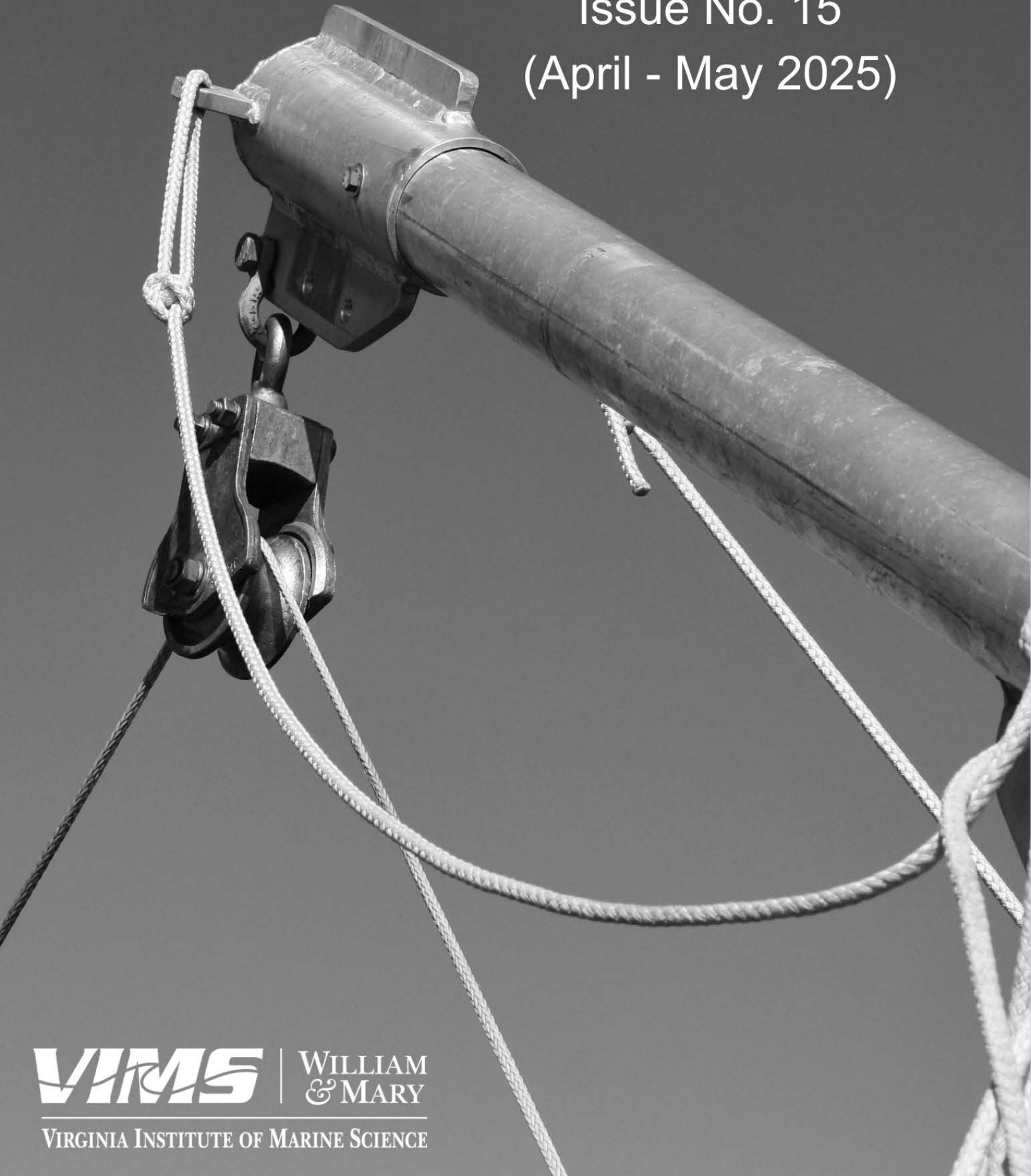


Research Digest

Issue No. 15

(April - May 2025)



VIMS

WILLIAM
& MARY

VIRGINIA INSTITUTE OF MARINE SCIENCE

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Photo credit: VIMS

Caption: Zoomed in, black and white photo of a pulley and rope at the end of a boom. Cover created by Madison Sears.

Message from the Associate Dean of Research & Advisory Services

This latest issue of the Digest is brief, containing a total of eighteen peer reviewed articles spanning eleven coastal and marine topic areas. In previous issues of the Research Digest, you may have noticed several new topic categories including 'biogeochemistry' and 'modeling', which are also listed in this issue of the Digest.

The new categories have been added in response to feedback from VIMS researchers and a desire to avoid placing articles under topic areas that may be too general or don't adequately reflect the topic area the research addresses. So, we've created additional categories that better highlight the primary focus of the research. With each new issue of the Digest, you'll begin to see more of the new topic categories.

We will continue to refine how we lump and split the listed publications each quarter and appreciate the thoughtful feedback we have received to date.

Mark W. Luckenbach, Associate Dean



Office of Research & Advisory Services
Virginia Institute of Marine Science
William & Mary

Topics In This Issue

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Biogeochemistry	2 articles
Marine & Estuarine Ecology	4 articles
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(Listed alphabetically by last name. An asterisk () indicates VIMS student.)*

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Additional Topics

(VIMS authors in **bold**, asterisk indicates VIMS student)

Topic **Aquaculture**

Title	Corrigendum to “Survival and toxin accumulation in <i>Crassostrea virginica</i> larvae following exposure to various <i>Dinophysis</i> species” (Aquaculture, 602: art no. 742294. https://doi.org/10.1016/j.aquaculture.2025.742294)
Author(s)	Ayache N., Sanderson M.P., Small J.M., Chesler-Poole A.B. , Giddings S.D., Campbell L., Trainer V.L., Brosnahan M.L., Smith J.L. (2025)
Journal	Aquaculture, 604: art no. 742462
Link	https://doi.org/10.1016/j.aquaculture.2025.742462
Summary	The effects of <i>Dinophysis</i> cells and their toxins on the viability of 7-day-old <i>Crassostrea virginica</i> larvae were investigated through exposures to living cells, cell lysates, dialysates, and their purified toxins. The results indicate that living <i>Dinophysis</i> cells producing high concentrations of PTXs, along with other bioactive compounds, are responsible for the higher mortality in oyster larvae.

Topic **Coastal Geology**

Title	Updated stratigraphic mapping reveals insights into the late Pleistocene evolutionary history of the Virginia Eastern Shore, US Mid-Atlantic Coast
Author(s)	Cahoon K.M* , Hein C.J. , Fenster M.S., Clarke C.* , Ramsey K.W.
Journal	Stratigraphy, 22(2): pg. 99-134 (2025)
Link	https://doi.org/10.29041/strat.22.2.02
Summary	This study investigated ancient coastal sediments of the Virginia Eastern Shore to resolve conflicting interpretations of past sea-level changes. It identified new depositional units, reinterpreted others, and mapped the barrier islands, spits, and dunes that developed during multiple periods when sea level was higher than today between 120,000 and 40,000 years ago.

Topic **Economics**

Title	Valuing present and future benefits provided by coastal wetlands and living shorelines
Author(s)	Bilkovic D.M., Scheld A., Isdell R., Mason P. , Stafford S., Mitchell M., Gonzalez-Dorantes C. , Chambers R., Leu M., Musick S. Gregory S., Hendricks J., Dada O.* , Benson G.*
Journal	Nature-Based Solutions, 8: art no. 100243 (2025)
Link	https://doi.org/10.1016/j.nbsj.2025.100243
Summary	This research assessed the present and future economic value of coastal wetlands and living shorelines in Virginia’s Middle Peninsula and supported the development of an online resource to estimate the economic benefits from marshes and living shorelines, SHORE-BET (Shoreline Benefit Estimation Tool).

Additional Topics

(VIMS authors in **bold**, asterisk indicates VIMS student)

Topic	Evolutionary Ecology
Title	Linking phenotypic variation to patterns of genetic isolation along a speciation continuum
Author(s)	Heiser S., Amsler C.D., Shilling A.J., Higginbotham H.M., Amsler M.O., Stoeckel S., McClintock J.B., Baker B.J., Krueger-Hadfield S.A.
Journal	Journal of Phycology, 61(1): pg. 3-19 (2025)
Link	https://doi.org/10.1111/jpy.13529
Summary	We explored phenotypic and genetic variation in a red seaweed for which we found evidence that there are at least two species.

Topic	Evolutionary Ecology
Title	Monoicy, dioicy, and genetic structure in three species of <i>Sheathia</i> (Batrachospermales, Rhodophyta)
Author(s)	Shanker-Connelly S.J., Stoeckel S., Vis M.L., Krueger-Hadfield S.A.
Journal	Journal of Phycology, 61(4): pg. 820-839 (2025)
Link	https://doi.org/10.1111/jpy.70032
Summary	We explored the role of the sexual system on reproductive mode variation in a freshwater red alga. We found evidence for the association of monoicy (hermaphrodite) with greater incidence of selfing.

Topic	Evolutionary Ecology
Title	Seasonality and interannual stability in the population genetic structure of <i>Batrachospermum gelatinosum</i> (Rhodophyta)
Author(s)	Shanker-Connelly S.J., Stoeckel S., Vis M.L., Crowell R.M., Krueger-Hadfield S.A.
Journal	Journal of Phycology, 61(1): pg. 172-193 (2025)
Link	https://doi.org/10.1111/jpy.13539
Summary	This work explored the seasonality of the freshwater red alga <i>Batrachospermum</i> . We highlighted gaps in analytical tools for which we can analyze population genetic data.

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Additional Topics (cont.)

(VIMS authors in **bold**, asterisk indicates VIMS student)

Topic **Fish & Fisheries**

Title	Trends in Atlantic Striped Bass growth in the mid-Atlantic, USA
Author(s)	Schiano S., Nessler G.M., Collie J.S., Lengyel Costa N.L., Drew K., Latour R.J. , McNamee J.E., Schueller A.M., Wilberg M.J.
Journal	Transactions of the American Fisheries Society, 154(3): pg. 262-277 (2025)
Link	https://doi.org/10.1093/tafafs/vnaf006
Summary	We documented increased size-at-age of Striped Bass, particularly those of intermediate ages, across a variety of fishery-dependent and fishery-independent sources. Results could be due in part to density-dependence, where growth is higher when abundances are lower. Additionally, we determined that otolith-based size-at-age was generally lower than scale-based.

Topic **Physical Oceanography**

Title	Development of a data-driven automatic unstructured mesh generation tool suitable for compound flooding studies
Author(s)	Calzada J.R.* , Zhang Y. J. , Ye F. , Cui L.
Journal	Environmental Modelling and Software, 192: 106587 (2025)
Link	https://doi.org/10.1016/j.envsoft.2025.106587
Summary	The main objective of this study is to develop an automatic algorithm that can generate elongated quadrilaterals and combine these with triangles to faithfully and efficiently resolve river channels for large expanses of terrain, directly from Digital Elevation Model (DEM). Storm surge during Hurricane Harvey is used as a test case.

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Additional Topics (cont.)

(VIMS authors in **bold**, asterisk indicates VIMS student)

Topic	Shellfish
Title	The parasitic dinoflagellate <i>Hematodinium perezii</i> suppresses the innate immunity of <i>Portunus trituberculatus</i> via exosomal miRNAs
Author(s)	Zhang J., Small H.J. , Li M., Huang Q., Hu L., Xue Q., Wang J., Li C.
Journal	Aquaculture, 609: art. no. 742827 (2025)
Link	https://doi.org/10.1016/j.aquaculture.2025.742827
Summary	This study investigated the host-pathogen interaction between a parasitic dinoflagellate, <i>Hematodinium perezii</i> , and its crustacean host, <i>Portunus trituberculatus</i> . We show that the parasite was able to modulate the host immune response by releasing exosomes that contained novel miRNAs which inhibited host signaling pathways thus facilitating survival of the parasite.

Topic	Water Quality
Title	Dynamics of suspended sediment variability over various timescales: A quantitative analysis using remote sensing data
Author(s)	Du Z.* , Lin H., Yu Q., Wang Y., Peng Y., Wang L., Gao S., Wang Y.
Journal	Estuaries and Coasts, 48(4): art. no. 112 (2025)
Link	https://doi.org/10.1007/s12237-025-01553-w
Summary	This paper analyzes nine years (2012–2020) of GOCI satellite data to quantify suspended sediment variability along the Jiangsu coast. Using Lomb-Scargle periodograms and phase-folding, it identifies dominant seasonal (~65 km) and fortnightly (~20 km) expansion cycles of highly turbid waters, driven mainly by waves and tides with spatial-temporal lags.

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Title	Modeling dissolved Pb concentrations in the Western Arctic Ocean: The continued legacy of anthropogenic pollution
Author(s)	Rogalla B., Allen S.E., Colombo M. , Myers P.G., Orians K.J.
Journal	Journal of Geophysical Research: Oceans, 130(4): e2025JC022415 (2025)
Link	https://doi.org/10.1029/2025JC022415
Summary	This study presents a 3D model of dissolved lead (dPb) in the western Arctic Ocean from 2002–2021, revealing that anthropogenic pollution—via aerosols and ocean transport—still significantly influences dPb levels. Advected waters from the Pacific and Atlantic contribute 43% to the annual dPb budget.

Title	Using a coupled satellite image-numerical model framework to simulate <i>Margalefidinum polykrikoides</i> in the York River estuary
Author(s)	Yu X., Tomlinson M.C., Shen J. , Li Y., Hounshell A.G., Scott G.P. , Reece K.S.
Journal	Frontiers in Marine Science, 12: art no. 1561340 (2025)
Link	https://doi.org/10.3389/fmars.2025.1561340
Summary	Satellite imagery and a particle-tracking model were combined to predict harmful algal bloom in the York River. Incorporating vertical migration behaviors and set sub-surface aggregation depth improved prediction accuracy and bloom dynamics, demonstrating the model framework’s potential for short-term HAB forecasting in the Bay coastal waters.

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(VIMS authors in **bold**, asterisk indicates VIMS student)

Title Biogeographic patterns of community diversity associated with an introduced alga

Author(s) Lee T.S., Fowler A.E., **Krueger-Hadfield S.A.**, Gabriel C., Blakeslee A.M.H.

Journal Aquatic Invasions, 20(1): 127 - 151 (2025)

Link <https://doi.org/10.3391/ai.2025.20.1.134814>

Summary This study explored the patterns of community diversity, including parasites, associated with *Gracilaria vermiculophylla* along the eastern seaboard.

Title Is macroinvertebrate habitat use driven by the cascading effects of a native polychaete and a non-native alga?

Author(s) Mott A.W., Blakeslee A.M., **Krueger-Hadfield S.A.**, Fowler A.E.

Journal Ecosphere, 16(4): e70204 (2025)

Link <https://doi.org/10.1002/ecs2.70204>

Summary This was work done out of VIMS ESL and part of the dissertation of the GMU grad student Alex Mott. We observed patterns of choice in the tube-building polychaete *Diopatra cuprea* which might facilitate the invasion of *Gracilaria vermiculophylla*.

Title Recovery of saltmarsh macroinfauna after the Deepwater Horizon Oil Spill

Author(s) **Pant M.**, Fleeger J.W., **Johnson D.S.** et al.

Journal Estuaries and Coasts, 48: art. no. 87 (2025)

Link <https://doi.org/10.1007/s12237-025-01520-5>

Summary Macroinfaunal communities in moderately oiled marshes recovered within 8 years post-spill, while heavily oiled marshes showed lasting divergence and likely need over a decade for full recovery due to severe initial plant loss and prolonged community shifts.

Title Herbivore fronts shape saltmarsh plant traits and performance

Author(s) **Wittingham S.S.***, **Johnson D.S.**

Journal Ecology and Evolution, 15(4): e71360 (2025)

Link <https://doi.org/10.1002/ece3.71360>

Summary Herbivorous crabs can turn marshes into mudflats, which lowers marsh elevation and soil stability. Initially, grazed plants grow slower and are less defended against additional attack from these herbivores. Over time though, plants recover and produce more belowground plant matter, enhancing soil strength and ecosystem resilience.

(VIMS authors in **bold**, asterisk indicates VIMS student)

Title	Inundation monitoring using a machine learning algorithm combining AI and edge detection
Author(s)	Loftis J.D. , Harman H., Katragadda S., Lotspeich R. R.
Journal	Applied Ocean Research, 160: art. no. 104653 (2025)
Link	https://doi.org/10.1016/j.apor.2025.104653
Summary	This study demonstrated that low-cost web cameras integrated with machine learning and edge detection can autonomously measure tidal water levels from oblique pictometry. Field deployments produced continuous water level observations with < 1.25 cm RMSE, validated against radar sensors, confirming the feasibility of passive remote sensing for real-time flood monitoring.

Title	BathyFormer: A transformer-based deep learning method to map nearshore bathymetry with high-resolution multispectral satellite imagery
Author(s)	Lv Z. , Herman J.D. , Brewer E., Nunez K. , Miller Runfola D.M.
Journal	Remote Sensing, 17(7): art. no. 1195 (2025)
Link	https://doi.org/10.3390/rs17071195
Summary	Accurate nearshore bathymetry mapping is vital for coastal management, navigation, and monitoring. Traditional methods are costly and slow. BathyFormer, a vision transformer–encoder deep learning model, estimates depths from multispectral satellite imagery. Trained with CUDEM data, it achieved 0.55–0.73 m RMSE in Chesapeake Bay, offering cost-effective, scalable, shallow-water mapping for coastal applications.

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