Status of RIEMC Coastal Monitoring Programs/Indicators - October 2017
(including enhancements suggested in State of Narragansett Bay Technical Report)

Program/ Indicator	Utility	Status	Current Funding & Program Support	State Funding Outlook - 2018	Identified Gaps/Suggested Enhancements
	Coastal Water Quality				
Narragansett Bay Water Quality: -temperature -salinity -chlorophyll -dissolved oxygen	1. Fixed-Site Monitoring Network: Network of monitoring stations at 13 fixed locations (8 buoys and 5 fixed dock sites) taking time-series data of water quality in Narragansett Bay. Data used to assess compliance with state water quality criteria. 2. Field Surveys: Boat surveys measuring water quality data at 77 stations; Provides cross-sectional information within the Bay; complements the fixed-site network; and identifies areas that are at significant risk for hypoxic conditions to occur	1. Implemented 2. Implemented	1. RIDEM covers most of this program using federal funds supported by Clean Water Act SRF Funding. **Reliance on SRF funding is not sustainable.** NBC uses rate payer funds and NBNERR uses NOAA funds. 2. No direct state funding for spatial surveys; field operations supported by Brown University, URI GSO/RIDEM, and STB.	1. Annual Unmet Need: $400,000-$650,000 2. At risk of disruption; Annual Unmet Need: $30,000-$75,000	• GAP: Gap analysis needed to ascertain what additional information is required to characterize the ecosystem response to nutrient reductions. • GAP: Additional chlorophyll data representative of all major sub-regions of Narragansett Bay. • GAP: Additional NBFSMN stations in Mount Hope Bay, the Sakonnet River, and the Lower East Passage. • GAP: Assessment to determine whether the existing network of fixed sites provides adequate information for tracking long-term temperature changes. • Funds for major upgrades/replacement of aging equipment in in the network is needed. • Stable funding for operations and data processing is needed. • Analysis of Phillipsdale data to see how upper section of the Seekonk River is changing. • Further analysis of the Chlorophyll Bloom Index. • Additional data synthesis studies or longer-term monitoring to further explore the different temporal and spatial scales of dissolved oxygen variability. • Continued development and validation of a water quality/ecosystem model for Narragansett Bay. • Models for better understanding of the connection between benthic conditions and overlying dissolved oxygen conditions.

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Water Clarity (NBEP)	Clarity is an important indicator of water quality; Secchi depth and being PAR data collected at certain locations	Partially implemented	Not available	No state funding assigned to these programs	• GAP: Increase spatial coverage and reliability of clarity measurements through Narragansett Bay. • Comparison of Secchi Depth and PAR methods for measuring clarity. • Satellite remote sensing-based measurements of coastal water clarity. • Event-based study of water clarity.
Shellfish Growing Areas	Pathogen monitoring in shellfish growing areas for public health protection; 300 established stations in bay and other coastal waters	Implemented	State general revenues - RIDEM	Currently stable	• GAP: Additional sampling in prohibited harvesting areas. • Synthesis of existing data and development of site-specific models. • Additional data collection and analysis to reassess the relationship between precipitation and pathogens. • Further data synthesis and analysis to relate water quality improvements to reduced pathogen loadings due to non-point source management actions. • Development of a metric more sensitive to water quality improvements using pathogen data.
Harmful Algal Blooms (Coastal)	Monitoring phytoplankton to screen for potential public health risks associated with harmful algal blooms	Implemented; Plans to expand effort for 2018;	State General Revenues - RIDEM & RIDOH	State funding is limited; expanded program unmet need: $200,000-$440,000	• Analysis of changes in phytoplankton species composition and abundance over time.

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Rotating Assessment of Coastal Waters	Intended to systematically address water quality data gaps in coastal coves and embayments	Not implemented Some data collected by RIDEM and volunteers	No state funding assigned to this program	Annual Unmet Need: $250,000	• GAP: Data collection in certain coves, embayments and coastal ponds: DO, nutrients, Chl, temperature, salinity.
Toxic Contaminants in Fish and Shellfish	Data needed to identify and assess public health risks of toxic contaminants in fish and shellfish.	Not implemented Available data generated primarily by researchers	No state funding assigned to these programs	Annual Unmet Need: $150,000	• GAP: Expansion of state monitoring programs to include estuarine and near-shore fish to create a holistic assessment of mercury in commercially and recreationally important species throughout the Bay. • GAP: Collection of data to assess other legacy contaminants including PCBs, pesticides, and cadmium in fish. • GAP: Addition of a Mussel Watch monitoring station to Mount Hope Bay to track legacy contaminants in that region. • Incorporation of Brayton Power Plant maintained metals-monitoring data in quahogs (Mercenaria mercenaria) into status and trends analyses. • Hydrodynamic model of Narragansett Bay to better understand the transport, behavior, and fate of contaminants.
Legacy Contaminants in Sediments (NBEP)	Data on persistence of contaminants in the benthic environment helps characterize habitat quality and potential public health concerns	Available data has been collected primarily by researchers	Not available	No state funding assigned to these programs	• GAP: Ensure periodic data collection to support indicator reporting over time and meet management needs.

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Emerging Contaminants (NBEP)	Data on emerging contaminants reflect anthropogenic influence the environment; effects are not yet well understood	Available data has been collected primarily by researchers	Not available	No state funding assigned to this program	• Continued research is needed to better understand the potential exposure and assess the likelihood of ecological and human health risks. • An assessment should be performed to identify key CECs prior to further investment in initiating a monitoring program.
Physical Conditions					
River and Stream Flows (RI Stream Gage Network)	Provides vital data for flood forecasting, flood response and risk management, water pollution control, water quality management including modeling, water supply planning and management, drought management	Implemented	Limited state funding USGS (30%) RIDEM & RI WRB (70%) of 21 stream gages; Providence Water Supply Board also funds gages	At risk of disruption Annual Unmet Need: $110,000	• GAP: Need updated assessment of existing network of stream gages to identify key gaps.
Shoreline Change/Sea Level Rise	Provides data critical to development of CRMC's Shoreline Change Special Area Management Plan and to understand the threat of coastal erosion on public and private infrastructure and natural ecosystems	Partially Implemented	Federal funds with support from URI, CRMC	Annual Unmet Need: $100,000	• GAP: Enhanced bathymetry data. • Expansion of the STORMTOOLS model to include the Massachusetts portion of Narragansett Bay to identify and evaluate high-risk areas. • Analysis of potential impacts of sea level rise on groundwater, drinking water supplies, floodplains, and individual wastewater treatment systems. • Trend analysis of sea level rise trend for Mount Hope Bay using data from the Fall River tide gauge.
Biological Communities and Habitats					

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Marine Fisheries Surveys	Fisheries trawl surveys; supports stock assessments and management decision-making for important commercial fisheries, both finfish and shellfish, also provides data to track ecological status and trends	Implemented - Program enhancements recommended	RIDEM using USFW federal funds matched primarily with license receipts	Projected as stable for current programs; Expansion of programs would require additional resources - TBD	• Analyses of comparability of the GSO and RIDEM trawl data over time, including an examination of the timing and effects of any gear changes. • Consultation with experts to advise on other approach(es) to use in the future to characterize changes in estuarine fish communities. • Compilation and analysis of data on estuarine fish communities in the Upper Bay, including the Providence River Estuary and Greenwich Bay. • Analysis of data collected since 2012.
Lobster Population Surveys	Commercial logbooks, ventless trap surveys, and diver-based young-of-the-year settlement surveys; improves characterization of the abundance and recruitment of lobster	Implemented	RIDEM using NMFS Inter-jurisdictional Fisheries Funding, NOAA	Funding not yet secured for 2018;	
Eelgrass Beds	Aerial photography mapping extent and area of eelgrass beds to characterize the status and trends for this important habitat	Partially Implemented	STB, NBNERR, and CRMC using RI Coastal and Estuarine Habitat Restoration Trust Fund	Currently stable Annual Unmet Need: FY15 $85,000 (periodic investment for overflights)	• GAP: Full implementation of Rhode Island Eelgrass Task Force's recommendations for a three-tiered approach.

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Saltmarshes	Three-tiered monitoring strategy includes landscape scale-GIS assessment, field-based rapid assessment protocol, and intensive research-based assessment of salt marshes	Partially implemented	CRMC, using RI Coastal and Estuarine Habitat Restoration Trust Fund, RIDEM using USFWS Coastal Program and EPA funds. NBNERR using NOAA funds. RINHS is key partner.	Funding is not stable Annual Unmet Need: TBD	• GAP: Full implementation of the multi-parameter Rhode Island Salt Marsh Monitoring Strategy. • Research and monitoring to evaluate methods that will facilitate salt marsh resilience to sea level rise. • Field research and modeling to better understand the process of landward marsh migration under regimes of accelerated rates of sea level rise.
Arrival and Spread of Marine AIS	Identifies invasive species, to allow for proper eradication and management techniques	Partially implemented	Program partners: CRMC, RIDEM, RINHS, NBNERR, EPA AED, RWU	Limited federal funding (USFW) has steadily declined Annual Unmet Need: $150,000	
Benthic Habitat (NBEP)	Characterization of benthic habitat supports bay resource management decision-making	Available data has been collected primarily by researchers	Not available	No state funding assigned to this program	• GAP: The sites characterized in 1988 and 2008 should be revisited every five years using sediment profile imagery. • GAP: Need to coordinate sediment profile imagery with surveys of larger fauna, e.g. shellfish. • Future assessments of benthic habitat quality to incorporate measurements of benthic biogeochemistry, and for future benthic biogeochemistry studies to take a habitat-based approach.

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Volunteer Monitoring of Coastal Waters	Provides supplemental data that may be used state agencies to target monitoring programs, identify pollution sources and track change in condition over time	Implemented	Multiple sources including state and local sponsors	At risk of disruption Annual Unmet Need: $25,000	
Saltwater Beach Water Quality	Monitors saltwater beaches to protect public health, reduce illness associated with swimming in potentially contaminated bathing waters, and to find and eliminate sources of contamination	Implemented	No state funding; RIDOH uses EPA BEACH Act funding. No federal funding may be available after 2015 field season.	At risk for disruption Annual Unmet Need: $212,000	
Other RIEMC Indicators related to watersheds (not the focus of Workshop discussion)					
Water Quality in Large Rivers	Monitors water quality in major rivers to track long term trends for managing water pollution sources; these programs also evaluate pollutant loadings into Narragansett Bay and coastal waters. MA rivers (Taunton, upstream portion of Blackstone) to be similarly monitored to support effective watershed management.	Implemented Additional stations recommended in Pawtuxet River watershed	USGS, RIDEM, NBC	At risk of disruption Annual Unmet Need: $155,000	

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Water Quality in Wadeable Rivers and Streams (rotating assessment)	Assesses water quality in rivers and streams and guides water pollution control programs for rivers, streams, salt ponds and Narragansett Bay	Disrupted in 2017 due to loss of staff and federal funding uncertainties	RIDEM using EPA funds	Disrupted/ Uncertain Annual Unmet Need: $300,000	
Arrival and Spread of Freshwater AIS	Identifies species to support more effective management and control strategies	Partially implemented	RIDEM using USFWS & EPA funds, RINHS, URI	Funding is limited & unstable Annual Unmet Need: $150,000	
Freshwater Wetlands	Provides ecological condition data for freshwater wetlands and the stressors adversely affecting their functions and values	Partially implemented	RIDEM using EPA and RINHS funds	Relies on competitive grants; limited funding available to continue program Annual Unmet Need: $125,000	
Volunteer Monitoring	*Rivers and Streams* Supplements data collected by the State to help assess changing conditions in rivers and streams *Lakes and Ponds* Collects data on State's lakes and ponds that would	Implemented Implemented, no funding for recommended expansion to unassessed lakes	URI Cooperative Extension, RIDEM using EPA funds, and various local sponsors Clean Ocean Access using EPA and other funding	At risk of disruption Annual Unmet Need: TBD At risk of disruption Annual Unmet Need: $80,000	

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	otherwise go un-assessed; this data improves statewide water quality assessments and management, but needs to be expanded to fill gaps.				
Freshwater Beach Water Quality	Freshwater beaches make up nearly half of RI's licensed swimming beaches, but are monitored far less frequently than saltwater beaches. Of particular concern are freshwater swimming beaches at youth summer camps.	Partially implemented by freshwater beach owners and operators	No funding available to enhance the limited existing program	Annual Unmet Need: $100,000	