NOAA Living Marine Resources Cooperative Science Center

LMRCSC II Fellowship Handbook

University of Maryland Eastern Shore

Partners:

Delaware State University

Hampton University

Savannah State University

Oregon State University

University of Maryland Center for Environmental Science Institute of Marine and Environmental Technology

University of Miami - Rosenstiel School

Table of Contents

List of Tables

List of Figures

Welcome from the Center Director

Welcome students to the National Oceanic and Atmospheric Administration (NOAA) Living Marine Resources Cooperative Science Center II (LMRCSC II). At the NOAA LMRCSC II it is our mission to prepare students from across the US, for careers in marine and fisheries sciences and to be eligible for the future NOAA mission workforce, through exemplary academic and research collaborations.

NOAA LMRCSC II is funded by the NOAA Educational Partnership Program with Minority-Serving Institutions (EPP/MSI). The NOAA LMRCSC II trains and graduates students in marine science for careers in research, management, and public policy that support the sustainable harvest and conservation
of our nation's living marine resources. With its partner universities the LMRCSC II conducts research on marine and estuarine systems congruent with the interests of NOAA Fisheries.

NOAA LMRCSC II partner universities work with students to achieve the following goals: Prepare the future workforce for marine and fisheries science; Strengthen collaborations across universities and professional networks to enhance academic programs in marine and fisheries science; and Develop an exemplary capacity for scientific collaborations among partner institutions in the NOAA relevant fields of marine and fisheries science. Fellows are eligible for direct hire into NOAA careers after completion of the fellowship and degree requirements, including a qualifying internship at a NOAA facility under the supervision of NOAA scientists. This handbook is intended as a reference material for fellows, faculty and program directors to facilitate the completion of fellowship requirements.

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LMRCSC Directory

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Acronyms

EPP – Educational Partnership Program
ISDP – Individualized Student Development Plan
LMRCSC II- Living Marine Resources Cooperative Science Center II
LMS – Learning Management System
LOU – Letter of Understanding
MSI – Minority Serving Institutions
NERTO – NOAA Experiential Research & Training Opportunities
NOAA- National Oceanographic and Atmospheric Administration
SDP – Student Development Plan
SMART - Specific, Measurable, Achievable, Realistic, Timely
SSIO – Student Scholarship Internship Opportunities
TAB – Technical Advisory Board

Requirements of LMRCSC Fellows

Letter of Understanding

All LMRCSC Students will be required to sign a letter of understanding at their home institution. A copy of the letter of understanding should be held by the student, the faculty advisor, home institution Program Director, and the center administration. The Letter of Understanding will be routed by the center through HelloSign.

Program Directors will turn in signed letters of understanding to the LMRCSC Deputy Director or Education Expert. The letter of understanding or commitment will outline all the professional development provided by the center to the student, now Fellow, will be expected to complete. This fellowship is a minimum of a two-year commitment per student and faculty advisor. A list of professional development and training is listed in Table 1 below. Students selected for the LMRCSC II award are referred to hereafter as Fellows.

Table 1. Requirements for Fellowship

Graduate Students	Undergraduates
NERTO	NOAA Relevant Research Internship
LMRCSC Annual Fellows Assembly	LMRCSC Annual Fellows Assembly
Grant Writing Workshop/Proposal Writing	Grant Writing Workshop/Proposal Writing
Data Carpentry Workshop/Data Management Course	DATA Management Course
Responsible Conduct of Research Training	Responsible Conduct of Research Training
Mentoring Training	Mentoring Training
Social Science Course - ≥400/4000 level	Social Science Course ≥100/1000 level
Professional Communications Seminar	Professional Communications Seminar
Manuscript Submission Before Graduation	Presentation at a Scientific Meeting
How to establish a social networking site for professional use	How to establish a social networking site for professional use
Writing Retreat	Writing Retreat
Presentation at a Scientific Meeting	
NOAA Science Seminar Presentation	
Graduate Seminar Series Presentation	
NOAA S&T Strategies Seminars	

Eligibility for LMRCSC II Funding

All LMRCSC II Fellows are responsible for maintaining eligibility throughout the fellowship. Minimally, a fellow must adhere to the following each semester to maintain eligibility:

- Must be a US citizen
- Must be enrolled each term/semester during the academic year as a full-time student
- Must maintain a minimum of 3.0 cumulative AND term GPA out of 4.0 scale

- Failure to maintain GPA for both cumulative and term will result in a loss of funds until GPA is restored.
- Must be working on a research project relevant to NOAA Fisheries
- Support for B.S. degree students will be for up to a maximum of 4 calendar years*
- Support for M.S. degree students will be for up to a maximum of 3 calendar years*
- Support for Ph.D. degree students will be for up to a maximum of 5 calendar years*

*Time is based on NOAA EPP/MSI requirements and is not indicative of actual financial support provided at the center or center partners for all fellows. Funding duration will be based on your Letter of Understanding, and availability of funds.

Milestones for progress monitoring: Each fellow's progress through the core competencies will be marked by the milestones described in Table 2. These milestones are based on expected completion dates. Completion dates will be recorded in the NOAA Office of Education Student Tracker version 2.1. The tracker is a product of the National Oceanic and Atmospheric Administration, Office of Education Educational Partnership Program award number (NA21SEC4810005). Its contents are solely the responsibility of the award recipient and do not necessarily represent the official views of the U.S. Department of Commerce, National Oceanic and Atmospheric Administration. Courses approved by the center will be taught by faculty at partner institutions. All center workshops, seminars and in person meetings will be conducted by content experts in the workshop field. Core competency milestones will be tracked in the learning management system and the Completion dates will be recorded in the NOAA Office of Education Student Tracker. Record reviews will occur bi-annually until the fellow graduates with terminal degree.

Table 2. Core Competency Milestones

Task	Undergraduate	Graduate
Development Plan Complete	At First Annual Fellows Assembly	
Type Core Completed	At First Annual Fellows Assembly	
Social Science Completed	≥100 level Social Science Course +training from Evergreen Collection	≥400 level Social Science Course + training from Evergreen Collection
Data Science Completed	≥100 level Data Management +training from Evergreen Collection	Data Carpentry Workshop
Responsible Conduct of Research Training Completed	CITI training completion	

LMRCSC II Fellows will be evaluated annually on progress in the core competencies. The evaluation will utilize the Milestone Rubric found at the end of the Handbook. LMRCSC Fellows will receive feedback with the rubric. The rubric will be completed by the Fellow's advisor, Program Director and the Education Expert as applies. The rubric measures the fellow's progress in the fellowship and does not impact GPA or other academic metrics.

Learning Management System Portal (LMS)

The LMRCSC II has an independent learning management portal for all students. The Education Expert will archive student meetings, seminars, center videos and professional development materials for you to help meet center competency requirements. Your progress in required modules will be monitored by the Education Expert.

The LMRCSC Annual Assembly, seminars, and workshops will be housed in the learning management system (LMS). The LMS will also serve as the center's inward facing website. Fellows will receive job opportunity announcements, event notifications, and performance evaluations through the LMS. The LMS will also provide information regarding policies and procedures not addressed in the handbook.

How to enroll in the LMS: The Education Expert will build your profile in the LMS based on your successful application to the center. The LMS will use the email from the application and will email notifications to that address. Contact the Education Expert to change your email address. You are encouraged to add your profile picture and short biography to your user profile. This enables other fellows to 'see' who you are.

Weblink to LMS: lmrcsc.ispringlearn.com

Student Development Plan

The Student Development Plan (SDP) is an assessment tool used by the center administration to monitor progress toward degree completion for LMRCSC Students.

Purpose

The SDP is required from all LMRCSC Students each semester. The SDP reports student progress to the LMRCSC center office. The information from the student development plan allows the center office to track student progress - allows the center to support students and provide mechanisms to meet benchmarks toward Fellowship completion.

Process:

Prior to submitting a SDP, schedule an advisement meeting with the LMRCSC Program Director and your faculty advisor. This meeting should focus on program progress for the LMRCSC Student. After or during this meeting, the LMRCSC Student should submit a Student Development Plan based on the goals and reflections from the advisement meeting.

The SDP will route to the Program Director at the fellow's home institution for approval. Once approved the student will receive an email from FormSite stating the plan was approved. Submit that email to the Education Expert in the LMS.

Submission Deadlines:

Fall Submission Deadline: September 1 each year
Spring Submission Deadline: March 1 each year
Student development plan location:
https://fs29.formsite.com/umes/form23/form_login.html

Education and Training for LMRCSC II

Requirements and Explanations

Ethics Training

All LMRCSC II funded fellows must participate in ethics training. Ethics training can be either a formal course or CITI training. Fellows must submit a certificate of completion through the LMS if they complete CITI training. Fellows may choose to complete both an ethics course for credit and CITI training. All fellows are **required** to complete a minimum of either a course for credit or CITI training. A course syllabus from the semester the fellow took the course and unofficial transcript will serve as documentation for the requirement.

Social Science

LMRCSC Fellows will receive an orientation to Social Science in Fisheries through the LMRCSC II Annual Assembly. LMRCSC II Fellows are **required** to take an appropriate social science course at their home institution. Refer to Table 2 Core Competency Milestones for which course level is required. The social science course should include topics relevant to fisheries management. A list of preapproved social science courses that are known to meet Center requirements are listed by institution and degree level in the ISpring Knowledge Base. If you wish to meet the requirement using a course that you do not see listed for your institution, please submit the course description and/or course syllabus to the LMRCSC II Social Science Lead, Dr. Abiodun Omotayo (410-651-8121; email: aoomotayo@umes.edu). The Social Science Lead is the point of contact for questions regarding social science requirements.

NOAA LMRCSC Center-wide Framework for Social Science Integration

NOAA defines social science as "the process of describing, explaining, and predicting human behavior and institutional structure in interaction with their environment" (SSRP, 2003). The process of objective, transparent, documentable, and replicable methods should be integrated into scientific studies related to social science (Hannah et al., 2009). Social science encompasses a broad array of disciplines, including economics, archaeology, anthropology, psychology, and sociology.

Center students will engage with the social sciences in a variety of ways as demonstrated in Figure 1. At a minimum, all undergraduates will receive social science training through course requirements as prescribed through their home institution and the requirements of their state's

governing board over colleges and universities. For students who participate in undergraduate internships with NOAA and NSF REU programs or conduct research at their home institution, they will also integrate a broader impact statement in their final paper and presentation.

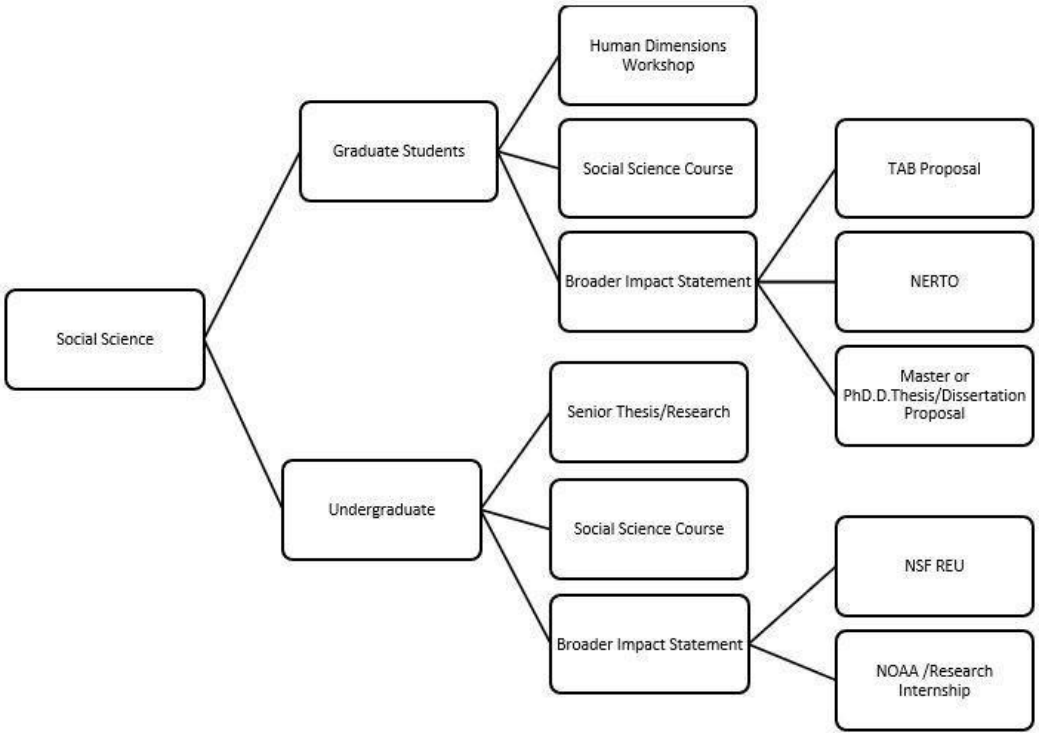

Figure 1. Social science integration throughout the Center for graduate and undergraduate students.

Graduate students have multiple options for addressing social science during their tenure at the LMRCSC. At a minimum, all graduate students participate in a five-day professional development workshop that includes Human Dimensions activities focused on social science and economics. Additionally, all students must articulate societal relevance of their research through the broader impact statements in their NERTO final reports and TAB proposals.

Broader impact statements are grounded in research and focus on the human behavior associated with a research question. These statements may address socio-economic impacts of social change with a target population. Broader Impact statements may be predictive of future research or the benefits of the current study for the larger population. Broader impacts statements by themselves are not social science. Rather they reflect an understanding of the social relevance of one's research. Graduate students are required to include a broader impacts statement in their TAB Proposals. The TAB Proposal will be discussed in detail in a following section. The rubric for the Broader Impact statement can be seen in Table 3.

Some graduate fellows conduct social science as the bulk of the graduate research or include a chapter focused on social science, such as a specific question or application in education, management or policy. Ideally in these cases, a social scientist serves as a committee member and the Center works with the fellows to achieve social science literacy. Not all center fellows will participate in all social science related activities at the center. Social science experience will move from broad to specific integration depending on the fellow's research focus as demonstrated in Figure 2.

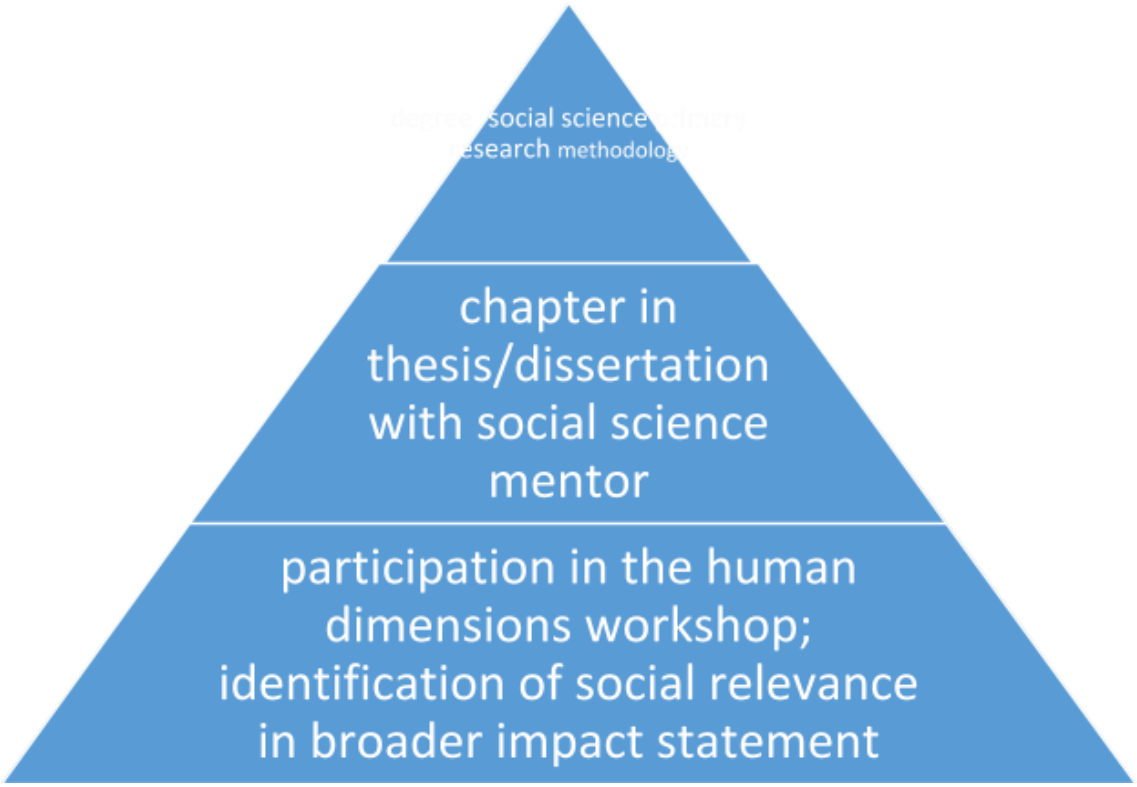

Figure 2. Integration of Social Science integration at LMRCSC II.

Table 3. Broader Impact Statement Rubric

The purpose of this rubric is to provide guidance to faculty mentoring LMRCSC Fellows on the inclusion of social science in the broader impacts statement.

Criteria	Score	Comments
• The LMRCSC Fellow includes appropriate primary literature synthesizing the connection between the social impact and the research question.	1 (no) 2 (somewhat) 3 (yes)	
• LMRCSC Fellow provides clear connections between a socio-economic impact or social change with a target population and the research question.	1 (no) 2 (somewhat) 3 (yes)	
• LMRCSC Fellows demonstrate societal decision-making connections	1 (no)	

between the research and the broader impacts statement.	2 (somewhat) 3 (yes)	
• LMRCSC Fellow analyzes the potential cultural, economic or policy connections between the research and NOAA Mission for social science integration.	1 (no) 2 (somewhat) 3 (yes)	
Overall Feedback:		

DATA Management Training

Graduate Fellows are required to take the Center Data Carpentry Workshop. The 16-hour workshop will introduce all LMRCSC II Graduate Fellows to OpenRefine, SQL and R Studio. All graduate fellows are required to attend the workshop once during their fellowship. The Center will strongly encourage Graduate Fellows to complete the workshop the first time that it is offered during their fellowship. Undergraduate Fellows are encouraged to participate in the workshop toward the end of their undergraduate training.
Fellows may attend the workshop a second time if they wish. Additional data management courses aligned with a fellow's primary research is highly encouraged by the center.

Undergraduate Fellows must take a course that focuses on data management skills as part of their course requirements. A basic statistics course will not necessarily meet this requirement. The course should include the use of a data analysis tool such as SQL, Python, R or MatLab to be considered as meeting this requirement. Alternatively, students may complete the asynchronous data management course in iSpring with a basic statistics course to meet this requirement. Fellows will turn in the course syllabus from the semester they took the course as documentation they have enrolled in a course. Success will be evaluated based on the unofficial transcript submitted at the next SDP reporting period.

Grant Writing

All LMRCSC II Fellows will participate in proposal/grant writing through training with Distinguished Research Scientist and the Education Expert. The training will be conducted at the LMRCSC II Annual Assembly and a Center-wide writing retreat.

Technical Advisory Board

A webinar focused on TAB projects hosted by the Distinguished Research Scientist once a year prior to the dissemination of the TAB request for proposal (RFP) will include the Center expectations of data management and sharing at the center.

Research Data Sharing

LMRCSC Fellows are required to comply with the LMRCSC Data Sharing Plan (Appendix B). In summary, in compliance with NOAA requirements, environmental data

and information collected and/or created under the LMRCSC, including data collected for theses and dissertations, will be made visible, accessible, and independently understandable to general users. Data will be made public within a year of the student's graduation or upon publication of a paper based on the results (whichever is sooner), to allow students the opportunity to publish their analyses in the peer-reviewed literature before the data are made public.

Students play an important role in meeting these data management and accessibility requirements. Student and Faculty responsibilities are listed below:

Student Responsibilities:

1. Maintain data in a clear, readable, and organized fashion. This includes clear labeling including units on all measures and consistent formatting.
    a. If the research requires IRB approval, the data may require processing before it can be shared. This may involve summarizing, disaggregating, or redacting.
2. Deliver complete data to your Faculty Mentor and Program Director no later than the time of the thesis or dissertation defense or publication of a manuscript based on the data, whichever is sooner.
    a. It is a good research practice to ensure that all collaborators, including your Faculty Mentor have access to the research data throughout the project.
    b. You are encouraged to deposit your data in a publicly accessible database that is appropriate to your field of study. Your Faculty Mentor, Program Director, and the Center Distinguished Research Scientist can advise you on which database may be the best choice for your data. In some cases, the journal in which you publish may require that you use a specific database.
3. Provide complete metadata to be published on the LMRCSC website, including where and/or how the data may be accessed. This may be a URL for the publicly accessible website, or it may be the contact information for the custodian of the data within the LMRCSC. Metadata is submitted through a form, accessed here if viewing this document digitally.

Faculty Mentor Responsibilities:

1. Directly supervise student data management to ensure that the above responsibilities are met.
2. Advise the student regarding whether and where to post the data to a publicly accessible database.
3. Maintain a copy of the finalized dataset after the student's graduation.

Program Director Responsibilities:

1. Collect and maintain a copy of the finalized dataset after the student's graduation.
2. Advise the student regarding whether and where to post the data to a publicly accessible database.
3. Be prepared to share the data that is not already posted to a public database if appropriate requests are made by potential data users.

Research Opportunities

LMRCSC II Fellows are expected to participate in research internship opportunities. Graduate Fellows are expected to spend a minimum of 12 weeks of continuous presence at a NOAA facility/Lab under a NOAA Mentor. Undergraduates who elect to participate in a NOAA facility internship must spend 10 weeks at the NOAA facility. Undergraduates may elect to participate in an internship in a non-NOAA facility; however, it is important to note that a non-NOAA facility cannot convey direct hire eligibility to the student. A **NOAA Mentor** is defined as NOAA Federal employee working directly for NOAA. NOAA affiliates may work with LMRCSC Fellows but cannot be the primary mentor for NOAA internships.

NOAA Experiential Research and Training Opportunity (NERTO)

The NERTO is a 12-week internship at a NOAA facility. The NERTO is overseen by a NOAA Mentor. It is required to be completed by a fellow prior to graduation. The center provides detailed training regarding how to develop the NERTO in the LMS. Graduate fellows will present their NERTO research results at the NOAA Science Seminar series after the completion of their NERTO. One of the graduate fellows' benefits of completing their NERTO and Fellowship is to become eligible for direct hire at NOAA.

Undergraduate Internship

Undergraduate fellows may participate in internships at either a NOAA facility or other research facility. Internships must be 10 weeks in length to count as meeting the requirement for the fellowship. Fellows will present their NOAA Internship results at NOAA Headquarters with the other NOAA undergraduate programs participants.

NOAA Facility

Similar to the NERTO for Graduate fellows, undergraduates will spend 10 weeks at a NOAA facility with a NOAA mentor. The final product of the research internship should include a final report or poster to present at the conclusion of the internship with the potential to present at a professional conference. Fellows pursuing this option should speak to their Program Director about identifying and arranging an appropriate internship.

Research Internship

Undergraduates may participate in any Research Experience for Undergraduates (REU) or other similar internship experiences. It is highly recommended the internship have a focus in fisheries and fisheries management. The product of the research internship should include a final report or poster to present at the conclusion of the internship with the potential to present at professional conference.

Direct Hire Authority with NOAA

NOAA Conservation Corps Act Direct Hiring Authority
What is a Direct Hiring Authority (DHA)? An appointing authority the Office of Personnel Management offers to Federal agencies to fill vacancies when a critical hiring need or severe shortage of candidates exists.
Why use DHA? To expedite the hiring process and allow for greater chance of hiring qualified applicants by eliminating competitive rating and ranking with other Federal employees and by removing veterans' preference.

Conservation Corps Act Direct Hire Authority (CCA DHA). NOAA was granted Direct Hire Authority under the Conservation Service Corps Act – "*with respect to the National Marine Sanctuary System, coral reefs, and other coastal, estuarine, and marine habitats, and other land and facilities (scientific mission critical occupations) administered by the National Oceanic and Atmospheric Administration (NOAA) in order to place recent graduates in national service positions to conserve, restore, and enhance the great outdoors and other purposes*". NOAA's Administrator is committed to utilizing the CCA DHA to increase recruitment of graduates supported by NOAA scholarship, fellowship, and internship programs to its early career workforce.

The LMRCSC Graduate Fellows who complete their NERTO are eligible for Direct Hire. The certificate for Direct Hire comes from NOAA EPP/MSI. That office will email the certificate to the Center Director. It will then be sent to qualifying fellows. Be sure to update graduation status with the center.

Technical Advisory Board (TAB) Proposal

Each year, NOAA LMRCSC undergoes a science development process. This process includes a Request for Proposal (RFP) for Center scientists and graduate fellows. The RFP is issued in October with project submissions in January. TAB proposals are reviewed between January and March. Project awards are issued in April.

LMRCSC student, and the faculty advisor along with their NOAA scientist collaborator conference about TAB proposal before and after submission. The outcome of the TAB proposal is shared with the student's faculty advisor and the Program Director of the LMRCSC at the home institution.

TAB Timeline

October - Request for proposal issued

January - Submission deadline for proposals

January - March Proposal review by the TAB

Spring - Award announcements

One-Time Research Fund

The one-time research fund is a fund used by graduate fellows to support their research while actively supported by NOAA LMRCSC. Fellows are eligible for up to $10,000 for M.S. and up to $20,000 for Ph.D. Fellows work with their faculty advisor and LMRCSC Program Director at their hosting institution to develop and submit a budget to the Center for approval.

The funds are used to pay for Specialized Student Training:

- Accommodation during student training
- Travel for training

- Sample processing at specialized labs with expensive equipment that are not readily available at the Center (e.g., Stable Isotopes analyses or Genetic sequencing of samples)
- Boat rental for research
- Other uses must be approved by LMRCSC Center Director

Professional Communication

LMRCSC II Fellows are expected to communicate in a professional manner. Avenues of professional communication include acknowledgement of funding support, email and social media, scientific communication and technical writing.

Acknowledgement of Funding Support

All LMRCSC II supported fellows must acknowledge NOAA EPP/MSI support on ALL publications, posters, oral and other presentations. Templates and directions with the current award number are available in the LMS under Communication and Writing in the course catalog.

Refer to the templates found in iSpring under the Communication and Writing section for the most recent guidance for language and award numbers.

Email and Social Media

LMRCSC II fellows are expected to indicate their fellowship status in their email signature. A template and directions are located in the LMS. Fellows are also expected to establish a professional social media profile. LinkedIN and ResearchGate are the LMRCSC II preferred professional social media. Directions for professional social media is found in LMS under Communication and Writing.

Scientific Communication and Technical Writing

LMRCSC II Fellows are expected to share the outcomes of scientific research through science communication. This is achieved by participation in the Graduate Seminar Series, NOAA Science Seminar Series, Cross-CSC Seminar series and professional conferences. A list of professional conferences recommended by the LMRCSC can be found in Table 4.

Table 4. Recommended conferences for LMRCSC Fellows

Conference	Professional Organization Affiliation
NOAA EPP/MSI Biennial Forum	NOAA Educational Partnership Program with Minority Serving Institutions, http://www.noaa.gov/office-education/epp-msi
American Fisheries Society Annual Meeting; and Chapter Meetings	American Fisheries Society https://afsannualmeeting.fisheries.org/
Ocean Sciences/ASLO Winter Meeting	Association for the Sciences of Limnology and Oceanography https://aslo.org/
ASLO Summer Meeting	Association for the Sciences of Limnology and Oceanography https://aslo.org/
Annual Regional Symposium	University of Maryland Eastern Shore - www.umes.edu
CERF	Coastal & Estuarine Research Federation Biennial Conference - https://www.erf.org/cerf-2017-biennial-conference

Technical Writing

LMRCSC II Fellows will receive technical writing training during a Writing Retreat. The writing retreat will provide a number of short professional developments in CV and cover letters, white papers, poster development and thesis/dissertation support. Fellows will also receive supported writing time for their senior/master thesis and dissertation or publications. Fellows will also participate in peer review to support each other as well as obtain hands on experience in the peer review process.

Travel

LMRCSC II Fellows are expected to travel to in person center activities, professional conferences and the NOAA EPP/MSI forum. LMRCSC Fellows are also provided funding for travel and housing related to NERTO and Research Internships for Undergraduates at NOAA facilities. The LMRCSC II Center provides the funds for travel. Contact your program director to identify if proposed travel is supported under the LMRCSC II.

Table 5. Center and University Guidelines for Student Travel

University	**Link to Student Travel Resources**
University of Maryland of Eastern Shore (UMES)	See Ms. Ida Tilghman in Tanner Hall
Delaware State University (DSU)	https://www.desu.edu/sites/flagship/files/document/31/03-04_travel_policy.pdf
Hampton University (HU)	See Dr. Deidre Gibson

Savannah State University (SSU)	https://www.savannahstate.edu/fiscal-affairs/UniversityTravel.shtml
UM-Rosenstiel School of Marine, Atmospheric, and Earth Science (Rosenstiel)	Forms must be filled out in Workday. Your advisor and department administrative assistant can help.
University of Maryland Center for Environmental Science Institute of Marine and Environmental Technology (UMCES)	www.umces.edu/sites/default/files/VIII1100UMCES_0.pdf Fellows should contact Dr. Schott and Sarah Hughes for specific travel planning
Oregon State University (OSU)	See Dr. Jessica Miller

Virtual Campus

The LMRCSC II and Partner institutions have an articulation agreement to share courses between each university with the exception of Oregon State University. If you are in need of a specific course, it is best to identify that course at least one semester before the class is needed. You would reach out to the instructor for the course to identify if they are willing to add an online student to their course. Post-COVID, most faculty have access to Zoom, GoogleMeet, WebEx, etc. to conduct online instruction. Registration for virtual courses is through your home institution. Table 6 includes a list of courses regularly offered to LMRCSC II Fellows at the graduate level.

Virtual Campus Registrations

Registration will vary from institution to institution:

University of Maryland Eastern Shore (UMES) and University of Maryland Center for Environmental Science Institute of Marine and Environmental Technology (IMET) fellows will register for this course through the MEES system.

Savannah State University (SSU) fellows will register for the course as a Special Topics course with their mentor or other identified faculty as the instructor.

- The SSU instructor will be responsible for reporting the course grade to the SSU Registrar's office based on the syllabus grade scale.
- Mid-term and final grade deadlines will be communicated by the SSU faculty to the virtual campus course instructor.
    - SSU faculty must submit grades by the deadlines to keep the student in good standing with the university.
- Virtual campus courses concluding after the final exam date will require a grade change form to be submitted based on the final grade from the virtual campus instructor.

University of Miami (Rosenstiel School) fellows will register for the corresponding course in the UM course catalog. The course instructor will report the student's grade to the UM program director, who will upload the grade.

Hampton University (HU) students would contact Dr. Deidre Gibson and her support staff regarding the registration procedures for Hampton University.

Delaware State University (DSU) fellows will register for the course as Research Problems. The course instructor will report grades to the DSU program director, who will report course grades to the DSU Registrar

Table 6. Virtual Campus/MEES Courses offered Regularly to LMRCSC II Fellows.

Course Offerings	*Offered by*	*Semesters Offered*
Bayesian Statistics for Marine Scientists	E. Babcock, UM-RSMAS	Spring
MEES 682 Fishery Science and Management	Nesslage, Wilberg, UMCES	Fall
MEES 631 Fisheries Ecology	T. Miller, D. Secor, UMCES	Fall
MEES 660 – Ecological Systems	Hildebrandt, Woodland, UMCES	Fall
Fisheries Survey Sampling	TBD, UMES	Fall
Intro. to Fish Pop. Dynamics & Stock Assessment	P. Chigbu, UMES	Spring (by request)
Marine Population Dynamics	D. Die, UMES	Spring
Ichthyology	TBD, UMES	Fall (by request)
Intro. to Env. & Resource Economics	Y. Chi, UMES	Spring
Ecosystem Modeling for Fisheries	H. Townsend, NOAA	Winter (by request)
GIS Course	K. Ejiogu, UMES	Spring (by request)

Mentorship

LMRCSC II Fellows will receive mentorship from faculty, NOAA scientists, center staff and peers. The LMRCSC training in mentorship will be organized through the LMS (iSpring). It is expected all mentors will successfully complete the LMRCSC mentorship training seminars and asynchronous materials. Fellows and Mentors will have a mentorship contract as part of the Letter of Understanding.

Should a fellow encounter problem with a mentor they should report the challenges to the Center for investigation. The LMRCSC II may request a mentor to take additional training and/or a reassignment of the fellow. Results would be dependent on the outcome of the investigation.

Problems, Challenges, and Conflict Resolution:

Because of the interinstitutional, interdisciplinary, and collaborative nature of the LMRCSC, it can be confusing to identify who students should reach out to for help with issues within the Center. Because of

this, the LMRCSC has identified that the Deputy Director will serve as Ombudsman for the Center. Generally speaking, your Faculty Mentor and/or the Program Director at your institution should be your first points of contact with regard to problems, challenges, and conflicts. If they are not able to help you, or if you feel more comfortable seeking assistance elsewhere, please reach out to the Deputy Director/Ombudsman for further assistance.

Title IX Statement:

The LMRCSC is committed to creating a learning and working environment that is free from gender discrimination and sexual misconduct. Title IX of the Education Amendments of 1972 states, "No person in the United States shall, on the basis of sex, be excluded from participation in, be denied benefit of, or be subjected to discrimination under an education program or activity receiving federal financial assistance." In compliance with Title IX, any form of sex discrimination (including sexual harassment, sexual assault, dating or domestic violence, or stalking) is prohibited. Retaliation for asserting claims of sex discrimination is also prohibited.

Each of our partner institutions maintains policies to comply with Title IX. Links to each partner's Title IX office are listed below. Please be aware that faculty members are "Responsible Employees" and required to report information about suspected or alleged sex discrimination. LMRCSC Faculty and Staff will report any incident that they become aware of to the Title IX office at each institution that is involved in the incident.

Delaware State University

Hampton University

Oregon State University

Savannah State University

University of Maryland Center for Environmental Science

University of Maryland Eastern Shore

University of Miami

References:

Susan Hannah, Lee Anderson, Roberta Balstad, David Fluharty, Dolly Garza, Hauke Kite-Powell, … James N. Sanchirico. (2009). *Integrating social science into NOAA planning, evaluation and decision making: A review of implementation to date and recommendations for improving effectiveness* (p. 57). NOAA Science Advisory Board.

Social Science Review Panel (SSRP). (2003). *Social science research within NOAA: Review and recommendations* [Final Report of the Social Science Review Panel to the NOAA Science Advisory Board].

NOAA Social Science Committee, (n.d) Application of an Integrated Assessment (IA) Modeling Approach.

Appendix A: Milestone Rubric

LMRCSC II Core Competency Rubric and Learning Objectives

	0	1 = Awareness	2 = Basic	3 = Intermediate	4 = Advanced	5 = Expert
	No exposure to this material	Understanding level in Bloom's Taxonomy	Applying level in Bloom's Taxonomy	Analyzing level in Bloom's Taxonomy	Evaluating level in Bloom's Taxonomy	Creating level in Bloom' s Taxonomy
Competency 1: Stock Assessment Support and Information						
Learning Objective 1.1:Analyze data from surveys or fisheries with statistical methods such as GLM, GAM, machine learning or geostatistical models, to estimate population abundance, distribution, or catch/bycatch		Annual Assembly	≥C in 300 or 400 level course on the topic	≥B in 600 level course on the topic; or undergraduate research opportunity	NERTO or other research activity on the topic; or senior thesis	Thesis or Dissertation Chapter, submitted manuscript
Learning Objective 1.2: Apply simple fisheries stock assessment models like logistic models and data limited methods		Annual Assembly	≥C in 300 or 400 level course on the topic	≥B in 600 level course on the topic; or undergraduate research opportunity	NERTO or other research activity on the topic; or senior thesis	Thesis or Dissertation Chapter, submitted manuscript
Learning Objective 1.3:Apply integrated stock assessment models such as statistical catch at age models or catch at length models		Annual Assembly	≥C in 300 or 400 level course on the topic	≥B in 600 level course on the topic; or undergraduate research opportunity	NERTO or other research activity on the topic; or senior thesis	Thesis or Dissertation Chapter, submitted manuscript

Learning Objective 1.4. Measure or model fundamental biological processes including growth, recruitment, maturity, movement, diet, mortality, and the factors that influence these processes in ecosystems.		Annual Assembly	≥C in 300 or 400 level course on the topic	≥B in 600 level course on the topic; or undergraduate research opportunity	NERTO or other research activity on the topic; or senior thesis	Thesis or Dissertation Chapter, submitted manuscript
Learning Objective 1.5: Understand fisheries sustainability reference points and how population dynamics model outputs are used in fishery management		Annual Assembly	≥C in 300 or 400 level course on the topic	≥B in 600 level course on the topic; or undergraduate research opportunity	NERTO or other research activity on the topic; or senior thesis	Thesis or Dissertation Chapter, submitted manuscript

Competency 2: Climate Impacts on Marine Ecosystems						
Learning Objective 2.1: Understand the major impacts of climate change on marine ecosystems, including warming temperatures and ocean acidification. Understand how these impacts can directly and indirectly impact marine populations, including their reproduction, growth, mortality, diseases and contaminants, and		Annual Assembly	≥C in 300 or 400 level course on the topic	≥B in 600 level course on the topic; or undergraduate research opportunity	NERTO or other research activity on the topic; or senior thesis	Thesis or Dissertation Chapter, submitted manuscript

sustainability.						
Learning Objective 2.2: Develop the ability to collect, collate, and synthesize physical and biological data from marine and coastal system.		Annual Assembly	≥C in 300 or 400 level course on the topic	≥B in 600 level course on the topic; or undergraduate research opportunity	NERTO or other research activity on the topic; or senior thesis	Thesis or Dissertation Chapter, submitted manuscript
Learning Objective 2.3: Understand the principles of Ecosystem-Based Fisheries Management (EBFM) and how data on living marine resources, such as diet composition and individual and population growth rates, can be incorporated into EBFM.		Annual Assembly	≥C in 300 or 400 level course on the topic	≥B in 600 level course on the topic; or undergraduate research opportunity	NERTO or other research activity on the topic; or senior thesis	Thesis or Dissertation Chapter, submitted manuscript
Competency 3: Habitats and Biological Systems						
Learning Objective 3.1: The characteristics of habitats required for the health and sustainability of fish, invertebrate, and marine mammal populations		Annual Assembly	≥C in 300 or 400 level course on the topic	≥B in 600 level course on the topic; or undergraduate research opportunity	NERTO or other research activity on the topic; or senior thesis	Thesis or Dissertation Chapter, submitted manuscript
Learning Objective 3.2: The impacts on marine habitats, ecosystems, and		Annual Assembly	≥C in 300 or 400 level course on the topic	≥B in 600 level course on the topic; or undergraduate research opportunity	NERTO or other research activity on the topic; or senior	Thesis or Dissertation Chapter, submitted

populations caused by					thesis	manuscript
fishing, bycatch,						
development, nutrient						
and sediment						
overload, anoxia, and						
HABs.						
Learning Objective		Annual	≥C in 300 or	≥B in 600 level	NERTO or	Thesis or
3.3: Conservation and		Assembly	400 level	course on the topic;	other research	Dissertation
restoration of marine			course on the	or undergraduate	activity on the	Chapter,
habitats and			topic	research opportunity	topic; or senior	submitted
populations,					thesis	manuscript
particularly for fragile						
habitats such as coral						
reefs and estuaries.						
Competency 4: Seafood, Nutrition, Aquaculture, and Pathology						
Learning Objective		Annual	≥C in 300 or	≥B in 600 level		
4.1: understand the		Assembly	400 level	course on the topic;		
diversity of			course on the	or undergraduate		
Aquaculture in			topic	research opportunity		
fisheries science						
Learning Objective		Annual	≥C in 300 or	≥B in 600 level	NERTO or	Thesis or
4.2: Aquaculture food		Assembly	400 level	course on the topic;	other research	Dissertation
safety and product			course on the	or undergraduate	activity on the	Chapter,
nutrition, biosecurity			topic	research opportunity	topic; or senior	submitted
					thesis	manuscript
Learning Objective		Annual	≥C in 300 or	≥B in 600 level	NERTO or	Thesis or
4.3: Aquaculture		Assembly	400 level	course on the topic;	other research	Dissertation
animal health and			course on the	or undergraduate	activity on the	Chapter,
biosecurity, fish			topic	research opportunity	topic; or senior	submitted
nutrition and					thesis	manuscript
sanitation, sustainable						
feeds						
Learning Objective		Annual	≥C in 300 or	≥B in 600 level	NERTO or	Thesis or
4.4: Knowledge and		Assembly	400 level	course on the topic;	other research	Dissertation
technologies for			course on the	or undergraduate	activity on the	Chapter,
recirculating			topic	research opportunity	topic; or senior	submitted

aquaculture					thesis	manuscript
Learning Objective		Annual	≥C in 300 or	≥B in 600 level	NERTO or	Thesis or
4.5: Aquaculture in the		Assembly	400 level	course on the topic;	other research	Dissertation
environment,			course on the	or undergraduate	activity on the	Chapter,
Aquaculture genetics			topic	research opportunity	topic; or senior	submitted
and biosecurity					thesis	manuscript
Learning Objective		Annual	≥C in 300 or	≥B in 600 level	NERTO or	Thesis or
4.6: Aquaculture and		Assembly	400 level	course on the topic;	other research	Dissertation
seafood regulations,			course on the	or undergraduate	activity on the	Chapter,
stakeholders,			topic	research opportunity	topic; or senior	submitted
extension					thesis	manuscript

Competency 5: Social Science and Human Dimensions						
Learning Objective		Annual	≥C in 1000	≥B in 600 level		
5.1: Examining the		Assembly	level course	course on the topic;		
connections between			on the topic	or undergraduate -		
social science and				research opportunity		
decision making.				or ≥C in 300 or 400		
				level course on the		
				topic		
Learning Objective		Annual		≥B in 600 level	NERTO or	Thesis or
5.2: Identify and		Assembly		course on the topic;	other research	Dissertation
connect social science				or undergraduate -	activity on the	Chapter,
(including economics,				research opportunity	topic; or senior	submitted
policy, culture, etc) to				or ≥C in 300 or 400	thesis	manuscript
fisheries science and				level course on the		
research				topic		
Learning Objective		Annual	≥C in 100	≥B in 600 level	NERTO or	Thesis or
5.3: Determine the		Assembly	level course	course on the topic;	other research	Dissertation
connections between			on the topic	or undergraduate -	activity on the	Chapter,
species management,				research opportunity	topic; or senior	submitted
ecosystem valuation				or ≥C in 300 or 400	thesis	manuscript
and economic value				level course on the		
				topic		
Learning Objective		Annual	≥C in 1000	≥B in 600 level	NERTO or	Thesis or
5.4: Understand the		Assembly	level course	course on the topic;	other research	Dissertation

cultural connections to fisheries and the communities they serve.			on the topic	or undergraduate - research opportunity or ≥C in 300 or 400 level course on the topic	activity on the topic; or senior thesis	Chapter, submitted manuscript
Competency 6: Data Management and Analysis						
Learning Objective 6.1: Clean, format, and organize data for analysis in Excel, R or other data management system		LMRCSC data management workshop, undergraduate or graduate	≥C in 100 to 200 level course on the topic	≥B in 600 level course on the topic; or undergraduate research opportunity	NERTO or other research activity on the topic; or senior thesis	Thesis or Dissertation Chapter, submitted manuscript
Learning Objective 6.2:Write and use a data management plan, including producing meta-data and archiving data		LMRCSC data management workshop, undergraduate or graduate	Student receives LMRCSC data management plan and discusses with advisor or program director	Advisor and PD make sure student is following LMRCSC DMP and relevant university policies throughout research	Student submits a proposal with a data management plan	Student submits meta-data to LMRCSC archive, and data to appropriate archive
Learning Objective 6.3:Manipulate, analyze and display data with R, Python, or other statistics software		LMRCSC data management workshop, undergraduate or graduate	advanced workshop training -min 2-day	Graduate ≥B in 600 level course in statistics; or undergraduate ≥C in 300 or 400 level course in statistics	NERTO or other research activity on the topic; or senior thesis	Thesis or Dissertation Chapter, submitted manuscript
Learning Objective 6.4: Access and query relational databases such as Oracle using SQL		LMRCSC data management workshop, undergraduate or graduate	advanced workshop training - min 2-day	Graduate ≥B in 600 level course in statistics; or undergraduate ≥C in 300 or 400 level course in statistics	NERTO or other research activity on the topic; or senior thesis	Thesis or Dissertation Chapter, submitted manuscript
Competency 7: Technical and Professional						

Communications						
Learning Objective 7.1: Develop skills and strategies for authoring and delivering poster presentations		Attend a poster session	Attend LMRCSC poster workshop	Present poster at university or center level conference	Present at least one poster at a regional or national professional meeting	Present multiple posters at professional meetings
Learning Objective 7.2: Develop skills and strategies for authoring and delivering oral presentations		Attend oral presentation at a regional or national meeting	Attend LMRCSC presentation workshop	Make an oral presentation at a university or center level conference or seminar	Make an oral presentation at	Present at more than one national meeting and/or oral defense of thesis of dissertation
Learning Objective 7.3: Develop skills for authoring scientific manuscripts		Complete LMRCSC module on Introduction to Primary Literature	≥C in 300-400 level technical course on the topic	≥B in 600 level technical writing course; Co-author of accepted peer reviewed article	Complete thesis or dissertation	Primary author of accepted peer reviewed article
Learning Objective 7.4: Develop skills for successful job interviews		Asynchronous training through Evergreen content collection	Participation in Cross-CSC workshop	Practice interviews Writing Retreat and/or via video conference		
Learning Objective 7.5: Develop skills at resume/cv writing		Asynchronous training through Evergreen content collection	Participation in Cross-CSC workshop	Mock hiring committee evaluation and feedback		
Learning Objective 7.6: Develop skills for communicating with the public about scientific results		Participate in Center or other Seminar on Science Communication, particularly Citizen Science	Participating in a Citizen Science project as a volunteer; participating in the delivery of K-12 STEM activities	Undergraduate research project including Citizen Science Component	Collaborate with/develop a Citizen Science plan	Citizen Science component to Thesis or Dissertation ;
Competency 8: Other Professional Skills						
Learning Objective 8.1: Develop strategies for professional conflict management			Engage in discussion of conflict management strategies at the Annual Assembly			

				professional development session			
	Learning Objective 8.2: Develop strategies for effective time management			Create a color coded personal time management plan at the Annual Assembly professional development session			

Appendix B: The LMRCSC Data/Information Sharing Plan

1) Data Management Goals:

LMRCSC research is conducted under best practices for scientific integrity. All LMRCSC faculty are required to report and manage any conflicts of interest (COI) through their respective universities' COI management systems. All students are required to take a course in research ethics in their first semester in the program. Data are communicated and made public in a timely manner except in cases of proprietary or confidential data. All sources of funding are acknowledged in all publications. The Data Manager, along with the Center Director, the Distinguished Research Scientist, and the Program Directors, are responsible for making Center research results publicly accessible, within one year, using NOAA standards for data/metadata format and content. They are also responsible for increased public access to results from Federally-funded research as provided for in NOAA published guidance,

2) Communication:

Faculty and students present their results at scientific meetings, and at public meetings such as Fishery Management Council meetings. The LMRCSC uses a communications plan to share the work and accomplishments of its scientists and students with the public. The LMRCSC highlights the accomplishment on its website, social media outlets and newsletter and employs public relations strategies to share the accomplishment with broader audiences.

3) Publications:

Results of LMRCSC research are published as soon as possible in the peer reviewed literature. Students are encouraged to publish in journals that allow open access, or that allow free access to articles within a year of publication. Longitudinal tracking of project outputs is accomplished through the student tracker database, which records all publications and presentations, and through the semi-annual reports which include records of all publications and presentations by LMRCSC members. All LMRCSC publications are submitted to the NOAA institutional repository, and are listed on the LMRCSC website. The Program Directors are responsible for communicating with recent Center graduates to ensure that publications resulting from LMRCSC funded thesis or dissertation research are recorded as LMRCSC products.

4) Accessibility:

In compliance with NOAA requirements, environmental data and information collected and/or created under the LMRCSC will be made visible, accessible, and independently understandable to general users, free of charge or at minimal cost, in a timely manner. In order to allow students the opportunity to publish their analyses in the peer-reviewed literature before the data are made public, student-generated data will be made public within a year of the student's graduation or upon publication of a paper based on the research (whichever is sooner), except where limited by law, regulation, policy or by security requirements.

5) Data Standards:

The LMRCSC may generate environmental data either through thesis or dissertation research conducted by LMRCSC students, or research supported by LMRCSC TAB funding. The nature of the data to be collected is not yet known, because the specific projects have yet to be proposed, and proposed projects have to undergo review by the TAB before funding decisions. To support discovery, exchange, and use of data generated by LMRCSC researchers, metadata will be generated in compliance with established standards in the appropriate fields. Students and other researchers who generate data will be encouraged to receive training on metadata standards, for example through the National Centers for Environmental Management's online coursework.

6) Metadata:

On publication of a project, LMRCSC researchers receive a link from the Data Manager referring them to the data entry form for LMRCSC meta-data. This form collects meta-data including the name of the Principal Investigator and submitting organization, their contact information, the program, project, or expedition name, funding agency and grant/contract numbers, data collector's ID numbers (e.g. Cruise and Leg numbers, Ship or Other platform names, collection start and end dates, geographic location (Latitude/Longitude), objectives of data collection effort, data parameters, units, precision, observation methodology, instrument/gear identification or description, analysis methodology, data processing/reduction methodology, explanations of data quality flags, citations of relevant publications and grey literature, and the link to the repository where the data are stored. These meta-data are available for published projects on the LMRCSC data portal https://www.umes.edu/LMRCSC/Content/Data-Portal/. The Data Portal includes links to where the data are stored in the researcher's choice of public data repositories (e.g., GitHub, FigShare). All data will be posted to repositories except where data are confidential or proprietary, in which case only the meta-data will be posted.

7) Responsibility and Oversight:

The Program Directors, along with the LMRCSC Data Manager, will be responsible for ensuring that students and other researchers generate and submit their metadata to the LMRCSC Data Portal in appropriate formats that are accessible, usable and secure. Any data requiring Institutional Review Board (IRB) certification will reside with the IRB certified scientist at each partner university. Confidentiality requirements of human subjects research may require that some data be summarized, or identifying material removed, before sharing. Data shared with LMRCSC researchers by other organizations, such as commercial fisheries logbook data, may not be released to the public, or may be summarized before release, depending on the protocols of the data owner. Partner institutions are responsible for ensuring the security of any reports, publications, datasets and metadata records resulting from the grant. Physical samples that contribute to grant publications must be stored in a manner that will ensure integrity and future access for at least as long as grant records are retained.