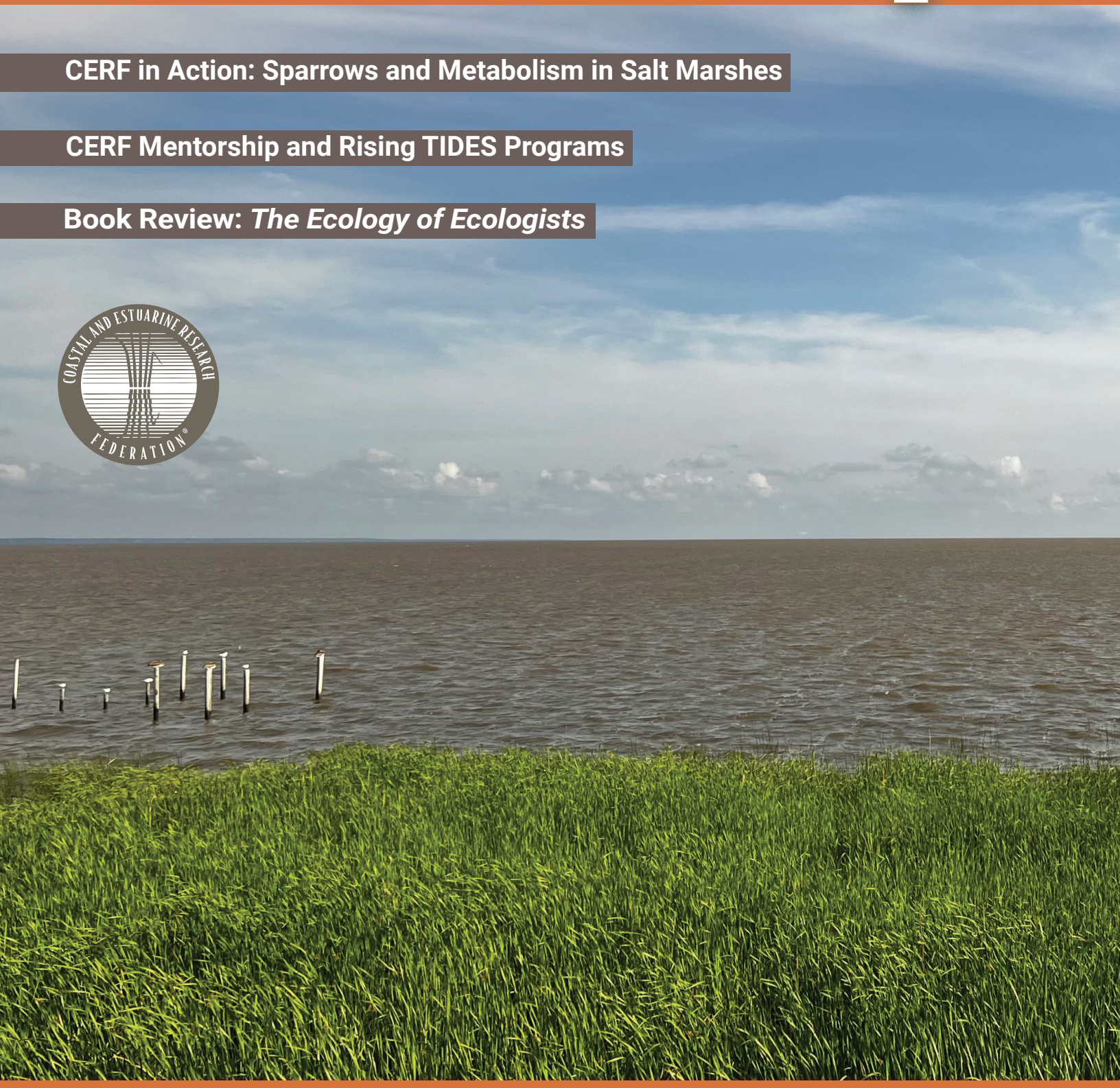
CERF's Up!

Volume 52 • Number 2 • June 2026

CERF in Action: Sparrows and Metabolism in Salt Marshes

CERF Mentorship and Rising TIDES Programs

Book Review: *The Ecology of Ecologists*



A new wave of information from the Coastal and Estuarine Research Federation

CERF's Up!

Volume 52 • Number 2 • June 2026

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Front Cover: Spanish Fort, Mobile Bay, Alabama, USA Photo: Kelly Samek

Back Cover: Mangemangeroa Reserve, Auckland, New Zealand Photo: Greg Nunes

Call for Cover Photos for *CERF's Up!*

Would you like to see your favorite estuary displayed on the cover of *CERF's Up!*? If so, send high-resolution shots showing the place's natural beauty, along with a short caption and photo credit, to bulletin@cerf.science.

President's Message

Sharon Herzka
CERF President

The CERF Governing Board (GB) and volunteers have been busy!

We have been working to deliver better content and services for all our members. One area we are working to improve is our communications, including the *CERF's Up!* bulletin, *Coastal and Estuarine Science News* (CESN), and the Monthly CERFer, to better deliver the information you are seeking to stay on top of the field and develop professionally. One key action is contracting a communications consultant to evaluate our internal and external communications programs and strategies and strengthen how CERF conveys its science, mission, and impact to key audiences in ways that drive engagement, influence, and support. The consultant's work integrates an analysis of recommendations made by the 2023–2025 and current Publications and Communications Committee, survey results of CERF members' needs and interests, and a GB analysis of the impact of our current communication platforms (e.g., *CERF's Up!*, the Monthly CERFer, CESN, webinars, online communities). Volunteers are working with the communication content expert to enhance outreach across platforms; establish mechanisms for translating complex science into clear, accessible messages for policymakers and stakeholders; and improve the efficiency and effectiveness of CERF's communication workflows and products. We will keep you posted!

While CERF is a financially sound organization, we strive to maintain our long-term ability to sustain current programs and deliver new programs for members. CERF's primary revenues are from *Estuaries and Coasts*, with smaller amounts coming from membership dues, donations, and conferences. We are looking to expand our revenue streams by securing sponsorships. The GB has also engaged a consultant to orient and inform our external fundraising efforts so that we can reinvest those funds into programs that meet the needs of our members.

For example, two tremendously successful CERF programs, Rising TIDES[1] (Toward an Inclusive, Diverse, and Enriched Society) and the Inclusive Leadership Program[2] (ILP), need funding. Since its implementation in 2017, Rising TIDES has supported five cohorts of students and recent graduates from groups underrepresented in CERF disciplines to participate in a year-long program with mentoring, professional development, and networking to increase their sense of belonging and encourage them to pursue careers in marine science. Likewise, ILP builds a diverse learning community that develops inclusive leadership skills through training, mentorship, and collaboration. It supports current leaders in driving culture change and prepares future leaders to become confident, effective change agents, with a focus on diversity, equity, inclusion, and belonging; leadership; and capacity-building. The programs had been funded primarily by the National Science Foundation (NSF) and the National Oceanic and Atmospheric Administration (NOAA), but NSF funds were terminated in 2025. Following the loss of support for our programming, CERF is dedicated to ensuring that Rising TIDES and ILP can be maintained.

Over the last few months, we have established 14 committees and task forces[3] of dedicated volunteers that are focused on numerous programs. Committees provide direction by making recommendations to the GB and by developing and advancing specific priorities and programs that serve CERF's membership. Typically, this includes identifying key issues, developing and recommending strategies, ensuring effective communication and coordination, and overseeing implementation or progress toward defined objectives. In contrast, our task forces address a specific, time-bound issue, so their goals are more focused and action-oriented than those of a committee. Our committees and task forces promote alignment with CERF's mission and our current strategic plan (Visions V), while leveraging our members' expertise to deliver actionable outcomes. I am incredibly grateful to the fleet of volunteers who generously donate their time, expertise, and creativity to benefit CERF.

CERF has made several enduring contributions since its founding in 1971, shaping both the science and management of estuarine and coastal systems. CERF's major contribution has been to build and sustain the intellectual and professional infrastructure of estuarine and coastal science—from generating and publishing knowledge, to building networks, training and supporting students and early career scientists, and ensuring that science informs real-world management and policy. We have relied

on thousands of volunteers who have made the organization what it is today.

CERF has been highly effective at advancing interdisciplinary science and maintaining a strong publication platform through *Estuaries and Coasts*, but its impact on policy and management remains uneven and often indirect. Despite a stated emphasis on science translation, stronger, more consistent mechanisms are needed to translate research into decision-making frameworks, particularly at regional and local scales. Participation has broadened over time, yet barriers to inclusion persist, especially for underrepresented groups, practitioners, and stakeholders outside academia. Additionally, while CERF has supported applied science, there is an opportunity to more directly incentivize work that integrates social, economic, and governance dimensions alongside biophysical processes. Future priorities could include more intentional engagement with the people who apply science in real-world decisions, strengthening partnerships with management agencies, increasing the accessibility of our outputs (e.g., open science and communication products), and fostering transdisciplinary approaches that better connect ecosystem science with societal outcomes.

2025–2027 Committees

2027 Biennial Conference
Co-Chairs – Arnoldo Valle-Levinson and Margaret Mulholland
Develop the scientific, attendee experience, and inclusive culture programs for the conference.

Affiliate Society Presidents
Chair – Stephanie Archer
Maintain and improve coordination, communication, and knowledge sharing across the Affiliate Societies and between the Affiliates and CERF.

Finance and Audit
Chair – Dave Tomasko
Provide oversight of the Federation's financial status and make recommendations to the Governing Board about CERF's investment asset allocations and financing activities.

Globalization
Chair – Alia Al-Haj
Serve an advisory role when needed to provide input on how CERF can be more welcoming to a global community.

Leadership and Volunteer Development
Chair – Joe Reustle
Develop and implement content and programs to recruit and retain volunteers and generate a pipeline of future CERF and the Affiliate Society leaders.

Mentorship Program
Chair – Aaron Ridall
Continue implementation of the newly developed year-round mentoring program.

Online CERF Communities
Chair – Justine Whitaker
Recruit new online communities; assist communities in increasing engagement.

Policy and Advocacy
Chair – Jes Watts
Develop activities to meet CERF's mission of translating science to policy and management.

Publications and Communication
Co-Chairs – Elisa Baldrighi and Kyle Capistrant-Fossa
Work to coordinate all CERF publications and to improve and promote our publications and communication to maximize the impact of the work of CERF.

2025–2027 Task Forces

Business Model
Chair – Dave Tomasko
Analyze the current business model and business lines of CERF and make recommendations to improve long-term solvency and sustainability.

Continuing Education Program Development
Chair – Anna Braswell
Develop topics and mechanisms for continuing education programming, such as reviewing papers, policy and advocacy, and developing business skills, for members in an off-conference year.

Early Career Peer Reviewer Training Program
Chair – Jeff Clements
Develop an annual training program for early-career researchers to contribute to their professional development and increase the quantity and quality of reviewers for ESCO.

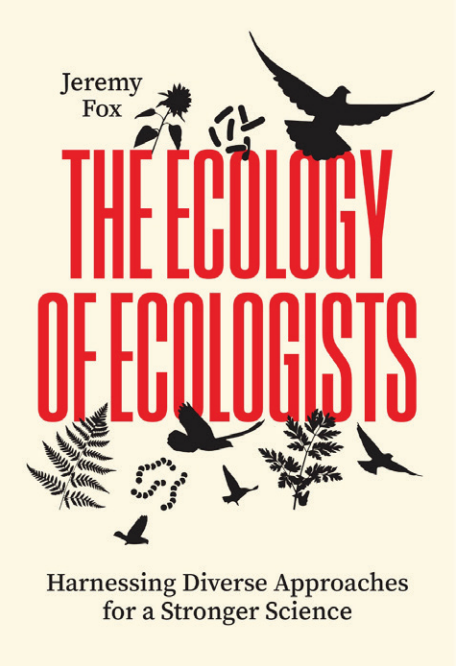
Governing Board Nominations
Chair – Linda Blum
Recruit and review Governing Board nominations.

Rising TIDES and ILP Fundraising
Co-Chairs – Allison Fitzgerald and Christine Whitcraft
Seek funding support to sustain Rising TIDES and the Inclusive Leadership Program.

References:
1. https://www.cerf.science/rising-tides-program
2. https://www.cerf.science/inclusive-leadership-program-ilp-
3. https://www.cerf.science/committees

The Ecology of Ecologists: Book Review

John Kominoski
Florida International University, Miami, Florida, USA



Ecology is a truly interdisciplinary science, and *it's a complete mess!* According to Jeremy Fox in *The Ecology of Ecologists*, this is all expected, and it is our challenge as ecologists to embrace our diverse discipline to change it for the better. Fox argues that ecology's biggest challenges are (1) *we don't know what ecology is*, and (2) *we don't know how to do it*. Even more challenging is that forging new ground in our field has repeatedly been met with opposition, sometimes misinformation, and often a well-intended but unrealistic desire to unify (i.e., constrain) our disciplinary thinking through endless efforts (i.e., battles) of standardized definitions, questions, and measurements. And he's only scratching the surface of the challenges gleaned from literature since the 1980s.

Fox argues that the grand challenge in ecology is to accommodate the diversity of ideas, but also the diversity of organisms and systems and how we define and select for our measurements of diversity…all of these are major obstacles to unifying and advancing our discipline. Also, how we study and collect data in ecology varies incredibly, given the context of the systems and organisms that we *choose* to study. Given the complexity of life on Earth and how we humans are changing our planet, we ecologists must advance our thinking and our inclusion of diverse ideas to save the world and, before it, our discipline.

This book is an essential read for any and all undergraduate and graduate students and faculty from all career stages (or anyone who likes ecology). The examples and case studies used reflect the population and community ecology expertise of the author, but he delves deep and wide into fields and examples from across the spectrum of ecological hierarchy and even other STEM and non-STEM fields. What emerges is a cogent and accessible synthesis, steeped in philosophy about the history, present, and future of our beloved field.

Fox challenges and encourages us to be better scientists by criticizing ideas over individuals. He tells personal tales of roadblocks he overcame as a student that guided his thinking and his conviction in his science. He cautions that not everyone will help you with your academic and scientific journey, and he acknowledges that our understanding of one another as scientists and how we accept or not others' scientific discoveries can be improved by embracing the breadth and challenge of our discipline.

Ecology has come a long way since the 1980s, but not fast enough, and not in a way that gets our science where it needs to be given all the rapid changes we see in the world. Don't you agree? Well, Fox would tell us that we might just be overstating change at local scales, which we see happening at larger scales of observation, scales larger than we measure and report. He reminds us of some of the ways that ecology has made important strides (e.g., embracing applied ecology, integrating models, alternative hypotheses, meta-analyses, climate change, distributed experiments, forecasting, theory). Yet, we need something more in order for the field of ecology to be "greater than the sum of its parts." What that something is *must* be decided by us as ecologists, *not* solely by the technological advances driving computational science or by each of us becoming narrower in our expertise as individual scientists. We must have legs placed strategically apace with the breadth and dimensions of the metaphoric table upon which ecology exists as a discipline. In short, we need to support and listen to one another's diverse ideas and work with all of our messiness, so that we can *know what ecology is* and *know how to do it*.

Editors' Note: *The Ecology of Ecologists* was published in 2025 by the University of Chicago Press

Reference:
Fox, J. 2025. *The Ecology of Ecologists: Harnessing Diverse Approaches for a Stronger Science*. University of Chicago Press. ISBN: 978-0226844947.

Seasonal and Short-Term Ecosystem Metabolism in a Temperate Salt Marsh Channel

Emily J. Chua
Dalhousie University, Halifax, Nova Scotia, Canada

An observational platform installed in a salt marsh estuary in coastal New Jersey (Seven Mile Island Innovation Laboratory). The platform was equipped with underwater sensors that continuously monitored dissolved oxygen, temperature, and pH. Data collected autonomously over a three-year period was used to track how the marsh "breathes" as plants produce oxygen and marsh life consumes it Photo: Jake Supino

Coastal salt marshes play a major role in carbon storage, but we still lack baseline data to track climate-driven change. Over three years, we monitored water quality and metabolism in a New Jersey marsh channel to measure carbon balance. Results show the system is overall net heterotrophic—releasing more carbon than it stores—with strong seasonal shifts: slightly carbon-storing in winter, but strongly carbon-releasing by late summer. Temperature was the main driver, while storms intensified short-term carbon loss. These findings highlight how dynamic blue carbon systems are, emphasizing the need for high-frequency, long-term monitoring to better predict ecosystem responses to climate change.

References:

Chua, E.J., J. Supino, K.E. Fogaren et al. 2026. Multiyear Monitoring Reveals Seasonal and Short-Term Dynamics of Ecosystem Metabolism in a Temperate Salt Marsh Channel. *Estuaries and Coasts* 49: 82. https://doi.org/10.1007/s12237-026-01695-5

The Importance of Local Scale Factors in Restoration Planning

Grace McCulloch
New Hampshire Audubon, Concord, New Hampshire, USA

A saltmarsh sparrow perches in the salt marsh, photographed during field research. This research provides a glimpse into the habitat characteristics that predict where this secretive species is likely to occur on the landscape Photo: Grace McCulloch

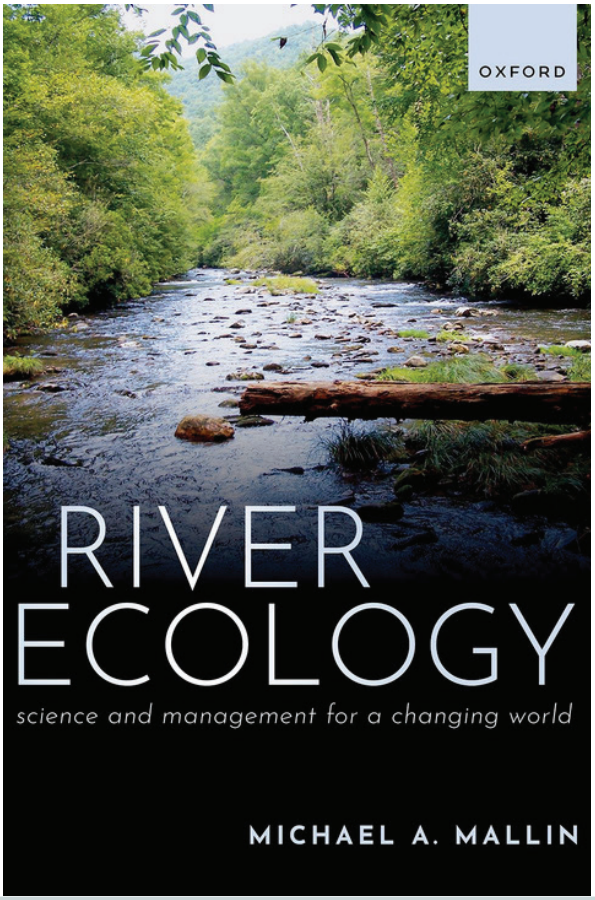
Coarse habitat models are often used in decision-making, yet fine-scale data frequently capture local conditions relevant for species conservation. In the Northeastern US, managers are restoring salt marshes to support the vulnerable saltmarsh sparrow. We evaluated a marsh-scale habitat model for saltmarsh sparrow in New Hampshire, comparing it with fine-scale predictors. Several common marsh-scale metrics poorly predicted sparrow occurrences, while fine-scale factors were strong predictors. Occupancy increased substantially with greater high marsh cover and distance from upland edges. These findings highlight the importance of incorporating fine-scale habitat data into models that guide where restoration is implemented for species conservation.

References:

McCulloch, G., C.S. Elphick, R.J. Moll et al. 2026. The Importance of Local Scale Factors in Restoration Planning: A Case Study With an Indicator Species for Salt Marsh Ecosystems. *Estuaries and Coasts* 49: 86. https://doi.org/10.1007/s12237-026-01699-1

River Ecology

Science and Management for a Changing World



Rivers have been vitally important to human populations worldwide for millennia as "highways" for inland travel, and as sources of water for drinking, cooking, cleaning, manufacturing, irrigation, and power generation, as well as repositories for human, animal, and industrial wastes.

This accessible textbook takes a broad approach to river ecology, covering the basics but going beyond by including topics that are often overlooked such as blackwater streams and rivers, tidal creek ecosystems, and reservoir limnology. Since most running water (lotic) systems have been altered or impacted by human activities, there is significant emphasis on anthropogenic impacts, including sedimentation, nutrient pollution and related eutrophication issues as well as the effects of dams and river fragmentation, power plant operations, chemical contamination, invasive species, wastewater treatment discharges, industrial scale livestock pollution and the impacts of hurricanes and climate change on river ecology.

Rural and urban storm water runoff pollution is emphasized, and the current state of stream and river protection and restoration is also discussed. While the book is aimed at the graduate student level, it is also designed to be of use to working professionals including planners, environmental engineers, natural resource managers and the NGO community.

THE AUTHOR: Michael A. Mallin

Michael A. Mallin, Research Professor, Center for Marine Sciences at University of North Carolina Wilmington.

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Spartina patens *in late summer forming its characteristic tufts on the salt marsh* Photo: Karen Aerni

CERF'S Inaugural Yearlong Mentorship Program

Aaron Ridall
University of Southern Mississippi, Ocean Springs, Mississippi, USA

CERF's inaugural Yearlong Mentorship Program[1] launched this January to help professionals at all career stages benefit from the support and guidance of longstanding CERF members through discussions, resource sharing, and networking. The past CERF Governing Board recognized the importance of strengthening CERF member connections and asked the Career Development and Education Committee to build such a program. Our intentions with this inaugural program are to evaluate, through conversations and feedback, the wants and needs of our mentees and mentors so we can continue to improve the program and support our amazing CERF members.

In its first year, we have 26 mentors from academic, industry, government, and non-governmental organizations (NGO) backgrounds supporting 37 mentees, primarily graduate students and early-career professionals. Our mentors and mentees are mostly US residents, though we have a few international participants, and our US participants span the East, West, and Gulf coasts. We are providing a lot of flexibility in this first year for mentors and mentees to form organic mentorship partnerships, so we have not created a rigid program structure. Instead, the Career Development and Education Committee created a mentorship program guide[2] with resources and suggestions on how to meet mentees where they are and how to support them, from preparing a job application to navigating new research questions. We have bi-weekly mentee check-ins using the CERF Communities platform, where I pose questions to get the mentees to discuss and share about themselves, as I recognize the importance of community and peer or near-peer support in developing a flourishing program. We will also have some formal check-ins with mentees as we approach the mid-year point in the program.

My hope, as the new chair of the CERF Mentorship Program Committee, is to learn how best to support our CERF members and their goals. Our committee will spend time evaluating what worked well and what we need to improve before we launch the second round of this program. We will also work to support our current mentor-mentee pairings through our online CERF Mentorship Community platform and virtual meetings. What I am looking most forward to is building additional resources and getting some committee members at different career stages in the room to talk through ideas. My hope is that we can work on formalizing some workshops, webinars, or materials that can add more variety to the mentorship program.

We are not in need of any additional participants or volunteers at this time, but we will announce when the next cycle of the Mentorship Program is live for volunteers and participants to enroll!

1. https://www.cerf.science/cerf-mentorship-program
2. https://bit.ly/CERFMentorshipGuide

Coastal marsh, Winthrop, Massachusetts, USA *Photo: Todd Kent*

2025–2026 CERF Rising TIDES Program

2025–2026 CERF Rising TIDES Program participants and leadership team

Photo: José R. Vázquez

Rising TIDES (Toward an Inclusive, Diverse, and Enriched Society) supports students who face various obstacles to pursuing a career in coastal and estuarine disciplines with the goal of inspiring and motivating them to pursue careers in coastal and estuarine science and management. The program is for current students and recent graduates who are interested in exploring or pursuing a career in coastal and estuarine science or management, who identify as from a group that is underrepresented in coastal and estuarine science and management or who face barriers to pursuing experiences in the field, and who are looking for a funded opportunity to join and engage with the CERF community.

The 2025–2026 program provides funding for scholars and near-peer mentors to attend CERF 2025 and an Affiliate Society meeting of their choice, while also providing mentorship, networking, and professional development. Many choose to present their research at the CERF conference or an Affiliate Society meeting. Through funding from the National Oceanic and Atmospheric Administration and CERF, we are supporting 15 scholars, four near-peer mentors, and four professional mentors in the 2025–2026 cohort. Participants are placed in mentoring pods of three to four scholars, one near-peer mentor (a Rising TIDES alum), and one professional mentor. Through joint support of students, near-peer mentors, and professional mentors, this program aims to enhance career development of minoritized and marginalized students in the coastal and estuarine sciences, provide leadership opportunities for alums, ensure that students participating in the program will have sustained mentorship following the conference, help develop a community of practice for CERF members who are engaged in building diversity and inclusion within their own organizations and across institutions, and involve those who are already mentors in helping to transform CERF into a broadly inclusive society.

Scholars

Nana Obeng Adu-Agyei, University of Cape Coast

Saia Bennett, Agnes Scott College

Rashel Caraballo, New Jersey City University

Andrea Dávila López, Universidad San Carlos de Guatemala

Jailine Rodriguez, Interamerican University of Puerto Rico

Sof Fox, University of Alaska Fairbanks

Ima Hosseinzadeh, Virginia Institute of Marine Science

Yue Liu, Texas A&M University–Corpus Christi

Marco Moriel, University of Texas at Austin Marine Science Institute

Roland Ovbiebo, University of California San Diego, Scripps Institution of Oceanography

Mak Perry, Georgia Southern University

Robertson Ramos Flores, Fordham Graduate School of Arts and Sciences

Tamara Rivera, University of Texas at Austin Marine Science Institute

Kendra Sampson, Saint Mary's University

Divine Siam, Columbia University

Near-peer Mentors

Valeria Hernandez Talavera, University of Massachusetts, Boston

Jennifer Raabe, University of Louisiana, Lafayette

Natalia Schoenberg, Virginia Institute of Marine Science, College of William & Mary

Alex Zinck, Hólar University

Professional Mentors

Julio Lorda, Universidad Autónoma de Baja California

Danielle Perry, National Oceanic and Atmospheric Administration

Antoinetta Quigg, Texas A&M University - Galveston

Jenn Zhu, Billion Oyster Project

Leadership Team

Docia Agyapong, University of Amsterdam (Rising TIDES alum)

Stephanie Tsui, Northeastern University (Rising TIDES alum)

Allison Fitzgerald, New Jersey City University

Hilary Neckles, US Geological Survey (retired)

Drew Talley, University of San Diego

Christine Whitcraft, California State University Long Beach

Kristin Wilson Grimes, University of the Virgin Islands

Amara Foster, CERF

Susan Park, CERF

Estuaries and Coasts Editors' Choice Papers

Volume 48 Issue 6, November 2025

Watts. E.G. et al. 2025. Efficient burial of labile organic carbon in sediments of oxygenated Icelandic Fjords. *Estuaries and Coasts* 48: 167. https://doi.org/10.1007/s12237-025-01582-5

Volume 49 Issue 1, January 2026

Sanders. R.D. et al. 2025. Open-coast eelgrass (*Zostera marina*) transplant catalyzes rapid mirroring of structure and function of extant eelgrasses. *Estuaries and Coasts* 49: 2. https://doi.org/10.1007/s12237-025-01609-x

Volume 49 Issue 2, March 2026

Reilly, E.L. et al. 2026. Improved reporting needed for comprehensive analysis of thin layer placement of dredge materials in salt marshes: a review. *Estuaries and Coasts* 49: 43. https://doi.org/10.1007/s12237-025-01658-2

Volume 49 Issue 3, May 2026

Yan, X. et al. 2026. Nonlinear thresholds in carbon–water functional synergies under coastal reclamation in the Liaohe River Delta, China. *Estuaries and Coasts* 49: 62. https://doi.org/10.1007/s12237-026-01684-8

Estuaries and Coasts Outstanding Reviewers

Estuaries and Coasts would not be successful without the hard work of hundreds of volunteer peer reviewers whose dedication and expertise play a crucial role in upholding the quality and integrity of the articles published in the journal. CERF recognizes the critical contributions of all our reviewers and thanks them for the generosity of their time.

The *Estuaries and Coasts* editorial board is proud to recognize the dedicated efforts of outstanding reviewers in each issue of *CERF's Up!* This recognition honors reviewers based on the quality, the number of reviews, and their promptness. For 1 October 2025 to 31 March 2026, we are happy to highlight the following outstanding reviewers for their significant contributions to the quality and success of *Estuaries and Coasts*.

We thank and highlight the two reviewers who each completed four reviews: Hallie Fischman, Hanna Amaral; and the six reviewers who completed three reviews each: Richard Zimmerman, Stephen Tettelbach, Elorri Arevalo, Matthew Kimball, Derek Detweiler, James Hagy.

We are especially grateful to reviewers who complete reviews rapidly, as this allows us to offer feedback to anxious authors and publish papers quickly. We thank the 36 people who completed at least two reviews, and we recognize eight of those reviewers who completed their reviews in less than a week on average: Hallie Fischman, Richard Zimmerman, Holly Greening, Xiaojie Xu, David Burdick, Eudriano Costa, Tobia Politi, and Wenzhong Tang.

Thank you for your invaluable contributions to CERF and *Estuaries and Coasts*!

The Latest *Coastal & Estuarine Sciences News* (CESN)

Merryl Alber, CESN Editor, University of Georgia
Janet Fang, CESN Science Writer/Managing Editor

The mission of CESN is to highlight the latest research in the journal *Estuaries and Coasts* that is relevant to environmental managers. CESN is a free electronic newsletter that is posted online and delivered to subscribers on a bimonthly basis (six issues per year). Please visit www.cerf.science/cesn to read the full summaries and sign up to have future issues delivered to your email inbox. And please encourage environmental managers you work with to sign up as well.

2026 CESN Issue 1

Balancing Eelgrass Preservation with Oyster Aquaculture
And where do nekton fit in?
Source: Lewis, N.S. et al. 2025. Spatiotemporal dynamics of eelgrass (*Zostera marina*), oyster aquaculture, and channel-fringing habitat provided to managed nekton species throughout Willapa Bay, WA, USA. *Estuaries and Coasts* 49: 28.
https://doi.org/10.1007/s12237-025-01621-1
https://rdcu.be/eXVII
https://www.cerf.science/cesn-2026-issue-1#Article1

Mangrove Plantings Can Prevent Shoreline Erosion
Shoreline loss and gain linked to mangrove presence in Vietnam's Red River Delta.
Source: Nguyen, H.Q. et al. 2025. Five decades of shoreline dynamics and their response to dramatically reduced sediment supply on the southern Red River Delta Coast, Vietnam. *Estuaries and Coasts* 49: 15.
https://doi.org/10.1007/s12237-025-01640-y
https://rdcu.be/eQ3OF
https://www.cerf.science/cesn-2026-issue-1#Article2

When Will Created Marshes Reach Dynamic Equilibrium?
Vegetation establishes relatively quickly, but sedimentation rates could take decades.
Source: Palinkas, C.M. et al. 2025. Drivers of vegetation and sediment development differ in the created marshes of living shorelines. *Estuaries and Coasts* 49: 10.
https://doi.org/10.1007/s12237-025-01625-x
https://rdcu.be/eQ3Q7
https://www.cerf.science/cesn-2026-issue-1#Article3

Oyster Shell Growth Synthesis Reveals Data Gaps
Despite variability among studies, patterns emerge with salinity and pH.
Source: Savage, K.B. et al. 2025. A synthesis of eastern oyster (*Crassostrea virginica*) growth and calcification responses under changing environmental conditions. *Estuaries and Coasts* 49: 16.
https://doi.org/10.1007/s12237-025-01637-7
https://rdcu.be/eQ3NV
https://www.cerf.science/cesn-2026-issue-1#Article4

Upcoming Events

2026 National Marine Educators Association Conference
12–16 July 2026
Cambridge, Maryland, USA
https://www.marine-ed.org/conference/2026

ECSA 61- Bridging the gap between science and policy in estuarine and coastal marine biodiversity: the way forward
24–27 August 2026
Brussels, Belgium
https://www.estuarinecoastalconference.com/

California Estuarine Research Society (CAERS) 2026
21 September 2026
San Francisco, California, USA
https://caers.wildapricot.org/

Restore American's Estuaries 2026 Coastal & Estuarine Summit
22–25 September 2026
San Francisco, California, USA
https://estuaries.org/2026summit/

Gulf Estuarine Research Society (GERS) 2026
4–6 November 2026
Houma, Louisiana, USA
https://gers.wildapricot.org/

Ecosystem Tipping Points

Stephen S. Hale
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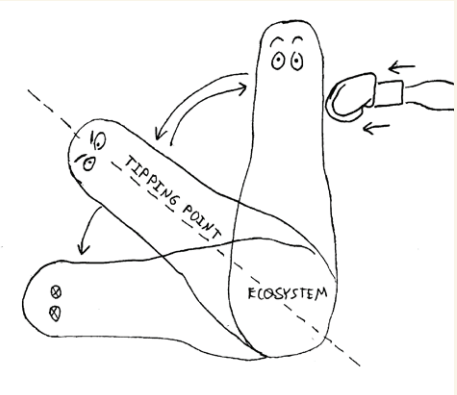
stephenshale@gmail.com

Last fall, scientists from 87 institutions in 23 countries released the second Global Tipping Points Report 2025 (https://global-tipping-points.org), warning that several Earth ecosystems are nearing critical thresholds as global warming pushes beyond 1.5° above pre-industrial levels. Aimed at policymakers, the report defines tipping points as largely irreversible thresholds where an ecosystem, in response to cumulative pressures, abruptly shifts to a different state, with catastrophic consequences for global ecosystems and human well-being.[1]

Since the origin of life some 3.5–4 billion years ago, Earth's ecosystems have experienced several tipping points, the five mass extinctions being among the most dramatic. Asteroid strikes, widespread volcanism, shifting tectonic plates, atmospheric oxygenation by cyanobacteria, and ice ages all led to major ecosystem changes. Today, humans are the driving force.

The report highlights four current major risks. First, repeated mass bleaching events are already devastating warm-water coral reefs. The report estimates the thermal tipping point for corals is 1–1.5°C. With global warming already 1.4° and rising, many reefs will be lost. Second, melting of the Greenland and West Antarctica ice sheets at 1–3° of warming would raise sea levels by several meters. Third, the Atlantic Meridional Overturning Circulation—which includes the Gulf Stream—could weaken or fail at 1.5–4.5° of warming, bringing colder winters to Europe and widespread declines in agricultural productivity. Finally, warming of 1.5–4.5° combined with continued deforestation could push large parts of the Amazon rainforest toward a savanna-like ecosystem. Even if all nations met their current Paris Agreement commitments, global temperature over this century is still projected to rise 2.3–2.5°.

Ecosystems are much like boxers:



they can absorb repeated blows and bounce back until the cumulative effect knocks them down. Some boxers and ecosystems can absorb more punches than others, but all have limits. Human pressures deliver straight punches to ecosystems (like excess nutrients and overharvesting) but also sucker punches (like PFAS chemicals and microplastics) that ecosystems have little evolutionary history with.

Global warming is only one source of pressure. Pollution, habitat destruction, overharvesting, overpopulation, invasive species, and accelerating biodiversity loss (the Sixth Mass Extinction) have changed many ecosystems. Like a boxer who has taken many hits, this makes them more vulnerable to the next punch. Estuaries and coasts have taken a lot of hard punches since the start of the Industrial Revolution, illustrating the cumulative impact of diverse pressures. Many estuaries are staggering.

Encouragingly, the report also points to the possibility of positive tipping points in society, including the rapid adoption of solar and wind power, battery storage, heat pumps, and electric vehicles. The pressing question is whether human society will act quickly enough to survive our self-inflicted punches to the gut. David Hawk explores this challenge in his 2025 book *The Climate is Changing: Can Humans?*

1. Some ecosystem declines are gradual and remain at least partially reversible. In a 2024 *Nature Climate Change* article, Kopp et al. 2024 offer a thoughtful and nuanced discussion of the tipping point framework (https://www.nature.com/articles/s41558-024-02196-8).

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