Rhode Island Freshwater Lakes and Ponds: Aquatic Invasive Plants and Water Quality Concerns

A Report to the Governor and Rhode Island General Assembly




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State of Rhode Island
Department of Environmental Management

Rhode Island Freshwater Lakes and Ponds: Aquatic Invasive Plants and Water Quality Concerns

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Submitted to

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Speaker of the House

Senator M. Teresa Paiva Weed
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By the

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Executive Summary

Rhode Island's lakes and ponds are a valuable natural resource relied on to supply drinking water to a majority of the State's population, highly valued for active and passive outdoor recreation and recognized as essential to our freshwater ecosystems. Pursuant to Rhode Island General Laws Section 42-17.1-2-34, the Rhode Island Department of Environmental Management (RIDEM) has used available information to report on the water quality of lakes, the occurrence of aquatic invasive species in lakes and the feasibility of instituting a boat sticker program as a means to generate funding for lake management. Given the significant public benefits derived from lakes, it is appropriate for the State to have a leading role in promoting effective lake stewardship and collaborating with all partners including lake associations. This report acknowledges the need to strengthen lake management in Rhode Island and recommends, subject to the availability of additional funding, that RIDEM establish a program with staff dedicated fulltime to work with lake associations and other important partners to advance needed improvements in lake management.

Lakes cover 20,749 acres of the Rhode Island landscape. RIDEM uses a data system to track 237 lakes that account for 91% of Rhode Island's total lake acreage. Data is available to assess water quality in about 75% of the statewide acreage. Much of the data is generated from the University of Rhode Island Watershed Watch program which has coordinated volunteer-based monitoring in lakes for 24 years. The 2010 statewide assessment of water quality conducted by RIDEM found that 9,861 lake acres, or 63% of the total acreage assessed, have one or more water quality impairments. The largest cause of impairment is aquatic invasive plants which adversely affect aquatic habitat in about one-third of the total lake acreage in Rhode Island. Fifty-nine (59) lakes covering about 24% of the total lake acreage have water quality impairments associated with pollutants. These impairments include fish tissue contamination (primarily mercury), nutrient enrichment, metals and pathogens. Water quality restoration studies have been completed to identify the pollutant loading reductions needed to mitigate one or more impairments on 34 of the 59 lakes. Blue-green algal blooms, produced by naturally occurring cyanobacteria and often fueled by excess nutrients, are also an emerging water quality management and public health issue in Rhode Island lakes.

Aquatic invasive plants have been documented as a widespread problem in RI freshwater lakes. A review of information on the presence or absence of aquatic invasive species in 133 lakes covering 15,335 acres found that 80 lakes, or 59% of the total for which information is available, are infested with one or more aquatic invasive plant. A total of 13 different species have been detected with variable milfoil and fanwort being the plants most commonly found. Aquatic invasive plants create dense vegetative growth in lakes that interferes with the desirable uses of lakes and has been documented by researchers in New England and elsewhere to reduce lakeside property values as the infestation progresses. The occurrence of aquatic invasive plants in Rhode Island lakes is similar to that documented in neighboring Connecticut and Massachusetts.

The management approach to aquatic invasive species should include measures to prevent the introduction of new species, to rapidly respond to new infestations and to undertake the long-term needed management techniques to control existing infestations. Lake management planning provides a process for compiling the appropriate lake specific information that is needed to optimize the success of management actions. Eradication of well established aquatic invasive species infestations is not usually feasible so a commitment to long-term management

is needed. The most commonly employed techniques to combat aquatic invasive plants, including chemical treatment with herbicides, are usually expensive to implement. RIDEM believes many lake associations will need both technical and financial assistance in order for management to be successfully pursued and implemented. RIDEM reviewed the potential for a boat sticker program, similar to that in place in Maine, to provide a source of funding for lake management. Noting uncertainties in the available data, RIDEM estimated the number of boats operating in Rhode Island freshwater lakes to be significantly lower than that in other states such that the boat sticker program's potential for generating revenue is limited.

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Definitions & Acronyms

Non-native, **non-indigenous** and **exotic** species are used interchangeably to refer to a species transported intentionally or accidentally from another region.

Invasive Species refer to non-native species that threaten the diversity or abundance of native species or the ecological stability of local ecosystems, or the commercial, agricultural, aquacultural or recreational activities dependent on such ecosystems.

Aquatic Invasive Species (AIS) refer to those invasive aquatic plants present in the submersed or floating plant communities, or non-plant species found on/in the water body substrate or within the water column.

CALM refers to the consolidated assessment and listing methodology document produced by RIDEM.

CRMC refers to the Rhode Island Coastal Resources Management Council.

Emergent Invasive Species refer to those invasive plants present in the emergent plant communities of water bodies, such as *Phragmites*.

EPA refers to the federal Environmental Protection Agency.

IPM refers to integrated pest management.

Lake, **pond** and **reservoir** are used interchangeably to refer to a place not less than one-quarter acre in extent, natural or manmade where open standing or slowly moving water shall be present for at least six months a year

PCBs refer to the compounds polychlorinated biphenyls.

A **River** refers to a body of water that is designated as a perennial stream by the United States Department of the Interior Geologic Survey on 7.5-minute series topographic maps, and that is not a pond.

RIASM Plan refers to the Rhode Island Aquatic Species Management Plan.

RIDEM refers the Rhode Island Department of Environmental Management.

RIEMC refers to the Rhode Island Environmental Monitoring Collaborative.

RIDOH refers to the Rhode Island Department of Health.

RINHS refers to the Rhode Island Natural History Survey, a non-profit organization established to gather and disseminate information on Rhode Island's animals and plants, geology, and ecosystems.

STL is Save the Lakes, an alliance of individuals and associations dedicated to improving, protecting and preserving the freshwater bodies of Rhode Island for future generations

Stream and **brook** are used interchangeably to refer to any flowing body of water or watercourse other than a river that flows long enough each year to develop and maintain a defined channel

TMDL is Total Maximum Daily Load and refers to the maximum amount of a pollutant that a waterbody can receive and still meet water quality standards.

URIWW is the University of Rhode Island Watershed Watch, part of the Cooperative Extension at URI, which trains volunteer "citizen scientists" to collect water quality data from fresh and salt water resources including lakes, ponds, streams and coastal waters.

Water body refers to freshwater flowing or standing water wetlands, including lakes, rivers and streams.

1.0 Introduction

Rhode Island's lakes and ponds are a valuable natural resource relied upon to supply drinking water to a majority of the State's population and widely used for recreation. Lakes are also vital elements in the biodiversity of the environment, providing habitat for many species. Effective stewardship of our lakes is essential to ensuring the public will continue to enjoy the many benefits provided by lakes both now and in the future. Protecting and, where needed, restoring the water quality conditions in lakes will require greater collaboration by state resource managers, local communities, lake associations, dam owners, property owners and those who use lakes for recreation and other purposes. Current lake water quality management challenges include infestations of aquatic invasive species, nutrient enrichment, mercury in fish tissue and the emerging issue of blue-green algae, also known as cyanobacteria.

The Rhode Island Department of Environmental Management (RIDEM) is well aware of growing public concern about declining conditions in lakes and ponds. Over the past few years an increasing number of lake associations and citizens have contacted RIDEM about nuisance conditions created by the growth of aquatic invasive plants. The organization Save The Lakes, formed in 2008, is a reflection of the public demand for greater governmental attention to the management of conditions in lakes and ponds. In recognition of the heightened public interest, RIDEM utilized limited federal funding to initiate seasonal field surveys aimed at better characterizing the extent of aquatic invasive plants infestation in our freshwaters. Unfortunately, the resulting data reveals aquatic invasive plants to be a widespread potential problem in Rhode Island lakes. The purpose of this report is to provide information on this lake management challenge and other lake water quality concerns, as well as to recommend actions for improving lake management in Rhode Island.

This report has been produced to fulfill requirements of Rhode Island General Laws Section 42-17.1-2-34 as enacted in 2011. That law specifies that the Director of the Rhode Island Department of Environmental Management (RIDEM) prepare a report, using available information, that "provides (a) an assessment of lake conditions including a description of the presence and extent of aquatic invasive species in lakes and ponds; (b) recommendations for improving the control and management of aquatic invasive species in lakes and ponds; and (c) an assessment of the feasibility of instituting a boat sticker program for the purpose of generating funds to support implementation of action to control aquatic invasive species within the state." In this report, the term "lakes" will be used in a manner inclusive of all surface water bodies considered a lake, pond or reservoir.

This report draws upon the existing statewide plan for managing aquatic invasive species that was previously developed by the Coastal Resources Management Council, RIDEM and partners in response to the federal Aquatic Nuisance Prevention and Control Act of 1990, amended as the National Invasives Species Act of 1996. Approved in 2007, the Rhode Island Aquatic Invasive Species Management Plan, hereafter referred to as the RIAISM Plan, is a framework to coordinate state government activities with those of federal agencies, non-governmental organizations and academic institutions in order to achieve the overarching goal of implementing a coordinated approach to preventing the introduction and spread of aquatic invasive species in both Rhode Island's freshwater and marine environments.

2.0 Rhode Island Lakes and Ponds

2.1 Background Information

Rhode Island's landscape includes hundreds of freshwater lakes, ponds and reservoirs covering 20,749 acres. Generally, lakes are thought of as larger than ponds, but in Rhode Island both terms were used historically to name waterbodies of varying sizes. As noted in the Introduction, in this report the term "lakes" is being used to refer collectively to lakes, ponds and reservoirs. Lakes are widely distributed throughout the state although some communities have only one sizable lake (Figure 1). At least 12 lakes overlie the state border and are shared with either Massachusetts or Connecticut. The RIDEM Office of Water Resources currently maintains a database that tracks 237 named lakes covering 18,838 acres (Note: water quality data is not available for all lakes). This constitutes about 91% of the total lake acreage mapped in the state. The remaining acreage not included in the database consists of small ponds, generally less than 5 acres.

Worden Pond in South Kingstown is Rhode Island's largest natural lake.

Smith & Sayles Reservoir

Among the lakes tracked by RIDEM, there are 72 lakes larger than 50 acres. Only four exceed 500 acres – Watchaug Pond, Flat River Reservoir, also known as Johnson's Pond, Worden Pond and the Scituate Reservoir- Rhode Island's largest lake. Most lakes are smaller with about half of those tracked measuring less than 25 acres. The size distribution of Rhode Island lakes is reflected in Figure 2. Compared with much of the rest of New England, Rhode Island lakes are generally shallower and higher in nutrients. Since 2000, the depth measured in Rhode Island lakes monitored by the University of Rhode Island Watershed Watch Program has averaged 17.7 feet with a range of 2.2 feet to seventy-five feet.

Many of Rhode Island's deeper lakes are a vital source of drinking water. Forty-three reservoirs covering 7,823 acres, equivalent to 37% of the total statewide lake acreage, are relied on as sources of public drinking water supplies. Collectively, these reservoirs are maintained as source water for 11 public water systems that currently supply 74% of the State's population with drinking water.

Figure 1. Rhode Island Lakes, Ponds and Streams

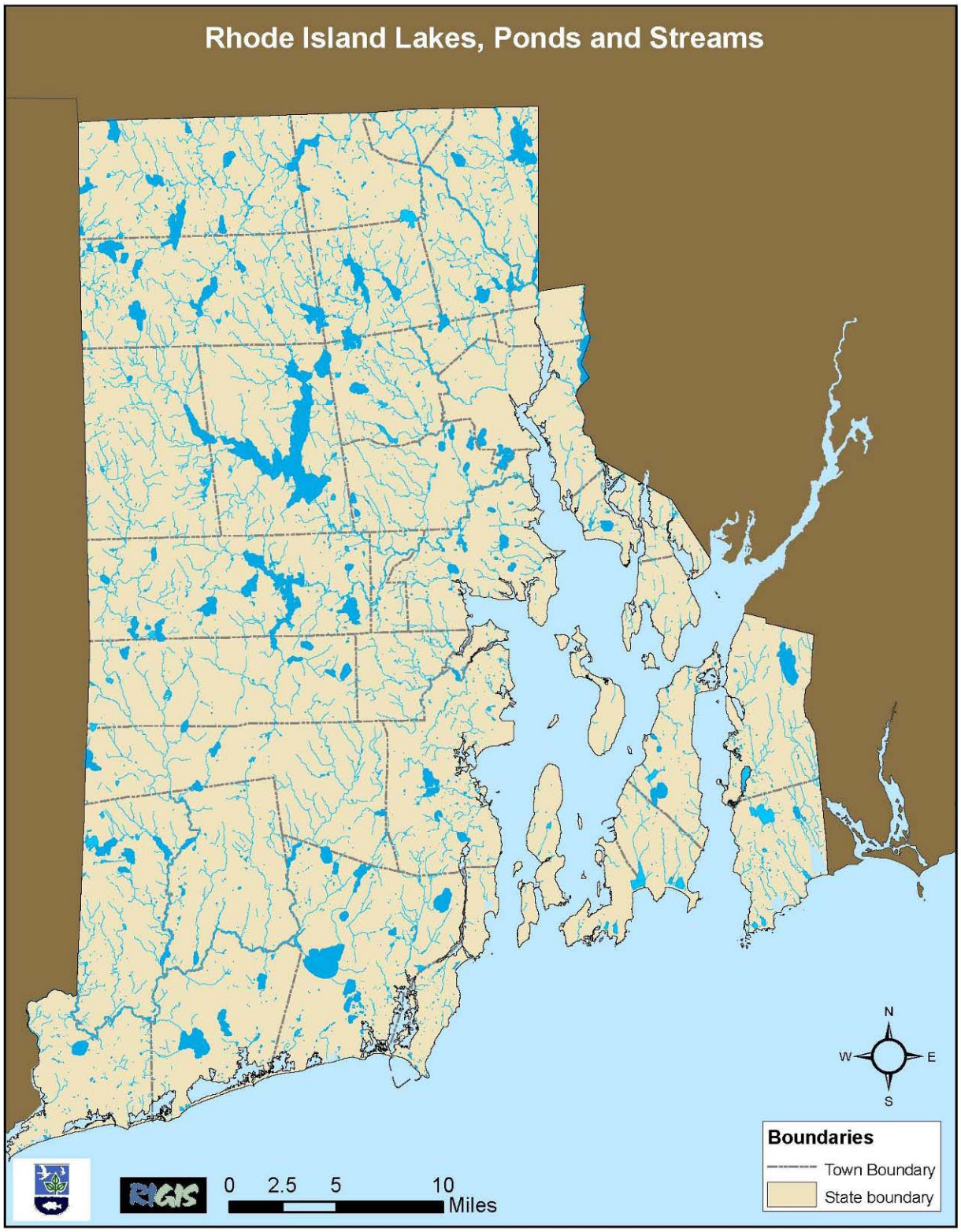
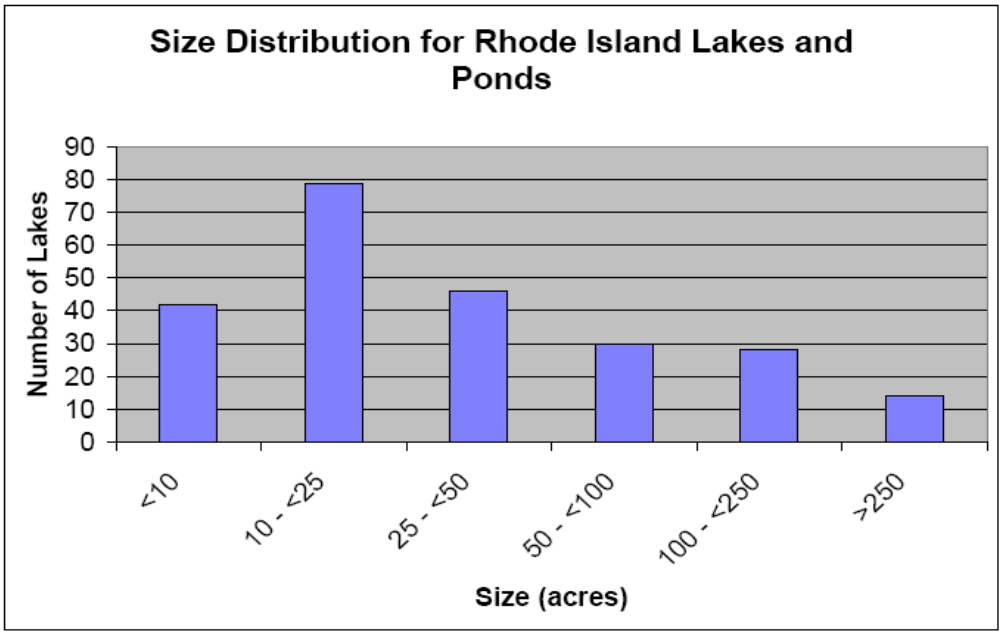


Figure 2. Size Distribution of Rhode Island Lakes



Rhode Island lakes are highly valued as an outdoor recreational resource. They provide ample active and passive recreational opportunities including fishing, boating, water skiing, kayaking, swimming, ice skating and nature viewing among others. Although the range of economic benefits provided by lakes has not been fully quantified, Rhode Island's lakes contribute to the State's attractiveness for tourism and support a vibrant recreational freshwater fishing industry. A 2006 survey found that 50,000 anglers age 16 and older (both residents and non-residents) fished in RI freshwaters and expended an estimated $18 million on trips, equipment and related items (USFW, 2006). Many people may not be aware that each year Rhode Island lakes are host to frequent fishing tournaments that draw participation from local and out-of-state anglers. In 2011, DEM authorized 314 freshwater tournaments which took place between April and October. Black bass (largemouth and smallmouth) were the species most sought after. These events range in size from approximately 6 to more than 100 participants. Lakes hosting the largest events include Echo Lake (Pascoag Reservoir), Worden Pond, and Johnson Pond.

Fishing tournament.

Anglers enjoying success.

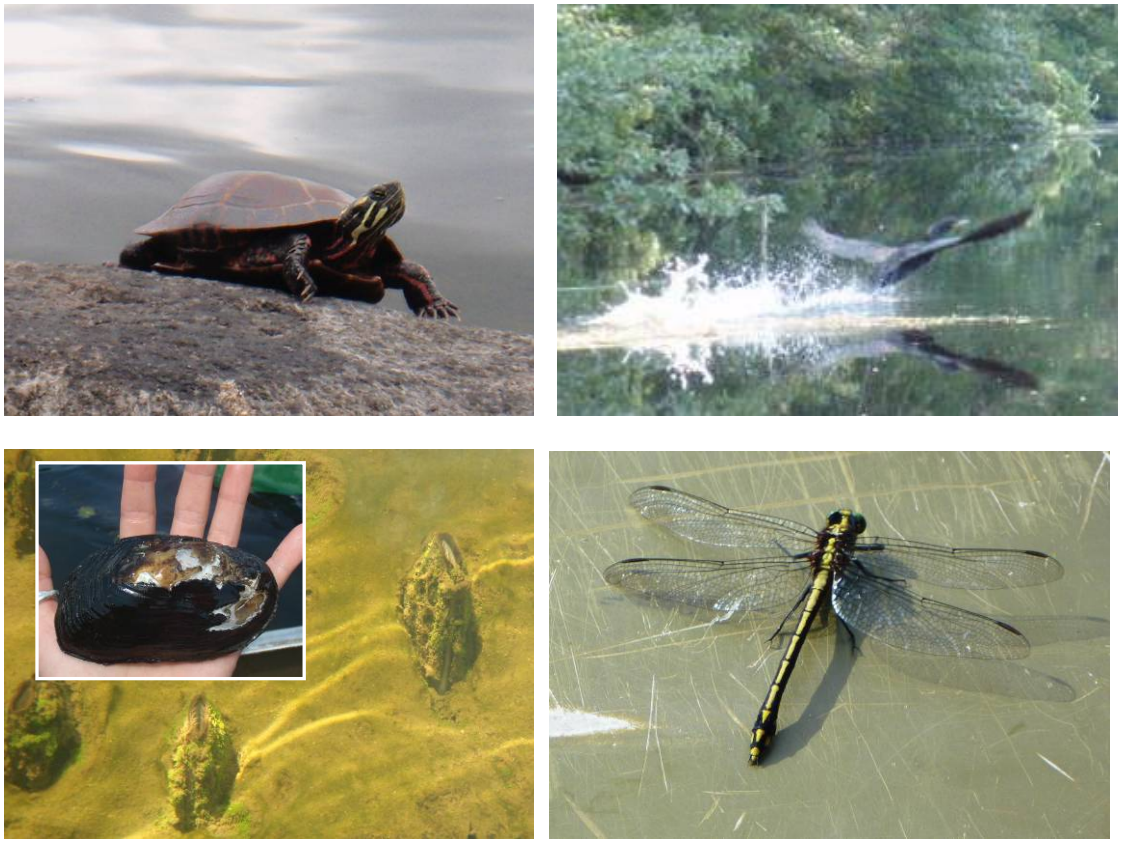
To support recreational fishing, Rhode Island has a long history of stocking fish to augment the fisheries in freshwater lakes and rivers. The state owned fish hatchery system, initiated in the 1950s, consists of four RIDEM fish hatcheries that raise rainbow, brown and brook trout. In 2011, RIDEM Division of Fish and Wildlife stocked 69,800 trout in 53 lakes and ponds as well as about a dozen smaller municipal or fishing club ponds that were opened to the public for special derbies or events. In addition, 184 Atlantic salmon were stocked in four lakes. To facilitate access for fishing and other recreational pursuits, RIDEM has installed and now operates 41 boat ramps and maintains 85 other facilities and areas that provide fishing access to the public. Municipalities and other entities also maintain boat ramps and facilities that provide access to lakes.

Forty-two (42) licensed bathing beaches are located on freshwater lakes. The beaches are a prominent feature of popular state parks including Burlingame State Park and Lincoln Woods State Park. Camps operated by scouting and other youth organizations are located on several lakes. In addition, lakes are important assets to the George Washington, Arcadia and Great Swamp Management Areas, among other state run recreation areas.

Boat ramp at Echo Lake – Burrillville

Bathers at Lincoln Woods State Park.

Lakes and ponds are rich habitats for fish and wildlife. They provide breeding locations, food resources, nesting sites, refuge from predators and migratory locations for numerous species. Animals of interest may range from fish (warm and coldwater species), mussels, amphibians (frogs, newts and salamanders), insects (dragonflies, mayflies and stoneflies) waterfowl and migratory birds (ducks, loons and herons) to mammals (beaver, muskrat, and river otter).



Lakes and ponds provide habitat to support fish and wildlife such as painted turtles (upper left), double crested cormorants (upper right), freshwater mussels (lower left), and the dragonfly (lower right).

2.2 Lake Formation

Lakes in Rhode Island were formed in two primary ways: glacial and human activity. Some of Rhode Island's lakes were created thousands of years ago when glaciers retreated and carved depressions in the landscape or buried large ice chunks which subsequently melted creating kettle hole ponds. These are considered natural lakes. However, most of Rhode Island's lakes exist as a result of man-made impoundments created during the last few hundred years by the building of dams on a flowing river or stream. Many of these impoundments moderate flood flows during intense rain events. Of the 237 lakes it tracks, RIDEM estimates that 75 percent are man-made impoundments. Due to the nature of man-made impoundments in Rhode Island, the resulting lakes are often shallow and provide ideal conditions for aquatic plant growth. Rhode Island recently experienced the "loss" of three ponds as a result of damage to dams during the heavy rains and flooding that occurred in March 2010. The washed out dams that created the impoundments at Geneva Pond (North Providence), Blue Pond (Hopkinton) and Sweet Pond (West Greenwich) are not expected to be replaced and RIDEM anticipates a natural succession process that will return the sites to stream and wetland complexes.

3.0 Water Quality Conditions in Rhode Island Lakes

3.1 Assessing Water Quality in Lakes

Monitoring and assessment of water quality conditions is essential for effective stewardship of our water resources. The federal Clean Water Act requires that all states report on the water quality status of their waters in accordance with prescribed procedures. In Rhode Island, this responsibility is assigned to the RIDEM Office of Water Resources which receives federal Environmental Protection Agency (EPA) funding to support this function. For the purposes of this report, RIDEM is reporting on the status of lake water quality conditions using information from the most recently completed statewide assessment conducted for 2010 as well data generated from surveys for aquatic invasive plants through the summer of 2011. The next update to the statewide water quality assessment will be completed later this year (2012).

The RIDEM Office of Water Resources compiles and uses readily available data to periodically conduct an assessment of the status of water quality in individual waterbodies. Applying the state water quality standards, the assessment for lakes is done by evaluating whether the water quality conditions support certain designated uses such as swimming, fish consumption and aquatic life (suitable fish and wildlife habitat conditions). A detailed description of the assessment methodology is contained in the RIDEM document known as the Consolidated Assessment and Listing Methodology, or CALM (RIDEM, 2009). The assessment results are reported to the Environmental Protection Agency (EPA) pursuant to the federal Clean Water Act. Waters determined to be impaired by a pollutant are scheduled for Total Maximum Daily Load (TMDL) development – which is process that results in a water quality restoration plan that identifies the actions needed to restore water quality. To date, water quality restoration plans addressing one or more pollutant problems have been completed for 34 lakes. More information on the water quality assessment process and water quality restoration plans is available on the RIDEM website at:
http://www.dem.ri.gov/programs/benviron/water/quality/surfwq/iwqmon.htm and
http://www.dem.ri.gov/programs/benviron/water/quality/rest/index.htm.

Burlingame Reservoir in Gloucester exhibits good water quality.

Central Pond (Turner Reservoir) in East Providence exhibits poor water quality.

Rhode Island is fortunate to have a large amount of data available for lakes. Most of this has been generated through the University of Rhode Island Watershed Watch (URIWW) Program which in 2011 completed its 24th year of operation (see box). Since 1999, RIDEM has provided annual financial support to URIWW to sustain and encourage the expansion of this volunteer-based monitoring program. In 2011, URIWW coordinated the volunteer monitoring of 65 freshwater lakes in Rhode Island. Volunteers take measurements and collect water samples between May and October for several core water quality parameters. Other sources of lake data include drinking water suppliers, RIDEM water quality studies, and research projects including work on fish tissue contamination by the federal Environmental Protection Agency and RIDEM surveys for aquatic invasive plants.

University of Rhode Island Watershed Watch Program

Photos courtesy of URI

Volunteer conduct monitoring on lakes in RI.

The University of Rhode Island Watershed Watch (URIWW) Program is a statewide volunteer monitoring program. It focuses on providing current information on the water quality of surface water resources throughout Rhode Island, including lakes, ponds, reservoirs, rivers, streams and the marine environment. The heart of the program consists of weekly measurements taken by trained volunteer monitors. The program emphasizes watershed scale monitoring because the water quality of a given body of water is a reflection of the activities on the lands and waters that surround it and lie upstream. The program is intended to encourage communities and shoreline residents to understand the need to cooperatively manage and improve the water quality of all the waterbodies within a watershed.

URIWW coordinates volunteer monitoring of lakes and ponds that takes place annually from May to October. The program measures water clarity (Secchi Depth), algal density (chlorophyll a), dissolved oxygen, temperature, alkalinity, pH, nutrients (nitrogen and phosphorus) and pathogens (bacteria). The program operates with an EPA approved quality assurance project plan governing its sampling procedures as well as a state certified water quality testing laboratory.

The program is supported by numerous partners and sponsors. More information on the URI-WW is available at: http://www.uri.edu/ce/wq/ww/

3.2 Overview of Water Quality In Rhode Island Lakes

In the 2010 assessment cycle, the available data allowed RIDEM to characterize water quality conditions in 15,582 lake acres which equates to about 75% of the total statewide lake acreage. For a significant portion of Rhode Island lakes, the available data allowed RIDEM to evaluate whether the lake water quality was acceptable for swimming and other recreational uses; as well as suitable for supporting aquatic life (fish and other species). In contrast, due to the limited availability of fish tissue data, RIDEM was able to only evaluate about 15% of lake acres relative to the fish consumption use. For the 25% of lake acres not assessed for any use, data was either completely lacking or insufficient to characterize water quality conditions.

The assessments completed for 2010, are summarized in Table 1. Overall, RIDEM found in the 2010 assessment that 63% of lake acres (9,861 acres) evaluated were impaired for one or more uses (swimming/recreation, aquatic life and fish consumption). This represented an increase of 1,120 acres from the prior 2008 statewide assessment. ***The largest cause of impairment was the presence of aquatic invasive plants*** affecting 6,345 acres which equates to about 1/3 of all lake acreage in Rhode Island. The growth of aquatic invasive plants was found to have degraded the native aquatic habitat conditions. It is notable that in many cases, aquatic invasive plants are thriving in lakes that otherwise exhibit good water quality conditions. In such cases, the degradation of the lake condition is not directly related to a water pollutant but rather is attributable to the excessive growth of an invasive plant. The extent of aquatic invasive species is discussed further in Section 5.0.

Excluding aquatic invasive plants, the 2010 assessment reveals most lakes had water quality conditions considered safe for swimming and other recreational uses and that provided acceptable conditions for aquatic plants and animals. However, a total of 59 lakes covering 4,919 acres, or about 24% of all lake acres in the state, have a water quality impairment related to a pollutant. The leading pollution problems documented in lakes are mercury contamination of fish tissue, excessive nutrients, metals and pathogens. The water quality status of individual lakes is contained in Appendix A.

Table 1. 2010 Use Assessment of RI Lakes

Designated Use	Lake Acres Tracked	Lake Acres Assessed	Acres Fully Supporting	Acres Not Supporting	Number of Lakes Not Supporting	Lake Acres Unassessed
Fish and wildlife habitat (aquatic life)	18,838	14,991	6,615	8,376	91	3,847
Swimming (all primary & secondary recreational activities)	18,838	14,189	13,812	377	8	4,649
Fish Consumption	18,838	3,124	732	2,392	20	15,714

Source: RIDEM 2010

3.3 Water Pollution Concern in Rhode Island Lakes

3.3.1 Fish Tissue Contamination

Although not the only known contaminant in fish tissue, the primary contaminant of concern in Rhode Island is mercury. Mercury is a potent neurotoxin that poses risks to human health. Exposure to this metal occurs when humans consume fish that contain mercury's most toxic form, methylmercury. The majority of mercury in the environment is released into the air and enters waterbodies through atmospheric deposition. Mercury is persistent in the environment and bioaccumulates in fish. Due to their limited time in a waterbody, hatchery raised stocked fish are not expected to be similarly affected. Consumption of fish contaminated with mercury is a health risk with developing fetuses at greatest risk. The RI Department of Health (RIDOH) provides health advisory information concerning mercury in fish on its website at: http://www.health.ri.gov/healthrisks/poisoning/mercury/about/fish/

Unlike most other states, Rhode Island has not routinely sampled for fish tissue contamination. The lack of data on fish tissue contamination is among the largest data gaps in RI, and was previously identified by the Rhode Island Environmental Monitoring Collaborative (RIEMC, 2009) and Rhode Island Bays, Rivers and Watersheds Coordination Team (RIBRWCT, 2008). There is currently no data to assess fish tissue contamination in most of Rhode Island lakes (85% of lake acreage in RI). Data that is available has been generated by EPA researchers, site specific studies and a limited collaborative program implemented by the RIDEM Office of Water Resources (OWR) and Division of Fish and Wildlife (DFW), RIDOH and EPA. This effort integrated the collection of samples for fish tissue analysis with the fish community surveys being done by RIDEM-DFW that are done on lakes using an electro-shocking boat. Between 2007 and 2009 a total of 12 lakes were able to be sampled before a loss in staffing prevented the project's continuation. The RIDEM Office of Water Resources is currently collaborating with the EPA to design a probabilistic survey design that may provide a more cost effective means of assessing the proportion of freshwaters affected. Full implementation of the strategy is subject to funding availability.

Based on the available data, RIDEM has to date identified 20 lakes as impaired due to fish tissue contamination: 19 for mercury, one for PCBs. The affected lakes are listed in Appendix B. While this constituted 77% of the total acres for which data was available, RIDEM also found six lakes in which fish tissue data fell below public health threshold of concern- less than 0.3 parts per million (ppm) of methylmercury. The fact that most lakes were found to have elevated levels of fish tissue contaminants is consistent with what is understood about the scope of this problem throughout New England. Currently, all six New England states have statewide fish consumption advisories for mercury and recommend limits on the consumption of non-stocked fish caught in freshwaters. As Rhode Island moves forward to close the data gap on fish tissue contamination, it is expected that additional lakes with elevated levels of mercury in fish tissue will be documented.

The New England states and New York, in conjunction with the New England Interstate Water Pollution Control Commission, cooperated to develop the "Northeast Regional Mercury Total Maximum Daily Load (TMDL)" which identified reductions in mercury contamination necessary to bring fish tissue levels into compliance with federal standards. The plan, finalized in 2007 in the form of a TMDL water quality restoration plan, identified atmospheric deposition as the largest source of mercury with 75% being generated from anthropogenic sources including coal-fired power plants, sewage sludge incinerators and residential heating both in and out of the

New England region. The Northeast states have all moved forward with management to reduce mercury emissions and releases through emission limits on incinerators and coal-fired utilities, source reduction programs and other strategies to prevent mercury from being released into the environment; e.g. dental amalgam separators. With the reductions being achieved locally, the New England state are now interested in collaborating on region-wide fish tissue sampling to evaluate progress toward reducing fish tissue concentrations of mercury. More information on the Northeast Regional Mercury TMDL is available at:
http://www.neiwpcc.org/mercury/MercuryTMDL.asp

3.3.2 Nutrient Enrichment

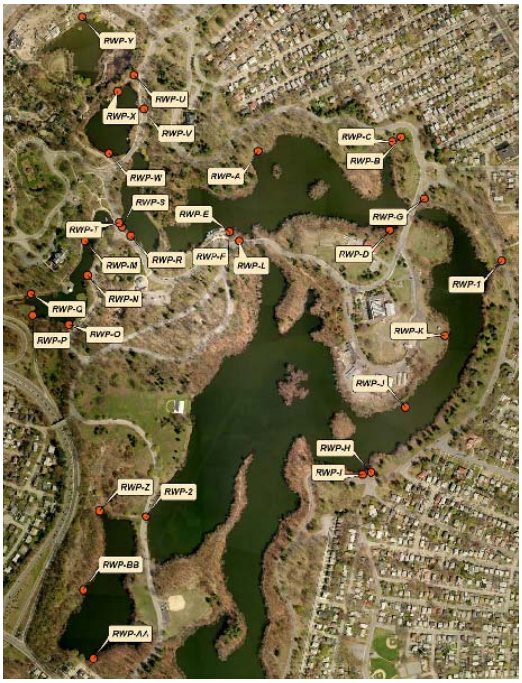
Nutrients, especially phosphorus and nitrogen, are necessary for algae and aquatic plant growth. A limiting nutrient is an essential element needed by an organism for growth and reproduction. In freshwater lakes, phosphorus availability typically limits the amount of algae and aquatic plant growth. Increases in the amount of this limiting nutrient will stimulate growth, but an excessive amount can cause extreme and harmful amounts of algal and aquatic plant growth.

All lakes, even the most pristine, will accumulate nutrients and sediments over long timeframes. The process of nutrient accumulation and enrichment of lakes is called **eutrophication**. Water quality problems arise when the natural eutrophication process is accelerated by human activities in the watershed. Stormwater runoff from agricultural land, suburban and urban areas containing fertilizers and animal wastes or other improperly treated wastewaters, can be significant sources of phosphorus. If left uncontrolled, these sources can deliver excess quantities of phosphorus into a lake which fuels the growth of heavy algal blooms and excessive plant biomass. Algal blooms and dense vegetative growth can become a nuisance that diminishes the recreational and aesthetic appeal of a lake and affects the value of lakefront properties. For drinking water suppliers, algal blooms in their source water can translate into increased treatment costs. Ecologically, when excess plant material dies and decays, lakes and ponds can be depleted of oxygen, harming other aquatic life including fish. Decaying plant material releases nutrients which can then accumulate in the bottom sediments. Lake sediments can then become a source of nutrients released back into the water column in a continual nutrient recycling process.


Excessive algal growth in Turner Reservoir (left) and a Roger Williams Park Pond (right).

RIDEM water quality standards specify a criterion that average total phosphorus concentrations should be 0.025 mg/l or less in all freshwater lakes and in streams at the point where they enter a freshwater lake to ensure this criteria is not exceeded. Consistent with a national initiative to refine nutrient criteria, RIDEM, in collaboration with the New England Interstate Water Pollution Control Commission (NEIWPCC), is currently engaged in a multi-year project to re-evaluate this criterion. Preliminary work from this project suggests that the current criterion may not be adequately protective of all lakes and further refinement is warranted (RIDEM, 2011). Any future change to the criterion for total phosphorus, such as establishing a lower, protective limit, would be promulgated via the state water quality regulations.

Using the existing criterion, RIDEM found in its 2010 assessments that the aquatic life use (fish and wildlife habitat) in 36 lakes covering 2,273 acres was impaired due to excess nutrients. Management of eutrophic (high nutrient) lakes often requires both watershed measures that reduce phosphorus loadings to the lake as well as in-lake management to mitigate the release of phosphorus from lake sediments. There are no authorized direct discharges of sanitary wastewater into lakes in RI, though several impoundments are along Rhode Island rivers (Blackstone, Ten Mile and Woonasquatucket) which receive major municipal wastewater treatment facility discharges. Watershed management to reduce phosphorus loadings to RI lakes focuses on sources such as stormwater discharges, fertilizer practices, on-site wastewater systems, animal and pet waste management and in some cases wildlife management (nuisance populations of Canadian geese). A range of best management practices can be employed to reduce phosphorus loadings from these sources. Proper management of stormwater from densely developed areas to reduce the amount of phosphorus is a significant challenge in restoring lakes in urbanized watersheds. In addition, there exist in-lake treatment techniques, such as the addition of alum that can be used successfully to inactivate phosphorus in lake bottom sediments. Alum treatment should be done in conjunction with other controls on phosphorus pollutant loadings in the lake watershed.



Stormdrain outfalls mapped for Roger Williams Park Ponds in Providence (left). Algae accumulates on the shore of Brickyard Pond in Barrington (right).

RIDEM records indicate that at least seven of the lakes with elevated phosphorus levels have received treatment with chemical herbicides (typically copper-based) to control algal blooms. Given the toxicity of copper to aquatic life, the repeated use of copper-based herbicides over many years may cause the undesirable accumulation of copper in the lake ecosystem.

Between 1999 and 2010, RIDEM completed water quality restoration studies, known as TMDLS, which identify the actions needed to reduce pollutant loadings of phosphorus into 15 of the 34 lakes considered eutrophic. These included individual TMDL studies for Stafford Pond (Tiverton), Kickemuit Reservoir (Warren), Yawgoo and Barber Ponds (South Kingstown), Belleville Pond (North Kingstown) and Mashapaug Pond (Providence). The TMDL studies specify the reductions in phosphorus loadings needed to restore water quality and recommend specific actions to mitigate stormwater discharges and in some cases agricultural and waterfowl sources. The TMDL studies also noted the need for managing internal sources of phosphorus. In 2007, RIDEM completed a water quality restoration study for a group of nine eutrophic (high nutrient) lakes and ponds. These ponds exhibit elevated total phosphorus and related water quality impairments, including excessive algal growth and low dissolved oxygen. The ponds are located in generally urbanized watersheds and include Almy Pond (Newport), Brickyard Pond (Barrington), Gorton Pond (Warwick), North Easton Pond (Newport), Roger Williams Park Ponds (Providence), Sand Pond (Warwick), Spectacle Pond (Cranston), Upper Dam Pond (Coventry) and Warwick Pond (Warwick). The Eutrophic Ponds TMDL found that reductions in phosphorus pollutant loadings of 33-85% were needed to restore the water quality in these ponds. Recommended strategies for achieving the reductions were primarily related to improved stormwater management but to a lesser extent included actions related to controlling waterfowl, streambank and lakeshore erosion and in some cases control of wastewater sources. Local actions to implement pollution controls have been implemented or are currently being planned in a few of the lake watersheds. The full TMDL documents are available at: http://www.dem.ri.gov/programs/benviron/water/quality/rest/reports.htm

3.3.3 Pathogens

RIDEM reviews data on pathogens to determine if lake water quality is suitable for swimming and other recreational uses. The 2010 assessment results indicate that almost all lakes sampled (97% of the lake acres assessed) were of acceptable water quality for recreational use. Only 8 lakes covering 377 acres exhibited elevated levels of pathogens as measured by the presence of bacteria (fecal coliform, enterococci). They are: Mashapaug Pond and Roger William Park Ponds (Providence), Valley Falls Pond (Central Falls), Slater Park Pond (Pawtucket), Omega Pond (E. Providence), Print Works Pond (Cranston), Sandy Pond (Warwick) and the Kickemuit Reservoir (Warren). Generally, these ponds are located in urbanized, largely sewered watersheds and are likely affected by stormwater discharges from point and non-point conveyances in addition to other sources of pathogens such as illicit wastewater discharges, waterfowl, wildlife and pet waste. Watershed restoration studies addressing pathogens impairments have been completed for Mashapaug and Roger Williams Park Ponds as part of the Statewide Bacteria TMDL completed in 2011, and for the Kickemuit Reservoir (TMDL approved in 2006).

The RI Department of Health oversees the monitoring of freshwater beaches on lakes which is typically performed by the beach facility owner or operator and occurs monthly during the recreational bathing season. In 2011, a total of 42 freshwater beaches were licensed for both public and private facilities including a number of campgrounds. A list of licensed freshwater

beaches is included in Appendix C. Between 2008-2011, a total of 10-11 beach closure events occurred per year at freshwater beaches as a result of poor water quality conditions. Over this four year period, a total of 14 beaches experienced one or more closure events; with 5-8 beaches/year affected. Both Gorton Pond (Warwick) and Wenscott Reservoir (North Providence) experienced one or more closure events each year during this period. Olney Pond, located within Lincoln Woods State Park, had closures 3 of the 4 years (Parris, A. RIDOH, personal communication, 2012).

It is important to note that freshwater beaches are not monitored as extensively as RI's saltwater beaches. Due to the availability of federal funds that are targeted to saltwater beaches, RIDOH was able to develop and implement a risk-based approach to monitoring of saltwater beach water quality. The frequency of sampling is tailored to the risk of water quality problems and is based on specific facility and site conditions. The RI Environmental Monitoring Collaborative and RI Bays, Rivers and Watershed Coordination Team have identified the expansion of freshwater beach monitoring to incorporate a similar risk-based approach as a priority monitoring need (RIEMC, 2009; RIBRWCT, 2008).

3.3.4 Metals

Metals are naturally occurring elements that can be toxic to aquatic life in elevated concentrations. RIDEM has identified ten (10) lakes with elevated metals concentrations in the water column of the lake. About 786 acres are affected. As testing for metals is not included in the routine monitoring of lakes; e.g. URIWW program, metals data is lacking for most lakes. Where data was available, the most common metals detected were copper and lead. Aluminum and cadmium were also documented in the Ten Mile River and its impoundments as part of a watershed-wide water quality study completed by RIDEM, Massachusetts Department of Environmental Protection and USEPA. The lakes identified as having a water quality impairment due to metals are: Central Pond (East Providence), Chapman Pond (Westerly), Omega Pond (East Providence), Print Works Pond (Cranston), Scott Pond (Lincoln), Slater Park Pond (Pawtucket), Slatersville Reservoir (Burrillville/North Smithfield), Three Ponds (Warwick), Turner Reservoir (East Providence) and Valley Falls Pond (Cumberland). Most of these lakes are in urbanized watersheds. The sources of metals have not yet been studied in detail, but are presumed to be related to urban stormwater discharges as well as in some cases historical industrial land uses or specific waste sites; e.g. landfill, etc.

4.0 Cyanobacteria In Rhode Island Lakes

Cyanobacteria, also known as blue-green algae, grow naturally in many waterbodies throughout the world. When certain conditions are present, such as warm weather and an abundance of nutrients in the water, the algae may undergo an explosive type of growth that is called an algal bloom. These algal blooms may be harmful to people and animals (RIDOH). They often produce a scum on the water's surface and may also cause the water to become a striking green color.

Slater Park Pond – Pawtucket

Slack's Reservoir – Johnston/Smithfield

Cyanobacteria produce a number of nuisance compounds, including natural toxins. Different types of cyanobacteria are known to produce different toxins, but many types of cyanobacteria can also produce the same toxins. In sufficient quantity these toxins can make a lake unsafe for recreational and other uses such as drinking water supply (NALMS, 2012). Contact with cyanobacteria can cause skin or eye irritation. Ingesting small amounts can cause gastrointestinal symptoms. Ingesting large amounts may cause liver or neurological damage and in some cases death. Small children and pets are more susceptible to the effects of cyanobacteria than adults, especially because they are more likely to ingest the water. Dogs, in particular, can get very ill and even die from ingesting cyanobacteria, either directly ingesting it or licking if off their fur (RIDOH, 2011).

The issue of cyanobacteria in lakes has been gaining greater attention in the New England region. With growing awareness of this potential public health concern in 2010, RIDEM and RIDOH began working cooperatively to monitor the state's lakes to detect the presence of cyanobacteria blooms and to advise the public of health concerns.

A joint health advisory is issued by RIDEM and RIDOH when any of the following three criteria, which indicate a bloom exists, are met:

- Evidence of a visible cyanobacteria scum or mat.
- Cyanobacteria cell count exceeding 70,000 cells/mL.
- Toxin (microsystin- LR) level of lysed cells meeting or exceeding 14 ppb.

This protocol was adopted based upon recent work by the Massachusetts Department of Public Health (MDPH) and guidelines from the World Health Organization. The MDPH has been active in monitoring the Turner Reservoir, a resource shared by East Providence and Seekonk, MA,

which had experienced cyanobacteria blooms in 2007 and 2010. The health advisory advocates no swimming, fishing or playing in waters experiencing a cyanobacteria bloom. Contact with the affected waters by humans and their pets should be avoided. Once issued, the advisory remains in effect for the remainder of the swimming season, unless follow-up sampling by a local entity (city, town) or third party (facility owner) indicate that the advisory can be lifted. Health advisories can be lifted after two weeks of successive and representative sampling rounds, two weeks apart, demonstrate no evidence of an algal scum or mat and cyanobacteria cell counts and toxin levels are below threshold concentrations. In the fall and winter seasons, cyanobacteria blooms typically die off and the cyanobacteria population is dramatically reduced. The repeat appearance of blooms in a lake is variable; e.g. present some years, absent other years.

In 2011, the RIDEM Office of Water was able to support a limited expansion of its effort by initiating a monitoring program intended to screen lakes considered to be potentially susceptible to cyanobacteria blooms – those that have historically had high nutrient or chlorophyll *a* levels (factors that lead to or indicate blooms). The goals of this extended monitoring were to better understand the presence and distribution of cyanobacteria and toxins in Rhode Island. RIDEM also responded to public complaints about suspected blooms, sampled if appropriate, and arranged for analysis of toxin levels. At present, the specialized nature of the testing for cyanobacteria toxins requires the services of out-of-state laboratories. There is currently no state funding for this work and very limited capacity to continue this work using non-state funding sources. The State's existing limited capacity for this work will likely be strained as demand for services increases in response to greater public awareness of cyanobacteria.

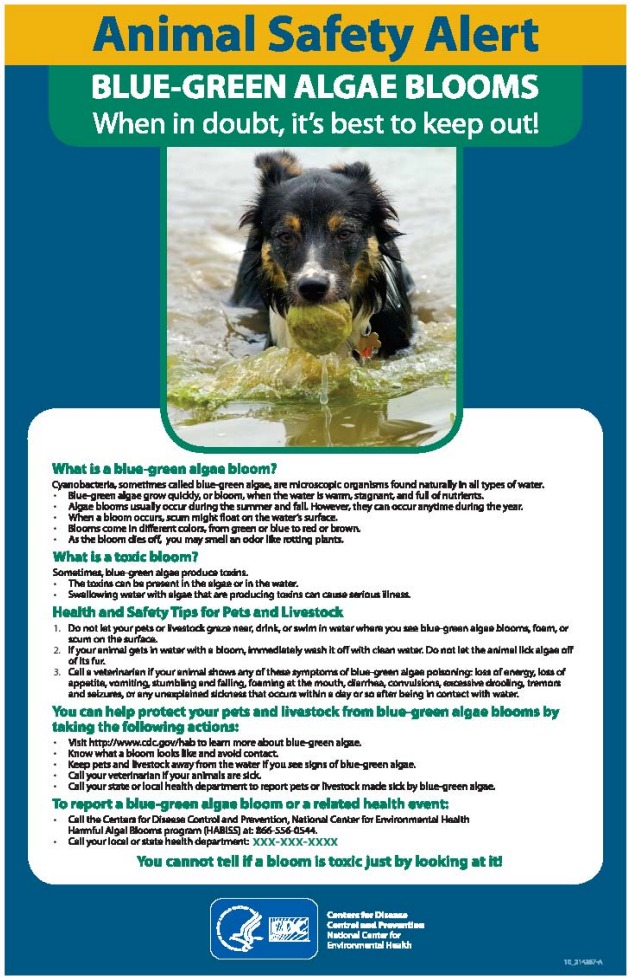
To date, the most commonly detected cyanobacteria in Rhode Island lakes are *Anabaena Microsystis and Woronichinia*. Blooms of these species have produced striking green coloration in the affected lakes as indicated in the pictures above and below. The waterbodies with cyanobacteria blooms confirmed by RIDEM and RIDOH are listed in Table 2. Surveillance to detect the blooms when they do occur will continue to be critical to managing this public health concern.

Melville Pond – Portsmouth

Mashapaug Pond - Providence

Table 2. Lakes with Documented Cyanobacteria Blooms

Lake Name	Location	Year bloom was documented	Dominant cyanobacteria type
Almy Pond	Newport	2010	*Aphanizomenon, Microsystis, Anabeana*
Central Pond	East Providence	2007, 2010	*Microsystis*
J.L. Curran Reservoir	Cranston	2011	*Anabaena, Woronichinia*
Mashapaug Pond	Providence	2001, 2011	*Woronichinia, Anabaena*
Melville Pond	Portsmouth	2010	*Anabeana, Microsystis*
Omega Pond	East Providence	2007	*Microsystis*
Roger Williams Park Ponds	Providence	2011	*Woronichinia*
Slack's Reservoir	Johnston, Smithfield	2011	*Woronichinia, Anabaena, Microcystis*
Slater Memorial Park Pond	Pawtucket	2011	*Woronichinia*
Spectacle Pond	Cranston	2011	*Woronichinia*
Turner Reservoir	East Providence	2007, 2010	*Microsystis*
Yawgoo Pond	South Kingstown	1998	Not available



This poster was made available to RI veterinarians to raise awareness about cyanobacteria blooms occurring in RI freshwaters.

5.0 Aquatic Invasive Species in Rhode Island Lakes

5.1 Problems Associated with Aquatic Invasive Species in Lakes

Aquatic invasive species are recognized as a significant threat to the ecological integrity of Rhode Island's freshwater ecosystems, in particular its lakes and ponds. For the purposes of this report, aquatic invasive species are considered those non-native plants and animals that upon infesting a waterbody will threaten its ecological stability or interfere with its desirable uses. Aquatic invasive species typically have traits that allow them to quickly outgrow and crowd out native species. Once becoming the dominant species in an area, aquatic invasive species disrupt native habitat and threaten the natural diversity and abundance of desirable native species. In addition to ecological consequences, dense growth of aquatic invasive species can interfere with the recreational use of freshwaters. The dense plant growth at the surface of the water that is typical of aquatic invasive plant infestations impedes the ability to boat, fish, paddle or swim on or in the waterbody. In some cases, boating is rendered impossible and the plant growth becomes a potential safety hazard for swimmers. Unmanaged, aquatic invasive species will cause deteriorating conditions in lakes and as a result negatively impact state-owned resources being managed for conservation and recreation, including some of RI's state parks.

Aquatic invasive plants clog Tarkiln Pond (left) and Johnson's Pond (right).

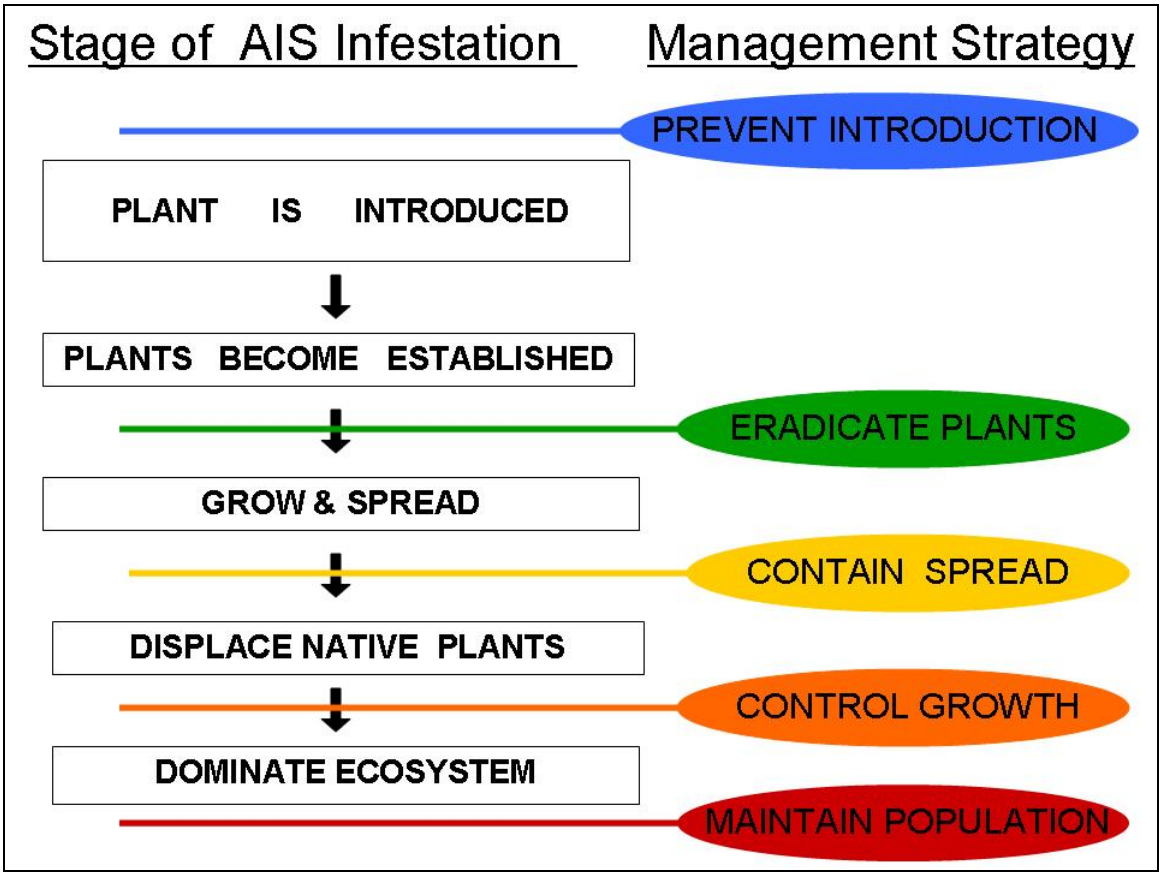
In addition to ecological impacts, researchers have associated aquatic invasive species with negative economic impacts to commercial, agricultural, aquacultural industries as well as drinking water suppliers that may be forced to expend funds for aquatic invasive species control. In addition, growth of aquatic invasive plants are correlated with diminishing lake front property values. Results from a study of over 170 lakes in Wisconsin indicate that a Eurasian milfoil infestation reduces average property values by 8% and reduces land values, net of the value of any structures on the property, by approximately 13% (Horsch and Lewis, 2009). A 2010 study in Vermont concluded that Eurasian milfoil infestations diminished property values by <1%-16% (Zhang and Boyle, 2010). They report that the size of the deleterious impact depends on the extent of the infestation, and reductions in property values increase with incremental increases in plant coverage. They found a 20% increase in the infestation coverage can have a 6.4% reduction in property values. An earlier New Hampshire study found even larger declines of 21-43% on shoreline property values due to the presence of an aquatic invasive species (Halstead

et al. 2003). Although no study is available looking specifically at the impact of aquatic invasive species on property values in Rhode Island, it is likely that the trends of negative impacts observed elsewhere would be applicable to shoreline property values in Rhode Island.

This report will focus on rooted or floating aquatic invasive ***plants*** (macrophytes), which are currently the dominant aquatic invasive species concern in Rhode island freshwaters. The analysis excludes emergent aquatic plants such as Phragmites, purple loosestrife or yellow iris which are found on lake shorelines and present a different set of management challenges. For invasive aquatic macrophytes, the progression of an infestation can be described by its stages. As depicted in the Figure 3, an infestation begins with an initial introduction that is followed by the plant spreading and becoming more established and eventually reaching a mature state. Thriving aquatic invasive species infestations can create very dense stands of aquatic plants that are mostly rooted and that grow to the surface of the water interfering with recreational and other uses of a lake.

Figure 3. Progression of an Aquatic Invasive Species (AIS) Infestation

An aquatic invasive plant infestation has five stages, and depending on which stage of invasion, differing management strategies may be applied to inhibit further progression of the plant infestation.

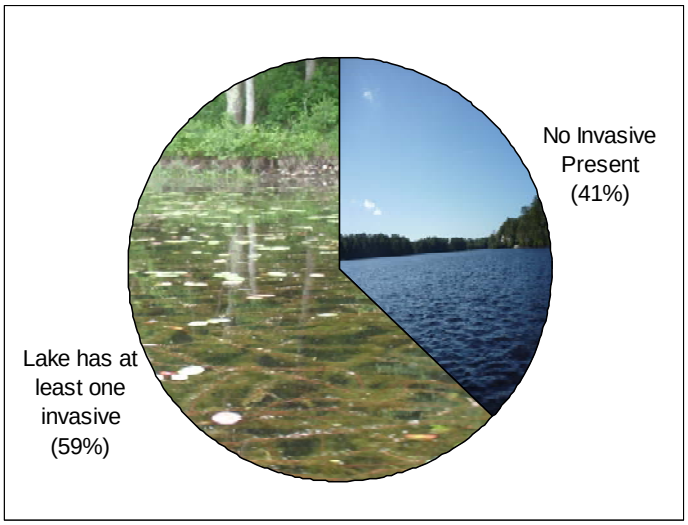


5.2 Assessment of Aquatic Invasive Plants in RI Lakes

Aquatic invasive plants have been present is Rhode Island lakes for decades. RIDEM is aware of the first report of fanwort dating back to 1936. While no known studies exist that document the trends in aquatic invasives in Rhode Island lakes over time, there is ample anecdotal evidence that conditions have worsened and that excessive plant growth is significantly more of a nuisance than conditions a decade or more ago. Until recently, the extent of aquatic invasive species in lakes was not well understood or documented. As public concern about aquatic invasive species in lakes and ponds increased, RIDEM initiated seasonal field surveys in 2007 in order to provide a more complete assessment of their presence in Rhode Island lakes and ponds. From 2007-2011, the RIDEM Office of Water Resources utilized summer seasonal employees to survey 123 freshwater lakes for the presence of aquatic invasive species. Surveyed lakes varied in their size, depth, use restrictions and location. As resources allow, RIDEM intends on continuing its survey activities to both screen additional lakes and collect data to help evaluate the effectiveness of management controls that are undertaken in lakes with aquatic invasive species infestations.

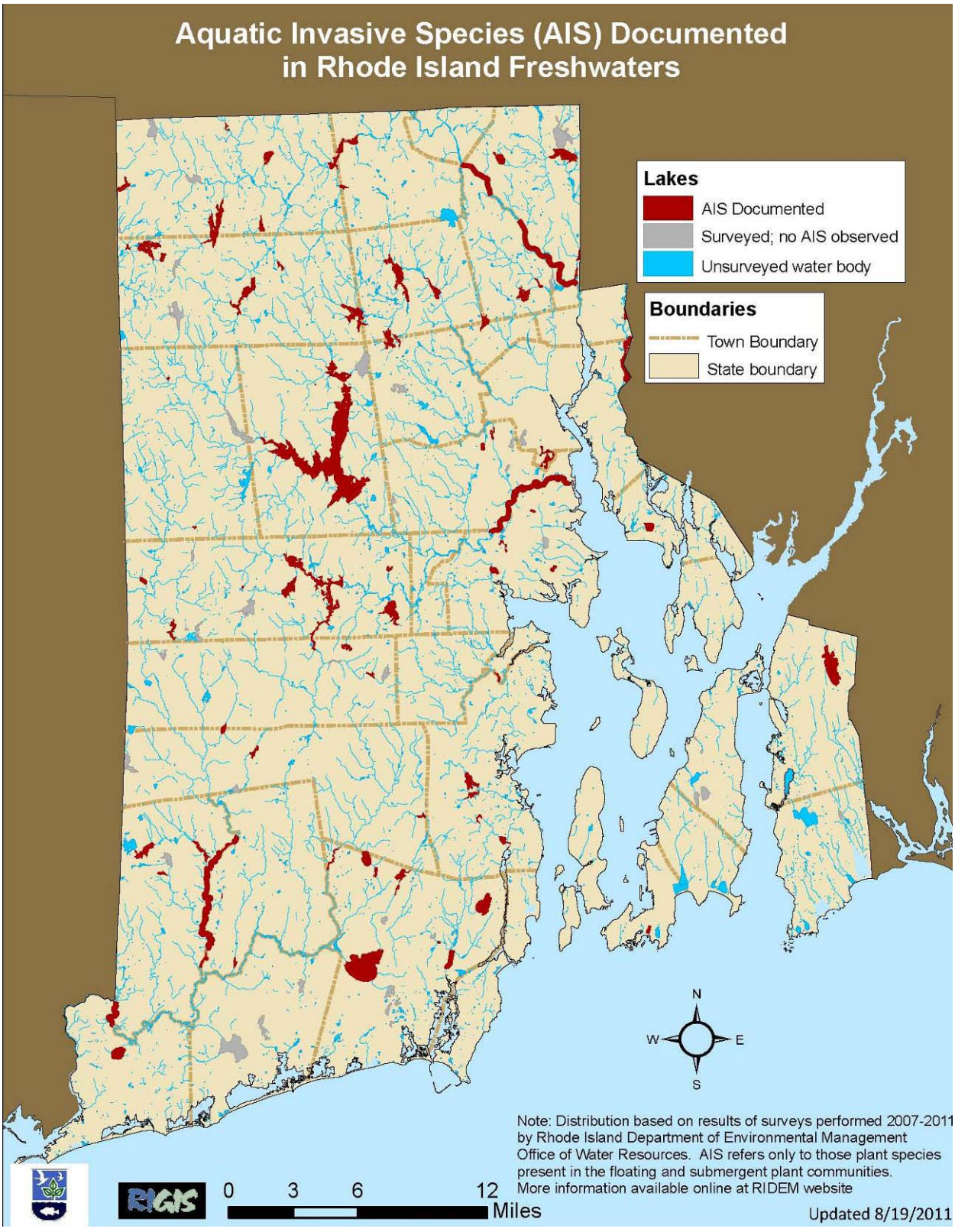
Combining data from all sources including RIDEM surveys, RINHS and URI Watershed Watch, RIDEM has information on the presence of specific aquatic invasive species in 133 lakes covering 15,335 acres. This constitutes 74% of the state's total lake acreage and provides a sufficient basis for characterizing the aquatic invasive species problem in Rhode Island. The data reveal that one or more aquatic invasive species were found in 80 of the 133 lakes threatening 11,226 acres. Aquatic invasive species were detected in 59% of the lakes for which information was available (Figure 4). A list of lakes surveyed and the invasive plant species observed is contained in Appendix D. This list also includes lakes surveyed and found free of aquatic invasive plants. A map of the distribution of aquatic invasive species is reflected in Figure 5. No information is available for Block Island. Aquatic invasive species are widely distributed in Rhode Island and a serious threat to the quality of its lakes. From field observations, RIDEM found most of the infestations were at stages beyond the initial introduction and were either spreading or well established suggesting the aquatic invasive species have been present for some time in the lake.

Figure 4. Percentage of Surveyed RI Lakes with Confirmed Aquatic Invasive Species (AIS)



Source: RIDEM, 2012

Figure 5. Distribution of Aquatic Invasive Species in RI Freshwaters



Overall:

- **59%** of lakes (80 lakes) for which data is available had at least one aquatic invasive species present.
- **61 %** of infested lakes (48 lakes) had more than one aquatic invasive species present.

Curly leaf pondweed (left), dense growth of yellow floating-heart (middle, right).

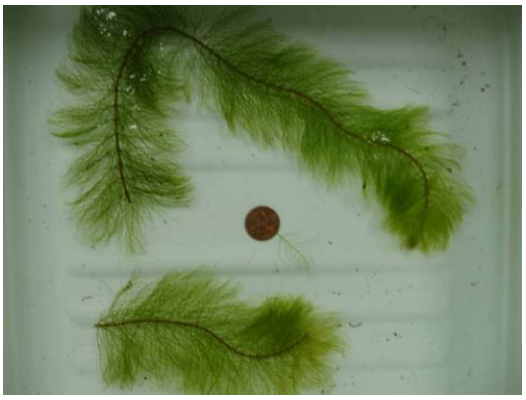
Olney Pond in Lincoln Woods State Park is known to contain the greatest diversity of aquatic invasive plants with five different species observed in the pond. Chapman Pond in Westerly and Central Pond in East Providence each have four different invasive species. Overall, 13 different invasive plant species have been observed in Rhode Island lakes. They are listed in Table 3 in order of frequency of occurence*.

Table 3. Aquatic Invasive Plants Observed in Rhode Island Lakes by RIDEM-OWR Surveys

Common Name	Latin Name	Number of Lakes	Number of Rivers
Variable milfoil	*Myriophyllum heterophyllum*	54	12
Fanwort	*Cabomba caroliniana*	44	10
Curlyleaf pondweed	*Potamogeton crispus*	8	3
Spiny naiad	*Najas minor*	6	
Mudmat	*Glossostigma cleistanthum*	6	
Water chestnut	*Trapa natans*	5	
Eurasian milfoil	*Myriophyllum spicatum*	4	2
Brazilian elodea	*Egeria densa*	2	
Yellow floating heart	*Nymphoides peltata*	2	
American lotus	*Nelumbo lutea*	2	
Parrot feather	*Myriophyllum aquaticum*	1	

* Table note; Two species, water hyacinth (*Eichhornnia crassipes*) and inflated bladderwort (*Utricularia inflata*), are excluded from the table although they have both been observed in Rhode Island. Water hyacinth has been observed in 3 locations, but all plants were removed. No established population of water hyacinth is known to exist in Rhode Island. Inflated bladderwort has been observed in 4 locations. However, because of physical similarities to native floating bladderwort, identification is difficult and further work is needed to verify some of the observed populations as the invasive species.

From Table 3 it is clear that variable milfoil and fanwort are the most common aquatic invasive plants being detected. Along with water chestnut, these species are pictured below and further described in fact sheets included in Appendix E.



Variable milfoil covers Wyoming Pond, Hopkinton in 2009; at right, plant size related to a penny.



Dense stands of Fanwort at Zeke's Bridge Fishing Area at Johnson's Pond (Coventry) in 2007



Water Chestnut covers the water's surface at Chapman Pond (Westerly) in 2011.

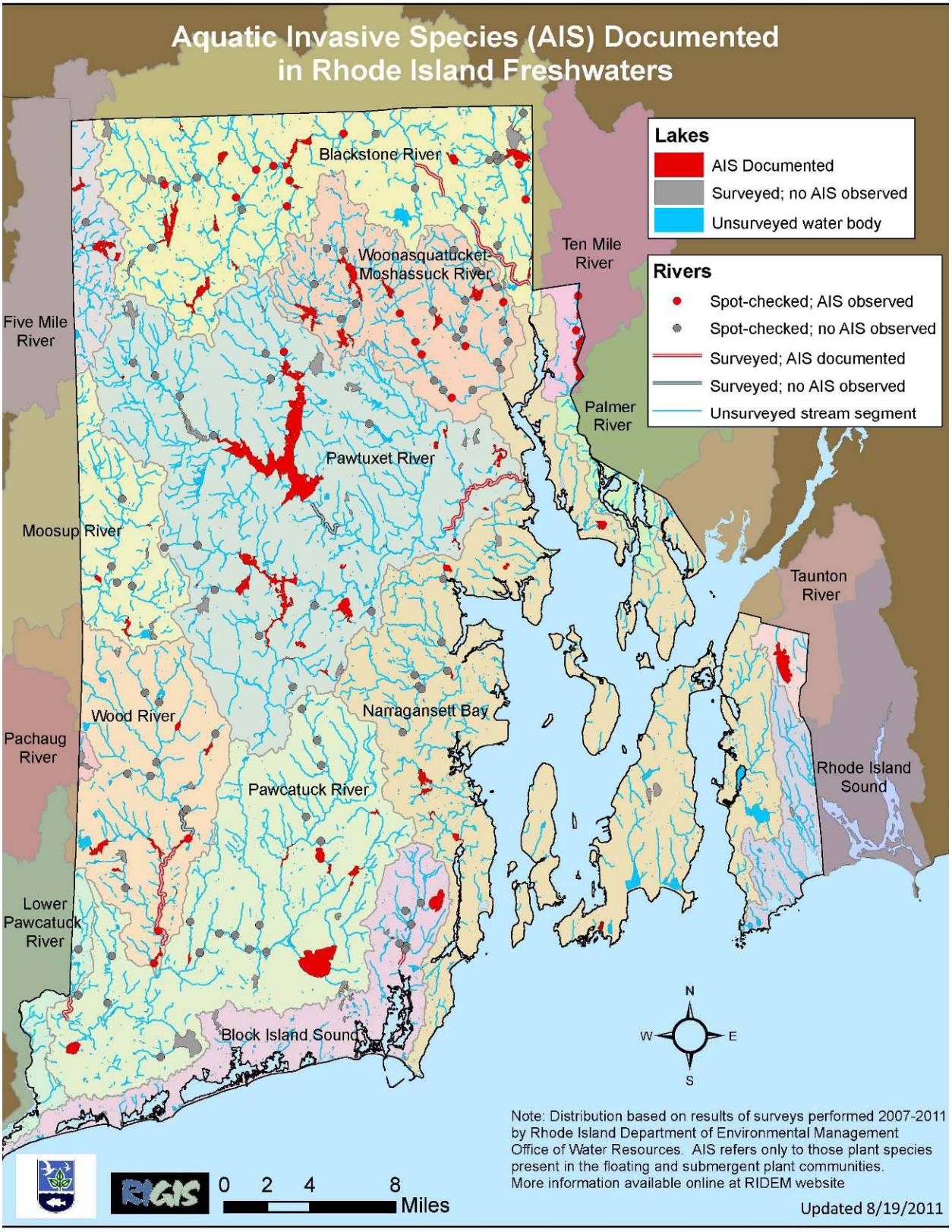
Conditions regarding aquatic invasive plants in Rhode Island are similar to the pattern found throughout much of southern New England. The current Rhode Island rate of detection, 59%, is similar to the 64% detection rate reported by the Massachusetts Department of Environmental Protection (Mattson, M.D., 2004). Like Rhode Island, variable milfoil and fanwort were the most commonly detected submerged invasive plant species in Massachusetts. Conditions in Connecticut are also similar with a detection rate of about 60% reported for by the Invasive Aquatic Plant Program at the Connecticut Agricultural Experiment Station (CAES, 2012). Understanding that aquatic invasives are a regional problem underscores the need to collaborate on regional measures to prevent new introductions and stop the spread of aquatic invasive species.

The problem of aquatic invasive plants is distributed across the state, and is not limited to specific regions of Rhode Island. RIDEM-OWR has directly observed aquatic invasive plants in 29 of Rhode Island's 39 cities and towns. Further towns are likely to have invasive plants that have not yet been confirmed. Thus, continued monitoring will likely discover a wider distribution than is currently known. Most municipalities without an aquatic invasive species infestation are located in coastal areas with fewer freshwater resources. The municipalities currently with no documented occurrences of aquatic invasive species are: Bristol, Central Falls, Charlestown, East Greenwich, Jamestown, Middletown, Narragansett, Portsmouth, West Warwick and Woonsocket.

Of the 15 major watersheds that have some or all of their surface area within the state of Rhode Island, 12 maintain at least one population of aquatic invasive species (Figure 6). As most Rhode Island lakes are hydrologically connected to rivers and streams, information on the occurrence of aquatic invasive species in rivers is provided in Appendix F. Management of invasives where both lakes and rivers are known to be affected should be approached from a watershed perspective. Those watersheds currently without aquatic invasive species have only a small portion of the total watershed within Rhode Island and likely have invasives elsewhere.

"Stop Aquatic Hitchhikers" is a national campaign to raise awareness about AIS. Primary sponsors include the federal Aquatic Nuisance Species (ANS) Task Force, the US Fish and Wildlife Service and the US Coast Guard.

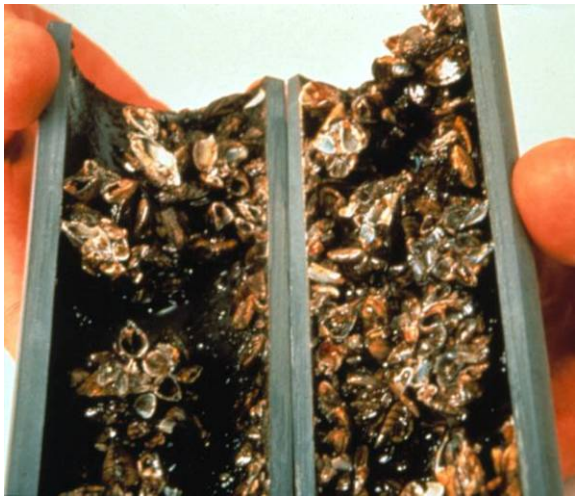
Figure 6. Map of Watersheds in Rhode Island with Aquatic Invasive Species



5.3 Aquatic Invasive Animals

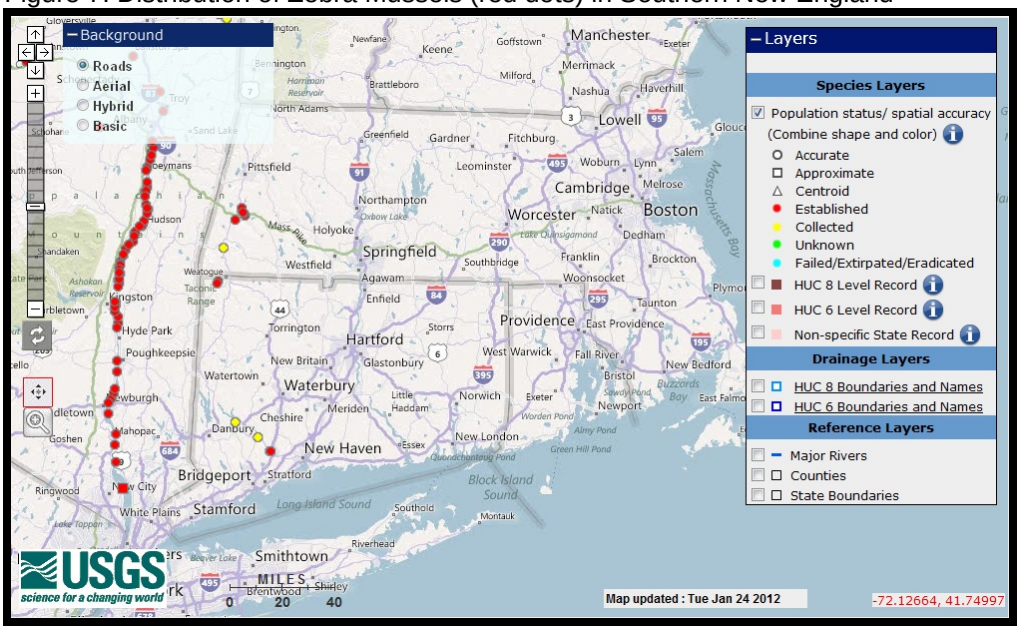

Zebra mussels (left, Source: USGS) and Asian clams (right).

In addition to invasive plants, aquatic invasive animals present threats to lake ecosystems. Among the most infamous invasive species is the zebra mussel. Since it was first discovered in North America's Great Lakes in 1988, the zebra mussel has rapidly expanded throughout the Midwest, the Mississippi River and New York waters. Its range has been extended into western New England including detection in Lake Champlain in Vermont (1993), a lake in northwest Connecticut (1998) and several additional waterbodies. The zebra mussel was first detected in Massachusetts in 2009 in Laurel Lake in the western region of the state near Lee (Biodrawversity, 2009). Its ability to attach to surfaces using a byssal thread distinguishes it from native freshwater mollusks and allows it to colonize any hard surface. Despite its small size, its ability to colonize in high densities creates significant biofouling concerns. As a result, zebra mussel infestation can impose substantial economic costs on water dependent communities. Mussels attached to boats, boating equipment or fishing gear translate to extra maintenance costs. Recreational uses are affected as bathers must take precautions against stepping on or coming into contact with the zebra mussels' sharp shell edge. Industries and public water suppliers incur costs when mussels clog water intake pipes. Tourism can be negatively affected as well. Figure 6 (USGS) shows the current infestation of zebra mussels in southern New England which occurs in western Connecticut and Massachusetts.

Zebra mussels smother native clams and clog pipes (photo sources: USGS)

Figure 7. Distribution of Zebra Mussels (red dots) in Southern New England



As zebra mussels arrived in western New England, RIDEM sought and was awarded federal funds to update an assessment of the vulnerability of Rhode Island freshwaters to infestation. RIDEM has completed an updated vulnerability assessment and is currently preparing a final report. The project reviewed the water chemistry of lakes relative to the requirements of zebra mussels. In what is viewed as good news for Rhode Island lakes, the work to date has found that the number of lakes likely to sustain a reproducing mussel population is limited. Based on calcium concentration, alkalinity and pH, it appears the waters most vulnerable would be: Almy Pond (Newport), Brickyard Pond (Barrington), Gorton Pond (Warwick), Handy Pond (Lincoln) Mashapaug Pond and Roger Williams Park Ponds (Providence), Round Pond (Little Compton), Silver Creek (Bristol) and Simmons Brook (Johnston). Most of the ponds listed above do not have existing boat ramps or high boat traffic which may further reduce their risk of infestation. The Providence Water Supply Board currently conducts early-detection monitoring for zebra mussels in five of its reservoirs.

The invasive animals that have been detected in lakes include the Asian clam (*Corbicula fluminea, above*), an invasive freshwater mollusk, which has been observed in 7 lakes and in the Pawtuxet River. This small clam prefers sandy lake bottoms and does not attach itself to hard surface like the zebra mussel. In high densities the Asian Clam can out compete native species and degrade biodiversity. Common carp (*Cyprinus carpio*) are known to exist in several Rhode Island lakes and the Blackstone River. Carp are considered a nuisance species due to their large size, ravenous appetites, and rapid rate of reproduction. They pose a significant threat to native biodiversity, including native fish species as well as waterfowl. Carp are hardy fish that can tolerate extremely low levels of dissolved oxygen (by gulping air at the surface) and large temperature changes that would be lethal to other fish species. To find food, carp suck up muck from the bottom into their mouths, expelling the inedible mud and swallowing the remaining organisms. This feeding behavior uproots plants and disturbs bottom sediments, causing severe habitat damage and lowering the water quality. Stirred-up sediment may clog the gills and filter-feeding apparatus of aquatic organisms such as fish, mussels and snails. All of these impacts render the habitat unsuitable and are detrimental to the survival of native aquatic species.

6.0 Strategies for Controlling and Managing AIS in Lakes

6.1 AIS Management Goals

Effectively controlling aquatic invasive species in Rhode Island lakes is clearly a resource management challenge. The Rhode Island Aquatic Invasive Species Management Plan (RIAISM Plan) articulates the following goals:

1. Prevent the introduction and establishment of aquatic invasive species in RI
2. Control the growth and spread of aquatic invasive species in RI and
3. Abate the impacts and minimize the harmful effects of aquatic invasive species

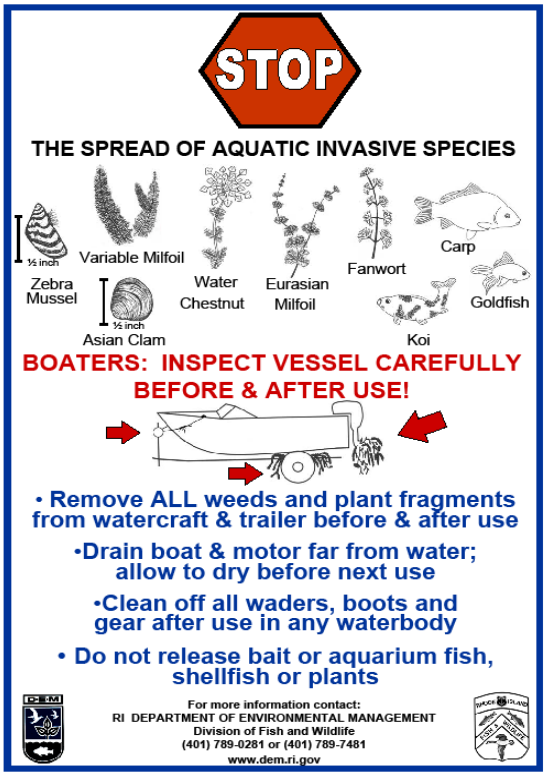
The plan describes the roles of governmental and non-governmental entities and provides recommendations related to various elements of Rhode Island's overall approach to aquatic invasive species. These include coordination, education and outreach, monitoring, research and development, planning and assessment, prevention, control and restoration. The plan reflects the need for collaboration between state government, non-governmental organizations, lake associations and other entities in order to advance progress toward achieving these goals. The full plan is available on-line at:
http://www.dem.ri.gov/programs/benviron/water/quality/pdf/aisplan.pdf

6.2 Preventing the spread of Aquatic Invasive Species

Preventing the spread of invasive species into waters currently free of invasives is clearly the preferred management option for such lakes. It is both more cost effective and environmentally sound than the strategies available to mitigate an infestation. When aquatic invasive species are not stopped during the early stages of infestation, their rapid spread usually results in a lengthy and expensive effort at controlling the problem. As noted earlier, ***once aquatic invasive species become well established, eradication is usually not possible with currently available management techniques.*** This has long-term implications for the cost of managing lakes.

Several of the predominant invasive plant species (milfoils, fanwort) are known to reproduce by fragmentation and thus are easily spread by recreational activities including but not limited to boating. Plant fragments that adhere to a boat leaving an infested lake may be unintentionally carried into and infest another lake. Other means for aquatic invasive species to become established include similar transport via other recreational activities, transport by wildlife, accidental release associated with the aquarium and water garden trades and even the intentional planting of aquatic invasive plants in lakes. Expanded efforts to monitor and prevent the introduction of aquatic invasive species into lakes not yet infested is warranted.

The RIAISM Plan recommends expanded outreach, education, surveillance, and rapid response planning as well as additional regulatory restrictions, as important prevention strategies. Some progress has been made toward implementation of these strategies, but additional effort is needed.



Sign Posted by RIDEM at boat ramps

Photos courtesy of Save the Lakes (STL)

During 2011, RIDEM and STL were able to launch a pilot project that placed volunteers at state boat ramps for the purpose of educating boat owners about aquatic invasive species and the need to routinely inspect and clean their boats. A training manual was developed and volunteers participated. Initial response to the program was positive and RIDEM and STL are hoping to expand the program and eventually provide for voluntary boat inspections. Boat inspection programs have been used more widely in other parts of New England as well as other states. In some cases, the programs have been made mandatory. Certain states that operate programs have produced statistics on the number of times a lake was “saved” by the boat inspectors identifying and preventing a boat with attached plant fragments from entering a lake. Boat washing stations installed near ramps are used in many other locales to provide an added measure of prevention by making it convenient to properly clean a boat of invasive plants.

It is important to plan for the introduction of invasive species likely to arrive in Rhode Island and build the capacity to rapidly contain new infestations in their earliest stages and where possible eradicate them. The RIAISM Plan recommends early detection and rapid response plans specific to aquatic invasive species of high concern be prepared. RIDEM is currently developing such a plan for zebra mussels but there is a need to execute planning for other species.

Effective prevention also requires that the pathways by which aquatic invasive species enter Rhode Island freshwaters be reasonably restricted wherever possible. RIDEM has been granted additional legislative authority to regulate activities that are considered vectors for the spread of aquatic invasive species. Accordingly, at the state level, RIDEM will be developing additional regulations that will restrict the possession, sale or transport of certain aquatic invasive species. This will include issuing a list of prohibited (banned) aquatic plants (RIGL §20-1-26), restricting

the importation, sale and transport of exotic bait fish (RIGL § 20-1-28) and restricting the release of exotic invasive freshwater fish and invertebrates (RIGL § 20-1-27). RIDEM is aware that several aquatic invasive species are currently available for sale via catalogues and internet sites. Accordingly, in addition to an appropriate level of enforcement, public outreach to raise general awareness about invasives will be essential to curbing demand for the sale of such plants and animals, and hence reducing their availability over time.

6.3 Options for Controlling Existing AIS Infestations

6.3.1 Lake Management Planning

The long-term control of aquatic invasive plants in a lake is best accomplished through a specific lake management planning process. Because of the complex interrelationships at work in each unique lake ecosystem, aquatic invasive plant control options do not have the same universal results. Successful application of a control technique in one lake may have very different results in another lake because the ecosystem characteristics are slightly different (Mattson, M.D., et al, 2004). The chances of successful management are greatly improved when the *specific* characteristics of the lake are known and the priorities of the lake users are made clear. This information can be brought together through a lake management planning process which identifies lake specific issues, management goals and the preferred strategies for achieving those goals; e.g. protecting or restoring lake conditions. With respect to aquatic invasive species, the plan will often need to reflect an "integrated pest management (IPM)" approach that will involve a combination of control strategies as opposed to reliance on a single control strategy. IPM strategies generally result in longer term control than a single control method (Smagula, A. 2008). A lake management plan can also be useful in coordinating the actions that may be needed among all the parties in a lake watershed; e.g. upstream lake associations. In situations requiring lakewide management of aquatic plants – a likely long-term and expensive endeavor - developing a lake management plan is strongly recommended. Where the management need is more targeted, e.g. initial infestation in a small portion of a lake or correction of a specific known pollution source, the needed course of action may be ascertained and pursued successfully without such detailed planning. However, RIDEM believes the best means to long-term effective stewardship of all lakes is through strengthened lake management planning.

To promote the concept of lake management, in 2009, RIDEM undertook a project in partnership with the US Natural Resources Conservation Service (NRCS) that allowed the Northern Rhode Island Conservation District to retain a consultant to complete lake management plans for two lakes: Bowdish Reservoir and Smith & Sayles Reservoir. The plans are intended to serve as models for other lake associations and reflect the need to consider lake management actions over a multi–year timeframe. The plans addressed both water quality concerns and aquatic plant management needs and were based on field surveys of the existing extent of aquatic invasive plant infestation. They explain the advantages and disadvantages of various control techniques. The plans can be viewed at: http://nricd.org/education.htm#lake

6.3.2 Techniques for Controlling Aquatic Invasive Plants

There are a range of techniques available for combating aquatic invasive plant infestations. These techniques can be categorized as physical control, chemical control, mechanical control, habitat manipulation and biological control. Developing more effective techniques to control aquatic invasive species is also the subject of research both in New England and elsewhere

raising the possibility of that over time additional options may be available for lake associations and resource managers.

As noted above, the selection of one or more strategies should be determined as part of lake management planning process. The development of a lake management plan will draw together the important information needed to devise a plan of actions that if implemented in a coordinated manner maximizes the potential for successfully mitigating an aquatic invasive species infestation. The selection of the most appropriate control technique will reflect the stage of the infestation: introduced, established and growing, displacing native pants or dominating the ecosystem. More options are available when invasive plants are in the initial stages of growth; as a practical matter fewer options exist for controlling aquatic invasive populations when they are well established throughout a lake. Information on the various techniques is summarized in Table 5. Additional information on the strategies most commonly employed in Rhode Island is provided below.

6.3.2.1 Chemical Treatment:

A chemical treatment program properly designed and implemented can provide effective short-term control of the invasive plants in Rhode Island lakes including milfoils and fanwort. In Rhode Island, annually repeating this strategy has been an approach taken in certain lakes with well established infestations. During 2007-2011, RIDEM records indicate 58 lakes were treated once or more with herbicides to control excessive AIS plant growth (macrophytes). This figure does not include treatments to control algal growth. The permittees include lake associations, individual property owners and municipalities. The application of aquatic herbicides is not always acceptable to all lakefront property owners and has at times generated controversy and objections to their use. Experience in Rhode Island and elsewhere indicates that chemical treatments of well established aquatic invasive species populations are not likely to eradicate an infestation completely. To sustain control, a commitment to a long range lake management plan that tailors repeat treatments and other IPM strategies to improve lake conditions is needed.

Due to the potential for harm, there are a limited number of herbicides authorized for use in surface waters pursuant to federal law and Environmental Protection Agency (EPA) regulations. The selection of a herbicide is driven by the plant species to be targeted as well as other environmental and public health considerations. In Rhode Island, the application of these herbicides is regulated by the RIDEM Division of Agriculture as part of its overall pesticides regulatory program. Application of herbicides in or on a lake typically is done by an individual licensed by the RIDEM Division of Agriculture pursuant to the pesticide applicator program and in accordance with a permit. The licensed applicator is obligated to ensure the herbicide is applied in an appropriate manner using the proper dosage. Herbicides, which are sold under various product names, are usually applied in liquid or granular forms from a boat using specialized equipment that controls the dosage. Treatments may be lakewide or more targeted. A lakewide treatment is often followed by targeted spot treatments. A well designed treatment program will incorporate a monitoring program that tracks the re-growth of the aquatic invasive plants and ensures treatments are targeted to optimize effectiveness. The herbicides typically recommended for the most commonly detected aquatic invasive plants in lakes are listed in Table 4.

One of the chief constraints to employing herbicides is cost. Estimated rates for treatment range from $300 to $1,000/acre per year. By way of example, the Bowdish Reservoir Management Plan outlined three options for chemical treatment for the 233 acre lake. The estimated costs for implementing treatment programs targeting 200 acres in 2010 ranged from

$35,000 to $200,000 (ESS Group, Inc., 2010). Most lake associations lack the fiscal capacity to commit to such programs and thus have expressed strong interest in the development of some form of financial assistance program for needed lake management actions.

Table 4. Aquatic Herbicides Commonly Used to Control Aquatic Invasive Plants in RI

Herbicide Active Ingredient	Mode of Action	Advantages	Disadvantages	AIS Plant Species Targeted in DEM Herbicide Permit Applications (2007-2011)
Forms of 2, 4-D	Systemic herbicide. Readily absorbed by plant. Inhibits cell division in new tissue and stimulates growth in old tissue, resulting in gradual cell disruption	Moderately to highly effective control of a variety of plants. Can achieve some selectively through timing of application and concentration. Fairly fast action.	Variable toxicity to aquatic fauna, depending on the formulation and ambient water chemistry. Not for use in water supplies. Times delays for use of the water being treated for recreation or agriculture.	Variable milfoil Fanwort Water Chestnut Curly-leaf Pondweed
Triclopyr	Systemic herbicide. Readily absorbed by plant foliage. Disrupts enzyme systems specific to plants.	Effectively controls many floating and submerged plants. Can be used selectively; more effective against dicot plants species (e.g. milfoils). Effective against some difficult to control species. Low toxicity to aquatic fauna.	Current time delay of 30 days on consumption of fish from treated areas. Impacts on non-target species possible at higher doses. Higher cost per acre than other herbicides.	Eurasian milfoil
Forms of Diquat	Contact herbicide. Absorbed by foliage but not roots. Strong oxidant. Disrupts cellular functions.	Moderate control of emersed plant species, moderately to highly effective control of floating or submersed species. Limited toxicity to fish at recommended dosages. Rapid action.	Non-selective in treated area. Toxic to zooplankton at recommended dosages. Inactivated by suspended particles. Restricted near potable water intakes.	Variable milfoil Fanwort Water Chestnut Curly-leaf Pondweed Brazilian Elodea
Glyphosate	Contact herbicide. Absorbed through foliage, disrupts enzyme formation.	Moderate to highly effective control of emersed and floating plants species. Can be used selectively. Rapid action. Low toxicity to aquatic fauna at recommended dosages. No time delays for use of treated water.	Non-selective in treated area. Inactivation by suspended particles. Restricted near drinking water intakes. Highly corrosive.	Variable milfoil Fanwort Water Chestnut Curly-leaf Pondweed
Fluridone	Systemic herbicide. Inhibits carotenoid pigment synthesis and impacts photosynthesis.	Can be used selectively. Gradual deterioration of plants limits effects on oxygen level. Low toxicity to other aquatic fauna.	Impacts on non-target plant species possible with higher doses. Extremely soluble; difficult to perform partial lake treatments. Requires extended contact time.	Variable milfoil Fanwort

Adapted from Mattson, M.D., 2004.

Table 5. Techniques for Managing Aquatic Invasive Plant Infestations

Options	**Advantages**	**Disadvantages**	**Cost**	**Permitting**
Management Strategy: ERADICATE PLANTS – effective for small areas removing individual plants; highly specific to target plant species				
Hand-pulling or DASH	Completely removes nuisance plant from small area, no other control methods required (therefore may be most cost-effective in the long term). Because it targets specific plants, the impacts on native species are reduced.	Can be labor intensive, may not be practical for dense plant growth or large areas and initial cost may be expensive	$2000 / acre for manual labor $5000 / acre for DASH (Diver Assisted Suction Harvesting)	Project plans need to be reviewed and approved by DEM's Wetlands Program if area to be cleared is more than 15 feet from existing docks, beaches, and swimming areas.
Management Strategy: CONTAIN PLANTS – effective in small areas of plant growth; not specific to target plant species (will impact all species within barrier or net)				
Benthic Barriers	(Black screen/tarp secured to lake bottom like a carpet) Blocks sunlight and prevents growth for very small areas, impedes fragmentation so it can be extremely effective for several years	High annual maintenance, high initial cost for barrier material, effects all native flora, fauna and soils below barrier, may cause sediment/water oxygen depletion	$90,000 / acre	All containment project plans (barriers or floating nets) need to be reviewed and approved by DEM's Wetlands Program
Floating nets	Enclose small area (cove or inlet) to slow spread of plant fragments moved with water current	Requires proper anchors and maintenance, can impede boating, swimming, & fish movement. Does not prevent spread by other means (vegetative growth, transport by animals, seed dispersal etc…)	Depends on size of mesh, and size of area to be blocked off or enclosed	

Options	Advantages	Disadvantages	Cost	Permitting
Management Strategy: CONTROL PLANT GROWTH – effective in larger areas of plant growth; cost frequency and specificity to target species depends on method chosen				
Chemical Herbicide Treatment	Can control large areas, chemical may be specific to plant species, results may be seen rapidly	High initial cost; must be applied per label instructions; may be effective for 1-3 years and/or require repeat treatments for large infestations; swimming and drinking may be temporarily restricted depending on herbicide instructions	$300 - $1,000 per acre Varies widely dependant on which herbicide is selected (many vary in efficacy, target selectivity, and target toxicity); additionally a licensed herbicide applicator should be contracted for consultation, pre- and post-treatment monitoring	Permit required from DEM's Division of Agriculture *
Physical Mechanical/suction Harvesters Hydro-raking	Specialized large machinery covers large areas and removes plants	High cost for short-term solution; requires follow-up maintenance; may cause plant to fragment and further spread invasives; removes all beneficial plants; disturbs soils & habitat, causes turbidity; machinery requires highly detailed cleaning before use in another lake	$2,000 per acre	Project plans that involve harvesters and hydro-raking require a wetlands permit from DEM's Wetlands Program *

Options	Advantages	Disadvantages	Cost	Permitting
Habitat Manipulation Water Drawdown	Water levels may be lowered in October to allow sediments and plants to freeze and dry out during the winter.	Requires outlet structure to control water release. Will effect all (including beneficial) plant species and wildlife (fish, frogs, mussels); will not be effective for plants that produce seeds or that have extensive root systems; may effect access to water supplies or downstream flows from outlet; efficacy is weather dependent	Costs are associated with: maintaining and operating outlet structure; professional consultants contracted to develop drawdown plan and obtain hydrologic information; pre- and post-treatment plant monitoring	Drawdown plans require review and approval from DEM's Wetlands Program*
Dredging	Total removal of plants and associated sediments	Completely alters lake ecology, will impact all plants and wildlife, may cause water quality problems	$16,000 - $32,000 per acre Plus additional costs associated with contracting professionals to develop dredging plan or monitor plants	Project plans that involve dredging will require a wetlands permit from DEM's Wetlands Program *
Biological Controls Introduce milfoil weevil	Introduction of natural prey (insects, fish) into lake to control plant population; often highly specific for plant target	Introduction of new species may be problematic (or unethical); highly experimental and efficacy is not guaranteed	Costs vary by which animal is introduced and how many are required. Introduced animals may not eat intended target or may overproduce and become pests, or may not survive.	Project plans that involve the introduction of new species, such as certain species of fish or weevils, to control weeds must be reviewed and approved by DEM's Division of Fish & Wildlife.

* In coastal areas where freshwater wetlands are under the jurisdiction of the RI Coastal Resources Management Council, a CRMC assent or approval will be required.

6.3.2.2 Hand-pulling:

While generally limited to smaller areas, hand-pulling is a strategy that can be used to combat aquatic invasive plants, especially non-fragmenting plants. The technique may involve wading, snorkeling, scuba diving or use of boats to pull plants, including the root system. Being labor intensive, it is most often recommended to control invasive plants in the early stages of infestation. In the case of water chestnut, hand-pulling has been employed to control water chestnut in two Rhode Island lakes: Belleville Pond and Chapman Pond. The long-range goal is eradication. The approach to date has involved volunteers in light watercraft (canoe, kayak) hand-pulling the plants including its shallow roots. The plant produces a seed pod that can survive for years so management will involve repeat visits to the affected lake. In the case of Belleville Pond, some success has been evident. After an initial large pull in 2008, the repeat inspections the following year have yielded low number of new plants re-emerging. Monitoring the areas will be needed until 2020 when the seeds deposited by the plants are expected to be depleted. Any new plants found are being removed. The infestation at Chapman Pond is substantially larger and has not to date been successfully controlled. Continued management is needed. As resources allow, the RIDEM and RINHS have plans to continue surveillance of both lakes. Hand-pulling is also being used in combination with chemical control to combat water chestnut in a third private pond in Foster.

Volunteers pull Water Chestnut from Bellville Pond in 2008 (left) and Chapman Pond in 2010 (right). The Belleville Pond event was organized by the RINHS. Work on Chapman Pond was organized by the Westerly Land Trust and RINHS.

6.3.2.3 Habitat Manipulation (Drawdown):

The intentional lowering of a lake for an extended period of time is sometimes pursued as a strategy to control aquatic invasive plants. Historically, drawdowns have been employed primarily for the purposes of flood control, to prevent property damage or to allow maintenance and repair of shoreline structures. This practice may have had a benefit in controlling macrophyte plant populations, particularly along the shore. RIDEM is aware of certain drawdowns being undertaken on lakes as a historical practice, but the data does not exist to characterize how widespread this control strategy is currently being used on lakes in Rhode Island. RIDEM also has experience with entities interested in initiating new drawdown practices – a regulated activity that requires a freshwater wetlands permit. Within the last several years, a RIDEM wetlands permit was issued to allow a drawdown on Boone Lake consistent with an approved lake drawdown plan. The RIDEM OWR has also been interacting with officials from Bowdish Reservoir and Smith & Sayles in regard to specific requests related to drawdowns.

The ability to control the water level in a lake is affected by area precipitation patterns, system hydrology, lake morphometry and the outlet structure. The base elevation of the outlet (or subsurface pipes) will usually set the maximum drawdown level, while the capacity of the outlet to pass water and the pattern of water inflow to the lake will determine if the base elevation can be achieved and maintained (Mattson, M.D., 2004). The impact of an increased initial release from the lake downstream and subsequent reduced flows from outlets also has to be taken into account. To mitigate impacts to native species, RIDEM requires the drawdown be implemented in a manner that regulates the water release to protect downstream uses and to allow movement of amphibian and other species in the lake to deeper over-wintering locations. This usually requires that lowering occur in October which for some lake associations is not viewed as a feasible option given the on-going uses of the lake.

Outlet structure at Keech Pond (Glocester, left) lowers the lake water level exposing docks (right).

The effectiveness of drawdown is dependent on a number of factors including: sensitivity of the target species to dehydration, sediment composition and slope, lake morphology (slopes) which influences depth of the drawdown, the weather experienced during the drawdown, pattern and rate of groundwater seepage and plant density at the time of drawdown. The Final Generic Environmental Impact Report for Eutrophication and Aquatic Plant Management in Massachusetts reviews in detail the environmental issues associated with drawdown. In citing literature on the effectiveness of drawdown, it noted some published reports of success with reducing plant biomass associated with this strategy. However it also noted that the effect of drawdown on plants is not always predictable or desirable, citing cases in which the nuisance

species were increased or other reductions in desirable species occurred. Some of these concerns are reflected in the experience of the New Hampshire Exotic Species Program which does not often recommend drawdowns for invasive plant control, generally due to the fact that drawdowns cause disturbance within natural systems, and invasives thrive on that disturbance (Smagula, A., 2008). It is RIDEM's understanding that the practice of drawdown is not generally allowed in either Vermont or Maine.

Where conditions indicate drawdown may be appropriate, long-term control with this strategy will require a lake management drawdown plan that involves continued review and manipulations or adjustments to sustain control of the aquatic invasive plants. Success with this strategy for sensitive species (which includes milfoil and fanwort) is deemed largely a function of sediment features and regrowth rates (Mattson, M.D., 2004). Drawdown is often used in combination with other strategies (e.g. herbicide application) as part a comprehensive IPM program. A specific evaluation of each lake and its suitability for achieving success with this practice is needed. Given that of Rhode Island's lakes are shallow with plant growth often occurring across the entire lake bottom, control of aquatic invasive plants through drawdown may prove to be ineffective other than along the shoreline areas that are adequately desiccated or frozen.

6.3.2.4 Other Approaches:

There are other physical control techniques being used elsewhere in New England that to the RIDEM's knowledge have not been used in Rhode Island. These include: Diver assisted suction harvesting (DASH), benthic barriers and mechanical harvesting (see Table 4). The first two techniques are generally used for small infestations and not applied lakewide. The New Hampshire Department of Environmental Services (DES) owns a DASH unit and is continuing to research its effectiveness. There is also some experience with this technique in other New England states. This approach can be expensive on a per acre basis ($5,000 per acre). However, used effectively in the early stages of a small infestation, DASH may avert the higher costs associated with managing a more advanced infestation through chemical treatment.

Mechanical harvesting involves cutting and pulling plants from a specially equipped watercraft. Generally utilized in larger lakes, this technique can provide effective short-term control by reducing the plant biomass present for that growing season. The technique is not likely to control growth year to year and it is not considered an appropriate strategy for controlling RI's most common aquatic invasive plants (milfoils and fanwort) because these species are spread via fragmentation. The action of harvesting, if not done carefully, may result in further spread of the plant either within a waterbody or into downstream waters. In Rhode Island, this strategy may need to be considered as part of a management plan only after all other approaches have been exhausted.

Additionally, biological control techniques are another possible control strategy. This technique involves introducing a live predator (such as insects or pathogens) to the invasive plant population. These insects (such as weevils or midges) must first be well studied and have known preferences for feeding on the invasive plant, and are introduced with the intention that they will impact the growth or reproduction of the invasive plant (and avoid adverse impacts to native flora and fauna). The success of biocontrol methods is dependent on several factors, including weather and climate, the susceptibility of the invasive plant species, and the reproductive success of the introduced biocontrol agent. There are no known efforts to control AIS in Rhode Island using biological agents. RIDEM Division of Fish and Wildlife must approve all introductions of any insects or animals.

7.0 Considerations Related to Adopting a Boat Sticker Program

7.1 Need for Financial Assistance

Given their importance to our public welfare and environment, there exists a strong public interest in ensuring Rhode Island lakes are managed and maintained in good condition. Local lake associations have expressed strong interest in establishing a financial assistance program to support local lake management. RIDEM is also cognizant of the significant budget constraints that exist at both the state and local level. There currently is no state or federal source of funding regularly made available to help defray the costs incurred by entities, including lake associations, in implementing needed lake management. Additionally, not all lakes benefit from having an organization (lake or dam associations) ready and able to plan and implement needed lake management actions. The local associations that do exist vary in size and capabilities and often have limited technical or fiscal capacity to apply to lake management.

Recognizing the public benefits of maintaining lakes in good condition, many states have established programs with some form of cost-share grant assistance program being offered. When resources allow, RIDEM believes developing a state financial assistance program, as part of a dedicated lake management program, would be an appropriate enhancement to current lake management practices in Rhode Island. Three New England states currently maintain specific programs that offer grants to eligible groups for aquatic invasive species control projects. Funding for these programs comes from several sources, although generally involves a fee paid by boaters. In Rhode Island, RIDEM administers the boat registration program. By law, the fees are deposited into a restricted receipt account. The funds are budgeted for the administration of the registration program as well as boating safety and boating enforcement programs and are not readily available for other purposes. Below is a description of grant programs in other New England states and their funding mechanisms.

7.2 Financial Assistance Programs in Other New England States

Maine Invasive Aquatic Plant Cost Share Grants: The Maine Department of Environmental Protection provides grants up to $2,000 to municipal and county governments, quasi-municipal organizations and 501C(3) organizations (including lake associations) for locally-initiated courtesy boat inspection programs. Grants are also available for the manual removal of invasive aquatic plants up to $6,000, provided the required match amount is met. Eligible projects utilize manual control techniques including plant removal by hand, Diver Assisted Suction Harvesting (DASH) and benthic barriers. Control grants are only available to those entities that already maintain a courtesy boat inspection program, or must provide an explanation why an inspection program is not warranted (M.R.S. Title 38 §1863, M.R.S Title 12 §10257). Funding source: Boat Sticker Program (M.R.S. Title 12 § 13058).

New Hampshire Control Grants for Exotic Aquatic Plants: The New Hampshire Department of Environmental Services (DES) awards grants to local lake associations and municipalities for the control and treatment of aquatic invasive species. DES may pay 100 percent of treatment costs for a new infestation, and may match up to 50 percent for repeat management practices. The demand for assistance has exceeded available funding and resulted in cost share grants that generally ranged from 25-40 percent match. Prior to awarding grant monies, DES, with input from lake residents and municipalities, develops a long-term management plan for each

water body that requests funding. Management plans include an evaluation of the infestation, evaluation of control options, management goals and a plan for carrying out the selected strategy. Because requests for control grants exceed available funding, DES developed a priority-ranking model for funding control projects. DES also awards a limited amount of funding each year for forward-thinking strategies to prevent new infestations. Funding source: Revenue collected through boat registrations, distributing $7.50 of each registration fee to their Lake Restoration and Preservation Fund (R.S.A. 270E-5). The NHDES uses $.50 of the fee for lake restoration and preservation measures, exclusive of exotic aquatic weed control, $3 for AIS control grants, and $4 for the milfoil and other exotic aquatic plants prevention program (RSA 487:25).

Vermont Aquatic Nuisance Species Grant-in-Aid Grants: This program, managed by the Vermont Department of Environmental Conservation (DEC), provides financial assistance to municipalities and agencies of the state for projects aimed at controlling or preventing the spread of aquatic invasive species. Local groups, including lake associations, that wish to receive funding for a project must apply through the municipality in which the water body is located (water bodies located in more than one municipality may require a joint application). Eligible projects include all control projects for nuisance plants (both native and exotic) and prevention programs such as public access "greeter" programs, boat wash stations, monitoring and education and outreach projects. Grants may be awarded for 75 percent or less of their total estimated project cost. Recipients must contribute at least 25 percent of the eligible project cost via cash expenditure, in-kind labor and/or in-kind services. Funding shortfalls have meant that grants generally do not meet the 75% match. In 2009, $320,981 was available and grants requests totaled over $1.08 million. In an effort to fund all eligible projects at some level, the maximum grant award was 40% with the majority of awards at 30%. Funding source: Primarily revenues from annual motorboat registration fees, in addition to proceeds from their voluntary Aquatic Invasive Species Sticker Program (described below) and occasional federal grants. VT DEC receives 25% of motorboat registration revenue, which goes directly to the Grant-in-Aid program. A separate surcharge on motorboat registrations of $5-$10 (dependent on the class of the boat) is also directed to the Grant-in-Aid program (10 V.S.A. § 1459).

7.3 Boat Sticker Programs

As states are challenged to manage the problems created by aquatic invasive species and prevent their spread, several states have adopted a boat sticker program to fund aquatic invasive species initiatives. In New England, Maine established a mandatory program in 2002; Vermont followed with a voluntary program in 2006. Both programs applied to motorized watercraft. In recent years, boat sticker programs have been adopted by several western states and applied more broadly to both motorized and non-motorized watercraft. They have also been established at the local or district level in areas outside of New England. In some cases, funds are used primarily to pay for state management activities, including boat inspections, boat wash stations and education and outreach as opposed to financial assistance for local aquatic invasive control projects. All the programs RIDEM reviewed limited their scope to boating activity on inland freshwaters. Key aspects of select individual state programs are described below.

Maine requires all motorized watercraft on inland Maine waters to display a Lake and River Protection Sticker (M.R.S. Title 12 §13058). "Motorized" boats include those with any type of motor, including electric motors. Non-motorized watercrafts are excluded from the requirement,

including non-motorized canoes and kayaks. The cost of the sticker depends on the residency of the boat, not the residency of the boater. Boats registered in Maine pay a $10 fee that is built into the total registration fee and the aquatic invasive sticker is combined with the registration sticker. Out-of-state boats must purchase a sticker for $20 prior to launching in Maine's inland waters. Stickers are sold wherever boats are registered or fishing licenses are sold. Stickers are not required for watercraft used on tidal waters. Owners of Maine-registered watercraft used only in tidal waters can declare such use during registration and avoid the AIS sticker fee. Revenues from the sticker are divided between the Maine Department of Environmental Protection (DEP) and the Division of Inland Fisheries and Wildlife (DIFW) (M.R.S. Title 12 §10206). DEP's share supports a range of AIS initiatives, including volunteer monitoring, education, boat inspections (including grants to local boat inspection initiatives) and plant management. In their 2011 budget, ME DEP allocated $70,000 for grants to local plant removal programs. Maine sells over 100,000 stickers per year - primarily to residents (over 90,000 stickers) along with 9,000 or more non-residential stickers. The fees have generated $1.02-$1.18 million per year since its inception, of which ME DEP receives 60%.

Vermont maintains a voluntary program in which boaters may purchase an aquatic invasive species boat sticker for $10 which goes directly to the Grant-in-Aid program. Although the program was instituted to provide additional revenue to their grant program, sticker sales were lower than expected and initial revenues did not cover the cost of sticker development and printing. The DEC maintains that a strong, effective and continuous marketing program would be necessary to boost sales, which would require funds from the legislature.

In 2010, Wyoming initiated a boat sticker program. It requires all watercraft, including canoes, kayaks and jet skis, using waters of the state to display an aquatic invasive species decal. Costs for the decal are $10 for motorized watercraft registered in Wyoming, $30 for motorized watercraft registered in other states, $5 for non-motorized watercraft owned by Wyoming residents and $15 for non-motorized watercraft owned by non-residents. Decals are available for purchase online through the Wyoming Game and Fish Department website or through licensed selling agents throughout the state.

Idaho maintains the Idaho Invasive Species Fund (IISF) to fund prevention and education efforts. Initiated by legislation adopted in 2009, any motorized or non-motorized boat is required to purchase and display an IISF sticker in order to legally launch and operate in Idaho waters, the fees of which go directly into the IISF. A fee of $10 is built into the boat registration cost for registered Idaho boaters, which are in compliance with the law by displaying their current registration sticker. Non-motorized boats or motorized boats registered outside of Idaho must purchase a separate sticker annually for $7 and $22 respectively. Stickers can be purchased through the mail, online, at any Idaho State Park and through vendors.

Oregon requires both motorized and non-motorized boaters to possess an Aquatic Invasive Species Prevention Permit at all times. Oregon registered boaters pay a $5 surcharge on their boat registration. By displaying their boat registration decal, they indicate that they paid the AIS permit fee. Oregon residents with non-motorized watercraft must purchase a permit for $7. These permits are transferable, and can be used for any non-motorized boat owned by that individual or loaned to friends and family members. Non-residents with either a motorized boat or a non-motorized boat must purchase a permit for $22 before launching in Oregon waters. Non-motorized boats under 10 feet, Federal, state, county, and municipality-owned watercraft, lifeboats and seaplanes are exempt from permit requirements. Discounts are available for boat rental businesses and clubs. Permits are required for both freshwater and marine use.

Permits are sold through Oregon Division of Fish and Wildlife (ODFW) license agents, ODFW offices and on their web site.

In addition, boat sticker programs have been under discussion in both Connecticut and New Hampshire. In New Hampshire, legislation to create a boat sticker program has been introduced twice, but was not adopted. The proposed NH program would have mandated a sticker for all motorized vessels used in inland waters of the state. This includes any vessel with an inboard or outboard motor, but excludes manually-powered vessels such as canoes and kayaks. Stickers would be integrated into boat registrations for resident boaters, and sold via authorized agents for non-residents. The proposed fee is $10 for resident boats and $15 for non-resident.

In reviewing options for a boat sticker program to be a viable source of funding to support AIS management in freshwaters, important considerations are its potential for generating a sufficient revenue stream and the current capacity to implement such a program.

Estimating Potential Revenues:

If Rhode Island adopted a boat sticker program, how much revenue would it generate? RIDEM considered a variety of information in attempting to answer this question. All boats, both motorized and non-motorized, over the size of fourteen feet are required to register through the RIDEM boating registration program. Registration stickers are valid for two years and subject to renewal. The universe of boats currently registered with RIDEM is 41,358, of which 34,923 are Rhode Island resident boat owners and 6,435 are out-of-state owners. Within the data collected for registration purposes, there is no readily available information that distinguishes where a boat will primarily be used: freshwater versus saltwater. Data on boat traffic at public ramps on lakes is also not quantified.

With respect to boating activity, Rhode Island lake shorelines appear to be primarily developed with residential properties that may have individual docks along with some limited types of other development. There are very few facilities operating to service or support multiple boats at one location; e.g. marina type operations. RIDEM was able to do a spatial analysis of property addresses (using E-911 address data) that indicates that there may be about 2,300 homes located within 125 feet of a shoreline on lakes 20 acres or larger in size. Based on information that is available and staff experience, RIDEM believes the majority of Rhode Island registered boats are used primarily in coastal waters, and providing a specific estimate of the proportion of boats using lakes was judged to be infeasible. Presuming a boat sticker program would be intended to support lake management, if a program were to be adopted, it would be appropriate to include a procedure such as that used in Maine that allows boats used only in coastal waters to be exempted from the fee.

While an accurate estimate is not available, using the following simple assumptions, RIDEM calculated a range of potential revenue scenarios for illustrative purposes only. The assumptions are as follows: $10/year sticker cost for all registered boats (residential and non-residential) equaling $20 paid for a two-year registration period, the percentage of boats using freshwaters will range between 5% and 15% of the total boats registered in Rhode Island under 30 feet in length (37,104 boats). These assumptions yield a projected revenue stream ranging from $18,560 (1,856 boats) to $55,656 (5,566 boats) per year. The 5% figures would translate to an assumption that 80% of lakeside homes have registered boats, a figure RIDEM believes is higher than actually exists as many properties do not maintain docks. If a Rhode Island boat sticker program is limited to motorized boats used on freshwaters, the revenues will likely be

less than $20,000 per year at a fee of $10/boat. Given the costs of aquatic invasive control, this amount is lower than desired for supporting an annual grants program or state lake management program and may not justify the costs of developing the program.

The figures above would be increased by accounting for higher fees on out-of-state boaters and extending the program to non-motorized watercraft as has been done in western states. This may also be considered more equitable given that motorized watercraft are not the only boats used on lakes and in some Rhode Island lakes motorized watercraft are prohibited. Over the last decade, RIDEM believes canoeing and kayaking have become increasingly popular in Rhode Island freshwaters in response to improvements in both water quality conditions and access. Unfortunately, RIDEM found there was no data readily available data from which to estimate the potential number of additional small non-motorized boats in use in Rhode Island freshwaters.

Capacity to Implement a Boat Sticker Program

The steps needed to implement a boat sticker program would vary with the scope of the program. If the Boat Sticker Program is integrated with boating registration, then a series of actions would be needed to develop and activate the program. As annual renewals are mailed in January of each year, any changes would need to be made by the prior September to maintain the annual schedule. In addition to potential rule-making, the process to design and execute changes would involve the design and production of stickers, changing of forms and programming changes involving the ri.gov online application for boating registration service. Additionally, RIDEM anticipates there would need to be an outreach effort to explain the program. This process would require an investment of funds not currently available in the RIDEM budget. If authorized in 2012 and funding was made available, under current procurement procedures, the program would not be able to take effect until the registration period beginning January 2014.

If the scope of the program were to include the larger universe of non-motorized boat owners, then RIDEM believes it would be necessary to develop a network of authorized agents to sell the stickers to both the owners of boats that are not required to be registered as well as out-of – state boaters. A sufficient number of outlets would be needed to ensure buying a sticker was not an inconvenience. The program may be able to build on the vendor network that sell fishing licenses but RIDEM anticipates other entities would also potentially be interested; e.g. kayak centers, etc.

Regardless of the approach or funding source selected, a financial assistance program will require a program support structure to manage and distribute funds in the form of grants. This would involve establishing the rules for distributing funds, managing a process to solicit project proposals, award and oversee use of grant funds. If funding allowed, a financial assistance program could become part of the duties carried out by a state lake management program which is discussed in the next section.

8.0 Recommendations for Strengthening Management of Lakes

Stronger management of lakes is needed in Rhode Island both to prevent further degradation of lake conditions and restore lakes currently in poor condition. Given the significant public benefits derived from lakes, it is in the public interest for the State of Rhode Island to foster more effective stewardship of its lake resources. RIDEM, as the State's natural resource agency, should continue to have a leading role in promoting sound lake management in Rhode Island. Opportunities to strengthen existing partnerships and build greater collaboration among the many parties responsible for activities that impact the quality of Rhode Island's lake resources should be pursued. The formation of Save The Lakes has been instrumental in this regard and RIDEM expects to continue to work with the organization along with the RINHS and URIWW as important partners in advancing lake management. Given our current understanding of lake conditions, it is clear that achieving effective lake management will require additional investment by the State as well as local entities responsible for managing lakes. Without such investment, water quality conditions in lakes not being actively managed would be expected to decline over time, especially with respect to invasive aquatic plants.

Rhode Island is currently the only New England state that lacks a formally organized lake management program within its state government. While acknowledging the need for such a program, current statewide budget constraints have curtailed RIDEM from seeking new funding to establish such a program. Between FY2008 and FY2012, the RIDEM workforce was reduced from 478 to 388 authorized fulltime equivalents (FTEs). During this period of reductions, RIDEM has lacked the capacity to dedicate staff on a fulltime basis to lake management concerns. If additional resources could be secured, RIDEM believes a lake management program could effectively coordinate management of pressing lake issues including aquatic invasive plants, cyanobacteria blooms, eutrophication and other water quality problems. The need for a state lakes program is reflected in state planning documents including the RI Aquatic Invasive Species Management Plan (RIAISM Plan, page 54, 80) and Bays, Rivers and Watersheds Systems Level Plan produced by the Rhode Island Bays Rivers and Watersheds Coordination Team (Table 8, page 123).

Many other states have established programs that provide a focal point for coordinating needed lake management actions. These programs typically involve monitoring, data management, outreach and education and the provision of technical assistance, with many also offering some form of financial assistance. In a few cases, states have taken on a very proactive role. Examples include New Hampshire, where the state agency prepares the lake management plans and North Carolina, where state personnel are deployed to provide free consulting to public entities pursuing lake management. All other New England states have programs and personnel dedicated to managing lakes that either include or are supplemented with aquatic invasive species management programs, e.g., Connecticut Department of Environmental Protection - Lake Water Quality Management Program (with CT Non-native Invasive Plant Species Program); Massachusetts Department of Conservation and Recreations (DCR) Lakes and Ponds Program; New Hampshire Department of Environmental Services (DES) Lakes Management and Protection Program (with Exotic Species Program, Weed Watcher Program and Boat Ramp Monitor Program), Vermont Department of Environmental Conservation (DEC) Monitoring, Assessment and Planning Program (with Aquatic Nuisance Control Program and VT Invasive Patrollers Program) and Maine Department of Environmental Protection (DEP) Lakes Program (with Invasive Aquatic Species Program).

Working within its available resources, RIDEM has found limited ways to expand activities related to aquatic invasive species and lake stewardship in an effort to be responsive to growing public concerns. This has included using a share of the less than $30,000 per year awarded by the federal government to Rhode Island, via a grant to the Rhode Island Coastal Resources Management Council (CRMC), for work related to both freshwater and marine invasive species. Various activities with which RIDEM has been involved that relate to management of aquatic invasive species are listed in Table 6. The list reflects the involvement of several divisions: Office of Water Resources, Division of Fish and Wildlife, and the Division of Agriculture chief among them. Many of the activities have been accomplished through the employment of a federally-funded seasonal employee. Many of these activities also involve working in partnership with other organizations, most notably Save The Lakes, the RINHS and URI-WW. The activities constitute partial implementation of many of the recommendations in the RIAISM Plan. In looking to the year ahead, utilizing its existing resources, RIDEM expects to continue to perform the following tasks related to lake management and aquatic invasive species:

- Implement various regulatory functions including herbicide permitting.
- Issue new regulations to restrict transport, sale and release of AIS.
- Use seasonal employee to conduct summer surveys for AIS.
- Update the state map of AIS to reflect survey results (Fall 2012).
- Provide support to URI-Watershed Watch.
- Complete a rapid response plan for zebra mussels.
- Limited public outreach activities.
- Post additional signage at public access points on lakes.
- Continue pilot program for volunteers to provide outreach at boat ramps.
- Continue to screen lakes (up to 20 samples) for cyanobacteria.

Any expansion of effort beyond these tasks will be subject to the availability of additional resources, in particular available staff time.

RIDEM remains very interested in the establishment of a lakes management program as an element of its resource management responsibilities. Such a program would allow the state to work more effectively with lake associations and other entities, including drinking water suppliers, to accelerate the management actions needed to achieve our shared goals of protecting and restoring lake conditions. Lake associations and other entities responsible for lake management would benefit from access to additional technical assistance that a dedicated lake management program could provide. As resources become available, RIDEM recommends the following actions be implemented to strengthen management of lakes in Rhode Island.

Priority Recommendations

1. **Establish a lake management program**. Provide funding to allow establishment of a lake management program within RIDEM to direct state activities associated with managing aquatic invasive species in freshwaters, fostering effective management actions to abate other lake water quality concerns including algal blooms, expanding the level of technical assistance available to lake associations and other entities responsible for local lake management and administering cost-sharing grants for AIS control actions (if available). At minimum, RIDEM estimates that 1 FTE supported by one or more seasonal employees would be required to establish a program.

2. **Establish a financial assistance program to support lake management**. Provide funds to allow establishment of a financial assistance program to provide cost-sharing grants to advance implementation of effective lake management actions. Governor Chafee has included in his budget submittal for FY13, announced on January 31, 2012, a proposal for an environmental bond issue. The proposal included additional funding for the existing Narragansett Bay and Watersheds Restoration Fund (BWRF) administered by RIDEM. This fund is currently one of the primary mechanisms by which RIDEM provides cost-sharing grants for both water quality and habitat restoration projects. The FY13 proposal includes expanding the current scope of the BWRF program to allow a portion of the funds to be dedicated to cost-sharing grants for lake management actions, including aquatic invasive plant controls. If the environmental bond proposal is approved by the legislature and subsequently the voters in November, RIDEM expects up to $200,000 would be available after July 2013.

Additional Recommended Actions to Strengthen Lake Management

In addition to the priority recommendations above, the following actions are recommended, as needed, to supplement Rhode Island's existing efforts to strengthen lake management. These recommendations are drawn from the RIAISM Plan as well as RIDEM recent experience. Implementation of most of the recommendations will require additional investment above the level of funding expected to be available at this time.

<u>Monitoring and Assessment</u>

1. Ensure current level of volunteer monitoring is maintained. Expand capacity of URI-Watershed Watch program to collect data from lakes that haven't yet been monitored or from those that have limited data currently available (URI-WW).
2. Ensure continuation of the surveillance of cyanobacteria in lakes that have previously experienced a bloom or may be vulnerable to algal blooms. Expand capacity to allow implementation of a protocol comparable to the MDPH which tracks the status of blooms through the season (RIDEM, RIDOH).
3. Expand capacity of RIDOH to allow implementation of risk-based approach to monitoring freshwater beaches (RIDOH).
4. Expand capacity to monitor for fish tissue contamination in lakes (RIDEM).
5. Train additional volunteers to identify aquatic invasive species (URI-WW, RINHS, RIDEM). Continue to promote the prompt reporting of new infestations.
6. Expand capacity for RIDEM to conduct AIS seasonal surveys to monitor for new infestations, assess lakes not yet surveyed and evaluate the effectiveness of management actions (RIDEM).
7. Collect information to better characterize how drawdown practices are being employed in RI (RIDEM).
8. Ensure herbicide applications include accurate identification of the plant species being targeted for treatment (RIDEM).
9. Conduct surveys to update the bathymetry information of lakes.

<u>AIS Prevention and Rapid Response</u>

10. Prepare rapid response plans for specific species to guide and facilitate prompt management action when new infestations are discovered (RIDEM, Partners).
11. Develop additional capacity for boat ramp inspection program (STL, RIDEM).

12. Expand public outreach and prevention efforts on lake management concerns: aquatic invasive species, algal blooms and nutrient management and cyanobacteria (RIDEM, STL, partners):
    a. Develop additional outreach materials for pet and aquarium trades.
    b. Develop additional outreach for recreational boaters.
    c. Develop outreach for water garden trade.
    d. Develop outreach for freshwater fishing industry including bait shops.
    e. Update state website regarding cyanobacteria and fish tissue contamination.
13. Establish boat washing stations at priority locations (RIDEM).

Lake Management: Planning, AIS Control and Water Quality Management

14. Develop and publish guidance on the preparation of lake management plans in RI (RIDEM).
15. Encourage formation of additional lake associations to support local lake management.
16. Expand capacity to provide technical assistance to lake associations and other local entities responsible for lake management (RIDEM, partners).
17. Develop and administer program to provide planning grants to expand the number of lakes which are being managed in accordance with a lake management plan (RIDEM).
18. Improve monitoring and reporting related to the use of aquatic herbicides in lakes to help gauge effectiveness of specific AIS control actions (RIDEM).
19. Implement best management practices identified in water quality restoration plans (TMDLs) as needed to restore water quality conditions (Municipalities, property owners, other entities).
20. Mitigate stormwater discharges associated with water quality degradation in lakes. Encourage the development of stormwater utility districts as a means to provide a stable source of funding for the needed retrofitting of stormwater infrastructure (Municipalities, State, property owners, partners).
21. Develop strategies to strengthen protection of and accelerate restoration of lake buffers including re-establishing native vegetation along degraded lake shorelines (RIDEM, partners).
22. Promote effective maintenance, repair and upgrade of on-site wastewater systems through the activities of state and local wastewater management districts and their partners (RIDEM, local wastewater programs).

Table 6. Activities Related to Aquatic Invasive Species Management in RI Freshwaters

Monitoring and Early Detection	**Organization**
Seasonal surveys of AIS in lakes	DEM- OWR
Integration of AIS documentation into ambient river monitoring	DEM-OWR
Identification of AIS in freshwater fisheries surveys	DEM-DFW
Review monitoring related to aquatic herbicide applications	DEM- Agriculture
Surveillance of 2 sites undergoing hand-pulling for water chestnut	IDEM-OWR, RINHS, WLT
Training of volunteers to identify AIS	URIWW, RINHS, DEM
Develop rapid response plan for zebra mussels	DEM-OWR,
Respond to and confirm reports of newly detected AIS	DEM-OWR, DEM-DFW, RINHS
Develop indicators for tracking invasive species	RINHS, NBEP, RIDEM and partners
Outreach and Education	
Updated state map of AIS distribution in RI	DEM-OWR, DEM-DFW
Development of fact sheets for individual AIS	DEM-OWR, DEM-DFW
Expanded website content on AIS topics	DEM- OWR, DEM-DFW, STL
Link to AIS information included on boating registration web-page	DEM-Boating Registration , DEM-OWR
AIS educational display installed in Boating Registration Office	DEM- Boating Registration, DEM-OWR
Post and distribute signage at boat ramps and public access points	DEM-DFW
Pilot Lake Host program to educate boaters at boat ramps	STL, DEM-DFW, DEM-OWR
Outreach at large lake events: fishing tournaments	DEM-DFW, DEM-OWR
Sponsored workshops on AIS topics	STL, URIWW, DEM
Planning	
Provide guidance on lake management planning	DEM-OWR, URIWW
Rapid response planning for zebra mussels	DEM-OWR, DEM-DFW, DEM-Legal
Pilot Lake Management Planning Project	DEM-OWR, DEM-DFW, NRICD, STL
Regulatory Programs	
Administer the aquatic herbicide program	DEM-Agriculture, DEM-OWR, DEM-DFW
Pre-application assistance for proposed lake management projects	DEM-OWR
Review and issuance of wetland permits for lake drawdown Practices.	DEM-OWR
Development of list of prohibited aquatic invasive plants & related rules	DEM-DFW, DEM-OWR, Partners
Management & Control Actions	
Volunteer-based hand-pulling of water chestnut. Follow-up Inspections.	RINHS, RIDEM-OWR, WLT,
Oversee chemical treatment in lakes within DEM managed properties.	DEM-Parks & Recreation
Coordination	
Co-chair and participate in the RI AIS Working Group (associated with the RIAISM Plan)	RIDEM-OWR, URIWW, RINHS, CRMC*,NBEP*, NBNERR. NBEP*, NBNERR*
Participate in New England Aquatic Nuisance Species Panel (NEANS)	RIDEM, RINHS, CRMC*, partners
Participate in the RI Invasives Species Council	RINHS, RIDEM, partners

* Participation is related primarily to marine invasive species

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* In association with the New England Interstate Water Pollution Control Commission

All photographs in the report are from RIDEM unless specifically attributed to another source.

Cover photos: Carbuncle Pond – Coventry (upper left), Wincheck Pond - Hopkinton (lower left), Belleville Pond- North Kingstown (upper right), Chapman Pond – Westerly (lower right).

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Appendix A. 2010 Water Quality Assessment Results for RI Lakes

Pursuant to procedures established by the Environmental Protection Agency (EPA), RIDEM submits a report summarizing water quality assessment information. The format used for reporting provides for five categories of assessment determinations outlined below. Based on the assessment and listing methodology (RIDEM, 2009), each lake is placed in one of the categories.

Category 1 – Attaining all designated uses and no use is threatened (waters are considered to be "fully supporting" all uses.

Category 2 – Attaining some of the designated uses; no use is threatened; and insufficient or no data and information is available to determine if the remaining uses are attained or threatened.

Category 3 – Insufficient data or no data and information are available to determine if any designated use is attained, threatened or impaired; e.g. more monitoring is needed to assess any use.

Category 4 – Impaired or threatened for one or more designated uses but does not require development of a TMDL because:

A. TMDL has been completed (and when implemented are expected to result in attainment of the water quality standard) or
B. Other pollution control requirements are reasonably expected to result in attainment of the water quality standard in the near future, or
C. Impairment is not caused by a pollutant; e.g. aquatic invasive plants.

Category 5 – Impaired or threatened for one or more designated uses by a pollutant(s) and requires a TMDL (This is the 303(d) Impaired Waters List).

The lakes in this Appendix are listed by category by major watershed basin. The basins include:

Blackstone River Basin
Coastal Waters
Moshassuck River Basin
Narragansett Basin
Pawcatuck River Basin
Pawtuxet River Basin
Ten Mile River Basin
Thames River Basin
Woonasquatucket River Basin

2010 Category 1 Lakes

Waters Fully Supporting All their Designated Uses

Pawtuxet River Basin

Oak Swamp Reservoir RI0006018L-01 Waterbody Size: 109.4 A Classification: B

Oak Swamp Reservoir. Johnston

Use Description	*Use Attainment Status*
Fish and Wildlife habitat	Fully Supporting
Fish Consumption	Fully Supporting
Primary Contact Recreation	Fully Supporting
Secondary Contact Recreation	Fully Supporting

2010 Category 2 Lakes

Waters Meeting Some of their Designated Uses (Fully Supporting) and Insufficient or no Data to Evaluate other Designated Uses (Not Assessed)

Blackstone River Basin

Wallum Lake

RI0001001L-01 Waterbody Size: 173 A Classification: AA

Wallum Lake. Burrillville

Use Description	Use Attainment Status
Fish and Wildlife habitat	Fully Supporting
Fish Consumption	Not Assessed
Primary Contact Recreation	Fully Supporting
Public Drinking Water Supply	Fully Supporting
Secondary Contact Recreation	Fully Supporting

Wilson Reservoir

RI0001002L-01 Waterbody Size: 109 A Classification: B

Wilson Reservoir. Burrillville

Use Description	Use Attainment Status
Fish and Wildlife habitat	Fully Supporting
Fish Consumption	Not Assessed
Primary Contact Recreation	Fully Supporting
Secondary Contact Recreation	Fully Supporting

Nichols Pond

RI0001002L-13 Waterbody Size: 21.0 A Classification: B

Nichols Pond. Burrillville

Use Description	Use Attainment Status
Fish and Wildlife habitat	Fully Supporting
Fish Consumption	Not Assessed
Primary Contact Recreation	Fully Supporting
Secondary Contact Recreation	Fully Supporting

Handy Pond (Upper Rochambeau Pond)

RI0001003L-04 Waterbody Size: 8.06 A Classification: B

Handy Pond (Upper Rochambeau Pond). Lincoln

Use Description	Use Attainment Status
Fish and Wildlife habitat	Fully Supporting
Fish Consumption	Not Assessed
Primary Contact Recreation	Fully Supporting
Secondary Contact Recreation	Fully Supporting

Social Pond

RI0001003L-05 Waterbody Size: 1.1 A Classification: B

Social Pond. Woonsocket

Use Description	Use Attainment Status
Fish and Wildlife habitat	Not Assessed
Fish Consumption	Not Assessed
Primary Contact Recreation	Fully Supporting
Secondary Contact Recreation	Fully Supporting

Woonsocket Reservoir #1

RI0001004L-02 Waterbody Size: 8.47 A Classification: AA

Woonsocket Reservoir #1. North Smithfield

Use Description	Use Attainment Status
Fish and Wildlife habitat	Not Assessed
Fish Consumption	Not Assessed
Primary Contact Recreation	Not Assessed
Public Drinking Water Supply	Fully Supporting
Secondary Contact Recreation	Not Assessed

Sneech Pond

RI0001005L-01 Waterbody Size: 98.8 A Classification: AA

Sneech Pond. Cumberland

Use Description	Use Attainment Status
Fish and Wildlife habitat	Not Assessed
Fish Consumption	Not Assessed
Primary Contact Recreation	Not Assessed
Public Drinking Water Supply	Fully Supporting
Secondary Contact Recreation	Not Assessed

Diamond Hill Reservoir

RI0001006L-01 Waterbody Size: 358 A Classification: AA

Diamond Hill Reservoir. Cumberland

Use Description	Use Attainment Status
Fish and Wildlife habitat	Fully Supporting
Fish Consumption	Not Assessed
Primary Contact Recreation	Fully Supporting
Public Drinking Water Supply	Not Assessed
Secondary Contact Recreation	Fully Supporting

Happy Hollow Pond

RI0001006L-03 Waterbody Size: 20.6 A Classification: AA

Happy Hollow Pond. Cumberland

Use Description	Use Attainment Status
Fish and Wildlife habitat	Fully Supporting
Fish Consumption	Not Assessed
Primary Contact Recreation	Fully Supporting
Public Drinking Water Supply	Fully Supporting
Secondary Contact Recreation	Fully Supporting

Robin Hollow Pond

RI0001006L-04 Waterbody Size: 14.7 A Classification: AA

Robin Hollow Pond. Cumberland

Use Description	*Use Attainment Status*
Fish and Wildlife habitat	Fully Supporting
Fish Consumption	Not Assessed
Primary Contact Recreation	Fully Supporting
Public Drinking Water Supply	Not Assessed
Secondary Contact Recreation	Fully Supporting

Howard Pond

RI0001006L-07 Waterbody Size: 10.4 A Classification: AA

Howard Pond. Cumberland

Use Description	*Use Attainment Status*
Fish and Wildlife habitat	Fully Supporting
Fish Consumption	Not Assessed
Primary Contact Recreation	Fully Supporting
Public Drinking Water Supply	Not Assessed
Secondary Contact Recreation	Fully Supporting

White Pond RI0010043L-05 Waterbody Size: 25.9 A Classification: A

White Pond. South Kingstown

Use Description	*Use Attainment Status*
Fish and Wildlife habitat	Fully Supporting
Fish Consumption	Not Assessed
Primary Contact Recreation	Fully Supporting
Secondary Contact Recreation	Fully Supporting

Wash Pond RI0010043L-06 Waterbody Size: 19.2 A Classification: A

Wash Pond. South Kingstown

Use Description	*Use Attainment Status*
Fish and Wildlife habitat	Fully Supporting
Fish Consumption	Not Assessed
Primary Contact Recreation	Fully Supporting
Secondary Contact Recreation	Fully Supporting

Deep Pond (Charlestown) RI0010043L-08 Waterbody Size: 14.9 A Classification: A

Deep Pond. Charlestown

Use Description	*Use Attainment Status*
Fish and Wildlife habitat	Fully Supporting
Fish Consumption	Not Assessed
Primary Contact Recreation	Fully Supporting
Secondary Contact Recreation	Fully Supporting

Schoolhouse Pond RI0010043L-09 Waterbody Size: 96.4 A Classification: A

Schoolhouse Pond. Charlestown

Use Description	*Use Attainment Status*
Fish and Wildlife habitat	Fully Supporting
Fish Consumption	Not Assessed
Primary Contact Recreation	Fully Supporting
Secondary Contact Recreation	Fully Supporting

Little Maschaug Pond RI0010043L-18 Waterbody Size: 11.7 A Classification: A

Little Maschaug Pond. Westerly

Use Description	*Use Attainment Status*
Fish and Wildlife habitat	Fully Supporting
Fish Consumption	Not Assessed
Primary Contact Recreation	Fully Supporting
Secondary Contact Recreation	Fully Supporting

Coastal Waters

Fresh Pond

RI0010046L-02 Waterbody Size: 19.7 A Classification: AA

Fresh Pond. New Shoreham

Use Description	*Use Attainment Status*
Fish and Wildlife habitat	Not Assessed
Fish Consumption	Not Assessed
Primary Contact Recreation	Not Assessed
Public Drinking Water Supply	Fully Supporting
Secondary Contact Recreation	Not Assessed

Simmons Pond

RI0010048L-03 Waterbody Size: 36.8 A Classification: A

Simmons Pond. Little Compton

Use Description	*Use Attainment Status*
Fish and Wildlife habitat	Fully Supporting
Fish Consumption	Not Assessed
Primary Contact Recreation	Fully Supporting
Secondary Contact Recreation	Fully Supporting

Narragansett Basin

North Carr Pond

RI0007036L-01 Waterbody Size: 25 A Classification: AA

North Carr Pond. Jamestown

Use Description	*Use Attainment Status*
Fish and Wildlife habitat	Not Assessed
Fish Consumption	Not Assessed
Primary Contact Recreation	Not Assessed
Public Drinking Water Supply	Fully Supporting
Secondary Contact Recreation	Not Assessed

South Watson Pond

RI0007036L-02 Waterbody Size: 4.54 A Classification: AA

South Watson Pond. Jamestown

Use Description	*Use Attainment Status*
Fish and Wildlife habitat	Not Assessed
Fish Consumption	Not Assessed
Primary Contact Recreation	Not Assessed
Public Drinking Water Supply	Fully Supporting
Secondary Contact Recreation	Not Assessed

Pawcatuck River Basin

Pasquiset Pond

RI0008039L-06 Waterbody Size: 76.6 A Classification: A

Pasquiset Pond. Charlestown

Use Description	*Use Attainment Status*
Fish and Wildlife habitat	Fully Supporting
Fish Consumption	Not Assessed
Primary Contact Recreation	Fully Supporting
Secondary Contact Recreation	Fully Supporting

Glen Rock Reservoir

RI0008039L-19 Waterbody Size: 30.3 A Classification: B

Glen Rock Reservoir. South Kingstown

Use Description	*Use Attainment Status*
Fish and Wildlife habitat	Fully Supporting
Fish Consumption	Not Assessed
Primary Contact Recreation	Fully Supporting
Secondary Contact Recreation	Fully Supporting

Wickaboxet Pond

RI0008040L-18 Waterbody Size: 39.0 A Classification: A

Wickaboxet Pond. West Greenwich

Use Description	*Use Attainment Status*
Fish and Wildlife habitat	Fully Supporting
Fish Consumption	Not Assessed
Primary Contact Recreation	Fully Supporting
Secondary Contact Recreation	Fully Supporting

Long Pond (Hopkinton)

RI0008040L-20 Waterbody Size: 20.2 A Classification: B

Long Pond. Hopkinton

Use Description	*Use Attainment Status*
Fish and Wildlife habitat	Fully Supporting
Fish Consumption	Not Assessed
Primary Contact Recreation	Fully Supporting
Secondary Contact Recreation	Fully Supporting

Carr Pond (W. Greenwich)

RI0006012L-01 Waterbody Size: 81.3 A Classification: A

Carr Pond. West Greenwich

Use Description	Use Attainment Status
Fish and Wildlife habitat	Fully Supporting
Fish Consumption	Not Assessed
Primary Contact Recreation	Fully Supporting
Secondary Contact Recreation	Fully Supporting

Regulating Reservoir

RI0006015L-01 Waterbody Size: 214 A Classification: AA

Regulating Reservoir. Scituate

Use Description	Use Attainment Status
Fish and Wildlife habitat	Fully Supporting
Fish Consumption	Not Assessed
Primary Contact Recreation	Fully Supporting
Public Drinking Water Supply	Not Assessed
Secondary Contact Recreation	Fully Supporting

Ponagansett Reservoir

RI0006015L-02 Waterbody Size: 220 A Classification: AA

Ponagansett Reservoir. Glocester

Use Description	Use Attainment Status
Fish and Wildlife habitat	Fully Supporting
Fish Consumption	Not Assessed
Primary Contact Recreation	Fully Supporting
Public Drinking Water Supply	Not Assessed
Secondary Contact Recreation	Fully Supporting

Moswansicut Pond

RI0006015L-04 Waterbody Size: 281 A Classification: AA

Moswansicut Pond. Scituate, Johnston

Use Description	Use Attainment Status
Fish and Wildlife habitat	Fully Supporting
Fish Consumption	Not Assessed
Primary Contact Recreation	Fully Supporting
Public Drinking Water Supply	Not Assessed
Secondary Contact Recreation	Fully Supporting

Scituate Reservoir

RI0006015L-07 Waterbody Size: 3280 A Classification: AA

Scituate Reservoir. Scituate

Use Description	*Use Attainment Status*
Fish and Wildlife habitat	Fully Supporting
Fish Consumption	Not Assessed
Primary Contact Recreation	Fully Supporting
Public Drinking Water Supply	Fully Supporting
Secondary Contact Recreation	Fully Supporting

King Pond

RI0006015L-10 Waterbody Size: 17.9 A Classification: AA

King Pond. Scituate

Use Description	*Use Attainment Status*
Fish and Wildlife habitat	Fully Supporting
Fish Consumption	Not Assessed
Primary Contact Recreation	Fully Supporting
Public Drinking Water Supply	Not Assessed
Secondary Contact Recreation	Fully Supporting

Lake Aldersgate

RI0006015L-13 Waterbody Size: 15.2 A Classification: AA

Lake Aldersgate. Glocester

Use Description	*Use Attainment Status*
Fish and Wildlife habitat	Not Assessed
Fish Consumption	Not Assessed
Primary Contact Recreation	Fully Supporting
Public Drinking Water Supply	Not Assessed
Secondary Contact Recreation	Fully Supporting

Randall Pond

RI0006018L-04 Waterbody Size: 34.4 A Classification: B

Randall Pond. Cranston

Use Description	*Use Attainment Status*
Fish and Wildlife habitat	Fully Supporting
Fish Consumption	Not Assessed
Primary Contact Recreation	Fully Supporting
Secondary Contact Recreation	Fully Supporting

Thames River Basin

Beach Pond

RI0005010L-01 Waterbody Size: 143 A Classification: B

Beach Pond. Exeter

Use Description	*Use Attainment Status*
Fish and Wildlife habitat	Fully Supporting
Fish Consumption	Not Assessed
Primary Contact Recreation	Fully Supporting
Secondary Contact Recreation	Fully Supporting

Waterman Pond (Sisson Pond)

RI0005011L-02 Waterbody Size: 32.3 A Classification: A

Waterman Pond (Sisson Pond). Coventry

Use Description	*Use Attainment Status*
Fish and Wildlife habitat	Fully Supporting
Fish Consumption	Not Assessed
Primary Contact Recreation	Fully Supporting
Secondary Contact Recreation	Fully Supporting

Peck Pond

RI0005047L-02 Waterbody Size: 13.4 A Classification: B

Peck Pond. Burrillville

Use Description	*Use Attainment Status*
Fish and Wildlife habitat	Not Assessed
Fish Consumption	Not Assessed
Primary Contact Recreation	Fully Supporting
Secondary Contact Recreation	Fully Supporting

Clarksville Pond

RI0005047L-08 Waterbody Size: 15.0 A Classification: B

Clarksville Pond. Glocester

Use Description	*Use Attainment Status*
Fish and Wildlife habitat	Fully Supporting
Fish Consumption	Not Assessed
Primary Contact Recreation	Not Assessed
Secondary Contact Recreation	Not Assessed

Upper Sprague Reservoir RI0002007L-05

Waterbody Size: 24.5 A Classification: B

Upper Sprague Reservoir. Smithfield

Use Description	*Use Attainment Status*
Fish and Wildlife habitat	Not Assessed
Fish Consumption	Not Assessed
Primary Contact Recreation	Fully Supporting
Secondary Contact Recreation	Fully Supporting

2010 Category 3 Lakes

Waters with Insufficient or no Data to Evaluate any Designated Uses

Blackstone River Basin

Round Top State Pond RI0001002L-12 Waterbody Size: 9.72 A Classification: A

Round Top State Pond. Burrillville

Use Description	Use Attainment Status
Fish and Wildlife habitat	Not Assessed
Fish Consumption	Not Assessed
Primary Contact Recreation	Not Assessed
Secondary Contact Recreation	Not Assessed

Cherry Valley Pond RI0001002L-14 Waterbody Size: 20.8 A Classification: B

Cherry Valley Pond. Glocester

Use Description	Use Attainment Status
Fish and Wildlife habitat	Not Assessed
Fish Consumption	Not Assessed
Primary Contact Recreation	Not Assessed
Secondary Contact Recreation	Not Assessed

Round Pond RI0001002L-15 Waterbody Size: 15.2 A Classification: B

Round Pond. Burrillville

Use Description	Use Attainment Status
Fish and Wildlife habitat	Not Assessed
Fish Consumption	Not Assessed
Primary Contact Recreation	Not Assessed
Secondary Contact Recreation	Not Assessed

Shingle Mill Pond RI0001002L-16 Waterbody Size: 12.3 A Classification: B

Shingle Mill Pond. Glocester

Use Description	Use Attainment Status
Fish and Wildlife habitat	Not Assessed
Fish Consumption	Not Assessed
Primary Contact Recreation	Not Assessed
Secondary Contact Recreation	Not Assessed

Blackstone River Basin

Trout Brook Pond

RI0001002L-17 Waterbody Size: 11.9 A Classification: B

Trout Brook Pond. North Smithfield

Use Description	*Use Attainment Status*
Fish and Wildlife habitat	Not Assessed
Fish Consumption	Not Assessed
Primary Contact Recreation	Not Assessed
Secondary Contact Recreation	Not Assessed

Lake Bel Air

RI0001002L-18 Waterbody Size: 6.77 A Classification: B

Lake Bel Air. North Smithfield

Use Description	*Use Attainment Status*
Fish and Wildlife habitat	Not Assessed
Fish Consumption	Not Assessed
Primary Contact Recreation	Not Assessed
Secondary Contact Recreation	Not Assessed

Todd's Pond

RI0001003L-03 Waterbody Size: 12.7 A Classification: A

Todd's Pond. North Smithfield

Use Description	*Use Attainment Status*
Fish and Wildlife habitat	Not Assessed
Fish Consumption	Not Assessed
Primary Contact Recreation	Not Assessed
Secondary Contact Recreation	Not Assessed

Woonsocket Reservoir #3

RI0001004L-01 Waterbody Size: 251 A Classification: AA

Woonsocket Reservoir #3. North Smithfield, Smithfield

Use Description	*Use Attainment Status*
Fish and Wildlife habitat	Not Assessed
Fish Consumption	Not Assessed
Primary Contact Recreation	Not Assessed
Public Drinking Water Supply	Not Assessed
Secondary Contact Recreation	Not Assessed

Woonsocket Reservoir #2

RI0001004L-03 Waterbody Size: 2.25 A Classification: AA

Woonsocket Reservoir #2. North Smithfield

Use Description	*Use Attainment Status*
Fish and Wildlife habitat	Not Assessed
Fish Consumption	Not Assessed
Primary Contact Recreation	Not Assessed
Public Drinking Water Supply	Not Assessed
Secondary Contact Recreation	Not Assessed

Blackstone River Basin

Laporte's Pond

RI0001004L-04 Waterbody Size: 4.56 A Classification: A

Laporte's Pond. Lincoln

Use Description	*Use Attainment Status*
Fish and Wildlife habitat	Not Assessed
Fish Consumption	Not Assessed
Primary Contact Recreation	Not Assessed
Secondary Contact Recreation	Not Assessed

Arnold Mills Reservoir (Pawtucket Reservoir)

RI0001006L-02 Waterbody Size: 252 A Classification: AA

Arnold Mills Reservoir (Pawtucket Reservoir). Cumberland

Use Description	*Use Attainment Status*
Fish and Wildlife habitat	Not Assessed
Fish Consumption	Not Assessed
Primary Contact Recreation	Not Assessed
Public Drinking Water Supply	Not Assessed
Secondary Contact Recreation	Not Assessed

Miscoe Lake

RI0001006L-05 Waterbody Size: 40.4 A Classification: AA

Miscoe Lake. Cumberland

Use Description	*Use Attainment Status*
Fish and Wildlife habitat	Not Assessed
Fish Consumption	Not Assessed
Primary Contact Recreation	Not Assessed
Public Drinking Water Supply	Not Assessed
Secondary Contact Recreation	Not Assessed

Rawson Pond

RI0001006L-06 Waterbody Size: 31.2 A Classification: AA

Rawson Pond. Cumberland

Use Description	*Use Attainment Status*
Fish and Wildlife habitat	Not Assessed
Fish Consumption	Not Assessed
Primary Contact Recreation	Not Assessed
Public Drinking Water Supply	Not Assessed
Secondary Contact Recreation	Not Assessed

Blackstone River Basin

Carls Pond

RI0001006L-08 Waterbody Size: 6.90 A Classification: A

Carls Pond. Cumberland

Use Description	*Use Attainment Status*
Fish and Wildlife habitat	Not Assessed
Fish Consumption	Not Assessed
Primary Contact Recreation	Not Assessed
Secondary Contact Recreation	Not Assessed

Little Pond (Cumberland)

RI0001006L-09 Waterbody Size: 9.7 A Classification: AA

Little Pond. Cumberland

Use Description	*Use Attainment Status*
Fish and Wildlife habitat	Not Assessed
Fish Consumption	Not Assessed
Primary Contact Recreation	Not Assessed
Public Drinking Water Supply	Not Assessed
Secondary Contact Recreation	Not Assessed

Coastal Waters

Creamer Pond

RI0010031L-01 Waterbody Size: 9.02 A Classification: A

Creamer Pond. Tiverton

Use Description	*Use Attainment Status*
Fish and Wildlife habitat	Not Assessed
Fish Consumption	Not Assessed
Primary Contact Recreation	Not Assessed
Secondary Contact Recreation	Not Assessed

Lake Conochet/Little Neck Pond

RI0010042L-01 Waterbody Size: 13.5 A Classification: A

Lake Conochet/Little Neck Pond. Narragansett

Use Description	*Use Attainment Status*
Fish and Wildlife habitat	Not Assessed
Fish Consumption	Not Assessed
Primary Contact Recreation	Not Assessed
Secondary Contact Recreation	Not Assessed

Hothouse Pond

RI0010043L-01 Waterbody Size: 12.4 A Classification: A

Hothouse Pond. South Kingstown

Use Description	*Use Attainment Status*
Fish and Wildlife habitat	Not Assessed
Fish Consumption	Not Assessed
Primary Contact Recreation	Not Assessed
Secondary Contact Recreation	Not Assessed

Cedar Swamp Pond (South Kingstown)

RI0010043L-02 Waterbody Size: 10.1 A Classification: A

Cedar Swamp Pond. South Kingstown

Use Description	*Use Attainment Status*
Fish and Wildlife habitat	Not Assessed
Fish Consumption	Not Assessed
Primary Contact Recreation	Not Assessed
Secondary Contact Recreation	Not Assessed

Factory Pond

RI0010043L-03 Waterbody Size: 29.6 A Classification: A

Factory Pond. South Kingstown

Use Description	*Use Attainment Status*
Fish and Wildlife habitat	Not Assessed
Fish Consumption	Not Assessed
Primary Contact Recreation	Not Assessed
Secondary Contact Recreation	Not Assessed

Coastal Waters

Cross Mills Pond

RI0010043L-04 Waterbody Size: 17.1 A Classification: A

Cross Mills Pond. Charlestown

Use Description	*Use Attainment Status*
Fish and Wildlife habitat	Not Assessed
Fish Consumption	Not Assessed
Primary Contact Recreation	Not Assessed
Secondary Contact Recreation	Not Assessed

King Tom Pond

RI0010043L-11 Waterbody Size: 9.45 A Classification: A

King Tom Pond. Charlestown

Use Description	*Use Attainment Status*
Fish and Wildlife habitat	Not Assessed
Fish Consumption	Not Assessed
Primary Contact Recreation	Not Assessed
Secondary Contact Recreation	Not Assessed

Fresh Pond

RI0010043L-12 Waterbody Size: 12.8 A Classification: A

Fresh Pond. South Kingstown

Use Description	*Use Attainment Status*
Fish and Wildlife habitat	Not Assessed
Fish Consumption	Not Assessed
Primary Contact Recreation	Not Assessed
Secondary Contact Recreation	Not Assessed

Mill Pond

RI0010043L-13 Waterbody Size: 8.39 A Classification: A

Mill Pond. South Kingstown

Use Description	*Use Attainment Status*
Fish and Wildlife habitat	Not Assessed
Fish Consumption	Not Assessed
Primary Contact Recreation	Not Assessed
Secondary Contact Recreation	Not Assessed

Bull Head Pond

RI0010043L-14 Waterbody Size: 7.99 A Classification: A

Bull Head Pond. South Kingstown

Use Description	*Use Attainment Status*
Fish and Wildlife habitat	Not Assessed
Fish Consumption	Not Assessed
Primary Contact Recreation	Not Assessed
Secondary Contact Recreation	Not Assessed

Coastal Waters

Perry Pond

RI0010043L-15 Waterbody Size: 5.56 A Classification: A

Perry Pond. Charlestown

Use Description	*Use Attainment Status*
Fish and Wildlife habitat	Not Assessed
Fish Consumption	Not Assessed
Primary Contact Recreation	Not Assessed
Secondary Contact Recreation	Not Assessed

Garden Pond

RI0010043L-16 Waterbody Size: 5.89 A Classification: A

Garden Pond. Charlestown

Use Description	*Use Attainment Status*
Fish and Wildlife habitat	Not Assessed
Fish Consumption	Not Assessed
Primary Contact Recreation	Not Assessed
Secondary Contact Recreation	Not Assessed

West Pond

RI0010043L-17 Waterbody Size: 12.4 A Classification: A

West Pond. Charlestown

Use Description	*Use Attainment Status*
Fish and Wildlife habitat	Not Assessed
Fish Consumption	Not Assessed
Primary Contact Recreation	Not Assessed
Secondary Contact Recreation	Not Assessed

Sprague Pond

RI0010044L-04 Waterbody Size: 6.33 A Classification: A

Sprague Pond. Narragansett

Use Description	*Use Attainment Status*
Fish and Wildlife habitat	Not Assessed
Fish Consumption	Not Assessed
Primary Contact Recreation	Not Assessed
Secondary Contact Recreation	Not Assessed

Peace Dale Reservoir

RI0010045L-03 Waterbody Size: 11.7 A Classification: B

Peace Dale Reservoir. South Kingstown

Use Description	*Use Attainment Status*
Fish and Wildlife habitat	Not Assessed
Fish Consumption	Not Assessed
Primary Contact Recreation	Not Assessed
Secondary Contact Recreation	Not Assessed

Coastal Waters

Sachem Pond

RI0010046L-03 Waterbody Size: 79.9 A Classification: A

Sachem Pond. New Shoreham

Use Description	*Use Attainment Status*
Fish and Wildlife habitat	Not Assessed
Fish Consumption	Not Assessed
Primary Contact Recreation	Not Assessed
Secondary Contact Recreation	Not Assessed

Middle Pond

RI0010046L-04 Waterbody Size: 16 A Classification: A

Middle Pond. New Shoreham

Use Description	*Use Attainment Status*
Fish and Wildlife habitat	Not Assessed
Fish Consumption	Not Assessed
Primary Contact Recreation	Not Assessed
Secondary Contact Recreation	Not Assessed

Clayhead Swamp

RI0010046L-05 Waterbody Size: 6.60 A Classification: A

Clayhead Swamp. New Shoreham

Use Description	*Use Attainment Status*
Fish and Wildlife habitat	Not Assessed
Fish Consumption	Not Assessed
Primary Contact Recreation	Not Assessed
Secondary Contact Recreation	Not Assessed

Peckham Pond

RI0010046L-06 Waterbody Size: 5.15 A Classification: A

Peckham Pond. New Shoreham

Use Description	*Use Attainment Status*
Fish and Wildlife habitat	Not Assessed
Fish Consumption	Not Assessed
Primary Contact Recreation	Not Assessed
Secondary Contact Recreation	Not Assessed

Long Pond (Little Compton)

RI0010048L-01 Waterbody Size: 40.9 A Classification: A

Long Pond. Little Compton

Use Description	*Use Attainment Status*
Fish and Wildlife habitat	Not Assessed
Fish Consumption	Not Assessed
Primary Contact Recreation	Not Assessed
Secondary Contact Recreation	Not Assessed

Coastal Waters

Tunipus Pond

RI0010048L-04 Waterbody Size: 48.2 A Classification: A

Tunipus Pond. Little Compton

Use Description	*Use Attainment Status*
Fish and Wildlife habitat	Not Assessed
Fish Consumption	Not Assessed
Primary Contact Recreation	Not Assessed
Secondary Contact Recreation	Not Assessed

Canada Pond

RI0003008L-04 Waterbody Size: 17.6 A Classification: B

Canada Pond. North Providence, Providence

Use Description	*Use Attainment Status*
Fish and Wildlife habitat	Not Assessed
Fish Consumption	Not Assessed
Primary Contact Recreation	Not Assessed
Secondary Contact Recreation	Not Assessed

Narragansett Basin

Posnegansett Pond

RI0007020L-04 Waterbody Size: 13.3 A Classification: A

Posnegansett Pond. Warwick

Use Description	*Use Attainment Status*
Fish and Wildlife habitat	Not Assessed
Fish Consumption	Not Assessed
Primary Contact Recreation	Not Assessed
Secondary Contact Recreation	Not Assessed

Spring Green Pond

RI0007024L-03 Waterbody Size: 8.6 A Classification: B

Spring Green Pond. Warwick

Use Description	*Use Attainment Status*
Fish and Wildlife habitat	Not Assessed
Fish Consumption	Not Assessed
Primary Contact Recreation	Not Assessed
Secondary Contact Recreation	Not Assessed

Mill Pond

RI0007026L-01 Waterbody Size: 16.2 A Classification: A

Mill Pond. Bristol

Use Description	*Use Attainment Status*
Fish and Wildlife habitat	Not Assessed
Fish Consumption	Not Assessed
Primary Contact Recreation	Not Assessed
Secondary Contact Recreation	Not Assessed

Annaquatucket Mill Pond

RI0007027L-01 Waterbody Size: 6.30 A Classification: B

Annaquatucket Mill Pond. North Kingstown

Use Description	*Use Attainment Status*
Fish and Wildlife habitat	Not Assessed
Fish Consumption	Not Assessed
Primary Contact Recreation	Not Assessed
Secondary Contact Recreation	Not Assessed

Kettle Hole Pond

RI0007027L-04 Waterbody Size: 7.88 A Classification: B

Kettle Hole Pond. North Kingstown

Use Description	*Use Attainment Status*
Fish and Wildlife habitat	Not Assessed
Fish Consumption	Not Assessed
Primary Contact Recreation	Not Assessed
Secondary Contact Recreation	Not Assessed

Narragansett Basin

Davol Pond

RI0007027L-05 Waterbody Size: 15.8 A Classification: A

Davol Pond. North Kingstown

Use Description	*Use Attainment Status*
Fish and Wildlife habitat	Not Assessed
Fish Consumption	Not Assessed
Primary Contact Recreation	Not Assessed
Secondary Contact Recreation	Not Assessed

Frys Pond

RI0007027L-06 Waterbody Size: 6.8 A Classification: A

Frys Pond. North Kingstown

Use Description	*Use Attainment Status*
Fish and Wildlife habitat	Not Assessed
Fish Consumption	Not Assessed
Primary Contact Recreation	Not Assessed
Secondary Contact Recreation	Not Assessed

South Easton Pond

RI0007035L-04 Waterbody Size: 132 A Classification: AA

South Easton Pond. Middletown, Newport

Use Description	*Use Attainment Status*
Fish and Wildlife habitat	Not Assessed
Fish Consumption	Not Assessed
Primary Contact Recreation	Not Assessed
Public Drinking Water Supply	Insufficient Information
Secondary Contact Recreation	Not Assessed

Watson Reservoir

RI0007035L-07 Waterbody Size: 371 A Classification: AA

Watson Reservoir. Little Compton

Use Description	*Use Attainment Status*
Fish and Wildlife habitat	Not Assessed
Fish Consumption	Not Assessed
Primary Contact Recreation	Not Assessed
Public Drinking Water Supply	Insufficient Information
Secondary Contact Recreation	Not Assessed

Nonquit Pond

RI0007035L-08 Waterbody Size: 196 A Classification: AA

Nonquit Pond. Tiverton

Use Description	*Use Attainment Status*
Fish and Wildlife habitat	Not Assessed
Fish Consumption	Not Assessed
Primary Contact Recreation	Not Assessed
Public Drinking Water Supply	Insufficient Information
Secondary Contact Recreation	Not Assessed

Pawcatuck River Basin

Yawgoo Mill Pond

RI0008039L-16 Waterbody Size: 16.4 A Classification: A

Yawgoo Mill Pond. Exeter

Use Description	*Use Attainment Status*
Fish and Wildlife habitat	Not Assessed
Fish Consumption	Not Assessed
Primary Contact Recreation	Not Assessed
Secondary Contact Recreation	Not Assessed

James Pond

RI0008039L-20 Waterbody Size: 23.7 A Classification: A

James Pond. Exeter

Use Description	*Use Attainment Status*
Fish and Wildlife habitat	Not Assessed
Fish Consumption	Not Assessed
Primary Contact Recreation	Not Assessed
Secondary Contact Recreation	Not Assessed

Maple Lake

RI0008039L-22 Waterbody Size: 14.4 A Classification: A

Maple Lake. Charlestown

Use Description	*Use Attainment Status*
Fish and Wildlife habitat	Not Assessed
Fish Consumption	Not Assessed
Primary Contact Recreation	Not Assessed
Secondary Contact Recreation	Not Assessed

Grass Pond

RI0008039L-23 Waterbody Size: 8.26 A Classification: A

Grass Pond. Richmond

Use Description	*Use Attainment Status*
Fish and Wildlife habitat	Not Assessed
Fish Consumption	Not Assessed
Primary Contact Recreation	Not Assessed
Secondary Contact Recreation	Not Assessed

Saw Mill Pond

RI0008039L-24 Waterbody Size: 7.97 A Classification: B

Saw Mill Pond. Charlestown

Use Description	*Use Attainment Status*
Fish and Wildlife habitat	Not Assessed
Fish Consumption	Not Assessed
Primary Contact Recreation	Not Assessed
Secondary Contact Recreation	Not Assessed

Pawcatuck River Basin

Dawley Pond

RI0008039L-25 Waterbody Size: 9.65 A Classification: A

Dawley Pond. Exeter

Use Description	Use Attainment Status
Fish and Wildlife habitat	Not Assessed
Fish Consumption	Not Assessed
Primary Contact Recreation	Not Assessed
Secondary Contact Recreation	Not Assessed

Blue Pond

RI0008040L-03 Waterbody Size: 93.9 A Classification: B

Blue Pond. Hopkinton

Use Description	Use Attainment Status
Fish and Wildlife habitat	Not Assessed
Fish Consumption	Not Assessed
Primary Contact Recreation	Not Assessed
Secondary Contact Recreation	Not Assessed

Ell Pond

RI0008040L-05 Waterbody Size: 4.9 A Classification: B

Ell Pond. Hopkinton

Use Description	Use Attainment Status
Fish and Wildlife habitat	Not Assessed
Fish Consumption	Not Assessed
Primary Contact Recreation	Not Assessed
Secondary Contact Recreation	Not Assessed

Grassy Pond

RI0008040L-08 Waterbody Size: 22.6 A Classification: A

Grassy Pond. Hopkinton

Use Description	Use Attainment Status
Fish and Wildlife habitat	Not Assessed
Fish Consumption	Not Assessed
Primary Contact Recreation	Not Assessed
Secondary Contact Recreation	Not Assessed

Moscow Pond

RI0008040L-09 Waterbody Size: 16.5 A Classification: B

Moscow Pond. Hopkinton

Use Description	Use Attainment Status
Fish and Wildlife habitat	Not Assessed
Fish Consumption	Not Assessed
Primary Contact Recreation	Not Assessed
Secondary Contact Recreation	Not Assessed

Pawcatuck River Basin

Tippencansett Pond

RI0008040L-17 Waterbody Size: 57.9 A Classification: A

Tippencansett Pond. West Greenwich

Use Description	*Use Attainment Status*
Fish and Wildlife habitat	Not Assessed
Fish Consumption	Not Assessed
Primary Contact Recreation	Not Assessed
Secondary Contact Recreation	Not Assessed

Tillinghast Pond

RI0008040L-19 Waterbody Size: 40.7 A Classification: A

Tillinghast Pond. West Greenwich

Use Description	*Use Attainment Status*
Fish and Wildlife habitat	Not Assessed
Fish Consumption	Not Assessed
Primary Contact Recreation	Not Assessed
Secondary Contact Recreation	Not Assessed

Hazard Pond

RI0008040L-21 Waterbody Size: 16 A Classification: A

Hazard Pond. West Greenwich

Use Description	*Use Attainment Status*
Fish and Wildlife habitat	Not Assessed
Fish Consumption	Not Assessed
Primary Contact Recreation	Not Assessed
Secondary Contact Recreation	Not Assessed

Frying Pan Pond

RI0008040L-22 Waterbody Size: 16.5 A Classification: B

Frying Pan Pond. Richmond, Hopkinton

Use Description	*Use Attainment Status*
Fish and Wildlife habitat	Not Assessed
Fish Consumption	Not Assessed
Primary Contact Recreation	Not Assessed
Secondary Contact Recreation	Not Assessed

Canob Pond

RI0008040L-23 Waterbody Size: 12.9 A Classification: B

Canob Pond. Richmond

Use Description	*Use Attainment Status*
Fish and Wildlife habitat	Not Assessed
Fish Consumption	Not Assessed
Primary Contact Recreation	Not Assessed
Secondary Contact Recreation	Not Assessed

Pawtuxet River Basin

Milbrook Pond

RI0006012L-03 Waterbody Size: 21.7 A Classification: A

Milbrook Pond. Exeter

Use Description	*Use Attainment Status*
Fish and Wildlife habitat	Not Assessed
Fish Consumption	Not Assessed
Primary Contact Recreation	Not Assessed
Secondary Contact Recreation	Not Assessed

Capwell Mill Pond

RI0006012L-04 Waterbody Size: 23.9 A Classification: A

Capwell Mill Pond. West Greenwich

Use Description	*Use Attainment Status*
Fish and Wildlife habitat	Not Assessed
Fish Consumption	Not Assessed
Primary Contact Recreation	Not Assessed
Secondary Contact Recreation	Not Assessed

Carr Pond (Coventry)

RI0006013L-13 Waterbody Size: 10.2 A Classification: B

Carr Pond. Coventry

Use Description	*Use Attainment Status*
Fish and Wildlife habitat	Not Assessed
Fish Consumption	Not Assessed
Primary Contact Recreation	Not Assessed
Secondary Contact Recreation	Not Assessed

Hall Pond

RI0006013L-14 Waterbody Size: 33.5 A Classification: B

Hall Pond. Coventry

Use Description	*Use Attainment Status*
Fish and Wildlife habitat	Not Assessed
Fish Consumption	Not Assessed
Primary Contact Recreation	Not Assessed
Secondary Contact Recreation	Not Assessed

Matteson Pond

RI0006014L-05 Waterbody Size: 12.2 A Classification: B

Matteson Pond. West Warwick

Use Description	*Use Attainment Status*
Fish and Wildlife habitat	Not Assessed
Fish Consumption	Not Assessed
Primary Contact Recreation	Not Assessed
Secondary Contact Recreation	Not Assessed

Pawtuxet River Basin

Middle Dam Pond

RI0006014L-06 Waterbody Size: 7.41 A Classification: B

Middle Dam Pond. Coventry

Use Description	Use Attainment Status
Fish and Wildlife habitat	Not Assessed
Fish Consumption	Not Assessed
Primary Contact Recreation	Not Assessed
Secondary Contact Recreation	Not Assessed

Huron Pond

RI0006014L-07 Waterbody Size: 7.6 A Classification: B

Huron Pond. Coventry

Use Description	Use Attainment Status
Fish and Wildlife habitat	Not Assessed
Fish Consumption	Not Assessed
Primary Contact Recreation	Not Assessed
Secondary Contact Recreation	Not Assessed

Phelps Pond

RI0006014L-08 Waterbody Size: 5.41 A Classification: B

Phelps Pond. West Greenwich

Use Description	Use Attainment Status
Fish and Wildlife habitat	Not Assessed
Fish Consumption	Not Assessed
Primary Contact Recreation	Not Assessed
Secondary Contact Recreation	Not Assessed

Westconnaug Reservoir

RI0006015L-03 Waterbody Size: 184 A Classification: AA

Westconnaug Reservoir. Foster, Scituate

Use Description	Use Attainment Status
Fish and Wildlife habitat	Not Assessed
Fish Consumption	Not Assessed
Primary Contact Recreation	Not Assessed
Public Drinking Water Supply	Not Assessed
Secondary Contact Recreation	Not Assessed

Shippee Saw Mill Pond

RI0006015L-05 Waterbody Size: 8.19 A Classification: AA

Shippee Saw Mill Pond. Foster

Use Description	Use Attainment Status
Fish and Wildlife habitat	Not Assessed
Fish Consumption	Not Assessed
Primary Contact Recreation	Not Assessed
Public Drinking Water Supply	Not Assessed
Secondary Contact Recreation	Not Assessed

Pawtuxet River Basin

Barden Reservoir

RI0006015L-06 Waterbody Size: 247 A Classification: AA

Barden Reservoir. Foster, Scituate

Use Description	*Use Attainment Status*
Fish and Wildlife habitat	Not Assessed
Fish Consumption	Not Assessed
Primary Contact Recreation	Not Assessed
Public Drinking Water Supply	Not Assessed
Secondary Contact Recreation	Not Assessed

Coomer's Lake

RI0006015L-08 Waterbody Size: 15.5 A Classification: AA

Coomer's Lake. Glocester

Use Description	*Use Attainment Status*
Fish and Wildlife habitat	Not Assessed
Fish Consumption	Not Assessed
Primary Contact Recreation	Not Assessed
Public Drinking Water Supply	Not Assessed
Secondary Contact Recreation	Not Assessed

Brush Meadow Pond

RI0006015L-09 Waterbody Size: 10.3 A Classification: AA

Brush Meadow Pond. Foster, Scituate

Use Description	*Use Attainment Status*
Fish and Wildlife habitat	Not Assessed
Fish Consumption	Not Assessed
Primary Contact Recreation	Not Assessed
Public Drinking Water Supply	Not Assessed
Secondary Contact Recreation	Not Assessed

Pine Swamp Pond

RI0006015L-11 Waterbody Size: 37 A Classification: AA

Pine Swamp Pond. Scituate

Use Description	*Use Attainment Status*
Fish and Wildlife habitat	Not Assessed
Fish Consumption	Not Assessed
Primary Contact Recreation	Not Assessed
Public Drinking Water Supply	Not Assessed
Secondary Contact Recreation	Not Assessed

Pawtuxet River Basin

Betty Pond

RI0006015L-12 Waterbody Size: 24.0 A Classification: AA

Betty Pond. Scituate

Use Description	*Use Attainment Status*
Fish and Wildlife habitat	Not Assessed
Fish Consumption	Not Assessed
Primary Contact Recreation	Not Assessed
Public Drinking Water Supply	Not Assessed
Secondary Contact Recreation	Not Assessed

Kimball Reservoir

RI0006015L-14 Waterbody Size: 27.9 A Classification: AA

Kimball Reservoir. Johnston

Use Description	*Use Attainment Status*
Fish and Wildlife habitat	Not Assessed
Fish Consumption	Not Assessed
Primary Contact Recreation	Not Assessed
Public Drinking Water Supply	Not Assessed
Secondary Contact Recreation	Not Assessed

Black Rock Reservoir

RI0006016L-01 Waterbody Size: 21.9 A Classification: B

Black Rock Reservoir. Coventry

Use Description	*Use Attainment Status*
Fish and Wildlife habitat	Not Assessed
Fish Consumption	Not Assessed
Primary Contact Recreation	Not Assessed
Secondary Contact Recreation	Not Assessed

Fones Pond

RI0006016L-03 Waterbody Size: 6.33 A Classification: B

Fones Pond. Coventry

Use Description	*Use Attainment Status*
Fish and Wildlife habitat	Not Assessed
Fish Consumption	Not Assessed
Primary Contact Recreation	Not Assessed
Secondary Contact Recreation	Not Assessed

Meshanticut Pond

RI0006017L-01 Waterbody Size: 12.3 A Classification: B

Meshanticut Pond. Cranston

Use Description	*Use Attainment Status*
Fish and Wildlife habitat	Not Assessed
Fish Consumption	Not Assessed
Primary Contact Recreation	Not Assessed
Secondary Contact Recreation	Not Assessed

Pawtuxet River Basin

Tongue Pond

RI0006017L-10 Waterbody Size: 5.44 A Classification: B

Tongue Pond. Cranston

Use Description	*Use Attainment Status*
Fish and Wildlife habitat	Not Assessed
Fish Consumption	Not Assessed
Primary Contact Recreation	Not Assessed
Secondary Contact Recreation	Not Assessed

Almy Reservoir

RI0006018L-02 Waterbody Size: 52.9 A Classification: B

Almy Reservoir. Johnston

Use Description	*Use Attainment Status*
Fish and Wildlife habitat	Not Assessed
Fish Consumption	Not Assessed
Primary Contact Recreation	Not Assessed
Secondary Contact Recreation	Not Assessed

Dyer Pond

RI0006018L-07 Waterbody Size: 6.98 A Classification: B

Dyer Pond. Cranston

Use Description	*Use Attainment Status*
Fish and Wildlife habitat	Not Assessed
Fish Consumption	Not Assessed
Primary Contact Recreation	Not Assessed
Secondary Contact Recreation	Not Assessed

Stone Pond

RI0006018L-08 Waterbody Size: 6.14 A Classification: B

Stone Pond. Cranston

Use Description	*Use Attainment Status*
Fish and Wildlife habitat	Not Assessed
Fish Consumption	Not Assessed
Primary Contact Recreation	Not Assessed
Secondary Contact Recreation	Not Assessed

Thames River Basin

Whitford Pond

RI0005011L-04 Waterbody Size: 38.3 A Classification: A

Whitford Pond. Coventry

Use Description	*Use Attainment Status*
Fish and Wildlife habitat	Not Assessed
Fish Consumption	Not Assessed
Primary Contact Recreation	Not Assessed
Secondary Contact Recreation	Not Assessed

Great Grass Pond

RI0005011L-05 Waterbody Size: 50.8 A Classification: A

Great Grass Pond. Coventry, West Greenwich

Use Description	*Use Attainment Status*
Fish and Wildlife habitat	Not Assessed
Fish Consumption	Not Assessed
Primary Contact Recreation	Not Assessed
Secondary Contact Recreation	Not Assessed

Clark Pond

RI0005011L-06 Waterbody Size: 20.4 A Classification: A

Clark Pond. Foster

Use Description	*Use Attainment Status*
Fish and Wildlife habitat	Not Assessed
Fish Consumption	Not Assessed
Primary Contact Recreation	Not Assessed
Secondary Contact Recreation	Not Assessed

Briggs Pond

RI0005011L-07 Waterbody Size: 10.6 A Classification: A

Briggs Pond. Coventry

Use Description	*Use Attainment Status*
Fish and Wildlife habitat	Not Assessed
Fish Consumption	Not Assessed
Primary Contact Recreation	Not Assessed
Secondary Contact Recreation	Not Assessed

Koszela Pond

RI0005011L-08 Waterbody Size: 6.24 A Classification: A

Koszela Pond. Coventry

Use Description	*Use Attainment Status*
Fish and Wildlife habitat	Not Assessed
Fish Consumption	Not Assessed
Primary Contact Recreation	Not Assessed
Secondary Contact Recreation	Not Assessed

Thames River Basin

Little Grass Pond

RI0005011L-09 Waterbody Size: 8.21 A Classification: A

Little Grass Pond. Coventry

Use Description	*Use Attainment Status*
Fish and Wildlife habitat	Not Assessed
Fish Consumption	Not Assessed
Primary Contact Recreation	Not Assessed
Secondary Contact Recreation	Not Assessed

Cedar Swamp Pond

RI0005047L-05 Waterbody Size: 7.78 A Classification: B

Cedar Swamp Pond. Burrillville

Use Description	*Use Attainment Status*
Fish and Wildlife habitat	Not Assessed
Fish Consumption	Not Assessed
Primary Contact Recreation	Not Assessed
Secondary Contact Recreation	Not Assessed

Killingly Pond

RI0005047L-07 Waterbody Size: 46.9 A Classification: B

Killingly Pond. Glocester

Use Description	*Use Attainment Status*
Fish and Wildlife habitat	Not Assessed
Fish Consumption	Not Assessed
Primary Contact Recreation	Not Assessed
Secondary Contact Recreation	Not Assessed

Hawkins Pond

RI0005047L-09 Waterbody Size: 11.3 A Classification: B

Hawkins Pond. Glocester

Use Description	*Use Attainment Status*
Fish and Wildlife habitat	Not Assessed
Fish Consumption	Not Assessed
Primary Contact Recreation	Not Assessed
Secondary Contact Recreation	Not Assessed

Wilbur Pond

RI0005047L-10 Waterbody Size: 22.8 A Classification: B

Wilbur Pond. Burrillville

Use Description	*Use Attainment Status*
Fish and Wildlife habitat	Not Assessed
Fish Consumption	Not Assessed
Primary Contact Recreation	Not Assessed
Secondary Contact Recreation	Not Assessed

Woonasquatucket River Basin

Stillwater Pond

RI0002007L-07 Waterbody Size: 15.0 A Classification: B

Stillwater Pond. Smithfield

Use Description	*Use Attainment Status*
Fish and Wildlife habitat	Not Assessed
Fish Consumption	Not Assessed
Primary Contact Recreation	Not Assessed
Secondary Contact Recreation	Not Assessed

Harris Pond

RI0002007L-09 Waterbody Size: 10.1 A Classification: B

Harris Pond. Smithfield

Use Description	*Use Attainment Status*
Fish and Wildlife habitat	Not Assessed
Fish Consumption	Not Assessed
Primary Contact Recreation	Not Assessed
Secondary Contact Recreation	Not Assessed

Mountaindale Reservoir

RI0002007L-10 Waterbody Size: 10.4 A Classification: B

Mountaindale Reservoir. Smithfield

Use Description	*Use Attainment Status*
Fish and Wildlife habitat	Not Assessed
Fish Consumption	Not Assessed
Primary Contact Recreation	Not Assessed
Secondary Contact Recreation	Not Assessed

2010 Category 4A Lakes

Waters for which a TMDL has been Approved

Coastal Waters

Indian Lake

RI0010045L-04 Waterbody Size: 260 A Classification: B

Indian Lake. South Kingstown

Use Description	Use Attainment Status	Cause/Impairment	TMDL Approval Date	Comment
Fish and Wildlife habitat	Fully Supporting			
Fish Consumption	Not Supporting	Mercury in Fish Tissue	12/20/2007	
Primary Contact Recreation	Fully Supporting			
Secondary Contact Recreation	Fully Supporting			

Sands Pond

RI0010046L-01 Waterbody Size: 13 A Classification: AA

Sands Pond. New Shoreham

Use Description	Use Attainment Status	Cause/Impairment	TMDL Approval Date	Comment
Fish and Wildlife habitat	Not Supporting	Phosphorus (Total)	6/2/2008	
		Turbidity	6/2/2008	
		Excess Algal Growth	6/2/2008	
		Chlorophyll-a	6/2/2008	
Fish Consumption	Not Assessed			
Primary Contact Recreation	Not Assessed			
Public Drinking Water Supply	Not Supporting	Phosphorus (Total)	6/2/2008	
		Turbidity	6/2/2008	
		Chlorophyll-a	6/2/2008	
		Excess Algal Growth	6/2/2008	
Secondary Contact Recreation	Not Assessed			

Coastal Waters

Almy Pond

RI0010047L-01 Waterbody Size: 50 A Classification: A

Almy Pond. Newport

Use Description	Use Attainment Status	Cause/Impairment	TMDL Approval Date	Comment
Fish and Wildlife habitat	Not Supporting	Phosphorus (Total)	9/27/2007	
Fish Consumption	Not Assessed			
Primary Contact Recreation	Fully Supporting			
Secondary Contact Recreation	Fully Supporting			

Narragansett Basin

Brickyard Pond

RI0007020L-02 Waterbody Size: 84 A Classification: B

Brickyard Pond. Barrington

Use Description	Use Attainment Status	Cause/Impairment	TMDL Approval Date	Comment
Fish and Wildlife habitat	Not Supporting	Oxygen, Dissolved	9/27/2007	
		Phosphorus (Total)	9/27/2007	
		Non-Native Aquatic Plants		No TMDL required. Impairment is not a pollutant.
Fish Consumption	Not Assessed			
Primary Contact Recreation	Fully Supporting			
Secondary Contact Recreation	Fully Supporting			

Warwick Pond

RI0007024L-02 Waterbody Size: 85 A Classification: B

Warwick Pond. Warwick

Use Description	Use Attainment Status	Cause/Impairment	TMDL Approval Date	Comment
Fish and Wildlife habitat	Not Supporting	Oxygen, Dissolved	9/27/2007	
		Phosphorus (Total)	9/27/2007	
Fish Consumption	Fully Supporting			
Primary Contact Recreation	Fully Supporting			
Secondary Contact Recreation	Fully Supporting			

Gorton Pond

RI0007025L-01 Waterbody Size: 58 A Classification: B

Gorton Pond. Warwick

Use Description	Use Attainment Status	Cause/Impairment	TMDL Approval Date	Comment
Fish and Wildlife habitat	Not Supporting	Oxygen, Dissolved	9/27/2007	
		Phosphorus (Total)	9/27/2007	
		Non-Native Aquatic Plants		No TMDL required. Impairment is not a pollutant.
		Excess Algal Growth	9/27/2007	
		Eurasian Water Milfoil, Myriophyllum spicatum		No TMDL required. Impairment is not a pollutant.
Fish Consumption	Fully Supporting			
Primary Contact Recreation	Fully Supporting			
Secondary Contact Recreation	Fully Supporting			

Belleville Ponds

RI0007027L-02 Waterbody Size: 130 A Classification: B

Belleville Ponds. North Kingstown

Use Description	Use Attainment Status	Cause/Impairment	TMDL Approval Date	Comment
Fish and Wildlife habitat	Not Supporting	Phosphorus (Total)	12/28/2010	
		Non-Native Aquatic Plants		No TMDL required. Impairment is not a pollutant.
Fish Consumption	Fully Supporting			
Primary Contact Recreation	Fully Supporting			
Secondary Contact Recreation	Fully Supporting			

Kickemuit Reservoir (Warren Reservoir)

RI0007034L-01 Waterbody Size: 42 A Classification: AA

Kickemuit Reservoir (Warren Reservoir). Warren

Use Description	Use Attainment Status	Cause/Impairment	TMDL Approval Date	Comment
Fish and Wildlife habitat	Not Supporting	Phosphorus (Total)	9/28/2006	
		Turbidity	9/28/2006	
		Excess Algal Growth	9/28/2006	
		Taste and Odor	9/28/2006	
Fish Consumption	Not Assessed			
Primary Contact Recreation	Not Supporting	Fecal Coliform	9/28/2006	
Public Drinking Water Supply	Not Supporting	Phosphorus (Total)	9/28/2006	
		Turbidity	9/28/2006	
		Excess Algal Growth	9/28/2006	
		Taste and Odor	9/28/2006	These surface water impairments should not be interpreted as violations of the Safe Drinking Water Act (SDWA) standards since the water is treated at the BCWA water treatment plant prior to distribution and the finished water is monitored separately for compliance with SDWA standards.
Secondary Contact Recreation	Not Supporting	Fecal Coliform	9/28/2006	

North Easton Pond (Green End Pond)

RI0007035L-03 Waterbody Size: 110 A Classification: AA

North Easton Pond (Green End Pond). Middletown, Newport

Use Description	Use Attainment Status	Cause/Impairment	TMDL Approval Date	Comment
Fish and Wildlife habitat	Not Supporting	Phosphorus (Total)	9/27/2007	
		Excess Algal Growth	9/27/2007	
		Other flow regime alterations		Impairment associated with water level fluctuations.
Fish Consumption	Not Assessed			
Primary Contact Recreation	Not Assessed			
Public Drinking Water Supply	Insufficient Information			
Secondary Contact Recreation	Not Assessed			

Stafford Pond

RI0007037L-01 Waterbody Size: 480 A Classification: AA

Stafford Pond. Tiverton

Use Description	Use Attainment Status	Cause/Impairment	TMDL Approval Date	Comment
Fish and Wildlife habitat	Not Supporting	Oxygen, Dissolved	3/23/1999	
		Phosphorus (Total)	3/23/1999	
		Excess Algal Growth	3/23/1999	
Fish Consumption	Not Assessed			
Primary Contact Recreation	Fully Supporting			
Public Drinking Water Supply	Fully Supporting			
Secondary Contact Recreation	Fully Supporting			

Watchaug Pond

RI0008039L-02 Waterbody Size: 570 A Classification: B

Watchaug Pond. Charlestown

Use Description	Use Attainment Status	Cause/Impairment	TMDL Approval Date	Comment
Fish and Wildlife habitat	Fully Supporting			
Fish Consumption	Not Supporting	Mercury in Fish Tissue	12/20/2007	
Primary Contact Recreation	Fully Supporting			
Secondary Contact Recreation	Fully Supporting			

Meadowbrook Pond (Sandy Pond)

RI0008039L-05 Waterbody Size: 23 A Classification: A

Meadowbrook Pond (Sandy Pond). Richmond

Use Description	Use Attainment Status	Cause/Impairment	TMDL Approval Date	Comment
Fish and Wildlife habitat	Not Supporting	Non-Native Aquatic Plants		No TMDL required. Impairment is not a pollutant.
Fish Consumption	Not Supporting	Mercury in Fish Tissue	12/20/2007	
Primary Contact Recreation	Fully Supporting			
Secondary Contact Recreation	Fully Supporting			

Tucker Pond

RI0008039L-08 Waterbody Size: 93 A Classification: B

Tucker Pond. South Kingstown

Use Description	Use Attainment Status	Cause/Impairment	TMDL Approval Date	Comment
Fish and Wildlife habitat	Fully Supporting			
Fish Consumption	Not Supporting	Mercury in Fish Tissue	12/20/2007	
Primary Contact Recreation	Fully Supporting			
Secondary Contact Recreation	Fully Supporting			

Pawcatuck River Basin

Larkin Pond

RI0008039L-11 Waterbody Size: 42 A Classification: B

Larkin Pond. South Kingstown

Use Description	Use Attainment Status	Cause/Impairment	TMDL Approval Date	Comment
Fish and Wildlife habitat	Not Supporting	Non-Native Aquatic Plants		No TMDL required. Impairment is not a pollutant.
Fish Consumption	Not Supporting	Mercury in Fish Tissue	12/20/2007	
Primary Contact Recreation	Fully Supporting			
Secondary Contact Recreation	Fully Supporting			

Barber Pond

RI0008039L-14 Waterbody Size: 28 A Classification: B

Barber Pond. South Kingstown

Use Description	Use Attainment Status	Cause/Impairment	TMDL Approval Date	Comment
Fish and Wildlife habitat	Not Supporting	Oxygen, Dissolved	6/26/2004	
		Non-Native Aquatic Plants		No TMDL required. Impairment is not a pollutant.
Fish Consumption	Not Assessed			
Primary Contact Recreation	Fully Supporting			
Secondary Contact Recreation	Fully Supporting			

Yawgoo Pond

RI0008039L-15 Waterbody Size: 140 A Classification: A

Yawgoo Pond. Exeter, South Kingstown

Use Description	Use Attainment Status	Cause/Impairment	TMDL Approval Date	Comment
Fish and Wildlife habitat	Not Supporting	Excess Algal Growth	6/26/2004	
		Oxygen, Dissolved	6/26/2004	
		Phosphorus (Total)	6/26/2004	
Fish Consumption	Not Supporting	Mercury in Fish Tissue	12/20/2007	
Primary Contact Recreation	Fully Supporting			
Secondary Contact Recreation	Fully Supporting			

Pawcatuck River Basin

Alton Pond

RI0008040L-01 Waterbody Size: 44 A Classification: B

Alton Pond. Hopkinton

Use Description	Use Attainment Status	Cause/Impairment	TMDL Approval Date	Comment
Fish and Wildlife habitat	Not Supporting	Non-Native Aquatic Plants		No TMDL required. Impairment is not a pollutant.
Fish Consumption	Not Supporting	Mercury in Fish Tissue	12/20/2007	
Primary Contact Recreation	Fully Supporting			
Secondary Contact Recreation	Fully Supporting			

Ashville Pond

RI0008040L-04 Waterbody Size: 26 A Classification: B

Ashville Pond. Hopkinton

Use Description	Use Attainment Status	Cause/Impairment	TMDL Approval Date	Comment
Fish and Wildlife habitat	Not Supporting	Non-Native Aquatic Plants		No TMDL required. Impairment is not a pollutant.
Fish Consumption	Not Supporting	Mercury in Fish Tissue	12/20/2007	
Primary Contact Recreation	Fully Supporting			
Secondary Contact Recreation	Fully Supporting			

Wincheck Pond

RI0008040L-06 Waterbody Size: 150 A Classification: B

Wincheck Pond. Hopkinton

Use Description	Use Attainment Status	Cause/Impairment	TMDL Approval Date	Comment
Fish and Wildlife habitat	Not Supporting	Non-Native Aquatic Plants		No TMDL required. Impairment is not a pollutant.
Fish Consumption	Not Supporting	Mercury in Fish Tissue	12/20/2007	
Primary Contact Recreation	Fully Supporting			
Secondary Contact Recreation	Fully Supporting			

Yawgoog Pond

RI0008040L-07 Waterbody Size: 160 A Classification: AA

Yawgoog pond. Hopkinton

Use Description	Use Attainment Status	Cause/Impairment	TMDL Approval Date	Comment
Fish and Wildlife habitat	Not Assessed			
Fish Consumption	Not Supporting	Mercury in Fish Tissue	12/20/2007	
Primary Contact Recreation	Fully Supporting			
Public Drinking Water Supply	Fully Supporting			
Secondary Contact Recreation	Fully Supporting			

Locustville Pond

RI0008040L-10 Waterbody Size: 82 A Classification: B

Locustville Pond. Hopkinton

Use Description	Use Attainment Status	Cause/Impairment	TMDL Approval Date	Comment
Fish and Wildlife habitat	Not Supporting	Non-Native Aquatic Plants		No TMDL required. Impairment is not a pollutant.
Fish Consumption	Not Supporting	Mercury in Fish Tissue	12/20/2007	
Primary Contact Recreation	Fully Supporting			
Secondary Contact Recreation	Fully Supporting			

Wyoming Pond

RI0008040L-11 Waterbody Size: 34 A Classification: B

Wyoming Pond. Hopkinton

Use Description	Use Attainment Status	Cause/Impairment	TMDL Approval Date	Comment
Fish and Wildlife habitat	Not Supporting	Non-Native Aquatic Plants		No TMDL required. Impairment is not a pollutant.
Fish Consumption	Not Supporting	Mercury in Fish Tissue	12/20/2007	
Primary Contact Recreation	Fully Supporting			
Secondary Contact Recreation	Fully Supporting			

Browning Mill Pond (Arcadia Pond)

RI0008040L-13 Waterbody Size: 50 A Classification: B

Browning Mill Pond (Arcadia Pond). Exeter, Richmond

Use Description	Use Attainment Status	Cause/Impairment	TMDL Approval Date	Comment
Fish and Wildlife habitat	Fully Supporting			
Fish Consumption	Not Supporting	Mercury in Fish Tissue	12/20/2007	
Primary Contact Recreation	Fully Supporting			
Secondary Contact Recreation	Fully Supporting			

Boone Lake

RI0008040L-14 Waterbody Size: 46 A Classification: B

Boone Lake. Exeter

Use Description	Use Attainment Status	Cause/Impairment	TMDL Approval Date	Comment
Fish and Wildlife habitat	Fully Supporting			
Fish Consumption	Not Supporting	Mercury in Fish Tissue	12/20/2007	
Primary Contact Recreation	Fully Supporting			
Secondary Contact Recreation	Fully Supporting			

Eisenhower Lake

RI0008040L-16 Waterbody Size: 55 A Classification: A

Eisenhower Lake. West Greenwich

Use Description	Use Attainment Status	Cause/Impairment	TMDL Approval Date	Comment
Fish and Wildlife habitat	Fully Supporting			
Fish Consumption	Not Supporting	Mercury in Fish Tissue	12/20/2007	
Primary Contact Recreation	Fully Supporting			
Secondary Contact Recreation	Fully Supporting			

Quidnick Reservoir

RI0006013L-04 Waterbody Size: 170 A Classification: B

Quidneck Reservoir. Coventry

Use Description	Use Attainment Status	Cause/Impairment	TMDL Approval Date	Comment
Fish and Wildlife habitat	Not Assessed			
Fish Consumption	Not Supporting	Mercury in Fish Tissue	12/20/2007	
Primary Contact Recreation	Fully Supporting			
Secondary Contact Recreation	Fully Supporting			

Tiogue Lake

RI0006014L-02 Waterbody Size: 230 A Classification: B

Tiogue Lake. Coventry

Use Description	Use Attainment Status	Cause/Impairment	TMDL Approval Date	Comment
Fish and Wildlife habitat	Not Supporting	Non-Native Aquatic Plants		No TMDL required. Impairment is not a pollutant.
		Nonnative Fish, Shellfish, or Zooplankton		No TMDL required. Impairment is not a pollutant.
Fish Consumption	Not Supporting	Mercury in Fish Tissue	12/20/2007	
Primary Contact Recreation	Fully Supporting			
Secondary Contact Recreation	Fully Supporting			

Upper Dam Pond

RI0006014L-04 Waterbody Size: 20 A Classification: B

Upper Dam Pond. Coventry

Use Description	Use Attainment Status	Cause/Impairment	TMDL Approval Date	Comment
Fish and Wildlife habitat	Not Supporting	Phosphorus (Total)	9/27/2007	
Fish Consumption	Not Assessed			
Primary Contact Recreation	Fully Supporting			
Secondary Contact Recreation	Fully Supporting			

Pawtuxet River Basin

J.L. Curran Reservoir (Fiskeville Reservoir)

RI0006016L-02 Waterbody Size: 46 A Classification: B

J.L. Curran Reservoir (Fiskeville Reservoir). Cranston

Use Description	Use Attainment Status	Cause/Impairment	TMDL Approval Date	Comment
Fish and Wildlife habitat	Not Assessed			
Fish Consumption	Not Supporting	Mercury in Fish Tissue	12/20/2007	
Primary Contact Recreation	Not Assessed			
Secondary Contact Recreation	Not Assessed			

Spectacle Pond

RI0006017L-07 Waterbody Size: 39 A Classification: B

Spectacle Pond. Cranston

Use Description	Use Attainment Status	Cause/Impairment	TMDL Approval Date	Comment
Fish and Wildlife habitat	Not Supporting	Excess Algal Growth	9/27/2007	
		Phosphorus (Total)	9/27/2007	
Fish Consumption	Not Assessed			
Primary Contact Recreation	Fully Supporting			
Secondary Contact Recreation	Fully Supporting			

Sand Pond (N. of Airport)

RI0006017L-09 Waterbody Size: 12 A Classification: B

Sand Pond (North of Airport). Warwick

Use Description	Use Attainment Status	Cause/Impairment	TMDL Approval Date	Comment
Fish and Wildlife habitat	Not Supporting	Oxygen, Dissolved	9/27/2007	
		Phosphorus (Total)	9/27/2007	
Fish Consumption	Not Assessed			
Primary Contact Recreation	Fully Supporting			
Secondary Contact Recreation	Fully Supporting			

2010 Category 4C Lakes

Waters Impaired but Not by a Pollutant

Blackstone River Basin

Burlingame Reservoir

RI0001002L-10 | Waterbody Size: 67.24 A | Classification: B

Burlingame Reservoir. Glocester

Use Description	Use Attainment Status	Cause/Impairment	Comment
Fish and Wildlife habitat	Not Supporting	Non-Native Aquatic Plants	No TMDL required. Impairment is not a pollutant.
Fish Consumption	Not Assessed		
Primary Contact Recreation	Not Assessed		
Secondary Contact Recreation	Not Assessed		

Echo Lake (Pascoag Reservoir)

RI0001002L-03 | Waterbody Size: 349.1 A | Classification: B

Echo Lake (Pascoag Reservoir). Burrillville, Glocester

Use Description	Use Attainment Status	Cause/Impairment	Comment
Fish and Wildlife habitat	Not Supporting	Non-Native Aquatic Plants	No TMDL required. Impairment is not a pollutant.
Fish Consumption	Not Assessed		
Primary Contact Recreation	Fully Supporting		
Secondary Contact Recreation	Fully Supporting		

Keech Pond

RI0001002L-11 | Waterbody Size: 49.25 A | Classification: B

Keech Pond. Glocester

Use Description	Use Attainment Status	Cause/Impairment	Comment
Fish and Wildlife habitat	Not Supporting	Non-Native Aquatic Plants	No TMDL required. Impairment is not a pollutant.
Fish Consumption	Not Assessed		
Primary Contact Recreation	Fully Supporting		
Secondary Contact Recreation	Fully Supporting		

Blackstone River Basin

Smith & Sayles Reservoir

RI0001002L-07 | Waterbody Size: 172.7 A | Classification: B

Smith & Sayles Reservoir. Glocester

Use Description	Use Attainment Status	Cause/Impairment	Comment
Fish and Wildlife habitat	Not Supporting	Non-Native Aquatic Plants	No TMDL required. Impairment is not a pollutant.
Fish Consumption	Not Assessed		
Primary Contact Recreation	Fully Supporting		
Secondary Contact Recreation	Fully Supporting		

Spring Grove Pond

RI0001002L-06 | Waterbody Size: 22.38 A | Classification: B

Spring Grove Pond. Glocester

Use Description	Use Attainment Status	Cause/Impairment	Comment
Fish and Wildlife habitat	Not Supporting	Non-Native Aquatic Plants	No TMDL required. Impairment is not a pollutant.
Fish Consumption	Not Assessed		
Primary Contact Recreation	Fully Supporting		
Secondary Contact Recreation	Fully Supporting		

Spring Lake (Herring Pond)

RI0001002L-04 | Waterbody Size: 94.80 A | Classification: B

Spring Lake (Herring Pond). Burrillville

Use Description	Use Attainment Status	Cause/Impairment	Comment
Fish and Wildlife habitat	Not Supporting	Non-Native Aquatic Plants	No TMDL required. Impairment is not a pollutant.
Fish Consumption	Not Assessed		
Primary Contact Recreation	Fully Supporting		
Secondary Contact Recreation	Fully Supporting		

Blackstone River Basin

Sucker Pond

RI0001002L-05 | Waterbody Size: 53.81 A | Classification: B

Sucker Pond. Burrillville

Use Description	Use Attainment Status	Cause/Impairment	Comment
Fish and Wildlife habitat	Not Supporting	Non-Native Aquatic Plants	No TMDL required. Impairment is not a pollutant.
Fish Consumption	Not Assessed		
Primary Contact Recreation	Not Assessed		
Secondary Contact Recreation	Not Assessed		

Tarkiln Pond

RI0001002L-08 | Waterbody Size: 22.92 A | Classification: B

Tarkiln Pond. North Smithfield

Use Description	Use Attainment Status	Cause/Impairment	Comment
Fish and Wildlife habitat	Not Supporting	Non-Native Aquatic Plants	No TMDL required. Impairment is not a pollutant.
Fish Consumption	Not Assessed		
Primary Contact Recreation	Not Assessed		
Secondary Contact Recreation	Not Assessed		

Coastal Waters

Asa Pond

RI0010045L-02 | Waterbody Size: 23.85 A | Classification: B

Asa Pond. South Kingstown

Use Description	Use Attainment Status	Cause/Impairment	Comment
Fish and Wildlife habitat	Not Supporting	Non-Native Aquatic Plants	No TMDL required. Impairment is not a pollutant.
Fish Consumption	Fully Supporting		
Primary Contact Recreation	Fully Supporting		
Secondary Contact Recreation	Fully Supporting		

Carr Pond (N. Kingstown)

RI0010044L-03 | Waterbody Size: 54.56 A | Classification: B

Carr Pond. North Kingstown

Use Description	Use Attainment Status	Cause/Impairment	Comment
Fish and Wildlife habitat	Not Supporting	Non-Native Aquatic Plants	No TMDL required. Impairment is not a pollutant.
Fish Consumption	Not Assessed		
Primary Contact Recreation	Fully Supporting		
Secondary Contact Recreation	Fully Supporting		

Long Pond

RI0010043L-07 | Waterbody Size: 39.38 A | Classification: A

Long Pond. South Kingstown

Use Description	Use Attainment Status	Cause/Impairment	Comment
Fish and Wildlife habitat	Not Supporting	Non-Native Aquatic Plants	No TMDL required. Impairment is not a pollutant.
Fish Consumption	Not Assessed		
Primary Contact Recreation	Fully Supporting		
Secondary Contact Recreation	Fully Supporting		

Moshassuck River Basin

Olney Pond

RI0003008L-01 | Waterbody Size: 129.0 A | Classification: B

Olney Pond. Lincoln

Use Description	Use Attainment Status	Cause/Impairment	Comment
Fish and Wildlife habitat	Not Supporting	Non-Native Aquatic Plants	No TMDL required. Impairment is not a pollutant.
		Eurasian Water Milfoil, Myriophyllum spicatum	No TMDL required. Impairment is not a pollutant.
Fish Consumption	Not Assessed		
Primary Contact Recreation	Fully Supporting		
Secondary Contact Recreation	Fully Supporting		

Wenscott Reservoir (Twin Rivers)

RI0003008L-05 | Waterbody Size: 82.82 A | Classification: B

Wenscott Reservoir (Twin Rivers). North Providence, Smithfield, Lincoln

Use Description	Use Attainment Status	Cause/Impairment	Comment
Fish and Wildlife habitat	Not Supporting	Non-Native Aquatic Plants	No TMDL required. Impairment is not a pollutant.
Fish Consumption	Not Assessed		
Primary Contact Recreation	Fully Supporting		
Secondary Contact Recreation	Fully Supporting		

Narragansett Basin

Echo Lake

RI0007020L-07 | Waterbody Size: 24.39 A | Classification: B

Echo Lake. Barrington

Use Description	Use Attainment Status	Cause/Impairment	Comment
Fish and Wildlife habitat	Not Supporting	Non-Native Aquatic Plants	No TMDL required. Impairment is not a pollutant.
Fish Consumption	Not Assessed		
Primary Contact Recreation	Not Assessed		
Secondary Contact Recreation	Not Assessed		

Gardiner Pond

RI0007035L-01 | Waterbody Size: 92.44 A | Classification: AA

Gardiner Pond. Middletown

Use Description	Use Attainment Status	Cause/Impairment	Comment
Fish and Wildlife habitat	Not Supporting	Other flow regime alterations	Impairment associated with water level fluctuations.
Fish Consumption	Not Assessed		
Primary Contact Recreation	Not Assessed		
Public Drinking Water Supply	Insufficient Information		
Secondary Contact Recreation	Not Assessed		

Lawton Valley Reservoir

RI0007035L-06 | Waterbody Size: 81.40 A | Classification: AA

Lawton Valley Reservoir. Portsmouth

Use Description	Use Attainment Status	Cause/Impairment	Comment
Fish and Wildlife habitat	Not Supporting	Other flow regime alterations	Impairment associated with water level fluctuations.
Fish Consumption	Not Assessed		
Primary Contact Recreation	Not Assessed		
Public Drinking Water Supply	Insufficient Information		
Secondary Contact Recreation	Not Assessed		

Nelson Paradise Pond

RI0007035L-02 | Waterbody Size: 28.94 A | Classification: AA

Nelson Paradise Pond. Middletown

Use Description	Use Attainment Status	Cause/Impairment	Comment
Fish and Wildlife habitat	Not Supporting	Other flow regime alterations	Impairment associated with water level fluctuations.
Fish Consumption	Not Assessed		
Primary Contact Recreation	Not Assessed		
Public Drinking Water Supply	Insufficient Information		
Secondary Contact Recreation	Not Assessed		

Potowomut Pond

RI0007028L-01 | Waterbody Size: 18.67 A | Classification: B

Potowomut Pond. North Kingstown

Use Description	Use Attainment Status	Cause/Impairment	Comment
Fish and Wildlife habitat	Not Supporting	Non-Native Aquatic Plants	No TMDL required. Impairment is not a pollutant.
Fish Consumption	Not Assessed		
Primary Contact Recreation	Not Assessed		
Secondary Contact Recreation	Not Assessed		

Saint Mary's Pond

RI0007035L-05 | Waterbody Size: 112.1 A | Classification: AA

Saint Mary's Pond. Portsmouth

Use Description	Use Attainment Status	Cause/Impairment	Comment
Fish and Wildlife habitat	Not Supporting	Other flow regime alterations	Impairment associated with water level fluctuations.
Fish Consumption	Not Assessed		
Primary Contact Recreation	Not Assessed		
Public Drinking Water Supply	Insufficient Information		
Secondary Contact Recreation	Not Assessed		

Narragansett Basin

Secret Lake

RI0007027L-03 | Waterbody Size: 46.21 A | Classification: B

Secret Lake. North Kingstown

Use Description	Use Attainment Status	Cause/Impairment	Comment
Fish and Wildlife habitat	Not Supporting	Non-Native Aquatic Plants	No TMDL required. Impairment is not a pollutant.
Fish Consumption	Not Assessed		
Primary Contact Recreation	Fully Supporting		
Secondary Contact Recreation	Fully Supporting		

Sisson Pond

RI0007035L-10 | Waterbody Size: 69.07 A | Classification: AA

Sisson Pond. Portsmouth

Use Description	Use Attainment Status	Cause/Impairment	Comment
Fish and Wildlife habitat	Not Supporting	Other flow regime alterations	Impairment associated with water level fluctuations.
Fish Consumption	Not Assessed		
Primary Contact Recreation	Not Assessed		
Public Drinking Water Supply	Insufficient Information		
Secondary Contact Recreation	Not Assessed		

Pawcatuck River Basin

Breakheart Pond

RI0008040L-15 | Waterbody Size: 43.79 A | Classification: A

Breakheart Pond. West Greenwich, Exeter

Use Description	Use Attainment Status	Cause/Impairment	Comment
Fish and Wildlife habitat	Not Supporting	Non-Native Aquatic Plants	No TMDL required. Impairment is not a pollutant.
Fish Consumption	Fully Supporting		
Primary Contact Recreation	Fully Supporting		
Secondary Contact Recreation	Fully Supporting		

Carolina Trout Pond

RI0008040L-02 | Waterbody Size: 3.304 A | Classification: A

Carolina Trout Pond. Richmond

Use Description	Use Attainment Status	Cause/Impairment	Comment
Fish and Wildlife habitat	Not Supporting	Non-Native Aquatic Plants	No TMDL required. Impairment is not a pollutant.
Fish Consumption	Not Assessed		
Primary Contact Recreation	Not Assessed		
Secondary Contact Recreation	Not Assessed		

The Reservoir

RI0008039L-21 | Waterbody Size: 21.49 A | Classification: A

The Reservoir. Exeter

Use Description	Use Attainment Status	Cause/Impairment	Comment
Fish and Wildlife habitat	Not Supporting	Non-Native Aquatic Plants	No TMDL required. Impairment is not a pollutant.
Fish Consumption	Not Assessed		
Primary Contact Recreation	Not Assessed		
Secondary Contact Recreation	Not Assessed		

Thirty Acre Pond

RI0008039L-12 | Waterbody Size: 15.15 A | Classification: B

Thirty Acre Pond. South Kingstown

Use Description	Use Attainment Status	Cause/Impairment	Comment
Fish and Wildlife habitat	Not Supporting	Non-Native Aquatic Plants	No TMDL required. Impairment is not a pollutant.
Fish Consumption	Not Assessed		
Primary Contact Recreation	Not Assessed		
Secondary Contact Recreation	Not Assessed		

Worden Pond

RI0008039L-07 | Waterbody Size: 1051 A | Classification: B

Worden Pond. South Kingstown

Use Description	Use Attainment Status	Cause/Impairment	Comment
Fish and Wildlife habitat	Not Supporting	Nonnative Fish, Shellfish, or Zooplankton	No TMDL required. Impairment is not a pollutant.
		Non-Native Aquatic Plants	No TMDL required. Impairment is not a pollutant.
Fish Consumption	Not Assessed		
Primary Contact Recreation	Fully Supporting		
Secondary Contact Recreation	Fully Supporting		

Coventry Reservoir (Stump Pond)

RI0006013L-03 | Waterbody Size: 168.0 A | Classification: B

Coventry Reservoir (Stump Pond). Coventry

Use Description	Use Attainment Status	Cause/Impairment	Comment
Fish and Wildlife habitat	Not Supporting	Non-Native Aquatic Plants	No TMDL required. Impairment is not a pollutant.
Fish Consumption	Not Assessed		
Primary Contact Recreation	Not Assessed		
Secondary Contact Recreation	Not Assessed		

Flat River Reservoir (Johnson Pond)

RI0006013L-01 | Waterbody Size: 647.1 A | Classification: B

Flat River Reservoir (Johnson Pond). Coventry

Use Description	Use Attainment Status	Cause/Impairment	Comment
Fish and Wildlife habitat	Not Supporting	Non-Native Aquatic Plants	No TMDL required. Impairment is not a pollutant.
		Eurasian Water Milfoil, Myriophyllum spicatum	No TMDL required. Impairment is not a pollutant.
Fish Consumption	Not Assessed		
Primary Contact Recreation	Fully Supporting		
Secondary Contact Recreation	Fully Supporting		

Maple Root Pond

RI0006013L-12 | Waterbody Size: 21.68 A | Classification: B

Maple Root Pond. Coventry

Use Description	Use Attainment Status	Cause/Impairment	Comment
Fish and Wildlife habitat	Not Supporting	Non-Native Aquatic Plants	No TMDL required. Impairment is not a pollutant.
Fish Consumption	Not Assessed		
Primary Contact Recreation	Not Assessed		
Secondary Contact Recreation	Not Assessed		

Mishnock Lake

RI0006014L-01 | Waterbody Size: 47.03 A | Classification: B

Mishnock Lake. West Greenwich

Use Description	Use Attainment Status	Cause/Impairment	Comment
Fish and Wildlife habitat	Not Supporting	Nonnative Fish, Shellfish, or Zooplankton	No TMDL required. Impairment is not a pollutant.
		Non-Native Aquatic Plants	No TMDL required. Impairment is not a pollutant.
Fish Consumption	Not Assessed		
Primary Contact Recreation	Fully Supporting		
Secondary Contact Recreation	Fully Supporting		

Reynolds Pond

RI0006012L-05 | Waterbody Size: 41.71 A | Classification: A

Reynolds Pond to the Harkney Hill Road highway bridge. West Greenwich, Coventry

Use Description	Use Attainment Status	Cause/Impairment	Comment
Fish and Wildlife habitat	Not Supporting	Non-Native Aquatic Plants	No TMDL required. Impairment is not a pollutant.
Fish Consumption	Not Assessed		
Primary Contact Recreation	Not Assessed		
Secondary Contact Recreation	Not Assessed		

Tarbox Pond

RI0006012L-02 | Waterbody Size: 19.90 A | Classification: A

Tarbox Pond. West Greenwich

Use Description	Use Attainment Status	Cause/Impairment	Comment
Fish and Wildlife habitat	Not Supporting	Non-Native Aquatic Plants	No TMDL required. Impairment is not a pollutant.
Fish Consumption	Not Assessed		
Primary Contact Recreation	Fully Supporting		
Secondary Contact Recreation	Fully Supporting		

Thames River Basin

Arnold Pond

RI0005011L-03 | Waterbody Size: 73.57 A | Classification: A

Arnold Pond. Coventry

Use Description	Use Attainment Status	Cause/Impairment	Comment
Fish and Wildlife habitat	Not Supporting	Non-Native Aquatic Plants	No TMDL required. Impairment is not a pollutant.
Fish Consumption	Not Assessed		
Primary Contact Recreation	Fully Supporting		
Secondary Contact Recreation	Fully Supporting		

Bowdish Reservoir

RI0005047L-03 | Waterbody Size: 219.4 A | Classification: B

Bowdish Reservoir. Glocester

Use Description	Use Attainment Status	Cause/Impairment	Comment
Fish and Wildlife habitat	Not Supporting	Non-Native Aquatic Plants	No TMDL required. Impairment is not a pollutant.
Fish Consumption	Not Assessed		
Primary Contact Recreation	Fully Supporting		
Secondary Contact Recreation	Fully Supporting		

Carbuncle Pond

RI0005011L-01 | Waterbody Size: 38.92 A | Classification: A

Carbuncle Pond. Coventry

Use Description	Use Attainment Status	Cause/Impairment	Comment
Fish and Wildlife habitat	Not Supporting	Non-Native Aquatic Plants	No TMDL required. Impairment is not a pollutant.
Fish Consumption	Not Assessed		
Primary Contact Recreation	Fully Supporting		
Secondary Contact Recreation	Fully Supporting		

Wakefield Pond

RI0005047L-01 Waterbody Size: 75.07 A Classification: B

Wakefield Pond. Burrillville

Use Description	Use Attainment Status	Cause/Impairment	Comment
Fish and Wildlife habitat	Not Supporting	Non-Native Aquatic Plants	No TMDL required. Impairment is not a pollutant.
Fish Consumption	Not Assessed		
Primary Contact Recreation	Fully Supporting		
Secondary Contact Recreation	Fully Supporting		

Woonasquatucket River Basin

Georgiaville Pond

RI0002007L-02 | Waterbody Size: 96.91 A | Classification: B

Georgiaville Pond. Smithfield

Use Description	Use Attainment Status	Cause/Impairment	Comment
Fish and Wildlife habitat	Not Supporting	Non-Native Aquatic Plants	No TMDL required. Impairment is not a pollutant.
Fish Consumption	Not Assessed		
Primary Contact Recreation	Fully Supporting		
Secondary Contact Recreation	Fully Supporting		

Hawkins Pond

RI0002007L-01 | Waterbody Size: 24.52 A | Classification: B

Hawkins Pond. Smithfield, Johnston

Use Description	Use Attainment Status	Cause/Impairment	Comment
Fish and Wildlife habitat	Not Supporting	Non-Native Aquatic Plants	No TMDL required. Impairment is not a pollutant.
Fish Consumption	Not Assessed		
Primary Contact Recreation	Fully Supporting		
Secondary Contact Recreation	Fully Supporting		

Primrose Pond

RI0002007L-11 | Waterbody Size: 10.38 A | Classification: B

Primrose Pond. North Smithfield

Use Description	Use Attainment Status	Cause/Impairment	Comment
Fish and Wildlife habitat	Not Supporting	Non-Native Aquatic Plants	No TMDL required. Impairment is not a pollutant.
Fish Consumption	Not Assessed		
Primary Contact Recreation	Not Assessed		
Secondary Contact Recreation	Not Assessed		

Woonasquatucket River Basin

Slack Reservoir

RI0002007L-03 | Waterbody Size: 133.6 A | Classification: B

Slack Reservoir. Smithfield, Johnston

Use Description	Use Attainment Status	Cause/Impairment	Comment
Fish and Wildlife habitat	Not Supporting	Non-Native Aquatic Plants	No TMDL required. Impairment is not a pollutant.
Fish Consumption	Not Assessed		
Primary Contact Recreation	Fully Supporting		
Secondary Contact Recreation	Fully Supporting		

Waterman Reservoir

RI0002007L-04 | Waterbody Size: 251.9 A | Classification: B

Waterman Reservoir. Glocester, Smithfield

Use Description	Use Attainment Status	Cause/Impairment	Comment
Fish and Wildlife habitat	Not Supporting	Non-Native Aquatic Plants	No TMDL required. Impairment is not a pollutant.
Fish Consumption	Not Assessed		
Primary Contact Recreation	Fully Supporting		
Secondary Contact Recreation	Fully Supporting		

Woonasquatucket Reservoir (Stump Pond)

RI0002007L-08 | Waterbody Size: 302.8 A | Classification: B

Woonasquatucket Reservoir (Stump Pond/Stillwater Reservoir). Smithfield

Use Description	Use Attainment Status	Cause/Impairment	Comment
Fish and Wildlife habitat	Not Supporting	Non-Native Aquatic Plants	No TMDL required. Impairment is not a pollutant.
Fish Consumption	Not Assessed		
Primary Contact Recreation	Fully Supporting		
Secondary Contact Recreation	Fully Supporting		

2010 Category 5 Lakes
303(d) List of Impaired Waters

Blackstone River Basin

Slatersville Reservoir

RI0001002L-09 Waterbody Size: 218.9 A Waterbody Classification: B

Slatersville Reservoir. Burrillville, North Smithfield

Use Description	*Use Attainment Status*	*Cause/Impairment*	*TMDL Schedule*	*TMDL Approval Date*	*Comment*
Fish and Wildlife habitat	Not Supporting	Copper	2018		
		Lead	2018		
		Non-Native Aquatic Plants			No TMDL required. Impairment is not a pollutant.
Fish Consumption	Not Assessed				
Primary Contact Recreation	Fully Supporting				
Secondary Contact Recreation	Fully Supporting				

Scott Pond

RI0001003L-01 Waterbody Size: 42.13 A Waterbody Classification: B

Scott Pond. Lincoln

Use Description	*Use Attainment Status*	*Cause/Impairment*	*TMDL Schedule*	*TMDL Approval Date*	*Comment*
Fish and Wildlife habitat	Not Supporting	Copper	2011		
		Oxygen, Dissolved	2011		
		Phosphorus (Total)	2011		
Fish Consumption	Not Assessed				
Primary Contact Recreation	Fully Supporting				
Secondary Contact Recreation	Fully Supporting				

Valley Falls Pond

RI0001003L-02

Waterbody Size: 37.97 A

Waterbody Classification: B1

Valley Falls Pond. Cumberland

Use Description	Use Attainment Status	Cause/Impairment	TMDL Schedule	TMDL Approval Date	Comment
Fish and Wildlife habitat	Not Supporting	Aquatic Macroinvertebrate Bioassessments	2018		Determine need for TMDL post WWTF upgrades.
		Lead	2022		Compliance with Consent Agreement for CSO abatement expected to negate need for TMDL.
		Oxygen, Dissolved	2018		Determine need for TMDL post WWTF upgrades.
		Phosphorus (Total)	2018		Determine need for TMDL post WWTF upgrades.
Fish Consumption	Not Assessed				
Primary Contact Recreation	Not Supporting	Fecal Coliform	2022		Compliance with Consent Agreement for CSO abatement expected to negate need for TMDL.
Secondary Contact Recreation	Not Supporting	Fecal Coliform	2022		Compliance with Consent Agreement for CSO abatement expected to negate need for TMDL.

Silver Spring Lake

RI0010044L-02 Waterbody Size: 18.75 A Waterbody Classification: B

Silver Spring Lake. North Kingstown

Use Description	Use Attainment Status	Cause/Impairment	TMDL Schedule	TMDL Approval Date	Comment
Fish and Wildlife habitat	Not Supporting	Non-Native Aquatic Plants			No TMDL required. Impairment is not a pollutant.
		Phosphorus (Total)	2014		
Fish Consumption	Not Assessed				
Primary Contact Recreation	Fully Supporting				
Secondary Contact Recreation	Fully Supporting				

Saugatucket Pond

RI0010045L-01 Waterbody Size: 40.68 A Waterbody Classification: B

Saugatucket Pond. South Kingstown

Use Description	Use Attainment Status	Cause/Impairment	TMDL Schedule	TMDL Approval Date	Comment
Fish and Wildlife habitat	Not Supporting	Benthic-Macroinvertebrate Bioassessments	2016		Record of Decision in place for Rosehill Landfill.
		Phosphorus (Total)	2016		
Fish Consumption	Not Assessed				
Primary Contact Recreation	Fully Supporting				
Secondary Contact Recreation	Fully Supporting				

Silver Lake

RI0010045L-05 Waterbody Size: 44.78 A Waterbody Classification: B

Silver Lake. South Kingstown

Use Description	Use Attainment Status	Cause/Impairment	TMDL Schedule	TMDL Approval Date	Comment
Fish and Wildlife habitat	Not Supporting	Phosphorus (Total)	2014		
Fish Consumption	Not Assessed				
Primary Contact Recreation	Fully Supporting				
Secondary Contact Recreation	Fully Supporting				

Lily Pond RI0010047L-02

Waterbody Size: 29.13 A Waterbody Classification: A

Lily Pond. Newport

Use Description	Use Attainment Status	Cause/Impairment	TMDL Schedule	TMDL Approval Date	Comment
Fish and Wildlife habitat	Not Supporting	Non-Native Aquatic Plants			No TMDL required. Impairment is not a pollutant.
		Phosphorus (Total)	2014		
Fish Consumption	Not Assessed				
Primary Contact Recreation	Fully Supporting				
Secondary Contact Recreation	Fully Supporting				

Round Pond (Little Compton) RI0010048L-02

Waterbody Size: 34.25 A Waterbody Classification: A

Round Pond. Little Compton

Use Description	Use Attainment Status	Cause/Impairment	TMDL Schedule	TMDL Approval Date	Comment
Fish and Wildlife habitat	Not Supporting	Phosphorus (Total)	2014		
Fish Consumption	Not Assessed				
Primary Contact Recreation	Fully Supporting				
Secondary Contact Recreation	Fully Supporting				

Barney Pond

RI0003008L-02

Waterbody Size: 23.84 A

Waterbody Classification: B

Barney Pond. Lincoln

Use Description	*Use Attainment Status*	*Cause/Impairment*	*TMDL Schedule*	*TMDL Approval Date*	*Comment*
Fish and Wildlife habitat	Not Supporting	Phosphorus (Total)	2014		
Fish Consumption	Not Assessed				
Primary Contact Recreation	Not Assessed				
Secondary Contact Recreation	Not Assessed				

Sandy Pond (S. of Airport) (Little Pond)

RI0007024L-01 | Waterbody Size: 28.34 A | Waterbody Classification: B

Sandy Pond (Little Pond, south of airport). Warwick

Use Description	Use Attainment Status	Cause/Impairment	TMDL Schedule	TMDL Approval Date	Comment
Fish and Wildlife habitat	Fully Supporting				
Fish Consumption	Not Assessed				
Primary Contact Recreation	Not Supporting	Fecal Coliform	2014		
Secondary Contact Recreation	Not Supporting	Fecal Coliform	2014		

Melville Ponds

RI0007029L-01 | Waterbody Size: 13.59 A | Waterbody Classification: A

Melville Ponds. Portsmouth

Use Description	Use Attainment Status	Cause/Impairment	TMDL Schedule	TMDL Approval Date	Comment
Fish and Wildlife habitat	Not Supporting	Phosphorus (Total)	2014		
Fish Consumption	Not Assessed				
Primary Contact Recreation	Fully Supporting				
Secondary Contact Recreation	Fully Supporting				

Chapman Pond

RI0008039L-01 Waterbody Size: 172.8 A Waterbody Classification: B

Chapman Pond. Westerly

Use Description	Use Attainment Status	Cause/Impairment	TMDL Schedule	TMDL Approval Date	Comment
Fish and Wildlife habitat	Not Supporting	Eurasian Water Milfoil, Myriophyllum spicatum			No TMDL required. Impairment is not a pollutant.
		Lead	2016		
		Non-Native Aquatic Plants			No TMDL required. Impairment is not a pollutant.
Fish Consumption	Fully Supporting				
Primary Contact Recreation	Fully Supporting				
Secondary Contact Recreation	Fully Supporting				

Hundred Acre Pond

RI0008039L-13 Waterbody Size: 84.16 A Waterbody Classification: B

Hundred Acre Pond. South Kingstown

Use Description	Use Attainment Status	Cause/Impairment	TMDL Schedule	TMDL Approval Date	Comment
Fish and Wildlife habitat	Not Supporting	Non-Native Aquatic Plants			No TMDL required. Impairment is not a pollutant.
		Oxygen, Dissolved	2014		
Fish Consumption	Not Supporting	Mercury in Fish Tissue		12/20/2007	
Primary Contact Recreation	Fully Supporting				
Secondary Contact Recreation	Fully Supporting				

White Brook Pond

RI0008039L-26 Waterbody Size: 6.4 A Waterbody Classification: B

White Brook Pond. Richmond

Use Description	Use Attainment Status	Cause/Impairment	TMDL Schedule	TMDL Approval Date	Comment
Fish and Wildlife habitat	Not Supporting	Phosphorus (Total)	2014		
Fish Consumption	Not Assessed				
Primary Contact Recreation	Fully Supporting				
Secondary Contact Recreation	Fully Supporting				

Deep Pond (Exeter)

RI0008040L-12 Waterbody Size: 17.39 A Waterbody Classification: A

Deep Pond. Exeter

Use Description	Use Attainment Status	Cause/Impairment	TMDL Schedule	TMDL Approval Date	Comment
Fish and Wildlife habitat	Not Supporting	Oxygen, Dissolved	2014		
		Phosphorus (Total)	2014		
Fish Consumption	Not Assessed				
Primary Contact Recreation	Not Assessed				
Secondary Contact Recreation	Not Assessed				

Three Ponds

RI0006017L-02 Waterbody Size: 21.42 A Waterbody Classification: B

Three Ponds. Warwick

Use Description	Use Attainment Status	Cause/Impairment	TMDL Schedule	TMDL Approval Date	Comment
Fish and Wildlife habitat	Not Supporting	Copper	2016		
		Lead	2016		
		Non-Native Aquatic Plants			No TMDL required. Impairment is not a pollutant.
		Oxygen, Dissolved	2014		
		Phosphorus (Total)	2014		
Fish Consumption	Not Assessed				
Primary Contact Recreation	Not Assessed				
Secondary Contact Recreation	Not Assessed				

Roger Williams Park Ponds

RI0006017L-05 Waterbody Size: 113.9 A Waterbody Classification: B

Roger Williams Park Ponds. Providence

Use Description	Use Attainment Status	Cause/Impairment	TMDL Schedule	TMDL Approval Date	Comment
Fish and Wildlife habitat	Not Supporting	Excess Algal Growth		9/27/2007	
		Non-Native Aquatic Plants			No TMDL required. Impairment is not a pollutant.
		Oxygen, Dissolved		9/27/2007	
		Phosphorus (Total)		9/27/2007	
Fish Consumption	Not Assessed				
Primary Contact Recreation	Not Supporting	Fecal Coliform	2011		
Secondary Contact Recreation	Not Supporting	Fecal Coliform	2011		

Mashapaug Pond

RI0006017L-06 Waterbody Size: 76.75 A Waterbody Classification: B

Mashapaug Pond. Providence

Use Description	Use Attainment Status	Cause/Impairment	TMDL Schedule	TMDL Approval Date	Comment
Fish and Wildlife habitat	Not Supporting	Excess Algal Growth		9/27/2007	
		Oxygen, Dissolved		9/27/2007	
		Phosphorus (Total)		9/27/2007	
Fish Consumption	Not Supporting	PCB in Fish Tissue	2022		
Primary Contact Recreation	Not Supporting	Fecal Coliform	2011		
Secondary Contact Recreation	Not Supporting	Fecal Coliform	2011		

Fenner Pond

RI0006017L-08 Waterbody Size: 19.47 A Waterbody Classification: B

Fenner Pond. Cranston

Use Description	Use Attainment Status	Cause/Impairment	TMDL Schedule	TMDL Approval Date	Comment
Fish and Wildlife habitat	Not Supporting	Phosphorus (Total)	2014		
Fish Consumption	Not Assessed				
Primary Contact Recreation	Fully Supporting				
Secondary Contact Recreation	Fully Supporting				

Simmons Reservoir

RI0006018L-03 Waterbody Size: 109 A Waterbody Classification: B

Simmons Reservoir. Johnston

Use Description	Use Attainment Status	Cause/Impairment	TMDL Schedule	TMDL Approval Date	Comment
Fish and Wildlife habitat	Not Supporting	Phosphorus (Total)	2018		
		Turbidity	2018		
Fish Consumption	Fully Supporting				
Primary Contact Recreation	Not Assessed				
Secondary Contact Recreation	Not Assessed				

Print Works Pond

RI0006018L-05 Waterbody Size: 26.26 A Waterbody Classification: B

Print Works Pond. Cranston

Use Description	Use Attainment Status	Cause/Impairment	TMDL Schedule	TMDL Approval Date	Comment
Fish and Wildlife habitat	Not Supporting	Chloride	2016		
		Lead	2016		
		Non-Native Aquatic Plants			No TMDL required. Impairment is not a pollutant.
		Total Suspended Solids (TSS)	2016		
Fish Consumption	Not Assessed				
Primary Contact Recreation	Not Supporting	Fecal Coliform	2016		
Secondary Contact Recreation	Not Supporting	Fecal Coliform	2016		

Blackamore Pond

RI0006018L-06 Waterbody Size: 20.44 A Waterbody Classification: B

Blackamore Pond. Cranston

Use Description	Use Attainment Status	Cause/Impairment	TMDL Schedule	TMDL Approval Date	Comment
Fish and Wildlife habitat	Not Supporting	Phosphorus (Total)	2014		
Fish Consumption	Not Assessed				
Primary Contact Recreation	Fully Supporting				
Secondary Contact Recreation	Fully Supporting				

Turner Reservoir RI0004009L-01A

Waterbody Size: 129.7 A Waterbody Classification: B1

Turner Reservoir North of Newman Avenue Dam. East Providence

Use Description	Use Attainment Status	Cause/Impairment	TMDL Schedule	TMDL Approval Date	Comment
Fish and Wildlife habitat	Not Supporting	Aluminum	2011		
		Cadmium	2011		
		Non-Native Aquatic Plants			No TMDL required. Impairment is not a pollutant.
		Oxygen, Dissolved	2011		
		Phosphorus (Total)	2011		
Fish Consumption	Not Assessed				
Primary Contact Recreation	Fully Supporting				
Secondary Contact Recreation	Fully Supporting				

Turner Reservoir RI0004009L-01B

Waterbody Size: 85.08 A Waterbody Classification: B

Turner Reservoir South of Newman Avenue Dam. East Providence

Use Description	Use Attainment Status	Cause/Impairment	TMDL Schedule	TMDL Approval Date	Comment
Fish and Wildlife habitat	Not Supporting	Aluminum	2011		
		Cadmium	2011		
		Oxygen, Dissolved	2011		
		Phosphorus (Total)	2011		
Fish Consumption	Not Assessed				
Primary Contact Recreation	Fully Supporting				
Secondary Contact Recreation	Fully Supporting				

Slater Park Pond

RI0004009L-02 Waterbody Size: 21.36 A Waterbody Classification: B1

Slater Park Pond. Pawtucket

Use Description	Use Attainment Status	Cause/Impairment	TMDL Schedule	TMDL Approval Date	Comment
Fish and Wildlife habitat	Not Supporting	Aluminum	2011		
		Cadmium	2011		
		Iron	2011		
		Lead	2011		
		Phosphorus (Total)	2011		
Fish Consumption	Not Assessed				
Primary Contact Recreation	Not Supporting	Fecal Coliform	2011		
Secondary Contact Recreation	Not Supporting	Fecal Coliform	2011		

Omega Pond

RI0004009L-03 Waterbody Size: 30.20 A Waterbody Classification: B

Omega Pond. East Providence

Use Description	Use Attainment Status	Cause/Impairment	TMDL Schedule	TMDL Approval Date	Comment
Fish and Wildlife habitat	Not Supporting	Aluminum	2011		
		Cadmium	2011		
		Oxygen, Dissolved	2011		
		Phosphorus (Total)	2011		
Fish Consumption	Not Assessed				
Primary Contact Recreation	Not Supporting	Fecal Coliform	2011		
Secondary Contact Recreation	Not Supporting	Fecal Coliform	2011		

Lake Washington

RI0005047L-04

Waterbody Size: 40.89 A

Waterbody Classification: B

Lake Washington. Glocester

Use Description	Use Attainment Status	Cause/Impairment	TMDL Schedule	TMDL Approval Date	Comment
Fish and Wildlife habitat	Not Supporting	Non-Native Aquatic Plants			No TMDL required. Impairment is not a pollutant.
		Phosphorus (Total)	2014		
Fish Consumption	Not Assessed				
Primary Contact Recreation	Fully Supporting				
Secondary Contact Recreation	Fully Supporting				

Lower Sprague Reservoir

RI0002007L-06

Waterbody Size: 25.12 A

Waterbody Classification: B

Lower Sprague Reservoir. Smithfield

Use Description	Use Attainment Status	Cause/Impairment	TMDL Schedule	TMDL Approval Date	Comment
Fish and Wildlife habitat	Not Supporting	Phosphorus (Total)	2014		
Fish Consumption	Not Assessed				
Primary Contact Recreation	Not Assessed				
Secondary Contact Recreation	Not Assessed				

Appendix B. Lakes Identified with Elevated Levels of Mercury in Fish Tissue

Source: 2010 Statewide Water Quality Assessment

Lake Name	Location
Alton Pond	Hopkinton
Ashville Pond	Hopkinton
Boone Lake	Exeter
Browning Mill Pond	Exeter/Richmond
Eisenhower Lake	West Greenwich
Hundred Acre Pond	South Kingstown
Indian Lake	South Kingstown
J.L. Curran Reservoir	Cranston
Larkin Pond	South Kingstown
Locustville Pond	Hopkinton
Meadowbrook Pond	Richmond
Quidneck Reservoir	Coventry
Tiogue Lake	Coventry
Tucker Pond	South Kingstown
Watchaug Pond	Charlestown
Wincheck Pond	Hopkinton
Wyoming Pond	Hopkinton
Yawgoo Pond	South Kingstown
Yawgoog Pond	Hopkinton

Lakes Identified with Elevated Levels of PCBs in Fish Tissue

Mashapaug Pond	Providence

Lakes with Fish Tissue Data below Public Health Threshold (< .3 ppm)

Lake Name	Location
Belleville Pond	North Kingstown
Chapman Pond	Westerly
Gorton Pond	Warwick
Oak Swamp Reservoir	Johnston
Simmons Reservoir	Johnston
Warwick Pond	Warwick

Appendix C. RI Freshwater Licensed Beaches

Beach Name	Lake Name	City/Town	Public/ Private
Aquapaug Scout Reservation	Wordens Pond	South Kingstown	Private
Bowdish Lake Campground	Bowdish Reservoir	Glocester	Private
Breezy Lake Beach	Upper Dam Pond	Coventry	Private
Briar Point Beach	Tiogue Lake	Coventry	Private
Buck Hill Campground	Wakefield Pond	Burrillville	Private
Burlingame State Park - Campground	Watchaug Pond	Charlestown	Public
Burlingame State Park - Picnic Area	Watchaug Pond	Charlestown	Public
Camp Aldersgate	Lake Aldersgate	Scituate	Private
Camp Canonicus	The Reservoir	Exeter	Private
Camp Cookie	Unnamed Pond	Chepachet	Private
Camp Davis	School House Pond	Charlestown	Private
Camp Hoffman	Larkin Pond	West Kingston	Private
Camp Massasoit	Oak Swamp Reservior	Johnston	Private
Camp Ruggles/Irons Homestead	Coomer Lake	North Scituate	Private
Camp Shepard	Unnamed Pond	Geenville	Private
Camp Watchaug	Watchaug Pond	Charlestown	Private
Camp Watmough	Coomer Lake	North Scituate	Private
Colwell's Campground	Flat River Reservior	Coventry	Private
DiFonzo Recreation Area	Spring Grove Pond	Glocester	Private
Dyer Woods Nudist Campground	Unnamed Pond	Foster	Private
Echo Lake Camps	Pascoag Reservior (Echo Lake)	Pascoag	Private
Episcopal Conference Center Church	Pascoag Reservior (Echo Lake)	Burrillville	Private
George Washington Campground	Bowdish Resevoir	Glocester	Private
Georgiaville Pond Beach	Georgiaville Pond	Smithfield	Public
Ginny-B Campground Beach	Unnamed Pond	Foster	Private
Gorton's Pond Beach	Gorton Pond	Warwick	Public
Governor Notte Park Beach	Wenscott Resevoir	North Providence	Public
Harmony Hill School	Unnamed Pond	Chepachet	Private
Hope Community Services Beach	Pawtuxet River	Scituate	Private
Kent County YMCA	Unnamed Pond	Warwick	Private
Kingston's Camp	Unnamed Pond	Warwick	Private
Larkin's Pond Beach	Larkin Pond	West Kingston	Private
Lincoln Woods State Park Beach	Olney Pond	Lincoln	Public
Marion Irons Beach	Moswansicut Pond	Glocester	Private
Mother of Hope Day Camp	Pascoag Reservior (Echo Lake)	Glocester	Private
Ninigret Park Beach	Unnamed Pond	Charlestown	Public
Pulaski State Park Beach	Bowdish Resevoir	Glocester	Public
Slack's Pond Beach	Slack Resvoir	Smithfield	Public
Spring Lake Beach	Spring Lake Pond	Burrillville	Public
W Alton Jones Beach	Eisenhower Lake	West Greenwich	Private
Westwood YMCA Beach	Quidnick Resevoir	Coventry	Private
Yawgoog Scout Reservation	Yawgoog Pond	Rockville	Private

Source: RI Department of Health, 2012

Appendix D. Occurrence of Aquatic Invasive Plants in Rhode Island Lakes

Appendix D: Occurrence of Aquatic Invasive Plants in Rhode Island Lakes

Lake Name	Size (acres)	Town	Public Access			Aquatic Invasive Plants Found in Lake														No Aquatic Invasive Plants present
			Public (DEM/Town) Boat Ramp	Licensed Beach	Public Fishing Area	**Variable watermilfoil**	**Fanwort**	Eurasian watermilfoil	Curly-leaf pondweed	Water chestnut	Spiny naiad	American Lotus	Inflated bladderwort	Brazilian elodea	Mudmat	Parrot feather	Water hyacinth	Yellow floating heart	
Alton Pond	44.21	Hopkinton	X			X														
Arnold Mills Reservoir (Pawtucket Reservoir)	251.51	Cumberland				X														
Arnold Pond	73.57	Coventry												X						
Asa Pond	23.85	South Kingstown																		X
Ashville Pond	25.68	Hopkinton	X			X							X							
Barber Pond	28.16	South Kingstown	X			X	X													
Barden Reservoir	247.12	Foster Scituate																		X
Barney Pond	23.84	Lincoln						X	X											
Beach Pond	142.74	Exeter	X																	X
Belleville Ponds	130.27	North Kingstown			X	X	X			X										
Blackamore Pond	20.44	Cranston																		X
Blue Pond	93.93	Hopkinton			X															X
Boone Lake	45.64	Exeter				X														
Bowdish Reservoir	219.37	Glocester	X	X		X	X													
Breakheart Pond	43.79	Exeter West Gree	X			X														
Brickyard Pond	84.06	Barrington			X				X											
Browning Mill Pond (Arcadia Pond)	50.03	Exeter Richmond			X															X
Burlingame Reservoir	67.24	Glocester			X															X
Capwell Mill Pond	23.88	West Greenwich																		X
Carbuncle Pond	38.92	Coventry	X			X	X								X					
Carolina Trout Pond	3.30	Richmond			X	X											X			
Carr Pond (N. Kingstown)	54.56	North Kingstown				X	X													
Carr Pond (W. Greenwich)	81.31	West Greenwich																		X
Chapman Pond	172.77	Westerly	X					X		X	X	X								
Clarksville Pond	15.03	Glocester	X			X	X													
Coomer's Lake	15.55	Glocester		X																X

Appendix D: Occurrence of Aquatic Invasive Plants in Rhode Island Lakes

Lake Name	Size (acres)	Town	Public Access			Aquatic Invasive Plants Found in Lake													No Aquatic Invasive Plants present
			Public (DEM/Town) Boat Ramp	Licensed Beach	Public Fishing Area	**Variable watermilfoil**	**Fanwort**	Eurasian watermilfoil	Curly-leaf pondweed	Water chestnut	Spiny naiad	American Lotus	Inflated bladderwort	Brazilian elodea	Mudmat	Parrot feather	Water hyacinth	Yellow floating heart	
Coventry Reservoir (Stump Pond)	168.00	Coventry				X													
Deep Pond (Charlestown)	14.87	Charlestown			X														X
Dexter Pond	1.85	Scituate			X													X	
Diamond Hill Reservoir	357.62	Cumberland																	X
Echo Lake	24.39	Barrington																	X
Echo Lake (Pascoag Reservoir)	349.07	Burrillville Glocest	X	X		X	X						X						
Flat River Reservoir (Johnson Pond)	647.14	Coventry	X	X		X	X												
Frying Pan Pond	16.47	Hopkinton Richmond																	X
Georgiaville Pond	96.91	Smithfield		X		X	X				X								
Glen Rock Reservoir	30.25	South Kingstown				X													X
Gorton Pond	58.30	Warwick		X			X	X							X				
Great Grass Pond	50.79	Coventry West Greenwich																	X
Happy Hollow Pond	20.57	Cumberland				X	X												
Hawkins Pond	24.52	Smithfield Johnston					X												
Hopkins Mills Pond	9.43	Foster			X														X
Hundred Acre Pond	84.16	South Kingstown				X	X							X					
Indian Lake	264.66	South Kingstown	X									X					X		
J.L. Curran Reservoir (Fiskeville Reservoir)	46.23	Cranston	X																X
Keech Pond	49.25	Glocester	X			X													
Kickemuit Reservoir (Warren Reservoir)	42.24	Warren																	X
Lake Washington	40.89	Glocester	X			X									X				
Larkin Pond	41.66	South Kingstown		X															X
Lily Pond	29.13	Newport				X													
Little Grass Pond	8.21	Coventry																	X

Appendix D: Occurrence of Aquatic Invasive Plants in Rhode Island Lakes

Lake Name	Size (acres)	Town	Public Access			Aquatic Invasive Plants Found in Lake														No Aquatic Invasive Plants present
			Public (DEM/Town) Boat Ramp	Licensed Beach	Public Fishing Area	**Variable watermilfoil**	**Fanwort**	Eurasian watermilfoil	Curly-leaf pondweed	Water chestnut	Spiny naiad	American Lotus	Inflated bladderwort	Brazilian elodea	Mudmat	Parrot feather	Water hyacinth	Yellow floating heart	
Locustville Pond	82.30	Hopkinton	X			X													
Long Pond	39.38	South Kingstown			X														X
Maple Lake	14.42	Charlestown																	X
Maple Root Pond	21.68	Coventry																	X
Mashapaug Pond	76.75	Providence	X																X
Meadowbrook Pond (Sandy Pond)	23.06	Richmond			X	X													
Melville Ponds	13.59	Portsmouth	X																X
Mishnock Lake	47.03	West Greenwich				X													
Moswansicut Pond	280.90	Johnston Scituate		X															X
Oak Swamp Reservoir	109.36	Johnston		X															X
Olney Pond	129.03	Lincoln	X	X		X	X	X	X		X								
Pasquiset Pond	76.62	Charlestown																	X
Peck Pond	13.41	Burrillville			X														X
Peckham Rd. Pond	0.33	Little Compton																X	
Peeptoad Pond	9.77	Scituate					X												
Pocassett Pond	3.75	Johnston														X			
Ponagansett Reservoir	219.98	Glocester																	X
Porters Pond	5.79	Foster								X									
Potowomut Pond	18.67	North Kingstown	X			X	X												
Primrose Pond	10.38	North Smithfield																	X
Print Works Pond	26.26	Cranston					X												
Quidnick Reservoir	173.41	Coventry		X															X
Randall Pond	34.44	Cranston					X												
Regulating Reservoir	213.59	Scituate				X	X												
Reynolds Pond	41.71	Coventry West Greenwich				X	X												
Robin Hollow Pond	14.72	Cumberland				X	X												
Rocky Brook Pond	5.83	South Kingstown				X													
Roger Williams Park Ponds	113.95	Providence	X				X		X										

Appendix D: Occurrence of Aquatic Invasive Plants in Rhode Island Lakes

Lake Name	Size (acres)	Town	Public Access			Aquatic Invasive Plants Found in Lake													No Aquatic Invasive Plants present
			Public (DEM/Town) Boat Ramp	Licensed Beach	Public Fishing Area	**Variable watermilfoil**	**Fanwort**	Eurasian watermilfoil	Curly-leaf pondweed	Water chestnut	Spiny naiad	American Lotus	Inflated bladderwort	Brazilian elodea	Mudmat	Parrot feather	Water hyacinth	Yellow floating heart	
Round Pond	15.24	Burrillville																	X
Round Pond (Little Compton)	34.25	Little Compton																	X
Round Top State Pond	9.72	Burrillville			X	X													
Saint Mary's Pond	112.06	Portsmouth			X														X
Sand Pond (N. of Airport)	12.21	Warwick													X				
Sands Pond	12.73	New Shoreham																	X
Sandy Pond (S. of Airport) (Little Pond)	28.34	Warwick													X				
Sawmill Pond	7.37	Glocester				X	X												
Schoolhouse Pond	96.44	Charlestown		X															X
Scituate Reservoir	3276.80	Scituate				X	X												
Scott Pond	42.13	Lincoln																	X
Secret Lake	46.21	North Kingstown				X	X												
Shippee Saw Mill Pond	8.19	Foster	X			X													
Silver Spring Lake	18.75	North Kingstown	X			X	X												
Simmons Pond	36.83	Little Compton			X														X
Sisson Pond	69.07	Portsmouth																	X
Slack Reservoir	133.61	Johnston Smithfield		X		X	X				X				X				
Slater Park Pond	21.36	Pawtucket			X	X			X										
Slatersville Reservoir	218.87	Burrillville North S	X			X	X												
Smith & Sayles Reservoir	172.74	Glocester	X			X													
Sneech Pond	98.82	Cumberland				X	X												
Spectacle Pond	38.81	Cranston																	X
Spring Green Pond	8.60	Warwick																	X
Spring Grove Pond	22.38	Glocester		X		X	X												
Spring Lake (Herring Pond)	94.80	Burrillville	X	X		X	X						X						
Stafford Pond	480.13	Tiverton	X												X				

Appendix D: Occurrence of Aquatic Invasive Plants in Rhode Island Lakes

Lake Name	Size (acres)	Town	Public Access			Aquatic Invasive Plants Found in Lake														No Aquatic Invasive Plants present
			Public (DEM/Town) Boat Ramp	Licensed Beach	Public Fishing Area	**Variable watermilfoil**	**Fanwort**	Eurasian watermilfoil	Curly-leaf pondweed	Water chestnut	Spiny naiad	American Lotus	Inflated bladderwort	Brazilian elodea	Mudmat	Parrot feather	Water hyacinth	Yellow floating heart	
Sucker Pond	53.81	Burrillville					X													
Tarbox Pond	19.90	West Greenwich	X			X	X													
Tarkiln Pond	22.92	North Smithfield			X	X	X													
The Reservoir	21.49	Exeter		X			X													
Thirty Acre Pond	15.15	South Kingstown	X			X	X													
Three Ponds	21.42	Warwick					X													
Tillinghast Pond	40.68	West Greenwich																		X
Tiogue Lake	233.90	Coventry	X	X		X	X													
Tucker Pond	92.97	South Kingstown	X																	X
Turner Reservoir (Central Pond)	129.69	East Providence				X	X		X	X										
Turner Reservoir	85.08	East Providence							X	X										
Upper Dam Pond	20.49	Coventry		X							X									
Wakefield Pond	75.07	Burrillville	X	X			X													
Wallum Lake	172.79	Burrillville	X (MA)	X(MA)																X
Warwick Pond	84.72	Warwick																		X
Wash Pond	19.24	South Kingstown																		X
Watchaug Pond	567.92	Charlestown	X	X																X
Waterman Pond (Sisson Pond)	32.34	Coventry																		X
Waterman Reservoir	251.86	Glocester Smithfield				X	X				X									
Wenscott Reservoir (Twin Rivers)	82.82	Lincoln North Providence Smithf		X		X	X		X											
White Pond	25.91	South Kingstown																		X
Whitford Pond	38.30	Coventry																		X
Wilson Reservoir	109.31	Burrillville	X																	X
Wincheck Pond	145.71	Hopkinton				X														
Woonasquatucket Reservoir (Stump Pond)	302.84	Smithfield	X			X	X													

Appendix D: Occurrence of Aquatic Invasive Plants in Rhode Island Lakes

Lake Name	Size (acres)	Town	Public Access			Aquatic Invasive Plants Found in Lake													No Aquatic Invasive Plants present
			Public (DEM/Town) Boat Ramp	Licensed Beach	Public Fishing Area	**Variable watermilfoil**	**Fanwort**	Eurasian watermilfoil	Curly-leaf pondweed	Water chestnut	Spiny naiad	American Lotus	Inflated bladderwort	Brazilian elodea	Mudmat	Parrot feather	Water hyacinth	Yellow floating heart	
Worden Pond	1051.18	South Kingstown	X	X		X	X										X		
Wyoming Pond	34.05	Hopkinton	X			X													
Yawgoo Pond	143.35	Exeter South Kingstown													X				

Appendix E. Aquatic Invasive Fact Sheets

RHODE ISLAND DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

FACT SHEET

Office of Water Resources September 2010

Freshwater Aquatic Invasive Species in Rhode Island
Variable Milfoil

Size of variable milfoil relative to a penny

Emergent spike with bracts and flowers

Fragments of variable milfoil washed ashore

Species Description and General Information

Variable milfoil (*Myriophyllum heterophyllum)* is a submerged aquatic plant with fine, densely packed, feather-divided leaves whorled around a main stem. There are generally 5 to 14 pairs of leaflets per leaf, and 4 to 6 leaves per whorl (5 is common). Stems range from green to bright red in color. In July, plants may exhibit a three- to six-inch emergent spike above the waterline. Specialized leaves (bracts) and flowers grow along the spike. Bracts are blade-shaped, serrated and longer than the flower. Flowers are small, white and occur in the axils of the bracts. Variable milfoil grows in both still and flowing waters in a variety of substrates at depths from 1 to 5 meters. Plants reproduce by spreading rhizomes, turions, seeds and fragmentation.

Why is Variable Milfoil Considered an Invasive Species?

Milfoil spreads rapidly and displaces beneficial native plant life. Thick growth of milfoil also degrades water quality for aquatic life and can provide breeding areas for mosquitoes. Dense stands can impede recreation such as swimming, fishing and boating and can devalue waterfront property. Milfoil is very difficult to control once it becomes fully established. Where this species grows in its native environment, insects and fish may feed on this plant at such a rate as to control its growth. However, in Rhode Island, milfoil has no natural predators to keep its population in check. Under optimum temperature, light and nutrient conditions, milfoil may grow up to an inch per day.

How Did Exotic Milfoil Become Established in Rhode Island?

Variable milfoil is native to the Southeastern and Midwestern United States. It was first observed in New England in Bridgeport, CT in 1932 and now resides in every New England state except Vermont. Initial

introductions were most likely from aquarium releases or from "stowaway" fragments attached to a boat or trailer. Milfoil can live out of water for many hours if it remains moist, like when it's wound around a wet

carpeted bunk on a boat trailer. Milfoil is usually first found near boat launch sites. Once introduced, milfoil can spread through fragmentation, whereby plant fragments break off from the parent plant through wind or boat action, grow roots and settle in a new location.

What Methods Are Currently Being Used to Control Milfoil?

Hand pulling may be effective for small patches. The manual removal of submerged aquatic vegetation is restricted to that area adjacent to, but no more than fifteen feet from existing or permitted docks, beaches or swimming areas under the RI Fresh Water Wetlands Regulations (Rule 6.02). Manual plant removal outside this area or control of larger patches via mechanical cutting or harvesting requires a DEM wetlands permit (see below). Physical removal methods, such as mechanical harvesting, are generally not recommended for milfoil species because the plant can reproduce by fragmentation. Experience from other states has indicated that infestations of fragmenting species can actually be made worse by mechanical harvesting activities that unintentionally promote the spread of the plant.

Chemical control may be effective for large populations. The DEM Division of Agriculture licenses the applicators that can apply the regulated herbicides to treat target invasive plants. Each herbicide treatment requires a specific permit from the Division of Agriculture. The most appropriate means of selecting a specific treatment plan is to consult a lake manager or licensed herbicide applicator, who can provide treatment options and estimate associated costs. A more detailed survey of the entire water body will likely be needed to assess the severity of the infestation and develop the most effective and cost efficient long-term management plan.

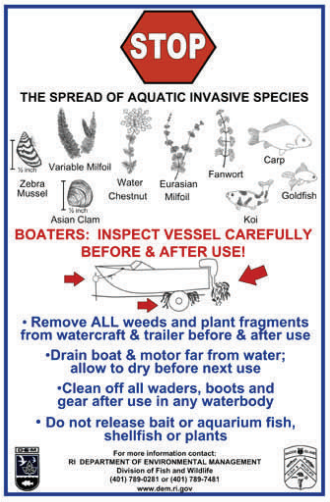
Please Help Prevent the Spread of Variable Milfoil in Rhode Island!

Learn to identify invasive plant species and be on the lookout for new plants in your lake.
It is much easier to manage a small patch of invasive plants than an entire lake covered with plants, so early detection is key! Identification resources are available on the RIDEM website at http://www.dem.ri.gov/programs/benviron/water/quality/surfwq/aisindex.htm.

RIDEM also encourages the use of clean boat hygiene practices. Boats (trailers and motors too) should be inspected for plant fragments before launching in the water and after boats have been hauled out of the water. See posted reminders at state boat ramps.

For more information also see:

- Guide to Understanding Freshwater Aquatic Plants, RIDEM
  http://www.dem.ri.gov/programs/benviron/water/quality/surfwq/pdfs/aquaplnt.pdf
- Aquatic Invasive Species in Rhode Island
  http://www.dem.ri.gov/programs/benviron/water/quality/surfwq/aisindex.htm
- RI DEM Herbicide permit application
  http://www.dem.ri.gov/programs/bnatres/agricult/pesticide.htm
- RI DEM Water Quality and Wetland Restoration Team
  http://www.dem.ri.gov/programs/benviron/water/wetlands/pdfs/wqwrteam.pdf
- RI DEM Wetlands permit application
  http://www.dem.ri.gov/programs/benviron/water/permits/fresh/index.htm
- The URI Watershed Watch Program
  www.uri.edu/ce/wq/ww
- The Rhode Island Natural History Survey
  http://www.rinhs.org/



RHODE ISLAND DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

FACT SHEET

Office of Water Resources / September 2010

Freshwater Aquatic Invasive Species in Rhode Island
Fanwort

Size of fanwort relative to a penny. Note fan-like opposite leaves.

Fanwort flower

Dense stand of fanwort

Species Description and General Information

Fanwort (*Cabomba caroliniana*) is a submerged aquatic plant that can be identified by its underwater leaves, which are divided into fine branches giving them a feathery, fan-like appearance. Leaves are bright green and oppositely arranged along stems that extend from short rhizomes rooted to the substrate. Fanwort flowers from from May to September. Flowers emerge from the water on stalks that extend from the tips of the stems. Flower buds on the stalks are surrounded by floating leaves that are small, linear and entire, differing from underwater leaves. Flowers range in color from white to pale yellow. *C. caroliniana* prefers shallow waters (less than 3 meters), but can survive in depths up to 10 meters. Plants thrive in eutrophic environments with a low pH and silty substrate. Alkaline environments, high calcium levels (not common to RI) and hard substrates impede plant growth and reduce vigor. Plants can withstand relatively high levels of turbidity. Fanwort produces seeds but is spread primarily through fragmentation, whereby plant fragments break off and settle in new locations.

Why is Fanwort Considered an Invasive Species?

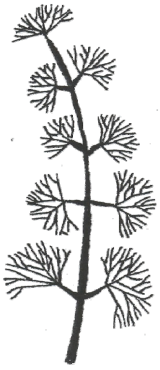
Fanwort is a competitive and aggressive plant that, once introduced, has the potential to displace native species. Dense stands of fanwort can interfere with recreational activities such as swimming, paddling and fishing. Heavy infestations can lower the aesthetic quality of the water body and devalue waterfront properties. When dense stands of fanwort die off the subsequent decomposition can lower oxygen levels, creating the potential for fish kills.

How Did Fanwort Become Established in Rhode Island?

Fanwort is native to the southeastern United States and parts of South America. It was likely introduced into natural water bodies in New England as an aquarium plant and was first observed in Rhode Island in 1936. Because plants can reproduce through fragmentation, boats, motors, fishing gear and other equipment used

in infested waters that are not properly cleaned can harbor viable plants and spread fanwort to new water bodies. According to USGS, plant fragments that are kept moist can survive 6 to 8 weeks. Therefore, it is extremely important to clean and remove all plant materials from motors, boats, trailers and other field gear each time they are taken out of a water body!

What Methods Can Be Used to Control Fanwort?



Because it can reproduce by fragmentation, physical control activities such as cutting or raking may unintentionally promote the spread of fanwort. It is recommended that physical control be limited to those areas where the plant is a nuisance and requires immediate relief or to manual hand pulling of small patches. By law, the manual removal of submerged aquatic vegetation is restricted to that area adjacent to, but no more than fifteen feet from, existing or permitted docks, beaches or swimming areas under the Fresh Water Wetlands Regulations (Rule 6.02). Manual plant removal outside this area requires a DEM wetlands permit (see below). The placement of benthic barriers to compress and shade out small patches of fanwort may also provide effective control but is less feasible for larger infestations.

Chemical control may be effective for large populations. The DEM Division of Agriculture licenses the applicators that can apply the regulated herbicides to treat invasive plants. Each herbicide treatment requires a specific permit from the Division of Agriculture (see below). The most appropriate means of selecting a specific treatment plan is to consult a lake manager or licensed herbicide applicator who can provide treatment options and estimate the associated costs. A more detailed survey of the entire water body will likely be needed to develop the most effective and cost efficient long-term management plan.

Please Help Prevent the Spread of Fanwort in Rhode Island!

Learn to identify invasive plant species and be on the lookout for new plants in your lake.
It is much easier to manage a small patch of invasive plants than an entire lake covered with plants, so early detection is key! Identification resources are available on the RIDEM website at http://www.dem.ri.gov/programs/benviron/water/quality/surfwq/aisindex.htm.

RIDEM also encourages the use of clean boat hygiene practices. Boats (trailers and motors too) should be inspected for plant fragments before launching in the water and after boats have been hauled out of the water. See posted reminders at state boat ramps.

For more information also see:

- Guide to Understanding Freshwater Aquatic Plants, RIDEM
  http://www.dem.ri.gov/programs/benviron/water/quality/surfwq/pdfs/aquaplnt.pdf
- Aquatic Invasive Species in Rhode Island
  http://www.dem.ri.gov/programs/benviron/water/quality/surfwq/aisindex.htm
- RI DEM Herbicide permit application
  http://www.dem.ri.gov/programs/bnatres/agricult/pesticide.htm
- RI DEM Water Quality and Wetland Restoration Team
  http://www.dem.ri.gov/programs/benviron/water/wetlands/pdfs/wqwrteam.pdf
- RI DEM Wetlands permit application
  http://www.dem.ri.gov/programs/benviron/water/permits/fresh/index.htm
- The URI Watershed Watch Program
  www.uri.edu/ce/wq/ww
- The Rhode Island Natural History Survey
  http://www.rinhs.org/

RHODE ISLAND DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

FACT SHEET

Office of Water Resources / October 2010

Freshwater Aquatic Invasive Species in Rhode Island
Water Chestnut

Floating rosette

Woody fruits of water chestnut

Dense floating mat of water chestnut

Species Description and General Information

Water chestnut (*Trapa natans*) is a rooted floating aquatic plant with both floating and submerged leaves. Floating leaves are arranged in a rosette pattern attached to the main stem by leaf-stems with air-filled bladders to provide buoyancy. Floating leaves are green, glossy, triangular and toothed. Submerged leaves are alternate and feathery. Flowers are small, white and located towards the center of the rosette. The fruit is large and woody and contains four sharp barbs. Fruits appear by late summer and are released as the plants die off with the advent of frost. Seeds remain viable for up to twelve years, though most germinate within two years. Water chestnut prefers soft sediments and quiet, nutrient rich waters.

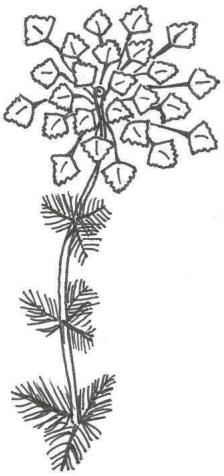
Why is Water Chestnut Considered a Nuisance Species?

Water chestnut can form dense, monotypic floating mats that cover the surface of the water. These mats limit the amount of light available to other aquatic plants, allowing it to quickly displace native species. The decomposition of these mats may lower the dissolved oxygen in the water, creating the potential for fish kills. Dense mats also impede recreation such as boating, fishing and swimming. The USGS reports that many previously fished bays in Lake Champlain are now completely inaccessible as a result of a severe water chestnut infestation. The barbed fruits wash up along the shore line posing a hazard for humans and pets.

How Did Water Chestnut Become Established in Rhode Island?

Water chestnut was introduced to New England from Asia as an ornamental plant that spread into natural water bodies. Water chestnut was first observed in Rhode Island in 2007 in Belleville Pond, North Kingstown and several subsequent infestations are currently known. Once introduced into a water body, water chestnut can establish and spread rapidly. Each seed may produce 10 to 15 rosettes and each rosette may produce 15-20 seeds. Plants disperse primarily through seeds but also by rosettes that detach from their stems, float to another area and drop their seeds.

What Methods Can Be Used to Control Water Chestnut?



Because it is an annual, water chestnut management is most effective through physical control. Hand pulling is effective for small populations. Because seeds can remain viable for up to 12 years, yearly monitoring of pulled water bodies is necessary. Water chestnut can spread rapidly. Thus, early detection and rapid response to infestations is important. Severe infestations may require large scale mechanical harvesting. By law, the manual removal of submerged aquatic vegetation is restricted to that area adjacent to, but no more than fifteen feet from, existing or permitted docks, beaches or swimming areas under the Fresh Water Wetlands Regulations (Rule 6.02). Manual plant removal outside this area or physical control of larger patches via mechanical cutting or harvesting requires a DEM wetlands permit (see below).

Chemical control may be effective for large populations. The DEM Division of Agriculture licenses the applicators that can apply the regulated herbicides to treat invasive plants. Each herbicide treatment requires a specific permit from the Division of Agriculture (see below). The most appropriate means of selecting a specific treatment plan is to consult a lake manager or licensed herbicide applicator who can provide treatment options and estimate the associated costs. A more detailed survey of the entire water body will likely be needed to develop the most effective and cost efficient long-term management plan.

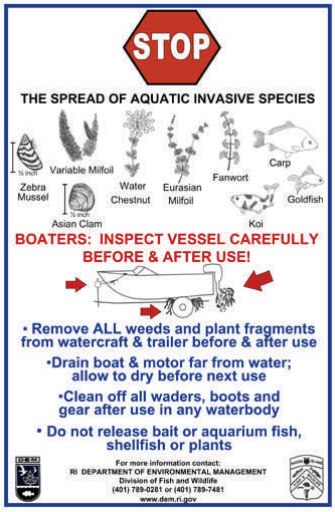
Please Help Prevent the Spread of Water Chestnut in Rhode Island!

Learn to identify invasive plant species and be on the lookout for new plants in your lake.
It is much easier to manage a small patch of invasive plants than an entire lake covered with plants, so early detection is key! Identification resources are available on the RIDEM website at http://www.dem.ri.gov/programs/benviron/water/quality/surfwq/aisindex.htm.

RIDEM also encourages the use of clean boat hygiene practices. Boats (trailers and motors too) should be inspected for plant fragments before launching in the water and after boats have been hauled out of the water. See posted reminders at state boat ramps.

For more information also see:

- Guide to Understanding Freshwater Aquatic Plants, RIDEM
  http://www.dem.ri.gov/programs/benviron/water/quality/surfwq/pdfs/aquaplnt.pdf
- Aquatic Invasive Species in Rhode Island
  http://www.dem.ri.gov/programs/benviron/water/quality/surfwq/aisindex.htm
- RI DEM Herbicide permit application
  http://www.dem.ri.gov/programs/bnatres/agricult/pesticide.htm
- RI DEM Water Quality and Wetland Restoration Team
  http://www.dem.ri.gov/programs/benviron/water/wetlands/pdfs/wqwrteam.pdf
- RI DEM Wetlands permit application
  http://www.dem.ri.gov/programs/benviron/water/permits/fresh/index.htm
- The URI Watershed Watch Program
  www.uri.edu/ce/wq/ww
- The Rhode Island Natural History Survey
  http://www.rinhs.org/



Appendix F. Aquatic Invasive Species Detected in Rhode Island Rivers

The majority of RI lakes exist as the result of the impoundment of a river or stream. The effective management of AIS in a lake needs to take into account conditions in all rivers or streams that are tributary to the lake. Given the ability of both variable milfoil and fanwort to spread by fragmentation, it is important to know if AIS are present upstream and therefore likely to be transported via streamflow into the lake. In cases where multiple lakes are infested within a watershed, coordinated management among lake associations and other responsible entities will be needed to maximize the potential for successful control of AIS. Accordingly, RIDEM integrated AIS surveys into its ambient river monitoring program for water quality as an efficient means to gain important information on the presence of AIS in RI's rivers. RIDEM-OWR checked 81 rivers and streams at one or more points along their course (riverway). AIS were observed in 15 rivers; **19%** of those checked. Although a 19% infestation rate initially appears low relative to 64% of lakes, the majority of rivers checked by RIDEM-OWR personnel are small headwater streams that do not provide adequate physical habitat for plant growth. All of Rhode Island's large rivers, which provide suitable habitat for plant growth, maintain AIS populations. Eight rivers have more than one species of AIS present. Invasive plants present in Rhode Island rivers are listed below.

Aquatic Invasive Plants Observed in Rhode Island Rivers by RIDEM-OWR Surveys

River	Variable Milfoil	Eurasian Milfoil	Fanwort	Curlyleaf Pondweed
Abbott Run Brook	X			
Blackstone	X	X	X	X
Branch	X		X	
Chipuxet	X		X	
Clear	X		X	
Moshassuck		X	X	
Pawcatuck	X			
Pawtuxet	X		X	X
Peeptoad Brook			X	
Saugatucket	X		X	
Tarkiln Brook	X			
Ten Mile	X			X
West			X	
Wood	X			
Woonasquatucket	X		X	