Researcher	Research Focus	Relevant Publications
Dr. Margret Muholland, Old Dominion University	**High Tide Flooding and Water Quality Implications:** Dr. Margret Muholland's research focuses on the relationship between tidal flooding and water quality. Her work spans nitrogen cycling in marine organisms, climate change impacts on coastal ecosystems, and pollution movement during flooding. Her insights can aid coastal managers in addressing water quality concerns amid tidal flooding challenges, specifically in the Chesapeake Bay.	Mulholland, M. R., Macias-Tapia, A., & Loftis, J. D. (2022). Water quality impacts from tidal flooding in Southern Chesapeake Bay. *OCEANS 2022, Hampton Roads*, 1–5. https://doi.org/10.1109/OCEANS47191.2022.9977117 “Abstract: While threats to infrastructure from tidal flooding and sea level rise have been widely examined to support coastal adaptation to sea level rise, little is known about the chemical and biological effects of flooding on the adjacent aquatic environments we are trying to restore. Here, we leveraged a citizen scientist project mapping the extent of floodwaters to also quantify nutrient loads delivered to the Lafayette River, a tidal sub-tributary of the lower Chesapeake Bay. We found that the nitrogen load delivered during a single tidal flooding event exceeded the US Environmental Protection Agency’s annual allocation for nitrogen from overland flow to this tributary. Because tidal flooding is increasing due to sea level rise, these loads need to be accounted for when setting restoration targets and goals for the Bay.” Macías-Tapia, A., Mulholland, M. R., Selden, C. R., Loftis, J. D., & Bernhardt, P. W. (2021). Effects of tidal flooding on estuarine biogeochemistry: Quantifying flood-driven nitrogen inputs in an urban, lower Chesapeake Bay sub-tributary. *Water research*, *201*, 117329. https://doi.org/10.1016/j.watres.2021.117329 Rising sea levels are causing more tidal flooding in coastal areas, even without heavy rain. During flooding, water carries substances into urban estuarine systems, affecting water quality. In a study of the Lafayette River in the Chesapeake Bay, we found high levels of bacteria and nutrients during tidal flooding, exceeding safe standards. These findings are vital as sea levels continue to rise, underscoring the need to understand and manage nutrient loading from tidal flooding for better water quality in affected areas.

Dr. Tristian McKenzie, University of Gothenburg, Sweden	**Sea Level Rise and Groundwater Inundation:** Dr. Tristan McKenzie, a recent PhD graduate from the University of Hawai'i at Mānoa, specializes in the intricate relationship between coastal hydrology, submarine groundwater discharge, water contamination, and sea-level rise (SLR). His innovative approach combines field-based geochemical techniques and advanced machine learning to unravel the complexities of SLR and tidal flooding's impact on water quality. His work may provide coastal managers with insights on how increased frequency of tidal flooding may implicate water quality management regimes	McKenzie, T., Habel, S., & Dulai, H. (2021). Sea-level rise drives wastewater leakage to coastal waters and storm drains. *Limnology and Oceanography Letters*, *6*(3), 154–163. https://doi.org/10.1002/lol2.10186 This study in urban Honolulu, Hawai'i, investigates how sea-level rise (SLR) affects coastal wastewater infrastructure (WIS) using spring tides as SLR indicators. It examines two pathways: direct groundwater inundation (GWI) of WIS leading to ocean discharge, and indirect inundation in storm drains. Groundwater discharge and emerging organic contaminants (EOCs) were monitored. Results show tidal influence on groundwater discharge and EOCs in coastal and canal groundwater, surface water samples, and storm drains, revealing GWI and wastewater discharge driven by tides. The study provides field-based evidence of SLR increasing risks to environmental and human health through GWI in coastal WIS. Coastal managers gain insights into tidal flooding's impact on water quality for better decision-making.
Dr. Jean Ellis, University of South Carolina	**High Tide Flooding Dynamics and Resilience:** Dr. Ellis and her team delve deeply into understanding the intricate response and recovery mechanisms during storms and king tides. By closely studying these phenomena, her team contributes valuable insights that aid in developing proactive	Harris, M. E., & Ellis, J. T. (2021). Comparing Tropical Cyclone and King Tide Impacts on a South Carolina Coastal Dune System. *Journal of Coastal Research*, *37*(5). https://doi.org/10.2112/JCOASTRES-D-21-00025.1 Coastal communities face a growing threat from increasing natural hazards. In South Carolina, king tides, responsible for coastal flooding, surged by 126% between 2014 and 2019. This study shows that even without hurricanes, high tides can erode coastlines, highlighting their significant impact. Coastal managers must consider both storms and high tides in planning for and protecting our coasts.

	strategies for managing high tide flooding. Her research not only enhances coastal resilience but also equips decision-makers with the knowledge needed to mitigate the adverse effects of high tide events.	
NOAA Atlantic Oceanographic and Meteorological Laboratory (AOML)	**King Tide Events and Water Quality Challenges:** AOML researchers are studying how rising sea levels contribute to contamination during tidal flooding events like "King Tides." They focus on the pollutants and pathogens carried from urban areas to coastal waters. By investigating bacterial and chemical contaminants, the team aims to help coastal communities, like those in southeast Florida, cope with the water quality challenges posed by frequent tidal flooding. This research partnership with academic institutions aims to enhance resilience and understanding of the impacts of tidal flooding on both the environment and human health amidst rising sea levels and climate change.	NOAA Atlantic Oceanographic and Meteorological Laboratory. (2016, December 3). Contaminants in Tidal Flooding. NOAA. https://www.aoml.noaa.gov/contaminants-tidal-flooding/#:~:text=Tidal%20flooding%20from%20events%20such,built%20environment%20of%20urbanized%20coastlines. This article highlights the escalating threat of tidal flooding, exemplified by "King Tides" and "Super Tides," affecting urban coastal communities due to rising sea levels. These floodwaters carry contaminants and toxins from developed coastlines. Collaborating institutions, including NOAA's AOML, investigate contamination originating in urban settings and its introduction into coastal waters through tidal flooding. Over three years, microbial contaminants like fecal-indicating bacteria and disease-causing pathogens, carried from tidal floodwaters to the marine environment, have been studied. These contaminants pose risks to human populations and marine ecosystems like coral reefs, beaches, and estuaries. By analyzing bacterial levels, nutrient content, and chemical contaminants, the study reveals the influence of tidal flooding on water quality. Collaboration between NOAA and academic partners aims to understand floodwater contamination patterns comprehensively. This research enhances community resilience and provides insights into mitigating impacts of coastal tidal flooding events on both human health and the environment.