statistical instruction in the Advanced Environmetrics course (M.S. program) from SAS to R. The course was changed and offered this semester. R is more commonly used by NOAA scientists for population modelling.

Plans are underway to re-initiate the IMET's summer undergraduate internship program to provide relevant research experiences to minority undergraduates recruited from LMRCSC partners and other institutions through a structured Summer Internship Program as well as through in-semester internships. The provision of undergraduate research experiences will also serve to provide a conduit of students into LMRCSC graduate programs. Through research partnerships UMCES-IMET faculty are co-mentoring graduate students from partner institutions including Kristen Lycett (Ph.D., UMES), Stephanie Martinez-Rivera (Ph.D., UMES), Jasmine Smalls (M.S., DSU). UMCES-IMET has also continued to provide specialist training, such as in molecular biological techniques, to graduate students from LMRCSC partners that are outside the scope of Center partners, in addition to providing graduate level classes via IVN in molecular/cell biology, marine molecular microbial ecology, molecular immunology of fish/shellfish, comparative molecular endocrinology of fish/shellfish, diseases of the Chesapeake Bay.

Enhanced engagement with NOAA Scientists to Identify Opportunities for NOAA

Experiential Training – The Center has continued to enhance its engagement with NOAA scientists in order to identify mentors of LMRCSC graduate and undergraduate students during the NERTO program and as members of their thesis or dissertation committees. Engagement has occurred via a number of strategies including in the form of a) Webinar delivered to the SEFSC Director and Division Chiefs and Leaders in January 2017 during which information was provided on the LMRCSC education and research programs, b) Conference call between LMRCSC Director and two NEFSC scientists (Dr. Larry Alade and Mr. George Liles) in February 2017 which was followed by a visit to UMES by Dr. Jon Hare, Director of the NEFSC on February 23, 2017.

Scott B. Gudes Public Service Graduate Scholarship in Marine Resource Conservation –

The LMRCSC disseminated information and application materials on the scholarship to students via email and the website.

Research Goal:

Eight collaborative research proposals were funded during this reporting period; the titles, names of lead PIs, and the research thematic areas to which they belong are presented in Table 1. These projects are well aligned with NOAA Fisheries research priorities. Six of the lead PIs of the projects are located at LMRCSC MSIs, hence the projects are helping to build sustainable capacities at the Center MSIs; three of the lead PIs are graduate students.

Table 1. TAB projects funded for FY 2016 to 2017

#	Lead PI	Project Title	Research Thematic Area
1	Cara Schweitzer (UMES)	Discard mortality of sub-legal black sea bass in the commercial trap fishery: Impacts of air exposure and acute temperature changes.	Assessment
2	Bradley Stevens (UMES)	Biological baseline data for Jonah Crab Management	Assessment
3	Stephanie Martinez-Rivera (UMES)	Reproductive Biology of red deepsea crabs, <i>Chaceon quinque-dens</i> .	Assessment
4	Tara Cox (SSU)	Refining stock structure of common bottlenose dolphins (<i>Tursiops truncatus</i>) through photo-identification and genetic analysis	Assessment

5	Shari Wiley (HU)	The Impact of Increasing Sea Surface Temperatures on Piscivore and Planktivore Species Dynamics: An Ecosystem-Based Modeling Approach	Climate & Ecosystems
6	Joseph Pitula (UMES)	Ecosystem impact of a harmful algal bloom species (<i>Dinophysis acuminata</i>) on aquaculture shellfish	Healthy Habitats
7	Jessica Miller (OSU)	Migration and foraging ecology of at-risk species: Columbia River Chinook salmon and Atlantic weakfish	Assessment
8	Ammar Hanif (IMET)	Comparing the diet and microbiome of Atlantic menhaden and Eastern oyster using DNA barcoding	Assessment

In addition, several projects supported with leveraged funds from various agencies including NOAA, NSF and USDA are on-going at the Center, and new proposals were developed and submitted to various agencies for funding.

Data Management and QA/QC: Plans have been concluded for a Data management course to be offered to LMRCSC students and faculty in fall 2017.

Ethical Conduct of Research Training for Students and Faculty: This will be offered to students in summer 2017.

Administration Goals:

- a) Grant funds have been subcontracted to LMRCSC institutions
- b) LMRCSC Implementation Plan was developed and submitted to NOAA EPP for review
- c) The Center advertised vacant personnel positions, including the Assistant Director, Postdoctoral Research Fellows, Assistant Professor at Hampton University (HU), and the Education Lead at Savannah State University (SSU). Interviews for candidates who applied for the Assistant Director position have been completed. It is anticipated that the position will be filled before July 1, 2017. Interviewing for Post-doctoral position at UMES is on-going. The position posting for the Educational Expert was developed as a Visiting Assistant Professor in the School of Teacher Education and distributed.
- d) The Center conducted its monthly Executive Committee meetings, and Science Committee meetings
- e) The Communication Specialist of the LMRCSC, Ms. Anne Dudley, focused her time on disseminating information on activities and accomplishments of the Center. She is preparing a newsletter that will be released in April 2017
- f) The LMRCSC, working with the College of Exploration, has developed a Comprehensive Evaluation Plan for the Center that was submitted to NOAA EPP.
- g) The Center leadership has worked to enhance engagement with NOAA Fisheries scientists using various means including giving a webinar on the LMRCSC to the SEFSC Director and Division Chiefs, conference calls with the NEFSC to discuss Center capabilities and areas where NOAA scientists and LMRCSC scientists and students can collaborate.

2. Specific Objectives:

The specific objectives of the project are listed under the goals below.

Education Goal 1. Prepare the future workforce for marine and fisheries sciences

Objective 1.1: Recruit students from under-represented groups into marine and fisheries science disciplines

Objective 1.2: Increase retention and degree completion rates for students in marine and fisheries sciences programs

Objective 1.3: Assess the value-added outcomes of degree programs in marine and fisheries sciences at the partner institutions

Education Goal 2. Strengthen collaborations across universities and professional networks to enhance academic programs in marine and fisheries sciences

Objective 2.1: Use relevant research-based curricula to provide students with the highest quality education in marine and fisheries sciences

Objective 2.2: Use Virtual Campus technology to provide students with the opportunity to learn from some of the nation's leading scholars in marine and fisheries sciences

Objective 2.3: Ensure that curricula of degree programs at partner institutions address current challenges and emergent needs within the profession

Objective 2.4: Link students to professional networks and employment opportunities in marine and fisheries sciences

Scientific Research Goal 3. Develop an exemplary capacity for scientific collaborations among partner institutions in the NOAA relevant fields of marine and fisheries sciences

Objective 3.1: Integrate the Center's research agenda with NOAA Fisheries research priorities in four key thematic areas: ecosystem change and prediction, stock assessment support, habitat research and protection, and safe seafood and aquaculture

Objective 3.2: Foster collaborative research programs to strengthen the research capacities of partner institutions by leveraging the significant strengths and resources of research universities as infrastructure for capacity building

Objective 3.3: Develop faculty recruitment and retention practices that ensure that the collective capacity of scholars affiliated with the Center represents significant concentrations of strength in the four key research thematic areas

Administration Goal 4. Organizational excellence for effective and efficient management of the programs and activities of the Center

Objective 4.1: Establish an Administrative Structure to enhance center operations and provide supportive environment for training and mentoring of students, and for research in marine and fisheries sciences

Objective 4.2: Monitor and ensure compliance with Center Award Conditions

Administration Goal 5. Effectively communicate the activities and accomplishments of the center

Objective 5.1: Develop infrastructure for effective and efficient internal and external communication

Objective 5.2: Develop an effective strategy for communication with students, faculty and administrators within the center, and increase visibility of the center through enhanced communication of its accomplishments to external stakeholders

Administration Goal 6. Assess and evaluate the center's goals and objectives

Objective 6.1: Assess and evaluate center educational programs

Objective 6.2: Assess and evaluate center research

Objective 6.3: Assess and evaluate administration

3. Significant Results:

Education Goals:

Twelve (12) students have been identified/recruited to the Center as members of Cohort 1 (2016 – 2017), including 3 Ph.D., 4 M.S., and 5 B.S., in addition to 3 continuing Ph.D. students (1 at OSU

and 2 at IMET) who the Center has requested NOAA EPP for permission to include as members of cohort 1. This potentially brings it to a total of 15 students in cohort 1 center-wide. One of the students, a 3rd year Ph.D. student Halie O'Farrell at RSMAS has already done publishable work during her first two years as a Ph.D. student with other funding sources. She is working closely with SEFSC scientist Dr. Enric Cortes and members of the ICCAT working group on sharks as she develops her dissertation research. She is currently applying quantile regression to mako shark catch rates from the U.S. pelagic longline observer program. O'Farrell's dissertation research will contribute directly to the shortfin mako shark stock assessment to be conducted this year at the International Commission for the Conservation of Atlantic Tunas (ICCAT). Her research is also relevant for identifying essential fish habitat for sharks.

Recruitment of Rising Sophomores for Summer Experiential Training at the LMRCSC: This reporting period was also used for advertising and recruiting rising sophomores for summer experiential training at the Center. Consistent with our goal specified in the Implementation Plan, five rising sophomores have been selected for the 2017 summer program. The students will participate in the REU program at UMES (4) and SSU (1) that encompasses training in NOAA related research discipline, professional development activities, and special workshops during which they will be taught about NOAA and NOAA undergraduate scholarships such as NOAA EPP undergraduate scholarship and Hollings scholarship. They will learn the process of developing and submitting a competitive application package. Dr. Maggie Sexton will be responsible for implementing the program at UMES whereas Dr. Dionne Hoskins-Brown will be responsible for implementing the program at SSU. Students will be tracked to determine whether they submitted applications to the NOAA undergraduate scholarship programs and if they were successful.

Scott B. Gudes Public Service Graduate Scholarship in Marine Resource Conservation: Four applications have been received from graduate students, and are currently being reviewed by a committee including three LMRCSC Project Director. Input will also be solicited from NOAA EPP staff. It is anticipated that reviews of the applications will be completed and the award given to the most qualified student by first week of July 2017.

Building of a Strong Center Cohort Community: Plans for building a strong cohort community at the LMRCSC have been discussed at the LMRCSC Executive Committee meeting and will be fostered via a) Cohort Building Workshop in fall 2017, b) Student Seminar Series that will continue in fall 2017, c) Data management workshop, that will occur in August 2017, and d) Biweekly Professional Development workshop offered by Dr. Maggie Sexton separately for undergraduate students and graduate students in fall 2016, spring 2017.

Research Goals:

Eight collaborative proposals were funded by the LMRCSC after reviews by the Technical Advisory Board (TAB). Other research projects supported with leveraged funds from agencies such as NOAA, NSF, USDA, are on-going at the LMRCSC. For example, Dr. Beth Babcock (RSMAS) is working with NOAA scientists including Dr. Enric Cortes (SEFSC) on running Bayesian production models for the shortfin mako assessment.

Administration Goals:

- a) Interviews for the Assistant Director position at the LMRCSC have been completed. It is anticipated that the position will be filled by July, 2017. Ms. Judy Rose has continued to work for the Center in the interim and Dr. Maggie Sexton has also been assisting with the work of the Assistant Director. Interviews for the Post-doctoral Position at UMES is on-going and the position will be filled by July, 2017.
- b) The LMRCSC Implementation Plan was prepared and submitted to NOAA for review.

- c) At SSU, a partnership was formalized with the School of Teacher Education to share the Education Expert position. A personnel timeline was created for filling the vacant position. Dr. Dionne Hoskins has been serving as Education lead for the LMRCSA in an acting capacity.
- d) Sub-awards to the LMRCSA partner institutions were successfully executed
- e) A Comprehensive Evaluation Plan for the LMRCSA was developed and submitted to NOAA EPP
- f) The Center held its monthly Executive Committee meetings during which plans to execute student development and professional activities were discussed.
- g) Planning for this year's Science meeting at NOAA SEFSC, Miami, FL is far along
- h) The Center's website has been substantially modified and is regularly updated.
- i) Newsletter to disseminate information on LMRCSA accomplishments is in preparation for production in April 2017

4. Key outcomes or other achievements:

- a) Twelve (12) new students have been recruited to the Center
- b) Plans for more rigorous evaluations of the LMRCSA have commenced.
- c) New proposals have been submitted to various agencies to leverage funding in order to support additional students.

What training and professional development were completed during the reporting period for Center postsecondary students, early professionals, postdocs, and faculty?

Students recruited to the Center have begun taking courses to enable them acquire core competences in marine and fisheries science, and are defining their research projects. They have also discussed with their advisors the Student Development Plan. Students were offered an Advanced Environmetrics course.

How have the results been disseminated to communities of interest, including NOAA and other stakeholders?

The following table includes examples of the Center's communication activities that occurred during the current funding period including information on the FY16 awards and information pertaining to FY11 award and that of leveraged projects:

Table 2. Examples of LMRCSA Communication Activities during the Reporting Period

Date	Publication	Story Title	Link	Audience
			Communications on FY16 Awards	
1/5/17	UMES, Ingenuity	\$20.5 Million to Help Assure Future of Underrepresented Groups, pg. 7	https://issuu.com/umes.edu/docs/web_ingenuity_fall_2016_1?e=22255080/42031202	UMES Community; General Public
1/5/17	UMES, Ingenuity	Top NOAA Administrators visit LMRCSA at UMES, pg. 7	https://issuu.com/umes.edu/docs/web_ingenuity_fall_2016_1?e=22255080/42031202	UMES Community; General Public

9/25/2016	UMES The Key	UMES center earns \$15.5 million to train marine scientists	https://issuu.com/umes.edu/docs/key_web_sept_23_2016?e=22255080/39009640	UMES Community; General Public
9/25/2016	UMES.edu	UMES center earns \$15.5 million to train students in marine science	https://www.umes.edu/PR/Article.aspx?id=55542	UMES Community; General Public
			Communications Pertaining to FY11 awards and Leveraged Projects	
2/23/17	UMES The Key/Webpage	A Student's Perspective on UMES Day in Annapolis	https://www.umes.edu/PR/News-Articles/2017/A-Student-s-Perspective-on-UMES-Day-in-Annapolis/	UMES Community; General Public
2/10/17	UMES The Key	Masonry "fish habitats" provide habitat knowledge	https://issuu.com/umes.edu/docs/key_web_feb_10_2017?e=22255080/44099991	UMES Community; General Public
2/3/17	UMES Website, homepage	Marine researchers aim to nurture sea bass habitats	https://www.umes.edu/PR/News-Articles/2017/Masonry-fish-magnet/	UMES Community; General Public
1/18/17	NOAA Ocean Today	Introduction - Animals of the Ice	http://oceantoday.noaa.gov/every-full-moon/episode4-animalsoftheice/welcome.html	NOAA Community/LM RCSC + NOAA HIED Facebook Pages
1/5/17	UMES, Ingenuity	Chigbu Earns University System of Maryland Board of Regents' Award	https://issuu.com/umes.edu/docs/web_ingenuity_fall_2016_1?e=22255080/42031202	UMES Community; General Public
1/5/17	UMES, Ingenuity	UMES scientist earns NOAA grant	https://issuu.com/umes.edu/docs/web_ingenuity_fall_2016_1?e=22255080/42031202	UMES Community; General Public
1/5/17	UMES, Ingenuity	UMES Research Earns 485K for Geosciences Training Programs for Students	https://issuu.com/umes.edu/docs/web_ingenuity_fall_2016_1?e=22255080/42031202	UMES Community; General Public
1/5/17	UMES, Ingenuity	REU Interns Gain Experience at UMES	https://issuu.com/umes.edu/docs/web_ingenuity_fall_2016_1?e=22255080/42031202	UMES Community; General Public
1/5/17	UMES, Ingenuity	Outstanding Student - So Jin Park	https://issuu.com/umes.edu/docs/web_ingenuity_fall_2016_1?e=22255080/42031202	UMES Community; General Public
12/14/16	Ocean Today (Episode 3 - Marine Archaeology)	Introduction - Adventures of a Marine Archaeologist	http://oceantoday.noaa.gov/every-full-moon/episode3-marinearchaeology/welcome.html	NOAA Community/LM RCSC + NOAA HIED Facebook Pages
10/4/2016	Environmental Insights (UMCES e-Newsletter)	Program awarded major grant to train students in marine science	http://www.umces.edu/imet/lmrcsc?utm_source=UMCES+Newsletter+October+2016&utm_campaign=Environmental+Insights+October+2016&utm_medium=email	UMCES Community; General Public
9/9/2016	SavannahNow.com	SSU professor assists in sea turtle hatching	http://savannahnow.com/news-your-good-news/2016-09-08/ssu-	Savannah community/LM RCSC FB

What actions will be taken by the Center during the next reporting period to accomplish the goals?

Education Goals: As examples, the Center will;

- a) Continue its efforts to recruit students into the Center; at present 12 students have been recruited into cohort 1, including 3 Ph.D., 4 M.S. and 5 B.S.
- b) Offer to students a workshop on Data Management in fall 2017. In addition, and Introduction to Environmental and Resource Economics course will be offered to the students in fall 2017.
- c) Offer to students a workshop on Literacy in NOAA related sciences in fall 2017
- d) Organize during the summer 2017 Research Experiences training for rising sophomores in marine and estuarine science, and work with them to develop application packages for the NOAA undergraduate scholarship programs
- e) Continue to engage NOAA scientists in order to enhance research collaborations and identify scientists to serve on graduate student thesis and dissertation committees; work with students to identify sites for NERTO.
- f) Continue to mentor students and encourage them to present at professional meetings.

Research Goals: As examples, the Center will;

- a) Continue to seek leveraged funds to support students.
- b) Call for proposals and select projects to fund after TAB review of the proposals
- c) Continue research on TAB funded projects and projects supported with leveraged funds.
- d) Continue efforts to publish results from prior award and present at scientific meetings

Administration Goals: Examples are given below.

- a) Hold our annual Science meeting at NOAA SEFSC, Miami, FL
- b) Continue Executive Committee meetings and hold Board of Visitors meeting
- c) Continue to collect data for evaluation of Center's activities, programs, and accomplishments
- d) Continue to disseminate information about the Center to the public including producing Newsletters.
- e) Ensure that all students have taken Ethical Conduct of Research Training course

II. Products of Award

There are no limitations to the number of entries a Center submits. In reporting, keyword information can be directly pulled from Thomson Search and on Research.gov. *NOTE: Recipient may provide images, tables, charts, or other graphics in support of the Products section. Recipient may include high resolution photos.*

Within the Products section, recipient can list any products resulting from the FY16 CSC award, during the specified reporting period, such as:

Degrees Awarded: Nothing to report

Publications in Journals:

There are no publications from projects directly supported with FY16 funds.

The projects on which the following publications are based were not directly supported with FY16 funds. The papers are however, outcomes of leveraged programs, and the preparation of the manuscripts occurred during this reporting period when LMRCSC Principal Investigator (P. Chigbu) was supported with funds from the FY16 LMRCSC grant.

6 publications (4 student authors identified by *)

Bembe, S, Liang, D, Chung, JS (2017). Optimal environmental conditions for the spawning of the blue crab, *Callinectes sapidus*, in captivity. *Aquaculture Res* (In press).

Huang, X., Green*, S., Haihui, Y., Chung, J.S. (2017). The presence of an insulin-like peptide binding protein (ILPBP) in ovary and its putative role in ovarian development of the deep-sea red crab, *Chaceon quinque-dens*. (In review for *Marine Drugs*).

Marty, MJ, Vicente*, J, Place AR & Hill, RT. (2017). Do-It-Yourself Defense: Sponge symbiosis between *Xestospongia deweerdtiae* and *Plakortis* spp. is not driven by shared chemical defense against predators. *PLoS One*. (In revision)

Kang, X.*, Xia, M., Pitula, J.S. and Chigbu, P. (2017). Dynamics of water and salt exchange in Maryland Coastal Bays. *Estuarine, Coastal and Shelf Science* 189: 1-16.

Peters, R.* and Chigbu, P. (2017). Spatial and temporal patterns of abundance of juvenile black sea bass (*Centropristis striata*) in the Maryland Coastal Bays. *Fishery Bulletin*. (In revision)

Morales-Núñez A.G., and Chigbu, P. (2017). Amphipoda (Crustacea) from shallow waters in Maryland Coastal Bays (MCBs): abundance, species composition, and distribution. *Marine Biodiversity*, (Accepted).

Books: None

Book Chapters: None

Thesis/Dissertations: None

Conference Papers, Posters and Presentations:

There are no presentations from projects directly supported with FY16 funds. Presentations from leveraged projects are presented below.

5 presentations (2 oral presentations and 3 poster presentations)

Oral Presentations: 2

Jagus, R. Trans-splicing of mRNA in dinoflagellates - a link to translational control? Feb 2017.

Zhao Zhao, Michael Gonsior, Yuanchao Zhan, Rui Zhang, Nianzhi Jiao, Feng Chen, The microbial degradation of dissolved organic matter released from *Synechococcus* by viral lysis in coastal seawater. 3rd Xiamen Symposium on Marine Environmental Science (XMAS III), Xiamen, China, January 2017.

Posters: 3 (*2 student presenters)

E. Legrand, T. Schock, and J. Sook Chung (2017) Melt-related metabolomic and transcriptomic analyses of the blue crab, *Callinectes sapidus*. 24th Annual NIST Sigma Xi Postdoctoral Poster presentation. Gaithersburg, MD.

Vicente*, J., L. Moitinho-Silva, M. J. Marty and R. T. Hill. 2017. Pairing up of “high microbial abundance” and “low microbial abundance” sponge species in three mutualistic sponge pairs of the Caribbean. ASLO Aquatic Sciences Meeting, Honolulu, Hawaii.

Johnson*, AF, Aguilar, R. & Schott, E. Disease prevalence in proximity to flow through crustacean aquaculture in a N. Atlantic estuary. ASLO Aquatic Sciences Meeting, Honolulu, Hawaii, Feb 2017.

Other Publications: None

Technologies or Techniques:

Patents: None

Inventions:

Websites: www.umes.edu/lmrcsc

Products:

III. Participants in Award Performance

There are no limits on the number of participants listed for this section; however, the Center is required to list all participants who have worked one-person month or more for the project reporting period. *NOTE: Conversion of percentage of effort to person months is as follows. To calculate person months, multiply the percentage of effort associated with the project times the number of months of the appointment. For example: 25% of a 9 month academic year appointment equals 2.25 (AY) person months (9 x 0.25= 2.25).*

For the reporting period, specific questions are listed below. For award participants, recipient must provide information for:

1. What individuals have worked on the project?
2. What organizations have been involved as partners?
3. What other collaborators have been involved?

1. What individuals have worked on the project?

First name	Last Name	Partner Institution	Most Senior Project Role	Project Hours Worked per Month
TyRae	Freeman	DSU	M.S. Student (Economics)	80
Brian	Galvez	DSU	M.S. Student (Fisheries)	80
Stacy	Smith	DSU	Principal Investigator	80
Nefertiti	Smith	HU	Undergraduate researcher	40
Deidre	Gibson	HU	Principal Investigator	40
Angie	Munguia	OSU	M.S. Student	80
Jessica	Miller	OSU	Principal Investigator	40
Elizabeth	Babcock	RSMAS	Principal Investigator	6.71
David	Die	RSMAS	RSMAS Science Committee Member	3.83
Halie	O'Farrell	RSMAS	Ph.D. Student	173.33
Dionne	Hoskins-Brown	SSU	Principal Investigator	50
Tara	Cox	SSU	TAB co-PI	10
Sue	Ebanks	SSU	Faculty Mentor	5
Paulinus	Chigbu	UMES	Center Director and Principal Investigator	80
Bradley	Stevens	UMES	Distinguished Research Professor	160
Anne	Dudley	UMES	Data, Information, and Communication Manager	124
Margaret	Sexton	UMES	Research Assistant Professor	160
Ida	Tilghman	UMES	Administrative Assistant	160
Onjale	Scott	UMES	Operations Professional Program Coordinator	160
Rosemary	Jagus	UMCES	Principal Investigator	40
Tsetso	Bachvaroff	UMCES	*Participating faculty	participant not paid by LMRCS
Feng	Chen	UMCES	*Participating faculty	participant not paid by LMRCS
J. Sook	Chung	UMCES	*Participating faculty	participant not paid by LMRCS

Nick	Hammond	UMCES	*IMET Assistant Director, participating	participant not paid by LMRCSC
Russell	Hill	UMCES	*IMET Director, Participating faculty	participant not paid by LMRCSC
Allen	Place	UMCES	*Participating faculty	participant not paid by LMRCSC
Eric	Schott	UMCES	*Participating faculty	participant not paid by LMRCSC

2. What organizations have been involved as partners?

Provide additional information such as:

1. Type of Partner Organization:
2. Name:
3. Location:
4. Partner's Contribution to the Project:

Type of partner organization	Name	Location	Partner's contribution to the project
State government	DE NREC	Dover, DE	Helped students collect samples
State government	NJ DEP	Galloway Township, NJ	Helped students collect samples
State government	MD DNR	Annapolis, MD	Helped students collect samples

Have other collaborators or contacts been involved? Yes

If Yes, describe involvement and time spent.

Collaborator	Title/Affiliation	Description
Michael Casson	Economics Professor, Delaware State University	Helped with resource economics
Debra Abercrombie	Florida International University	Shared bull shark acoustic telemetry data with Ph.D. Student Halie O'Farrell
Demian Chapman	Florida International University	Shared bull shark acoustic telemetry data with Ph.D. Student Halie O'Farrell

Have NOAA collaborators or contacts been involved? Yes

o If Yes, describe involvement and time spent.

Collaborator	NOAA Affiliation	Description
Laurie Weitkamp	NWFSC, Newport OR	Mentor to Angie Munguia
Enric Cortes	SEFSC	Committee member for Halie O'Farrell; collaborator with E. Babcock
Lawrence Beefkircher	SEFSC	Provided Halie O'Farrell with the U.S. pelagic longline observer data for her dissertation

		research.
Patty Rosel	SEFSC, Lafayette, LA	TAB research collaborator
Richard Brill	NMFS, VIMS	Collaborator with Al Place (IMET) and A. Horodosky (Hampton Univ.) on taurine requirements for aquaculture fish
Francis van Dolah	NOS/NCCOS, Hollins Marine Lab, Charleston, SC	Collaborator with R. Jagus & Al Place (IMET) on dinoflagellate translational regulation
Kevin Friedland	NMFS NEFSC Naragansett, Rhode Island	Ph.D. committee member for Ammar Hanif (IMET) (Jagus/Place lab). Collaborates with Jagus/Place on menhaden diet project
Steven Kibler	NOS/NCOS Center for Coastal Fisheries Research	Collaborator with Al Place (IMET) on dinoflagellate toxins
Gretchen Messick	NOAA-NCCOS, Oxford, MD	Collaborates with Sook Chung and Eric Schott (IMET) on several projects including blue crab health and disease
Steve Morton	NMFS, Center for Coastal Fisheries and Habitat Research	Collaborator with S. Chung (IMET) on blue crab research
Matthew Poach	NMFS J.J. Howard Marine Sciences Lab, Sandy Hook, NJ	Collaborator with S. Chung (IMET) on red crab project
Jose Rivera	NMFS Habitat Conservation Division, Puerto Rico	Collaborator with R. Hill lab on sponge projects
Jim Sullivan	NOS/MBO/Formulation & Planning Division, Silver Spring, MD	Collaborator with Chen (IMET)
James Weinberg	NMFS/NEFSC Resource Evaluation & Assessment Division	Ph.D. committee member for Shadaesha Green (IMET) (S. Chung lab)

IV. Impacts of Award

What is the impact on the development of future workforce candidates for the principal discipline(s) of the award and NOAA mission-aligned support of the project?

Twelve (12) students have been identified as members of cohort 1 of which 10 belong to underrepresented minority groups. LMRCS activities focus on training activities that are preparing students for work on essential fish habitat, marine protected species and ecosystems.

What is the impact on other disciplines and Program Level Outputs and Outcomes aligned with the 2016 FFO?

LMRCS at SSU has established a task force to create a certificate program in Interdisciplinary Emergency Management. Representatives on the task force come from the degree programs in Homeland Security and Emergency Management, Marine Sciences, Business Administration, and Port Logistics. Two LMRCS faculty serve on this committee, one as a co-chair.

What is the impact on the development of candidates for the NOAA mission future workforce?

The LMRCS, through its Student Development Plan, will produce a cadre of more prepared students for careers in marine and fisheries science.

What is the impact of the Center activities to building institutional capacity in support of the objectives of the NOAA FY16 CSC award?

The project is helping the Center to build capacity at Center Institutions through hiring of postdoctoral fellows, new staff, and support of scientists in NOAA related science disciplines, and enhanced collaboration with NOAA scientists. Funds leveraged from external sources by Center scientists are being used to train additional students and to build infrastructure for research and education.

What is the impact of the NOAA award on the Center's data and information resources? To whom and how is this information and the Center accomplishments communicated?

Nothing yet to report.

How has the Center successfully conducted transfer of research results and new technologies in support of NOAA mission-aligned R2X?

Nothing yet to report

What were the societal impacts of the Center research activities? How were or are the impact results communicated to the general public.

Nothing yet to report.

V. Changes/Challenges

If not previously reported in writing to NOAA through other mechanisms, provide the following additional information or state, "Nothing to Report", if applicable.

Changes in performance of the award objectives - approach and reason(s) for change:

--Nothing to report--

Actual or anticipated problems or delays and actions or plans to resolve them:

--Nothing to report--

Changes that have a significant impact on expenditures:

--Nothing to report--

VI. Special Award Conditions

This report section is intended to provide information on progress under each special award condition for the specific reporting period. This is not cumulative reporting.

Accomplishments (provide evidence) in implementing of:

Center Evaluation – activities completed for the Evaluation Plan that assesses program progress and measures, the impact of activities related to intended education, and training, research and outcomes of the CSC.

A Comprehensive Evaluation Plan for the LMRCSC has been prepared and submitted to NOAA EPP. Additionally, survey instruments that will be used to collect data from LMRCSC students and faculty have been developed.

Direct Student Support –

12 students recruited.

Participant Beneficiaries

Increase in the number of undergraduate and graduate students who gain NOAA mission-relevant STEM discipline-specific knowledge and skills that are the primary focus of the Center Type award (i.e. Atmospheric Sciences and Meteorology, Coastal and Marine Ecosystems, Earth System Sciences and Remote Sensing Technologies, and Living Marine Resources), enroll and complete degrees, and are prepared to enter NOAA mission-aligned STEM careers or pursue advanced education.

EPP CSC Award Postsecondary Student Cohort(s) Supported (provide for each student by name):

1. Tuition, 2. Stipend, 3. Travel, 4. NERTO, 5. One-time Research:

First	Last	Degree	Partner	Tuition	Stipend	Travel	NERTO	One-time Research
India	Oliver	B.S.	UMES	\$3,902.00	0	0	0	N/A
TyRae	Freeman	M.S.	DSU	0	0	0	0	0
Brian	Galvez	M.S.	DSU	0	\$1,615.38	0	0	0
Halie	O’Farrell	Ph.D.	RSMAS	0	\$14,862.00	0	0	0
Darius	Sanford	B.S.	SSU	0	\$2,728.20	0	0	N/A
Emily	Griffin	M.S.	SSU	\$17,004	\$12,000	0	0	0
Amanda	Lawrence	Ph.D.	UMCES	0	0	0	0	0

Detbra	Rosales	Ph.D.	UMES	0	0	0	0	0
Rebecca	Wenker	M.S.	UMES	0	0	0	0	0
Nylah	McClain	B.S.	UMES	0	0	0	0	0
Nakia	Coit	B.S.	UMES	0	0	0	0	0
Nefertiti	Smith	B.S.	HU	0	0	0	0	0
Angie*	Munguia	M.S.	OSU	0	0	0	0	0
Ammar*	Hanif	Ph.D.	UMCES	0	0	0	0	0
Shadaesha*	Green	Ph.D.	UMCES	0	0	0	0	0
SUBTOTAL				\$20,906	\$31,205.58			
TOTAL					\$52,111.58			
% Student Support					20%			

**A request has been submitted to NOAA EPP to move the students supported with FY11 LMRCS award to FY 16 award (cohort 1); awaiting decision*

Milestones for Meeting Requirements of the Award: Presented below are timelines for students in cohort 1 to meet major award requirements. During this reporting period, NOAA mentors have been identified for three of the graduate students (H. O’Farrell, E. Griffin, D. Rosales). The students are in the process of developing their research synopsis, and none of them have completed the NERTO requirement.

First	Last	Degree/Yr	Partner	Cohort Experience	NERTO	One-time Research	Ethical Conduct of Research Training	Data Management Course	NOAA Mentor
India	Oliver	B.S. (Fr)	UMES	Sum 17	Sum 19	n/a	Sum 17	Fall 19	Sum 19
TyRae	Freeman	M.S. (Yr.1)	DSU	Fall 17	Sum 18	Sum 18	Fall 17	Fall 17	Spr 18
Brian	Galvez	M.S. (Yr.1)	DSU	Fall 17	Sum 18	Sum 18	Fall 17	Fall 17	Fall 17
Halie	O’Farrell	Ph.D.(Yr.2)	RSMAS	Fall 17	Sum 17	Sum 18	Fall 18	Fall 17	Fall 16
Darius	Sanford	B.S. (Fr)	SSU	Sum 17	Sum 19	n/a	Sum 18	Fall 19	Sum 19
Emily	Griffin	M.S. (Yr.1)	SSU	Fall 17	Fall 17	Sum 17	Fall 17	Fall 17	Fall 17
Amanda	Lawrence	Ph.D. (Yr.1)	UMCES	Fall 17	Sum 19	Sum 18	Fall 17	Fall 17	Fall 17
Detbra	Rosales	Ph.D. (Yr.3)	UMES	Fall 17	Sum 18	Sum 17	Fall 17	Fall 17	Fall 17
Rebecca	Wenker	M.S. (Yr.2)	UMES	Fall 17	Sum 18	Sum 18	Fall 17	Fall 17	Fall 17
Nylah	McClain	B.S. (Yr.2)	UMES	Sum. 17	Sum 18	n/a	Sum 17	Fall 18	Sum 18
Nakia	Coit	B.S. (Yr.1)	UMES	Sum.	Sum	n/a	Sum 17	Fall 19	Sum

				17	19				19
Nefertiti	Smith	B.S. (Yr.1)	HU	Sum. 17	Sum 19	n/a	Sum 17	Fall 19	Sum 19

Professional Development - Award Recipient Must Report Activities Accomplished for

1. [Rising Sophomore Experiential Training Program](#). Provide activities completed for IV., B., 8.1.2 (i) 1. thru 3. (FFO pg. 39). Students must be identified by name, home academic institution, academic year and major.

Recruiting for this activity took place during this period. Five students have been selected to participate in the rising sophomore experiential training program at the LMRCSC in summer 2017. Four students will take part in the program at UMES; one student will take part in the program at Savannah State University. These students will also participate in other activities designed for students taking part in the NSF Research Experiences for Undergraduates in marine and estuarine science at UMES and SSU. The names of the students, home institutions, academic year and their majors are presented below:

Summer 2017 Rising Sophomore Experiential Training Program Participants

#	First & Last Name	Home Institution	Year	Major	Site of the RSETP*
1	Nakia Coit	UMES	Fr	Biology	UMES
2	India Oliver	UMES	Fr	Env. Sci	SSU
3	Ileana Fenwick	HU	Fr	Mar. Sci.	UMES
4	Chryston Otubu	HU	Fr	Mar. Sci.	UMES
5	Isaiah Milton	HU	Fr	Mar. Sci.	UMES

*RSETP = Rising Sophomore Experiential Training Program

Individual Student Development Plan. Center activities to ensure completion, monitoring and student success.

All students are required to complete the student development plan with their advisors upon recruitment into the program. These plans are currently being completed and collated.

2. [Student Preparation for Success in the Career Path Relevant to the Center Award](#). Provide Center activities with activity titles, dates completed, participants, outcomes for Center measures of success.
 - RSMAS Ph.D. student Halie O'Farrell attended the Graduate Student Writing Workshop (UM RSMAS, Jan 9-13, 2017)

Post-Doctoral Program -

Center Process to Recruit and Select Postdoctoral Fellows

For each Fellow provide: Approved Postdoctoral Plan including anticipated number and proposed dates for publication submissions; activities; NOAA-facility tenure; and,

anticipated products in support of Center priorities for education and training

The position for the Postdoctoral fellow at UMES has been advertised. Interviewing of the candidates is on-going. It is anticipated that the position will be filled in mid-July after which an approved Postdoctoral Plan that has input from the Postdoctoral Research Associate will be submitted to NOAA EPP.

Pre-Publication Manuscript Submission -

Provide anticipated number and proposed dates for Center submissions for both faculty and students

	Target	Proposed Date of Submission
OSU faculty	5	By June 2017
SSU faculty	2	August 2017
UMCES faculty	1	Currently in preparation
OSU students	1	Late 2018
SSU students	1	August 2017
UMCES students	2	Currently in preparation
UMES faculty	3	August 2017

Papers currently in review: The projects on which the papers are based were not directly supported with FY16 funds. The papers are however, outcomes from leveraged programs, and the preparation of the manuscripts occurred during this reporting period when LMRCSC Principal Investigators (E. Babcock, B. Stevens, R. Jagus) were supported with funds from the FY 16 LMRCSC grant.

O'Farrell, H. B., A. Grüss, S. R. Sagarese, **E. A. Babcock**, and K. A. Rose. Ecosystem modeling in the Gulf of Mexico: current status and future needs to address ecosystem-based fisheries management and restoration activities. Submitted to Reviews in Fish Biology and Fisheries.

Bond, M.E., J. Valentin-Albanese, **E. A. Babcock**, M. R. Heithaus, R. D. Grubbs, R. Cerrato, B. J Peterson, E. K. Pikitch, D. D. Chapman. Top predators induce habitat shifts in prey within marine protected areas. Submitted to Oecologia

Fields, A., G. Fischer, S. Shea, , H. Zhang, D. Abercrombie, K. Feldheim, **E. A. Babcock**, and D. Chapman. Species composition of the global chondrichthyan (shark, batoid, chimera) fin trade assessed by a retail market survey in Hong Kong. Submitted to Conservation Biology.

Grüss, A., J. T. Thorson, S. R. Sagarese, **E. A. Babcock**, M. Karnauskas, J.F. Walter, and M. Drexler. Ontogenetic spatial distributions of red grouper (*Epinephelus morio*) and gag grouper (*Mycteroperca microlepis*) in the U.S. Gulf of Mexico. Submitted to Fisheries Research.

Grüss, A., K. A. Rose, J. Simons, C. H. Ainsworth, **E. A. Babcock**, D. D. Chagaris, K. de Mutsert, J. Froeschke, P. Himchak, I. C. Kaplan, H. O'Farrell, M. J. Zetina Rejo. Recommendations on the use of ecosystem modeling for informing ecosystem-based fisheries management and restoration outcomes in the Gulf of Mexico. Submitted to

Marine and Coastal Fisheries.

Tewfik, A., **E. A. Babcock**, J. Gibson, V. R. Burns Perez, S. Strindberg. Benefits of conservation strategies revealed through trends in focal species. Submitted to Marine Ecology Progress Series.

Cullen*, D. and **B.G. Stevens** (accepted) Assessment of black sea bass using underwater video with baited and unbaited traps. Fisheries Bulletin 0:00-00.

Liu, CL, Watson* AM, Place, AR & **Jagus, R.** Taurine Biosynthesis in a Fish Liver Cell Line (ZFL) Adapted to a Serum-Free Medium. (in review for Marine Drugs)

Liu, CL, Place AR & **Jagus, R.** Maintenance of axenic cultures of *A. carterae* for analysis of translation. (in review for Marine Drugs).

NOAA Substantial Involvement and Collaborative Engagement

Identify NOAA mentors and collaborators, including: mentor and aligned student mentored; start date and time mentorship; time commitment; Line Office affiliation; and, project title.

Mentor	LMRCSC Student	Start date	Time Commitment	Line Office	Project Title
Patricia Rosel	Emily Griffin	Sept 1, 2017	Committee member, communicating collaborator	NOAA NMFS Lafayette	Refining stock structure of common bottlenose dolphins (<i>Tursiops truncatus</i>) through photo-identification and genetic analysis
Laurie Weitkamp	Angie Munguia	Sept 1, 2017	~1.5 month/year	NOAA NWFSC	Characterizing feeding ecology and food web linkages of yearling chinook salmon (<i>Onchorhynchus tshawytscha</i>) emigrating through the lower Columbia River and Estuary
Enric Cortes	Halie O'Farrell	2015	Committee member	NOAA SEFSC	Evaluation of the effect of size and sex-based spatial segregation on shortfin mako and bull shark fishery sustainability

CSC Programmatic Special Award Conditions

Recipient must provide accomplishments for Programmatic Special Award Conditions that address the education and training, scientific research and administrative functions in the award including, for example, outcomes from Advisory Board Meetings, effective management for all

key personnel positions, early engagement with NOAA in performance of award, outcomes of Center meetings, integration of human dimensions in all award activities, implementing longitudinal outcomes tracking, and overall Program-level metrics for the EPP/MSI CSC postsecondary awards as a Federal STEM Education Agency-mission Future Workforce, for reporting period (NOT cumulative).

A. Provide FY16 Center award information for:

1. **Number of EPP-funded post-secondary students from underrepresented minority communities** who are trained 10 and graduated 0 in NOAA- mission sciences.
2. **Total number of EPP-funded post-secondary students** who are trained 12 and graduate 0 in NOAA-mission fields relevant to this announcement.
3. **Number of EPP-funded graduates who enter the NOAA mission workforce as hires** by NOAA 0, NOAA contractors 0, NOAA partners 0, resource management agencies 0, NGO community 0, academia 0 or as entrepreneurs 0.
4. **Number of EPP-funded graduates who participate in and complete NOAA agency mission-related postdoctoral level programs** 0.
5. **Total new funds leveraged with NOAA EPP award** (including post-secondary student support) = \$1,941,445

B. Provide FY16 Center award information to demonstrate contribution to supporting CSC Desired Program level Outcomes and Outputs defined in FFO p. 7 - 10, for this reporting period.

5. CSC Desired Program Level Outcomes and Outputs

5.1 Education and Training

Outcome 1. Increased number, annually, of CSC post-secondary students, trained.

Twelve (12) students have been identified/recruited to the Center as members of Cohort 1 (2016 – 2017), including 3 Ph.D., 4 M.S., and 5 B.S., in addition to 3 continuing Ph.D. students (1 at OSU and 2 at IMET) who the Center has requested NOAA EPP for permission to include as members of cohort 1. The LMR CSC has met its target for CSC student recruitment for this period.

Outputs:

(a) Increase quantitative and analytical skills – Center students took courses that enabled them to acquire quantitative and analytical skills including Advanced Environmetrics offered by Dr. Dionne Hoskins.

(b) Increased competence in applying STEM to decision making, policy and management – Center students enrolled in a Fisheries Policy seminar course offered by Dr. Brad Stevens and Dr. Kevin Chu (NOAA) in spring 2017.

(c) Increased skills to use large data sets, geographical information systems (GIS) and statistical analysis, computer modeling, and algorithm development – No GIS course was offered during this reporting period.

Outcome 2. Increased number of CSC post-secondary students educated and graduated annually.

Twelve (12) students were educated by the Center as members of Cohort 1 (2016 – 2017), including 3 Ph.D., 4 M.S., and 5 B.S., in addition to 3 continuing Ph.D. students (1 at OSU

and 2 at IMET) who the Center has requested NOAA EPP for permission to include as members of cohort 1.

(a) **Number of degrees earned annually in NOAA mission-related disciplines** - None of the students graduated during this reporting period.

(b) **Number of students (total and URM) who participated in professional development opportunities, to include at least one on-site experiential research and training opportunity at a NOAA Lab, office, or facility with tangible training and research:** None of the students participated in an on-site experiential research and training opportunity at a NOAA Lab, office or facility during this reporting period.

Outcome 3. Increased CSC capacity to train and graduate students.

The grant has made it possible for 8 collaborative research projects to be funded for the period of 2016 – 2017, which will enable more Center scientists to be available to mentor and advise undergraduate and graduate students. In addition, 10 NOAA scientists have been identified to serve as mentors of the students during the NERTO program or as collaborators in the TAB funded projects.

Outputs: (a) Number of seminars, new courses, new programs, and new degrees offered to develop working skills and functional competencies to support the NOAA mission and workforce, (b) Total numbers of students supported by the LMRCS and degrees awarded that reflect the changing demographics of the nation.

Outputs	# During this Reporting Period
Seminars	5
New courses offered	0
New programs developed	0
New degrees offered	0
# of students supported by the LMRCS	12
Total degrees awarded	0
Degrees awarded to URMs	0

Outcome 4. Reduce the attainment gap for URMs in NOAA mission-relevant fields

The recruitment of new URMs (graduate and undergraduate students) during this reporting period is an important first step needed for preparing the students for careers in NOAA mission-relevant fields. This will ultimately help to reduce the attainment gap for the URMs in the fields.

Outputs:

(a) Increased number of URM students in student development activities that will lead them to the attainment of degrees and/or employment in NOAA mission fields = **9** URMs at the LMRCS took part in student development activities.

(b) Increased number of URM students who select to pursue higher education in NOAA mission fields = **5** URMs at the LMRCS are pursuing higher education in NOAA mission fields during this reporting period.

5.2 Scientific Research

Outcome 1. Increased NOAA mission-relevant research capacity at MSIs.

NOAA scientists are already collaborating with Center scientists as well as working with some of the graduate students; suitable mentors are being identified for the remaining students. The Center is in the process of completing search for the two post-doctoral positions at two MSIs (UMES and SSU) which will help increase research capacity the Center. Additionally, research funds provided to scientists at the Center are enabling them to purchase equipment and supplies for their research in addition to Graduate Research Assistantship provided to support research endeavors.

Outputs:

- (a) **Number of research collaborations with NOAA and LMRCSC faculty, staff and students:** Each of the eight LMRCSC TAB projects has a NOAA scientist as a collaborator.
- (b) **Number of NOAA scientists serving as mentors and advisors for student research:** 10 NOAA scientists and collaborators are working with the Center.
- (c) **Number of intra-institutional collaborative partnerships established and maintained in support of NOAA's mission = 6**
- (d) **Number of uses of NOAA data in research and tool development = 1.** Halie O'Farrell (Ph.D. student at RSMAS) is using the U.S. pelagic longline observer data for her dissertation research.
- (e) **Number of inter-institutional collaborative partnerships established and maintained in support of NOAA's mission = 6** partnerships have been established.

Outcome 2. CSC-supported faculty, staff and students' research directly aligned with NOAA's mission and strategic priorities.

Eight collaborative research projects were funded by the LMRCSC for the period of 2016 – 2017. These projects were funded after they had been reviewed by the Technical Advisory Board (TAB) based on a number of criteria one of which is their alignment with NOAA's mission and strategic priorities.

Outputs:

	# From Projects Directly Supported with FY 16 Funds	# from Leveraged Projects
# of peer reviewed publications	0	6
# of presentations	0	4
# Tools developed	0	
Use of LMRCSC research results and tools by NOAA & other stakeholders	1. Halie O'Farrell's research will contribute directly to the shortfin mako shark stock assessment at ICCAT*	
# of instances LMRCSC publications are cited	0	
# of LMRCSC students, staff or faculty recognized nationally for LMRCSC research	0	

**International Commission for the Conservation of Atlantic Tunas (ICCAT)*

5.3 CSC Administration

Outcome 1. Increased CSC capacity to support and sustain education and research in NOAA mission areas.

Outputs:

- (a) Funds leveraged with CSC award to support NOAA mission in education and research amount to **\$1,941,445**. Additional details can be found in Section VII of this report.

Outcome 2. Increased engagement by CSCs with the URM communities to enhance the mission workforce pipeline.

Output:

- (a) *Number of structured activities to recruit and retain students, particularly from URM communities:* Center recruitment activities focused on several events targeted at underrepresented minority audiences, including attendance at professional meetings such as the American Indian Science and Engineering Society, and College/Career Pathways to Success Night at Wor-Wic Community College, MD.
- (b) *Number of MSI inter-institutional collaborative partnerships established and maintained in support of NOAA's mission:* 6.

Outcome 3. To increase communication of CSC accomplishments and capacity

Outputs: (a) *Number of LMRCSC products used by stakeholders,* (b) *Number of featured articles in print or digital media referencing the NOAA LMRCSC:*

The LMRCSC Communication Specialist is preparing a newsletter that will be released in April, and has also been busy modifying and updating the LMRCSC website.

Outcome 4. Increased use of post-secondary education evaluation methodologies

Outputs: (a) Number of best practices that are measurable, scalable and transferrable, (b) Consistent use of established evaluation practices, including higher education practices, to measure effectiveness of each component of the award:

The College of Exploration that serves as External Evaluator of the LMRCSC has developed, as part of the Center's Comprehensive Evaluation Plan, surveys that incorporate post-secondary education evaluation methodologies that will be used to collect data and evaluate the Center.

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VII. Financial Information

1. Total NOAA funding breakout

FY 16 Award Center base funds: Indicate how funds were used for the reporting period, using award budget categories to provide detailed information for reporting period. Unobligated balances will be compared with SF 425 reporting.

Postsecondary Direct Student Support:

Tuition:	\$20,906.00
Stipend:	\$31,205.58
Travel:	\$0
NERTO:	\$0
One-time Research:	\$0
Total:	\$52,111.58 (20% Direct Student Support for the period)

Collaborative Research:

Eight collaborative projects in the amount of \$321,279 in direct cost were funded during this reporting period. We do not know yet how much of that amount has been spent.

2. Total leverage funding breakout

Indicate funding source, type (grant or contract), amount, Center PI, project title; and, how funding contributed to the FY 16 Center award for:

Postsecondary Student Support:

Collaborative Research:

Source	Type	Total amount	Current 6 month period	PI	Project title	Contribution to Center
NOAA BREP	Grant	\$139,925	\$54,365	Bradley Stevens	Cold water corals in MAB	Funds are used to support a M.S. student Rebecca Wenker at UMES; also provides partial salary support for Brad Stevens
MAFMC/AS MFC	Contract	\$216,394	\$18,311	Bradley Stevens	Hab in the MAB: black sea bass habitats	Funds are used to support research for Cara Schweizer (Ph.D. student at UMES); also provides partial salary for B. Stevens

NOAA S-K	Grant	\$358,305	\$113,254	Bradley Stevens	Assessment of Puerto Rico queen conch	Funds are used to pay stipend to and provide research support for Wilmelie Cruz (Ph.D. student at UMES); also provides partial salary for B. Stevens
NSF	Grant	\$55,000	\$9,167	Cuker, B	Multicultural Diversity in the Aquatic Sciences	Funds are used to pay for travel by some center students to attend scientific meetings
NSF	Grant	\$900,000	\$180K	Gibson, D.	Cryptic Diet of the Doliolid...	
NSF	Grant	\$200K	\$75K	Gibson, D.	Partnership in Research and Education in Materials (PREMP)	
OSU Markham Award	Grant	\$3M	\$600K	Munguia, A.	Lower Columbia River and estuary food web support for Chinook salmon	
Consortium for Ocean Leadership	Grant	\$10,000	\$10,000	Hoskins-Brown, D. and Young, V.	NOSB regional site	
Maryland Industrial Partnerships	Grant	\$246,999	\$16,266.42	Chen, F.	Turning chicken manure into fertilizer and clean energy	
Maryland Industrial Partnerships	Grant	\$99,963	\$18314.27	Chen, F.	Developing a practical and economical system to grow microalgae with chicken manure nutrient in large pilot system (Phase 2)	
Maryland Industrial Partnerships	Grant	\$100,000	\$987.88	Chen, F., Hill, R.	Increase methane in chicken manure digesters	
National Institute of Standards and Technology	Grant	\$274,732	\$50,758.33	Chung, J.S.	Crustacean metabolomics: Identification of potential growth and reproductive indicators for aquaculture using NMR and MS approaches	
National Science Foundation	Grant	\$635,507	\$11,489.5	Chung, J.S.	Functional Roles of a Novel Crustacean Female Sex Hormone in Sex Differentiation and Developing	

					Secondary Sex Features of Crustaceans	
Maryland Industrial Partnerships	Grant	\$99,999	\$36,273.2	Hill, R.	Harvest of algal blooms for crude oil production	
National Institute of Standards and Technology	Grant	\$883,780	\$108,045.37	Hill, R.	IMET Post-Doctoral Research Program in Environmental and Marine Science	
Ratcliffe Foundation	Grant	\$600,000	\$103,784.55	Hill, R.	The Ratcliffe Environmental Entrepreneurs Fellowship Program (REEF)	
Ratcliffe Foundation	Grant	\$181,830	\$43,213.83	Hill, R.	IMET Environmental Biotechnology Incubator (EBI)	
National Institutes of Health	Grant	\$644,111	\$41,611.69	Jagus, R., Place, A	Translation regulation of gene expression in toxic dinoflagellates	
National Science Foundation		\$802,036	\$138,160.08	Jagus, R., Place, A	Translation regulation of gene expression in toxic dinoflagellates	
National Science Foundation		\$308,440	\$77,540.37	Li, Y.	Understanding the Prokaryotic Pathways for Triacylglycerol Synthesis and Turnover in the Plastid of Microalgae and Implications for Biofuels	
Office of Naval Research		\$78,000	\$14,719.59	Li, Y.	Liquid Hydrocarbon Production with the Electrobiome Platform	
Environmental Research Services		\$6,600	\$849.1	Place, A.	Spatial and temporal analysis of phytoplankton in the Great Lakes over a one-year period	
Maryland Industrial Partnerships		\$158,685	\$44,870.33	Place, A.	Plant-Based Aquafeed with Low-Leaching Taurine	
City of Baltimore Department of Public Works		\$12,990	\$3,264.09	Schott, E.	Microbial Source Tracking as a Tool for Assessing and Managing Fecal Contamination	

Northeastern Regional Aquaculture Center		\$12,513	\$3,989.54	Schott, E.	Testing and Application of Novel Probiotic Bacteria for use in Marine Aquaculture	
Tides Foundation		\$25,000	\$12,428.65	Schott, E.	Inquiry-based exploration of urban waterfront biodiversity: DNA barcoding protocols and support for high school education	
DE NOAA Sea Grant		\$15,000	\$10,362	McIntosh, Dennis	Preliminary assessment of new technology for oyster purification	
NOAA SEFSC		\$100,000	\$50,000	Hoskins-Brown, D.	NOAA CMER	
NOAA-Saltonstall Kennedy		\$299,381	\$83,697.16	Schott, Eric	Disease and discard mortality in the blue crab fishery: using new information about an old virus to improve management of the resource	
NOAA-ECO HAB		\$136,833	\$8,114.15	Place, Allen	ECO HAB: Integrating Cell and Toxin Cycles of <i>Karlodinium veneficum</i> with Key Environmental Regulators: In Situ Studies of Predictive Determinants for Bloom Toxicity	
Maryland Sea Grant		\$9,999	\$2,607.90	Chung, J. Sook	The Blue Crab Genome Initiative	