

**Rhode Island Shellfisherman's Association**  
**Proposed Findings & Recommendations for the**  
**Joint Quahog Commission**

**Findings**

1. In 2004 the Rhode Island General Assembly enacted legislation that required DEM to reduce nitrogen loading by 50% to the upper Bay from wastewater treatment facilities (WWTFs). R.I. Gen. Laws § 46-12-2(f).
2. In 2005 DEM implemented a 5 mg/L nitrogen wastewater effluent standard (May-October) for 11 Rhode Island WWTFs to meet the 50% nitrogen loading reduction goal mandated by state law.
3. In 2012 DEM achieves the 50% wastewater nitrogen load reduction goal with loading from the 11 WWTFs decreasing from 12,043 lbs/day as measured in 2004 to 5563 lbs/day in 2012. DEM data.
4. By 2017 wastewater nitrogen load reductions result in a significant decrease of primary production of 31% in the upper Bay and 45% in the mid-Bay. Nutrient load reduction statistically improved water clarity in the mid and upper Bay and reduced summer hypoxia by 34%. Nitrogen reduction also reduced the winter spring diatom bloom, while winter chlorophyll levels after nutrient reduction have been significantly lower than before the reduction. Oviatt C., et al. (2017) Managed nutrient reduction impacts on nutrient concentrations, water clarity, primary production, and hypoxia in a north temperate estuary. *Estuarine, Coastal and Shelf Science*. Vol. 199, pp. 25-34.
5. Since 2013 there has been a decline in hypoxia, and during recent years hypoxia has been essentially absent for the moderate and severe thresholds (dissolved oxygen measured at 2.9 mg/L and 1.4 mg/L, respectively). The Bay appears to have reached a new state characterized by reduced chlorophyll levels and effectively free of all but mild hypoxia during summer months. Codiga, D. (2021) Analysis and Synthesis of Eutrophication-Related Conditions in Narragansett Bay (RI/MA USA): Updated Through 2019. Narragansett Bay Estuary Program, 2021.
6. The average nitrogen load over the 3-year period of 2020-2022 from the 11 RI WWTFs during May-October is 2616 lbs/day, a further decrease of 53% from the 2012 nitrogen loading of 5563 lbs/day. Total nitrogen load reduction into the Bay from these 11 WWTFs from 2004 to 2022 is 78%. DEM data.
7. The Narragansett Bay Commission reports that during the warm weather months (May-October) over that last four years (2020-2023) that nitrogen effluent concentrations at the Field's Point WWTF are typically well below the DEM

discharge permit standard of 5mg/L ,and frequently are averaging 2.5mg/L or less. Jim Kelly (NBC) presentation to the Commission (12/5/23).

8. Rhode Island quahog landings precipitously declined 56% from 902,988 pounds harvested in 2012 to landings of 397,442 pounds in 2022. NOAA Fisheries.
9. The number of commercially licensed RI shellfish harvesters has remained relatively stable over the last decade with 540 in 2012 to 527 in 2022. DEM, 2023. A summary of the Rhode Island historical quahog wild harvest landings and the quahog fishery fleet demographics.
10. Average annual rainfall has increased 0.4 to 0.7 inches per decade since 1895 across the Narragansett Bay watershed. The total air temperature increase across the watershed is 2.3 to 3 degrees F (1960 –2015). The total surface water temperature of the Bay has increased 2.7 to 3 degrees F (1960-2015). In the last 20 years there are significantly more summer days exceeding 73 degrees F. In addition, there has been a steady decrease in wind speeds and an increase in cloudy days. In summary, climate change due to a warming Earth has been and continues to affect the Narragansett Bay ecosystem. Dr. Robinson W. Fulweiler (BU) presentation to the Commission (11/15/23).
11. Dr. Scott Nixon, et al. (2008) writing in their chapter titled “Nitrogen and Phosphorus Inputs to Narragansett Bay: Past, Present and Future” in the book “Science for Ecosystem-Based Management - Narragansett Bay in the 21st Century, presciently warned that the major wastewater nitrogen load reduction (just being implemented at that time) will be large enough to result in a significant reduction of primary production in the Bay. Further, they suggested that the drastic reduction of nitrogen loading within the Bay over a relatively short period of time would likely result in undesirable negative impacts on the growth and production of fish and shellfish in the bay.
12. Changes to the Narragansett Bay ecosystem as a result of global climate change are reportedly impactful, but minimally incremental as measured over many decades. Nitrogen loading reductions in the upper Bay, however, have been dramatic (78% between 2004 to 2022) and achieved over a comparatively shorter time period.
13. By 2013 primary production in the upper Bay had been reduced by one-third as a result of wastewater nitrogen load reductions that started in 2005. It is very likely that primary production in the Bay has further decreased since 2013 (over the last decade) as a result of additional reductions in wastewater nitrogen loads by 50% above and beyond the significant reduction achieved by 2012. Consequently, the decline in phytoplankton (as measured by chlorophyll a) over the period substantially reduced the amount of food available for the Bay quahog resource.

14. The evidence suggests that the drastic decline in Rhode Island quahog landings of 56% from 2012 to 2022 may be more closely correlated to the substantial and contemporaneous reduction in wastewater nitrogen loads (a further 53% reduction between 2012 and 2022), rather than a coincidental decline as has been attributed to other minimally incremental factors, such as a warming Bay, over the same period of time.
15. URI Sea Grant mesocosm experiments suggest that the winter-spring diatom bloom enhances the reproductive potential of quahogs. A recommended management option to consider is the release of nutrients from the three big WWTFs on the Providence (and Seekonk) Rivers to support a winter-spring bloom in the upper Bay. URI data indicate that release of nutrients in the winter will not cause summer hypoxia. Dr. Candice Oviatt (URI GSO) presentation to the Commission (11/15/23).
16. The evidence shows that the Bay is now effectively free of all but mild hypoxia limited to infrequent events during the warm summer months. Increasing the amount of nitrogen from wastewater facility discharges in the Providence and Seekonk Rivers during the winter months will not result in a violation of state water quality standards for dissolved oxygen in the Bay.
17. The RI Shellfisherman's Association has been partnering with the Narragansett Bay Commission and DEM for many years to successfully conduct the transplanting of quahogs from closed areas into shellfish management areas to enhance the quahog resource and improve winter harvesting opportunities.
18. The RI Shellfisherman's Association has for many years partnered with Roger Williams University to produce millions of seed quahogs that are grown out and then distributed into state waters to enhance the quahog resource and benefit the public and the commercial shellfish industry.

## **Recommendations**

1. DEM should develop a plan to modify the discharge permits for the big three WWTFs on the Providence/Seekonk Rivers (NBC Bucklin and Fields Points and E. Prov.) to increase nutrients to support winter-spring phytoplankton blooms in the Bay. URI GSO data indicate that summer hypoxia will not be a problem.
2. Plan development should begin immediately with meetings to include DEM Director (or designee), DEM Water Resources, DEM Division of Marine Fisheries, WWTF Operators, Shellfish Industry and University Scientists (e.g., URI GSO, RWU).
3. Plan must be implemented by November 2024 to allow WWTFs in the Providence/Seekonk Rivers to discharge higher levels of Nitrogen during the winter to enhance robust winter-spring phytoplankton blooms starting in 2025.

4. Explore feasibility of increasing the May-October WWTF discharge limits of 5mg/L N (perhaps 6-7mg/L N?) to improve year-round phytoplankton biomass and improve productivity and the quahog resource throughout the Bay.
5. Ensure accountability and implementation of Plan (progress reports to the General Assembly?).
6. The state budget should support and provide consistent and dedicated funding to substantially increase the existing minimally-funded quahog seeding and transplant programs to more robustly enhance the quahog resource within the Bay.