# An Integrated Observational and Modeling Approach to Estimation of the Groundwater Contribution to the Water and Nutrient Budgets in Coastal Environments
Case Studies – Greenwich Bay and Southern Rhode Island Coastal Lagoons

MOTIVATION

Submarine groundwater discharge represents a significant source freshwater, nutrients and pollutants to coastal waters yet remains poorly estimated or largely ignored in studies of nutrient budgets and resulting environmental impacts.
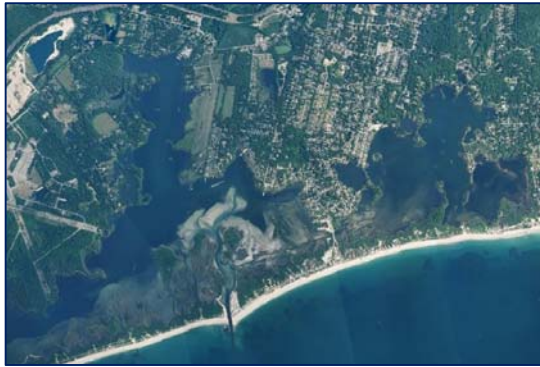
OBSERVATIONS

Water column surveys –
   Electrical Resistivity and
   Radon
Direct measurements –
   Temperature
   Salinity
   Radon
   Nutrients
   Stable isotopes of nitrate

GOALS

To estimate submarine groundwater discharge to Greenwich Bay and Ninigret / Green Hill coastal ponds and development of groundwater, surface water, and nutrient transport models.

MODELING

Use the new observation, regional geology and hydrology, temperature, precipitation, and climate data to predict the quantity and distribution of nutrients into coastal waters.

KNOWLEDGE TRANSFER

Audiences – Local and state decision makers, major resource users, and environmental managers engaged with the Narragansett Bay Special Area Management Plan (Bay SAMP). This project will complement other URI research efforts studying groundwater in the region.

Mechanisms - a) Meetings between stakeholders and researchers to explain issues and concerns, science, and how the research responds to the needs of the communities; b) Inclusion of decision makers in field based research efforts to aid learning and illustrate needs and challenges; c) training to ensure the users know how to access and use data products; d) print and digital media products to share the results with stakeholders.and the public.

ANTICIPATED OUTCOMES

- Assessment of the impact of submarine groundwater on the total nutrient loads at the study sites
- Predictions about the broader impact on Narragansett Bay as a whole
- Digital data and model results shared via an online data repository (RI Data Discovery Center)
- A suite of models for groundwater surface water, and nutrient transport
- Establish/bolster ongoing submarine groundwater discharge and saltwater intrusion monitoring in RI
- A set of monitoring tools and protocols that are translatable to other coastal systems

PROJECT TEAM

University of Rhode Island (URI) Lead Principal Investigator: Dr. Rebecca S. **Robinson** rebecca_r@uri.edu

URI Team: John King, Graduate School of Oceanography; Reza Hashemi, Ocean Engineering; Soni Pradhanang, Geosciences; Teresa Crean, Coastal Resources Center

Coastal Carolina University: Richard Peterson and Richard Viso

Partners: Restore America's Estuaries, Environmental Protection Agency, RI Coastal Resources Management Council, Natural Resources Conservation Service, Rhode Island Office; Towns of Charlestown and South Kingstown and City of Warwick.

Funder: U.S. Environmental Protection Agency, Southern New England Program (SNEP) 2018