# Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>List of Acronyms</td>
<td>3</td>
</tr>
<tr>
<td>Evaluation Plan Executive Summary</td>
<td>4</td>
</tr>
<tr>
<td>CESSRST Project Description</td>
<td>5</td>
</tr>
<tr>
<td>CESSRST Project Goals and Objectives</td>
<td>5</td>
</tr>
<tr>
<td>CESSRST Logic Model</td>
<td>6</td>
</tr>
<tr>
<td>Outcomes Measures by CESSRST Goal</td>
<td>7</td>
</tr>
<tr>
<td>Summative Key Indicators</td>
<td>8</td>
</tr>
<tr>
<td>Project Evaluation</td>
<td>9</td>
</tr>
<tr>
<td>Purpose</td>
<td>9</td>
</tr>
<tr>
<td>Clear Delineation of Evaluation for Funded Activities</td>
<td>10</td>
</tr>
<tr>
<td>External Evaluator</td>
<td>10</td>
</tr>
<tr>
<td>Evaluator Credentials</td>
<td>10</td>
</tr>
<tr>
<td>Role of Evaluator</td>
<td>12</td>
</tr>
<tr>
<td>External Evaluation Design</td>
<td>13</td>
</tr>
<tr>
<td>Design and Methodology</td>
<td>13</td>
</tr>
<tr>
<td>Process and Product Evaluation</td>
<td>13</td>
</tr>
<tr>
<td>Evaluation Questions</td>
<td>14</td>
</tr>
<tr>
<td>Data Collections Methods and Tools</td>
<td>15</td>
</tr>
<tr>
<td>Data Collection Methods</td>
<td>15</td>
</tr>
<tr>
<td>Collection Methodology by Evaluation Question</td>
<td>16</td>
</tr>
<tr>
<td>Direct and Indirect Assessment of Student Learning Related to Core Competencies</td>
<td>17</td>
</tr>
<tr>
<td>Alignment of Evaluation Design to NOAA Priorities</td>
<td>19</td>
</tr>
<tr>
<td>Linkages to FFO Outcomes and Outputs</td>
<td>19</td>
</tr>
<tr>
<td>Data Validation and Analysis</td>
<td>19</td>
</tr>
<tr>
<td>Data Validation</td>
<td>19</td>
</tr>
<tr>
<td>Evaluation Stakeholders</td>
<td>19</td>
</tr>
<tr>
<td>Communication, Reporting, and Dissemination</td>
<td>21</td>
</tr>
<tr>
<td>External Evaluation Communication Plan</td>
<td>21</td>
</tr>
<tr>
<td>Project Monitoring</td>
<td>22</td>
</tr>
<tr>
<td>Sub-recipient Monitoring Reports</td>
<td>22</td>
</tr>
<tr>
<td>CESSRST Semi-Annual Progress Reports</td>
<td>23</td>
</tr>
<tr>
<td>Data Management and Security via MIS</td>
<td>23</td>
</tr>
<tr>
<td>Annual, Interim, and End-of Project Reporting</td>
<td>23</td>
</tr>
<tr>
<td>Use of Results</td>
<td>24</td>
</tr>
<tr>
<td>Evaluation Timeline</td>
<td>25</td>
</tr>
<tr>
<td>Evaluation Budget</td>
<td>25</td>
</tr>
<tr>
<td>Project Year 2 through Project Year 5 Budget</td>
<td>25</td>
</tr>
</tbody>
</table>
Appendices .................................................................................................................................................. 27
Appendix A: Mark Howse Vitae ........................................................................................................... 28
List of Acronyms

AGU – American Geophysical Union
AMS – American Meteorological Society
BEYA – Black Engineers Year Award
CSC – Cooperative Science Center
CWCC – Center-wide Core Competency
GIS – Geographic Information System
GOES-R – Geostationary Operational Environmental Satellite-R Series
HACU – Hispanic Association for Colleges and Universities
HBCU – Historically Black College and Universities
ISDP – Individualized Student Development Plan
JPSS – Joint Polar Satellite System
LAESA-SHPE - Latin American Engineering Student Association- Society for Hispanic Professional Engineers
LSAMP - Louis Stokes Alliances for Minority Participation
SSIO – Students Scholarship Internship Opportunities
STAR – Center for Satellite Applications and Research
NCCOS – National Centers for Coastal Ocean Science
NCEI – National Centers for Environmental Information
NCWCP – National Center for Weather and Climate Prediction
NERTO – NOAA Educational Research and Training Opportunities
NOAA-CESSRST – National Oceanic and Atmospheric Administration-Cooperative Science Center for Earth System Sciences and RE mote Sensing Technologies
PACE – Professional Advancement and Career Engagement
SACNAS - Society for Advancement of Chicanos and Native Americans in Science
SDSU – San Diego State University
SPARKS - Students Professional and Academic Readiness with Knowledge in Satellites
UMBC - University of Maryland, Baltimore County
UPRM - University of Puerto Rico, Mayaguez
UTEP – University of Texas, El Paso
Evaluation Plan Executive Summary

The Center for Earth System Sciences and Remote Sensing Technologies (CESSRST) has drafted this document as the Comprehensive Evaluation Plan in compliance with the criteria outlined on pages 53-54 of the Financial Assistance to Establish Four NOAA Cooperative Science Centers at Minority Serving Institutions Announcement of Federal Funding Opportunity (FFO) (NOAA-SEC-OED-2016-2004758). The evaluation plan describes CESSRST processes for the assessment of the program’s progress and measures the impact of activities related to the CESSRST goals and objectives. CESSRST has contracted the services of an expert External Evaluator who understands the mission of the CESSRST and who has the training and experience that is required to assess the education and training outcomes of the project using protocols that are developed by the U.S. Department of Education and National Science Foundation.

Consistent with the criteria outlined in the FFO, the CESSRST will execute an IRB approved plan for implementation and evaluation. References to the additional evaluation plan criteria as outlined in the FFO are bulleted below.

- **External evaluator demonstrates expertise necessary to successfully conduct the proposed CSC evaluation**- See Evaluator Credentials (Page 11)
- **The extent to which methods for conducting formative and summative evaluations are rigorous and appropriate for the CSC**- See Table 4 Summary of CESSRST Core Competency Assessment (Page 17) and the CESSRST Assessment & Evaluation Milestones Matric (Appendix B)
- **The extent to which the formative and summative evaluation methods will provide high-quality data and performance feedback and permit periodic assessment towards reaching intended outcome**- See Use of Results (Page 23)
- **The extent to which the evaluation plan includes sufficient resources to carry out the evaluation**- See Evaluation Budget (Page 24)

Like the CESSRST implementation activities, the CESSRST evaluation activities are consistent with the CESSRST Logic Model. The plan will engage all stakeholders (i.e. students, faculty, scientists, and community stakeholders) in the evaluation process. The evaluation will draw from formative and summative data that are collected through both quantitative and qualitative methods as a means to gauge program success. The Center Management Team (CMT) and External Evaluator have identified a set of streamlined performance indicators and aligned them to the CESSRST goals and objectives. The CMT is comprised of the Center Director, Co-PIs, Assistant Director, Distinguished Scientist, Thematic Leads, Education Expert, and Data, Information, and Communication Officer. **Appendix B: CESSRST Assessment & Evaluation Milestones Matric (Appendix B)** outlines the alignment of each goal and associated outcomes to the process and product evaluation design, including the data and collection methods as described starting on page 15 of this document.

The CESSRST Evaluation Team has designed the Year 1 & 2 Comprehensive Evaluation Plan in order to streamline data and data collection in a manner that clearly links the process and product evaluation design to the Program Outcomes and Outputs as identified in the FFO.

CESSRST evaluation efforts will lead to actionable results that allow the Project Director and Center Management Team (CMT) to make informed decisions about project implementation, make more impactful mid-course corrections, and reach summative conclusions about the overall impact
of the project. The CMT is comprised of the Center Director, Co-PIs, Assistant Director, Distinguished Scientist, Thematic Leads, Education Expert, and Data, Information, and Communication Officer. The CESSRST evaluation plan will also serve to help NOAA and stakeholders to determine CESSRST success in the achievement of the Program goals and objectives.

CESSRST Project Description

The Center for Earth System Sciences and Remote Sensing Technologies supports the National Oceanic and Atmospheric Administration (NOAA) in its commitment to workforce diversity by striving to educate and train large numbers of students, particularly those from the underserved and underrepresented minority communities. The goal (see goals, p. 10) is to prepare the next generation of engineers, scientists and technologists in NOAA sciences. Through a consortium of academic institutions, led by the City College of the City University of New York, NOAA CESSRST recruits, educates, trains, and graduates an increasing number of underrepresented minority student through rigorous academic programs and research affiliates. Included in the CESSRST consortium are well known Minority Serving Institutions (MIS), Hispanic Serving Institutions (HSI), and Historically Black Colleges and Universities (HBCU) strategically chosen to incorporate the geographic diversity of the nation and serve areas with large concentrations of Under Represented Minority (URM) students, guaranteeing a diverse pipeline of students trained in NOAA sciences. CESSRST students must meet rigorous academic requirements that are complemented by hands-on participation in state-of-the-art research that is tightly coupled with NOAA interests. These research projects are enhanced by building effective partnerships between CESSRST faculty, NOAA scientists, and industrial partners who serve as mentors and co-mentors for CESSRST students. The Evaluation plan is being delineated, monitored and evaluated under three major program elements: (1) Education and Training; (2) Science – Collaborative Research and (3) Management.

CESSRST Project Goals and Objectives

**Goal 1: Conduct NOAA mission-aligned collaborative research**

Objectives:
- 1a. Increase NOAA Collaboration and Engagement with NESDIS and other Line Offices
Goal 2: Recruit, train and graduate increased number of students in NOAA related STEM fields

Objectives:
- 2a. Create and implement Center-Wide Recruitment Plan
- 2b. Create and institutionalize Center-wide Core-Competency (CWCC) Framework
- 2c. Create and implement Center-Wide Social Science Framework
- 2d. Create and implement Professional Advancement and Career Engagement (PACE)
- 2e. Create summer Bridge Program to increase number of applications for NOAA UG scholarship opportunities

Goal 3: Increase/attain institutional capacity to sustain education and research

Objectives:
- 3a. Increase/leverage University and generate extramural resources to sustain CSC capacity to conduct research and education
- 3b. Create new Academic Programs and Curriculum in line with NOAA mission science
- 3c. Communicate CSC accomplishments and success stories
- 3d. Create best practices that are scalable and transferable

CESSRST Logic Model

The conceptual framework for determining CESSRST Outcomes and Impacts incorporates a broad range of educational outcomes that will be used to provide evidence of NOAA CESSRST program success. The construct of a successful educational program goes beyond a student’s acquisition of specific knowledge and skill through completion of courses and attainment of a degree. It includes academic achievement, attainment of learning objectives, acquisition of desired skills and competencies, satisfaction, persistence and post-college performance (York, Gibson, & Rankin, 2015). In Figure 1, blue cells highlight the institutional commitment of NOAA CESSRST in achieving its goal of training a diverse and highly skilled workforce that pursue careers in disciplines that support NOAA’s mission while the orange cells emphasize data collection efforts used to provide evidence of a successful program.
Outcomes Measures by CESSRST Goal

Table 1 below outlines the associations between each CESSRST goal and the key measures as well as the person(s) primarily responsible for monitoring performance relative to the goal.

<table>
<thead>
<tr>
<th>Goal</th>
<th>Key Measure</th>
<th>Responsible Person(s)</th>
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<tbody>
<tr>
<td><strong>Goal 1: Conduct NOAA mission-aligned collaborative research</strong></td>
<td>• Number of CESSRST research projects</td>
<td>• Project Director (Khanbilvardi)</td>
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<tr>
<td></td>
<td>• NOAA mentor questionnaire/</td>
<td>• Science Oversight Committee Chair - Distinguished</td>
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<td></td>
<td>• Number and types of CESSRST and NOAA collaborations</td>
<td>Research Scientist</td>
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<td></td>
<td>• Number of NOAA scientist serving as research mentors</td>
<td>• Educational Expert</td>
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<td></td>
<td>• NOAA scientist survey</td>
<td>• Research Themed Coordinators</td>
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<tr>
<td></td>
<td>• Number of collaborative partnerships</td>
<td>• CESSRST Campus PIs</td>
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<tr>
<td></td>
<td>• Number of students trained in NOAA sciences</td>
<td>• External Evaluator</td>
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<tr>
<td></td>
<td>• Number of publications</td>
<td></td>
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<tr>
<td></td>
<td>• Number of presentations</td>
<td></td>
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<tr>
<td></td>
<td>• Number of data products, R2X (R2O, R2A, R2D)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Number of citations related to CESSRST research</td>
<td></td>
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<tr>
<td><strong>Goal 2: Recruit, train and graduate increased number of students in NOAA related STEM fields</strong></td>
<td>• Number of CESSRST students recruited and trained in CESSRST Focus Areas</td>
<td>• Project Director (Khanbilvardi)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Assistant Director (Merchant)</td>
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<td>Goal 3: Increase/attain institutional capacity to sustain education and research</td>
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<tr>
<td>▪ Number of applicants,</td>
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<tr>
<td>▪ Number of new course, programs, and training</td>
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<tr>
<td>models created and implemented</td>
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<td></td>
</tr>
<tr>
<td>▪ Number and types of CESSRST and NOAA</td>
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<tr>
<td>collaborations</td>
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<td>▪ Number of new articulation agreements</td>
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<td>▪ Number of best practices that are measurable,</td>
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<td>scalable, and transferrable</td>
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<tr>
<td>▪ Center-Wide Core Competency</td>
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<td>Sub-Committee Chair Jorge Gonzalez</td>
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<td>▪ Research Coordination Chair and the Committee</td>
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<td>▪ Campus PIs</td>
<td></td>
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<td>▪ CESSRST Social Science Lead</td>
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<tr>
<td>▪ Recruitment Sub-Committee (Delgado)</td>
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<tr>
<td>▪ Research Coordinators (Moshary, Tzortziou,</td>
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<td>Anderson, Lakhankar, Devineni)</td>
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<td>▪ Educational Expert</td>
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<td>▪ External Evaluator</td>
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**Summative Key Indicators**

Based on the review of the CESSRST goals and objectives that have been approved by NOAA and the outcomes and outputs outlined in the FFO, the External Evaluator has adopted a comprehensive set of key performance indicators. This comprehensive list of summative indicators will be used to ensure that each program and activity are executed and evaluated with fidelity to NOAA priorities and the CESSRST goals and objectives.

As indicated in the preceding paragraphs, the outcome measures outlined in Table 1 above will be used as indicators to determine the effectiveness of the project in the achievement of the CESSRST goals. In addition, the Evaluation Team will use 10 metrics, NOAA’s five (5) program level metrics for all CSCs and five (5) CESSRST-specific indicators, as the official set of key summative indicators for quantifying and qualifying CESSRST’s overall impact. The Key Summative Indicators are the:

- Number of CESSRST-funded post-secondary students who are trained and graduate in NOAA mission-related sciences;
- Number of CESSRST-funded post-secondary underrepresented minority students who are trained and graduate in NOAA-mission sciences;
- Number of CESSRST graduates hired by NOAA, NOAA contractors, NOAA partners, or resource management agencies, or academia, or as entrepreneurs;
- Number of CESSRST graduates who participate in and complete NOAA mission-related post-doctoral level programs;
- Funds leveraged with NOAA EPP award (including post-secondary support);
- Total number of research projects conducted by CESSRST scientists in alignment with NOAA mission-related priorities as outlined in the award;
- Number of CESSRST-approved research projects, theses, and dissertations that include human dimension components in alignment with award;
- Number of scholarly publications (peer-reviewed, reports to community groups and coastal decision-makers) and presentations (scientific, agency, inter-agency, local) related to NOAA mission-related areas associated with award;
- Number of research collaborations with NOAA and CESSRST student, faculty, and staff; and
- Number of partnerships established and maintained in support of NOAA’s mission.

These goals, objectives, and indicators serve as the framework the CESSRST comprehensive evaluation plan design that is described in great detail in the following narrative.

**Project Evaluation**

**Purpose**

As a condition of the award, the CESSRST is required to draft and implement a comprehensive evaluation plan, including plans for measurement of the effectiveness in meeting the CSC goals and objectives, as well as the requirements of the funding program for producing a pool of candidates from traditionally underrepresented minority communities eligible for the agency STEM, natural resources management, and policy workforce. All CSCs are required to develop and implement a comprehensive evaluation plan in alignment with NOAA’s guidelines as articulated in the FFO. The purpose of the comprehensive evaluation plan is to gauge CESSRST’s success in achieving the goals and objectives as described in the CESSRST Proposal. To meet these goals and objectives, CESSRST developed the required plans (Education and Training, Student Development, Postdoctoral Development, Collaborative Research and Science, Center Administration, and Strategic Plans) that have been approved by NOAA. CESSRST will engage in both internal and external evaluation efforts and will provide formative and summative feedback in order to gauge the success of the project in compliance with NOAA award criteria. Specifically, evaluation efforts are designed to summarize CESSRST performance relative to:

1. CESSRST-Specific Project Goals and Objectives.
2. CESSRST Strategic Plan Performance Objectives.
3. NOAA Outcomes and Outputs for all CSCs as described in the FFO.

The scope of the comprehensive evaluation plan is to measure the success and impact of annual activities of the CESSRST partner institutions in the overall achievement of the Center in relation to the goals, objectives, outcomes, and outputs as outlined in the CESSRST Proposal and FFO.
Clear Delineation of Evaluation for Funded Activities

The External Evaluator has tailored the evaluation to focus specifically on the evaluation of CESSRST outputs and outcomes aligned to funded objectives. While the External Evaluator may provide formative evaluation information to the CESSRST Management Team (CMT) on both funded activities and activities supported by leveraged funding, the summative evaluation reports will only focus on outputs and outcomes aligned with the funded objectives and indicators as outlined below. The Project Director and CMT will carefully differentiate between the EPP funded activities and those activities supported by leveraged funding. Evaluation reports will not co-mingle results across funding sources.

CESSRST evaluation activities will be conducted in compliance with the program evaluation standards established by the Joint Committee on Standards for Educational Evaluation. The CESSRST Evaluation Team (CET) and CMT will use information gathered during the planning, implementation, and evaluation cycles of the project to report findings and make modifications at key transition points in order to make program improvements. The External Evaluator will work with the CMT and CET to conduct overall formative and summative evaluation of the project.

External Evaluator

CESSRST has selected Dr. Mark Howse of the Stellar Achievement Center to serve as the External Evaluator (Evaluator) for the CESSRST project. Because CUNY serves as the lead institution, the CMT selected the Evaluator in compliance with the guidelines and procedures for the procurement of contractual services established by the CUNY’s governing bodies. CUNY sought out the External Evaluator based on the following minimum requirement.

1. Formal training in assessment, evaluation, research methodology, or related discipline;
2. Minimum of 5 years of assessment and/or mixed methods research and evaluation;
3. Successful experience in the assessment/evaluation of STEM-related educational programs that target students from traditionally underrepresented minority populations; and
4. Prior evaluation experience (external or internal) with federally funded projects.

Dr. Howse and the Stellar Team will bring to bear the resources and practices necessary to implement the comprehensive project evaluation plan in adherence to the Guiding Principles for Evaluators and consistent with standards established by the Joint Committee on Standards for Educational Evaluation.

The Evaluator was selected based on the demonstrated capacity required to conduct evaluation activities that include both formative and summative measures of project performance. The Evaluator will employ qualitative and quantitative approaches to gauge progress towards the achievement of short-term and long-term project goals. In addition, the Evaluator will establish processes for timely feedback to CESSRST leadership, allowing for mid-program adjustments based on valid and reliable performance data.

Evaluator Credentials

The selected Evaluator has the credentials, training, and experience required to serve as the external evaluator as described in the NOAA-SEC-OED-2016-2004758 Federal Funding Opportunity Announcement, CESSRST Proposal Narrative, and NOAA NA16SEC4810009.
Special Awards Conditions. Table 2 identifies the Evaluator’s experience and credentials in alignment to the specified qualification components. The credentials and related experience for the Evaluator are outlined in greater detail in the vita that is included in the Appendices (Appendix A: Mark Howse Vitae).

Table 2 Evaluator’s Experience by Qualification Component

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<tr>
<th>Qualification Component</th>
<th>Evaluator’s Experience/Credentials</th>
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| Formal training in assessment, evaluation, and research methodology or related discipline | - Earned doctorate in Curriculum and Instruction to include educational training in program evaluation, research design and methodology, quantitative methods, and qualitative research.  
- Completed NOAA grant implementation/management/training program                                                                                     |
| Minimum of 5 years of assessment and/or mixed methods research and evaluation.           | - 2 years as Statistical Research Coordinator for Carnegie-funded initiative  
- 2 years as Associate VP of Assessment, Bethune-Cookman University  
- 2 years as Associate Dean of Assessment and Accountability, College of Education, Florida A&M University  
- 3 years as Director of University Assessment, Florida A&M University  
- 8 years as Assessment and Program Evaluation Consultant                                                                                           |
| Successful experience in the assessment/evaluation of STEM-related educational programs that target underrepresented minority students. | - Served as Internal Evaluator for FAMU HBCU UP with a focus on STEM educational outcomes for minority students, NSF-funded initiative  
- Served as Internal Evaluator for Environmental Cooperative Science Center, NOAA-funded initiative with a focus on improving NOAA-related science outcomes for minority students and faculty of partnering minority-serving institutions.  
- Served as Faculty Administrator and Project Lead for the Stellar Student Program, state-funded initiative to increase the number of minority students with STEM degree pursuits.  
- Served as Evaluator for Innovative Academic Instruction in STEM Education Project, US DOE Title III-funded Initiative with a focus on improving educational outcomes for minority STEM students and faculty that teach them. |
| Prior evaluation experience (external or internal) with federally funded projects.       | - Served as Internal Evaluator for FAMU HBCU UP, NSF-funded initiative  
- Served as Internal Evaluator for Environmental Cooperative Science Center, NOAA-funded initiative |


_CESSRST-Award # NA16SEC4810008 Page-11_
Role of Evaluator

The CESSRST Evaluation Team (CET) is comprised of the Center Director, Assistant Director, Education Expert, the Data, Information, and Communication Manager, and External Evaluator. The Assistant Director, Distinguished Scientist, Education Expert, Social Science Coordinator, and Data, Information, and Communication Manager will form the Internal Assessment Team (IAT). The Evaluator will coordinate the core evaluation efforts and will work with the Project Director, PIs, and Internal Assessment Team to collect and analyze project data for the purposes of improving performance and reporting impact of project activities to stakeholders.

This document will outline the Evaluator’s plan for working with the CMT team to:

- Refine the list of performance indicators in alignment with project goals and objectives.
- Use of outcomes assessment data for gauging student learning and stakeholder perceptions.
- Develop/refine protocols for onsite and remote interviews with students, faculty, scientific experts, community stakeholders, and project staff members.
- Determine level of achievement relative to both process and product outcomes and measures.
- Identify a timeline for site visits, meetings with CESSRST staff, and submission of progress reports.
- Support CESSRST staff in the design and implementation of strategies for tracking students for a minimum of three (3) years after engagement in CESSRST activities.

The following are the core principles of the American Evaluation Association and will frame the Evaluators work on the project.

A. **Systematic Inquiry:** Evaluators conduct systematic, data-based inquiries about whatever is being evaluated.

B. **Competence:** Evaluators provide competent performance to stakeholders.

C. **Integrity/Honesty:** Evaluators ensure the honesty and integrity of the entire evaluation process.

D. **Respect for People:** Evaluators respect the security, dignity and self-worth of the respondents, program participants, clients, and other stakeholders with whom they interact.

E. **Responsibilities for General and Public Welfare:** Evaluators articulate and take into account the diversity of interests and values that may be related to the general and public welfare.

The Evaluator will coordinate implementation of the project evaluation plan and will meet regularly with the project leadership to share formative and summative results. The evaluation
team will meet multiple times each year to review the project goals, performance indicators, and logic model. The Evaluator will be primarily responsible for the final evaluation of CESSRST.

External Evaluation Design

Design and Methodology
The CET will make use of both quantitative and qualitative approaches in assessing and evaluating the center’s success in meeting its goals and objectives. The evaluation team will draw from a mixed-methods design which will include an in-depth exploration of the CESSRST program, events, activities and key performance indicators. Data will be collected by means of interviews with key CESSRST stakeholders, document analysis, and focused interviews with students and faculty. A survey design will be employed in assessing students’ self-reported proficiency in all themed research areas in addition to their experiences and level of satisfaction with the CESSRST. A faculty/focus area lead survey will also be developed and administered to the relevant populations as a way of gauging their satisfaction with the CESSRST. These surveys will also serve to solicit feedback relative to issues which may impact ongoing CESSRST work.

The program assessment and evaluation plan will draw from formative and summative data to make mid-program improvements and to measure the overall effectiveness of the project in achieving CESSRST goals and objectives.

Formative Assessment & Evaluation
Formative evaluation will principally include quantitative analysis of: a) annual increases in the number of students enrolled in NOAA-related disciplines at partnering institutions; b) student performance in CWCC and other NOAA mission-related training activities; c) student, faculty, and staff perception survey results; d) increases in the number and quality of faculty-led student research projects; and e) number of peer-reviewed publications and presentations made annually by CESSRST students, faculty, and scientists.

Summative Assessment & Evaluation
The summative evaluation will serve to gauge the overall success and effectiveness of the project. Again, specific summative measures are outlined in Table 1. Summative evaluation will include monitoring of the: a) number of underrepresented students trained and graduated in NOAA mission-related disciplines; b) number of CESSRST graduates who are hired in NOAA mission-related careers; and c) total number of research projects conducted by CESSRST faculty and students; d) number of research projects that include well-developed human dimension components; and e) number of partnerships established by CESSRST.

Qualitative evaluation measures will focus on: a) results from student and faculty surveys of perceptions of the effectiveness of project activities; b) results from surveys of faculty and students about perceptions of student engagement and level of preparedness; c) stakeholder descriptions of the quality of partnerships and collaborations; and d) NOAA scientist and partner perceptions of project effectiveness.

Process and Product Evaluation
The evaluation design will include both process and product evaluation to:
1. Determine the effectiveness of project implementation and management;
2. Determine the strengths and weaknesses of the project design;
3. Enable program staff to make mid-program changes that will improve project effectiveness; and
4. Document the level of overall achievement in relation to the project’s operational goals.

The process evaluation will involve information about how well the CESSRST strategies were implemented and will determine if project operation is effectively consistent with NOAA CSC administrative outcomes and outputs as outlined in the FFO. The process evaluation will rely very heavily upon the formative and summative data gathered through quantitative and qualitative methods. Process evaluation will focus on measuring CESSRST operational efficiency.

The product evaluation will focus on measuring final outcomes against the projects intended goals and objectives. Product evaluation, too, will rely on formative and summative assessment data gathered through quantitative and qualitative methods. However, product evaluation will revolve around measures of the quality of training and educational experiences for CESSRST students; the quality of collaboration with NOAA scientists that advance NOAA research priorities; and the success of the project in diversifying the NOAA workforce.

**Evaluation Questions**

Formative evaluation will be guided by the following questions.

1. **To what extent are the Education and Training components of CESSRST being implemented as planned?**
   a. Are underrepresented minority (URM) students being effectively recruited and trained in CESSRST undergraduate and graduate programs?
   b. To what extent is the Summer Bridge Program preparing new students for the academic and research experiences in CESSRST?
   c. How does the ISDP process support and advance the student learning program?
   d. What evidence is there that PACE helps students to achieve their learning and professional objectives?
   e. Are undergraduate and graduate internship opportunities exposing students to meaningful learning experiences in NOAA mission related sciences?

2. **To what extent is the Science and Research component of CESSRST being implemented as planned?**
   a. How does CESSRST research align with NOAA mission and priorities?
   b. What is the nature (qualities, quantity, and impact) of established collaborations between NOAA and CESSRST faculty, staff and students?
   c. To what extent has CESSRST integrated social science issues into research projects?
   d. To what extent are NOAA scientists serving as mentors and advisors for student research?
   e. What is the nature of the collaborative partnerships being established in support of NOAAs mission?
   f. How has CESSRST research training increased students’ competencies related to the Center’s four collaborative research themes?
   g. What are the CESSRST research outputs and tools and how have they been used by NOAA and the science community?

3. **To what extent is the CESSRST Center Management able to support and sustain Education and Training and Research components of the CESSRST program?**
   a. How are administrative data and management processes used to enhance the implementation of the project?
b. How has center management made use of assessment and evaluation results to improve project outcomes?

c. How has the CESSRST program increased engagement with the URM communities to enhance the mission workforce pipeline?

d. How has the center promoted and nurtured partnerships that advance the center’s goals and NOAA’s priorities?

The summative evaluation will address the following questions:

4. **What impact has CESSRST’s programmatic efforts had on increasing the number of qualified post-secondary URM students trained and graduated in NOAA Sciences?**
   
a. To what extent has CESSRST’s academic training increased the number of post-secondary students trained and graduated in NOAA Sciences?

b. What are the impacts of CESSRST’s research training on increasing URM students’ ability to conduct research relevant to NOAA sciences?

c. What are the impacts of professional development training on increasing CESSRST students’ job-ready skills?

5. **To what extent has CESSRST efforts advanced the science research related to NOAA priorities?**
   
a. To what extent is CESSRST faculty, staff and students’ research directly aligned with NOAA mission strategies and priorities?

b. To what extent has CESSRST increased NOAA mission-relevant research capacity at MSIs?

In order to assess these questions, a mixed-method approach using both qualitative and quantitative data gathering techniques will be employed. The Management Information System (MIS) will collect and monitor student progress toward achieving their academic, research and professional development goals.

Evaluative assessments highlighting longitudinal outcomes and impacts of the CESSRST program will be created or adapted with feedback from the CESSRST CMT and staff as needed. All data collection instruments and protocols will be approved by the CUNY Institutional Review Board prior to administration.

**Data Collections Methods and Tools**

**Data Collection Methods**

The evaluation team will employ a broad range of tools and methods for gathering the data and information for evaluation of the CESSRST project. The CAT has developed a set of surveys and questionnaires to gather perception data from students, faculty, CESSRST team members, and other stakeholders. Content validity of the instruments will be established through an expert panel who has reviewed all items relative to their theme areas in an effort to ensure that they are aligned with specified objectives. As a means of ensuring rigor, credibility, and reliability of the evaluation findings, data triangulation methods will include well-structured document analysis, direct measures of learning, individualized surveys and interviews, and focus group discussions.
Table 3: Evaluation Questions and Associated Data Collection Methods

<table>
<thead>
<tr>
<th>Evaluation Questions</th>
<th>Data Collection Method</th>
<th>Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. To what extent are the Education and Training components of CESSRST being implemented as planned?</td>
<td>Document analysis Site Visit Observations Questionnaires Student/faculty/staff surveys Pre/Post Assessments Interviews Focus Group Discussions</td>
<td>CESSRST Project Director CET IAT CESSRST Students CESSRST Faculty/Advisors Monitoring Reports Semi-Annual Reports</td>
</tr>
<tr>
<td>2. To what extent is the Science and Research component of CESSRST being implemented as planned?</td>
<td>Document analysis Questionnaires Student/faculty/staff surveys NOAA-mission scientists surveys Interviews Focus Group Discussions</td>
<td>Distinguished Research Scientist Research Theme Coordinators CET CESSRST Students CESSRST Faculty/Advisors Monitoring Reports Semi-Annual Reports</td>
</tr>
<tr>
<td>3. To what extent is the CESSRST Center Management able to support and sustain Education and Training and Research components of the CESSRST program?</td>
<td>Document analysis Questionnaires Student/faculty/staff surveys NOAA-mission scientists surveys Interviews Focus Group Discussions</td>
<td>CMT CET Focus Area Leads CESSRST Students CESSRST Faculty/Advisors NOAA Scientists Community Partners Monitoring Reports Semi-Annual Reports</td>
</tr>
<tr>
<td>4. What impact has CESSRST’ programmatic efforts had increasing the number of qualified post-secondary URM students trained and graduated in NOAA Sciences?</td>
<td>Document analysis Site Visit Observations Pre/Post Assessments Student/faculty/staff surveys Interviews Focus Group Discussions</td>
<td>CESSRST Project Director CET CESSRST Students CESSRST Faculty/Advisors Monitoring Reports Semi-Annual Reports</td>
</tr>
<tr>
<td>5. To what extent has CESSRST efforts advanced the science research related to NOAA priorities?</td>
<td>Document analysis Questionnaires Student/faculty/staff surveys</td>
<td>Project Director CET Research Theme Coordinators CESSRST Students</td>
</tr>
</tbody>
</table>
Direct and Indirect Assessment of Student Learning Related to Core Competencies

The direct and indirect measures and tools that will be used to monitor student mastery of the technical core competencies, social science core competencies, and professional development core competencies are identified in Table 4 below.

Table 4: Summary of CESSRST Core Competency Assessment

<table>
<thead>
<tr>
<th>Technical Core Competency Element</th>
<th>Direct Measure(s)</th>
<th>Indirect Measure(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geospatial Data Analysis and Visualization</td>
<td>Quizzes and/or exams associated with CWCC Modules and courses</td>
<td>• Pre-Core Competency Self-Assessment Survey</td>
</tr>
<tr>
<td>Geographic Information Systems</td>
<td></td>
<td>• Post-Core Competency Self-Assessment Survey</td>
</tr>
<tr>
<td>Remote Sensing and Satellite Data Interpretations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Satellite Operations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Computational Coding and Programming</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NOAA Social Science Basics Video</td>
<td>Quizzes associated with CWCC and Center modules</td>
<td>• Pre-Core Competency Self-Assessment Survey</td>
</tr>
<tr>
<td>Story Map</td>
<td>Rubric for assessing Story Map</td>
<td>• Post-Core Competency Self-Assessment Survey</td>
</tr>
<tr>
<td>Social Science Research Question (MS theses and Ph.D. dissertations as appropriate)</td>
<td>Completion of M.S. thesis/Project reports or Ph.D. dissertation</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Social Science Core Competency Element</th>
<th>Direct Measure(s)</th>
<th>Indirect Measure(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Professional Development Core Competency Element</td>
<td>Direct Measure(s)</td>
<td>Indirect Measure(s)</td>
</tr>
<tr>
<td>Oral Communication</td>
<td>Assignments during the professional development course</td>
<td>• Pre-Core Competency Self-Assessment Survey</td>
</tr>
<tr>
<td>Scientific Writing</td>
<td></td>
<td>• Post-Core Competency Self-Assessment Survey</td>
</tr>
<tr>
<td>Career Development</td>
<td>Completion of the Individual Student Development Plan (ISDP)</td>
<td></td>
</tr>
<tr>
<td>Ethical Conduct in Research (CITI)</td>
<td>CITI Course Completion Certificate</td>
<td></td>
</tr>
</tbody>
</table>
Multiple **assessment** techniques will be used to ensure the students have attained core competency and help assess their individual learning outcomes.

a. **Direct Measure**: The instructors (particularly the Technical CCs) will create a 10-15 questions-based module exam – which students will take online, and they are graded online (MOODLE/MIS). Each module has developed a final examination for this Direct Measure. Figure 2 shows the process for the Direct and Indirect Measures indicating that students must pass the final exam with a minimum of 80% the final exam of the module, or equivalent course.

b. **Indirect Measure**: The Assessment team has created a 10-15 Likert-type survey to assess student’s perceptions, experience, reflection about the CWCC and their self-assessment on the content knowledge. Appendix C includes a sample of the Survey for the Indirect Measure.

c. **Hybrid Measure**: This is to assess how much of the CWCC content was integrated in the research and professional training. 50% (i.e. 5 out of 10 elements) and above means that students were able to successfully integrate CWCC in their research training. This tool is under development by a team of members – i.e. faculty advisors, theme coordinators, NERTO mentors, social science lead and education expert.

**Figure 2**: Direct and Indirect Measure of Individual Technical and Professional Development Modules

In addition, the IAT has developed a list of survey and interview tools that are designed to gather stakeholder perceptions of the impact and effectiveness of specific CESSRST activities. These tools include:

1. NOAA CESSRST Day Evaluation Tool
2. HIRES – Post Questionnaire (prompts for electronic journals)
3. SSIO/NERTO (Student Post-Internship Survey)
4. CURE/REU & GRT Summer Survey
5. Consortium Member Survey
6. Alumni Survey
7. ISDP – Self assessment
8. Core Competency Training -pre & post
9. Summer Bridge Interview Questions

These instruments are used by IAT and the External Evaluator to measure the effectiveness of targeted CESSRST project activities and to provide feedback that is critical to program improvement.
Alignment of Evaluation Design to NOAA Priorities

Linkages to FFO Outcomes and Outputs
The CET developed the *CESSRST Assessment & Evaluation Milestones Alignment Matrix* (Appendix B) to demonstrate alignment between CESSRST evaluation questions, data collection methods, and NOAA’s Program Level Outcomes and Outputs that are outlined in the FFO.

Data Validation and Analysis
Data for the purpose of this evaluation will be analyzed employing descriptive statistics and content/document analysis. Survey and perception data will be coded and summarized in a manner consistent with best practices for analysis of participant responses. Data summaries and findings will be shared with the Project Director and CMT for review and contextualization.

The Evaluator will employ triangulation techniques (i.e., member checks, interview transcript coding and recoding, and expert panel reviews) to affirm findings and recommendations.

Data Validation
The *Data, Information, and Communication Officer* (Data Manager) and *Education Expert* are charged with primary validation of all evaluation data. The Data Manager and Education Expert validation efforts are supported by the full CET. The External Evaluator will share data and summaries that are associated with Interim, Annual, and Summative Evaluation reports in draft form with the CET prior to official submission of the reports to the Project Director. The Data Manager and Education Expert will use the draft report to validate data and evaluation information. Data associated with the reports will be validated every six (6) months in sequence with the semiannual reporting timeline required by NOAA. In addition to the review of data used in external evaluations, the Data Manager and Education Expert will conduct regular monitoring of key performance indicators and internal data validation. Thus, the review of data accuracy and quality is ongoing throughout the life of project.

**Evaluation Stakeholders**
For the purpose of this evaluation, several key stakeholders have been identified and will provide feedback data via interviews, reports and surveys in efforts to ascertain how and to what extent the CESSRST achieves the established goals and objectives. Table 5 provides a list of all key stakeholders, their categorization (primary/secondary stakeholders), interest/perspective relative to the evaluation, role in the evaluation, and how and when they will be engaged in the evaluation process.

<table>
<thead>
<tr>
<th>Stakeholder Name</th>
<th>Interest or Perspective</th>
<th>Role in the Evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dr. Reza Khanbilvardi</td>
<td>CESSRST Director</td>
<td>Reviews reports and facilitates ongoing improvements. Leads CMT</td>
</tr>
<tr>
<td>Name</td>
<td>Position</td>
<td>Responsibilities</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>--------------------------------------</td>
<td>----------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Dr. Shakila Merchant</td>
<td>CESSRST Assistant Director</td>
<td>Reviews and oversees internal data collections and serves on CMT, IAT, and CET</td>
</tr>
<tr>
<td>To be hired</td>
<td>Distinguished Scientist</td>
<td>Coordinates internal research science data collection. Serves on CMT and CET</td>
</tr>
<tr>
<td>To be Hired</td>
<td>Education Expert</td>
<td>Coordinates internal education data collections and serves on CMT, IAT, and CET</td>
</tr>
<tr>
<td>Paul Alabi</td>
<td>Data, Information, and Communication Manager</td>
<td>Supports all internal data collections and serves on CMT, IAT, and CET</td>
</tr>
<tr>
<td>Ms. Georgina Fekete</td>
<td>Budget Coordinator</td>
<td>Coordinates internal administrative and budget data collections</td>
</tr>
<tr>
<td>Dr. Patrick McCormick, HU</td>
<td>Lead Institutional PI</td>
<td></td>
</tr>
<tr>
<td>Dr. Miguel Velez-Reyes, UTEP</td>
<td>Lead Institutional PI</td>
<td></td>
</tr>
<tr>
<td>Dr. Rafael Rodriguez Solis, UPRM</td>
<td>Lead Institutional PI</td>
<td></td>
</tr>
<tr>
<td>Dr. Walt Oechel, SDSU</td>
<td>Lead Institutional PI</td>
<td></td>
</tr>
<tr>
<td>Dr. Fred Moshary</td>
<td>Science Coordinator</td>
<td></td>
</tr>
<tr>
<td>Maria Tzortziou</td>
<td>Theme Lead (Costal Resilience)</td>
<td></td>
</tr>
<tr>
<td>Dr. John Anderson</td>
<td>Theme Lead (Atmospheric Hazards)</td>
<td></td>
</tr>
<tr>
<td>Dr. Naresh Devineni and Dr. Tarendra Lakhankar</td>
<td>Theme Lead (Water Prediction and Ecosystem Services)</td>
<td></td>
</tr>
<tr>
<td>CESSRST Faculty/Scientists</td>
<td>Faculty Collaborators</td>
<td>Survey and Focus Group Participants</td>
</tr>
</tbody>
</table>
NOAA /Mentors Scientists | Expert Scientists | Survey and Focus Group Participants
NOAA Staff and Technical Monitors | Project Oversight | Survey and Focus Group Participants
Students | Program Participants | Survey and Focus Group Participants
Dr. Mark Howse | External Evaluator | Collect, analyze, and report all external evaluation data. Serves on CET

**Communication, Reporting, and Dissemination**

The results of evaluation activities will provide the CESSRST Director with empirically based results that will serve to furnish the administration with valuable information in support of the Center’s mission. As part of the CESSRST grant award, the Center is obligated to conduct an independent, objective evaluation in an effort to assess the center’s success in meeting its goals and objectives as outlined in the grant. The results of this evaluation will also serve the center in meeting its reporting obligation with NOAA EPP, NOAA Technical Monitors and the Advisory Board by providing substantive evidence of the center’s on-going activities and an assessment of the quality and impact of the Center in reaching its stated goals and objectives. The results will be shared with the Project Director, CMT, and CET.

**External Evaluation Communication Plan**

For the purpose of this evaluation, several key stakeholders within the CESSRST will be contacted as a means of collecting data in support of the goals of the evaluation. Throughout this review process, the evaluating team will make contact, either directly or indirectly, with all stakeholders outlined in Table 5 (Evaluation Stakeholders and Engagement Plan). The Evaluator will convene several meetings with the CMT in order to gather more information and to follow-up with clarifying questions aligned with the goals of the evaluation. Engaging the stakeholders outlined in Table 5 will be critical in the efforts to conduct a substantive and thorough evaluation of the CESSRST. In addition to the formal meetings with the CMT, the evaluation team will engage stakeholders in the CESSRST by means of in-person meetings, videoconferences, e-mails, and surveys.

Table 7 identifies the method of communication with each evaluation stakeholder.

**Table 7 Stakeholder Communication Plan**

<table>
<thead>
<tr>
<th>Evaluation Stakeholder</th>
<th>Purpose of Communication</th>
<th>Primary Methods</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Director</td>
<td>Evaluation planning and formative and summative reporting</td>
<td>-Face-to-face meetings - Conference calls -Report templates -MIS</td>
<td>Semi-annually</td>
</tr>
<tr>
<td>CMT</td>
<td>Evaluation planning and reporting</td>
<td>-Face-to-face meetings - Conference calls</td>
<td>Semi-annually</td>
</tr>
<tr>
<td>Role</td>
<td>Activities</td>
<td>Reporting</td>
<td>Frequency</td>
</tr>
<tr>
<td>------</td>
<td>------------</td>
<td>-----------</td>
<td>-----------</td>
</tr>
<tr>
<td>(Center Director, Co-PIs, Assistant Director, Distinguished Scientist, Thematic Leads, Education Expert, and Data, Information, and Communication Manager)</td>
<td>Evaluation planning, Progress monitoring, and reporting</td>
<td>-Face-to-face meetings - Conference calls -Report templates -MIS</td>
<td>Quarterly</td>
</tr>
<tr>
<td>CET (Center Director, Assistant Director, Education Expert, the Data, Information, and Communication Manager, and External Evaluator)</td>
<td>Evaluation planning, Progress monitoring, and reporting</td>
<td>-Face-to-face meetings - Conference calls -Report templates -MIS</td>
<td>Quarterly</td>
</tr>
<tr>
<td>Lead PIs</td>
<td>Site evaluation planning, and reporting</td>
<td>-Face-to-face meetings - Conference calls -Report templates -MIS</td>
<td>Annually</td>
</tr>
<tr>
<td>CESSRST Faculty/Scientists</td>
<td>Collection of perception data regarding program operation, program impact and student development</td>
<td>-Surveys/Questionnaires -Interviews -Focus group discussions</td>
<td>Annually</td>
</tr>
<tr>
<td>CESSRST Students</td>
<td>Collection of perception data regarding training, mentorship, and scientific knowledge (learning gains)</td>
<td>-Surveys/Questionnaires -Interviews -Focus group discussion</td>
<td>Annually</td>
</tr>
<tr>
<td>Community Stakeholders</td>
<td>Collection of perception data regarding outreach and communication activities</td>
<td>-Surveys</td>
<td>Annually</td>
</tr>
<tr>
<td>NOAA Scientists and Collaborators</td>
<td>Collection of perception data regarding program operation, program impact and student development</td>
<td>-Surveys/Questionnaires -Interviews -Focus group discussion</td>
<td>Annually</td>
</tr>
<tr>
<td>NOAA Staff and Technical Monitors</td>
<td>Collection of formative and summative feedback for ongoing program improvement</td>
<td>-Surveys/Questionnaires -Interviews -Focus group discussion</td>
<td>Annually</td>
</tr>
</tbody>
</table>

**Project Monitoring**

**Sub-recipient Monitoring Reports**

CESSRST requires that each partner institution submit a Monitoring Report to the Project Director and CET each year. The CESSRST will share these monitoring reports with the Evaluator. The Evaluator will work with the CMT to develop a specific set of core specifications for the Monitoring Report template. The template will require each Lead PI to address key questions that
are tailored to the implementation plan for each CESSRST partner institutions. In addition, the Monitoring Report will allow each partner to report: 1) the number of CESSRST sponsored activities conducted each year; 2) the number of students recruited and engaged in CESSRST sponsored activities; 3) the number of scholarly products produced by site-based CESSRST students, faculty, and partners; 4) the number of program completers by CESSRST mission-related degree program; and 5) the impact of activities on the advancement of science and research in alignment with NOAA priorities as described in the CESSRST proposal.

CESSRST Semi-Annual Progress Reports
As a condition of the award, the CESSRST is required to submit a progress report to NOAA on a semi-annual basis. The Evaluator will submit progress reports to support the Project Director and CMT in the submission of the Semi-Annual Report. The Evaluator’s semi-annual report will serve to summarize performance data and overall progress relative to the project’s formative and summative measures as outlined in this evaluation plan.

Data Management and Security via MIS
The New CESSRST Management Information System (MIS) is a Cross-Platform – Relational Database Management System (RDMS) that can be accessed by CESSRST members, NOAA management and the evaluation team via WebDirect (Cloud). The MIS system helps collect all students’ development plan and faculty portfolio in one place making it easy for generating data queries, mining and analysis. It also helps in relational database management for:

- Students (Mentee) + Faculty (Mentor)
- Recruitment + Nomination (across center and real-time)
- Publications
- Research
- Reports

Other features include:

- Ability to upload files **all in one place**
- Data Analysis
  - Recruitment, graduation, retention and post graduate tracking
- Data Queries
- Data Interpretation – multiple ways
- Data Calls (from NOAA and Congressional Members)
- Formative Assessments
- Budget Management (across the center)
- Oversee Special Award conditions compliance across the center
- Help report on all **FIVE (5) EPP performance metrics**

Annual, Interim, and End-of Project Reporting
The Evaluator will use the formative and summative data provided by students, faculty, and CESSRST personnel to draft and submit a series of reports to the Project Director and CMT. The first of these reports is the **CESSRST Annual Evaluation Report** that will be submitted to the project leaders each year. Each annual report will provide a detailed, comprehensive summary of formative and summative measures. Each annual report, though based on a summary of performance relative to some summative metrics, will serve as a formative project report that will help the Project Director and CMT to make mid-program corrections that improve project operation and overall effectiveness from year to year.
Upon completion of the third year of the project, the Evaluator will prepare the **Interim 3rd Year Report** that will describe the project’s progress and performance in alignment to the summative indicators that have been detailed in the CESSRST Strategic Plan. The Interim 3rd Year Report will serve as a mid-cycle report that will detail the overall progress of the CESSRST efforts towards the achievement of the project goals and objectives. Additionally, the Interim 3rd Year Report will help the CMT to prepare for the CSC Interim Review of the CESSRST that will be conducted by a NOAA-appointed evaluation panel.

As a culminating evaluation effort, the Evaluator will prepare the **Summative 5th Year Evaluation Report** and submit it to the Project Director and CMT as a part of the project’s continuation review effort. The Summative 5th Year Evaluation Report will summarize the effectiveness of the project in the achievement of the CESSRST overarching goals and objectives. The report will focus primarily on the summary of performance relative to the **CESSRST Goals and Outcome Measures**.

### Use of Results

The comprehensive evaluation process outlined in this document frames the formative and summative assessment of the project and will inform mid-course corrections in terms of the programs’ implementation. The CESSRST Project Director and CMT are charged with the ultimate responsibility of using the results of this evaluation as a guide in continuing the work of the CESSRST from year to year. As such, the results of the Evaluation will provide the CESSRST with a list of recommendations which are intended to enhance the level of service and programming provided by the CESSRST in its quest to educate a new generation of marine ecosystems professionals, particularly from underrepresented minorities, in the NOAA-related sciences.

As described in the previous section, the Evaluator will produce an **Annual CESSRST Evaluation Report** (annually), an **Interim 3rd-Year Report**, and a **Summative 5th Year Report**. The Project Director and CMT will use the evaluation reports and any recommendations for improvements that are included to make changes to the overall project plan, specific plan components, focus area plans, or sub-recipient implementation plans as appropriate. The Evaluator will meet with the Project Director and CMT for a **2-Day Annual Evaluation Meeting** each project year, during which the evaluation team will distill the evaluation reports and recommendation into improvement action plans that will increase the program’s effectiveness in achieving its goals from year to year.

**Figure 1** depicts the process by which evaluation results are put to use for programmatic improvement.

**Figure 1 CESSRST Process for Use of Evaluation Outputs and Outcomes**
To operationalize the formative improvement process, the Project Director, CMT, and evaluation team will meet with Institutional Lead PIs and Theme Lead (by video/phone conference or face-to-face) as a part of the 2-Day Evaluation Meeting. These meetings will ensure that each program component plan and associated performance are constantly monitored and adjusted based on evidence of impact on students, faculty, scientists, and stakeholders in alignment to the project goals and objectives. The CMT (comprised of the Project Director, Assistant Director, Education Expert, and Data, Information, and Communication Manager) will take the lead in ensuring that any proposed changes are implemented with fidelity to the CET recommendations. The Evaluator will modify the CESSRST Evaluation Plan to include measures of impact related to intended improvements in all subsequent evaluation reports.

**Evaluation Timeline**

The Evaluator worked with the CMT to establish a timeline for all evaluation activities, including key evaluation planning meetings, site visits, interim and end-of-project reporting meetings, and due dates. The timeline for submission of all external evaluation reports are synchronized with the Center’s reporting requirements established by NOAA (Appendix C: Evaluation Timeline).

**Evaluation Budget**

Project Year 2 Total: $60,000.00

Project Year 2 through Project Year 5 Budget
The fee for evaluation services includes all evaluation material costs, as well as all associated lodging and travel expense: (30 days of service@$1,000/day=$30,000; 6 x 2-day monitoring and evaluation visits@$4,000/visit=$24,000 (includes related travel and lodging costs); 2 days of face-to-face and video conference interviews with project students, staff, and partnering personnel @$3,000.00 (includes associated video conferencing fees); and a 2-day onsite visit.
with PIs and project leadership for annual, interim reviews and summative evaluation reports @ $3,000 all per each project year.

**Project Year 2 through Project Year 5 Total:** $240,000 ($60,000 annually)
Appendices
Appendix A: Mark Howse Vitae

Mark E. Howse
823 Lake Knoll Drive, Lilburn, Georgia
Phone: 850.339.8525    Email: howsem06@gmail.com

EDUCATION

2006    Ph. D. in Curriculum and Instruction, Florida State University.

1999    MS in Mathematics, Middle Tennessee State University
        Minor:  Education

1996    BS in Mathematics and Aerospace Technology, Middle Tennessee State University
        Minor:  Education/Industrial Studies Technology

TEACHING AND PROFESSIONAL EXPERIENCE

2016-Present

Director of Educational Outcomes and Assessment, Morehouse School of Medicine
Responsible for oversight of outcome and assessment planning for Educational Affairs. Works
in collaboration with associate and assistant deans to maintain a systematic process for the use
of student learning and program educational outcomes to promote continuous quality
improvement. Facilitates academic program evaluation for all educational and educational
support units. Ensures area-wide compliance with all assessment matters related to specialized
and regional accreditation. Collaborates with institutional partners to maintain a culture of
evidence and data-informed decisions for the improvement of all MSM academic programs and
services.

2015-2016

Director of Academic Initiatives, Florida A&M University
Responsible for the coordination of curriculum renewal and innovation efforts on behalf of the
Office of Academic Affairs. Works in collaboration with academic deans and faculty to ensure
academic program curriculum alignment to relative strategic priorities, accreditation standards,
and industry/discipline expectations. Supports the infusion of technical and instructional
innovation in program curriculum design. Ensures effective academic program evaluation and
use of student learning and other program performance data for continuous improvement.

2013-2015

Director of University Assessment, Florida A&M University
Responsible for the implementation of a University-wide system for the assessment of student
learning and program outcomes for both instructional programs, as well as administrative and
educational support units. Ensures system-wide compliance with assessment standards of
regional and specialized accreditation agencies. Supports the use of data for continuous
improvement of University programs and services.

2011-2013

Director of Assessment & Accreditation, College of Education, Florida A&M
University
Responsible for coordination of all assessment and accreditation activities for the College of
Education. Ensures college’s compliance with Florida Department of Education Program
Approval Guideline and National Council for Accreditation Teacher Education Standards.
Also responsible for establishing and maintaining systems for the use of student and program
data for continuous improvement.
2010-2011  
**Associate Professor, College of Education, Daytona State College**
Responsible for the design and instruction of courses in mathematics education, science education, educational technology, and educational foundations.
Courses taught include: Math for Elementary Teachers, Integrating Technology into Secondary Mathematics and Science, Math Instructional Analysis, Science Instructional Analysis, and Teaching Diverse Populations.

2009-Present  
**Founder and Executive Director, Stellar Diverse Achievement Center**
The Stellar Diverse Student Achievement Center (Stellar) is non-profit organization that seeks to improve the education of diverse students through a focus on research, academic enrichment, and strategic partnerships. Stellar draws upon the expertise and commitment of professionals and community activists to synthesize best practices in support of diverse student achievement.

2009-2016  
**Member (Vice-Chair) of the State of Florida African American History Taskforce**
The Task Force works to ensure awareness of the requirements, identify and recommend needed state education leadership action, assist in adoption of instructional materials by the state, and build supporting partnerships to advance the Task Force’s mission. The State of Florida’s African American History Task Force is an advocate for Florida’s school districts, teacher education training centers, and the community at large, in implementing the teaching of the history of African peoples and the contributions of African Americans to society.

2007-2009  
**Kettering Foundation Research Fellow**
Conducted public research related to promoting democratic education on Historically Black College Campuses.

2007-2009  
**Assistant to Provost for Assessment, Bethune-Cookman University**
Responsible for coordinating the assessments and evaluations that are critical to driving the continuous improvement processes for the university. Additional responsibilities included:

- Executive member of the Institutional Effectiveness Committee (IEC)
- Chair of University and SACS Assessment Committee
- Oversight of the General Education Council
- Oversight of Testing and Evaluation
- Member of SACS Steering Committee
- Quality Enhancement Plan (QEP) Director
- Chair of Retention Advisory Council
- Chair of the Academic Support Committee
- Coordination of the Florida Department of Health review of the School of Nursing
- Oversight of preparation of the School of Nursing accreditation reaffirmation by the National League of Nursing Accrediting Commission
- Support of compliance review by the National Collegiate Athletic Association (NCAA)
- Support of compliance of School of Education with Florida Department of Education guidelines

2007-2009  
**Director of Assessment and Associate Professor, Bethune-Cookman University**
Responsible for instructing various courses in the School of Education. Also served as director of all Title III activities for the School of Education, worked with school leadership on program approval by the Florida Department of Education, and collaborated with colleagues in preparation for accreditation by the Nation Council for the Accreditation of Teacher Education.

2006-2007  
**Coordinator of Statistical Research, Florida Agricultural & Mechanical University Teachers for a New Era, Carnegie Foundation Funded Initiative**
Responsible for coordinating the collection, analysis, and management of all data related to the project mission which seeks to reform teacher education. The project seeks to improve teacher...
quality by studying pupil learning and by helping teacher education programs to make
decisions and revisions that are based on evidence.

2000-2006  
**Assistant Professor, College of Education, Florida Agricultural & Mechanical University**
Responsible for instructing various education courses in the Department of Secondary
Education and Foundations.
Courses taught include: Introduction to Educational Technology, Teaching Diverse
Populations, Instructional Seminar, Computer Applications in Education, CLAST
Preparation, and Teaching Elementary and Middle School Mathematics.

2002-Present  
**Founder and Senior Consultant, MathSpeedia Educational Services**
Responsible for providing a broad spectrum of services to educational institutions. Services
range from enriched instruction for students and professional development for classroom
teachers to consultations for school Staff.

2002-2012  
**Consultant and Trainer, LiveText Edu Solutions**
Responsible for the design and implementation of training programs to introduce users to
new software packages. Also advised software developers on the technical needs of
educational institutions.

2001-2009  
**Consultant, Commissioner of Education’s Task Force on African American History**
Responsible for the design and maintenance of a Task Force website and curriculum CD-
ROM which complement the Task Force’s mission to ensure that teachers have the resources
required to effectively integrate the history, culture, and experiences of Americans of African
descent into the K-12 curriculum. Also, responsible for the facilitation of workshops designed
to prepare teachers to infuse African-American history into the K-12 curriculum.

1999-2001  
**Adjunct Instructor, Mathematics Department, Florida Agricultural & Mechanical University**
Responsible for instructing various college-level mathematics courses in the Department of
Mathematics.
Course taught include: College Algebra, Liberal Arts Math I, Liberal Arts Math II, and
Trigonometry and Pre-calculus.

1999-2002  
**Mentor, Florida-Georgia Louis Stokes Alliance for Minority Participation**
Responsible for advising and mentoring undergraduate students seeking careers in
Mathematics, Science, and Engineering.

1999-2002  
**Adjunct Instructor, Academic Support, Tallahassee Community College**
Responsible for instructing various remedial mathematics courses in the Department of
Academic Support.
Courses taught include: Elementary Algebra, Basic Math, and Basic Math (Computer-based).

1999-2002  
**Graduate Teaching Assistant, College of Education, Florida State University**
Responsible for instructing various mathematics and mathematics education courses for pre-
service and mathematics teachers in the Department of Curriculum and Instruction.
Courses taught include: School Math Curriculum, Elements of Algebra, Advanced
Technology in Mathematics Education, Number Systems, Introduction to Applied Math for Teachers, and
Mathematical Problem Solving.

1999-2002  
**Graduate Research Assistant, Florida State University**
Responsible for offering assistance in educational research pertinent to various areas of
research design, instructional reform, and the use of technology in education.
Projects include:

- **Preparing Tomorrow’s Teachers to use Technology (PT³)**—a capacity building grant
  awarded by the US Department of Education. As a part of this project, my responsibility
  was to evaluate the College of Education at Florida State University to ascertain how well

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*CESSRST-Award # NA16SEC4810008 Page-30*
preservice teachers are prepared to use technology in instruction.

- **Course Designer for Web-based Master’s Degree Program in Mathematics Education**—an assistantship funded through the Office of Distributed Distance Learning at Florida State University. The purpose of this project is to design an on-line program for in-service teachers seeking a Master’s degree in Mathematics Education, but who cannot attend traditional face-to-face courses. My responsibilities include the design of several courses to meet the unique needs of distance-education students, to design course websites and web pages for these courses, and to provide technical assistance for instructors and students enrolled in these courses.

- **Peer Project Trainer and Counselor**—a project funded through the Center for the Study of Teaching and Learning at Florida State University. My responsibility as a part of this project was to train mathematics teachers of at-risk students (Gadsden County, Florida) and to provide tutoring for these students.

1996-1998  
*Adjunct Instructor, Department of Mathematics, Middle Tennessee State University*  
Responsible for instructing various college-level mathematics courses in The Department of Mathematical Sciences.  
Courses taught include: Math for General Studies, Foundations of Mathematics, and College Algebra

1999  
Recipient of a McKnight Doctoral Fellowship

**PROGRAM IMPLEMENTATION AND EVALUATION EXPERIENCE**

2012-2015  
*Internal Evaluator for HBCU UP NSF Grant*  
Currently conducting internal evaluation of $1.6 Million NSF grant for alignment to proposed goals and objectives

2012-2015  
*Interim Director/Principal Investigator for Black Male College Explorers Program*  
Responsible for implementation and high-level oversight of a drop-out prevention and college preparedness program for middle and high-school black males.

2012  
*Evaluator for NOAA Environmental Cooperative Science Center*  
Conducted internal evaluation of $15 Million grant assess project operation in alignment to proposed goals and objectives.

2011-2014  
*Program Approval Board Member, Florida Department of Education*  
Conducted high-level review and approval of educator preparation program for all state-approved programs.

**CURRENT LINES OF RESEARCH**

- Mission-impact for minority-serving institutions
- Recruitment, retention, and graduation of minority students
- Persistence of diverse students in STEM disciplines

**SCHOLARLY PAPERS and PUBLICATIONS**


Howse, M., (2000, February). Issues of African-Americans and Distance Education.


PRESENTATIONS


Howse, M., (2000, October). **Instructors’ Beliefs about African-American Students.** Presentation at a special colloquium for doctoral students of mathematics education at The Florida State University.

Howse, M., (1999, November). **Instructors’ Beliefs about African-American Students.** Presentation at a doctoral seminar held at The Florida State University.

**COMMITTEES**

Florida Agricultural & Mechanical University
- Blackboard Analytics Implementation Steering Committee (Chair)
- 2015-16 NCAA Accelerating Academic Success Grant Implementation Committee (Chair)
- SACS 5th Year Interim Report Committee (Co-Chair)
- Enrollment Management Committee
- Institutional Level Assessment Committee
- Institutional Effectiveness Committee
- Developmental Education Restructuring Committee (Chair)
- Recruitment Committee for the Department of Secondary Education and Foundations (Chair)
- Assessment Committee for the Department of Secondary Education and Foundations
- Teachers for a New Era (Carnegie Grant) Mathematics Design Team
- Teacher for a New Era Evidence Design Team
- Southern Associations of Colleges & Schools Accreditation Affirmation-Educational Programs
- NCATE Standard 2: Unit Assessment System Committee
- College of Education Technology Committee
- College of Education Committee on Student Retention

Bethune-Cookman University
- Institutional Effectiveness Committee
- SACS Steering Committee
- Administrative Council
- Retention Advisory Council (Chair)
- Assessment Liaisons Committee
- Program Assessment Committee
- Strategic Planning Committee
- General Education Council

**PROFESSIONAL AND SOCIAL ORGANIZATIONS**
- Alpha Phi Alpha Fraternity, Inc.
- Mathematical Association of America
Florida Collaboration for Excellence in Teacher Education
National Council for Teachers of Mathematics
National Association for the Advancement of Colored People
Association for Supervision and Curriculum Development
Association of Institutional Researchers

CERTIFICATIONS

Field Clinical Trainer
Certified by the Florida Department of Education to supervise student teachers during student teaching internships. Responsible for facilitating and assessing the development of state-designated skills and competencies (e.g., Florida Educator Accomplished Practices, Florida Generic Teaching Competencies, ESOL Competencies, and Special Area Skills).

ESOL Infusion Educator
Trained to infuse English for Speakers of Languages strategies into the instruction of courses for pre-service teachers. These strategies are designed to help pre-service students to master the ESOL Standards and Competencies as mandated by the Florida department of Education.

COURSES TAUGHT

Daytona State College
College of Education
MAE 4326 How Children Learn Mathematics
MAE 2801 Mathematics for Teachers

Bethune-Cookman University
School of Education
ED 437 Inquiry Math

Florida Agricultural & Mechanical University

College of Arts and Sciences
MAC1105 College Algebra
MAC1105 College Algebra (Web-Enhanced)
MGF1106 Liberal Arts Math I
MGF1107 Liberal Arts Math II
MAC1114 College Trigonometry and Pre-calculus
MTG2206 College Geometry

College of Education
EDF 5433 Assessment for Student Learning
ESE 4930 Educational Seminar: Legal and Ethical Issues in Education
EME 4400 Computer Applications in Education
EME 2040 Introduction to Educational Technology
EDG 2701 Teaching Diverse Populations
EDG 2001 CLAST Preparation
EDG 3430 Measurement and Evaluation
EDG 3004 Overview and Orientation to Education
MAE 3310 Teaching Elementary and Middle School Mathematics

The Florida State University

Undergraduate
MAE4813 Number Systems
MAE4815 Elements of Algebra
MAE4878 Introduction to the Application of Mathematics for Teachers

Graduate
MAE5146 School Mathematics Curriculum
MAE5915 Advanced Technology in Mathematics Education
MAT5932 Mathematical Problem Solving
MAE5658  Using Technology in Teaching Mathematics

**Tallahassee Community College**
- MAT002  Basic Mathematics
- MAT002  Basic Mathematics (Computer-aided)
- MAT024  Elementary Algebra
- MAT024C Elementary Algebra (Accelerated)

**Middle Tennessee State University**
- MAC105  Math for General Studies
- MAC114  College Algebra
- MAC346  Foundations of Mathematics

**SERVICE**
- Collegiate Ministry Director, Discovering Life International Ministries
- Cedric Washington Foundation, Member
- Alpha Education Leadership Foundation
- Black Males Think Tank
- Volusia County Schools African American Advisory Council
- Florida’s Race To The Top Teacher and Principal Leaders Implementation Committee
- Florida Association of Teacher Educators (FATE) Board Member

**REFERENCES**

**Donald Palm, Ph.D., Provost and Vice President of Academic Affairs**
Office of the Provost
Virginia State University
220 Virginia Hall
Virginia State University, VA 23806
(804) 524-5997

**Helena Walrond, Ph.D., Senior Vice President and Provost**
Office of Academic Affairs
Bethune-Cookman University
Daytona Beach, Florida  32114
Phone: (386) 481-2349

**Lawrence Morehouse, Ph.D., Executive Director**
The Florida Education Fund
201 East Kennedy Blvd.
Tampa, Florida 33602
Phone:  (813) 272-2772
## Appendix B: CESSRST Assessment & Evaluation Milestones Alignment Matrix

### Evaluation Question
1. To what extent are the *Education and Training* components of CESSRST being implemented as planned?

#### a. Are underrepresented minority (URM) students being effectively recruited into CESSRST undergraduate and graduate programs?

<table>
<thead>
<tr>
<th>Evaluation Question</th>
<th>CESSRST Objectives</th>
<th>NOAA Program Level Outcomes and Outputs</th>
<th>Assessment &amp; Evaluation Activities/Milestones</th>
<th>Metric</th>
<th>Person(s) Responsible</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Are underrepresented minority (URM) students being effectively recruited into CESSRST undergraduate and graduate programs?</td>
<td>2a</td>
<td>Education and Training Output 2.1 and 2.2 Output 4.1 and 4.2</td>
<td>Monitor recruitment and retention efforts Center-wide (ongoing) Incorporate questions regarding awareness of CESSRST and NOAA on application materials (Mar-Apr, 2017) Identify national, regional and local recruitment opportunities for in-person and virtual recruitment aligned with CESSRST research areas K12 engagement/pipeline program (summer internships, field trips &amp; after school programs) Survey students in high-school pipeline programs (i.e. NOAA CESSRST DAY, April and CUNY HIRES; Jul-Aug, Y1-Y5)</td>
<td>Number of interested students at recruitment events (Y1-Y5) Number of students participating in CESSRST educational activities Number of URM students participating in CESSRST professional development activities Number of CESSRST-sponsored URM students pursuing degrees in NOAA mission-related fields</td>
<td>Khanbilvardi (Director) CMT</td>
</tr>
</tbody>
</table>
• Develop annual recruitment budget
• Work with MIS data managers and others to identify student tracking variables aimed at recruitment for input into application materials and student longitudinal tracking (Mar-Apr, 2017)
| **b. To what extent is the Summer Bridge Program preparing new students for the academic and research experiences in CESSRST?** | **2e** | **Education and Training**<br>Output 2.2<br>Output 3.1 and 3.2<br>Output 4.1 and 4.2<br><b>Administration</b><br>Output 2.1 | ▪ Enroll CESSRST students at all institutions in retention and success programs (i.e. Summer Bridge, New Students Orientation)<br▪ Survey/Interview CESSRST Undergraduates in Summer Bridge Program (Jun-Aug, Y1-Y5)<br▪ Optional success programs<br▪ Retrospective survey items embedded into New Student Orientation materials (Jun, 2017)<br▪ Incorporate questions on recruitment, persistence, and success in alumni surveys (Apr-May, 2017) | ▪ Number of students enrolled in the optional success program<br▪ Number of students participating in the Summer Bridge<br▪ Number of students participating in the Student Orientation<br▪ Number of Summer Bridge students who go on to pursue degrees in NOAA mission-related fields | ▪ **Merchant**<br>Assistant Director<br▪ **Education Expert**<br▪ **External Evaluator** |

| **c. How does the ISDP process support and advance the student learning program?** | **Education and Training**<br>Output 1.1 and 1.2<br>Output 2.1 and 2.2<br>Output 3.2<br>Output 4.1 and 4.2 | ▪ Develop ISDP framework<br▪ ISDP Beta tested by current students, faculty and Education Coordinator (Apr-May, 2017)<br▪ Students complete ISDP within first 90 days of acceptance<br▪ Students assess their achievement towards the technical and professional core competencies (Y1-Y5, each semester) | ▪ Number of students that completed ISDP within the first 90 days of acceptance<br▪ Number of students demonstrating proficiency in data analytics<br▪ Number of students demonstrating competence relative to core competencies<br▪ Number of students demonstrating proficiency in the application of STEM to decision-making, policy, and management | ▪ **Merchant**<br>Assistant Director<br▪ **CESSRST-CUNY Staff**<br▪ **Education Expert**<br▪ **CESSRST Faculty Advisors** |
| 2d | **Education and Training**  
Output 1.1, 1.2 and 1.3  
Output 2.1  
Output 3.1  
Output 4.1  
Scientific Research  
Output 1.2 | Students meet with Education Coordinator each semester to track performance and identify strengths and areas of needed improvement  
- Education Coordinator develops Professional competencies and identifies associated modes of delivery  
- Broader NOAA CESSRST network (NOAA scientists, agency collaborates, etc.) review/edit competencies  
- CESSRST Staff monitor development of Professional Development (PD) Competency Framework (Feb-Mar, 2017)  
- Education Coordinator develops CESSRST Professional Skills Development Program  
- Final draft of PD competencies complete (Apr, 2017)  
- CESSRST Professional Skills Development Program implemented  
- Education Coordinator monitors student participation and compliance in achieving | Student satisfaction with CESSRST educational and training activities outlined in ISDP  
- Number of students demonstrating proficiency in the profession competencies and skills  
- Rubric for determining if the competencies are appropriately integrated into PACE activities  
- Number of students participated in PACE  
- Student satisfaction with CESSRST educational and training activities associated with PACE | *Khanbilvardi*  
(Director)  
Education Expert  
CESSRST CUNY Staff  
Co-PIs  
NOAA scientist  
CESSRST Faculty |
| 2a | **Education and Training** | **Undergraduate**
|    | **Output 2.2** | Identify summer research opportunities for students completing Freshman & Sophomore years  
Identify potential internships (SSIO/NERTO) hosts among NOAA labs and facilities  
Match eligible students with appropriate NOAA Science Mentor  
CESSRST Staff identify internship opportunities that align with research themes (Y1-Y5)  
Match students with internships based on student interests (Y1-Y5)  
   | **Graduate**
|    | **Scientific Research** | Identify potential internships (SSIO/NERTO) hosts among NOAA labs and facilities  
Match eligible students with appropriate NOAA Science Mentor  
CESSRST Staff identify internship opportunities that align with research themes (ongoing)  
   | **Undergraduate**
|    | **Output 1.1, 1.2 and 1.3** | Number of undergraduate students participating in CESSRST-related internship activities  
Pre-post survey results indicating that SURE and undergraduate summer research experiences increased interest in NOAA sciences  
   | **Graduate**
|    | | Pre-post survey results indicating graduate student satisfaction with internship activities  
Qualitative results from graduate focus group discussions regarding satisfaction with CESSRST internship activities  
Survey results from NOAA science mentors regarding the quality and impact of NERTO experiences  
Survey results from graduate students regarding quality and   |

- Are undergraduate and graduate internship opportunities exposing students to meaningful learning experiences in NOAA mission related sciences?
<table>
<thead>
<tr>
<th>2. To what extent is the <em>Science and Research</em> component of CESSRST being implemented as planned?</th>
</tr>
</thead>
</table>
| a. How does CESSRST research-align with NOAA mission and priorities? | 1b | *Scientific Research* Output 1.1 and 1.2 | • Interaction with NOAA scientist to align the research priorities with NOAA mission  
• NOAA CESSRST network (select NOAA scientists, agency collaborates, etc.) review research topics to ensure alignment with NOAA mission | • Number of CESSRST-sponsored research projects conducted by CESSRST students  
• Number of CESSRST-sponsored research projects aligned to each CESSRST focus area | • Khanbilvardi (Director)  
• Distinguished Research Scientist  
• Social Science Lead  
• NOAA Collaborators |
| b. What is the nature (quality, quantity, and impact) of established collaborations between NOAA and CESSRST faculty, staff and students? | 1a, 1b, 1c | *Scientific Research* Output 1.3 and 1.5  
*Administration* Output 2.2 | • Core Competency Sub-Committee designs CESSRST Level-I core competency requirements and curricula  
• NOAA CESSRST network (select NOAA scientists, agency collaborates, etc.) review/edit competencies  
• Monitor development of Core Competency Framework (Mar-May, 2017) | • Number and types of CESSRST and NOAA collaborations  
• Number of NOAA scientist serving as research mentors  
• NOAA scientist perceptions survey results regarding the quality and impact of collaborations | • Khanbilvardi (Director)  
• CESSRST Staff  
• Competency Sub-Committees  
• Research Theme Coordinators  
• CESSRST Faculty  
• NOAA collaborators  
• External Evaluator |
c. To what extent has CESSRST integrated social science issues into research projects?

| 2c | **Education and Training** Output 1.2 | ▪ Social Science Sub-Committee works with Research and Education Sub-Committees to identify activities and courses to integrate social science component of projects  
▪ Education Expert integrates social science in the PD offerings (Y1-Y5)  
▪ Number of NOAA related courses that integrate social sciences  
▪ Number of center related social science activities  
▪ Number of research projects that incorporate social science component  
▪ Student survey results regarding social science integration | ▪ Were (Social Science Lead)  
▪ Education Expert  
▪ Social Science Sub-Committee  
▪ Research and Education Sub-Committees |

| d. To what extent are NOAA scientists serving as mentors and advisors for student research? | 1a, 1b, 1c | **Scientific Research** Output 1.2 | ▪ Match eligible students with appropriate NOAA Science Mentor  
▪ Number of NOAA scientists serving as mentors and advisors for student research  
▪ Qualitative results from focus group discussions regarding satisfaction with interaction with NOAA mentors and advisors | ▪ Khanbilvardi (Director)  
▪ Distinguished Research Scientist |

| e. What is the nature of the collaborative partnerships being established in support of NOAA’s mission? | 1a, 1b, 1c | **Administration** Output 2.2 | ▪ Survey of NOAA Scientists on CESSRST collaboration (see CESSRST Management) (Y2 & Y4)  
▪ Number of collaborative partnerships  
▪ Survey for the collaborators (partnerships) | ▪ Khanbilvardi (Director)  
▪ Distinguished Research Scientist  
▪ CESSRST Faculty  
▪ CMT |

| f. How has CESSRST research training increased students’ competencies related to the Center’s four collaborative research themes? | 2b, 2d, 3a | **Education and Training** Output 1.1, 1.2 and 1.3 Output 2.1 and 2.2 Output 3.1 and 3.2 Output 4.1 and 4.2 **Scientific Research** Output 1.1, 1.2, 1.4 and 1.5 | ▪ Research Themed Sub-Committee monitors the completion of projects, tasks, and deliverables for each theme (Y1-Y5, ongoing)  
▪ including Social Science Connection and  
▪ Rubrics/questionnaires for self-assessment toward achieving competencies embedded in ISDP (Spring Semesters)  
▪ Rubrics/questionnaires for self-assessment toward achieving core competencies | ▪ Merchant (Assistant Director)  
▪ CWCC Sub committee Chair (Jorge Gonzalez and |
<table>
<thead>
<tr>
<th>Component</th>
<th>Activities</th>
</tr>
</thead>
</table>
| Student Training Component | - Research Themed Sub Committee works with Core Competency Subcommittee to develop CESSRST core competency requirements and curricula  
- CESSRST faculty list and define expectations for achievement of competencies  
- Broader NOAA CESSRST network (NOAA scientists, agency collaborators, etc.) review/edit competencies  
- CESSRST Level-II core competencies developed, and associated modes of delivery identified  
- CESSRST Staff monitor development of Level II Research Competency Framework (Mar - Apr, 2017)  
- CESSRST faculty, NOAA scientists, agency collaborators review Level II Competencies (Apr - May, 2017)  
- CESSRST Staff monitor integration of Social Science component of embedded in ISDP (Spring semesters)  
- Faculty perception survey of the students’ competencies  
- NOAA mentor survey regarding student competencies |

**John Anderson**  
- Education Expert  
- Research Theme Coordinators  
- CESSRST Network (NOAA Collaborators)  
- CESSRST faculty  
- CESSRST Advisory board  
- External Evaluator
g. What are the CESSRST research outputs and tools and how have they been used by NOAA and the science community?

1a Scientific Research Output 1.4 Output 2.1, 2.2, 2.3 and 2.4

- Regular interaction of the students with their NOAA mentors
- Seminars given by NOAA speakers
- CESSRST research symposium

| Scientific Research Output 1.4 |  
| Output 2.1, 2.2, 2.3 and 2.4 |  
| Number of students trained in NOAA sciences |  
| Number of publications |  
| Number of presentations |  
| Number of data products, R2X (R2O, R2A, R2D) |  
| Number of citations related to CESSRST research |  

3. To what extent is the CESSRST Center Management able to support and sustain Education and Training and Research components of the CESSRST program?

a. How are administrative data and management processes used to enhance the implementation of the project?

3d Administration Output 2.1 Output 4.1 and 4.2

- Develop application online portal for all levels (UG, MS PhDs) with access for CESSRST partners and Recruitment Sub-Committee

| Administration Output 2.1 Output 4.1 and 4.2 |  
| Develop application online portal for all levels (UG, MS PhDs) with access for CESSRST partners and Recruitment Sub-Committee |  
| Number of best practices that are measurable, scalable, and transferrable |  
| Demonstrated use of established evaluation |  

| Khanbilvardi (Director) |  
| CMT |  
| CESSRST Staff |  
| External Evaluator |
| 3d | **Administration** Output 4.1 and 4.2 | - Review applications, placement in the appropriate campus/lab/research group and notify the successful applicants  
- Create and manage a CESSRST cluster for data storage and mid-range computation GOES-R Launch, Acquisition and Archiving at CESSRST (satellite receiving station add-ons)  
- Large scale computation (CUNY High Performance Computing facility)  
- Expand and improve NOAA CESSRST cluster with API for websites for data transfers as data volume increases | practices to measure effectiveness of project  

b. How has center management made use of assessment and evaluation results to improve project outcomes?  

- Survey CESSRST Staff, faculty and Education Coordinator identify variables needed to support evidence of educational outcomes (Feb-Mar, 2017)  
- Monitor completion toward each milestone (Mar-Aug, 2017)  
- Internal Executive Committee meeting (Partner Institutions)  

- Number of best practices that are measurable, scalable, and transferrable  
- Demonstrated use of established evaluation practices to measure effectiveness of project  
- Results regarding the utilization of the Collaboration Evaluation and Improvement Framework (CEIF) survey to assess effectiveness of the CESSRST Collaboration  

- Khanbilvardi (Director)  
- CMT  
- CESSRST Staff  
- External Evaluator
| c. How has the CESSRST program increased engagement with the URM communities to enhance the mission workforce pipeline? | 2e, 3a, 3d | **Administration**  
Output 1.1  
Output 2.1 and 2.2 | **Seminars given by NOAA speakers**  
**CESSRST research symposium** | **Number and types of CESSRST and NOAA collaborations**  
**Number of collaborative partnerships** | **Khanbilvardi** (Director)  
**Education Expert**  
**CESSRST Staff**  
**External Evaluator** |
| d. How has the center promoted and nurtured partnerships that advance the center’s goals and NOAA’s priorities? | 3a, 3c | **Scientific Research**  
Output 1.1, 1.3 and 1.5  
Administration Output 2.2 | **Create Center-wide website for general information**  
**Create partner institution websites (using matching templates)**  
**CESSRST Center-wide Post Doc Plan**  
**Collaborate with NOAA Program Office and Scientists (thematic) to plan, create and implement graduate NERTO opportunities** | | **Khanbilvardi** (Director)  
**Merchant** (Assistant Director)  
**CMT**  
**External Evaluator** |

4. What impact has CESSRST' programmatic efforts had increasing the number of qualified post-secondary URM students trained and graduated in NOAA Sciences?
<table>
<thead>
<tr>
<th></th>
<th>Education and Training Output 1.1, 1.2 and 1.3 Output 2.1 and 2.2 Output 4.1 and 4.2</th>
<th>Education and Training Output 1.1, 1.2 and 1.3 Output 2.1 and 2.2 Output 4.1 and 4.2</th>
<th>Education and Training Output 1.1, 1.2 and 1.3 Output 2.1 and 2.2 Output 4.1 and 4.2</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Create Center wide core competency online modules</td>
<td>Ensure students take RCR training</td>
<td>UG and High School mentoring</td>
<td></td>
</tr>
<tr>
<td></td>
<td>All CESSRST students take the basic level core competency training</td>
<td>Regular interaction of the students with their NOAA mentors</td>
<td>Participate in the summer outreach – presentation to the summer bridge interns</td>
<td>Number of students enrolled in the optional success program</td>
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<td>Seminars given by NOAA speakers</td>
<td>Participate in center wide professional development webinars</td>
<td>Number of students participating in the Summer Bridge</td>
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<td>Attend regular seminars</td>
<td>Number of students participated in PACE</td>
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<td>a.</td>
<td>To what extent has CESSRST’s academic training increased the number of post-secondary students trained in NOAA Sciences?</td>
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<td>Number of CESSRST students recruited and trained</td>
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<td>2b, 2c, 3b</td>
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<td></td>
<td></td>
<td>Number of URM students recruited and trained</td>
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<td>Number of CESSRST students completing CWCC</td>
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<td>Number of CESSRST who graduate and pursue NOAA mission-aligned career opportunities</td>
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<td></td>
<td>Number of URM students who graduate and pursue NOAA mission-aligned career opportunities</td>
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<td>b.</td>
<td>What are the impacts of CESSRST’s research training on increasing URM students’ ability to conduct research relevant to NOAA sciences?</td>
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<td>Merchant (Assistant Director)</td>
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<td>1a, 1b, 1c</td>
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<td>c.</td>
<td>What are the impacts of professional development training on increasing CESSRST students’ job-ready skills?</td>
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<td>Khanbilvardi (Director)</td>
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<td>External Evaluator</td>
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</table>
## CESSRST Goals and Objectives

### Goal 1: Conduct NOAA mission-aligned collaborative research

**Objectives:**

- 1a. Increase NOAA Collaboration and Engagement with NESDIS and other Line Offices
- 1b. Increase and create NERTO opportunities for all NOAA CESSRST graduate students
- 1c. Participate in CSS Cooperative Committee (CCC) Network

### Goal 2: Recruit, train and graduate increased number of students in NOAA related STEM fields

**Objectives:**

- 2a. Create and implement Center-Wide Recruitment Plan
- 2b. Create and institutionalize Center-wide Core-Competency (CWCC) Framework

<table>
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<tr>
<th>5. To what extent has CESSRST efforts advanced the science research related to NOAA priorities?</th>
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<th><strong>Scientific Research</strong></th>
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<td>To what extent is CESSRST faculty, staff and students’ research directly aligned with NOAA mission strategies and priorities?</td>
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<td>Output 1.1, 1.2, 1.3, 1.4 and 1.5 Output 2.1, 2.2, 2.3 and 2.4</td>
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<td><strong>Output 2.1, 2.2, 2.3 and 2.4</strong></td>
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<td>Regular interactions (meetings, conference call, workshops et.) with NOAA members</td>
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<td>Engage students in NOAA SSIO/NERTO training</td>
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<td><strong>Number of NOAA scientist serving as research mentors</strong></td>
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<td><strong>NOAA scientist survey</strong></td>
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<td><strong>Number of students trained in NOAA sciences</strong></td>
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<td><strong>Number of publications</strong></td>
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<td><strong>Number of presentations</strong></td>
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<td><strong>Number of data products, R2X (R2O, R2A, R2D)</strong></td>
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<td><strong>Number of citations related to CESSRST research</strong></td>
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<td><strong>Number of center related social science activities</strong></td>
<td><strong>Scientific Research</strong></td>
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<tr>
<td><strong>Number of research projects that incorporate</strong></td>
<td><strong>Scientific Research</strong></td>
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<td>Khanbilvardi (Director)</td>
<td>Khanbilvardi (Director)</td>
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<th>5. To what extent has CESSRST increased NOAA mission-relevant research capacity at MSIs?</th>
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<th><strong>Scientific Research</strong></th>
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<td>To what extent has CESSRST increased NOAA mission-relevant research capacity at MSIs?</td>
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<td>Output 1.1, 1.3, 1.4 and 1.5 Administration Output 2.2</td>
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<td><strong>Number of data products, R2X (R2O, R2A, R2D)</strong></td>
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<td><strong>Number of research projects that incorporate</strong></td>
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| Khanbilvardi (Director) | Khanbilvardi (Director) |
| Distinguished Research Scientist | Distinguished Research Scientist |
| Education Expert | Education Expert |

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**CESSRST-Award # NA16SEC4810008 Page-49**
- 2c. Create and implement Center-Wide Social Science Framework
- 2d. Create and implement Professional Advancement and Career Engagement (PACE)
- 2e. Create summer Bridge Program to increase number of applications for NOAA UG scholarship opportunities

**Goal 3: Increase/attain institutional capacity to sustain education and research**

Objectives:
- 3a. Increase/leverage University and generate extramural resources to sustain CSC capacity to conduct research and education
- 3b. Create new Academic Programs and Curriculum in line with NOAA mission science
- 3c. Communicate CSC accomplishments and success stories
- 3d. Create best practices that are scalable and transferable
### Appendix C: Evaluation Timeline

<table>
<thead>
<tr>
<th>Evaluation Activity</th>
<th>Project Year 1</th>
<th>Project Year 2</th>
<th>Project Year 3</th>
<th>Project Year 4</th>
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**Site 6 Site Monitoring Report Due to Evaluator**

**Site 6 On-site Visit**

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*CESSRST-Award # NA16SEC4810008 Page-52*