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Virginia Institute of Marine Science

Research Digest

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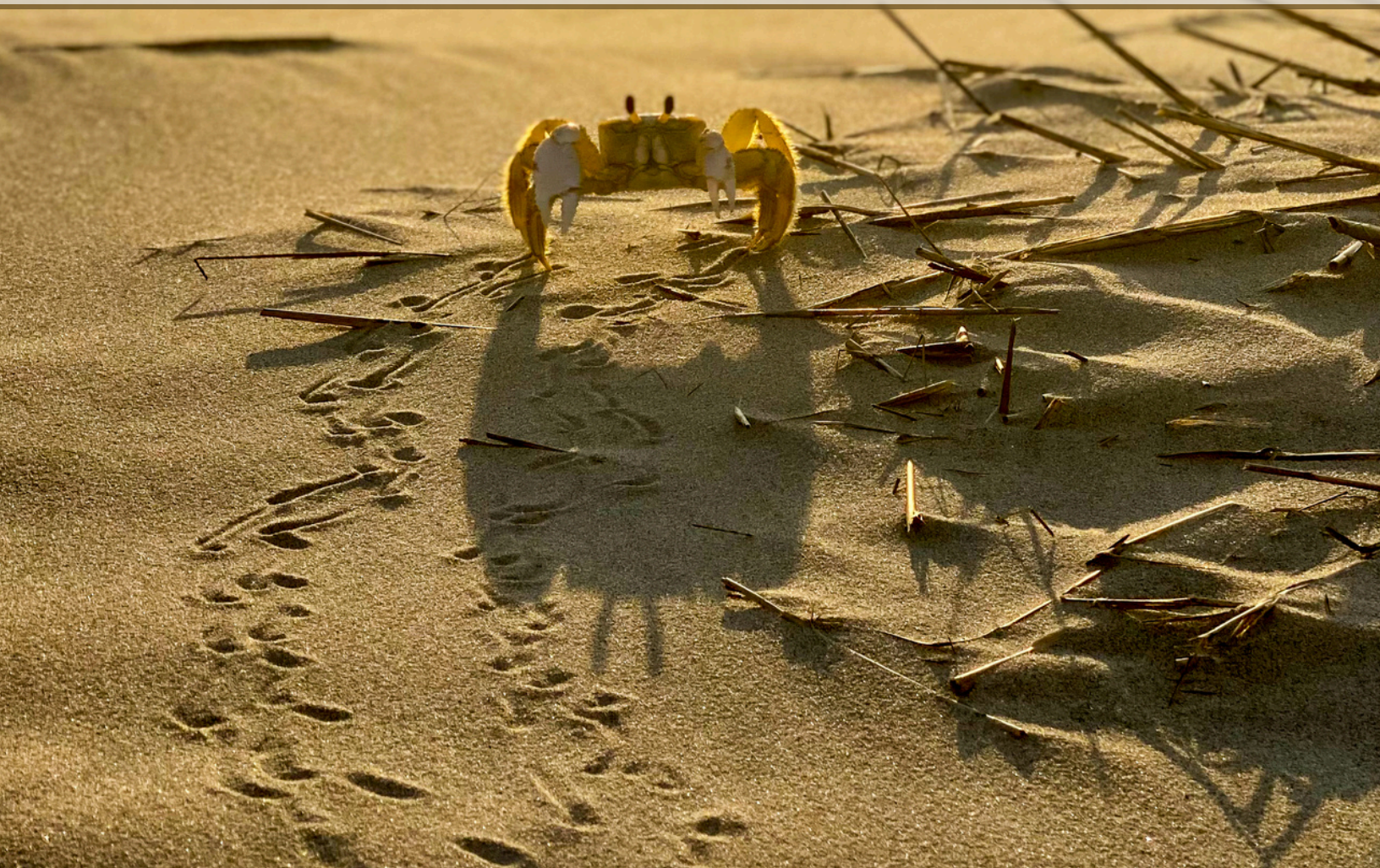

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VIMS authors in this issue

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

Fish & Fisheries

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

Title	New paddlefishes (*Acipenseriformes, Polyodontidae*) from the Late Cretaceous Tanis Site of the Hell Creek Formation in North Dakota, USA
Author(s)	**Hilton E.J.**, During M.A.D., Grande L., Ahlberg P.E.
Journal	Journal of Paleontology, 97(3): 675-692 (2023)
Link	https://doi.org/10.1017/jpa.2023.19
Summary	This paper described two new species of paddlefishes that, along with sturgeons described in a companion paper, are from a period of evolutionary transition for the North American fish fauna, and were recovered from a site in the Late Cretaceous Hell Creek Formation (66 Ma) thought to record when the Chicxulub asteroid struck off the Yucatan coast, causing one of Earth's great extinction events.

Title	Modeling the distribution of Atlantic Croaker and Spot in a dynamic seascape using metabolic scope
Author(s)	**Marcek B.J.**, Humston R., **Fabrizio M.C.**, **Shen J.**, **Brill R.W.**
Journal	Estuaries and Coasts, 47: 258–275 (2024)
Link	https://doi.org/10.1007/s12237-023-01240-8
Summary	The authors used physiological information on hypoxia tolerance and thermal preference of two fishes to build an individual-based model of movement in Chesapeake Bay. The authors concluded that the fishes observed spatial distribution in Chesapeake Bay results from a response to dissolved oxygen, temperature, and additional factors that were not considered in the model like the distribution of their prey.

Title	Improving electronic reporting rates in the U.S. recreational fishery for Atlantic Bluefin Tuna
Author(s)	Goldsmith W.M., **Scheld A.M.**, McGuire C., Lobue C.
Journal	North American Journal of Fisheries Management, 43: 893-907 (2023)
Link	https://doi.org/10.1002/nafm.10929
Summary	This research investigated non-compliance in the Atlantic bluefin tuna recreational fishery, finding that the majority of individuals do not comply with mandatory reporting regulations. Limited differences were found between individuals who do and do not comply, though several strategies were identified to increase compliance rates. Interestingly, awareness of the reporting requirement does not appear to be a driver of non-compliance.

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Title	Mortality and histopathology in sheepshead minnow (*Cyprinodon variegatus*) larvae exposed to pectenotoxin-2 and *Dinophysis acuminata*
Author(s)	**Gaillard S.**, Réveillon D., **Mason P.L.**, **Ayache N.**, **Sanderson M.**, **Smith J.L.**, Giddings S., McCarron P., Séchet V., Hégaret H., Hess P., **Vogelbein W.K.**
Journal	Aquatic Toxicology, 257: 106456 (2023)
Link	https://doi.org/10.1016/j.aquatox.2023.106456
Summary	This study shows the negative effects of *Dinophysis* toxin pectenotoxin-2 (250 nM) on *Cyprinodon variegatus* gills, leading to respiratory and osmoregulation alterations and mortality. The interaction between pectenotoxin-2 and actin is the potential cause for these damages.

Title	Genomic data resolve long-standing uncertainty by distinguishing white marlin (*Kajikia albida*) and striped marlin (*K. audax*) as separate species
Author(s)	**Mamoozadeh N.R.***, **Graves J.E.**, Bealey R., Schratwieser J., Holdsworth J.C., Ortega-Garcia S., **McDowell J.R.**
Journal	ICES Journal of Marine Science, 80(6): 1802-1813 (2023)
Link	https://doi.org/10.1093/icesjms/fsad114
Summary	The goal of this study was to determine whether white marlin (*Kajikia albida*) and striped marlin (*K. audax*) comprise separate species or populations of a single globally distributed species. Results based on 2520 genetic markers in over 300 samples were consistent with separate species. Our results support management efforts by identifying genetic markers that can be used for unambiguous species discrimination.

Title	Design and redesign of a bottom trawl survey in Chesapeake Bay, USA.
Author(s)	**Latour R.J.**, **Gartland J.**, **Bonzek C.F.**
Journal	Frontiers in Marine Science, 10: 1217792 (2023)
Link	https://doi.org/10.3389/fmars.2023.1217792
Summary	This case study details the redesign of a Chesapeake Bay bottom trawl survey, with a focus on enhancing data collection for fisheries management. It highlights the integration of a new survey trawl and vessel, and offers insights on adapting fisheries-independent surveys to stock assessment and management needs.

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Title	Compensatory mechanisms absorb regional carbon losses within a rapidly shifting coastal mosaic
Author(s)	**Smith A.J.***, McGlathery K., **Chen Y.**, Ewers Lewis C.J., Doney S.C., Gedan K., LaRoche C.K., Berg P., Pace M.L., Zinnert J.C., **Kirwan M.L.**
Journal	Ecosystems, 27: 122–136 (2024)
Link	https://doi.org/10.1007/s10021-023-00877-7
Summary	We synthesize carbon stocks, accumulation rates, and regional land cover data over 36 years for the coastal landscape of the Virginia Eastern Shore. We found that rapid losses and gains within individual ecosystems largely offset each other, which resulted in relatively stable areas for the different ecosystems, and a 4% (196.9 Gg C) reduction in regional carbon storage.

Title	The roles of tidal marshes in the estuarine biochemical processes: A numerical modeling study
Author(s)	**Cai X.***, **Shen J.**, **Zhang Y.J.**, **Qin Q.**, Linker L.
Journal	Journal of Geophysical Research: Biogeosciences, 128(2): e2022JG007066 (2023)
Link	https://doi.org/10.1029/2022JG007066
Summary	The authors embedded a marsh model – simulating the ecological functions of marshes at tidal, seasonal, and annual time-scales – inside SCHISM-ICM. The model simulates the growth and metabolism of tidal marshes and links biological processes to nutrient dynamics in the water column and sediment.

Title	Wet and dry climate regimes impact particulate organic matter quality in a low-inflow subtropical estuary
Author(s)	Douglas S.V., Xue J., **Hardison A.K.**, Liu Z.
Journal	Estuaries and Coasts, 46: 2076-2092 (2023)
Link	https://doi.org/10.1007/s12237-023-01235-5
Summary	We measured the water column particulate organic matter (POM) in south Texas estuaries. POM is the base of the food web in most aquatic ecosystems. This 8-year dataset spanned floods, droughts, and a category 5 hurricane. We captured important shifts in POM availability and nutritional quality, which may have ecosystem-level effects.

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Title	Geochemical factors impacting nitrifying communities in sandy sediments
Author(s)	**Wilson S.J.**, **Song B.**, **Anderson I.C.**
Journal	Environmental Microbiology, 25(12): 3180-3191 (2023)
Link	https://doi.org/10.1111/1462-2920.16504
Summary	This study explores microbial dynamics in sandy subterranean estuaries (STEs), focusing on nitrifying communities. Using molecular methods, it reveals seasonal stability but significant depth-dependent variation aligned with geochemical profiles. Key drivers include dissolved inorganic nitrogen, oxygen, and pH, highlighting microbial roles in biogeochemistry and nutrient cycling along the land-ocean continuum.

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Title	A parallel Python-based tool for meshing watershed rivers at continental scale
Author(s)	**Ye F.**, **Cui L.**, **Zhang Y.**, **Wang Z.**, Moghimi S., Myers E., Seroka G., Zundel A., Mani S., Kelley J.G.W.
Journal	Environmental Modelling and Software, 166: 105731 (2023)
Link	https://doi.org/10.1016/j.envsoft.2023.105731
Summary	A new Python utility for constructing unstructured grids aids in simulating compound floods, enabling small river mapping on a vast scale. It leverages DEMs to improve terrain feature depiction in grids, which supports accurate, detailed studies. When applied to the Eastern and Gulf Coasts of the United States, it markedly improves water flow dynamics in a three-dimensional creek-to-ocean forecast model.

Title	Effects of basin-scale climate modes and upwelling on nearshore marine heatwaves and cold spells in the California Current
Author(s)	Dalsin M., Walter R.K., **Mazzini P.L.F.**
Journal	Scientific Reports, 13: 12389 (2023)
Link	https://doi.org/10.1038/s41598-023-39193-4
Summary	A rare data set, consisting of over four decades of continuous in situ temperature measurements in a nearshore area of the US west coast, is analyzed to investigate how coastal upwelling and climate modes of variability such as El Niño (MEI) and Pacific Decadal Oscillation (PDO), affect extremely warm/cold temperature events, called Marine Heatwaves (MHWs) / Maine Cold Spells (MCSs).

Title	Author correction: Effects of basin-scale climate modes and upwelling on nearshore marine heatwaves and cold spells in the California Current
Author(s)	Dalsin, M., Walter, R.K. & **Mazzini, P.L.F.**
Journal	Scientific Reports, 13: 15827 (2023)
Link	https://doi.org/10.1038/s41598-023-42864-x
Summary	The original version of this article contained an error in the Methods section, under the subheading ‘Site description’, where the coordinates of the temperature measurement location were incorrect. It now reads: “Data were collected in a shallow (~ 3 m nominal depth) nearshore site adjacent to the Diablo Canyon nuclear power plant (35.2055°N, 120.8500°W; Fig. 8).”

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Title	A global unstructured, coupled, high-resolution hindcast of waves and storm surge
Author(s)	Mentaschi L., Vousdoukas M.I., García-Sánchez G., Fernández-Montblanc T., Roland A., Voukouvalas E., Federico I., Abdolali A., **Zhang Y.J.**, Feyen L.
Journal	Frontiers in Marine Science, 10: 1233679 (2023)
Link	https://doi.org/10.3389/fmars.2023.1233679
Summary	Accurate information on waves and storm surges is essential to understand coastal hazards. Despite the recent advancement in development and application of large-scale coastal models, nearshore processes are still not sufficiently resolved due to coarse resolutions. Here we developed a 73-year hindcast of waves and storm surges on an unstructured mesh of >650,000 nodes with an unprecedented resolution of 2-4 km at the global coast.

Title	Barotropic and baroclinic tides increase primary production on the Northwest European Shelf
Author(s)	Kossack J., Mathis M., Daewel U., **Zhang Y.J.**, Schrum C.
Journal	Frontiers in Marine Science, 10: 1206062 (2023)
Link	https://doi.org/10.3389/fmars.2023.1206062
Summary	We utilize the flexible cross-scale modeling capabilities of the novel coupled hydrodynamic–biogeochemical modeling system SCHISM–ECOSMO to quantify the tidal impacts on primary production on the NWES. We assess the impact of both the barotropic tide and the kilometrical-scale internal tide field explicitly resolved in this study by comparing simulated hindcasts with and without tidal forcing.

Title	Editorial: Eddy-current interactions in the ocean and their impacts on climate, ecology, and biology
Author(s)	Nan F., Zhai F., Zhu X., **Wang Z.**
Journal	Frontiers in Marine Science, 10: 1243578 (2023)
Link	https://doi.org/10.3389/fmars.2023.1243578
Summary	We studied the effects of eddy-current interaction on the changes of physical environment for the ocean ecosystem as well as the subsequent biological processes impacted by the changes that can lead to enhanced primary productivity in the ocean.

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Title	Investigating conspecific CsRV1 transmission in *Callinectes sapidus*
Author(s)	Lively J.A., Spitznagel M.I., Schott E.J., **Small H.J.**
Journal	Journal of Invertebrate Pathology, 20: 107987 (2023)
Link	https://doi.org/10.1016/j.jip.2023.107987
Summary	A reo-like virus, CsRV1, causes mortality of blue crabs during softshell production. The current study examined the roles of predation or scavenging in virus transmission. Preparing the virus in alginate was found to be an effective method of presenting the same homogenous sample of virus for oral challenge experiments.

Title	Parasite manipulation of host phenotypes inferred from transcriptional analyses in a trematode-amphipod system
Author(s)	Rand D.M., Nunez J.C.B., Williams S., Rong S., Burley J.T., Neil K.B., Spierer A.N., McKerrow W., **Johnson D.S.**, Raynes Y., Fayton T.J., Skvir N., Ferranti D.A., Zeff M.G., Lyons A., Okami N., Morgan D.M., Kinney K., Brown B.R.P., Giblin A.E., Cardon Z.G.
Journal	Molecular Ecology, 32(18): 5028-5041(2023)
Link	https://doi.org/10.1111/mec.17093
Summary	Salt marshes are home to small crustaceans called amphipods. They are brown, which helps them camouflage against the mud and under plants. When infected by a parasitic worm called a trematode, they turn bright orange and walk around exposed. This behavior makes them obvious to predators. In our study, we show the molecular mechanisms that allow the parasite to manipulate the amphipod.

Title	Co-occurrence of marine and freshwater phycotoxins in oysters, and analysis of possible predictors for management
Author(s)	**Pease S.K.D.***, **Reece K.S.**, **Sanderson M.P.**, **Onofrio M.D.***, **Huang I.S.W.**, **Scott G.P.**, **Smith J.L.**
Journal	Toxicon: X, 19: 100166 (2023)
Link	https://doi.org/10.1016/j.toxcx.2023.100166
Summary	Eleven of twelve HAB toxins of concern to human and/or oyster health were monitored in Virginia oysters. In 84% toxins were detected and two more toxins were found in 54%. Although, toxins of human health concern were very low, future monitoring to protect shellfish and human health is warranted.

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Title	Fine-scale population structure of the northern hard clam (*Mercenaria mercenaria*) revealed by genome-wide SNP markers
Author(s)	**Ropp A.J.***, **Reece K.S.**, **Snyder R.A.**, **Song J.***, **Biesack E.E.**, **McDowell J.R.**
Journal	Evolutionary Applications, 16: 1422-1437 (2023)
Link	https://doi.org/10.1111/eva.13577
Summary	Genetic analysis of wild hard clams collected from Prince Edward Island, Canada to South Carolina, USA using an advanced genotyping by sequencing technique enabled identification of six genetically different populations. Previously unrecognized differences were observed including a distinction between clams within Chesapeake Bay and those along the mid-Atlantic coast.

The following collection of papers examines temporal, spatial and sex-specific growth among Arctica islandica populations along the mid-Atlantic coast, including a fossil component dating back up to 4000y, with implications for retrospective and prospective climate change studies.

Title	Examination of spatial heterogeneity in population age frequency and recruitment in the ocean quahog (*Arctica islandica Linnaeus 1767*)
Author(s)	Sower J.R., Powell E.N., **Mann R.**, Hemeon K.M., Pace S.M., **Redmond T.E.**
Journal	Marine Biology, 170: art no. 38 (2023)
Link	https://doi.org/10.1007/s00227-023-04184-6
Summary	Article 1 of 5 - Age and length frequencies of two populations collected from New Jersey were analyzed and compared to two other populations from Long Island and Georges Bank. Sex-specific differences were also analyzed to determine how spatial and temporal differences influenced a range of demographic metrics. Though some similarities in recruitment trends exist, likely caused by large-geographic-scale environmental conditions, each site contains a distinct population with distinct demographics.

Title	Regional growth rates and growth synchronicity between two populations of Arctica islandica in the western Mid-Atlantic (US)
Author(s)	Hemeon K.M., Powell E.N., Klinck J.M., **Mann R.**, Pace S.M.
Journal	Estuarine, Coastal and Shelf Science, 291: 108412 (2023)
Link	https://doi.org/10.1016/j.ecss.2023.108412
Summary	Article 2 of 5 - *Arctica islandica* supports an important fishery in the US Mid-Atlantic. Understanding regional growth dynamics over time and growth responses to changing environments will improve current fishery assessments. Two populations of *A. islandica*, from Georges Bank and off Long Island on the US continental shelf with observed ages between 17 and 310 y, were evaluated for age-at-length relationships and growth trends over time.

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Title	Taphonomic indicators of dead ocean quahog (Arctica islandica) shell age in the death assemblage of the Mid-Atlantic Bight continental shelf
Author(s)	Leclaire A.M., Powell E.N., **Mann R.**, **Redmond T.E.**
Journal	Palaios, 38 (7): 305–314 (2023)
Link	https://doi.org/10.2110/palo.2022.030
Summary	Article 3 of 5 - *Arctica islandica* is a relatively widespread bivalve in the North Atlantic, with an extended lifespan that often exceeds two hundred years; hence, their shells are often studied to evaluate climate change over time. This report evaluates taphonomic age of 117 *A. islandica* shells collected from the Mid-Atlantic Bight offshore of the Delmarva Peninsula.

Title	Ocean quahog (*Arctica islandica*) growth rate analyses of four populations from the Mid-Atlantic Bight and Georges Bank
Author(s)	Sower J.R., Powell E.N., Hemeon K.M., **Mann R.**, Pace S.M.
Journal	Continental Shelf Research, 265: 105076 (2023)
Link	https://doi.org/10.1016/j.csr.2023.105076
Summary	Article 4 of 5 - Growth rates of *Arctica islandica* from New Jersey were analyzed and compared to animals obtained from Long Island and Georges Bank. NJ represents the southern portion of the *A. islandica* stock in the Mid-Atlantic Bight, and animals here may experience warmer temperatures compared to their northern counterparts, potentially due to increasing bottom water temperatures and leading to fewer years for reproduction prior to recruiting into the fishery.

Title	Population dynamics of Arctica islandica off Long Island (USA): An analysis of sex-based demographics and regional comparisons
Author(s)	Hemeon K.M., Powell E.N., Pace S.M., **Mann R.**, **Redmond T.E.**
Journal	Marine Biology, 170: art no. 34 (2023)
Link	https://doi.org/10.1007/s00227-023-04176-6
Summary	Article 5 of 5 - This study supports evidence that *A. islandica* is sexually dimorphic. Earlier assumptions of prolonged lapses in recruitment were not substantiated for either the Georges Bank or Long Island populations; yearly cohorts were observed for the past century, and both populations presented recruitment pulses in approximately 8-y periods.

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Chapter title	Estuarine seagrass and climate change
Author(s)	**Moore K.A.**, Jarvis J.C.
Book	Climate Change and Estuaries (1st ed.). CRC Press. 2023. pp. 401-429
Link	https://doi.org/10.1201/9781003126096-23
Summary	This article provides a comprehensive review of the relationships between estuarine submersed angiosperms or seagrass and climate change. It highlights the range of seagrass communities found along estuarine salinity gradients, and the important interactions between climate factors and anthropogenic factors. Management approaches and new scientific knowledge needed to improve restoration and resiliency are also highlighted.

Title	The dynamics of seagrass Ecosystems: History, past accomplishments, and future prospects
Author(s)	**Orth R.J.**, Heck K.L.
Journal	Estuaries and Coasts, 46: 1653-1676 (2023)
Link	https://doi.org/10.1007/s12237-023-01252-4
Summary	The goal of this perspective is to review how seagrass research has evolved over the past half century to our current state of knowledge. We review how our knowledge of seagrass ecosystems changed from the pre-1970s, when so little was known about seagrasses and how it progressed during the next 5 decades when seagrass knowledge rapidly expanded.

Title	The cycle of seagrass life: From flowers to new meadows
Author(s)	Kendrick G.A., Cambridge M.L., **Orth R.J.**, Fraser M.W., Hovey R.K., Statton J., Pattiaratchi C.B., Sinclair E.A.
Journal	Ecology and Evolution, 13(9): e10456 (2023)
Link	https://doi.org/10.1002/ece3.10456
Summary	Understanding sexual reproduction and recruitment in seagrasses is crucial to their conservation and restoration. The article presents data on multiple years of flowering and seed production and potential causes for the annua variability in seedling success.

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Title	Prenatal exposure to replacement flame retardants and organophosphate esters and childhood adverse respiratory outcomes
Author(s)	Mendy A., Percy Z., Braun J.M., Lanphear B., **La Guardia M.J.**, **Hale R.C.**, Yolton K., Chen A.
Journal	Environmental Research, 240: art no. 117523 (2023)
Link	https://doi.org/10.1016/j.envres.2023.117523
Summary	The relationship of childhood adverse respiratory outcomes to flame-retardants (FRs) exposure was explored.

Title	Exposure to dust organophosphate and replacement brominated flame retardants during infancy and risk of subsequent adverse respiratory outcomes
Author(s)	Mendy A., Percy Z., Braun J.M., Lanphear B., **La Guardia M.J.**, **Hale R.C.**, Yolton K., Chen A.
Journal	Environmental Research, 235: art no. 116560 (2023)
Link	https://doi.org/10.1016/j.envres.2023.116560
Summary	Flame retardants are incorporated into nearly all polymer-based consumer products to prevent the start or to retard the progression of fire. Migrating from indoor products, FRs have become ubiquitous environmental toxicants, disrupting human and environmental health.

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Title	Five years measuring the muck: Evaluating interannual variability of nutrient loads from tidal flooding
Author(s)	Macías-Tapia A., Mulholland M.R., Selden C.R., **Loftis J.D.**, Bernhardt P.W.
Journal	Estuaries and Coasts, 46: 1756-1776 (2023)
Link	https://doi.org/10.1007/s12237-023-01245-3
Summary	Tidal flooding, driven by sea level rise, contributes significant dissolved nutrients and Enterococcus to coastal waterways. Catch the King and Measure the Muck monitored king tides (2017-2021) in Chesapeake Bay, and found that nutrient loads exceeded annual limits. Enterococcus often surpassed recreational thresholds, worsening eutrophication, coastal ecosystems, and economies.

Title	Impacts and uncertainties of climate-induced changes in watershed inputs on estuarine hypoxia
Author(s)	**Hinson K.E.***, **Friedrichs M.A.M.**, Najjar R.G., Herrmann M., Bian Z., Bhatt G., **St-Laurent P.**, Tian H., Shenk G.
Journal	Biogeosciences, 20(10): 1937-1961 (2023)
Link	https://doi.org/10.5194/bg-20-1937-2023
Summary	Climate change impacts on land will impact nutrient runoff to coastal marine areas, affecting water quality and dissolved oxygen levels. A multitude of climate projections in the Chesapeake Bay watershed were analyzed using numerical models, and found that numerous factors contributed to estimates of uncertainty in future Chesapeake Bay hypoxia.

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Additional Topics

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

Topic	**Coastal Geology**
Title	Sediment exchange across coastal barrier landscapes alters ecosystem extents
Author(s)	Reeves I.R.B., Moore L.J., **Valentine K.***, Fagherazzi S., **Kirwan M.L.**
Journal	Geophysical Research Letters, 50 (14): e2023GL103680 (2023)
Link	https://doi.org/10.1029/2023GL103680
Summary	Connectivity of water, organisms, and sediment is generally thought to increase the resilience of ecosystems to disturbance. We apply concepts of connectivity in ecological theory to the broader coastal landscape, which is comprised of barrier islands, marshes, seagrass meadows, mudflats, and coastal forests.

Topic	**Mentorship & Collaboration**
Title	Better together: Early career aquatic scientists forge new connections at ECO-DAS XV
Author(s)	Graham O.J., Al-Haj A., Arrington E.C., Arsenault E.R., Barbosa C.C., Bice K., Brahmstedt E., Bryant S.R.D., Cai X., Calhoun-Grosch S., Culpepper J., Dale K., **Detweiler D.J.***, Doughty K.D., Emery K.A., Gadeken K., Griffiths L., Hosseini A., Jones C., Miraly H., Mott A.W., Münzner K., Ogashawara I., Olson C.R., Rabaey J.S., Rich W.A., Rogers P.A., Seeley M.E., Selak L., Shangguan Q., Solomon K.J., Sun X., Tassone S.J., Thellman A., Tracey J., **Xiong J.***, Xue T.
Journal	Limnology and Oceanography Bulletin, 32(3): 119-121 (2023)
Link	https://doi.org/10.1002/lob.10585
Summary	The University of Hawai'i at Manoa hosted the 2023 Ecological Dissertations in Aquatic Sciences (Eco-DAS) program, which brought together a team of early career aquatic ecologists for a week of networking and collaborative, interdisciplinary project development centered around the themes of bridging divides, integrating global and local perspectives, mentorship and collaboration, novel tools for aquatic monitoring, environmental stressors, equity and access to big data, and precise, shared language.

Topic	**Diversity, Equity, Inclusion & Belonging**
Title	Building an inclusive wave in marine science: Sense of belonging and Society for Women in Marine Science symposia
Author(s)	Canfield K.N., Sterling A.R., Hernández C.M., Chu S.N., Edwards B.R., Fontaine D.N., Freese J.M., Giroux M.S., Jones A.E., **McCarty A.J.**, Morrissette H.K., Palevsky H.I., Raker C.E., Robuck A.R., Serrato Marks G., Thibodeau P.S., Windle A.E.
Journal	Progress in Oceanography, 218: 103110
Link	https://doi.org/10.1016/j.pocean.2023.103110
Summary	We used quantitative analysis of the open-ended survey questions to examine the demographics of attendees and their fields of study. Qualitative thematic analysis identified the most effective aspects of the symposia, areas of logistical and content improvement for future symposia, and emphasized the unique challenges women in marine science experience.

Additional Topics *(cont.)*

Topic	**Phycology**
Title	Red macroalgae in the genomic era
Author(s)	Borg M., **Krueger-Hadfield S.A.**, Destombe C., Collén J., Lipinska A., Coelho S.M.
Journal	New Phytologist, 240(2): 471-488 (2023)
Link	https://doi.org/10.1111/nph.19211
Summary	Borg et al. highlights the role red algae have played in eukaryotic evolution and the emerging genetic resources in this understudied group of organisms.

Topic	**Phycology**
Title	The Rhodoexplorer Platform for red algal genomics and whole-genome assemblies for several *Gracilaria* species
Author(s)	Lipinska A.P., **Krueger-Hadfield S.A.**, Godfroy O., Dittami S.M., Ayres-Ostrock L., Bonthond G., Brillet-Gueguen L., Coelho S., Corre E., Cossard G., Destombe C., Epperlein P., Faugeron S., Ficko-Blean E., BeltrÃ¡n J., Lavaut E., Le Bars A., Marchi F., Mauger S., Michel G., Potin P., Scornet D., Sotka E.E., Weinberger F., Cabral De Oliveira M., Guillemin M.L., Plastino E.M., Valero M.
Journal	Genome Biology and Evolution, 15(7): evad124 (2023)
Link	https://doi.org/10.1093/gbe/evad124
Summary	Lipinska et al. provides four *Gracilaria* genomes and a platform for comparative genomics.

Topic	**Plankton**
Title	Mixoplankton and mixotrophy: Future research priorities
Author(s)	**Millette N.C.**, Gast R.J., Luo J.Y., Moeller H.V., Stamieszkin K., Andersen K.H., Brownlee E.F., Cohen N.R., Duhamel S., Dutkiewicz S., Glibert P.M., Johnson M.D., Leles S.G., Maloney A.E., McManus G.B., Poulton N., Princiotta S.D., Sanders R.W., Wilken S.
Journal	Journal of Plankton Research, 45(4): 576-596 (2023)
Link	https://doi.org/10.1093/plankt/fbad020
Summary	Mixotrophic plankton use photosynthesis and prey ingestion to grow, challenging our view of plankton as simply phytoplankton and zooplankton. Unfortunately, research on mixoplankton in aquatic systems significantly lags behind research on zooplankton and phytoplankton. In this paper, 19 experts on mixoplankton outlined five top research priorities that would make substantial advances in this field.

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Additional Topics *(cont.)*

Topic	**Sea-Level Rise**
Title	Modeling the mechanisms of conifer mortality under seawater exposure
Author(s)	Ding J., McDowell N., Fang Y., Ward N., **Kirwan M.L.**, Regier P., Megonigal P., Zhang P., Zhang H., Wang W., Li W., Pennington S.C., Wilson S.J., Stearns A., Bailey V.
Journal	New Phytologist, 239(5): 1679-1691 (2023)
Link	https://doi.org/10.1111/nph.19076
Summary	This work created a numerical model of coastal tree mortality that provides a mechanistic understanding of tree death.

Topic	**Shorelines, Satellite Imagery**
Title	Assessment of changes of complex shoreline from medium-resolution satellite imagery
Author(s)	Nezlin N.P., **Herman J.D.**, Hodge J., Sagar S., Bishop-Taylor R., Zheng G., DiGiacomo P.M.
Journal	Estuaries and Coasts, 46: 1723-1739 (2023)
Link	https://doi.org/10.1007/s12237-023-01259-x
Summary	Satellite imagery (10-30m resolution) from 1984-2021 on the Middle Peninsula, Virginia was used to locate shoreline erosion and accumulation. Results showed adequate agreement with analyses using aerial photography from 1937 - 2009. Reasonable disagreement was attributed to differences in analyzed periods and accuracy of land/water edge detection. Erosion dominated shoreline change.

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