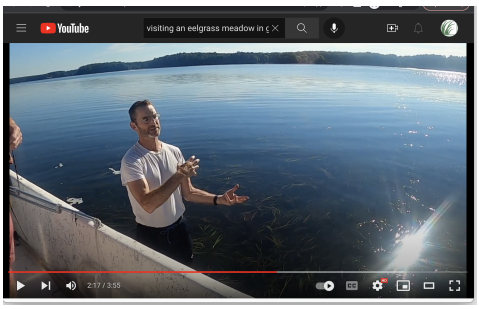
Update #2 | September 2022

Periodic project updates keep Great Bay communities and organizations informed about the Eelgrass Resilience project and will include a preview of results. Read the first update, and sign up to receive future updates by email. Please click on the photo and video links below and share these with your networks.

~ Project Updates ~

Reviewing plans with our advisors
The Eelgrass Resilience Project Advisory Committee met in March 2022 to review plans for the upcoming field season and discuss ideas for communication products. Their feedback prompted us to create Facebook posts, a project logo and a more distinctive identity for the project. The new newsletter banner includes a painting by Elias Matso that we think is gorgeous!

After many hours on zoom together, the advisory committee met up to visit an eelgrass meadow and the Jackson Estuarine Lab in August.



See: photos and a video from the field visit

First field season
The project team had a busy first field season!

Research question 1: *How does water quality affect eelgrass?* We took advantage of the on-going eelgrass monitoring ("Tier 2") that is led by the Piscataqua Region Estuaries Partnership and sampled water quality at 16 long term monitoring sites in Great Bay. We'll use this data to look for patterns in eelgrass growth across the estuary.

Research question 2: *How does eelgrass affect water quality?* We selected three areas of Great Bay for intensive sampling using novel methods. Our amazing field team followed water flow paths from paddle boards, sampling water quality at multiple points along the flow path. We wanted to know: how is the water changing as it flows through an eelgrass meadow - is the water getting clearer? Additional methods were used to measure the rate at which denitrification happens in the sediments within and outside an eelgrass bed. Stay tuned for a preview of results in future newsletters!

See: photos of the research team in action

~ So What? ~

Hydrodynamic modeling can help us manage Great Bay's ecosystems

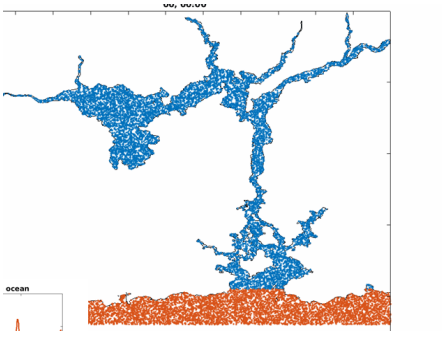
The Eelgrass Resilience Project is studying the interactions between water quality, eelgrass and water flow to generate science that can help us better manage water quality. Great Bay is an incredibly dynamic place - a massive amount of water flows in and out with the tides every day, moving around sediment and nutrients, and shaping the environment for plants and animals that live in and around Great Bay. For example, at low tide 50 percent of Great Bay's muddy bottom is exposed and at high tide some of those same areas are covered in 9 feet of water. This means you can't get a handle on the Bay's water quality without taking into account all that water movement.

Scientists have been measuring the tides and river flow into Great Bay for years and have used that data to develop mathematical models that can allow us to visualize water flow and predict the movement of particles in the water. For example: Tom Lippmann, an oceanographer from UNH and a member of the eelgrass resilience project team, implemented a hydrodynamic model that can simulate the movement of water and sediment in Great Bay (see links to video clips below). You can see how the tides create a "heart beat" for the Bay. Despite all that movement, it can take many tidal cycles to fully flush out the Bay.

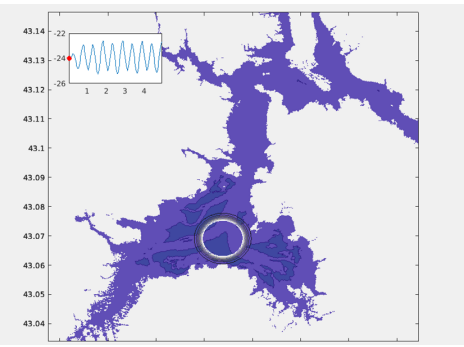
For those that are interested in the details, these visualizations are based on a widely used, open-source 3D hydrodynamic model known as COAWST. The ability of the Great Bay model to predict currents, water levels, sediment bed shear stress and surface waves has been verified (see references listed at the bottom). The Great Bay hydrodynamic model does a great job of predicting water flow patterns under average weather conditions though it may not accurately describe what happens during big rain events or in specific shoreline locations.

The Eelgrass Resilience project team is using Tom's hydrodynamic model to locate and sample along a few representative flow paths. We also plan to generate maps of water flow parameters that others can use. For example, restoration practitioners could use the maps to locate eelgrass or oyster restoration projects in areas with less shear stress and more gentle currents. The results could also help water quality regulators customize rules for different regions of the estuary.

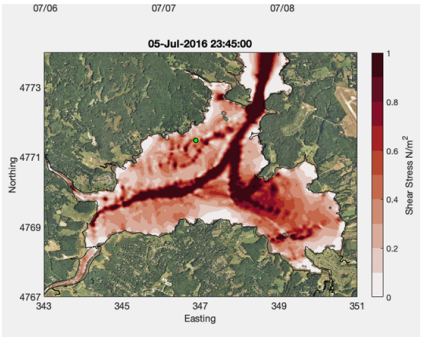
Before results are shared, Tom will validate and fine tune his model using field measurements taken this summer. So this story, like most science stories, is to be continued.



Watch how the model simulates the movement of water particles in Great Bay.



Watch how the model simulates the movement of sediment in Great Bay.



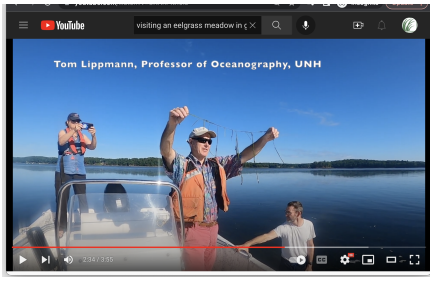
Watch this simulation of shear stress as tides come in and out.

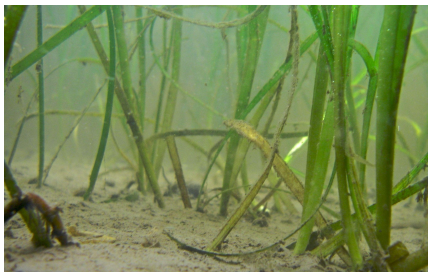
~ Get to Know Our Team and Advisors ~

Hydrodynamics Lead: Tom Lippmann, UNH
As one of the lead scientists on this project, Tom is responsible for measuring and modeling water flow patterns in Great Bay and helping the team interpret and use this data. Tom is a professor at UNH in the Department of Earth Sciences and the Center for Ocean Engineering. His research focuses on shallow water oceanography, hydrography, and bathymetric evolution in coastal waters (learn more). In his free time, Tom likes to play sports, hike, and travel. For this project, Tom is most excited about collaborations with team members and partners with differing expertise that collectively can address aspects of ecosystem health in the Great Bay not easily accomplished by individuals.

Project Advisor: Melissa Paly, Great Bay Piscataqua Water Keeper
As a member of the Project Advisory Committee, Melissa provides input on research and communication plans so that results will be relevant, trusted and useful. She also took the Committee out on the Waterkeeper boat in August! As Waterkeeper with the Conservation Law Foundation, Melissa promotes programs, policies and permits that will restore the health of the Great Bay Estuary. She works to inform and inspire people to take actions in their homes and communities to protect the rivers, bays and beaches of theSeacoast (learn more). In her free time, Melissa telemark skis, sails, kayaks and gardens. For this project, she is excited about developing a more detailed understanding of the factors that influence water quality and ecosystem health in Great Bay.

~ Learn more ~





Watch this video of a visit to a Great Bay eelgrass meadow with the team.

For more information about this 3-year collaborative research project, visit our project web page or reach out to a member of our Advisory Committee (see: List), which includes representatives from the municipalities and agencies that help protect Great Bay's waters. Sign up here to receive future project updates via email.

Attend the NH Climate Summit on September 28 - 29 to learn more about climate resiliency efforts happening around coastal NH. Learn more and register here.

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