VIMS | William & Mary
Virginia Institute of Marine Science

Research Digest

Issue No. 14
(January - March 2025)

(Intentionally left blank)

Cover by: Madison Sears

Photo credit: VIMS

Message from the Associate Dean of Research and Advisory Services

This Digest is intended to provide stakeholders, colleagues, and interested persons a sense of the depth and breadth of the research happening at VIMS. While we attempt to be as comprehensive as possible, it likely does not contain every article published in the issue's timespan due to differences in timelines and release dates across various publishers and databases that curate peer reviewed research.

If you are interested in reading the full text of any article that you do not have appropriate library/institution access for, please contact the VIMS author or corresponding author of the paper. Contact information for current VIMS scientists can be found on our website: www.vims.edu/about/directory/search/.

Mark W. Luckenbach, Associate Dean

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

Topics In This Issue

(click topic heading below to jump to desired section)

Navigating this document

Click on one of the headings listed above to jump to the desired section. Alternatively, search the document using keywords or an author's name. To search for words or names, simultaneously press the 'ctrl' and 'F' keys, type the desired word or name in the search field, then press 'enter' or 'return'. If the search term is in the document, it will be highlighted.

VIMS authors in this issue

(Listed alphabetically by last name. An asterisk (*) indicates VIMS student.)

Additional Topics

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

Topic	**Fish & Fisheries**
Title	Oyster reef recovery: Impacts of rotational management and restoration efforts on public fishing grounds
Author(s)	**Marquardt A.R.***, **Southworth M.**, **Scheld A.M.**, Button A., **Mann R.**
Journal	Journal of Environmental Management, 375: 124179 (2025)
Link	https://doi.org/10.1016/j.jenvman.2025.124179
Summary	This project examines the efficacy of shell replenishment (a common restoration strategy for oysters) and spatial management practices on public fishing grounds by analyzing long term datasets available for the Rappahannock River (Chesapeake Bay, VA). We examine how oyster reef metrics (brown shell volume, recruit density, market density, and fisheries efficiency respond to management actions.

Topic	**Phycology**
Title	Seasonality and interannual stability in the population genetic structure of *Batrachospermum gelatinosum* (Rhodophyta)
Author(s)	Shainker-Connelly S., 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 paper not only explored the reproductive system of an important freshwater red alga, building on earlier work, but highlighted how limited population genetic theory is at present.

Topic	**Toxicology**
Title	Clearance rates and diarrhetic shellfish toxin accumulation by North Atlantic bivalves fed on North American strains of *Dinophysis acuminata*
Author(s)	McGuire B.T., **Sanderson M.P.**, **Smith J.L.**, Gobler C.J.
Journal	Marine Pollution Bulletin, 213: 117613 (2025)
Link	https://doi.org/10.1016/j.marpolbul.2025.117613
Summary	Three species of bivalve (*Crassostrea virginica, Mercenaria mercenaria, and Mytilus edulis*) were exposed to two North American strains of toxigenic Dinophysis acuminata. Oyster clearance rates slowed significantly as the relative and absolute abundance of *D. acuminata* increased. Mussels rapidly accumulated diarrhetic shellfish toxins (DST) and pectenotoxins but depurated pectenotoxins at a rate 3 - 14 times faster than DSTs.

Back to topic list

Additional Topics (cont.)

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

Topic	**Wetlands**
Title	Advancing the understanding of coastal disturbances with a network-of-networks approach
Author(s)	Myers-Pigg A.N., Moanga D., Bond-Lamberty B., Ward N.D., Megonigal J.P., White E., Jr., Bailey V.L., **Kirwan M.L.**
Journal	Ecosphere, 16(1): e70156 (2025)
Link	https://doi.org/10.1002/ecs2.70156
Summary	This is a review article highlighting existing networks of coastal field sites, gaps in coverage areas (e.g. private lands), and ways to synthesize across networks.

Back to topic list

Biogeochemistry

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

Title	Biogeochemical and physical controls on the microbial degradation of dissolved organic matter along a temperate microtidal estuary
Author(s)	**Detweiler D.J., Anderson I.C., Brush M.J., Canuel E.A.**
Journal	Estuaries and Coasts, 48(2): art no. 51 (2025)
Link	https://doi.org/10.1007/s12237-024-01474-0
Summary	In this York River Estuary (YRE) study, we showed that high freshwater discharge associated with prolonged wet periods in 2018 and 2019 decreased estuarine flushing time and increased the delivery of allochthonous dissolved organic matter (DOM) derived from terrestrial sources into coastal waters, resulting in low rates of DOM degradation especially under cool conditions.

Title	The relative contribution of deep and shallow benthic sources to iron supply in the Ross Sea, with specific emphasis on Ross Bank
Author(s)	Greenan B.J.W., Dinniman M.S., McGillicuddy D.J., Jr., Sedwick P.N., Mack S.L., **Smith W.O.**
Journal	Deep-Sea Research Part II: Topical Studies in Oceanography, 219: 105450 (2025)
Link	https://doi.org/10.1016/j.dsr2.2024.105450
Summary	This article showed the reasons for spatial variability in surface productivity on the continental shelf of the Ross Sea.

Title	Unprecedented summer phytoplankton bloom in the Ross Sea
Author(s)	Portela E., Meyer M.G., Heywood K.J., **Smith W.O.**
Journal	Geophysical Research Letters, 52(3): e2024GL111264 (2025)
Link	https://doi.org/10.1029/2024GL111264
Summary	This article used data from a glider to highlight the magnitude of the summer bloom in the Ross Sea.

Back to topic list

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

Title	Nutrient management offsets the effect of deoxygenation and warming on nitrous oxide emissions in a large US estuary
Author(s)	Tang W., Da F., Tracey J.C., Intrator N., Kunes M.A., Lee J.A., Wan X.S., Jayakumar A., **Friedrichs M.A.M.**, Ward B.B.
Journal	Science Advances, 10(51): eadq5014 (2025)
Link	https://doi.org/10.1126/sciadv.adq5014
Summary	Estuarine warming and deoxygenation increase N_2O production from nitrification and denitrification. In Chesapeake Bay, tracer experiments show N_2O emissions rise sharply with lower O_2 and higher temperatures. Yet modeled N_2O emissions decline due to reduced nutrient inputs, highlighting nutrient management's critical role in mitigating greenhouse gas emissions.

Title	Climate change and variability drive increasing exposure of marine heatwaves across US estuaries
Author(s)	**Nardi R.U.***, **Mazzini P.L.F.**, Walter R.K.
Journal	Scientific Reports, 15(1): art no. 7831 (2025)
Link	https://doi.org/10.1038/s41598-025-91864-6
Summary	We analyzed a temperature dataset spanning over two decades and concluded that long-term climate-change-driven warming is driving more frequent MHWs along the East Coast. If trends continue, this region will be in a MHW state for ~ 1/3 of the year by the end of the century.

Back to topic list

Marine & Estuarine Ecology

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

Title	Long-term data reveal widespread phenological change across major US estuarine food webs
Author(s)	Fournier R.J., Colombano D.D., **Latour R.J.**, Carlson S.M., Ruhi A.
Journal	Ecology Letters, 27(12): e14441 (2024)
Link	https://doi.org/10.1111/ele.14441
Summary	Based on >2000 long-term, monthly time-series of phytoplankton, zooplankton, and fish from the San Francisco, Chesapeake, and Massachusetts bays, shifts in peak abundance varied across taxonomic groups. Planktonic taxa largely advanced their phenologies, while patterns were more variable for fishes. These divergent patterns illustrate the potential for climate-driven trophic mismatches.

Title	Physiological effects of acute exposure to acidification conditions in embryos of the American lobster (*Homarus americanus*)
Author(s)	**Sisti A.R.***, **Jellison B.M.**, **Shields J.D.**, **Rivest E.B.**
Journal	Journal of Experimental Marine Biology and Ecology, 585: art no. 152095 (2025)
Link	https://doi.org/10.1016/j.jembe.2025.152095
Summary	The American lobster, *Homarus americanus*, was used to determine the relationship between acute exposures of carbonate chemistry and physiology at different points in embryogenesis. Several physiological variables were measured in association with decreasing pH. However, pH had no effect on the oxygen consumption rate, heart rate, or Ferric-Reducing Antioxidant Potential of embryos after 24 hours of exposure.

Back to topic list

Modeling

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

Title	Impact of offshore wind farm monopiles on hydrodynamics interacting with wind-driven waves
Author(s)	Hosseini S.T., Pein J., Staneva J., **Zhang Y.J**., Stanev E.
Journal	Ocean Modelling, 195: art no. 102521 (2025)
Link	https://doi.org/10.1016/j.ocemod.2025.102521
Summary	This paper investigates the local and regional impact of offshore wind farm (OWF) foundations on hydrodynamics in interaction with wind-induced waves at the Meerwind-OWF site (German Bight, North Sea) on tidal and monthly time scales. For this purpose, a 3D high-resolution coupled circulation-wave model based on unstructured grids is employed, which enables an effective transition in resolution from ~2 km in marine open boundaries to ~2 m near the foundations.

Title	Cross-scale prediction for the Laurentian Great Lakes
Author(s)	**Zhang Y.J.**, Anderson J., Wu C.H., Beletsky D., Liu Y., Huang W., Anderson E.J., Moghimi S., Myers E.
Journal	Ocean Modelling, 194: 102512 (2025)
Link	https://doi.org/10.1016/j.ocemod.2025.102512
Summary	In this paper, all five Great Lakes are simulated using a 3D baroclinic model using a single, seamless unstructured mesh without nesting, including adjacent flood plains and watershed inflows to better connect the hydrodynamic model to the hydrologic model. The new model can potentially serve as a base to unify Great Lakes modeling while simultaneously providing flexibility for site specific studies in any areas of interest.

Back to topic list

Title	Exploring the impact of the widely introduced Pacific oyster *Magallana gigas* on the dispersal of *Bonamia* (Haplosporida): A global snapshot
Author(s)	Hill-Spanik K.M., Rothkopf H., Strand A.E., **Carnegie R.B.**, Carlton J.T., Couceiro L., Crooks J.A., Endo H., Hori M., Kamiya M., Kanaya G., Kochmann J., Lee K.-S., Lees L., Nakaoka M., Pante E., Ruesink J.L., Schwindt E., Strand Å., Taylor R., Terada R., Thiel M., Yorisue T., Zacherl D., Sotka E.E.
Journal	Diseases of Aquatic organisms, 161: pg. 39-46 (2025)
Link	https://doi.org/10.3354/dao03834
Summary	The work presented here assessed over 900 Pacific oysters, from global collections, to determine the degree of infection by the pathogen *Bonamia exitiosa*, for insight into the possibility that the pathogen co-dispersed globally with this oyster. Limited infection of Pacific oysters was observed, but the work suggests a role for oyster introductions in bringing *B. exitiosa* to California.

Title	Decreases in TBT concentrations in southern Chesapeake Bay: Evidence for long-term TBT degradation and reduced imposex in the invasive gastropod, *Rapana venosa*
Author(s)	**Unger M.A.**, **Harvey E.**, **Southworth M.**, **Mann R.**, **Marquardt A.R.***, **Otto N.**
Journal	Marine Pollution Bulletin, 212: art no. 117524 (2025)
Link	https://doi.org/10.1016/j.marpolbul.2024.117524
Summary	Concern over adverse environmental effects from the use of tributyltin (TBT) antifoulant paints in the 1980's led to regulations restricting TBT use worldwide. Our study compares recent and historical monitoring data and shows that regulations have been successful at reducing TBT levels and effects in southern Chesapeake Bay.

Title	Oyster allometry: Growth relationships vary across space
Author(s)	**Marquardt A.R.***, **Southworth M.**, **Mann R.**
Journal	Journal of the Marine Biological Association of the United Kingdom, 104: e119 (2024)
Link	https://doi.org/10.1017/S0025315424001140
Summary	This project aimed to: (1) describe the proportional carbonate contributions from each valve and (2) examine length–weight relationships for shell and tissue across an estuarine gradient. Our findings suggest that oyster exhibit allometric growth and substantial inter-reef variability in shell and tissue production, which is influenced by environmental conditions.

Back to topic list