



THE CITADEL

JAMES B. NEAR CENTER FOR
CLIMATE STUDIES

ANNUAL REPORT 2024-25

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EXECUTIVE SUMMARY

2024-25 was a successful year for the Near Center for Climate Studies (NCCS). The Center enjoyed accomplishments in scholarship, new areas of growth, and enhanced visibility. Key highlights include:

1. Dr. Tess Doeffinger as Senior Climate Fellow
2. RADM David Titley's Greater Issues speech: "Climate Change & National Security: Facts, Fictions, and Fantasies"
3. Additional improvements to the Citadel Climate Monitoring and Assessment Program via funding from SECOORA: "A Surface Elevation Table Station for Education and Research Purposes at The Citadel"
4. Updates of the NCCS web site, including research and education links, and the community Lowcountry Heat Action Plan Toolkit
5. Finalized charters on the three focal areas of the NCCS: *coastal environment and infrastructure, human health and wellbeing, and national security*
6. Awarding \$36,000 in climate studies research to faculty in Mechanical Engineering and Biology
7. Adding climate scholarship with 10 journal articles (a record!), 1 conference proceeding, and 6 professional presentations
8. Participation on a \$6 million dollar NSF research project and securing more than \$100,000 in external funding for The Citadel

Thanks to a significant contribution from Jim Near's estate (approximately \$500,000) and the continued generosity of his sister, Diana (Suki) Watson, the NCCS has successfully established an endowment to support the Climatological Research Studies Grant (CRSG) program. Funding for the 2024-25 CRSG cycle surpassed that of 2023-24, and we anticipate continued growth.

As the NCCS expands its role in providing climate and resiliency expertise across South Carolina, its partnership with TCF corporate giving has proven fruitful. Notably, Page Tisdale secured a \$15,000 award through the Coastal Community Foundation's Healthy Harbors initiative.

Finally, Senior Climate Fellow Dr. Tess Doeffinger has infused the NCCS with fresh ideas and momentum. We are pleased to share that her contract has been renewed for the 2025-26 academic year.

Scott Curtis, Ph.D., Director
Near Center for Climate Studies

VISION & MISSION

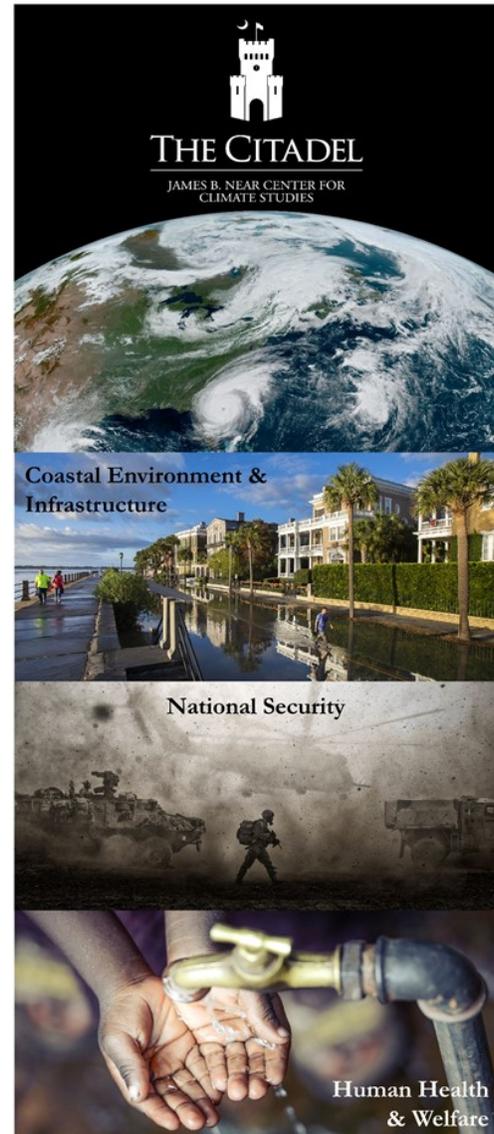
The NCCS serves the students and faculty of The Citadel and citizens of South Carolina by enhancing understanding of climate and its variability, change, and risks. The vision of the Center begins with the personal vision of Lt. Col. Jim Near. Near served twenty years in the USAF as a meteorologist and in fall 2014 returned to The Citadel as an adjunct professor of Physics. Near demonstrated extraordinary generosity by providing The Citadel Foundation (TCF) with a \$3.27 million gift to initiate the Center. Ever humble and not wanting to receive any recognition for his donation, he specified to TCF that his gift remain completely anonymous until his passing in March 2020.

Vision

The Lt Col James B. Near, Jr., USAF, '77 Center for Climate Studies will be nationally recognized as an academic leader in *climate science*¹ and facilitating the transition of this science from research into operational use to assist in principled decision making.

Mission

The NCCS mission is to promote climate science through education, research, transition to operations and community engagement and the development of public-private partnerships. The scope of the Center's activities will consist of the relation of Earth's climate to (a) national security, (b) coastal environment and infrastructure, and (c) human health and wellbeing.



1. climate science is defined as the science of how global, regional, or local climates are maintained and change over time and their effects on the environment and society.

SEMINARS OF NOTE

One of the actions for the NCCS in the current Citadel strategic plan is to “Develop a symposium series on relevant climate topic”. We are pleased to report that the James B. Near Center for Climate Studies Climate Speaker Series launched on November 14, 2024 with Dr. Dwayne Porter from University of South Carolina. Dr. Porter was one of the recommended speakers from the 2023-24 annual report. His talk, *Empowering Communities to “Use Data and Sound Science to Make Noise!”* was given to a capacity crowd of students and faculty in the Riverview Room.



The Krause Center, in partnership with the NCCS, invited RADM David Titley, Ph.D., to present the Spring 2025 Greater Issues Speech. Titley interacted with students for an early morning breakfast, lectured in CIVL 301, Highway Engineering, and presented “Climate Change & National Security: Facts, Fictions and Fantasies” to the entire corps of cadets.



PERSONNEL

The NCCS is comprised of an Executive Committee, Advisory Board, and Climate Fellows. The Director and Senior Climate Fellow prioritized interactions among the Climate Fellows and between the Climate Fellows and Advisory Board. Following a survey about the needs of the Fellows, an NCCS brown bag lunch series was established in the spring. The initial attendance was minimal, but we hope to grow attendance with food and guest speakers. The Climate Fellows were invited to both the fall and spring meetings of the Advisory Board. Those in attendance were excited to learn about each other's expertise and think about common interests and opportunities for collaboration.

THE CITADEL		
Climate Center Spring Schedule		
4	12:00 PM	Lunch to discuss funding opportunities
Feb	1:00 PM	
21	12:00 PM	Informal lunch to chat about research
Feb	1:00 PM	
4	12:00 PM	Lunch to discuss incorporating climate in the classroom
Mar	1:00 PM	
20	TBD	Board Meeting
3	12:20 PM	Greater Issues Speaker
Apr	1:20 PM	
15	12:00 PM	Fellows Meeting
Apr	1:00 PM	



Executive Committee

The Executive Committee (EC) is made up of Citadel leadership and has oversight of NCCS activities as they pertain to the fulfillment of the NCCS Charter. There was no change in the Executive Committee

- Dr. Darin Zimmerman (chair), Dean of Swain Family School of Science and Mathematics
- Dr. Kevin Bower, Associate Provost for Academic Affairs and Dean of General Studies
- Dr. Scott Curtis, Director of Near Center for Climate Studies
- Dr. John Weinstein, Professor of Biology and Assistant Provost for Research
- Dr. Andrew Williams, Dean of Engineering
- Dr. Hank Yochum, Head of Department of Physics

Advisory Board

The Advisory Board (AB) is comprised of experts in the areas of environmental, climate, oceanic, atmospheric, and other closely allied sciences. Members may also include educators, policymakers, and leaders of the community and industry whose skills and activities would inform the Executive Committee on Center activities and direction, as well as provide networking opportunities for students and Center Fellows. One member of the AB stepped down: Dr. Kirstin Dow. Dr. Fred Holland continues to serve as the chair of the AB. Committees were reorganized based on the three focal areas. During this academic year three charters were produced to guide the NCCS in activities that would strengthen the areas of emphasis (see Appendix A).

- **Strategic and Governance (oversight of membership and committees):**
 - Mr. David Johnston (chair), Hamilton Advisors LLC
 - Dr. Fred Holland '64, former Director of NOAA Hollings Marine Laboratory
 - Dr. Susan Lovelace, SC Sea Grant Consortium
- **Coastal Environment and Infrastructure:**
 - Dr. Fred Holland (chair)
 - Mr. Allan Clum, Mount Pleasant Waterworks
 - Ms. Debra Hernandez, Southeast Coastal Ocean Observing Regional Association
 - Dr. Mike Johns '72, Windward Environmental LLC
 - Dr. Susan Lovelace, SC Sea Grant Consortium
 - Mr. Chris Mack '18, JMT
 - Dr. Hope Mizzell, SC Climate Office
- **Human Health & Welfare Committee:**
 - Dr. Paul Sandifer (chair), College of Charleston
 - Dr. Geoff Scott, University of South Carolina
 - Dr. Brandon Emery, Lexington Medical Center
- **National Security Committee:**
 - Mr. David Johnston (chair)
 - Mr. Kevin Cooley, '90, National Oceanic and Atmospheric Administration (NOAA)
 - Col Allison Dean-Love, BOV, *ex officio*
 - Gen Will Grimsley, SC Secretary of the Department of Veterans' Affairs (retired)
 - Lt Col Tim Smith, Chief, Operations Integration Branch, Response Operations Division, FEMA (retired)

Two Advisory Board meetings were held, one on 11/07/24 and one on 3/20/25. Minutes of these meetings can be found in Appendix A.

Climate Fellows

At the close of the 2024-25 academic year there were 28 faculty and 3 community Fellows of the NCCS representing all five Schools at The Citadel and the Department of Leadership Studies. This number has remained steady over the past few years.

- Senior Climate Fellow
 - Dr. Tess Doeffinger, Civil and Environmental Engineering
- Climate Fellow
 - Dr. Jen Albert, Education
 - Dr. Mostafa Batouli, Civil and Environmental Engineering
 - Dr. Holly Bevsek, Chemistry
 - Dr. Kweku Brown, Civil and Environmental Engineering
 - Dr. Mei Chen, Mathematics
 - Dr. Dung Do, Chemistry
 - Dr. Sean Fourney, Public Speaking Lab Director, Leadership Studies
 - Dr. Simon Ghanat, Civil and Environmental Engineering
 - Dr. Chao Gu, Mathematics
 - Dr. Danny Gustafson, Biology
 - Dr. Howard Huynh, Biology
 - Dr. Deepti Joshi, Cyber and Computer Science
 - Dr. Kaelyn Leake, Physics
 - Dr. Thad Le-Vasicek, Chemistry
 - Dr. Bo Li, Mathematics
 - Dr. Clinton Moran, Biology
 - Dr. Amanda Mushal, History
 - Dr. Mark Owens, Political Science
 - Dr. Sergey Ponomarov, Marketing Supply Chain & Economics
 - Dr. Claudia Rocha, Biology
 - Dr. John Sanders, Mechanical Engineering
 - Dr. Nahid Vesali, Engineering Leadership & Program Management
 - Dr. John Weinstein, Biology
 - Dr. Gabriel Williams, Physics
 - Dr. Todd Wittman, Mathematics
 - Dr. John Zardus, Biology
 - Dr. Lisa Zuraw, Chemistry
- Community Fellows
 - Dr. Merrie Koester, USC Center for Science Education
 - Dr. LJ Palmer-Moloney, Visual Teaching Technologies
 - Mr. James Ward, College of Charleston (emeritus)
- New Student Fellows
 - Mitchel Huott, Department of Physics

There were two meetings of the Climate Fellows, one on 12/2/24 and one on 4/15/25. Fellows were updated on Center activities and reports of the four standing committees were given. The four standing committees are: Academic, Research, Engagement, and Industry. The membership and goals are given below.

Academic Committee

Comprised of Fellows: Simon Ghanat and Jen Albert. The charge of the Academic Committee is to propose educational and training opportunities for Citadel students and external constituents through curricular offerings, seminars and workshops, symposia, and continuing education. The committee will also engage with K-12 students and faculty.

Research Committee

Comprised of Fellows: Deepti Joshi, Clinton Moran, Mostafa Batouli, Sergey Ponomarov, and Gabriel Williams. The charge of the Research Committee is to seek research strategies and communicate external funding opportunities to the Director. They will also review internal research proposals, including the annual Climatological Research Studies Grant (CRSG) competition. Other Faculty Fellows may be invited to serve as reviewers in case of conflict of interest and/or a low committee membership. This year Tess Doeffinger served as a reviewer. The committee will promote ethical behavior in the practice of research and innovative problem solving in climate science.

Engagement Committee

Comprised of Fellows: Kaelyn Leake, Claudia Rocha, Thad Le-Vasicek, and James Ward. The charge of the committee is to facilitate NCCS outreach to the community (individuals, groups) in climate science and related environmental disciplines. The committee will listen to climate stakeholders and seek ways the Center can provide expertise and principled science-based leadership.

Industry Committee

Comprised of Fellows: Nahid Vesali, Sergey Ponomarov, and Mark Owens. The charge of the committee is to establish industry partnerships that benefit NCCS partners and provide research, internship, and other development opportunities for Citadel students and Fellows. The committee will provide mentoring and network opportunities for students interested in climate-related careers.

STRATEGIC ACTIVITIES

Academics

- “Develop a minor around Climate Studies” (complete)
 - Although this action item is complete, the NCCS continues to monitor course offerings and enrollment and track the number of students declaring the minor “Climate Resiliency and Environmental Sustainability Studies (CRESS)”. During the 2024-25 academic year cadet Remi Witt, Civil Engineering, declared the minor. The three core courses for the CRESS minor are BIOL 209/NTSS 305: Environmental Science, PHYS 343: Applied Climatology, and a Capstone Course. Environmental Science and Applied Climatology have only been offered 3 semesters total since Fall 2020. Below is a table of a few additional climate related courses. There does not appear to be a positive trajectory in course enrollment. Dr. Doeffinger and her student compiled a list of all courses with some climate content based on a survey of Climate Fellows and an inspection of the course catalog. Forty-seven classes were identified. This will be a good starting point for investigating the structure and utility of the minor.

Number	Title	# Fall 20	# Spring 21	# Fall 21	# Spring 22	# Fall 22	# Spring 23	# Fall 23	# Spring 24	# Fall 24	# Spring 25
BIOL 209/NTSS 305	Envi. Science	47	NA	36	NA	NA	NA	NA	NA	NA	NA
PHYS 343	Applied Climatology	NA	NA	NA	NA	NA	3	NA	NA	NA	NA
PHYS 243	Meteorology	NA	NA	NA	NA	8	NA	NA	NA	NA	NA
PHYS 244/NTSS 305	Extreme Weather and Climate	NA	12	13	NA	NA	NA	23	17	NA	NA
NTSS 301	Technical Solutions to Climate Change	NA	NA	14	24	NA	19	NA	NA	NA	NA
NTSS 303	Biology, Environment and Law	16	49	24	38	11	10	16	16	20	19
CIVL 322*	Intro to Env. Engineering	NA	49	NA	37	NA	33	NA	36	NA	22
Freshman seminars	Environ. Hazards	23	21	21	20	18	20	17	NA	18	NA
TOTAL		86	131	108	119	29	85	56	69	38	41

* An elective course in the CRESS minor

- Two new climate-related strand courses were offered in Spring 2025: NTSS 302 Weather, Climate, and Conflict and NTSS 301 Global Change Biology. New climate courses are now being advertised by the NCCS web site <https://www.citadel.edu/ssm/climate-center/climate-related-courses/> The ones advertised for Fall 2025 are ENGS 305 “Climate Fiction and Sustainability”, NTSS 301 “Technical Solutions to Climate Change”, ELES 302 “Water Security under Climate Change”, and PHYS 150 “Introduction to Climate Science”.
- The NCCS has a proposal into the Lowcountry Graduate Center to plan for a graduate certificate that would incorporate climate adaptation and uncertainty into decision making. There is a need for a better understanding of climate science and underlying uncertainty to make optimal decisions regarding future investments in institutions, infrastructure, and information. This need presents itself as three main knowledge gaps: 1) There is a disconnect between academics/scientists and leaders who make decisions around long-term policies and infrastructure investments; 2) Optimal solutions can cross-cut disciplines, so there is a need to foster interconnections and communications across fields so those solutions can be more readily identified; 3) There is a plethora of information available to decision makers. However, all datasets include inherent limitations and uncertainty. Therefore, being able to work with these large datasets and discern which are most applicable given a specific context will be a useful skill. The graduate certificate may be mostly online, but could include a “summer experience”, which would partly address the strategic plan action item: “develop a summer camp on climate information and communication”.
- As part of the Climate Center spring schedule (see Personnel), the NCCS held two workshops. The first was presented on 2/21/25 by Nora Walker and Lola Renauer from the College of Charleston on the Adopt-a-Stream program. Dr. Simon Ghanat presented at the spring Climate Fellows meeting: “Infusing Climate Concepts into Civil Engineering Courses”.
- “Develop a teacher workshop on infusing climate into the K-12 curriculum”
 - 2024-25 marked the second and final year of the NOAA National Sea Grant and Disaster Preparedness Program project: “Kids Teaching Flood Resilience: Step Up! Get Ready! Respond!” Dr. Merrie Koester, Climate Fellow, was paid to design, develop and field test a series of KTFR lessons, activities and artifacts. During the spring Dr. Koester partnered with NCCS, SC Sea Grant Consortium, The Citadel STEM Center, Bell Digital Media, City of Charleston, Moffat and Nichol, and the SC Aquarium in creating “Camp Flood Resilience” for Teacher Leaders. On May 17 the camp was held at Charleston Charter School for Science and Mathematics.

Takeaways

In 2024-25 the CRESS minor gained one student. The course database will aid in revising the minor. The Director and Senior Climate Fellow will come up with a revision proposal to present to the Climate Fellows in fall 2025. A graduate certificate that would incorporate climate and uncertainty into decision making is being considered.

Research

- Objective 6.2 Action Items: “Enhance research in Climate Studies” & “Increase funding for operational support, particularly for Climate-related research”
 - Funding from the Center to faculty and students
 - The Climatological Research Studies Grant (CRSG) program is administered through the NCCS and funds Citadel faculty and students in climate studies. This year both strategic actions were satisfied. Additional contributions from Jim Near’s estate and a generous donation from Jim’s sister launched the CRSG endowment! In addition, Page Tisdale from TCF was able to secure \$15,000 from the Coastal Community Foundation Healthy Harbor grant program. The director is beginning discussions with Climate Fellows to consider options for using the Healthy Harbor funds.
 - Like last academic year there were only three CRSG projects submitted/awarded, but the total of \$36,000 was closer to the target amount of \$40,000.

Last name	First name	Dept.	Amount	Title
Huynh	Howie	Biology	\$12,000	Spatial and temporal dynamics of polar bear (<i>Ursus maritimus</i>) diet: integrating historical museum collections and modern ecological data with stable isotope analyses to inform conservation and management.
Moran	Clinton	Biology	\$12,000	Storm impacts on habitat use in African pompano (<i>Alectis ciliaris</i>)
Sanders	John	Mechanical Engineering	\$12,000	More accurate weather predictions via symplectic integrators for the Navier-Stokes equations

- Publications, technical reports, undergraduate research projects, or conference proceedings per year. There was a total of 10 journal articles, 1 conference paper, and 6 presentations.

Journal Article

- Batouli, M. and D. Joshi, 2024: Pathways to socially sustainable adaptation: Real-time and context-specific vulnerability assessment in South Carolina after Hurricane Dorian. *Journal of Construction Engineering and Management*, 151(2), <https://doi.org/10.1061/JCEMD4.COENG-13722>.
- Becker, E.T., D. J. Inman, and J. W. Sanders, 2025: On the improved efficiency of higher-order dynamics for computing resonant frequencies. *Journal of Computational and Nonlinear Dynamics*, 20, <https://doi.org/10.1115/1.4067985>.
- Curtis, S., A. Guthrie, and E. Fish, 2025: Heat health height dependency in an urban environment. *Journal of Applied Meteorology and Climatology*, in press. Highlighted by AMS: <https://www.eurekalert.org/news-releases/1083538>.
- Doeffinger, T., 2025: Historical adaptation pathways: the case of Folly Beach, South Carolina, *Journal of Ocean and Coastal Management*, 261, <https://doi.org/10.1016.j.ocecoaman.2024.107490>.
- Doeffinger, T., and A.R. Siders, 2025: A proposed method for evaluating historical adaptation pathways of coupled natural-human systems, *Environmental Science and Policy*, 163, <https://doi.org/10.1016/j.envsci.2024.103969>.
- Gustafson, D. J., L. A. Dix, D. P. Webster, B. K. Scott, I. E. Gustafson, A. D. Farrell, and D. M. Koenemann, 2024: Phylogeography of *Coccoloba uvifera* (Polygonaceae) samples across the Caribbean basin, *Diversity*, 16, <https://doi.org/10.3390/d16090562>.
- Mukherji, A., K. Williamson, K.N. Adeniji, M. Millea, S. Curtis, and B. Sardina, 2024: Buyouts in the Carolinas: Pre & post buyout perspectives of public officials and community leaders. *International Journal of Disaster Risk Reduction*, 113, doi:10.1016/j.ijdr.2024.104906.
- Mukherji, A., S. Curtis, J. Helgeson, J. Kruse, and A. Ghosh, 2024: Mitigating compound coastal water hazards in eastern North Carolina. *Journal of Environmental Planning and Management*, 67(8), 1852-1870, doi:10.1080/09640568.2023.2183112.
- Sanders, J. W., E. T. Becker, A. C. DeVoria, 2024: Extension of Hamiltonian mechanics to non-conservative systems via higher-order dynamics. *Journal of Vibration and Acoustics*, 146(6), <https://doi.org/10.1115/1.4067376>.

- Siders, A.R., J. Niemann-Morris, M. Hino, E. Shields, L. Cano Pecharroman, T.Doeffinger, L. Gerber-Chavez, J.-C. Huang, A. Lafferty, S. Tamima, C. Williams, A. Agopian, C.Samoray, and M.J.Mach, 2024: How local governments avoid floodplain development through consistent implementation of routine municipal ordinances, plans, and programs. *Oxford Open Climate Change*, 4(1), https://doi.org/10.1093/oxfclm/kgae017_2634-4068.

Conference Proceeding

- Ghanat, S. T., and S. Curtis, 2025: Infusing Climate Concepts into Geotechnical Engineering Lessons, Paper presented at 2025 ASEE Southeast Conference, Mississippi State University, Mississippi. 10.18260/1-2-54179.

Presentation

- Angela, *Effect of linker length and linker density on enzyme attachment to magnetic nanoparticles*, American Chemical Society Spring Meeting, March 2025.
- Coulter, G., *Towards quantifying desorbed enzymes*, American Chemical Society Spring Meeting, March 2025.
- Fink, S., *Cellulase immobilized to iron magnetic nanoparticles (MNP): Enzyme stability due to function and group length*, American Chemical Society Spring Meeting, March 2025.
- Laws, G.M., K. Peebles, and C. Rocha, *Infection in unforeseen waters: The prevalence of *V.vulnificus* in tidal flooding waters on the Charleston Peninsula*, SC Branch of the American Society for Microbiology Spring Meeting, March 2025.
- Le-Vasicek, T., *Magnetic nanoparticle functional group density affects the performance of immobilized cellulase*, American Chemical Society Spring Meeting, March 2025.
- Owens, M., *Flood of attention: Hurricane Helene and voters in the South*, South Carolina Political Science Association Meeting, March 2025.

- Proposals for external funding per year. As of June 5, 2025, one proposal is pending and three funded.

Title	Citadel PI	Program	Funded?	Extent	Direct Funds	F&A
Graduate Certificate: Incorporating Climate and Uncertainty into Decision Making	Tess Doeffinger	Lowcountry Graduate Center	PENDING	8/1/2025-7/31/2026	\$24,365	\$0
Risks, Impacts, & Strategies for Coastal Communities (RISCC)	Scott Curtis	NSF EPSCoR/ College of Charleston	FUNDED	8/1/2024-7/31/2028	\$94,822 (\$6 million total)	\$21,359
A Surface Elevation Table for Education and Research Purposes at The Citadel	Scott Curtis	SECOORA (NOAA)	FUNDED	1/1/2025-12/31/2025	\$5,554	\$0
Educating Island Communities on Their Water-Related Risks	Tess Doeffinger	SC Sea Grant	FUNDED	2024-25	\$5,500	\$0

Takeaways

It was a successful year for climate research at The Citadel. Three proposals were funded totaling \$105,876 for The Citadel (the NSF EPSCoR grant's total funding was ~\$6 million). One proposal is pending, totaling \$24,365. Research was conducted and disseminated by many students and faculty. This year marks the highest number of journal articles published, demonstrating a return on five years of CRSG investment. Finally, the CRSG was endowed. We expect to grow the funds but are thankful to the Near family that "enhancing climate research at The Citadel" has a solid foundation.

Engagement & Industry

- Objective 6.2 Action Item: "Develop a symposium series on relevant climate topics"
 - The NCCS Advisory Board is helping to identify speakers for Fall 2025. Dr. Brandon Emery has offered to present on the Physicians Climate Action Network.
- Objective 6.2 Action Item: "Develop a summer camp on climate information and communication"
 - While not a summer camp, the NCCS is planning for a Climate Awareness Engagement Academy for small businesses, funded through SC Sea Grant Consortium, in the winter of 2025-26.

- Over the summer of 2024 there was a 2-day student learning experience geared towards civil engineers. Strengthening Hope through Oceanfront and Coastal Engineers (SHORES) brought together students from The Citadel, Trident Tech, Clemson, and Coastal Carolina to learn about climate science and climate adaptation, cultivate knowledge of the natural history and landscape of Charleston, meet and engage with engineers from SC companies, and view and discuss climate adaptation projects. The NCCS participated and the director gave remarks on climate science and adaptation and Dr. Doeffinger summarized her work on the history of Folly Beach renourishment projects.
- Objective 6.2 Action Item: “Increase funding for operational support, particularly for Climate-related research”
 - The NCCS received funding from the Southeast Coastal Ocean Observing Regional Association (SECOORA) to install a Surface Elevation Table (SET). Charleston is a region of rapid growth and development with a new Water Plan that contains a variety of engineering projects for conveying water and alleviating flood risk on the peninsula. Habitation of the peninsula is in jeopardy without raised edges (battery expansion) bordering most of the peninsula, but not The Citadel. West Ashley will also undergo transformations at the water’s edge. A SET station will help monitor the response of the marshes to community adaptation adjacent to the Ashley River. The SET in conjunction with the tide gauge and the weather station will be a great research and teaching opportunity in the event of storms and sea level change.
 - 2024-25 marked Dr. Tess Doeffinger’s first year as Senior Climate Fellow. She was a PI on a SC Sea Grant project, advanced strategic partnerships by editing and reviewing for international journals, was an integral part of SHORES, and held a position on SC Sea Grant Consortium’s Coastal Resilience Program. Dr. Doeffinger also published three papers. Finally, she extended the reach of the NCCS through surveying Climate Fellows about their needs, organizing the bi-monthly brown bag lunches, reviewing grant applications for the CRSG, starting a list of climate related courses, updating the NCCS web site, and leading an effort with Sister Cities International to develop a forum on port city climate resiliency. Her service to the NCCS was exemplary and she was reappointed for the 2025-26 academic year.



- The Center continues to be used in a variety of ways:
 - Richland County District 2 ALERT Program: Wind and Turbines Activity
 - Fall and Spring Climate Fellows Meetings, Advisory Board Meetings, and Executive Committee Meetings
 - Physics Research Experience for High School Students
 - Accepted Students Day
- The NCCS Director and Senior Climate Fellow are engaged with many resiliency efforts in the region
 - Dr. Doeffinger: Board of Advisors for the SC Sea Grant Consortium's Coastal Resilience Program
 - Dr. Curtis: Regional Stakeholder Committee for The Nature Conservancy Coastal Resilience Implementation Plan
 - Dr. Curtis: Advisory Committee for the Berkeley-Charleston-Dorchester Council of Governments Comprehensive Climate Action Plan
 - Dr. Curtis: Charleston County Resiliency and Sustainability Advisory Committee
 - Dr. Curtis: Advisory Committee, National Sea Grant Coastal Resilience DoD Liaison
- The NCCS updated its URL and web site structure and hosts the Lowcountry Heat Action Plan Toolkit - a collaborative effort among many state environmental leaders.
 - <https://www.citadel.edu/ssm/climate-center/>
 - <https://www.citadel.edu/ssm/climate-center/lowcountry-heat-action-plan-toolkit/>
 - This has generated press in the Post and Courier and Channel 2 News. Since posting at the beginning of May, the page has been visited 2,113 times.

Takeaways

The NCCS is making progress increasing operational support financially and with the addition of new equipment, staff, and partners.

BUDGET

Budget Category	Amount Spent	Comments
Personnel/labor	\$13,257	Directorship stipend plus fringe
	\$44,066	Director salary plus fringe
Operations	\$853.47	Operational expenses
	\$442.27	Annual speaker/panel
	\$36,000	CRSG

GOALS & CHALLENGES

- **Administration and Communication**

The addition of a Senior Climate Fellow with 25% of her time dedicated to the NCCS has alleviated some of the responsibilities falling on the director. However, administrative assistance is still lacking. Currently the Center is partially supported by the Dean of the Swain Family School of Science and Mathematics' office and the Department of Physics' office, but a dedicated staff assistant would benefit NCCS in several ways:

- Keeping records of revenues and budgetary expenses
- Engaging with TCF in managing proposals, grants, and gifts
- Gathering data from Climate Fellows
- Communicating important NCCS meetings and events to Fellows and the larger Citadel community
- Working with OCM to promote NCCS successes and connect with alumni (through press releases, newsletters, and an up-to-date website)

This fits into strategic plan: "increase operational support".

APPENDICES

- [Appendix A](#)

Minutes of 7 November 2024 Advisory Board Meeting of the Near Center for Climate Studies (NCCS)

Date: 8 Jan 2025

Members Present in Person: Scott Curtis (Director), Fred Holland (Advisory Board Chair), Mike Johns, Chris Mack, Susan Lovelace, Tim Smith, Debra Hernandez, and Tess Doeffinger.

Members Present by Zoom: David Johnston, Brandon Emery, Allison Love, Geoff Scott, Kevin Cooley

Members Absent: Kirstin Dow, Hope Mizzell, Will Grimsley, and Paul Sandifer.

Guests Present: Darin Zimmerman (Dean of SFSSM)

Prepared by: Fred Holland (Chairperson, Advisory Board) & Scott Curtis (Director, NCCS)

Caveats: The Board members on Zoom could not be heard adequately by those in The Climate Center. Also, some discussion in the back of the room was not picked up by those on Zoom. Thus, the minutes may be incomplete. Curtis will work on the technology but encourages in-person attendance.

Welcome: Scott Curtis and Fred Holland welcomed Advisory Board members to the fall meeting and stated that a major objective of the meeting was to: (1) identify overlaps in the Charters for Coastal Environment & Infrastructure, National Security, and Human Health & Well-being; (2) identify connections between the charters and strategic planning activities; and (3) identify action items

Introduction: Scott Curtis introduced Tess Doeffinger (Assistant Professor, Citadel Civil, Environmental & Construction Engineering). Tess provided a brief overview of her background and stated that her responsibilities included having an active role in NCCS including assisting NCCS with obtaining new funding sources, establishing partnerships with other organizations and institutions, and participating in strategic planning.

Coastal Environment & Infrastructure Charter: Fred Holland reported that in August 2024, Scott Curtis requested him to convene a committee to develop a draft charter for the Coastal Environment & Infrastructure focus area that included the Citadel Climate Monitoring & Assessment Program (CCMAP). This new charter should be concordant with the existing National Security and Human Health & Well-being charters. Advisory Board members that agreed to participate on the new Coastal Environment & Infrastructure Committee were Mike Johns, Susan Lovelace, Debra Hernandez, Chris Mack, Allen Clum, and Hope Mizzell.

The goal of the draft Coastal Environment & Infrastructure Charter is to guide NCCS in becoming a leader in supporting sustainability and resilience for the coastal environment and infrastructure (see Appendix 1). Key themes in the draft charter are:

- Informing cadets and others about the consequences of climate and extreme weather on human health, national security, and the coastal environment.
- Training cadets to measure, assess, and understand climate and extreme weather effects.
- Assessing climate and extreme weather impacts on The Citadel campus and adjacent environments.
- Seeking solutions that make The Citadel campus and associated environments sustainable and resilient to climate and extreme weather impacts.
- Reporting on Coastal Environment/NCCS activities and outcomes.

For each of the five objectives, the Coastal Environment & Infrastructure Charter identified example tasks that could be conducted. The tasks provided a useful tool that NCCS could use to prioritize and evaluate which activities could be conducted with the available resources.

National Security and Human Health & Well-being Charters: Brief summaries of the contents of the existing charters for the National Security and Human Health & Well-being thematic areas were provided by respective committee members. A consensus of Council members agreed these charters would benefit from the inclusion of example tasks. Curtis recommends a rewrite of charters so that objectives are the main focus and an appendix would include tasks. These charters are meant to be a living document that will be revised over time based on task completion or new avenues of research. Numerous Board members suggested that Climate Center Fellows should use the sample tasks as suggestions and opportunities for internal proposals.

***Action Item:** The National Security, Human Health & Well-being, and Coastal Environment & Infrastructure committees will review their draft charters and modify them to include example tasks.* Responsible Individuals: Committee Chairmen. Completion Date: By March 2025.

Summary of a Discussion of the Role of NCCS Faculty Fellows: The Advisory Board considered the Faculty Fellows to be an underutilized asset. If NCCS is to attain its potential as a regional Center of Excellence, Faculty Fellows must become more actively involved in all aspects NCCS activities. As many Faculty Fellows as possible should attend future NCCS Advisory Board meetings. Several Board members also suggested that a criterion for becoming a Faculty Fellow should include a commitment to incorporating knowledge about climate-related information into their classes. A portion of future Advisory Board meetings should also be allocated to Faculty Fellow progress reports that include information about their research activities as well as the climate-related information presented in their courses and received by students. In summary, the Advisory Board views the Faculty and Student Fellows as important NCCS staff that should be involved in as many NCCS activities as possible.

***Action Item:** A meeting of Faculty Fellows should be convened to identify their concerns and to discuss how they can contribute to the NCCS goals and mission.* Responsible Individual: NCCS Director. Proposed Completion Date: Before NCCS Spring Meetings.

State-of-Knowledge Assessment: Advisory Board members recommended that NCCS develop a State of Knowledge (SOK) review of existing climate-related resilience and sustainability efforts for coastal South Carolina as they relate to extreme weather events, flooding, sea level rise, and extreme temperatures. This review should incorporate information in existing documents prepared by local governmental organizations including the City of Charleston Water Plan, Beaufort County Long-term

Resilience Strategy, Hilton Head Island resilience planning efforts, Georgetown County Resilience Element as well as regional and national reviews by governmental agencies (e.g., USEPA, NOAA, SCDNR). The focus of the SOK would be to identify opportunities where NCCS could contribute to the resilience and sustainability of The Citadel campus and surrounding communities. The major audience for the SOK would be NCCS, The Citadel administration, Citadel faculty and students and the public of adjacent communities. The NCCS Director should plan and manage the SOK using Faculty and Student Fellows as the work force to develop it. Doeffinger is developing a research proposal that will bring these documents together by (1) collecting data on adaptation actions that are currently stored across state agencies, local governments, universities, non-profits etc., (2) surveying local governments and state agencies across the state to take stock of adaptation actions that have occurred or are ongoing, (3) incorporating climate data and risk reduction indicators, (4) and utilizing machine learning techniques to enable the database to be self-sustaining. NCCS Advisory Board could serve as the reviewer for the SOK.

Action Item: *NCCS should develop and publish a SOK report for climate-related resilience and sustainability efforts required to mitigate and adapt The Citadel Campus and surrounding communities to future climate, extreme weather, and sea level rise concerns.* Responsible Individual: NCCS Director and Senior Climate Fellow. Proposed Completion Date: Undecided

Overlaps & Synergies Among NCCS Focus Areas: The major areas of overlap identified by the Advisory Board among the National Security, Human Health & Well-being, and Coastal Environment & Infrastructure charters include:

- ***Increase Awareness of Climate and Extreme Weather Risks and Adaptation within the Corps of Cadets.*** The Citadel's mission is to educate and develop students to become principled leaders regardless of their field of study. Climate-related issues will affect every aspect of their lives from their health to national security to obtaining employment following graduation. For example, graduating engineering students that have not been trained in the complex adaptive and mitigating engineering approaches for resolving climate, extreme weather, and sea level rise risks will not be competitive in obtaining quality jobs. It is critical that the future leaders graduating from The Citadel become informed about the threats of a changing climate and how to adapt to it. The Advisory Board recommends NCCS pursue having Faculty Fellows infuse climate and extreme weather topics, including climate adaptation, into their existing courses in all disciplines (e.g., liberal arts, humanities, business, science and engineering). The nation requires principled leaders to assist in resolving climate issues of the 21st Century and The Citadel can have an important role in addressing this critical need. The Advisory Board also recognizes that adding a new course to address climate awareness issues to an already full curriculum will be difficult. However, development of a new interdisciplinary elective course to address climate awareness and adaptation should be a long-term goal.

Action Item: *NCCS Faculty Fellows should document how they are incorporating climate-related information in their classes. The NCCS Director should compile and summarize the information provided by the Faculty Fellows and present it to the Advisory Board at future meetings.* Responsible Individuals: NCCS Director and Faculty Fellows. Proposed Completion Date: Annually

Action Item: *NCCS should work with Faculty Fellows to develop an interdisciplinary climate-related elective course that could be taught in all of The Citadel's academic five Schools.*

Responsible Individual: NCCS Director and Faculty Fellows. Completion Date: To Be Determined.

- ***Climate-related Threats to Infrastructure.*** The Advisory Board identified climate-related threats to infrastructure, including but not limited to power plants and associated distribution grids, ports, military facilities, medical facilities, wastewater treatment facilities, freshwater supply, and transportation systems, as a major area of overlap for all focus areas and charters. Some of the more important adaptations and solutions to climate-related risks to infrastructure are or will be identified in the focus area charters.

Action Item: *NCCS should ensure that climate-related impacts are an important component of the National Security, Human Health & Well-being and Coastal Environment & Infrastructure charters.* Responsible Individual: NCCS Director. Completion Date: Spring 2025.

- ***Monitoring and Assessment.*** The Citadel campus is also a microcosm for training students to collect, compile, analyze, and interpret meteorological data to address questions related to national security, human health and well-being and the coastal environment and infrastructure.

Action Item: *NCCS should document progress toward planning and implementing the Citadel Climate Monitoring and Assessment Program.* Responsible Individual: NCCS Director. Completion Date: To Be Determined.

- ***Flooding and Extreme Heat.*** Charleston and the Citadel campus is a natural laboratory for evaluating adaptation to climate impacts. The campus and adjacent communities experience flooding associated with king tides and heavy rainfall as well as exposure to extreme heat and humidity. These conditions affect student health and day-to-day operations. The NCCS should document flooding and extreme heat events on the Citadel campus annually.

Action Item: *NCCS should ensure that flooding and extreme heat episodes that occur on The Citadel campus are documented and become an important element of planning and implementation of The Citadel Climate Monitoring and Assessment Program.* Responsible Individual: NCCS Director. Completion Date: To Be Determined.

Curtis also produced a matrix of overlap among the three charters shown below. The red falls under the category “identifying, analyzing, and packaging existing climate data”, the green falls under “Citadel climate monitoring”, the yellow falls under “developing recommendations”, and the blue under “increasing climate education”.

Coastal Environment and Infrastructure	Human Health and Wellbeing	National Security
Objective 1: Understand and Evaluate the Impacts of a Changing Climate on Coastal Ecosystems and Infrastructure.	Objective 1: Work with monitoring and assessment initiative to ensure that important health-relevant environmental parameters are included in the plan.	Objective 1: Develop and implement a cross-functional program of instruction focused on national security impacts of weather and climate
Objective 2: Conduct a climate and weather monitoring and assessment program for The Citadel campus.	Objective 2: Review monitoring results on an ongoing basis to flag any parameters that may of particular concern from a health and wellbeing perspective.	Objective 2: In coordination and collaboration with the Human Health and Wellbeing Committee efforts, identify and assess the climate and weather impacts on the effectiveness of armed forces training & operations
Objective 3: Identify the social and economic impacts of climate on the coastal zone.	Objective 3: Consider and suggest ways to enhance healthful characteristics of the Citadel's physical campus environment and surrounding neighborhoods.	Objective 3: Develop and implement a war gaming capability, using students, faculty and outside expertise to identify, analyze, and provide recommendations on real world challenges
Objective 4: Conduct a climate information transfer and outreach program.	Objective 4: Consider developing a clearinghouse for health-relevant and user-friendly global change information	Objective 4: Promote climate adaptation literacy across all academic curricula by adding climate examples
Objective 5: Report on NCCS activities relative to the Coastal Environment and Infrastructure Focus Area.	Objective 5: Develop recommendations for adaptive and mitigative measures to reduce impacts of climate change on health and wellbeing	Objective 5: Focus on climate and weather data analytics, gathering and analyzing data focused on national and DoD infrastructure

Strategic and Governance Committee: David Johnston (Chairman) questioned whether the existing NCCS committee structure is still appropriate. Most Advisory Board members agreed that we no longer required the Internship, Resources & Development, and Outreach & Engagement committees. Responsibilities of these committees become the responsibility of the National Security, Human Health & Well-being, Coastal Environment & Infrastructure, and Strategic and Governance committees.

David Johnston also noted that the several Board member's second term expires at the end of 2024 (Cooley, Dow, Holland, Johns, Johnston, Lovelace, Mizzell and Scott). These individuals should discuss reappointment with Scott Curtis if they desire to continue to be involved with NCCS as Advisory Board members. David also reported that the Strategic and Governance Committee was requesting nominations for new Board members. Brief biographies or resumes of potential nominees should be forwarded to Scott Curtis for review. Scott will vet the candidates and then provide a resumes/biography to the Committee for review and comment. Finally, the charter is intended to be reviewed every five years and the timing coheres with recommended changes to governance from the charter development process and meeting discussion (e.g. personnel, vision, and strategy). David suggested that the SGC review the current charter and make recommendations by the Spring meeting.

Action Item: *Advisory Board members seeking reappointment should discuss this issue with the NCCS Director as soon as possible.* Responsible Individuals: Completion Date: Before the Spring 2025 Advisory Board meeting.

Action Item: *Nominations of future NCCS Advisory Board members, including a brief resume or biography, should be forwarded to Scott Curtis as soon as possible.* Responsible Individual: All Advisory Board members. Completion Date: Before the Spring Advisory Board Meeting.

Action Item: *The current charter will be reviewed and recommendations for revisions compiled.* Responsible Individual: The Strategic and Governance Committee. Completion Date: Before the Spring Advisory Board Meeting.

Fellows Attending the Meeting: Three Climate Fellows were able to join the Advisory Board for lunch: Sergey Ponomarov (Associate Professor, Tommy and Victoria School of Business), Mark Owens (Assistant Professor of Political Science), and Gabriel Williams (Assistant Professor, Physics). They each gave a brief background and explained how they were contributing to the mission of the NCCS. Sergey and Mark remained behind after the Board meeting to discuss how they were infusing climate information into their classes.

NCCS Directors Report: During lunch Curtis and Doeffinger presented their highlights since the previous Board meeting

Curtis

- Discussed activities of the Climate Fellows – the spring 2024 meeting and Dr. Ghanat’s teacher workshop on infusing climate into the classroom
- Listed the activities that occurred in the Near Center
- Talked about the installation of the Davis Weather station and how the Boathouse weather station provided data during the April 2024 eclipse and is regularly used by Charleston NWS
- Highlighted resiliency conferences the NCCS was involved in and two key activities over the summer: SHORES experience and Heat research and outreach events.
- Listed the current external research projects that the NCCS is a part of and the three new Climatological Research Studies Grant awardees.
- Advertised for Dr. Dwayne Porter’s upcoming talk “Empowering Communities to ‘Use Data and Sound Science to Make Some Noise?’” and the Greater Issues talk with Dr. David Titley in April, 2025.

Doeffinger

- Discussed the project idea she is working on for eventual submission to a granting agency: South Carolina Climate Adaptation Knowledge Sharing Effort
- Relayed early conversations with Charleston Sister Cities International on a conference to be held in Charleston around the theme of climate or water security
- Reported that she hired a student through the SC Sea Grant Davidson Scholarship and that student will 1) work on the NCCS web site, 2) administer a survey to Climate Fellows to assess their needs, and 3) compile a comprehensive data base on climate-related courses across the college. Early survey results suggest that Climate Fellows are interested in more opportunities for collaboration and interdisciplinary research

APPENDIX 1

**Lt. Col. James B. Near, Jr., USAF, ’77 Center for Climate Studies (NCCS)
Advisory Board**

Coastal Environment and Infrastructure Charter

Prepared by:
Coastal Environment and Infrastructure Committee

Allan Clum, Debra Hernandez, Mike Johns, Susan Lovelace, Chris Mack, Hope Mizzell & Fred Holland

Introduction

Our coasts are highly populated and economically important regions. More than 40% of the U.S. population (128 million) live in the U. S. coastal zone (NOAA 2019). Many military bases, airports, power plants, oil refining facilities, and related infrastructure exist within the coastal zone including more than 60,000 miles of roads and bridges (Fleming et al. 2018). The goods and services produced along our coasts are valued at \$9.5 trillion annually supporting more than 58 million jobs (NOAA 2019). The U.S. coastal zone also contains diverse and productive ecosystems that provide natural beauty, pollutant processing, outdoor recreation, seafood, erosion control, and protection from storms and flooding. Rising temperatures, severe weather, tidal flooding, rising sea level, and saltwater intrusion represent a great risk to the infrastructure, human health, ecosystem health, and economic sustainability of the U. S. coasts.

More than 800 square miles of the South Carolina coast are less than 4 feet above the high tide line. Some \$24 billion in property value, and 54,000 homes – mostly in Charleston and Beaufort Counties – are in this area (Strauss et al. 2014). Approximately 1 in 6 homes are threatened by flooding in the city of Charleston, more than 1 in 4 on Hilton Head Island, and more than 1 in 2 on Edisto Island and in Folly Beach (Strauss et al. 2014).

In 1950, the City of Charleston experienced tidal flooding events roughly 2 days out of the year (total of 4 hours). By 2014, these flooding events increased to 25 days out of the year (total of 42 hours). The streets of Charleston are projected to experience 60 tidal flood event days a year, for a total of 103 hours of flooding, by 2051 (NCCOS 2020).

South Carolina has more than 1,200 miles of road below 4 feet above the mean high tide line, plus 13 schools; 33 houses of worship; and 76 EPA-listed sites such as hazardous waste dumps and sewage plants (Strauss et al. 2014). At 9 feet above the mean high tide line, these numbers increase to nearly 4,000 miles of road, plus 60 schools, 171 houses of worship, and more than 200 EPA-listed sites. More than 40 percent of the land and road miles on Parris Island, the major Marine Corps training center, are less than 4 feet above the high tide line.

As the U. S. and South Carolina coastal zone become hotter and coastal flooding becomes more severe, preexisting social inequities will be exacerbated. Poor communities which are frequently located in places likely to be impacted by flooding and heat stress will experience even greater flooding, storm surges, and exposure to temperatures and humidity that are a risk to human health. Individuals living in these communities, as well as many other coastal residents, will face the decision if, how, or when to relocate to more sustainable living space. The higher risks associated with living along the coast will also require coastal communities to develop policies and take actions to adapt to and mitigate to the impacts of a rapidly changing climate.

The mission of the Near Center for Climate Studies (NCCS) is to promote climate science through education, research, transition of research into operations, and community engagement. The scope of the Center's activities consists of the informing and assisting The Citadel community and the public to understand and respond to the impacts of Earth's changing climate on: (a) national security, (b) the coastal environment and infrastructure, and (c) human health and welfare. NCCS will also provide the communities it serves information about the actions coastal communities must take to adapt to and mitigate climate impacts.

This document is the NCCS *Charter for Climate Impacts on the Coastal Environment and Infrastructure*. In a sense, it is an outline for a work plan. The paragraphs below identify a goal for the Coastal Environment and Infrastructure thematic area and outline specific objectives that could be accomplished to successfully achieve this goal. Potential tasks are provided for each objective.

Goal: To assist and guide NCCS in becoming a leader in supporting sustainability and resiliency for the coastal environment and infrastructure.

Objective 1. Understand and Evaluate the Impacts of a Changing Climate on Coastal Ecosystems and Infrastructure.

Projected increases in sea level, increased storm surges, warmer ambient temperatures, and in the increases in the number and magnitude of extreme weather events will alter the kinds and abundance of living resources composing coastal ecosystems. These changes will adversely affect the free services coastal ecosystems provide humans including seafood supply, protection from storms, water purification, carbon sequestration, erosion control, recreational opportunities, tourism potential, and important habitats for marine life. The above changes in climate and weather will also place at risk the coastal infrastructure required for safe and sustainable human habitation including transportation systems, power generating facilities and their associated electrical grid, wastewater facilities, and freshwater supply.

Objective 1.1 Understand Climate Predictions and Forecasts. For Objective 1.1, NCCS seeks to guide, assist, and inform Citadel students, faculty, staff, alumni, and the public, especially those associated with nearby neighborhoods, about the consequences of climate and extreme weather impacts on the coastal environment and infrastructure. Examples of available tools NCCS could make available to these users include:

- https://sealevel.nasa.gov/data_tools/18
- <https://coast.noaa.gov/slr/>

Objective 1.2 Identify Faculty and Student Engagement Opportunities. The Center's approach for accomplishing Objective 1.2 is to collaborate and coordinate with organizations and agencies assessing and mitigating climate and extreme weather impacts on local and regional coastal ecosystems and infrastructure (e.g., State Climatology Office, SCDNR at Fort Johnson, NOAA's Hollings Marine Laboratory, South Carolina Sea Grant Consortium and its partners, State Office of Resilience, SC Department of Environmental Services, federal, state, and county transportation agencies, USACOE, Charleston Ports Authority, waste disposal facilities, water supply organizations regional academic institutions, and researchers). As a part of Objective 1.2, NCCSA will also seek to develop a collaboration with the Post and Courier's Rising Waters Lab. The purpose of this collaboration will be to inform the Rising Waters Lab about the Center and to provide the Rising Waters Lab access to relevant information and expertise of the Center including NCCS fellows, faculty, and students. The primary purpose of these collaborations will be to identify opportunities for Citadel students and faculty to become familiar with and engaged in relevant programs (e.g., student internships).

Objective 1.3 Expand NCCS Subject Matter Expertise. To accomplish Objective 1.3 NCCS will also seek include a representative of appropriate natural resource agencies as well as a representative an organization addressing climate impacts on coastal infrastructure to serve on the NCCS Advisory Board. In addition, the Center could host an on-campus seminar program about climate and weather

impacts to coastal ecosystems and infrastructure. These seminars should be open to interested students, faculty, alumni, and the interested public.

Objective 1.4 Identify Solutions to Climate Impacts. Informing Citadel students, faculty, staff, alumni, and neighboring communities about potential mitigation and adaptation approaches for addressing climate and weather impacts is the focus of Objective 1.4. A overview of approaches for addressing and mitigating the impacts of climate change on coastal ecosystems and infrastructure include:

- **Nature-based solutions:**
 - *Living shorelines:* Utilizing vegetation and oyster reefs to stabilize coastlines and protect against erosion, a major focus in South Carolina due to its extensive salt marshes.
 - *Dune restoration:* Protecting and rebuilding natural sand dunes to act as a barrier against storm surges.
 - *Wetland conservation:* Protecting existing wetlands and restoring degraded areas to absorb floodwaters and mitigate coastal erosion.
- **Land use management:**
 - *Smart development:* Planning coastal development to minimize impacts on natural ecosystems, including setbacks from the shoreline and clustered housing designs.
 - *Setback regulations:* Enforcing stricter building codes to prevent construction in high-risk flood zones.
 - *Green infrastructure:* Incorporating rain gardens and permeable pavements to manage stormwater runoff.
- **Infrastructure adaptation:**
 - *Elevation and relocation:* Raising existing structures or relocating critical infrastructure inland to accommodate rising sea levels.
 - *Flood protection systems:* Implementing floodwalls, levees, and storm surge barriers in strategic locations.
 - *Beach renourishment:* Regularly replenishing sand on beaches to maintain shoreline stability.
- **Climate change mitigation:**
 - *Renewable energy transition:* Investing in solar, wind, and other clean energy sources to reduce carbon emissions.
 - *Energy efficiency improvements:* Promoting energy-efficient building practices and appliance standards.
 - *Transportation planning:* Encouraging public transit, cycling, and walking to reduce vehicle emissions.

Examples of specific tasks that NCCS could conduct for Objective 1 are listed below:

- Task 1: Recruit a representative from a local/regional natural resource management agency to serve on the CAB. Responsible individual(s): Scott Curtis. Completion date: Completed.
- Task 2: Recruit a representative from an organization responsible for assessing and mitigating flooding on coastal infrastructure to serve on the NCCS Advisory Board. Responsible individual(s): Scott Curtis. Completion Status: Completed.

- Task 3: Assist the NCCS in hosting a seminar on the impacts of a changing climate on southeastern coastal ecosystems by a SC natural resource management agency representative. Responsible individual(s): TBD. Completion date: TBD.
- Task 4: Assist the NCCS in hosting a seminar on the impacts of a changing climate on coastal infrastructure by a representative from an organization addressing coastal flooding impacts on infrastructure. Responsible individual(s): TBD. Completion Status: TBD.
- Task 5: NCCS Faculty Fellows could be encouraged to incorporate information about climate and weather impacts on the coastal environment and infrastructure and solution for mitigating and adapting to these impacts as part of the courses they are responsible for teaching.
- Task 6: An interested SFSSM faculty member or NCCS Faculty Fellow could be encouraged to lead development of a General Education elective course on climate change and its consequences to ecosystems and human health and well-being. The primary goal of this effort would be to develop a course that could be taught in any of The Citadel's five Schools (Science & Mathematics, Engineering, Humanities & Social Sciences, Education, Business). Course content could be delivered from the perspective of the School/Department offering the course. Responsible individual(s): TBD. Completion date: TBD.
- Task 7: Plan and convene a workshop with NCCS collaborators, students, NCCS Advisory Board, and interested faculty to develop a brief (3-4 page) document providing a synthesis of the impacts of rising temperature, extreme weather events, and climate on the coastal environment and infrastructure adjacent to The Citadel campus including approaches for adapting to mitigating these impacts. Responsible individual(s): TBD. Completion date: TBD.
- Task 8: Work with local stakeholders to identify grant opportunities to increase infrastructure resiliency and/or access the impacts of climate change on infrastructure including water, wastewater, and septic tank infrastructure in the Lowcountry. Responsible individual(s): TBD. Completion Status: TBD.
- Task 9: Coordinate with the Human Health Committee on the many linkages between public health and the coastal environment. Responsible individual(s): TBD. Completion Status: TBD

Objective 2. Conduct a climate and weather monitoring and assessment program for The Citadel Campus.

Climate and weather monitoring involves collecting direct measurements or indicators of climate and weather conditions, such as temperature, rainfall, humidity, wind speed and direction, tidal height, water temperature, and salinity at specific locations. Objective 3 focuses on gathering meteorological and related water quality data from the Citadel Campus to establish a baseline dataset for analysis while exploring opportunities to install a more robust monitoring station. Over time, this data will be compared to similar data from other local, regional, and national climate/weather monitoring sites to assess spatial patterns and trends in climate and weather.

Examples of activities NCCS could conduct as part of Objective 2 are listed below.

- Task 10: Recruit faculty "champion(s)" to provide leadership and mentor the team of cadets, faculty, NCCS Advisory Board members, and alumni required to plan and implement the Citadel Climate

Monitoring and Assessment Program (CCMAP). The CCMAP plan should include a schedule, a list of program needs, preliminary budget. It can be used to develop proposals from sources such as The Citadel Foundation, SC Sea Grant, NOAA, NSF, NIH. Responsible individuals: Scott Curtis. Completion Status: Partially completed, January 2024.

- Task 11: Plan a long-term climate monitoring and assessment program for the Citadel campus to: (1) increase awareness among cadets, faculty, and administration awareness about the consequences of a changing climate on the health and well-being of students and staff, (2) document weather conditions and climate related flooding effects on campus infrastructure, and (3) provide data for developing future operational policies such as determining the best times and locations for physical training and drill. Responsible individuals: Scott Curtis, Faculty Champion(s), student and faculty fellows. Completion Status: Scheduled for January 2025.
- Task 12: Initiate a long-term climate monitoring program for meteorological, water and air quality, biological, human exposure, air temperature/humidity, and tidal and stormwater flooding indicators on The Citadel campus to establish a current climate and weather baseline. This information could in the future be used to assess trends and forecast the impacts of climate-related variables for the Citadel Campus. Responsible individuals: Scott Curtis, Tess Doeffinger. Completion Status: June 2025
- Task 13: Collaborate with the SC Geological Survey and SCDNR to install a Surface Elevation Table (SET) in a salt marsh adjacent to The Citadel campus. Students from the Citadel School of Engineering could be responsible for making the elevation measurements at the SET station. Responsible individuals: Scott Curtis, Tess Doeffinger. Completion Status: TBD.
- Task 14: Establish relationships with local and regional organizations monitoring weather and climate, such as the SC Climate Office, Southeast Coastal Ocean Observing Regional Association (SECOORA), and the SC National Estuarine Research Reserves. These collaborations could provide a pathway for linking CCMAP monitoring data with other local and regional-scale meteorological, air and water quality, tidal height, human exposure, air temperature/humidity, SET, and tidal and stormwater flooding data. This task could provide a basis for teaching students the logistics, data capture, and assessment tools required to assess status and trends for climate-related variables on The Citadel campus. Responsible individuals: TBD. Completion Status: TBD.
- Task 15: Partner with SECOORA to make the CCMAP data broadly available by: (1) developing necessary metadata for all meteorological and physical water data, as well as SET station information, and (2) publishing/hosting the data on portal.secoora.org for broad public access. Data in the portal meet federal data standards and are archived with the NOAA's National Center for Environmental Information (NCEI). Responsible individuals: TBD. Completion Status: TBD.
- Task 16: Create a [custom data view](#) to showcase multiple data sets from CCMAP to use for highlighting the value of the CCMAP monitoring effort. Responsible individuals: TBD. Completion Status: TBD.
- Task 17: Host a webinar describing utilizing the SECOORA data portal. Responsible individuals: TBD. Completion Status: TBD.

Objective 3. Identify the social and economic impacts of climate on the coastal zone.

As discussed above, climate impacts on the coastal zone threaten property values, public health and well-being, and coastal industries. Understanding the vulnerabilities of coastal communities and their

economies to potential climate risks is key to enabling these communities to take actions required to become more resilient and sustainable.

NCCS's approach for addressing Objective 3 is collaboration with Coastal Zone Management agencies responsible for evaluating and mitigating social and economic impacts of climate including resilience and sustainability (e.g., SC Sea Grant Consortium, NOAA, SCDNR, SCDES, Charleston Office of Resilience and Sustainability). The main purpose of this activity is to identify opportunities for students and faculty to become familiar with and participate in relevant Objective 3 activities. The initial geographic scope of this effort will be the South Carolina Low Country.

NCCS will seek to include a representative of an appropriate agency evaluating the social and economic impacts of a changing climate on the coastal zone to participate on the NCCS Advisory Board. In addition, NCCS could host an on-campus seminar by a local/regional expert related to social and economic impacts of climate. The seminar will be open to interested students, faculty, alumni, and the public.

Examples of specific tasks that NCCS could conduct for Objective 3 are listed below:

- Task 18: Recruit a representative from an organization responsible for evaluating and mitigating social and economic impacts of climate on coastal communities including resilience and sustainability to serve on the NCCS Advisory Board. Responsible individual(s): Scott Curtis. Completion date: Completed.
- Task 19: Assist the NCCS in hosting a seminar on social and economic impacts of a changing climate including adaptation and mitigation strategies for ensuring sustainability and resilience. Responsible individual(s): TBD. Completion Status: TBD.

Objective 4. Conduct a climate information transfer and outreach program.

Knowledge about climate and weather events will assist society and the Citadel Community, in understanding and addressing the consequences of a warming planet on humans, ecosystems, businesses, and the economy. This knowledge will also encourage everyone it reaches to change their behavior and seek to develop more resilient and sustainable coastal communities.

The NCCS's approach for Objective 4 could be to develop a mutually beneficial relationship/agreement with the SCSGC to ensure climate information is understood, accepted, and acted upon by the Citadel community (e.g., students, faculty, and staff) as well as by neighboring Low Country communities. This objective could include to the degree practicable, incorporation of relevant climate information into the academic curriculum (See Task 5 & 6 above). NCCS will attempt to include a representative of SCSGC on the NCCS Advisory Board.

Examples of specific tasks that NCCS could conduct for Objective 4 are listed below:

- Task 20: Recruit a Greater Issues Speaker on Climate Change to provide an address to all cadets. Responsible individual(s): Scott Curtis & Fred Holland. Completion date: Partially completed. Presentation scheduled for April 2025.

- Task 21: Recruit campus wide speakers on Climate Change Impacts and Human Health and Climate Change Impacts the Coastal Environment and Infrastructure. Responsible individual(s): TBD. Completion date: TBD.
- Task 22: Recruit a representative from SCSGC to serve on the NCCS Advisory Board. Responsible individual(s): Scott Curtis. Completion Status: Completed.
- Task 23: Assist the NCCS in hosting a seminar on role of SCSGC in information transfer and outreach efforts related to a changing climate. Responsible individual(s): TBD. Completion Status: TBD.

Objective 5. Report on NCCS activities relative to the Coastal Environment and Infrastructure Focus Area.

The annual accomplishments and activities of the NCCS Coastal Environment and Infrastructure committee relative to Objectives 1-4 will be summarized and incorporated into the NCCS Annual Report.

Examples of specific tasks that NCCS could conduct for Objective 4 are listed below:

- Task 24: Collaborate with the NCCS Director on development of the NCCS Annual Report. Responsible Individual(s); Scott Curtis and NCCS Committee Chairs. Completion Date: Annually.
- Task 25: In collaboration with the Human Health and National Security Committees, plan and convene an internal workshop with NCCS faculty and student fellows to create a state-of-knowledge brochure for public consumption on climate impacts on the coastal environment and infrastructure, human health, and national security and approaches to mitigate those impacts. Responsible individual(s): TBD. Completion Status: TBD.

Key References:

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**Minutes of 20 March 2025 Advisory Board Meeting of the Near Center for Climate Studies
(NCCS)**

Date: 28 April 2025

Members Present: Scott Curtis (Director), Fred Holland (Advisory Board Chair), Mike Johns, Paul Sandifer, Susan Lovelace, Kevin Cooley, Brandon Emery, Hope Mizzell, Tess Doeffinger and Darin Zimmerman (Dean, SFSSM).

Members Present by Zoom: Tim Smith, David Johnston, Allison Love, and Geoff Scott,

Members Absent: Allan Clum, Debra Hernandez, Will Grimsley, and Chris Mack.

Guests Present: Dana Norton (NCCS Fellow)

Prepared by: Fred Holland (Chairperson, Advisory Board) & Scott Curtis (Director, NCCS)

Welcome: Dean Zimmerman welcomed the Advisory Board members to the spring meeting, expressing gratitude for their ongoing support of the Near Center for Climate Studies (NCCS). He highlighted Jim Near's vision of centering NCCS activities around student education and training in climate science. Dean Zimmerman emphasized that student training and education form the core mission of both the Swain Family School of Science and Mathematics (SFSSM) and The Citadel.

Upcoming Event: Dean Zimmerman reminded the Advisory Board about the upcoming Greater Issues Lecture scheduled for April 3, 2025, featuring Rear Admiral David Titley (Retired). The lecture, titled "**Climate Change & National Security: Facts, Fictions, and Fantasies,**" aims to address critical issues at the intersection of climate change and national security. Advisory Board members interested in attending the lecture and/or the breakfast with Rear Admiral Titley should contact Scott Curtis by **Wednesday, March 25**.

Personal Updates: Dr. Susan Lovelace (Advisory Board member) plans to retire as the Executive Director of the South Carolina Sea Grant Consortium in fall 2025. Dean Zimmerman has been appointed as the Chairman of the Selection Committee to find her successor. Additionally, Kevin Cooley (Advisory Board member) is also set to retire in September 2025.

Funding Update: NCCS has received additional funding for from the Near Family for \$527,000 along with an additional \$50,000 from his sister in honor of her 70th birthday. This funding will be used to assist in endowing the NCCS competitive grants program and to support operational expenses.

Advisory Meeting Goals: Scott Curtis and Fred Holland initiated the business segment of the spring meeting, outlining three primary objectives:

- **Review the final versions of the Charters** for Coastal Environment & Infrastructure, National Security, and Human Health & Well-being, identifying overlaps and action items.
- **Identify, discuss and request recommendations** for the required five-year review of the NCCS Charter.
- **Identify candidate Advisory Board members** to replace members rotating off the Board.

Coastal Environment & Infrastructure Charter (CEIC) Overview: Fred Holland (CEIC Chair) provided an overview of the CEIC, which aims to guide NCCS in promoting sustainability and resilience in coastal environments and infrastructure.

Key opportunities and tasks identified by CEIC included:

1. **Informing stakeholders** about the impacts of climate change and extreme weather on human health, national security, and coastal environments.
2. **Training cadets** to measure, assess, and comprehend climate and extreme weather phenomena.
3. **Assessing climate impacts on The Citadel campus** and nearby environments, including identifying potential risks.
4. **Identifying sustainable solutions** that enhance resilience against climate and extreme weather impacts for The Citadel Campus.
5. **Reporting on CEIC** activities and outcomes to NCCS.

The CEIC identified the following priority areas of concern:

1. **Encouraging NCCS Fellows to integrate climate awareness into their courses**, along with maintaining a database of this information.
2. **Hosting seminars and lectures** on the effects of climate and extreme weather events, such as flooding, on military, commercial, public, economic, and natural resource management sectors.
3. **Planning and conducting a campus-based climate monitoring program**, including the installation of a marsh surface elevation table to assess climate impacts on The Citadel campus and training cadets in data measurement, analysis, and modeling.

This structured approach will ensure that NCCS remains focused on its mission while addressing the critical challenges posed by climate change and extreme weather

Human Health & Well-being Charter (HHWC) Overview: Paul Sandifer (HHWC Chair) provided an overview of the Human Health & Well-being Charter (HHWC), which aims to identify and assess both global and local climate-related environmental factors that significantly impact the health and well-being of The Citadel community and its surrounding neighbors, friends, and associates.

The HHWC identified several key opportunities and tasks:

1. **Collaboration with the Climate Monitoring and Assessment Initiative:** Ensure that essential health-relevant environmental parameters are included in the climate monitoring plan.
2. **Enhancing Sustainability:** Suggest strategies to improve the sustainability of The Citadel's physical campus and nearby neighborhoods such as implementing nature-based methods for shoreline protection and erosion control, adapting to sea level rise, and reducing exposure of students and staff to heat stress and potentially harmful microbes in floodwaters.
3. **Developing a Clearinghouse:** Create a user-friendly clearinghouse for climate and extreme weather information relevant to human health. This resource could benefit The Citadel, its students, faculty, friends, and other interested parties and may serve as a project for NCCS student fellows.
4. **Recommendations for Adaptive Measures:** Formulate recommendations for adaptive and mitigative measures to lessen the impacts of climate and extreme weather on the health and well-being of students, faculty, and the broader community.

The HHWC identified the following priority areas of concern:

1. **Linking Climate Data to Human Health:** Ensure that climate monitoring and assessment data include parameters that connect pollution and microbes to infectious diseases.
2. **Utilizing The Citadel Master Plan:** Evaluate the design of The Citadel campus using the Master Plan to identify strategies for mitigating the impacts of climate and extreme weather on human health and the environment.
3. **Focused Assessment:** Initially assess the impacts of climate and extreme weather on The Citadel campus, then expand the evaluation to adjacent communities in concentric circles.
4. **Seminar Series:** Sponsor a seminar series aimed at educating students, faculty, and neighboring communities about the effects of climate and extreme weather on human health, well-being, coastal environments, infrastructure, and national security.

By following these strategies, the HHWC seeks to promote a healthier and more resilient community in the face of climate challenges.

National Security Charter (NSC) Overview: David Johnston (Chair of NSC) provided an overview of the NSC, highlighting major opportunities and tasks aimed at addressing the intersection of climate, weather, and national security.

The NSC identified several key opportunities and tasks:

1. **Interdisciplinary Program Implementation:** Develop an inter-departmental, interdisciplinary program of instruction focused on the impacts of climate and weather on national security, the coastal environment, infrastructure, and human health and well-being.
2. **Collaboration with HHWC:** Identify and assess how climate and weather affect the readiness and effectiveness of armed forces training and operations.
3. **War Gaming Capability:** Establish and implement a war gaming capability utilizing students, faculty, and external experts to identify, analyze, and propose solutions for “real-world” challenges posed by climate and extreme weather on national security.
4. **Climate Adaptation Literacy:** Promote climate adaptation literacy by incorporating climate and weather case studies into the academic curriculum.
5. **Data Analytics Involvement:** Engage NCCS in climate and weather data analytics, focusing on gathering and analyzing data relevant to national and Department of Defense (DoD) infrastructure, which can also apply to other entities like ports, utilities, coastal environments, and transportation infrastructure.

The NSC has prioritized the following initiatives:

1. **Simulated Exercise:** Conduct a discussion-based “tabletop” exercise to explore the roles, responsibilities, and actions needed to adapt to a hypothetical climate-related national crisis.
2. **Internship Engagement:** Facilitate internships for cadets and graduate students that focus on adaptation strategies related to climate and extreme weather events.
3. **Curriculum Integration:** Integrate climate science into the curriculum through tailored modules or a summer workshop experience.

The Advisory Board discussion emphasized that the purpose of the “tabletop” exercise should be to:

- **Identify the strengths and weaknesses** of existing plans and operational activities.
- **Improve coordination** among stakeholders.
- **Enhance preparedness** for climate-related national security challenges.

Advisory suggestions for the “Tabletop” Exercise:

1. **Facilitation by Experts:** Use a climate expert affiliated with NCCS, such as Tim Smith (Advisory Board member), to facilitate the exercise.
2. **Relevant Topics:** Choose a topic for the tabletop exercise that is pertinent to NCCS and The Citadel, encompassing national security, human health and well-being, and coastal environment and infrastructure.
3. **Stakeholder Involvement:** Engage students, NCCS fellows, and local experts, including representatives from the SC Port Authority, US Army Corps of Engineers, natural resource managers, the National Guard, the SC Office of Resiliency, and community leaders, as possible.

Overlaps & Synergies Among NCCS Focus Areas: The Advisory Board identified areas of overlap among the NSC, HHWC, and CEIC:

1. **Increase Awareness of Climate and Extreme Weather Risks and Solutions within the Corps of Cadets.** The Citadel's mission is to educate and develop students into principled leaders in their fields of study. Climate-related issues will impact all aspects of their lives, including human and ecosystem health, national security, and future employment. It is essential that future leaders graduating from The Citadel understand the threats posed by a changing climate and how to adapt to them effectively. The Advisory Board recommends that NCCS require Faculty Fellows integrate climate and extreme weather topics, including climate adaptation, into their existing courses across all disciplines (e.g., liberal arts, humanities, business, science, and engineering).

Action Item: NCCS Faculty Fellows should document how they are incorporating climate-related information into their classes. The NCCS Director will compile and summarize this information and present it to the Advisory Board annually. Responsible Individuals: NCCS Director and Faculty Fellows: Proposed Completion Date: Annually

2. **Climate related Threats to Infrastructure:** The Advisory Board recognized climate-related threats to infrastructure—such as power plants, distribution grids, ports, military facilities, medical facilities, wastewater treatment plants, freshwater supply, and transportation systems—as a significant area of overlap for all focus areas and charters.

Action Item: NCCS should ensure that climate-related impacts are a key component of the NSC, HHWC, and CEIC charters. Responsible Individual: NCCS Director. Completion Date: Partially completed.

3. **Monitoring and Assessment:** The Citadel campus serves as a microcosm for training students to collect, compile, analyze, and interpret climate and meteorological data. This training addresses critical questions related to national security, human health and well-being, and the coastal environment and infrastructure.

Action Item: NCCS should document progress toward planning and implementing the Citadel Climate Monitoring and Assessment Program. Responsible Individual: NCCS Director. Completion Date: To Be Determined

4. **Exposures to Extreme Heat and Flooding:** Charleston and The Citadel campus provide a natural laboratory for evaluating adaptation strategies related to climate impacts, particularly flooding and exposure to extreme heat. The campus and surrounding communities face flooding due to king tides and heavy rainfall, along with extreme heat and humidity during warm seasons. These conditions significantly affect student health and daily operations.

Action Item: *NCCS should ensure that instances of flooding and extreme heat on The Citadel campus are documented and integrated into the planning and implementation of The Citadel Climate Monitoring and Assessment Program. Responsible Individual: NCCS Director. Completion Date: To Be Determined*

Overlap Summary: By addressing these overlaps and synergies, the NCCS can enhance its effectiveness in preparing future leaders to navigate the challenges posed by climate change.

Review NCCS Charter: David Johnston (Chairman of Strategic and Governance Committee) indicated that the Advisory Board is required to review the NCCS Charter every five years. At this time the Advisory Board may propose recommendations and changes to the NCCS Charter, which must be approved by a majority vote of both the NCCS Executive Committee and the Advisory Board. During the discussion period, the following potential modifications to the NCCS Charter were identified:

1. Increase the responsibilities of NCCS Faculty Fellows including requiring that they incorporate climate science into their courses and take a more active role in NCCS activities.
2. Direct NCCS competitive research towards the opportunities and tasks identified in the focus area charters.
3. Establish a new category for Advisory Board emeritus membership.

Action Item: *Advisory Board members are requested to submit proposed changes to the NCCS Charter to David Johnston (cc: Scott Curtis) by **30 June 2025**. The Strategic and Governance Committee will review and compile these proposals for presentation to the Advisory Board and Executive Committee for approval.*

Identification of NCCS Members: The terms of some current Advisory Board members are expiring, and some members have indicated they are not able to continue serving. The SGC needs to develop a list of potential new members to replace current members who will rotate off the board.

Action Item: *Standing committee chairs should reach out to their membership to gather names, biographies/resumes, and contact information for potential new NCCS Advisory Board members. This information should be forwarded to David Johnston and Scott Curtis by **30 June 2025**. The SGC will compile a list of proposed new members, including their biographies/resumes, for review and discussion at the fall NCCS Advisory Board Meeting.*

NCCS Directors Report: Scott Curtis (NCCS Director) updated the Advisory Board on Center activities. Highlights of the presentation were

- Review of the Spring semester brown bag series, times set aside for Climate Fellows to meet in the Climate Center for casual conversation about funding, research, and teaching. In one session College of Charleston Masters students described the Adopt-A-Stream program
- Reminder of Admiral Titley's Greater Issues speech and opportunity to pose questions. Three draft questions were presented for discussion

- Status of the NCCS web page, which was updated and redesigned. The landing page is now more easily found on Google.
- Announcement of the additional funding mentioned by Dean Zimmerman, two pending grant proposals, and the funded Surface Elevation Table Station for Education and Research Purposes at The Citadel
- Plans for the 2025 (2026?) Port Cities Climate Resiliency Forum
- Link to The Citadel Foundation NCCS donation page

Unfinished Business: State-of-Knowledge Assessment: At the Fall 2024 meeting, Advisory Board members recommended that NCCS develop a State of Knowledge (SOK) review of existing climate-related resilience and sustainability efforts for coastal South Carolina. The SOK should focus on climate impacts, extreme weather events, flooding, sea level rise, and extreme temperatures and should incorporate information in existing documents prepared by local governmental organizations including the City of Charleston Water Plan, Beaufort County Long-term Resilience Strategy, Hilton Head Island resilience planning efforts, Georgetown County Resilience Element as well as regional and national reviews by governmental agencies (e.g., USEPA, NOAA, SCDNR). The goal of the SOK would be to identify opportunities where NCCS could contribute to the resilience and sustainability of The Citadel campus and surrounding communities. The major audience for the SOK would be NCCS, The Citadel administration, Citadel faculty and students and the public of adjacent communities. The Faculty and Student NCCS Fellows should plan and manage the SOK with the NCCS Director. The NCCS Advisory Board could serve as the reviewer for the SOK.

***Action Item:** Progress on development of a State-of-Knowledge Report was not discussed at the Spring 2025 meeting. NCCS and the Advisory Board should determine if this report is still a priority activity for NCCS. Responsible Individual: NCCS Director. Proposed Completion Date: Undecided*