

Research Digest



Issue No. 1 (October - December 2021)

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Message from the Associate Dean of Research and Advisory Services

To promote a broader awareness of the breadth of research conducted at VIMS, we issue this first installment of the VIMS Research Digest. As a multi-disciplinary research and education institution, VIMS is the technical advisor to the Commonwealth of Virginia and serves as the graduate school of marine science for William & Mary. VIMS faculty, staff, and students publish over 200 peer-reviewed scientific publications and technical reports, annually. This annotated bibliography provides a listing of the peer-reviewed publications by VIMS authors and co-authors for the final quarter of 2021 (October – December 2021).

We have organized this inaugural version by broad topical research categories, but will consider other arrangements in the future. We are interested in your feedback about content, style, organization, etc. Feel free to distribute this to others that you think may be interested.

Mark W. Luckenbach, Associate Dean



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Title Aquaculture reuse water, genetic line, and vaccination affect rainbow trout (*Oncorhynchus mykiss*) disease susceptibility and infection dynamics (2021) *Frontiers in Immunology*, 12, art. no. 721048.

Authors Everson, J.L., **Jones, D.R., Taylor, A.K., Rutan, B.J.**, Leeds, T.D., Langwig, K.E., **Wargo, A.R.**, Wiens, G.D.

Summary Vaccine efficacy is almost always lower in practice than demonstrated from lab or field trials. In this manuscript, we investigated some of the factors that might shape vaccine efficacy and found that environmental stress (water quality) was an important determinant for fish vaccines in an aquaculture setting.

Access full article: <https://doi.org/10.3389/fimmu.2021.721048>

Title Environmentally-determined production frontiers and lease utilization in Virginia's eastern oyster aquaculture industry (2021) *Aquaculture*, 542, art. no. 736883.

Authors **Beckensteiner, J., Scheld, A.M., St-Laurent, P., Friedrichs, M.A.M.**, Kaplan, D.M.

Summary Oyster aquaculture has rebounded in Virginia in the last decade, associated with an increase in leased area. However, many leases are thought to be underutilized. This study confirmed this, finding many leases could scale up production or reduce their overall size to increase efficiency. In addition, leases in more populated areas were likely to be less efficient than those in less populated areas.

Access full article: <https://doi.org/10.1016/j.aquaculture.2021.736883>

Title Sperm repository for a breeding program of the eastern oyster *Crassostrea virginica*: Sample collection, processing, cryopreservation, and data management plan (2021) *Animals*, 11 (10), art. no. 2836.

Authors Yang, H., Huo, Y., Yee, J.C., Rikard, S., **Walton, W.C.**, Saillant, E.

Summary An oyster breeding program was initiated to support the fast-growing Gulf of Mexico aquaculture industry. Oysters from 17 wild populations were broodstock for the program to maximize genetic diversity with a sperm repository of 102 males. This study demonstrated sperm sample collection, processing, cryopreservation, and a data management plan.

Access full article: <https://doi.org/10.3390/ani11102836>

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(VIMS authors in **bold**)

Title Contrasting stream water temperature responses to global change in the Mid-Atlantic Region of the United States: A process-based modeling study (2021) *Journal of Hydrology*, 601, art. no. 126633.

Authors Yao, Y., Tian, H., Kalin, L., Pan, S., **Friedrichs, M.A.M.**, Wang, J., Li, Y.

Summary A new water transport scheme was incorporated into the Dynamic Land Ecosystem Model to predict spatiotemporal variations of water temperature in 1st order and higher-order streams in the Mid-Atlantic Region from 1900 to 2015. Results show climate change and land use/conversion explain most of the changes in stream water temperature since 1900.

Access full article: <https://doi.org/10.1016/j.jhydrol.2021.126633>

Title Anticipating and adapting to the future impacts of climate change on the health, security and welfare of low elevation coastal zone (LECZ) communities in southeastern USA (2021) *Journal of Marine Science and Engineering*, 9 (11), art. no. 1196.

Authors Allen, T., Behr, J., Bukvic, A., Calder, R.S.D., Caruson, K., Connor, C., D'elia, C., Dismukes, D., Ersing, R., Franklin, R., Goldstein, J., Goodall, J., Hemmerling, S., Irish, J., Lazarus, S., **Loftis, D.**, Luther, M., McCallister, L., McGlathery, K., **Mitchell, M.**, Moore, W., Nichols, C.R., **Nunez, K.**, Reidenbach, M., Shortridge, J., Weisberg, R., Weiss, R., Wright, L.D., Xia, M., Xu, K., Young, D., Zarillo, G., Zinnert, J.C.

Summary Low-elevation coastal zone communities are threatened by physical processes that are linked with socioeconomic consequences. Communities need to address linkages of human and socioeconomic vulnerabilities; public health; economics; land loss; wetland threats; and flooding. This paper reviews background on these issues and offers recommendations for integrating natural and social sciences to enhance resilience.

Access full article: <https://www.mdpi.com/2077-1312/9/11/1196>

Title Climate change drives increased directional movement of landscape ecotones (2021) *Landscape Ecology*, 36 (11), pp. 3105-3116.

Authors **Smith, A.J.**, * **Goetz, E.M.**

Summary Ecotones are boundary zones formed where overlap between neighboring ecosystems creates an intermediate ecosystem with unique ecological characteristics. This study examines how climate change alters movement dynamics of ecotones and finds that directional climate change increases directional movement in multiple types of ecotone.

Access full article: <https://rdcu.be/cCmkO>

Title Asymmetric root distributions reveal press-pulse responses in retreating coastal forests (2021) *Ecology*, 102 (10), art. no. e03468.

Authors **Messerschmidt, T.C., Langston, A.K., Kirwan, M.L.**

Summary The impacts of climate change on ecosystems are manifested in how organisms respond to episodic and continuous stressors. The conversion of coastal forests to salt marshes represents a prominent example of ecosystem state change, driven by the continuous stress of sea level rise (press), and episodic storms (pulse). In this study, researchers observed that adaptation to press stressors increases vulnerability to pulse stressors.

Access full article: <https://doi.org/10.1002/ecy.3468>

Title Coastal setting determines tidal marsh sustainability with accelerating sea-level rise (2021) *Ocean and Coastal Management*, 214, art. no. 105898.

Authors **Nunez, K., Zhang, Y.J., Bilkovic, D.M., Hershner, C.**

Summary This study evaluates the potential impacts of sea level rise on tidal marsh sustainability using an enhanced version of the Tidal Marsh Model. The model provides the highly-resolved simulations of multi-scale processes needed to inform marsh conservation and restoration.

Access full article: <https://doi.org/10.1016/j.ocecoaman.2021.105898>

Title Effect of environmental history on the physiology and acute stress response of the eastern oyster *Crassostrea virginica* (2021) *Marine Ecology Progress Series*, 674, pp. 115-130.

Authors Ashley, J., **Rivest, E.B.**

Summary This study examined environmental history complexities on eastern oyster growth, finding physiology and stress response to be affected by these factors. This study establishes the importance of environmental history factors in determining growth and ability to acclimate to future change.

Access full article: <https://doi.org/10.3354/meps13826>

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Title Delta in the Anthropocene: Multi-scale hydro-morphodynamics and management challenges (2021) Earth-Science Reviews, 223, art. no. 103850.

Authors Guo, L., Zhu, C., Xie, W., Xu, F., Wu, H., Wan, Y., Wang, Z., Zhang, W., **Shen, J.**, Wang, Z.B., He, Q. Changjiang

Summary The Changjiang Delta region is heavily anthropogenically impacted. By reviewing available data, we show how the region has transitioned from an adaptive, net sedimentation estuary to an area experiencing erosion and human-driven radical adjustment. These findings are applicable globally.

Access full article: <https://doi.org/10.1016/j.earscirev.2021.103850>

Title Leveraging the interdependencies between barrier islands and backbarrier saltmarshes to enhance resilience to sea-level rise (2021) Frontiers in Marine Science, 8, art. no. 721904.

Authors **Hein, C.J.**, Fenster, M.S., Gedan, K.B., Tabar, J.R., **Hein, E.A.**, DeMunda, T.

Summary Barrier islands provide a source for sediment to the marsh, and marshes widen the barrier and provide a platform onto which islands may migrate and stabilize. This paper translates science about saltmarsh-barrier couplings into a framework for applying these feedbacks to management of coupled marsh-islands to enhance resiliency of barrier-island systems.

Access full article: <https://doi.org/10.3389/fmars.2021.721904>

Title Mechanisms of pond expansion in a rapidly submerging marsh (2021) Frontiers in Marine Science, 8, art. no. 704768.

Authors Himmelstein, J., Vinent, O.D., Temmerman, S., **Kirwan, M.L.**

Summary Development and expansion of ponds in marshes drives marsh loss globally. We found that coalescence of small ponds drove pond expansion, and that expansion rates are maximized for intermediate ponds. Further, we use an equation to predict temporal change and maximum pond size to provide critical time windows for intervention.

Access full article: <https://doi.org/10.3389/fmars.2021.704768>

Title The effect of coastal landform development on decadal to millennial-scale longshore sediment fluxes: Evidence from the Holocene evolution of the central mid-Atlantic coast, USA (2021) Quaternary Science Reviews, 267, art. no. 107096.

Authors **Shawler, J.L.**, **Hein, C.J.**, **Obara, C.A.***, **Robbins, M.G.***, Huot, S., Fenster, M.S.

Summary This study quantifies the volume and fluxes of sediment trapped in the Assateague-Chincoteague-Wallops barrier-island complex along the Virginia coast and relates these volumes to downdrift coastal-system behavior to understand interactions between updrift coastal landforms and downdrift coastal behavior.

Access full article: <https://doi.org/10.1016/j.quascirev.2021.107096>

Title Molluscan aminostratigraphy of the US Mid-Atlantic Quaternary coastal system: Implications for onshore-offshore correlation, paleochannel and barrier island evolution, and local late Quaternary sea-level history (2021) Quaternary Geochronology, 66, art. no. 101177.

Authors Wehmler, J.F., Brothers, L.L., Ramsey, K.W., Foster, D.S., Mattheus, C.R., **Hein, C.J.**, **Shawler, J.L.**

Summary Sea level along the US Mid-Atlantic has shifted between elevations 10s of meters above present to hundreds of meters below present many times over the past million years. This study clarifies the timing of those changes using new and existing geochronological data from Virginia's Eastern Shore mainland and barrier islands.

Access full article: <https://doi.org/10.1016/j.quageo.2021.101177>

Title Sediment dynamics in the mudbank of the Yangtze River Estuary under regime shift of source and sink (2021) International Journal of Sediment Research.

Authors Zhang, D., Xie, W., **Shen, J.**, Guo, L., Chen, Y., He, Q.

Summary The completion of Three Gorge Dam on the Yangtze River in 2003 changed sediment dynamics in the river. We examined data from 1982 and 2013 and saw that fluvial sediment supply decreased, flood dominance increased, salinity became well-mixed, and tidal range increased in the river's mudbank, causing accelerated shoreline erosion.

Access full article: <https://doi.org/10.1016/j.ijsrc.2021.07.005>

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

Title Biosensor applications in contaminated estuaries: Implications for disaster research response (2022) Environmental Research, 204, art. no. 111893.

Authors Camargo, K., **Vogelbein, M.A.**, Horney, J.A., Dellapenna, T.M., Knap, A.H., Sericano, J.L., Wade, T.L., McDonald, T.J., Chiu, W.A., **Unger, M.A.**

Summary Due to the time input and expense of traditional contamination determination methods, there is a need, especially within disaster research response, to quickly determine priority for further analysis. This study utilized a KinExA Inline Biosensor to include soils and sediments, finding this use valuable for determining priority areas.

Access full article: <https://doi.org/10.1016/j.envres.2021.111893>

Title A pilot study to characterize hand-to-mouth transfer efficiency of organophosphate flame retardants identified in infant products (2021) Human and Ecological Risk Assessment.

Authors Gloekler, L.E., Barlow, C.A., Tvermoes, B., **La Guardia, M.J.**, Sahmel, J.

Summary This study explores flame-retardant (FR) transfers onto human hand surfaces after handling FR treated polyurethane foam-containing infant products, and subsequent transfer to human natural saliva (as a proxy for infant hand-to-mouth exposure). Exposures to FRs may be linked to adverse neurodevelopment effects.

Access full article: <https://doi.org/10.1080/10807039.2021.1989662>

Title Molecular mechanism of oil induced growth inhibition in diatoms using *Thalassiosira pseudonana* as the model species (2021) Scientific Reports, 11 (1), art. no. 19831.

Authors Kamalanathan, M., **Mapes, S.***, Hillhouse, J., Claflin, N., Leleux, J., Hala, D., Quigg, A.

Summary The 2010 Deepwater Horizon oil-spill exposed microbes of Gulf of Mexico to an unprecedented amount of oil. This study investigates the mechanisms underpinning reduced growth and photosynthesis rates during oil exposure in a model diatom species, *T. pseudonana*. Results show severe impairment to the light-harvesting complex and light absorption processes.

Access full article: <https://www.nature.com/articles/s41598-021-98744-9>

Title IgM-bearing B cell affinity subpopulations possess differential antigen sensitivity in rainbow trout (2021) Fish and Shellfish Immunology, 118, pp. 111-118.

Authors Ye, J., Li, L., Duan, C., Wu, L., Tu, X., **Vogelbein, M.A.**, Bromage, E., **Kaattari, S.L.**

Summary The need for accurate assessments of in vitro generated antibody prompted examination of the effect of antigen on secreted antibody concentrations and affinities. It was found that the antigen concentrations commonly employed for in vitro stimulation were able to significantly compromise immunoglobulin M titer and affinity estimates in rainbow trout.

Access full article: <https://doi.org/10.1016/j.fsi.2021.08.029>

Title A rapid phenotype change in the pathogen *Perkinsus marinus* was associated with a historically significant marine disease emergence in the eastern oyster (2021) Scientific Reports, 11 (1), art. no. 12872.

Authors **Carnegie, R.B.**, Ford, S.E., **Crockett, R.K.**, Kingsley-Smith, P.R., **Bienlien, L.M.**, **Safi, L.S.L.**, **Whitefleet-Smith, L.A.**, **Burreson, E.M.**

Summary The protozoan parasite *Perkinsus marinus*, which causes dermo disease in *Crassostrea virginica*, is one of the most ecologically important and economically destructive marine pathogens. This study found that the emergence of a unique, hypervirulent *P. marinus* phenotype was associated with the increase in prevalence and intensity of dermo disease and associated mortality in *Crassostrea virginica*.

Access full article: <https://www.nature.com/articles/s41598-021-92379-6>

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Title Environmental associations of cownose ray (*Rhinoptera bonasus*) seasonal presence along the U.S. Atlantic Coast (2021) *Ecosphere*, 12 (9), art. no. e03743.

Authors Bangley, C.W., Edwards, M.L., Mueller, C., **Fisher, R.A.**, Aguilar, R., Heggie, K., Richie, K., Ahr, B.J., Ogburn, M.B.

Summary The cownose ray undergoes large-scale season migrations but is relatively poorly understood. This study tracked mature cownose rays in Maryland and Virginia and found southward migration to be strongly associated with sea surface temperature while northward migration was strongly associated with day of the year.

Access full article: <https://doi.org/10.1002/ecs2.3743>

Title The extent of seasonally suitable habitats may limit forage fish production in a temperate estuary (2021) *Frontiers in Marine Science*, 8, art. no. 706666.

Authors **Fabrizio, M.C., Tuckey, T.D.**, Bever, A.J., MacWilliams, M.L.

Summary Sustained production of sufficient forage fishes is critical to advancing ecosystem-based fisheries management, yet factors that affect local abundances and habitat conditions are largely unexplored. This study quantified suitable habitat in the Chesapeake Bay and its tidal tributaries for four key juvenile forage fishes: spotted hake, spot, weakfish, and bay anchovy.

Access full article: <https://doi.org/10.3389/fmars.2021.706666>

Title Cranial morphology of the Stellate Sturgeon, *Acipenser stellatus Pallas 1771 (Acipenseriformes, Acipenseridae)*, with notes on the skulls of other sturgeons (2022) *Acta Zoologica*, 103 (1), pp. 57-77.

Authors **Hilton, E.J.**, Dillman, C.B., Paraschiv, M., Suci, R.

Summary This study describes the anatomy of the skull of a species of sturgeon, *A. stellatus*, and presents new anatomical data as well as interpretations of these characters.

Access full article: <https://doi.org/10.1111/azo.12355>

Title Sturgeons (*Acipenseridae*) from the Late Miocene of Ukraine, with a discussion of materials associated with Widhalm's (1886) *nomen nudum*, † *Acipenser euhuso* (2021) *Zootaxa*, 5057 (3), pp. 385-401.

Authors **Hilton, E.J.**, Kovalchuk, O., Podoplelova, N.

Summary A collection of fossil sturgeons from the Upper Miocene deposits of southern Ukraine were examined and while researchers did not establish a new taxon, the specimens do suggest the presence of several species.

Access full article: <https://doi.org/10.11646/zootaxa.5057.3.4>

Title Effects of a natural precipitation gradient on fish and macroinvertebrate assemblages in coastal streams (2021) PeerJ, 9, art. no. e12137.

Authors **Kinard, S.***, **Patrick, C.J.**, Carvallo, F.

Summary We sampled fish and invertebrate stream communities along a natural precipitation gradient to predict how coastal stream communities will respond to climate change. Declines in diversity and compositional shifts warn that aridification coincides with loss of competitive and environmentally sensitive taxa which could yield less desirable community states.

Access full article: <https://peerj.com/articles/12137/>

Title A taxonomic review of the family *Trachipteridae* (*Acanthomorpha: Lampridiformes*), with an emphasis on taxa distributed in the western Pacific Ocean (2021) Zootaxa, 5039 (3), pp. 301-351.

Authors Martin, J.M., **Hilton, E.J.**

Summary Taxonomic revisions to Ribbonfishes, Dealfishes, and their relatives (family *Trachipteridae*, genera *Trachipterus*, *Zu*, and *Desmodema*) were developed, including information regarding ontogeny and biogeography. Early life history stages remain unknown for several taxa which hinders full interpretation of ontogenetic transitions.

Access full article: <https://doi.org/10.11646/zootaxa.5039.3.1>

Title Reproductive characteristics differ in two invasive populations of blue catfish (2021) North American Journal of Fisheries Management, 41 (S1), pp. S180-S194.

Authors **Nepal, V.**, **Fabrizio, M.C.**

Summary Reproductive traits of female blue catfish were quantified and compared from two populations from the tidal reaches of the James and York Rivers. Variability in reproductive traits and the size dependence of relative fecundity were demonstrated, providing evidence that population-specific reproductive rates should be incorporated into Blue Catfish stock assessment models.

Access full article: <https://doi.org/10.1002/nafm.10611>

Title Evaluating optimal removal of derelict blue crab pots in Virginia, US (2021) Ocean and Coastal Management, 211, art. no. 105735.

Authors **Scheld, A.M.**, **Bilkovic, D.M.**, **Havens, K.J.**

Summary We evaluated the economic benefits of derelict crab pot removal from Chesapeake Bay based on blue crab productivity after pot removal. We found that optimal level of pot removal is >7000 pots/yr., creating blue crab productivity gains of ~17-18%. This yields >\$3M in annual net benefits to the commercial fishery.

Access full article: <https://doi.org/10.1016/j.ocecoaman.2021.105735>

Title Perspectives from the water: Utilizing fisher's observations to inform SNE/MA windowpane science and management (2021) Fisheries Research, 243, art. no. 106090.

Authors Bell, R.J., McManus, M.C., McNamee, J., **Gartland, J.**, Galuardi, B., McGuire, C.

Summary Windowpane flounder are a managed finfish species in the northwest Atlantic. This study found that temporarily closed areas were not located where the highest densities of windowpane flounder occurred but were located where the highest rates of discards occurred and thus where fishing had the greatest impact on stock.

Access full article: <https://doi.org/10.1016/j.fishres.2021.106090>

Title Dynamic factor analysis to reconcile conflicting survey indices of abundance (2021) ICES Journal of Marine Science, 78 (5), pp. 1711- 1729.

Authors **Peterson, C.D.**, Wilberg, M.J., Cortés, E., **Latour, R.J.**

Summary Stock-wide trends in fish relative abundance are challenging to obtain without a comprehensive survey. This study used a simulation model of two coastal shark species to explore the use of dynamic factor analysis (DFA) in the absence of comprehensive surveys. Researchers found DFA can improve understanding of stock trends in these situations.

Access full article: <https://doi.org/10.1093/icesjms/fsab051>

Title Invasive blue catfish in the Chesapeake Bay region: A case study of competing management objectives (2021) North American Journal of Fisheries Management, 41 (S1), pp. S156-S166.

Authors **Fabrizio, M.C.**, **Nepal, V.**, **Tuckey, T.D.**

Summary Blue catfish were introduced in the Chesapeake Bay region and are now considered invasive. Management of the species is complicated by multiple competing objectives. This paper provides management recommendations to control the spread and limit the ecological impacts of blue catfish.

Access full article: <https://doi.org/10.1002/nafm.10552>

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

Title Modeling oyster reef restoration: larval supply and reef geometry jointly determine population resilience and performance (2021) *Frontiers in Marine Science*, 8, art. no. 677640.

Authors **Lipcius, R.N.**, Zhang, Y., Zhou, J., Shaw, L.B., Shi, J.

Summary Restoration of native oyster reefs in Chesapeake Bay was traditionally thought to depend on a minimum oyster reef height for population persistence and resilience. Our model shows that reef health is more dependent on larval supply and sedimentation, where a minimum larval supply is required to maintain the reef.

Access full article: <https://doi.org/10.3389/fmars.2021.677640>

Title Cross-habitat access modifies the ‘trophic relay’ in New England saltmarsh ecosystems (2021) *Food Webs*, 29, art. no. e00206.

Authors Lesser, J.S., Floyd, O., Fedors, K., Deegan, L.A., **Johnson, D.S.**, Nelson, J.A.

Summary We demonstrate that access to marsh surface did not impact mummichog distribution in the marsh and had no evidence of top-down control on mummichog prey. Therefore, mummichog appear to move energy from the vegetated marsh to the creek food web, demonstrating the intricate connectivity of estuarine systems.

Access full article: <https://doi.org/10.1016/j.fooweb.2021.e00206>

Title Opportunities and challenges for including oyster-mediated denitrification in nitrogen management plans (2021) *Estuaries and Coasts*, 44 (8), pp. 2041-2055.

Authors Rose, J.M., Gosnell, J.S., Bricker, S., **Brush, M.J.**, Colden, A., Harris, L., Karplus, E., Laferriere, A., Merrill, N.H., Murphy, T.B., Reitsma, J., Shockley, J., Stephenson, K., Theuerkauf, S., Ward, D., Fulweiler, R.W.

Summary Nitrogen pollution is one of the primary global threats to coastal water quality. This paper discusses policy options to support denitrification using oysters and argues oysters should be included in nitrogen removal strategies but will not alone solve the excess nitrogen problem.

Access full article: <https://doi.org/10.1007/s12237-021-00936-z>

Title Community dynamics under environmental extremes: coastal plain wet prairie in a natural state and under restoration (2021) *Plant Ecology*, 222 (11), pp. 1251-1262.

Authors Dixon, C.M., Flaherty-Walia, K.E., **Snyder, R.A.**

Summary Ecological restoration is increasingly employed to restore degraded or destroyed ecosystems and evaluation of restoration success requires that natural community dynamics be understood. The authors of this study analyzed a 12-year plant community composition dataset from a fire-maintained Gulf of Mexico Coastal Plain wet prairie to characterize plant community dynamics and identify indicator species.

Access full article: <https://rdcu.be/cCmjT>

Title Nursery habitat use by juvenile blue crabs in created and natural fringing marshes (2021) Ecological Engineering, 170, art. no. 106333.

Authors **Bilkovic, D.M., Isdell, R.E., Stanhope, D., Angstadt, K.T., Havens, K.J.**, Chambers, R.M.

Summary This study shows how living shorelines, particularly marshes, can serve as a nursery habitat for blue crabs, finding that density and size in living shorelines as compared to natural marshes were similar, and even the youngest living shorelines (2 years) provided habitat.

Access full article: <https://doi.org/10.1016/j.ecoleng.2021.106333>

Title A review of how we assess denitrification in oyster habitats and proposed guidelines for future studies (2021) Limnology and Oceanography: Methods, 19 (10), pp. 714-731.

Authors Ray, N.E., Hancock, B., **Brush, M.J.**, Colden, A., Cornwell, J., Labrie, M.S., Maguire, T.J., Maxwell, T., Rogers, D., Stevick, R.J., Unruh, A., **Kellogg, M.L., Smyth, A.R.**, Fulweiler, R.W.

Summary If oyster-mediated denitrification is to be adopted in management plans, we need a broadly applicable model for anticipated denitrification rates. To make such a model, we need a common sampling and reporting scheme across studies. We therefore provide a background on oyster-mediated denitrification to be utilized in management decisions.

Access full article: <https://doi.org/10.1002/lom3.10456>

Title Ecological engineering with oysters enhances coastal resilience efforts (2021) Ecological Engineering, 169, art. no. 106320.

Authors Chowdhury, M.S.N., La Peyre, M., Coen, L.D., Morris, R.L., **Luckenbach, M.W.**, Ysebaert, T., Walles, B., Smaal, A.C.

Summary This paper reviews past studies on the impact of reef-building oysters on coastal resilience and ecosystem services. From this review, researchers found success depended on several factors and further research would help to identify the most suitable sites for the largest beneficial impact on coastal resilience.

Access full article: <https://doi.org/10.1016/j.ecoleng.2021.106320>

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Title Cultural ecosystem services enabled through work with shellfish (2021) Marine Policy, 132, art. no. 104689.

Authors Michaelis, A.K., **Walton, W.C.**, Webster, D.W., Shaffer, L.J.

Summary Cultural ecosystem services are frequently understudied relative to other types of ecosystem services, and this is especially true for bivalve shellfish. This study developed a list of shellfish-enabled cultural, provisioning, regulating, and supporting ecosystem services and their related benefits. Results underscore the importance of the inclusion of cultural services in policy and management discussions.

Access full article: <https://doi.org/10.1016/j.marpol.2021.104689>

Title Preferences for derelict gear mitigation strategies by commercial fishers (2021) Marine Policy, 132, art. no. 104662.

Authors **DeIBene, J.A., Scheld, A.M., Bilkovic, D.M.**

Summary Better management/mitigation of derelict fishing gear requires stakeholder support. We distributed a survey on potential actions and incentives to 1,032 commercial fishers in VA and received a 42% response rate. Responses demonstrated hesitancy to change gear behaviors, but heterogeneity in responses could allow targeting of certain population segments.

Access full article: <https://doi.org/10.1016/j.marpol.2021.104662>

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Title Alkali metal- and acid-catalyzed interconversion of goniodomin A with congeners B and C (2021) Journal of Natural Products, 84 (9), pp. 2554-2567.

Authors Harris, C.M., Krock, B., Tillmann, U., Tainter, C.J., Stec, D.F., Andersen, A.J.C., Larsen, T.O., **Reece, K.S.**, Harris, T.M.

Summary Goniodomin A (GDA, 1) is a phycotoxin produced by at least four species of *Alexandrium dinoflagellates* that are found globally in brackish estuaries and lagoons. Analyses of in vitro *A. monilatum* and *A. hiranoi* cultures indicate that only GDA is present in the cells; GDB and GDC appear to be postharvest transformation products.

Access full article: <https://doi.org/10.1021/acs.jnatprod.1c00586>

Title Advancing the sea ice hypothesis: trophic interactions among breeding *Pygoscelis* penguins with divergent population trends throughout the western antarctic peninsula (2021) Frontiers in Marine Science, 8, art. no. 526092.

Authors Gorman, K.B., **Ruck, K.E.**, Williams, T.D., Fraser, W.R.

Summary We used natural, stable isotopes of carbon and nitrogen to understand what foods Southern Ocean penguins consume. Food sources changed based on sea ice occurrence, species, age, etc. and our findings question the paradigm that Antarctic krill are the only food source critical to penguin fitness in the Southern Ocean.

Access full article: <https://doi.org/10.3389/fmars.2021.526092>

Title Phytoplankton growth at low temperatures: Results from low temperature incubations (2021) Journal of Plankton Research, 43 (5), pp. 633-641.

Authors Wang, X., **Smith, W.O.**

Summary While the relationship of phytoplankton growth to temperature is known to be exponential, this is rarely studied at very low temperatures. A series of experiments were conducted with polar phytoplankton and results showed different species responded differently to temperature, with a general trend of an increase in growth rate at higher temperatures.

Access full article: <https://doi.org/10.1093/plankt/fbab054>

Title A common love of science: the one-hundredth meeting of the American Society of Ichthyologists and Herpetologists (2021) Ichthyology and Herpetology, 109 (3), pp. 916-924.

Authors **Hilton, E.J.**, Bauer, A.M., Bemis, K.E., Sabaj, M.H., Smith, D.G., Watkins-Colwell, G.J.

Summary In 2021, the American Society of Ichthyologists and Herpetologists (ASIH), which is the largest professional organization in the world for the study of the biology of fishes, reptiles, and amphibians, held its 100th annual meeting. This paper discusses the history, growth, impact, and future of the meetings of the ASIH.

Access full article: <https://doi.org/10.1643/t2021071>

Title Global COVID-19 lockdown highlights humans as both threats and custodians of the environment (2021) *Biological Conservation*, 263, art. no. 109175.

Authors Bates, A.E., Primack, R.B., Biggar, B.S., (...) **Hensel, M.J.S., Orth, R.J., Patrick, C.J.**, et al.

Summary The global lockdown to mitigate the COVID-19 pandemic resulted in both positive and negative changes in human interactions with nature. While benefits were seen from a decrease in human interaction, important conservation efforts were impeded. This study highlights the dual role that humans play in threatening and protecting species and ecosystems.

Access full article: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8135229/>

Title Temporal and spatial variability of phytoplankton and mixotrophs in a temperate estuary (2021) *Marine Ecology Progress Series*, 677, pp. 17-31.

Authors **Millette, N.C., Da-Costa, M.***, Mora, J.W., Gast, R.J.

Summary A significant proportion of phytoplankton are known to be mixotrophs: cells that obtain nutrients through a combination of photosynthesis and prey ingestion. However, current methods to determine abundance are known to be limited. This research combines two methods to analyze abundance, resulting in a more robust measurement.

Access full article: <https://doi.org/10.3354/meps13850>

Title Influence of salinity on SAV distribution in a series of intermittently connected coastal lakes (2021) *Estuarine, Coastal and Shelf Science*, 260, art. no. 107503.

Authors **Hyman, A.C.***, **Lipcius, R.N.**, Gray, R., Stephens, D.B.

Summary Intermittently closed and open lakes and lagoons (ICOLs) exchange water with the sea and experience saline intrusions. The authors of this paper studied the natural seawater exchange and corresponding water chemistry of coastal dune lakes in northwest Florida to determine its effects on resident submersed aquatic vegetation (SAV) distributions in ICOLL ecosystems.

Access full article: <https://doi.org/10.1016/j.ecss.2021.107503>

Title The Chesapeake Bay program modeling system: Overview and recommendations for future development (2021) *Ecological Modelling*, 456, art. no. 109635.

Authors Hood, R.R., Shenk, G.W., Dixon, R.L., Smith, S.M.C., Ball, W.P., Bash, J.O., Batiuk, R., Boomer, K., Brady, D.C., Cerco, C., Claggett, P., de Mutsert, K., Easton, Z.M., Elmore, A.J., **Friedrichs, M.A.M.**, Harris, L.A., Ihde, T.F., Lacher, L., Li, L., Linker, L.C., Miller, A., Moriarty, J., Noe, G.B., Onyullo, G., Rose, K., Skalak, K., Tian, R., Veith, T.L., Wainger, L., Weller, D., **Zhang, Y.J.**

Summary The 2017 CBP Modeling System and the higher trophic level models developed by the NOAA Chesapeake Bay Office are described, along with a specific suite of recommendations to inform future model development that can broaden and improve characterization of responses to targeted nutrient and sediment load reductions.

Access full article: <https://doi.org/10.1016/j.ecolmodel.2021.109635>

Title Particulate organic matter distributions in the water column of the Chukchi Sea during late summer (2021) *Journal of Geophysical Research: Oceans*, 126 (9), art. no. e2021JC017664.

Authors Goñi, M.A., Juranek, L.W., **Sipler, R.E.**, Welch, K.A.

Summary Two oceanographic cruises investigated the distribution of particulate organic matter (POM) across the northeast Chukchi Shelf. Results show marked contrasts in POM in surface and middepth waters, including evidence of enhanced productivity in middepth waters following downwelling and in surface waters following upwelling.

Access full article: <https://doi.org/10.1029/2021JC017664>

Title Long-term trends in Chesapeake Bay remote sensing reflectance: Implications for water clarity (2021) *Journal of Geophysical Research: Oceans*, 126 (12), art. no. e2021JC017959.

Authors **Turner, J.S., Friedrichs, C.T., Friedrichs, M.A.M.**

Summary In the Chesapeake Bay, we analyzed long-term trends (2003 to 2020) in surface water reflectance from satellite sensor MODIS-Aqua. Results show a decrease in red-to-green and red-to-blue reflectance ratios, suggesting improving water clarity in most of the Bay. However, increasing green-to-blue reflectance ratios suggest increasing chlorophyll concentration.

Access full article: <https://doi.org/10.1029/2021JC017959>

Title Experimental tree mortality does not induce marsh transgression in a Chesapeake Bay low-lying coastal forest (2021) *Frontiers in Marine Science*, 8, art. no. 782643.

Authors Walters, D.C., Carr, J.A., Hockaday, A., Jones, J.A., McFarland, E., Kovalenko, K.E., **Kirwan, M.L.**, Cahoon, D.R., Guntenspergen, G.R.

Summary We induced local tree mortality to see how disturbance impacts marsh upland migration. While grasses and shrubs initially colonized the area, pine trees eventually recolonized and became the dominant species. These findings suggest that disturbance is necessary in marsh upland migration, but is not sufficient alone to cause shifting ecosystems.

Access full article: <https://doi.org/10.3389/fmars.2021.782643>

Title Carbon pools differ in source and temporal patterns in a tidal marsh creek system of the York River, VA estuary (2021) *Estuaries and Coasts*, 44 (7), pp. 1848-1865.

Authors **Knobloch, A.L.J., Reay, W.G., Canuel, E.A.**

Summary We characterized temporal patterns in carbon pools in a tidal marsh creek in order to identify their primary drivers. We found suspended sediments, chlorophyll-a, colored dissolved organic matter, and percent freshwater to be important predictors of different carbon pool patterns in this ecosystem.

Access full article: <https://rdcu.be/cCmlQ>

Title The application of metacommunity theory to the management of riverine ecosystems (2021) Wiley Interdisciplinary Reviews: Water, 8 (6), art. no. e1557.

Authors **Patrick, C.J.**, Anderson, K.E., Brown, B.L., Hawkins, C.P., Metcalfe, A., Saffarinia, P., Siqueira, T., Swan, C.M., Tonkin, J.D., Yuan, L.L.

Summary Metacommunity theory describes how multiple species from different communities potentially interact at various environmental scales. This study presents a conceptual model outlining how select local metacommunity processes can further inform traditional approaches to river management, and identify specific situations where traditional approaches could be enhanced by incorporating metacommunity dynamics concepts.

Access full article: <https://doi.org/10.1002/wat2.1557>

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