

Do We Have Too Many Nutrients in The Water?

Extremely dense housing developments cover the two peninsulas which form the western shore of the Waquoit Bay estuarine system and moderately dense development encompass the northeastern upland perimeter. The dissolved nitrogen from the septic systems within these developments percolates into the groundwater and then flows into the bay, degrading the function of the Waquoit Bay ecosystem. Historically, Waquoit Bay was covered in a thriving eelgrass bed, but the high nitrogen load caused the eelgrass to disappear over time.

Correlated with eelgrass loss in Waquoit Bay has been a sharp increase in the abundance and distribution of macroalgae (images below), a fundamentally different habitat that does not provide the same beneficial ecosystem services.

Trends from 2007-2018

— Not Changing

↑ Increasing ($p = 0.05$)

↓ Decreasing ($p = 0.05$)

		Ortho-phosphate*	Ammonium*	Nitrite/Nitrate*	Chlorophyll-a
CR	Childs River	—	—	↑	—
MH	Menauhant	↓	—	—	↑
MP	Metoxit Point	↓	—	↑	↑
SL	Sage Lot	—	—	—	↑

* 2010-2013 data omitted from nutrient analyses - Did not pass quality control checks.

Tracking the Health of Our Estuaries 24/7

The National Estuarine Research Reserve System (NERRS) is a network of 29 coastal Reserves established for long-term research, education, and stewardship. Water quality issues influence human and environmental health. The more we monitor our water, the better we are able to recognize and prevent problems.

The NERRS is a partnership program between NOAA and the coastal states to manage designated Reserves. More than 1.3 million acres of estuarine land and water are protected. Each Reserve is managed on a daily basis by a lead state agency or university with input from local partners.

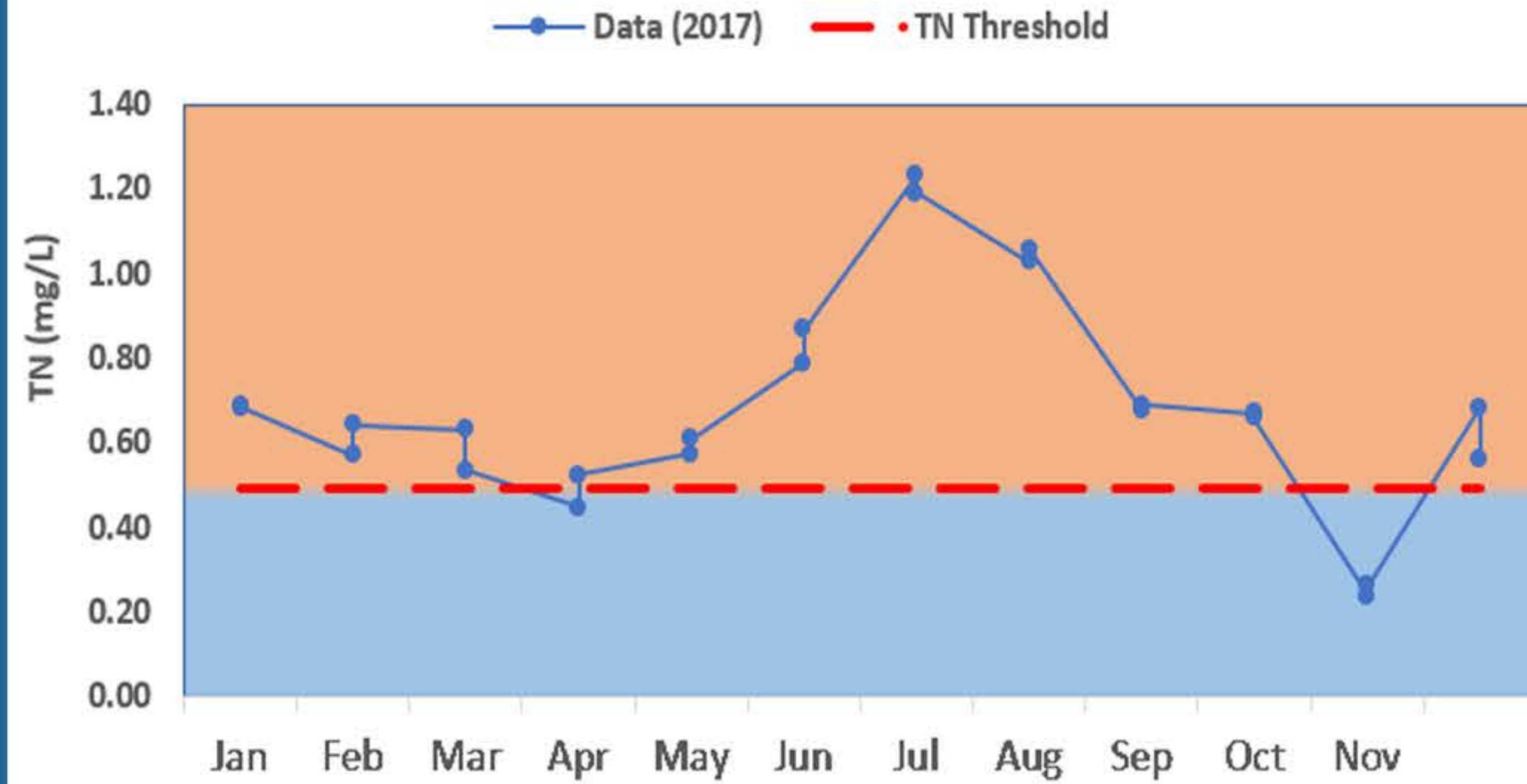
The health of every Reserve is continuously monitored by the System Wide Monitoring Program (SWMP). SWMP is a robust, long-term monitoring program that uses the NERRS network to intensively study estuarine reference sites for evaluating ecosystem function and change. Reserve-generated data and information are available to local citizens and decision makers.

ESTUARY TRENDS

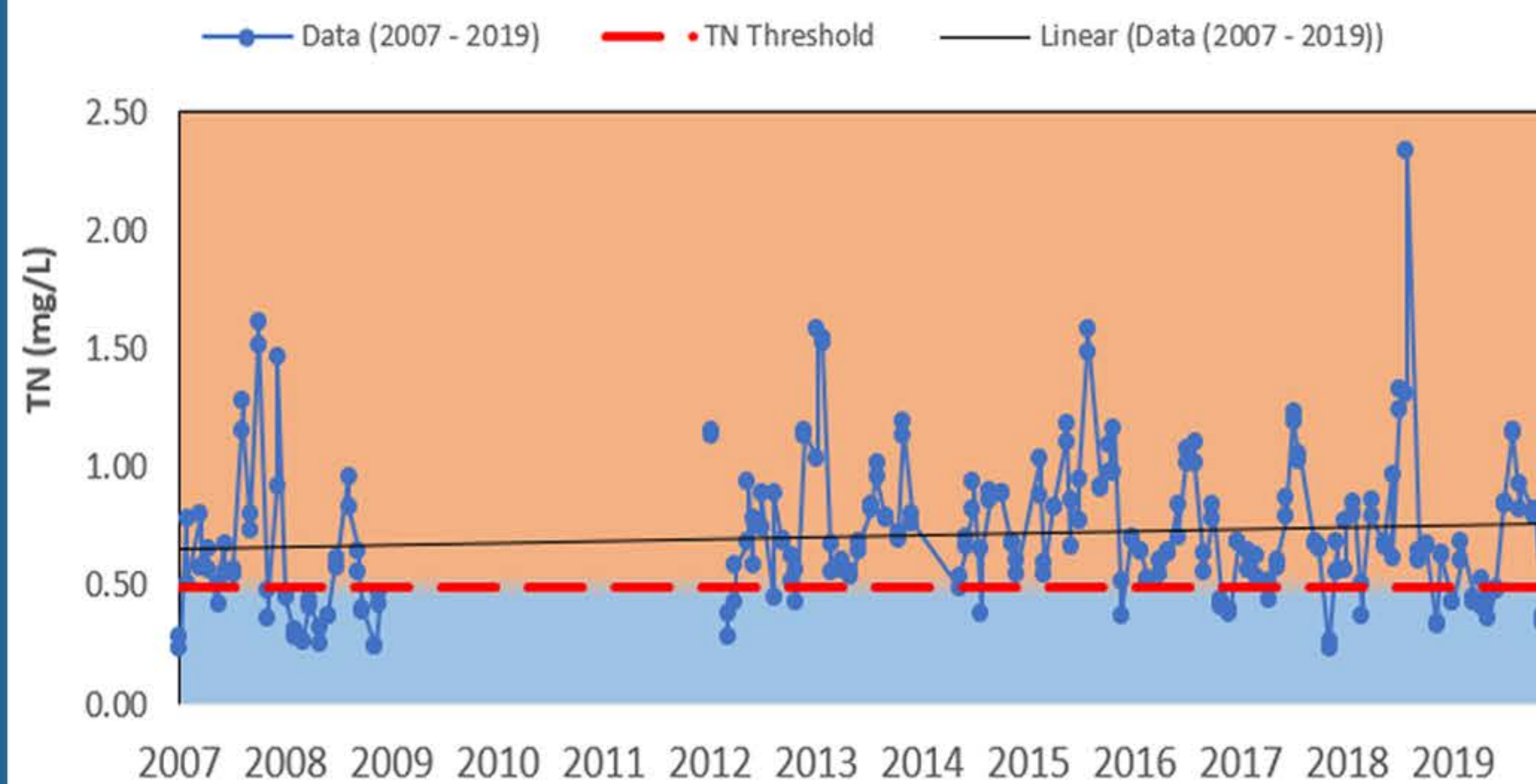
Nitrogen Impacts on Water Quality



Data Taken From Child's River (2017)



Data Taken From Child's River (2007-2019)



Monitoring

Towns are legally responsible for implementing strategies to reduce nutrients and improve water quality. The Massachusetts Estuaries Project (MEP) identified total maximum daily loads (TMDLs) for nitrogen for each estuary. In order to meet TMDLs, the total nitrogen (TN) concentration in the estuary should not exceed the threshold (red dashed line) at designated monitoring sites during summer months. TN is always highest in the summertime due to the production of organic nitrogen by plants and animals.

Management

The example provided here is from Childs River, an impaired sub-estuary of Waquoit Bay with very high nitrogen loading, where TN is above the threshold throughout most of the year. Childs River has a history of high nitrogen levels and based on current trends, the average is still increasing. In order to reverse this trend, town officials are investigating several nitrogen mitigation options including shellfish harvest and wastewater treatment facilities for high density neighborhoods. The Waquoit Bay NERR will continue to monitor these trends to evaluate the efficacy of these implementation strategies.



WAQUOIT BAY National Estuarine Research Reserve (NERR)

This Reserve is located on the south shore of Cape Cod, Massachusetts and contains open waters, salt and fresh marshes, barrier beaches, sand dunes, rivers, mixed pine and oak forests, and sandplain grasslands. Waquoit Bay, approximately 825 acres, is the dominant water feature and once supported one of the most diverse estuarine fish communities in the state. It is still important to commercial and recreational shellfish and finfish fisheries.

Please visit us at: <http://www.waquoitbayreserve.org/>

Brochure designed by Emma Hsiao (2020)



More Information

To access data, visit the NERRS Central Data Management Office (CDMO) website:
<https://www.nerrsdata.org/>

To learn more about the National Estuarine Research Reserve System, visit:
<https://coast.noaa.gov/nerrs/>

Have Questions?

Contact Waquoit Bay NERR Research Coordinator

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