

www.watershedcounts.org

Introduction

The Watershed Counts report is the work of a broad coalition of 34 agencies and organizations that have come together during the past year to characterize the condition of the land and waters of the Narragansett Bay Region.

Rhode Island's leaders in the legislature and executive offices understand that Rhode Island's economy is closely linked to the quality of our environment. Together we know that Narragansett Bay and our watersheds are changing – and those changes need to be tracked and understood.

Some of the change is positive – resulting from taxpayer investments in improved wastewater treatment to tackle long-standing pollution problems in the upper Bay. With legislative support, Rhode Island made a strong commitment to reduce the loadings of nutrient pollution (specifically nitrogen) into the upper Bay through upgrades at wastewater treatment facilities. Progress is evident in the fact that eight of the ten targeted facilities have completed upgrades; while the others are actively moving toward that goal. DEM has estimated a 35% reduction in total nitrogen pollutant loads from these facilities when compared to 2005 levels. The reductions are needed to alleviate hypoxic conditions – periods where the water lacks sufficient oxygen to support healthy marine ecosystems. Additionally, we will continue to work toward progress upstream into the Massachusetts portion of the watershed, where the federal Environmental Protection Agency (EPA) has issued permits to compel needed nutrient pollution reductions from that State's dischargers in our shared watershed. Working with our Massachusetts partners is one more way in which we will continue to build the Watershed Counts coalition to the benefit of both states.

We can also look to the completion of the Narragansett Bay Commission's (NBC) combined sewer overflow tunnel project – Phase I of a multi-part strategy to abate the release of untreated sewage into the bay – as evidence of our collective commitment to improving water quality in the upper bay. Monitoring by RIDEM and NBC continues in a collaborative effort to document the tunnel's effect on water quality and early evidence indicates operation of the tunnel is allowing for more days of open shellfishing in certain sections of the upper bay.

And some of the change is more troubling. Our recent management accomplishments occur against a backdrop of climate change, which is already altering our landscape and water resources.

In 2004, the RI General Assembly passed the Comprehensive Watershed and Marine Monitoring Act, which established the RI Environmental Monitoring Collaborative. During the past seven years, the Collaborative has developed a state monitoring strategy which has been implemented to better understand our water quality protection, fisheries and wildlife management, habitat restoration and coastal management. This Watershed Counts report builds on the Monitoring Collaborative's work.

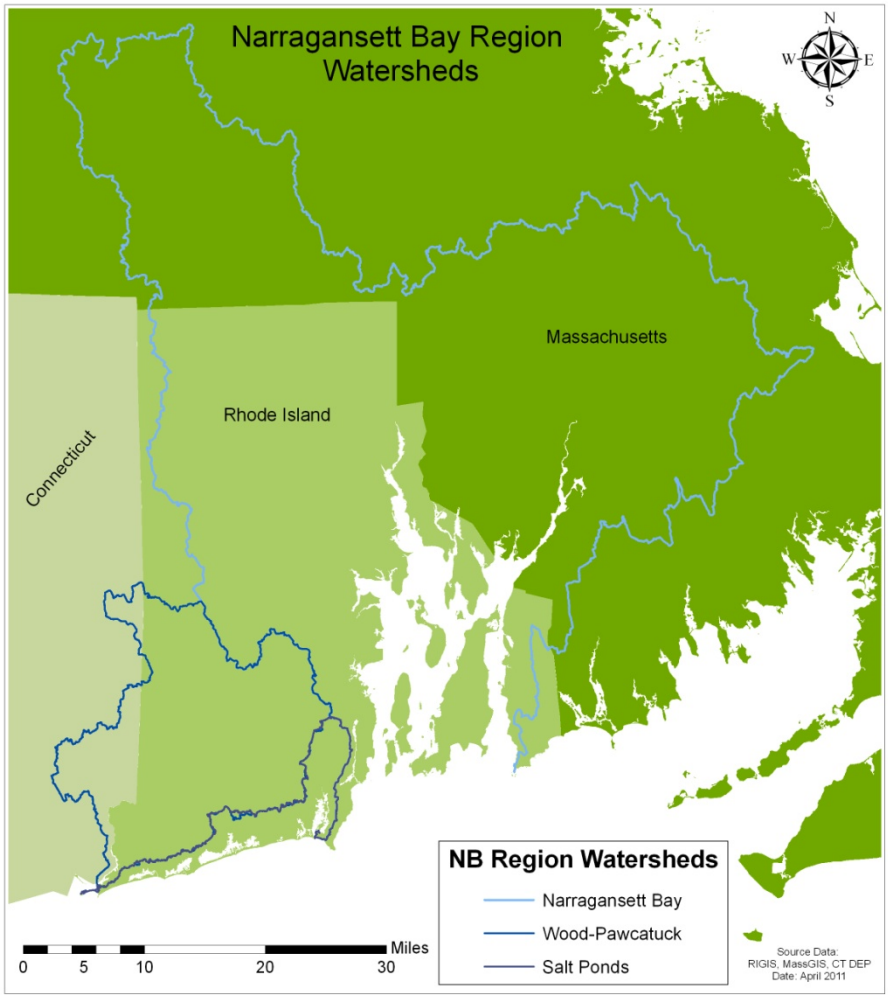
This report will be an annual Earth Day event that will expand in scope with each additional year to provide a useful snapshot of conditions. The five measures addressed in the 2011 report are beaches, freshwater resources, impervious cover, invasive species and climate change. Next year the report will

focus on progress being made in other areas, e.g., our goal of 50% reduction in nutrients entering Narragansett Bay and the protection of critical resource lands.

The Narragansett Bay Region

Narragansett Bay is an estuary – a partly enclosed coastal body of water with one or more rivers or streams flowing into it, with a free connection to the open ocean. More than two billion gallons of fresh water flow daily, on average, from Rhode Island and Southeastern Massachusetts to mix with the salt waters of Narragansett Bay. This mixing of sea water and freshwater produces the unique estuarine habitat that is home to the many creatures of the bay.

The Narragansett Bay region encompasses the land, waters and communities that are linked to the Narragansett Bay estuary. The region includes Narragansett Bay watershed along with the Wood-Pawcatuck and Salt Ponds watersheds in southern Rhode Island. The Narragansett Bay Region is 2066 square miles in area, with 1028 square miles (50%) in Massachusetts, 984 square miles (48%) in Rhode Island and 57 square miles (2%) in Connecticut. The Narragansett Bay Region is home to two million people in 100 cities and towns in three states.[1]



[1] From NBEP, "Currents of Change, Environmental Status and Trends of the Narragansett Bay Region"



Climate Change

Climate change is already happening in the Narragansett Bay region and will intensify in the years to come. Some current observed impacts include increases in air and water temperatures, rising sea level, and increasing rainfall and storm intensity, all of which result in more inland flooding and coastal erosion. Based on information from buoys and other monitoring sites throughout the bay, significant increases in bay water temperature have been observed over the past decades, with a change in the annual bay surface temperature of almost 3 ^{o}F since 1960. Winter bay temperatures have increased by about 4 ^{o}F, which is expected to cause major ecosystem shifts, affecting the bay's fish populations. Sea level has risen over 8 inches at the Newport tide gauge since 1930. At first glance, 8 inches may not look like much, but this trend will accelerate causing widespread shoreline flooding during high tides and coastal storms, especially during hurricanes and nor'easters.

The legislature, state and local agencies and NGOs have made Climate Change adaptation a priority.

What have we accomplished?

- The Climate Risk Reduction Act passed by the General Assembly in 2010 created the RI Climate Change Commission and charged it with studying and reporting on climate change and adaptation strategies. State agencies, environmental and business groups stand ready to assist the Commission.
- RI's coastal agency, Coastal Resources Management Council (CRMC), has taken the lead on researching climate change, implementing climate policy and supporting adaptation strategies with partners like RI Sea Grant and the Dept of Administration Statewide Planning Program. CRMC's Ocean Special Area Management Plan (SAMP), adopted by the Council in October 2010, was developed with partners at URI to examine climate change and promote offshore renewable energy. Their work has been heralded as a model for the nation.

Climate Change



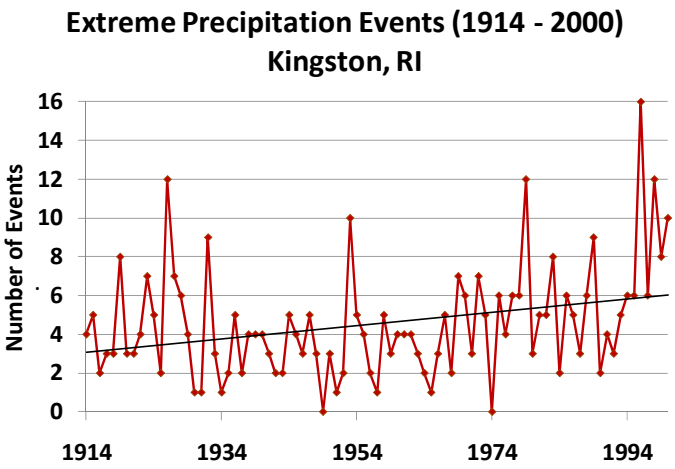
Status and Trends: Climate Change is here. We are dealing with the impacts and will continue to face increased temperatures, storminess, and sea level rise in the years to come.



Management: RI is taking action to adapt and respond to Climate Change.

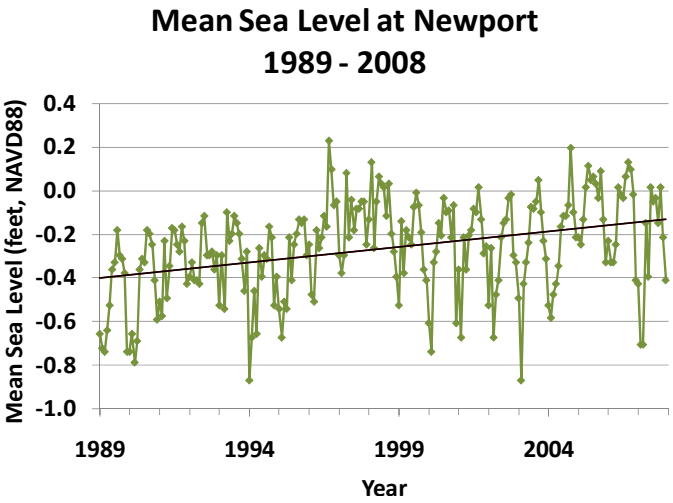
Climate Change Data for the Narragansett Bay Region

Physical, chemical and biological data for Narragansett Bay can be found at www.narrbay.org



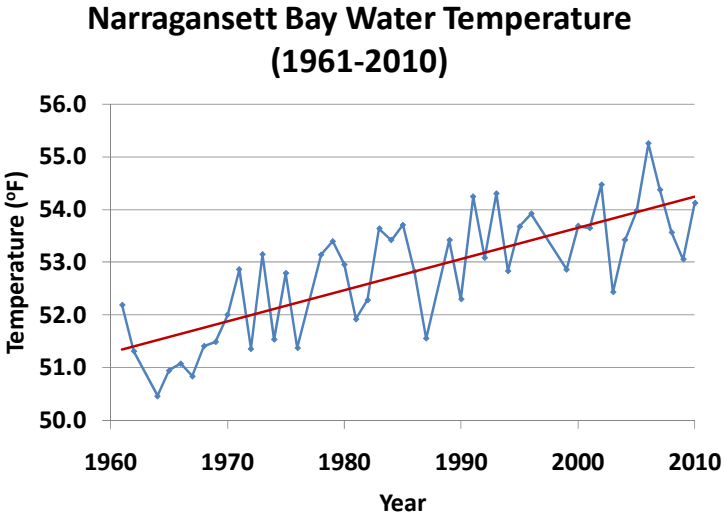
Data: New England Integrated Science and Assessment
http://neisa.unh.edu/Climate/KingstonRIExtremePPT.html

The number of extreme precipitation events (> 2 inches of rain in less than 48 hours) occurring annually has increased since 1914. These storms increase the risk and frequency of inland flooding.



Sea level has risen over 8 inches at the Newport tide gage. Rising sea levels increase the risk of coastal flooding. And more storms will increase coastal erosion.

Data: National Oceanographic and Atmospheric Administration
http://tidesandcurrents.noaa.gov/noaatidepredictions/viewDailyPredictions.jsp?Stationid=8452660



Narragansett Bay's average annual surface temperature has increased by almost 3°F over the past 50 years. Warmer temperatures change the marine ecosystem and will affect valuable fisheries.

Data: URI GSO Phytoplankton Laboratory
http://www.gso.uri.edu/phytoplankton/



Bay and Ocean Beaches

Rhode Islanders cherish their personal relationship with the shore, and beach visitors from near and far are an important part of the region's tourism economy. Beach closures hurt our quality of life and negatively impact tourism. Closures are closely linked to rainfall as storm water runoff is a significant source of bacteria to many beaches. Sources of bacteria include discharges of raw sewage from combined sewer overflows (CSOs), failing septic systems, cesspools, and wild and domestic animals.

Since 2001 Rhode Island beaches have received over 2 million dollars in federal money driving over 10 million dollars in remediation by the cities, towns, and private beach owners. This does not include the extraordinary contributions of state and federal resources to the Providence CSO tunnel project.

The work to improve water quality at Rhode Island beaches has resulted in a 36% decrease in beach closures since 2006. During the summer of 2010, the Rhode Island Department of Health (RIDOH) conducted a study of water quality at three public access areas in the upper bay near urban areas where people swim during the summer. They found that overall water quality was quite good, similar to licensed beaches in the lower bay. These results show that state investments in the combined sewer overflow tunnel in Providence, and sewer and storm water projects throughout the state are improving our beaches.

Bay and Ocean Beaches

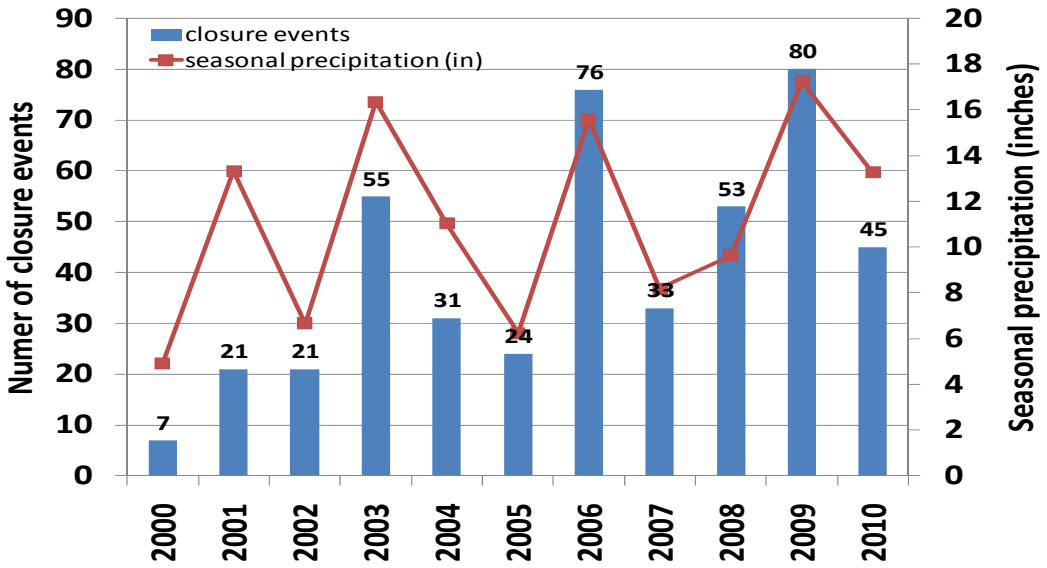
Status and Trends: Our beaches are improving, but we still have beaches with water quality problems. Most of our beach closures (80%) occur at only a few of the state's licensed beaches (10%). This means Rhode Island has over 100 licensed facilities that are open daily during the summer and are not affected by bacterial contamination.

Management: We are doing a good job monitoring our beaches and we are progressively addressing storm water and sewer connections. Continued investment in monitoring allows us to find and eliminate the sources of contamination. Additional source identification and remediation will result in more open beach days for the public and the capacity to accommodate our important tourism population.

Saltwater Beach Closure Data for Narragansett Bay

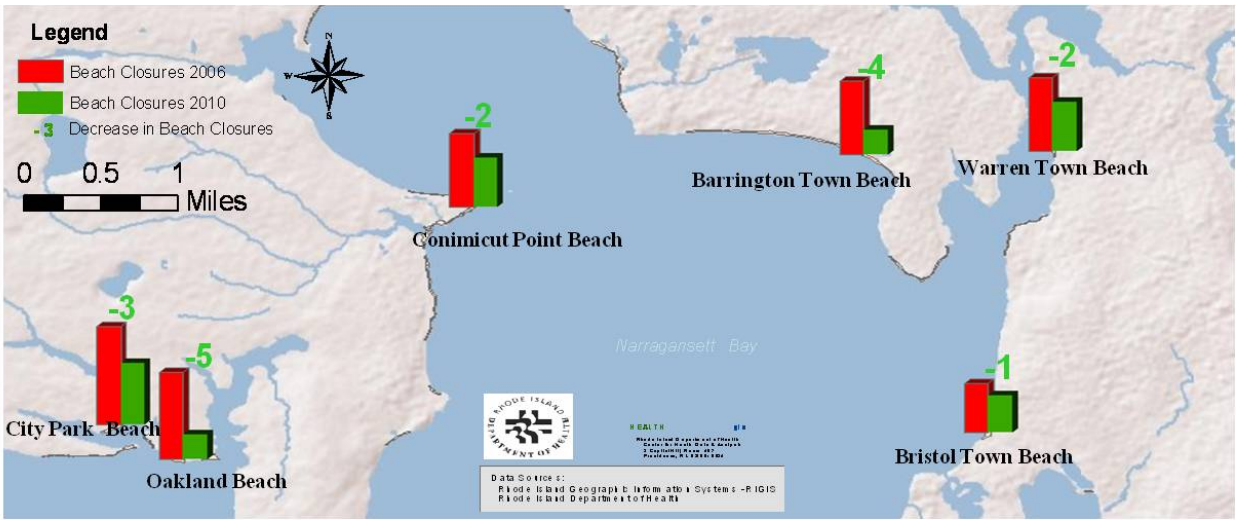
Data: http://www.ribeaches.org/

Seasonal Saltwater Beach Closure Events & Seasonal Precipitation (2000-2010)



The number of saltwater beach closures has decreased by 36% since 2006.

Upper Narragansett Bay beach improvements 2006 to 2010



Upper Narragansett Bay beaches have improved since 2006 as illustrated by the green numbers on this map. During the summer of 2010, DOH conducted additional studies at public access areas in Providence and East Providence and found that overall water quality was quite good, similar to licensed beaches in the lower bay.

Saltwater Beach Closure Events, Memorial Day to Labor Day, 2010

CITY/TOWN	Beach Name	Tier*	# Closure Events	# Days Closed	# Samples Analyzed	% Exceeding Standard
Barrington	Barrington Town Beach	*1*	2	2	65	8%
Bristol	Bristol Town Beach	*1*	3	5	69	10%
	Camp St. Dorothy	*1*	1	5	5	20%
Charlestown	Blue Shutters Beach	*2*	-	-	14	7%**
	Charlestown Breachway	*3*	-	-	9	-
	Charlestown Town Beach	*2*	-	-	14	-
	East Beach	*3*	-	-	16	-
Jamestown	Mackerel Cove Beach	*2*	-	-	18	-
Little Compton	Briggs Beach	*2*	-	-	10	-
	Goosewing Beach	*2*	-	-	16	-
	South Shore Beach	*2*	-	-	12	-
	Warrens Point Beach Club	*2*	-	-	6	-
Middletown	Atlantic Beach Club	*1*	6	7	55	22%
	Peabody's Beach	*2*	2	3	33	15%
	Sachuest Beach	*2*	-	-	30	-
	Third Beach	*1*	2	3	92	11%
Narragansett	Bonnet Shores Beach Club	*1*	-	-	23	4%**
	Capt. Roger Wheeler	*1*	-	-	36	-
	Dunes Club	*2*	-	-	26	-
	Galilee Beach Club	*2*	-	-	3	-
	Narragansett Town Beach	*1*	-	-	29	-
	Salty Brine Beach	*3*	-	-	3	-
	Scarborough State Beach N	*1*	2	2	122	10%
	Scarborough State Beach S	*1*	2	2	86	10%
New Shoreham	Fred Benson Town Beach	*3*	-	-	6	-
	Surf Hotel	*3*	-	-	2	-
Newport	Easton's Beach	*1*	4	5	136	17%
	Fort Adams State Park	*1*	1	2	48	4%
	Gooseberry Beach	*2*	-	-	11	-
	Hazard's Beach	*2*	1	2	10	20%
	King Park Main	*1*	-	-	131	17%**
	Spouting Rock Beach Assn.	*2*	-	-	17	-
North Kingstown	Camp Grosvenor	*1*	2	4	29	10%
	North Kingstown Town Beach	*1*	-	-	71	-
	Plum Beach Club	*2*	-	-	11	-
	Saunderstown Yacht Club	*1*	-	-	8	-
Portsmouth	Sandy Point Beach	*2*	1	1	22	9%
South Kingstown	Camp Fuller – YMCA Beach	*2*	1	3	6	17%
	East Matunuck State Beach	*3*	-	-	9	-
	Greenhill Beach	*3*	-	-	3	-
	Matunuck Town Beach	*2*	-	-	15	-
	Roy Carpenter's Beach	*2*	-	-	8	-
	Willow Dell Beach Club	*2*	-	-	4	-

CITY/TOWN	Beach Name	Tier*	# Closure Events	# Days Closed	# Samples Analyzed	% Exceeding Standard
Tiverton	Fogland Beach	*2*	-	-	27	7%**
	Grinells Beach	*2*	-	-	18	17%**
Warren	Warren Town Beach	*1*	4	4	41	10%
Warwick	City Park Beach	*1*	1	2	48	2%
	Conimicut Point Beach	*1*	4	8	80	20%
	Goddard Memorial State Park	*1*	4	5	138	12%
	Oakland Beach	*1*	2	5	120	7%
Westerly	Alfies	*2*	-	-	5	-
	Andrea Hotel	*2*	-	-	5	-
	Atlantic Beach Casino Resort	*2*	-	-	7	-
	Atlantic Beach Park	*2*	-	-	6	-
	Atlantic Pizza and Grill	*2*	-	-	6	-
	Breezeway Beach	*2*	-	-	3	-
	Dunes Park	*2*	-	-	7	-
	Jim's Trailer Park	*2*	-	-	7	-
	Misquamicut Club	*2*	-	-	16	-
	Misquamicut Fire Dist Beach	*2*	-	-	12	-
	Misquamicut State Beach	*1*	-	-	7	-
	Ocean House	*3*	-	-	7	-
	Paddy's Beach	*2*	-	-	5	-
	Pleasant View Inn	*2*	-	-	5	-
	Sam's Beach	*2*	-	-	6	-
	Sandy Shore Motel	*2*	-	-	5	-
	Seaside Beach Club	*2*	-	-	7	-
	Watch Hill Carousel Beach	*2*	-	-	8	-
	Weekapaug Fire District	*2*	-	-	28	-
	Westerly Town Beach – New	*2*	-	-	7	-
	Westerly Town Beach – Old	*2*	-	-	18	-
NB Watershed Total			***45***	***70***	***1988***	***9%***

Source: Rhode Island Department of Health, Beach Monitoring Program

* Tiers refer to risk and the associated frequency of sampling: Tier 1 beaches (high risk) are sampled at least weekly, Tier 2 beaches (moderate risk) are sampled at least monthly, and Tier3 beaches (low risk) are sampled at least twice per season. Risk is based on the level of usage, the presence of known pollution sources, and any past history of closures because of poor water quality.

** In addition to exceeding the enterococci standard, several other factors contribute to the decision to close a beach: weather, time since sample collection, tides and surf, presence of seaweed, and any history of closures. Also, a beach may be partially closed in the affected area, but remain open in the unaffected area.

For more information: http://www.ribeaches.org/sampling.cfm



Impervious Cover

Impervious Cover (IC), such as roadways, driveways and roofs, has a large impact on our environment. These hard surfaces don't allow rainwater to soak into the ground, where it would naturally be filtered through multiple layers of soil and recycled into the environment. Instead, rainwater runs off into storm water drains heading to rivers, ponds and to the bay, carrying pollutants, warming rivers, forcing beach closures, and worsening flooding downstream.

14% of the Narragansett Bay watershed is under impervious cover. Within RI, IC by municipality ranges from 3% to 40%. Scientists have also observed a relationship between IC and stream quality. As a rule of thumb, streams surrounded by more than 25% IC are severely impacted and can no longer support a stream community of diverse fish and other species important to the network of a healthy environment. When IC is between 10 and 25% streams show clear signs of degradation. When IC is less than 10%, IC streams support a wide range of plants, macroinvertebrates and fish, and should be protected from increases in IC. Only 17 towns in the state have less than 10% IC. Moreover, impervious cover increased almost 45% between 1972 and 1999, six times faster than population growth in the state.

Recent accomplishments: In 2007, the legislature passed "The Smart Development For A Cleaner Bay Act" raising Rhode Island's storm water runoff standards. The law requires the Department of Environmental Management (DEM) and the Coastal Resources Management Council (CRMC) to amend the 1993 storm water manual to require recharge or infiltration of a portion of storm water into the ground and use low impact development (LID) techniques as the primary method of storm water control. DEM and CRMC jointly developed revisions to the storm water manual which became effective in January 2011. These efforts will assist cities and towns in applying their land use authority to control IC. This was a bold piece of legislation and will help to moderate the future impacts of increased impervious cover. A great deal of work is currently being invested by many agencies to reduce the negative effects of IC through improved management of storm water[2].

Impervious Cover

Status and Trends: The Narragansett Bay watershed has 14% Impervious Cover (IC), and this will increase with further development. IC is regional, very high in urban centers and coastal areas, lower in rural areas.

Management: The legislature has shown leadership on managing storm water and state agencies have taken implementation seriously. DOA's urban services boundary directs new development to urban areas, and we are implementing strategies for minimizing IC as rural development occurs, and retrofitting to manage storm water in our urban areas.

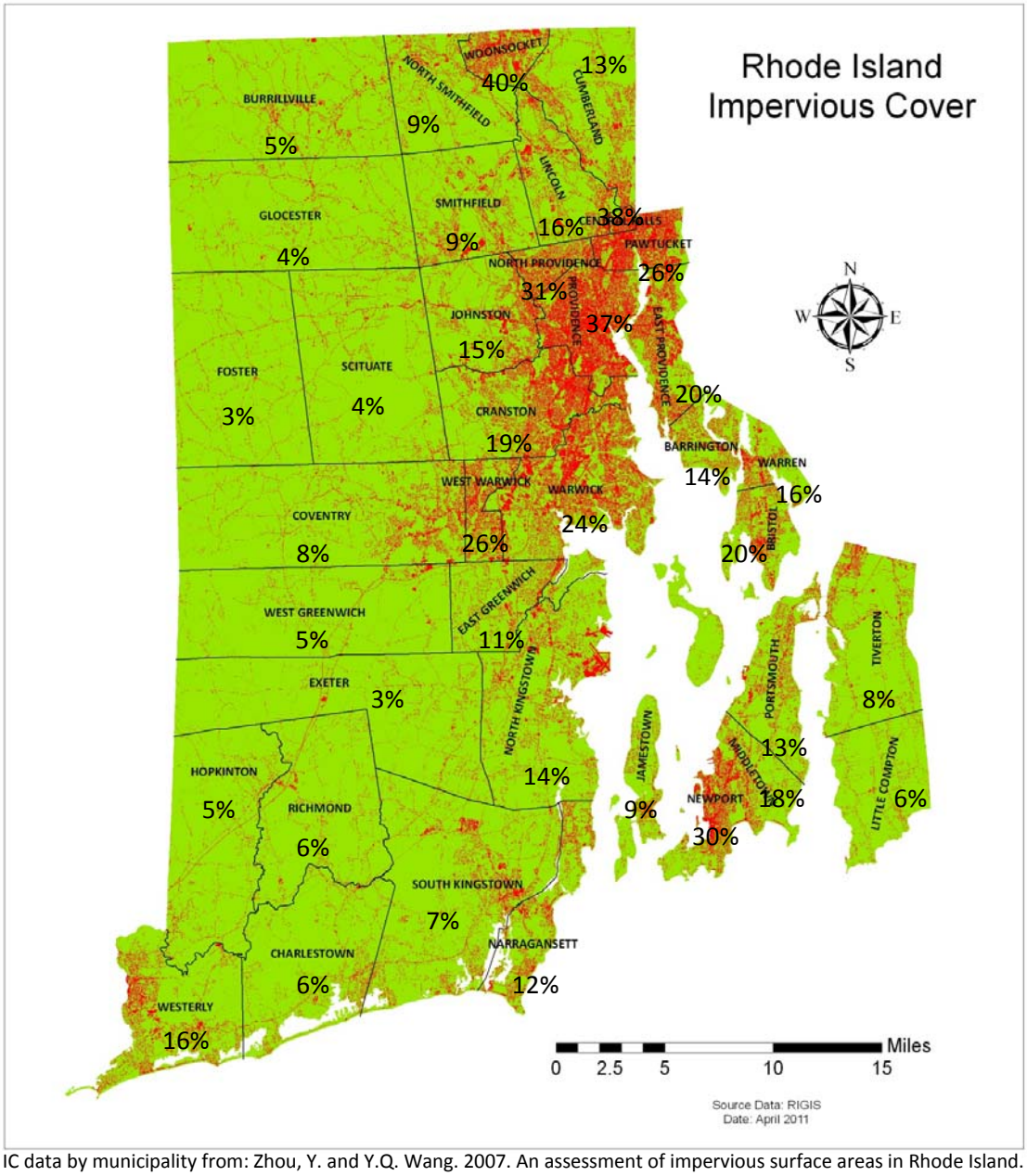
[2] To date, RIDEM has completed Water Quality Restoration Plans (formally known as TMDLs) addressing impairments affecting 86 waterbodies – which with few exceptions, identify storm water as the predominant source of pollutants causing the impairment. The TMDLs outline specific actions for municipalities, RIDOT and others to mitigate storm water related impacts, including identification of priority outfalls requiring retrofits.

Impervious Cover Data for the Narragansett Bay Region

Data: RIGIS at http://www.edc.uri.edu/rigis/ and MassGIS at http://www.mass.gov/mgis/
Data for this indicator are only available every several years, so the extent of recent changes won't be seen for a few years.

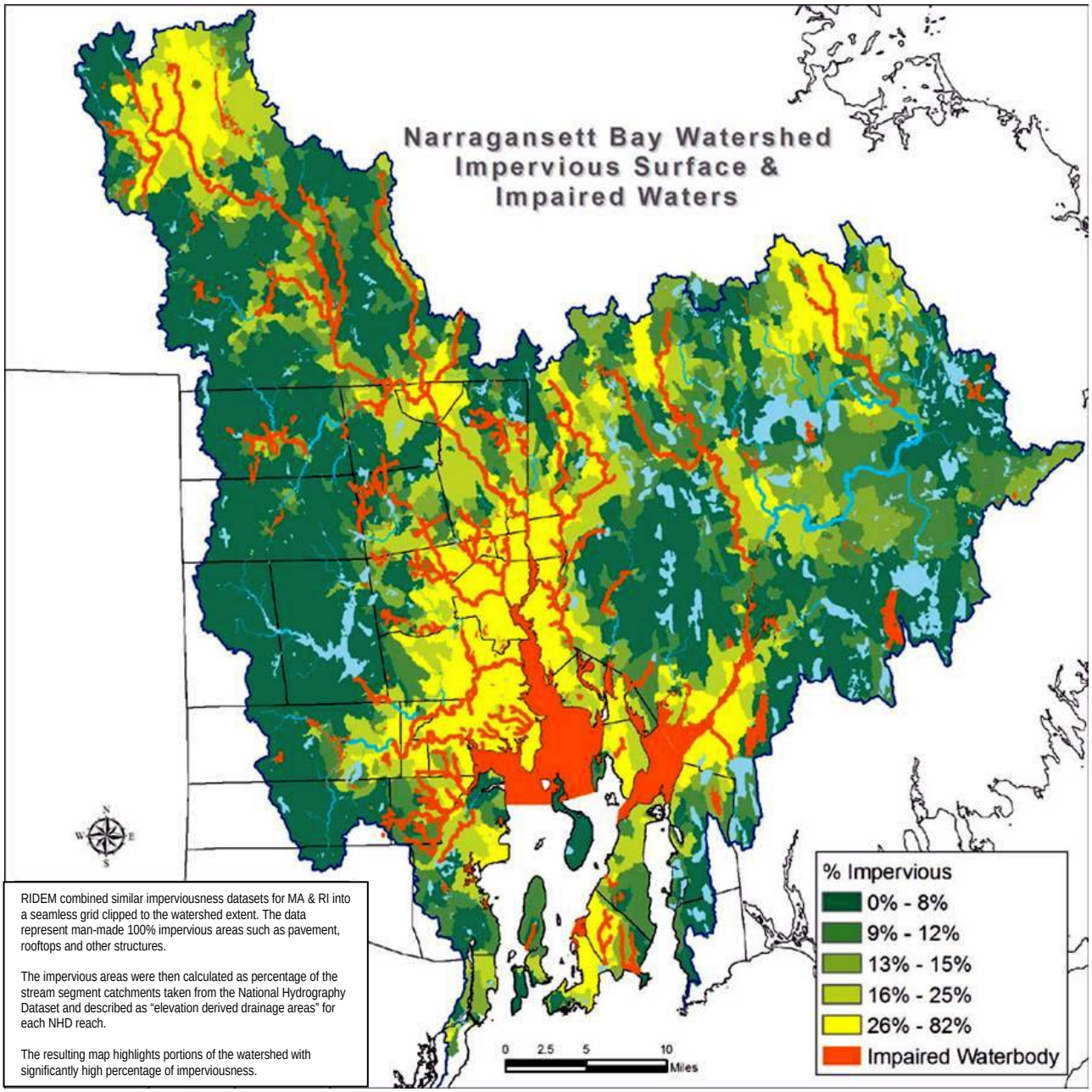
Streams, lakes, ponds and estuaries are all affected by the land cover of their watersheds, also called catchments. A catchment is the land area that contributes water to a particular water body. All land contributes water to streams, lakes and oceans. We can map impervious cover by the land contributing water to each stream and pond, or by municipality, which is where land use decisions are made.

Impervious cover by municipality:



IC data by municipality from: Zhou, Y. and Y.Q. Wang. 2007. An assessment of impervious surface areas in Rhode Island. Northeastern Naturalist 14(4):643-650.

Impervious cover by catchment, and impaired water bodies:



States are required to identify impaired water bodies -- rivers, streams, lakes and estuarine waters that do not meet their water quality standards. This map shows how impaired waters (in red) are often associated with high levels of impervious cover (in yellow).
Map: RI Department of Environmental Management.



Freshwater Resources

Rhode Island has ample rainfall that supports our freshwater system of groundwater aquifers, rivers, streams, and lakes, while providing freshwater as drinking water, as well as for industry, firefighting, and agriculture. Despite our plentiful rainfall, however, there is still a limit to this resource since its availability is linked to the amount of rainfall and demand in a given time period. In some suburban communities, during summer when water levels are naturally lower, demand for water that is suitable for drinking is 2 – 3 times wintertime usage. Much of this increased demand is for watering lawns – a practice that is now unsustainable. Increasingly, more water is taken from the ground than is returned by rain and the watersheds are affected.

Several watersheds in Rhode Island are stressed – essentially they reach drought-like conditions during non-drought years – by the over withdrawal of water. Examples include the Hunt/Potowomut River aquifer in North Kingstown and East Greenwich, which provides water supply for North Kingstown, Kent County Water and Quonset; and the Chipuxet watershed in South Kingstown which provides water to URI, Narragansett and South Kingstown, as well as irrigation water to local farms.

Recent accomplishments: In 2009, the legislature passed the "Water Use and Efficiency Act" to promote sustainable management of Rhode Island's shared water resources. The RI Water Resources Board held a public hearing on March 15 on regulations that begin to implement the requirements of this act.

Freshwater Resources

Status and Trends: In some areas, freshwater rivers and streams are stressed by over withdrawal of water.

Management: RI's Legislature has given DEM and the Water Resources Board the mandate to sustainably manage our shared water resources to provide water for essential human uses, economic development and ecological health. Continued implementation is needed.

Freshwater Resources Data for the Narragansett Bay Region

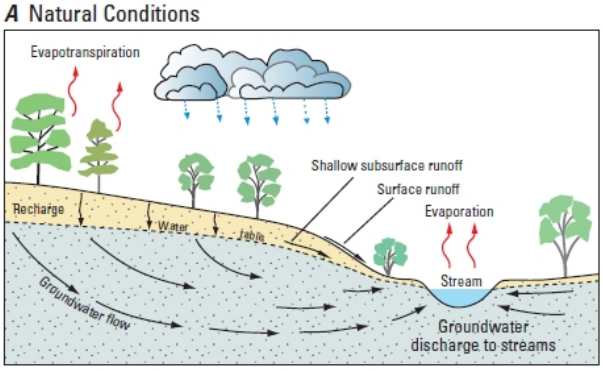
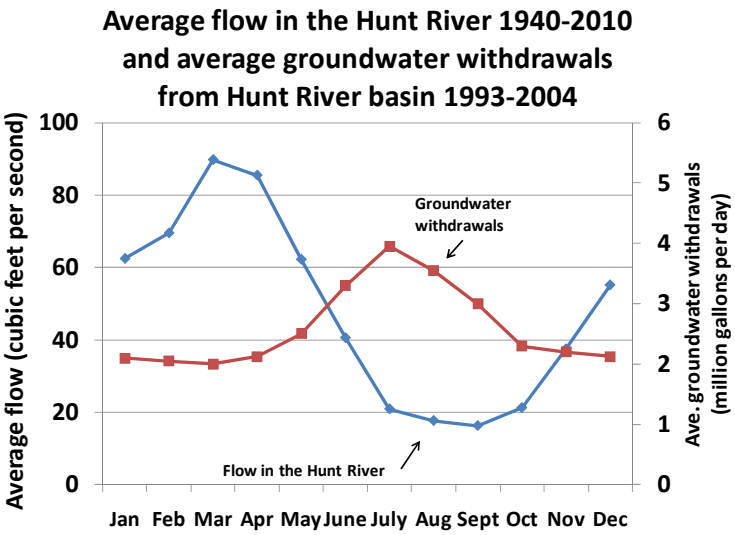


Figure 3. Flow paths of precipitation to a stream under *(A)* natural conditions, *(B)* intercepted groundwater by a pumped well, and *(C)* induced infiltration by a pumped well. A pumped well captures groundwater that would otherwise discharge to a stream, induces infiltration from the stream, or both; if the rate of withdrawal exceeds the rate of streamflow, induced infiltration can cause the stream to stop flowing.

Source: Breault et al., 2009. Effects of water-management strategies on water resources in the Pawcatuck River Basin, Southwestern Rhode Island and Southeastern Connecticut. USGS Circular 1340.

Data: RI Water Resources Board at www.wrb.ri.gov/index.htm
Streamflow & groundwater data: http://ma.water.usgs.gov/
Additional information may be found at
http://www.dem.ri.gov/programs/benviron/water/index.htm



Water demand increases during the summer months, primarily due to residential uses such as lawn watering. The increased demand coincides with the time of year when water supplies are most limited.



Hunt River at average flow (above) and low flow (below)



Photos: RI DEM



Freshwater and Terrestrial Invasive Species

When plants or animals are released into areas outside their native range and without their natural predators, they often find the new area suitable for their needs. The result: these foreign species grow and reproduce out of control, destabilizing the environment and harming native species and human activities. They become "invasive species."

In Rhode Island freshwater aquatic invasives have been found in over 70 lakes and ponds. They can affect the ecological balance, impair boating, fishing, and swimming, and reduce lakeside property values. The State has an aquatic invasive species management plan that was developed by CRMC, RIDEM, and federal and private partners, then approved in 2007. Some plan elements are being implemented with federal funds made available through CRMC or with other resources, for instance by the Research Reserve on Prudence Island, URI Watershed Watch, and the Rhode Island Natural History Survey (RINHS). Nonetheless, the plan is not fully implemented and aquatic invasive species remain a significant and growing threat to Rhode Island's environmental resources.

Terrestrial environments in Rhode Island are also affected by invasive species, such as bittersweet and barberry plants, gypsy moths, and hemlock wooly adelgids. They choke out native species, ruin scarce pasture land, damage valuable timber, and alter the look of our classic Rhode Island landscape. Recent efforts in Worcester, MA to prevent the Asian Long-horned Beetle from spreading across New England have cost $62 million dollars in less than three years.[3] Rhode Island does not have a comprehensive preparedness plan for terrestrial invasive species, though some agencies and private groups encourage prevention, conduct monitoring, and organize responses, among them RIDEM and RINHS. RIDEM and the Rhode Island Tree Council led a successful response and outreach effort targeting the Asian Longhorned Beetle that successfully caught larvae in Cranston before they could spread to other parts of our and neighboring states. Unfortunately that effort was funded with a one-time federal grant. There needs to be accessible resources to fight invasives on an emergency basis before they establish a stronghold.

Freshwater and Terrestrial Invasive Species



Status and Trends: Many invasive species are already here, and only a few of them are being tackled adequately to limit or reverse their damage. Non-native species will continue to make their way to Rhode Island, with the potential for them to become invasive.

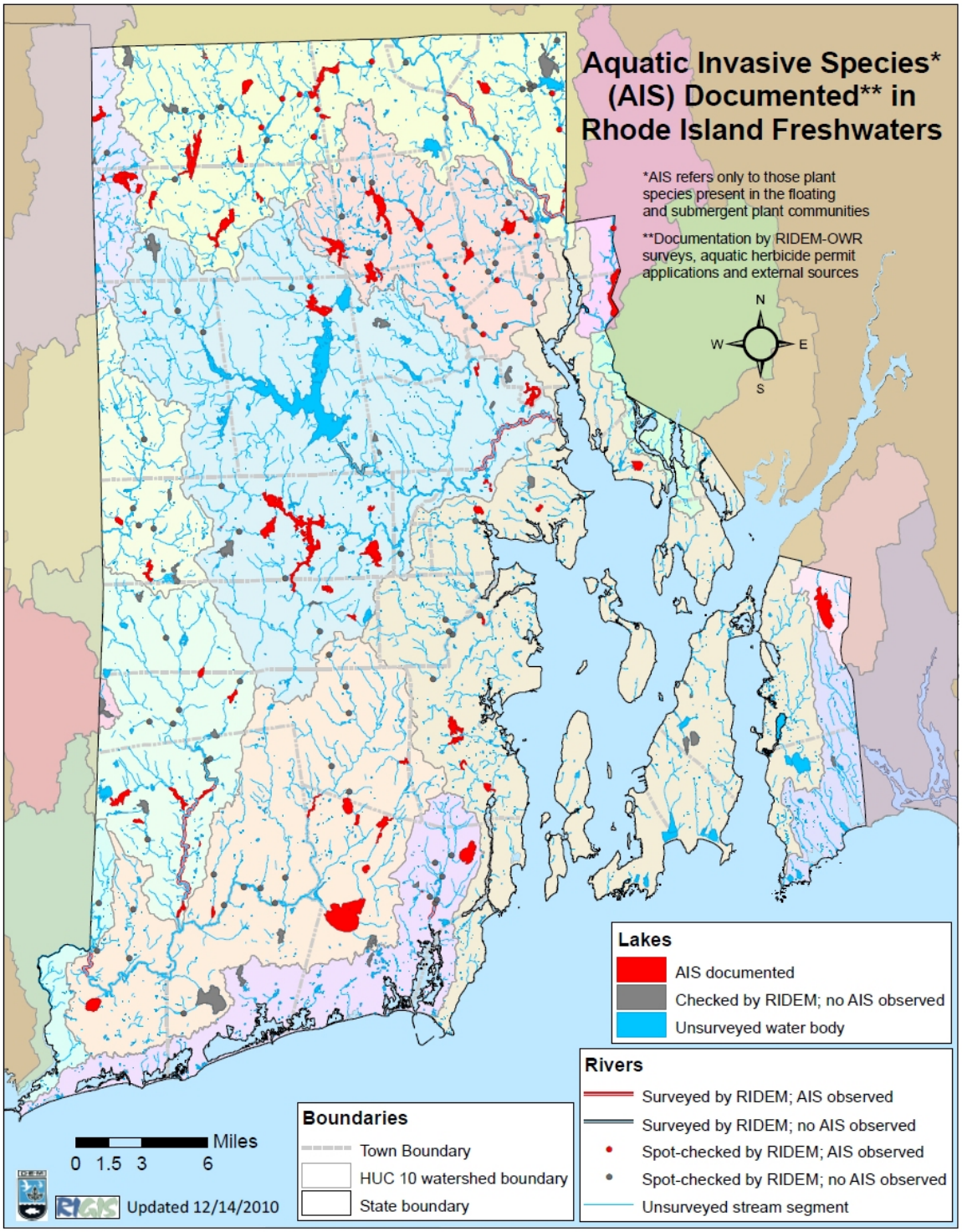


Management: Rhode Island needs to keep informed, be vigilant and have plans ready to respond when needed. Successful public and private efforts to date could be even more effective with consistent state funding of key capacities, particularly coordination and communication, training, and early detection and rapid response.

[3] Haack, R.A., F. Hérard, J. Sun, and J.J. Turgeon. In press. Managing invasive populations of Asian longhorned beetleand citrus longhorned beetle: a worldwide perspective. Annual Review of Entomology 55: 521–546; http://www.na.fs.fed.us/ra/specialinitiatives/alb/2011/alb_project_brief.pdf. Cost figure Personal Communication, RINHS (D.Gregg) and APHIS.

Invasive Species Information for the Narragansett Bay Region

RI DEM has documented the presence of aquatic invasive species in freshwaters.



RI DEM Aquatic Invasive Species:
http://www.dem.ri.gov/programs/benviron/water/quality/surfwq/aisindex.htm

MA DCR Aquatic Invasive Species: http://www.mass.gov/dcr/watersupply/lakepond/invasive_1.htm

RI Invasive Species Council: http://www.rinhs.org/what-we-do/invasives/riisc/

USDA for RI: http://www.invasivespeciesinfo.gov/unitedstates/ri.shtml

USDA for MA: http://www.invasivespeciesinfo.gov/unitedstates/ma.shtml



Oriental bittersweet
(Photo: James R. Allison, GA DNR)


Japanese barberry
(Photo: Leslie J. Mehrhoff, UConn)


Asian longhorned beetle
(Photo: invasive.org)



hemlock wooly adelgid
(Photo: CT Agriculture Experiment Station)



Asian clam
(Photo: Noel M. Burkhead)


water chestnut
(Photo: Northeast Aquatic Nuisance Species Panel)

NARRAGANSETT BAY

WATERSHED COUNTS

ECONOMY • ENVIRONMENT • EQUITY

Audubon Society of Rhode Island
Bays, Rivers and Watersheds Coordination Team
Blackstone River Coalition
Blackstone River Watershed Council / Friends of the Blackstone
Conservation Law Foundation
Friends of the Moshassuck
Grow Smart RI
Massachusetts Audubon Society
Narragansett Bay Commission
Narragansett Bay Estuarine Research Reserve
Narragansett Bay Estuary Program
Town of North Kingstown Planning Department
Office of Senator Sheldon Whitehouse
RI Resource Conservation & Development Area Council
The Rhode Island Foundation
RI Natural History Survey
RI Nursery and Landscape Association
RI Coastal Resources Management Council
RI Department of Administration
RI Department of Environmental Management
RI Department of Health
RI Department of Transportation
RI Water Resources Board
Save the Bay
Surfrider Foundation
U.S. Fish and Wildlife Service
Coastal Institute, URI
URI Cooperative Extension
URI Graduate School of Oceanography
URI Dept. of Natural Resources Science
URI Watershed Watch
U.S. EPA Atlantic Ecology Division
U.S. EPA Region I
Wood Pawcatuck Watershed Association

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