

Loon Pond Hillsborough, New Hampshire Source Water Protection Plan

January, 2015



Prepared By: **Town of Hillsborough, NH Drinking Water Protection Committee**
And

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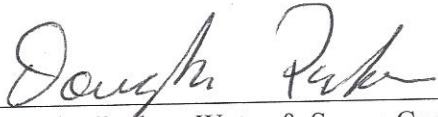
Source Water Protection Plan for Loon Pond, Hillsborough, NH
Drinking Water Protection Committee



Hermann Wiegelman, Water & Sewer Commissioner

3-5-15

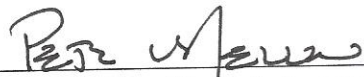
Date



Douglas Parker, Water & Sewer Commissioner

2-12-2015

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Peter Mellen, Water & Sewer Commissioner

2-12-2015

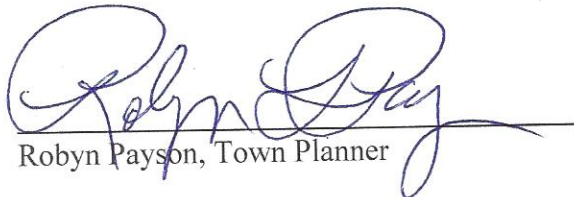
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Penny Griffin, Water & Sewer Administrator

2-12-2015

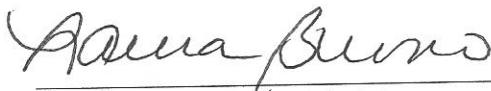
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Robyn Payson, Town Planner

2/18/2015

Date



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3-6-15

Date

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1. Introduction

Although more than 70% of Earth is covered by water, only approximately 2.4% is fresh water. Nearly 90% of fresh water is frozen in glaciers and icecaps, meaning only 0.24% of all of the water on Earth is available in fresh, liquid form. Preserving the purity of this resource has long been recognized as a priority for both municipal and state governments.

Approximately 40% of New Hampshire communities rely on surface waters such as lakes, reservoirs, and rivers for their domestic, municipal water needs. Although surface waters are more able to provide a large volume of water on-demand than groundwater, they are often more susceptible to pollution and often require more extensive treatment than groundwater sources. As such, protecting the area from which the surface water originates, also known as a watershed, is of vital importance for ensuring both quality and quantity.

This source water plan aims to increase public understanding of the Loon Pond Watershed, which is the primary drinking water supply for the Town of Hillsborough. This plan is meant to act as a guide for local decision makers, elected officials, managers, and citizens to use to make well-informed decisions regarding this resource. The objective of this plan is to identify potential sources of contamination from both anthropogenic and natural sources, and provide specific recommendations to manage these threats in order to maintain drinking water quality. This plan was prepared by the Granite State Rural Water Association (GSRWA) in collaboration with the Hillsborough Water Department, the Town of Hillsborough Planning Department, and Water System Operators, the contracted water operator for the Hillsborough Water Department. Following a workshop with the Hillsborough Water Department on September 11th, 2014, GSRWA began meeting with the above mentioned entities to discuss risks to Loon Pond and to develop a potential sources of contamination list and identify possible management actions to mitigate these risks.

This plan is a working document and should be reviewed annually and updated to remain current, relevant, active, and viable. A carefully researched and drafted source water protection plan is the first step to achieving comprehensive protection of a water supply, however community participation, landowner cooperation, and wise management action on the part of elected and appointed officials are key.

Hillsborough, New Hampshire is a rural community of 6,011 individuals, with a median household income of \$54,386 (US Census Bureau 2010). Hillsborough covers approximately 45 square miles in Hillsborough County, in South-Central New Hampshire. There are four distinct villages or census-designated places within Hillsborough: Hillsborough Center, Hillsborough Upper/Lower Village, and the Emerald Lake Village District. The Contoocook River comprises the southern edge of the town. New Hampshire Routes 9 and 202 each bisect the town. Hillsborough contains numerous historic textile mills and is the birthplace of former US President Franklin Pierce. Hillsborough is also home to the Fox and Low State Forests.

2. Methods

To determine what potential contaminants were present in the watershed and to evaluate their risk to Loon Pond, extensive research was performed examining land use practices and site histories. Information on above and underground storage tanks, hazardous waste and underground injection permits, and hazardous material spill reports was gleaned from New Hampshire Department of Environmental Services' One-Stop data portal (NH DES). This

information was then verified and supplemented using a windshield survey, where sites were inspected visually from public thoroughways. At times, information garnered from NH DES's One-Stop was verified by communication with the Hillsborough Water Department and the Hillsborough Planning Department. Land cover was determined using the 2010-2011 1-FT Color Aerial Photos. Soils and underlying geology was determined using the Natural Resource Conservation Service (NRCS) Web Soil Survey and the Soil Survey of Hillsborough County, New Hampshire (USDA Soil Conservation Service 1989).

Guidance on evaluating the risk presented potential sources of contamination was provided by The DES Guide to Ground Water Protection (NH DES 2008), The Trust for Public Land Source Protection Handbook (Hopper and Ernst 2005), and Nonpoint Source Pollution: A Handbook for Local Governments (Jeer et. al. 1997). Furthermore, all information, data, and conclusions stated in this plan were reviewed by the Hillsborough Water Department, and Hillsborough Planning Department for accuracy.

All GIS data layers were accessed from the University of New Hampshire Extension's Geographically Referenced Analysis and Information Transfer System (NH GRANIT) and NH DES.

3. Description of Loon Pond and Source Protection Area

3.1 Description of Source and Source Protection Area

Loon Pond is a natural, dimictic, oligotrophic lake with a small, man-made dam to improve water retention and to help direct water into the system intake. Loon Pond covers an area of 154 acres with a maximum depth of approximately 40ft, an average depth of approximately 32ft, and an approximate, calculated volume of 30 million gallons. The 10-year annual precipitation average for Hillsborough, NH is 45 inches, which has so far provided sufficient recharge for the source. Loon Pond supports a variety of aquatic life including warm water fish species such as Bass and Bluegill, cold water species such as Rainbow Trout, and is frequently visited by migrating waterfowl. This is indicative of high-quality surface waters, typically found in heavily forested watersheds.

The Loon Pond Watershed is located entirely within the town limits of Hillsborough, New Hampshire approximately 3.5 miles north of the Hillsborough Business District and Route 9. The Source Protection Area covers approximately 1265 acres of mostly forested land with some residences located along local roads. The system serves approximately 2,000 individuals through 906 connections including 890 in Hillsborough and 16 in Deering. The system had an average daily usage of 245,000 gallons as of 2013. The filtration plant for Loon pond is located on Town Property near the outflow of the lake where it is filtered with slow sand filtration and disinfected using Ultraviolet Light (UV) system installed in 2014. From the filter house it flows via a 16-inch mains to two 500,000 storage reservoirs on Bible Hill. From Bible Hill water flows via a 16-inch main to Main St. and system users.

Loon Pond Watershed, Hillsborough, NH.

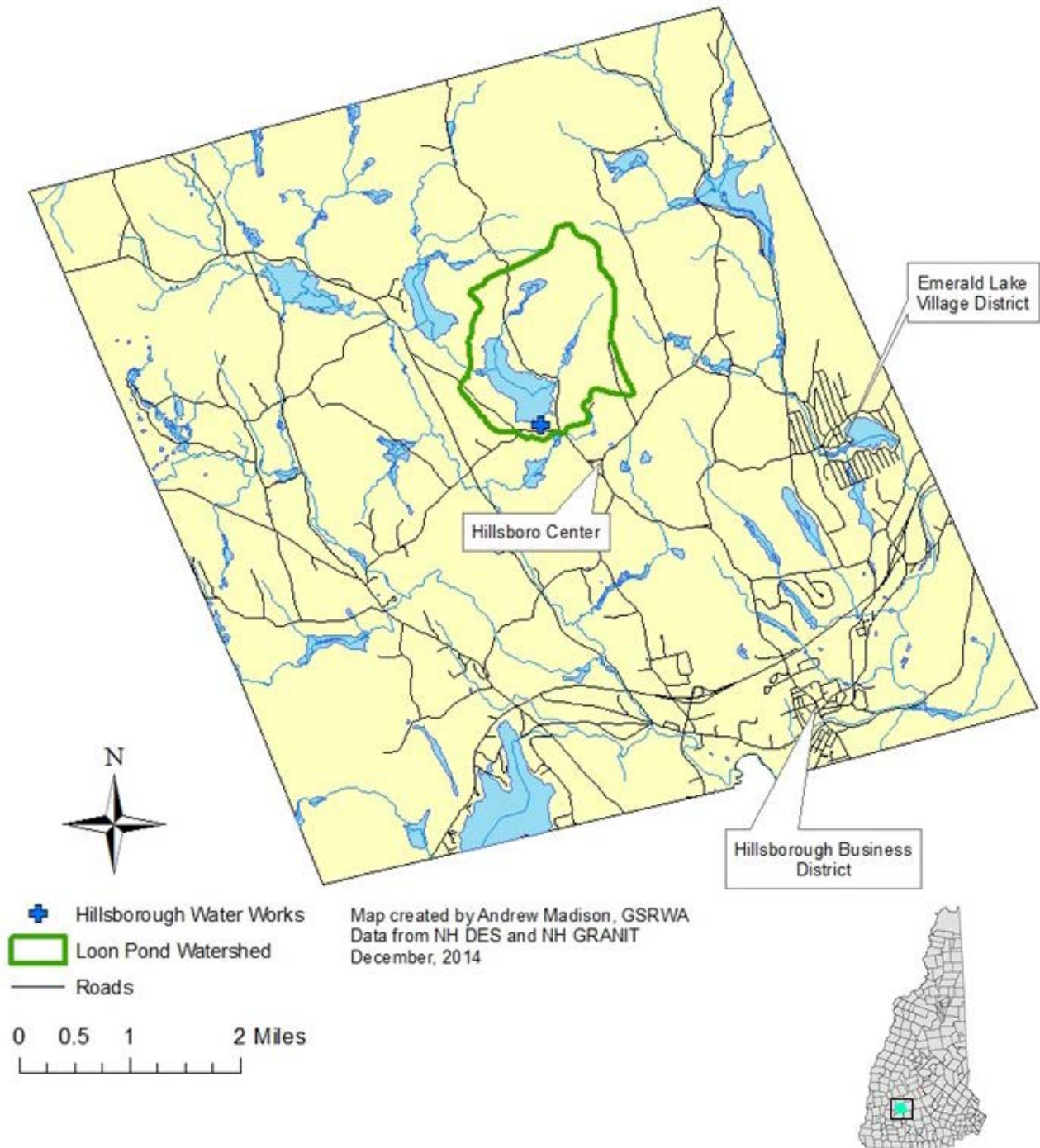


Figure 1. Loon Pond Watershed within Hillsborough, NH. Data from NH DES and NH GRANIT

3.2 Topography and Land Use

Elevation in the Loon Pond watershed varies from 940 ft above mean sea level on the surface of Loon Pond to 1768 ft at the peak of Thompson Hill, which defines the northern edge of the watershed. The eastern edge of the watershed is defined by rolling hills which vary in elevation from 1242 ft along the ridge of Kimball Hill to three un-named peaks, each approximately 1300 ft in elevation. East Washington Rd. runs along a ridge approximately 100ft above Loon Pond.

The Loon Pond watershed is primarily forest with few areas that have been cleared for either timber harvest, or residential land use. A windshield survey, and communication with the Hillsborough Planning Department revealed that only 28 residences are present in the watershed, however some are located adjacent to the Pond. Two roadways transect the watershed: East Washington Road travels north through the watershed along the western shore of Loon Pond while County Rd. travels north along the eastern shore. Kimball Hill Road dead ends within the watershed with a few residences located along it. Numerous, unofficial four-wheel drive roads are also located throughout the watershed. Land in the watershed is owned by private land-owners, and the Town of Hillsborough. Approximately 40% of the watershed (515 acres including Loon Pond) is conservation land with all but 3.5 acres of that being town-owned property. A list of property tax lot numbers, sizes and associated owners for conservation lands is available in Appendix 1.

3.3 Soils and Geology

Loon Pond is located in an area dominated by upland glacial till left from the Laurentian Glaciation approximately 20,000 years ago. Soils in the source protection area of Loon Pond consist primarily of stony and boulder fine sandy loams such as the Monadnock and Marlow fine sandy loams. Uplands in the watershed are dominated by Lyman-Turnbridge formations with shallow, sandy loam with gneiss and granite bedrock outcroppings. Two shallow ponds with associated wetlands are located east of Loon Pond and are hydrological connected to Loon Pond by first order streams. Two streams also drain from Loon Pond: One draining north to Contention Pond and a second un-named stream draining south, by the system intake, towards an un-named pond.

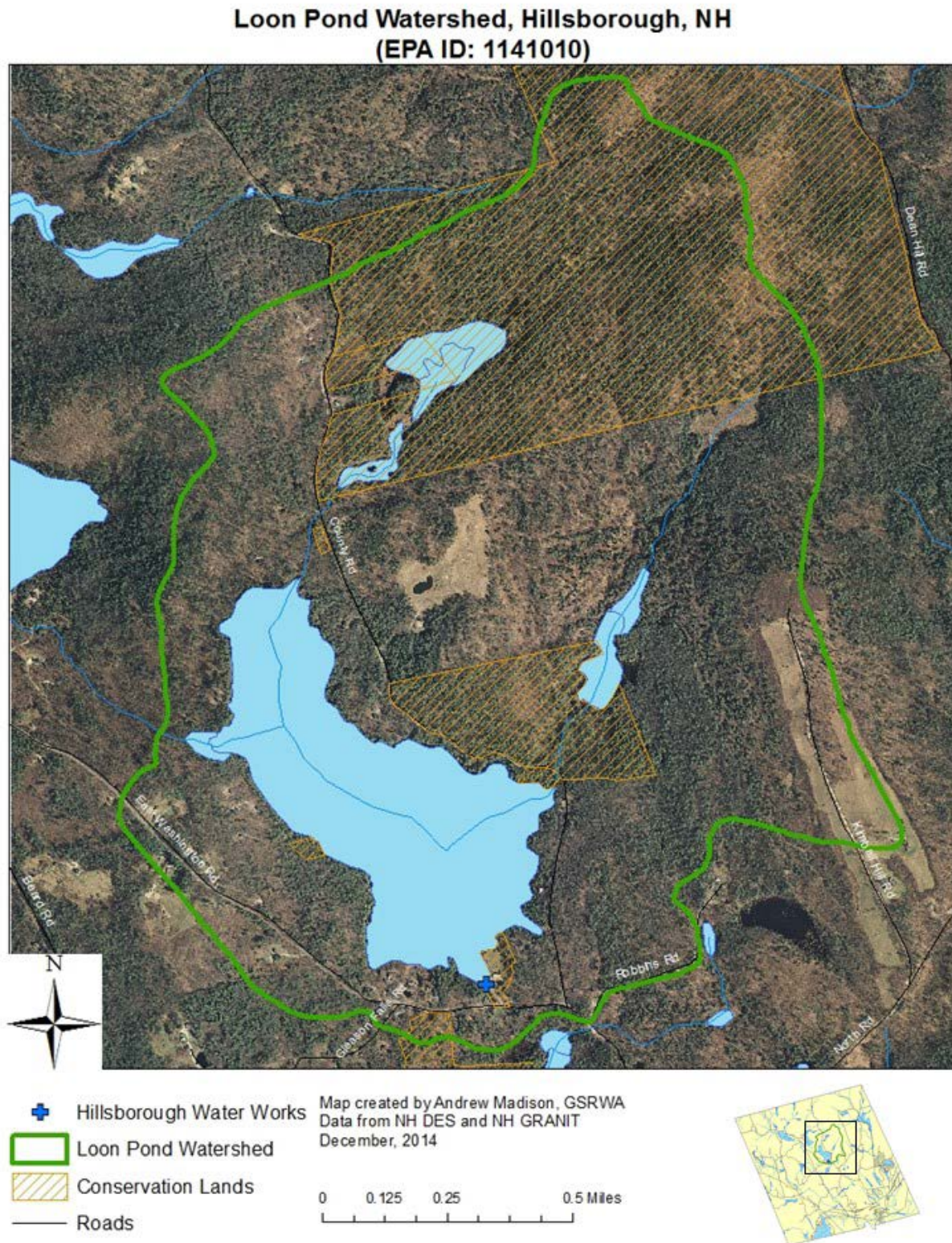


Figure 2. Land cover within the Loon Pond Watershed, Hillsborough, NH. Data from NH DES, NH GRANIT, and Hillsborough Planning Department.

4. Potential Sources of Contamination

4.1 *Current Land Use*

The Hillsborough Water Works has worked to protect water quality in Loon Pond by owning the lot where the system intake is located, acquiring land when possible, restricting access to the water, and monitoring surface water quality. The Town of Hillsborough has aided in this effort by passing zoning ordinances which restrict land use in this area. The Source Protection Area for Loon Pond is zoned for Rural-Agricultural and Timberland uses and is primarily occupied by residences, second/vacation homes, and forests. Potential impacts from historic land uses are practically non-existent, since the area has historically be rural and residential in nature. The rural nature and abutting state forests also protect Loon Pond for potential contamination from outside the source protection area. Activities in the Source Protection Area that may negatively impact water quality in Loon Pond include:

- Residential Land Use
- Transportation Corridors
- Recreation
- Land Clearing Activities

1.) Residential Land Use

There are approximately 30 residences in the Source Protection Area of Loon Pond. Some of these residences are primary, year-round residences while others may be second vacation or summer homes. Residential land use is associated with septic systems, lawn chemical use, the presence of home heating oil, and the presence of automotive chemicals and petroleum products in small quantities. Along the lake shore, residences may also be associated with lake access via private boat launches, docks or slips, and shore access for personal watercraft or swimmers.

When properly maintained, septic systems can provide single-family residences with decades of reliable service. Proper maintenance includes occasional pumping and cleaning, inspections, protection of its leach field, not overloading the system, and not using the septic system to dispose of hazardous chemicals. When septic systems fail, harmful bacteria, viruses, and nutrients can be discharged into groundwater and nearby waterways.

Lawn chemicals including chemical fertilizers and pesticides can be transported to surface waterways during rain events. Fertilizers can bring nutrients such as nitrogen and phosphorus and toxic pesticides can be harmful to aquatic life. These chemicals are often used in the early spring and summer, when heavy rainstorms are likely to happen, this increases the likelihood that lawn chemicals will be exported to surface water bodies.

Nutrients from lawn chemicals and faulty septic systems can cause the uncontrolled growth of toxic, blue-green algae (cyanophyta), a process known as “eutrophication.” These microscopic plants create a layer of scum on the lake surface and produce toxins known as “cyanotoxins.” These toxins cannot be removed by modern treatment processes and have been recognized as a growing threat to public water systems that rely on surface water sources.

Boating and physical contact can introduce petroleum products and other volatile organic compounds (VOC’s) into the reservoir from marine engines. Both human waste and garbage can also be an issue with boating. Although personal and non-motorized watercraft such as canoes, kayaks, row-boats, and small sailboats eliminate the risk of petroleum products, they increase the likelihood of human wastes being released into the reservoir.

Although the Town of Hillsborough has adopted ordinances restricting boating and physical contact on the reservoir, knowledge of this ordinance may be weak among the sporting community outside of Hillsborough, and enforcement of these regulations may not be. A September and October, 2014 windshield survey of the area noticed boats, boat houses, small docks, and dirt boat launches present at some residences. Other residences were noticed to have been built within 100 ft of the shore line, or had cut down significant numbers of trees, however these residences were likely built before 1981 and therefore grandfathered into the current Loon Pond Ordinance. The risk to Loon Pond from Residential Land Use is considered “Medium”.

2.) Transportation Corridors

Three roads travel through the source protection area of Loon Pond: East Washington Rd. and County Rd travel along the western and eastern shores of the lake respectively while Kimball Hill Rd. travels approximately 0.5 miles through the eastern edge of the source protection area. East Washington Rd. is a fully paved, undivided road while County Rd. and Kimball Hill Rd. are both dirt and gravel roads. None of these roads are major throughways and traffic is likely restricted to local traffic or delivery vehicles. Accidental releases or petroleum products, automotive chemicals, or other VOC's is possible on any size roadway and can travel to surface waters. Road salt application can also be harmful to aquatic life and water quality when applied in excess. A November, 2014 survey of County Rd found three sites where the roadway either crosses streams or has steep embankments adjacent to the shore line. An accident at one of these locations, particularly by trucks delivering fuel, could release thousands of gallons of hazardous chemicals into the water supply. Since these roadways are lightly used, the risk to Loon Pond from Transportation Corridors is considered “Low”.

3.) Recreation

Recreational activities on, or adjacent to the reservoir which might negatively impact water quality include: Boating, use of personal watercraft, swimming, ice fishing, camping, or shore fishing. Some of these activities are low-impact in nature and water quality impacts are primarily the result of careless disposal of garbage, or pet and human waste. These low-impact recreational activities include using personal watercraft, camping, hiking, and shore fishing. Higher impact activities include motor-boating, swimming, and ice fishing. These activities often bring people into direct contact with the water, introducing human waste and personal care products into the water supply. Motorboats add the risk of the accidental release of petroleum products in addition to the improper disposal of human waste and garbage. Ice fishing often requires the use of a gasoline powered auger, which also presents the risk of the accidental release of petroleum into the reservoir in addition to human waste and garbage.

In addition to pet and human waste, petroleum products, and the improper disposal of garbage and other solid wastes, recreational activities can also increase the risk of the introduction of aquatic invasive species. Motorboats and personal watercraft are both considered a route for invasive species to travel from water body to water body. Invasives of concern in New England include: Eurasian Water Milfoil, Zebra and Quagga Mussels, Spiny Water Flea, Hydrilla, and Didymo. These species often hide in standing water in personal watercraft, motorboat bilges and motors, and on fishing gear where they can often survive for up to 30 days out of the water.

One rental property was found located on property lot 005-135-000, which was listed online and available for rent on a weekly basis from April to October. It is possible, however, that other properties

Windshield surveys performed in October and November, 2014 did not reveal any publically accessible boat launches, nor did it locate and public locations where a motor boat could conceivably be launched. Any proper, or rudimentary boat launches are likely located on private property, accessible only to residents, owners or renters, all of whom are likely to be aware of Loon Pond use regulations. The risk to Loon Pond from Recreation is considered “High”, largely due to visitors either being unaware of Loon Pond’s status as a drinking water reservoir, unaware of the regulations regarding use of the pond, or unwilling to follow said regulations. Descriptions of common aquatic invasive species along with known infestations in the New England area is Located in Appendix D.

4.) Land Clearing

Clear-cutting for timber harvest or to clear land for development could have significant impacts on water quality in Loon Pond anywhere it is conducted in the watershed. Removing trees and other woody vegetation in large swaths (> 1 acre) would expose underlying soils and encourage erosion during precipitation events and snow melt. These soils would end up traveling in runoff to Loon Pond bringing soil-bound nutrients including nitrogen and phosphorus with them. Land clearing activities would also involve the use of heavy machinery, which would disturb soils and encourage soil erosion, fuels would also likely be present during any land clearing operation. Small-scale tree removal (i.e.: removing individual trees for lumber, firewood, or to remove hazards) would not likely present a significant threat to water quality. The Loon Pond Ordinance (Chapter 160 Town of Hillsborough Zoning Ordinance) currently prohibits clear-cutting, vegetation removal, and land disturbing via the NH Comprehensive Shoreline Protection Act (RSA 483-B), which prohibits clearing within a 50ft buffer of the mean high-water mark with the exception of areas cleared before 2008. There is currently one cleared area located at the “Palmer Farm” (Lot 005-053-000) where approximately 15 acres have been cleared and a small retention pond created. However, this area is located 1,000 ft from the shoreline of Loon Pond and therefore within the standards of RSA 483-B. The risk to Loon Pond from Land Clearing operations to be “Medium”.

**Loon Pond Watershed Potential Contamination Sources,
Hillsborough, NH (EPA ID: 1141010)**

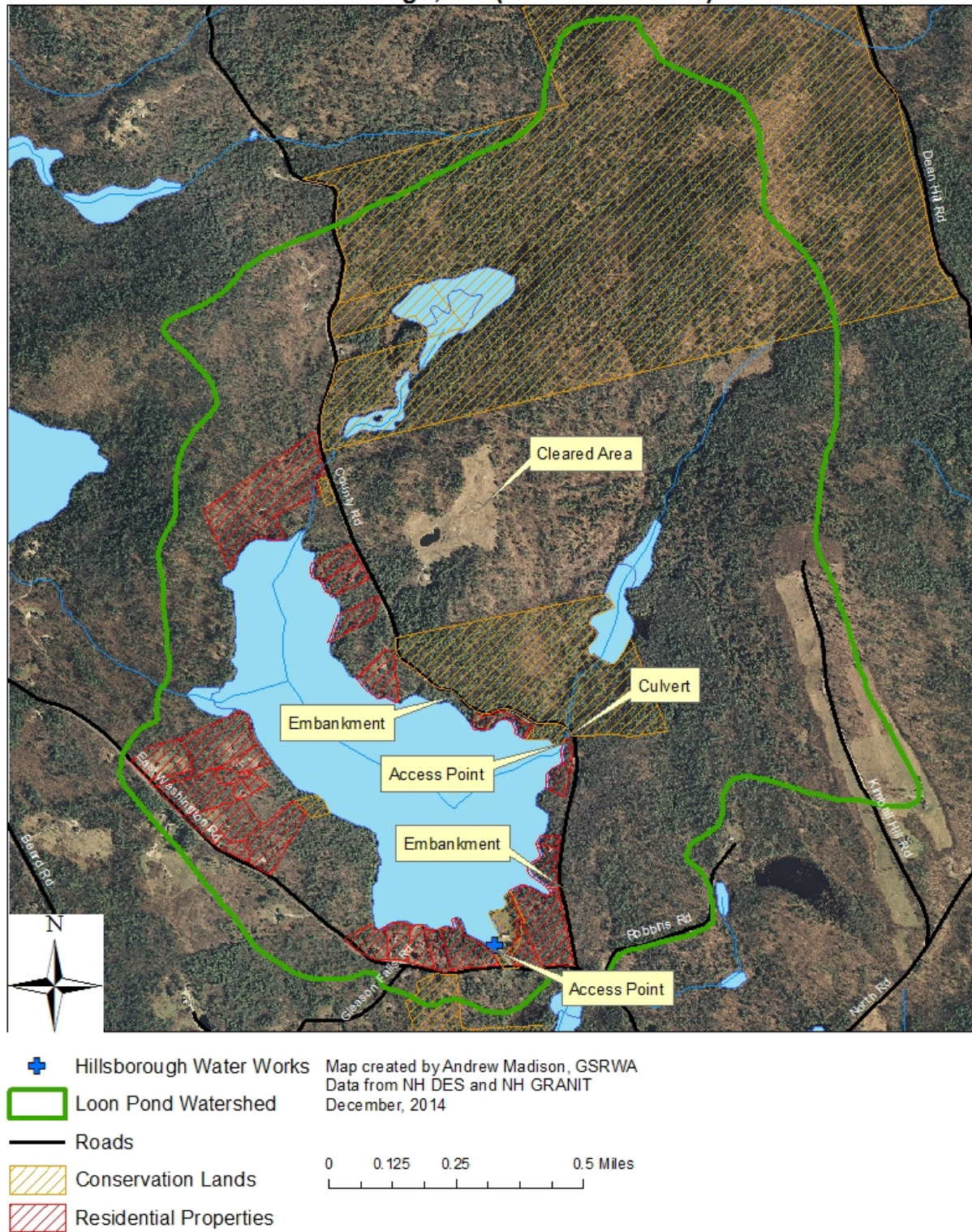


Figure 3. Potential sources of contamination within the Loon Pond Watershed, Hillsborough, NH. Data from NH DES and NH GRANIT.

4.2 Future land Uses

The Hillsborough Loon Pond Ordinance (Chapter 160) protects Loon Pond from future residential development within a 200 ft buffer of the mean high-water mark of the lake. The ordinance, however, does not prohibit development outside of that buffer, nor does it prohibit land clearing outside of the 50ft buffer stipulated in the NH Comprehensive Shoreline Protection Act (RSA 483-B). Additional residential development, even outside of the 200 ft buffer zone could have significant water quality impacts. These residences could contribute nutrients to the lake due to the increased presence of septic systems and lawn chemicals. Additional residences would also create a need for additional public and private roads, which in turn could increase the amount of road salts and automotive chemicals being released into the lake. Heavily traveled dirt roads could increase the transport of soils and soil-bound nutrients into the reservoir. Although residences may only be built outside of the 200 ft buffer, land may still be cleared to make room for lawns, verandas, or any type of structure deemed “not-significant” by the current version of the Loon Pond ordinance.

An increase in the number of rental properties would likely result in an increase in the number of out-of-area visitors. Although this would have positive effects on the local economy, it could have detrimental effects on water quality in Loon Pond. Increased visitation could result in increased traffic along East Washington and County Rds, and increased usage of septic systems at these residences. Many of these visitors may not be aware of Loon Pond’s regulations or its status as a drinking water supply and may inadvertently break the rules. Examples of violations could include: swimming; use of motor-boats, jet skis, or inflatable craft; and illegal garbage or sewage dumping.

5. Management of Risk

The Hillsborough Water Department, in collaboration with other Hillsborough Town Departments, can undertake the following measures to address water quality concerns in the Loon Pond Watershed.

5.1 Education and Outreach:

Education and Outreach can be a powerful tool to prevent environmental issues before they start. The vast majority of landowners want to be good neighbors, and maintaining pristine water quality in Loon Pond is mutually beneficial to system users, residents and recreationalists. Example letters are provided in Appendix B.

- Example Letter 1 should be sent to residences within the Loon Pond Watershed. The purpose of this letter is to remind residents and land owners that they are located within a drinking water protection area and to provide guidance on how to help maintain high-quality water within Loon Pond.
- Example Letter 2 should be sent to the Hillsborough Highway Department and the New Hampshire Department of Transportation to remind those entities of the source protection area and ask for their participation in helping to protecting it.

- Example Letter 3 should be sent to local sporting shops and guide services to remind them of Loon Pond's drinking water source status. This letter will provide information on the rules for the use of Loon Pond as well as information on how anglers and boaters can help prevent the introduction of invasive species into Loon Pond.
- A workshop could be held to promote cooperation between the Hillsborough Water Works and Land Owners within the Loon Pond watershed. This work shop would cover topics such as: Limnology of Loon Pond; Best management practices (BMP's) for land owners; Rules and regulations for Loon Pond; Invasive species; The relationship between water quality and property values. The goal of this workshop is to create a positive, collaborative atmosphere based on the mutual benefits both land owners and the Hillsborough Water Works gain from preserving water quality in Loon Pond. The theme of this workshop should revolve around protecting investments (property values for land owners/water quality for the system). Participants in this workshop should include: Land Owners, NH DES, Town of Hillsborough Planning Department, Hillsborough Police Department, Hillsborough Water Works, Water System Operators, GSRWA, Local Fishing Guides.

5.2 Signage

Signs should be produced and placed at access points along Loon Pond and along roadways to remind visitors that they are entering a drinking water protection area. Although this is stipulated in the Loon Pond Ordinance (Chapter 160-8, Paragraph G, Town of Hillsborough Zoning Ordinance) Three types of signs should be constructed and displayed, examples of these are available in Appendix C.

- A sign proclaiming "You are now entering a Drinking Water Source Protection Area" should be placed along East Washington Rd., and County Rd. where they enter the source protection area.
- A sign stating the rules for using Loon Pond should be placed at potential access points along the reservoir.
- A sign providing information on common invasive species, should be placed at potential access points along the reservoir, alongside the aforementioned rules sign. This sign should include tips on how to prevent the transport of invasive species (such as cleaning and drying boats and fishing equipment), images of common invasive species, and contact information for reporting possible invasive sightings.

5.3 Zoning

Although the Town of Hillsborough has enacted a zoning ordinance to protect the watershed of Loon Pond, this ordinance is currently over 30 years old and may not fully address contemporary threats. A review of the current ordinance (Chapter 160, Loon Pond Ordinance) identified the following, potential deficiencies:

- **Enforcement:** Currently, the ordinance grants the Hillsborough Water Works the authority to enforce regulations on Loon Pond. In the past, residents of Loon Pond have called the Hillsborough Police Department regarding illegal activity on town owned lots in the watershed, however police have been reluctant to conduct enforcement, citing the

ordinance. Although the Hillsborough Water Works Board of Commissioners, the Town Zoning Board of Adjustment, Town Planning Department, and relevant Courts may be the best route for addressing issues regarding new construction or development, they may be ineffective at addressing immediate threats such as illegal boating, dumping, or trespassing. For these threats, Local and State Police may be the best route for seeking resolution. A memorandum of understanding (MOU) signed with these entities may be worthwhile in preventing and stopping illegal activity around the reservoir.

- **Invasive Species:** The Current Loon Pond ordinance does not address the threat presented by the accidental or intentional release of exotic species into Loon Pond. The ordinance could be amended to include the following measures designed to prevent the introduction of harmful invasive species:
 - Any watercraft currently permitted on Loon Pond must be free of standing water, free of any internal bilge, live well, ballast, or other water storage and be cleaned of any attached vegetation before launching into Loon Pond.
 - Any watercraft launching into Loon Pond must have not entered, within 30 days prior, any water body know to have an infestation of Eurasian Water Milfoil, Zebra or Quagga Mussel, Spiny Water Flea, Didymo, or any other invasive species known to the USDA National Invasive Species Information Center.
 - Live bait taken from any other water body may not be used by any Loon Pond angler pursuant with Fis-500.
 - No fish, insect, amphibian, mollusk, plant or any other aquatic life form from another body of water may be released into Loon Pond pursuant with Fis-803.04 and Env-wq-1300.
 - In situations where this ordinance may conflict with state rules or regulations including Fis-803, Env-wq-1300, and Fis-500.

This list of proposed additions is not exhaustive and is meant only as a language suggestion for any future proposed ordinance changes. Any proposed changes to the town ordinance should be prepared in consultation with the town planning department and town attorney.

- **Rental Properties:** Rental properties around the reservoir could be required to furnish renters and visitors with a copy of the Loon Pond regulations and could encourage renters to require compliance with Loon Pond regulations as a condition of any rental agreement.

5.4 Land Acquisition

The Hillsborough Water Department has been working to acquire land parcels when they are available and it is fiscally feasible to do so. The system should continue this practice and continue to seek outside sources of funding to finance these transactions or seek donations of land when available. Sources of funding can come from trust funds, as well as state and federal grants. Some grant programs available to acquire these lands include the following:

- NH Dept. of Environmental Services Water Supply Land Protection Grants
- USDA Rural Development

- USDA Environmental Quality Incentives Program
- EPA Drinking Water State Revolving Fund
- US FWS North American Wetlands Conservation Fund

When possible, the Town of Hillsborough and the Hillsborough Water Department should acquire land parcels within the watershed that could potentially have the greatest impact on water quality in Loon Pond. These include any properties butting the lake itself, lots containing wetlands or ponds, or any properties through which contributing streams flow. Any properties containing extant structures that are vacant or are in a state of disrepair, and are available to be purchased by the Town should also be considered.

Land acquisition may not always be available to the Town due to properties not being up for sale or due to budgetary concerns. In this situation the Town should consider working with land owners to implement voluntary conservation practices on their property. These could include refraining from harvesting timber, replacing older septic systems, limiting building sizes, or limiting lawn sizes. Furthermore, the Water Department should consider encouraging land owners to put land into conservation easements, where they would retain ownership of the property and in exchange for not developing the land, would receive a tax credit. Conservation easements can be a powerful tool for protecting water quality and often result in a win-win type situation for both the land owner and the water system. A map detailing tax parcels as well as the locations of nearby ponds, wetlands, and streams is located in Appendix A

5.5 Physical Improvements:

Two physical structures could be constructed to prevent either unauthorized access or accidental releases into the reservoir. Physical barriers, installed at two locations where County Road traverses a ridge above the shore line of Loon Pond, and one where County Rd. crosses a culvert, could help prevent vehicle accidents where hazardous chemicals could be released into the lake. Photos of these locations, along with a map showing their location is available in Appendix C.

5.6 Monitoring:

Monitoring for invasive species can be done easily and inexpensively, often by volunteers. Fixed substrates, consisting of a nylon rope, anchored with a cinder block and floated with a buoy, with black PVC piping could be deployed at 3-4 locations, of varying depths around the lake. These would be checked monthly by volunteers for settled Zebra Mussels or for Spiny Waterfleas, likely to attach themselves to the substrate. Plankton net tows could also be performed and samples examined for microscopic veligers. The plankton tows themselves could be performed by volunteers, however the microscopy would need to be performed by a certified lab using trained professionals. The Hillsborough Water Department should consider investigating the associated costs of performing a microscopy analysis, or contact local colleges and universities, which may be willing to perform that task free of charge for research or educational purposes.

The Hillsborough Water Department should also consider participating in the New Hampshire Lakes Association's Lake Host program. This program stations trained volunteers, ideally local or lake residents, at lake access points to inspect watercraft for invasive species and to educate visitors on how they can help prevent the spread of invasive species. The

Hillsborough Conservation Commission is currently participating in this program and has lake hosts present at near-by Franklin Pierce Lake. A summary of NH Lakes Association's Lake Host activities between 2002 and 2014 is available in Appendix H.

6. Conclusions

Loon Pond is a reliable source of high-quality drinking water for the community of Hillsborough, and with wise management it should remain so for the foreseeable future. However like most surface water bodies in New Hampshire, it faces growing threats from development, exotic species, and unpredictable accidents. The management suggestions outlined in this plan are an important step in protecting water quality in Loon Pond, the next steps involve sharing this plan with other town departments, businesses, and residents with the goal of implementing one or more of the management objectives listed here. This plan should be reviewed annually and updated every three years to remain relevant and viable.

References

Hillsborough Town Planning Board, Central new Hampshire Planning Commission (1999). 1999 Master Plan Update for the Town of Hillsborough, New Hampshire.

New Hampshire Department of Environmental Services. 2008. The DES Guide to Ground Water Protection.

New Hampshire Department of Environmental Services. 2014. One-Stop Data Portal. Accessed From: [http:// des.nh.gov/onestop/index.htm](http://des.nh.gov/onestop/index.htm)

New Hampshire Lakes Association. 2014. New Hampshire Lake Host Program Summary 2002-2014. Accessed from <http://www.nhlakes.org>

University of New Hampshire. 2014. New Hampshire Geographically Referenced Analysis and Information Transfer System. Accessed from <http://www.granit.unh.edu/>.

Town of Hillsborough, NH (2014). Town of Hillsborough Zoning Ordinance, Chapter 160.

100th Meridian Initiative. (2014). Zap the Zebra Brochure. Accessed from www.100thmeridian.org

Appendix A. Loon Pond Site Tax Lot Numbers and Conservation Lands

Figure 4 (Insert). Tax lots, lot numbers and conservation lands within the Loon Pond Watershed, Hillsborough, NH. Data from NH DES, NH GRANIT, and Hillsborough Planning Department.

Appendix B. Sample Letters

Sample Letter 1.

DATE

Official Town of Hillsborough Letterhead

Dear _____: (Customer, Neighbor, Homeowner – fill in appropriate term)

The Purpose of this letter is to ask for your cooperation in ensuring safe drinking water. If we are all careful, we can protect our source of drinking water from contamination.

Your property has been identified as being located within the area from which water flows to Loon Pond, also known as a watershed (see map attached). As such it is important that you are aware that what you do on your property could affect the quality of the water in Loon Pond. If you are not on Town water, you should be aware that the activities that occur on your property may affect the water quality of your private well.

No one wants to drink polluted water. Who would pour gasoline, motor oil, paint, garden chemicals, or household chemicals into their drinking water? Yet, the equivalent is done when someone pours any of these products down their toilet, sink drain, or onto the ground. By following the “Do’s and Don’ts” on the attached flyer, your household can avoid activities that could threaten water quality.

Please take the time to review and follow the flyer’s instructions. We need your help to protect this valuable source of drinking water!

We appreciate your cooperation.

Sincerely,

Contact Person’s Name

Sample Letter 2.

Official Town of Hillsborough Letterhead

Chairperson's name

Appropriate Town/City Governing body's name

Address

Dear Local, Regional and State Officials:

Enclosed is a map showing the watershed for Loon Pond, which serves the Town of Hillsborough, New Hampshire. A watershed consists of the surface area from or through which rain fall, and with it, contaminants are likely to reach a water supply source. Land use activities in the watershed have the potential to adversely impact water quality in Loon Pond. If Loon Pond were to become contaminated, it may be impossible to eliminate the contamination so that the lake could continue to be used for drinking water. We are proactively trying to protect are water sources by implementing a source protection plan of which this letter of notification is a part.

We are contacting you to request your assistance in protecting this supply. There are a number of ways in which your agency may be able to help with protection that can help reduce the possibility of contamination of the water supply. For example, please keep us informed of any related land use decisions or permitting issues and involve us in the planning and decision process where it is deemed appropriate.

On behalf of the Business/Village/Town, I would like to thank you for your attention to this matter. If you have any questions or if I can be of some assistance please feel free to call me at (603) XXX-XXX.

Sincerely,

Contact Person

Encl. Maps of Source Protection Areas

Sample Letter 3.

Official Town of Hillsborough Letterhead

Dear _____: (Business Name)

The Purpose of this letter is to ask for your cooperation in ensuring safe drinking water and preserving water quality in Loon Pond. If we are all careful, we can protect our source of drinking water from contamination.

Your business has been identified as providing guide services, equipment, or advice to recreationalists on Loon Pond. As such it is important that you are aware that what you and others do on the lake could affect water quality, impacting system users as well as the resource your business relies on. Protecting this resource is mutually beneficial to land-owners, anglers, recreationalists, and water system users alike.

No one wants to drink polluted water, no one wants to live alongside a polluted lake, and certainly no one wants to fish a contaminated, depleted lake. Yet, when someone pours a hazardous substance down their toilet, sink drain, or onto the ground, they increase the risk of pollution. Harm could also be done when exotic species are intentionally or inadvertently released into the lake. By following the guidelines on the attached flyers, your business can avoid activities that could threaten water quality or harm the natural beauty of Loon Pond. Every business wants to be a positive force in their community, being a good neighbor to the community water system is a perfect start.

Please take the time to review the attached information. We need your help to protect this valuable source of drinking water!

We appreciate your cooperation.

Sincerely,

Contact Person

Zebra and Quagga Mussel Brochure



Quagga mussels encrusting a boat motor

100th Meridian Initiative

ZAP THE ZEBRA

www.100thMeridian.org

Please report any sighting by calling our National Hotline:

1-877-STOP-ANS

1-877-786-7267

Zebra and quagga mussels are a nuisance for anglers and boaters. They can ruin your equipment, clog motor cooling systems, foul hulls, and jam the centerboard wells under sailboats.








Image Credits: Zebra Mussel on a Fishing Line by Marc Murrell, Kansas Department of Wildlife and Parks • Zebra Mussels on a River Can, Zebra Mussels on a Native Mussel, Bull Ruckel, Quagga Mussels, Zebra/Quagga Mussel Distribution January 2009 by David Britton, U.S. Fish & Wildlife Service • Zebra Mussels in a Cut-Away Pipe by Don Schaefer, Great Lakes Science Center • Zebra Mussels in a Pipe by Craig Czarniecki, Michigan Sea Grant • Quagga Mussels Encrusting a Boat Motor by Matt Watson, The University of Texas at Arlington • The distribution map is based on data compiled by the U.S. Geological Survey's Nonindigenous Aquatic Species Program (<http://nas.er.usgs.gov>).



Follow these simple steps:



Clean

Remove all plants, animals, mud and thoroughly wash everything, especially all crevices and other hidden areas.



Drain

Eliminate all water before leaving the area, including wells, ballast, and engine cooling water.

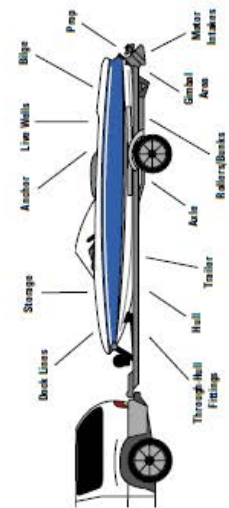


Dry

Allow sufficient time for your boat to completely dry before launching in other waters.

If your boat has been in infested waters for an extended period of time, or if you cannot perform the required steps above, you should have your boat professionally cleaned with high-pressure scalding hot water (>140 °F) before transporting to any body of water.

Before launching and before leaving... Inspect everything!



Invasive Mussels: Expensive Damage!

When zebra and/or quagga mussels invade our local waters they clog power-plant and public-water intakes and pipes. Routine treatment is necessary and very expensive. This leads to increased utility bills. If you use water and electricity, you do not want these mussels.



Zebra mussels in a cut-away pipe



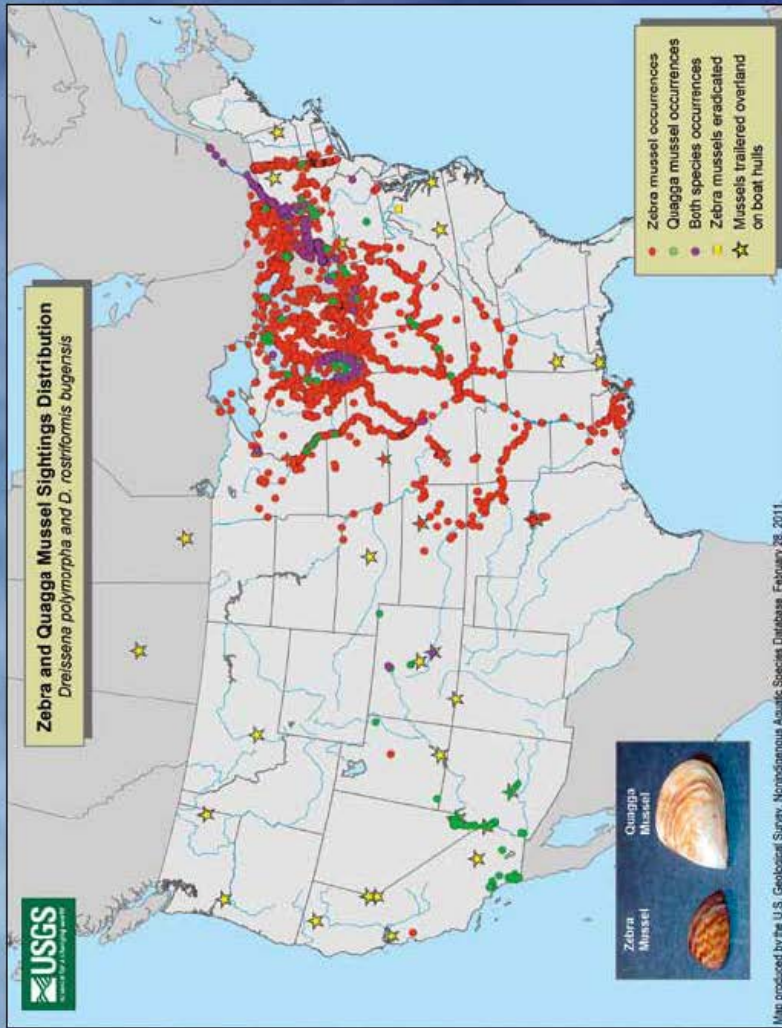
Zebra mussels blocking a pipe

Zebra/Quagga Mussels May Use Your Boat to Invade Additional Waters!

Once a boat has been in infested waters, it could carry invasive mussels. These mussels can spread to new habitats on boats trailered by commercial haulers or the public. Zebra and quagga mussels attach to boats and aquatic plants carried by boats. These mussels also commonly attach to bait buckets and other aquatic recreational equipment. An adult female zebra mussel can release up to a million eggs in a year. Please take precautions outlined in this brochure to help reduce the chance that zebra or quagga mussels will spread from your boat or equipment to uninfested areas.



Before zebra mussels After zebra mussels



Zebra/Quagga Mussels Harm Native Aquatic Life



Zebra mussels on a crayfish

Zebra mussels on a native mussel

Zebra/Quagga Mussels Encrust Any Hard Surface



Zebra mussels on a fishing lure

Zebra mussels on a bear can

Zebra Mussels / Quagga Mussels

What are they?

Both are closely related, invasive, freshwater bivalve (mollusk) species that encrust hard surfaces.

Where do they come from?

These species came from the Black and Caspian Sea Drainages in Eurasia.

What size are they?

Larvae are microscopic and adults may be up to two inches long. They are usually found in clusters.

Why "Zebra" mussels?

Both species are sometimes referred to as "zebra" mussels because they both have light and dark alternating stripes. Quagga mussels are actually a distinct (but similar) species named after an extinct animal related to zebras.

NH DES Clean Drinking Water Brochure

Got Clean Drinking Water?



It's up to you!

*The DOs and DON'Ts for
maintaining clean
Drinking Water*



For more information please contact the
Drinking Water Source Protection Program at
(603) 271-7061 or visit our website:
<http://des.nh.gov/organization/divisions/water/dwgb/dwspp/index.htm>.

Is Gasoline Contaminating Your Drinking Water?

Gasoline is one of the most dangerous products commonly found around the home, yet people often store and use it with little care. Some of the chemicals in gasoline have been found in drinking water with increasing frequency, including benzene, toluene and MtBE (Methyl t-Butyl Ether), which is *easily dissolved in water* and is a possible carcinogen. Even a gasoline spill as small as a gallon can contaminate your drinking water wells or a public water supply.

To Protect Your Drinking Water From Gasoline

Avoid Spilling Gasoline on the Ground, Especially Near Wells

- Don't drain gasoline from lawn mowers, snow blowers, etc. onto the ground.
- Don't burn brush with gasoline.
- Don't top off your fuel tank.
- Keep refueling and engine work away from water supply wells, and if possible, over a concrete floor or similar barrier. Immediately clean up any gas or oil spills.

Avoid Spilling Gasoline in Lakes, Ponds, and Rivers

- Keep special gasoline-absorbing pads on your gas-powered boat and know how to use them.
- If you own a larger boat, make sure it has no-spill tank vents.
- Fill portable tanks from outboard boat engines on shore.
- Refuel snowmobiles and ice augers on shore; do not take gasoline storage tanks onto ice-covered ponds.

Store Gasoline Properly

- Use a clearly labeled container made for gasoline and with a spout to avoid spills.
- Keep gasoline containers in a dry, well ventilated shed or detached garage away from water supply wells. Don't keep metal gasoline cans on a dirt floor for extended periods.

Dispose of Waste Gasoline Properly

- Handle old or dirty gasoline as hazardous waste. Bring it to a household hazardous waste collection center in a proper gasoline container.

If a spill occurs: For any size spill that is not immediately cleaned up, first contact your local 911 responder or fire department, then call the DES emergency spill number at (603) 271-3899 (Mon-Fri, 8-4), or weekends and evenings at (603) 223-4381 (NH State Police).

Revised August 2011

Where does your drinking water come from?

Your drinking water comes from either groundwater or surface water. Groundwater is the water that flows through the spaces between soil particles and through fractures in rock. It comes from rain and snowmelt percolating through the ground. Surface water comes from rainfall and snowmelt running over land and from *groundwater* seepage into lakes, rivers and reservoirs.

Why should you be concerned?

While some pollutants, such as bacteria, viruses and phosphorus, can be reduced by passing through soil under certain conditions, groundwater can be easily contaminated by chemicals and oils. Surface water is also affected by soil and pollutants picked up as water flows over land.

Keep Household Hazardous Wastes Out of your Drinking Water! Such as ...

Automotive Fluids • Auto Batteries • Used Motor Oil
Oil-Based Paint • Paint Thinner • Antifreeze
Pesticides • Cleaning products • Gasoline



DO –

- Use non-toxic and less-toxic alternatives to pesticides and household chemicals.
- Take leftover household chemicals to your town's household hazardous waste collection day.
- Follow package directions on pesticides, fertilizers and other household chemicals.
- Check your underground fuel storage tank (UST) frequently for leaks. If a UST is more than 20 years old, replace it with an aboveground storage tank that has a concrete slab underneath it, a cover and secondary containment.
- Take care of your septic system. Inspect it every year and get it pumped out every 3-5 years.
- Avoid damage to your leach field and distribution lines by keeping vehicles, livestock and other heavy objects off of them.

- Test soil every two years to determine existing nutrient levels and pH before applying fertilizers.
- Use slow or controlled release nitrogen sources of fertilizer.
- Measure the area of your lawn to be fertilized to determine how much to use and calibrate or adjust spreader settings to match the recommended rate for fertilizers.
- Use drip pans large enough to contain motor vehicle or power equipment fluids being replaced or drained.
- Fully drain oil over a drip pan or pail before disposal. Most solid waste transfer stations accept used oil filters for recycling. Store and transport used oil filters in a covered leak-proof container until disposal.
- Keep absorbent materials such as rags, pads, "Speedi-Dry" or kitty litter near the work area and clean up all spills as soon as they occur.
- Dispose of all used absorbents immediately in a leak-proof container.
- Refuel or repair engines over an impervious surface, such as a concrete floor or tarp.
- Drain all fluids from motor vehicle parts before removing them from the vehicle.
- Follow medicine disposal guidelines described at www.nh.gov/medsafety.



DON'T –

- Buy more pesticides or hazardous chemicals than you need.
- Dispose of hazardous chemicals by pouring them down the drain or onto the ground.
- Over-use pesticides or household chemicals. More is not necessarily better.
- Have your UST removed by a contractor who is not familiar with state guidelines for UST removal.
- Overload your septic system with solids by using a garbage disposal, unless the system is specifically designed for one.
- Pour chemicals down the sink or toilet.
- Use septic system cleaners or additives containing acids or chemical solvents such as trichloroethylene (TCE).
- Use fertilizers if heavy rains are anticipated as the nutrients will be flushed from the lawn into drains and low areas.
- Apply fertilizers within 25 feet of most lakes and streams.

UNH Lawn Chemical Fact Sheet



Water quality friendly lawn care and fertilizer recommendations for northern New England

According to a recent survey, it's likely that you and your neighbors believe having a lawn that is safe for the environment is very important.* However, some lawn care practices can create water quality problems. Excess nutrients (including nitrogen and phosphorous found in fertilizers) that run off our properties into local waterbodies can trigger algal blooms that cloud water and rob it of oxygen.

Many of us enjoy the time we spend working on our lawns and are willing to try new practices as long as our lawns continue to look good.* Here are some easy practices for creating and maintaining a truly healthy lawn – attractive and safer for the environment.



For additional resources, please visit:

[www.extension.unh.edu/
Sustainable-Landscapes-and-Turf](http://www.extension.unh.edu/Sustainable-Landscapes-and-Turf)



Simple Recommendations for Every Lawn

1. Choose the Right Grass Seed

- Consider limiting lawn area to locations where grass will grow easily and will actually be used for outdoor activities.
- Choose grass varieties that require less maintenance. For northern New England, choose seed mixes with higher percentages of turf-type tall fescues, compact-type fall fescues and/or fine fescues. Choose mixes with smaller percentages of Kentucky bluegrass and/or perennial ryegrass.
- In shaded areas, select shade-tolerant turf grasses like fine-leaf and tall fescues.
- Up to 10% of total seed mix can be white clover to help fix nitrogen in soil naturally. Avoid clover if anyone in the household is allergic to bee stings.

2. Don't Overwater

- If irrigating, one inch of water per week is typically enough. Overwatering can lead to runoff and leaching of contaminants into groundwater.

3. Test Your Soil

- Sometimes adjusting the soil pH or organic matter are the only treatments needed to improve a lawn. If the soil test results come back as acceptable but your lawn is not, then check for other problems like pest infestations. Learn more at: bit.ly/Home-Soil-Test

4. Mow Smart

- Mow grass 3" or higher. Cut no more than 1/3 of the blade to encourage longer, stronger turf grass roots. Leave the clippings after mowing to provide a source of low release nutrients.

Recommendations for Lawns that Need Fertilizer

1. Determine How Much to Apply

- Measure the dimensions of the area where you plan to apply. The square footage of the area will determine how much fertilizer to purchase and use.
- Only use what you need. Nearly half of homeowners mistakenly use the entire bag whether it is needed or not.* Seal and store opened fertilizer bags in an airtight container or share excess with others.
- Lawns older than 10 years usually need less nitrogen than newer lawns, especially if the clippings are left, so apply only half of the amount directed on the bag. Only apply more if there's no improvement over time in turf color and density. Staying under four applications per season at this reduced rate helps keep the overall application at the recommended level† for water friendly practices.
- Lawns less than 10 years old may need the full amount of nitrogen as indicated on the fertilizer instructions. Apply less than four times per year.

2. Know When & Where to Apply

- Avoid applying fertilizers mid-summer when turf growth naturally subsides or before a big rain when it can run off into nearby waterways or leach into ground water.
- In northern New England, apply no earlier than spring green-up and no later than mid-September to ensure the proper soil temperature for grass to take up the nutrients.
- Know your local and state laws related to fertilizer application. For example, do not apply any fertilizers within 25 feet of water bodies in New Hampshire.

3. Choose the Right Fertilizer

- Avoid combination products that include both pesticide and fertilizer unless confident you need both. Unnecessary applications of fertilizers and pesticides can lead to soil and water contamination.
- Select lawn fertilizers with low or no phosphorus unless your soil test indicates otherwise. The fertilizer formula (e.g., 20-0-15) tells the relative percentages of nitrogen (N), phosphorous (P) and potassium (K).

3. Choose the Right Fertilizer, cont.

- Slow release formulations (>50% water insoluble nitrogen – WIN) are generally preferable. Only use quick release products when there is a need to grow turf very quickly, for example to prevent erosion of bare soil during a new seeding. Check the product label to see what type of nitrogen it contains.
- Organic fertilizers are typically slow release and contain micronutrients that are beneficial to soil. They are not petroleum-based like most synthetic fertilizers. Overapplying any type of fertilizer or over-irrigating fertilized turf can lead to water quality problems.

For more information:

[www.extension.unh.edu/
Sustainable-Landscapes-
and-Turf](http://www.extension.unh.edu/Sustainable-Landscapes-and-Turf)



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603.641.6060

*Recommendations adapted from:
New England Regional Nitrogen and Phosphorus Fertilizer and Associated Management Practice Recommendations for Lawns Based on Water Quality Considerations. 2008. Karl Guillard (ed.). *Turfgrass Nutrient Management Bulletin 0100*. College of Agriculture and Natural Resources, University of Connecticut. USDA CSREES project # 2006-51130-03656.

*Survey references from:
Eisenhauer, B.W. and B. Gagnon. 2008. "Changing homeowner's lawn care behavior to reduce nutrient losses in New England's urbanizing watersheds: the report of findings from social science research." USDA CSREES project # 2006-51130-03656.

This material is based upon work supported by the National Institute of Food and Agriculture, U.S. Department of Agriculture, under Agreement No. 2006-51130-03656. Any opinions, findings, conclusions, or recommendations expressed in this publication are those of the author(s) and do not necessarily reflect the view of the U.S. Department of Agriculture.

Designed by: Rebecca Zelter, NHSG science writer. Publication #: UNHMP-IS-SG-13-27



Appendix C. Locations of Suggested Improvements

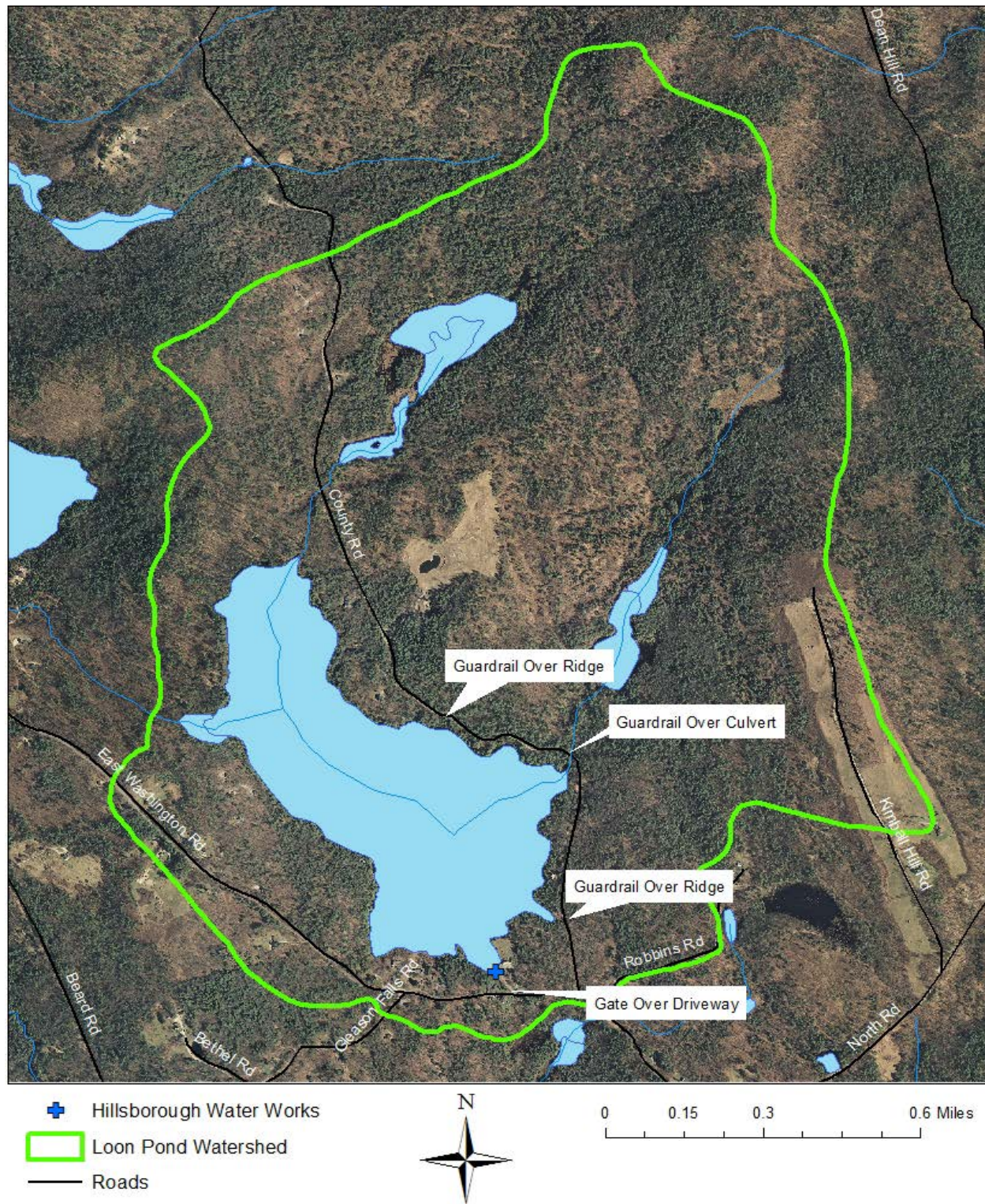


Figure 5. Locations of suggested physical barriers along roadways within the Loon Pond watershed. Data from NH DES One-Stop and NH GRANIT.

Images of Areas Needing Physical Improvements



Figure 6. Proposed location of guardrail between ridge and County Rd., located approximately 850ft north of intersection with East Washington Rd.



Figure 7. Location of proposed guardrail between County Rd., and tributary flowing into Loon Pond. Located approximately 2,500 ft north of intersection with East Washington Rd and 200 ft east of Loon Pond shoreline. This site is also a potential access point for boaters on Loon Pond.



Figure 8. View of tributary and Loon Pond shoreline from County Rd. culvert and road crossing, note that this area provides a clear path for pollutants flowing from the road, or for boaters seeking access to the lake. A parking area is located approximately 200ft north of this location.



Figure 9. Location of proposed guardrail between roadway and steep ridge along County Rd., located approximately 1 mile north of the intersection with East Washington Rd.

**Recommended Signage Locations, Loon Pond Watershed,
Hillsborough, NH (EPA ID: 1141010)**

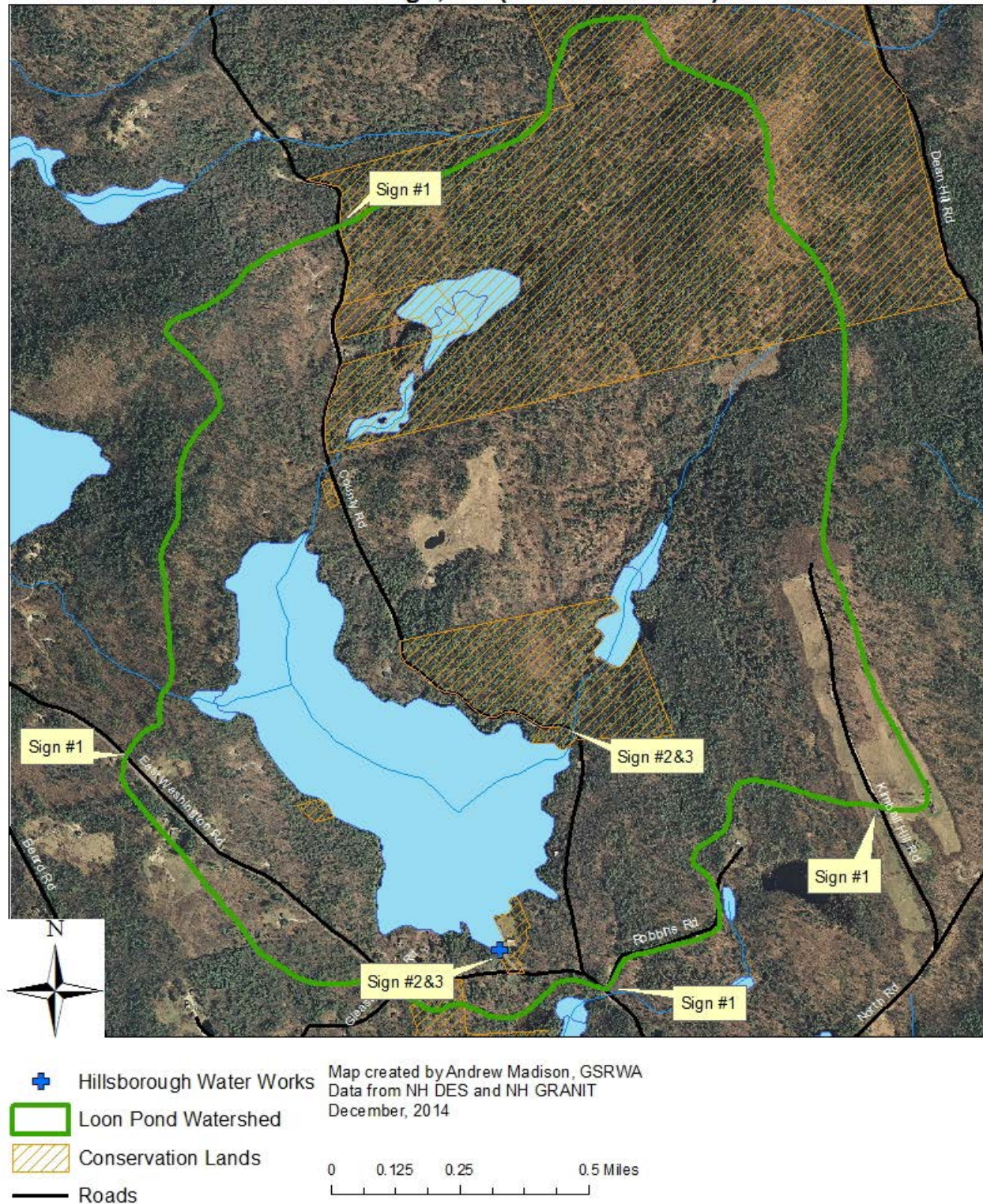
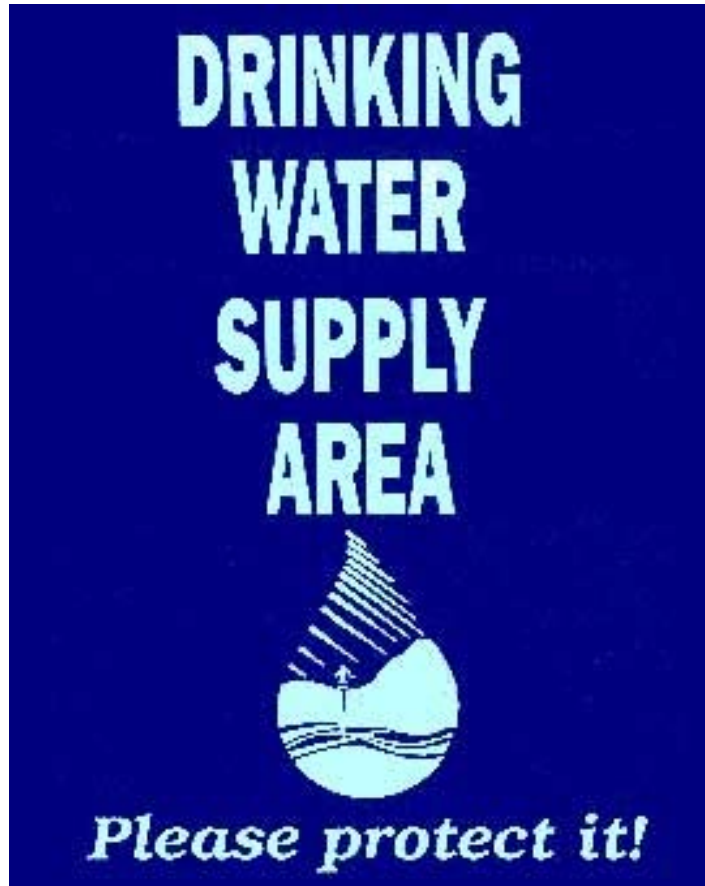


Figure 10. Recommended sign placement along roadways and access points within the Loon Pond Watershed. Data from NH DES and NH GRANIT.

Sign #1



Credit: Vermont Rural Water Association

Figure 11. Drinking water protection area sign to be placed along roadways traveling through the Loon Pond watershed.

Sign #2

LOON POND IS A DRINKING WATER SUPPLY

**PLEASE HELP US PROTECT THIS RESOURCE BY FOLLOWING
THESE RULES AND REGULATIONS**

PERMITTED ACTIVITIES

- CANOES, KAYAKS, ROWBOATS, ELECTRIC-POWERED BOATS, SUN/SAILFISH
- FISHING, WILDLIFE WATCHING

PROHIBITED ACTIVITIES

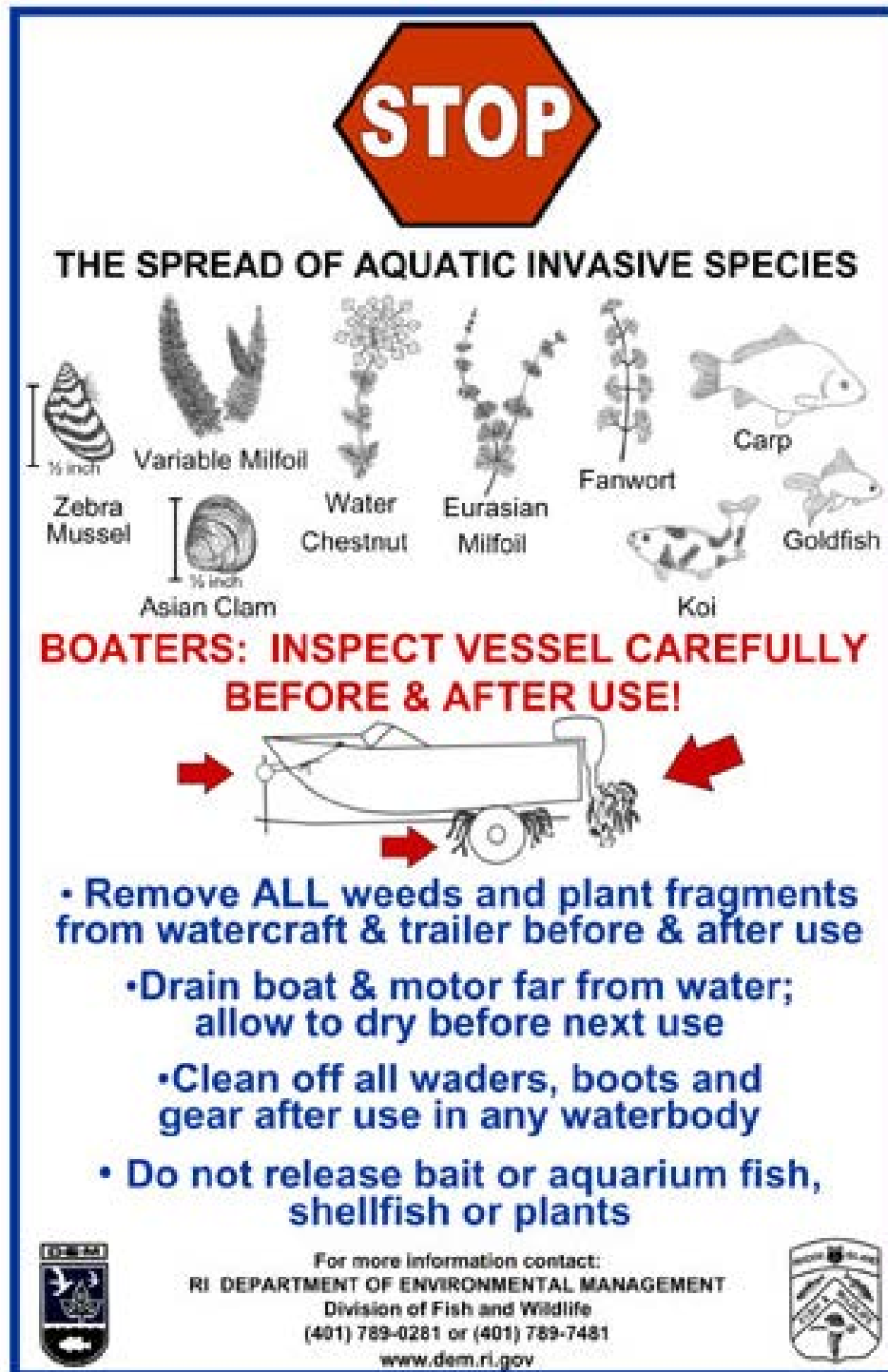
- MOTORBOATS, INFLATABLE WATERCRAFT, WET-SAILOR TYPE BOATS, JETSKIS, SAILBOARDS, STAND-UP PADDLEBOARDS
- OPERATION OF ANY MOTORIZED VEHICLE ON THE WATER OR ICE OF LOON POND
- SWIMMING, WATER SKIING, ANY WATER-CONTACT ACTIVITIES.
- CAMPING, OVERNIGHT MOORING
- CUTTING AND TAKING ICE, ICE FISHING
- HORSE RIDING OR LEADING WITHIN 50FT OF THE SHORELINE
- PETS OFF-LEASH WITHIN 50FT OF THE SHORELINE, PETS ARE NOT ALLOWED IN THE WATER OF LOON POND
- DISPOSAL OR DUMPING OF GARBAGE, ANIMAL OR HUMAN WASTE
- POSSESSION OF ANY HAZARDOUS CHEMICAL OR WASTE WITHIN 150 FT OF THE SHORELINE
- ANY FEEDING OF WILDLIFE, INCLUDING WATERFOWL
- ALCOHOL OR DRUG USE
- HOURS OF USE: 6:00AM – 9:00PM

**WITH YOUR HELP WE CAN PRESERVE THIS VALUABLE RESOURCE FOR
FUTURE GENERATIONS**

HILLSBOROUGH WATER DEPARTMENT: 603-464-3877 ext:229
HILLSBOROUGH POLICE DEPARTMENT: 603-464-5512

Figure 12. Sign advising users of the rules regarding the use of Loon Pond

Sign #3



Credit: RI DEM

Figure 13. Sign advising boaters of common aquatic invasive species and how to prevent their spread, a similar sign will need to be crafted specifically for Loon Pond, but following the same format as the sign above.

Appendix D. Examples of Common Aquatic Invasive Species

Eurasian Water Milfoil



Credit: Robert L. Johnson, Cornell University

Eurasian Water Milfoil is an aquatic macrophyte, originating from Europe and introduced to North America during the 1950's. Once established, it forms thick mats blocking sunlight for other plants, impeding recreation, and potentially blocking water intakes. Once established it can be removed mechanically but is very difficult to completely eradicate. Eurasian Water Milfoil is likely spread through watercraft when attached to trailers, propellers including electric motors, and to watercraft including canoes, jon boats, sailboats, and kayaks.

Didymo (Rock Snot)



Credit: Maine Department of Environmental Protection

Didymo, also known as “Rock Snot” is a diatom which produces large mats and growths when it infests a water body. Although it is native to North America, its traditional range has been spreading and it has been taking on invasive characteristics even within its native range. Didymo thrives in cold water with low nutrient concentrations, such as Loon Pond and can easily be spread through wet fishing gear and standing water in watercraft.

Spiny Water Flea



Credit: Emily DeBolt, Lake George Association

Spiny Water Flea is a planktonic crustacean, native to Europe and Asia, with a long barb as a tail. This barb makes this species much less prone to predation than other planktonic species and enables it to out-compete other zooplankton populations. This type of population dynamic can cause trophic cascades that may be detrimental to water quality. Once established, it is impossible to eradicate or effectively manage. Spiny Water Flea is spread through standing water in watercraft, including small, and personal water craft.

Zebra Mussels



Credit: US Fish and Wildlife Service

Zebra Mussels are native to the Caspian Sea region of Southern Europe and were introduced to the Great Lakes Region during the 1980's. These mussels begin their life cycle as microscopic planktonic larvae known as veligers. Later in their life cycle they develop byssal threads that allow them to attach to any type of substrate including rocks, vegetation, pipes, motors, and any other hard surface. Zebra Mussels have been known to settle in pipes and mains, clogging them and requiring costly maintenance. Like other mussels, Zebra Mussels filter feed and can out compete other planktivores for food and other resources. When Zebra Mussels die and decompose, they can release nutrients into the water promoting the growth of harmful, blue-green algae and leaving behind razor-sharp shells. These Mussels are transported as veligers in standing water or as settlers attached to watercraft, fishing gear or motors, and can survive for up to 30 days out of the water. Once introduced, they are nearly impossible to eradicate and prohibitively expensive to manage for a small water system. Zebra Mussels are currently known to infest lakes in Vermont, New York, Massachusetts, and Connecticut.

Appendix F. Emergency Action Plan

Hillsborough, NH Water Department

PWS ID: 1141010

Emergency Response Plan

Prepared: January, 2015

Prepared by:

Hillsborough Water Department
4 Church St. Hillsborough, NH 03244
603-464-3877 x229

Submitted to:

Johnna McKenna
NH Department of Environmental Services
Drinking Water & Groundwater Bureau
PO Box 95
Concord, NH 03302-0095
(603) 271-7017
(603) 271-0656 (fax)
johnna.mckenna@des.nh.gov

Section 1. System Identification

System EPA Number	1141010	
System Name	Hillsborough Water Department	
System Address	4 Church St. PO Box 2216 Hillsborough, NH 03244	
Town	Hillsborough	
Source ID/Type/Description/Well Yield	001/Surface Water-Loon Pond	1.0 MGD
Population Served/# Service Connections	2000 People	906 connections
Name, Title, E-mail and Phone Number of person responsible for maintaining this emergency plan.	Joe Damour Water System Operators, Inc.	603-428-3525

Section 2. Chain-of-Command

Hillsborough Water & Sewer Commissioners

1. Overall responsibility for managing a water emergency.
2. Immediately notify Water System Operators, Inc of the existence of a water emergency and assign WWTP staff as needed.
3. If necessary, immediately notify local and state emergency, such as police, fire, ambulance, health, and DES Water Supply Engineering Bureau
4. Be available as a contact person for local and state emergency agencies
5. Coordinate the system user and service/repair notification procedures
6. If necessary, instruct the Treatment Plant and/or Distribution System operator to implement the boil order, alternate water procedures, and/or water conservation measures.

Hillsborough Director of Emergency Management

1. During Town-wide emergencies, this position directs and coordinates efforts of various Town departments and private service providers. The Town of Hillsborough has an emergency management plan in place. The water department plan is intended to supplement the Town plan and work within the established framework.
2. Be available to provide direction and resources to water commissioners or their designees.

System Operator

1. Be available as necessary to provide hands-on knowledge of system components.
2. Be available as necessary to provide specialized repair of system components such as pumps, water treatment devices and valves.
3. Be available as necessary to collect water samples and to transport them to a certified laboratory for analysis.
4. If necessary, oversee and implement boil orders and alternate water procedures.
5. Oversee and coordinate the return of the treatment and distribution system to normal operation.

Administrative Assistant

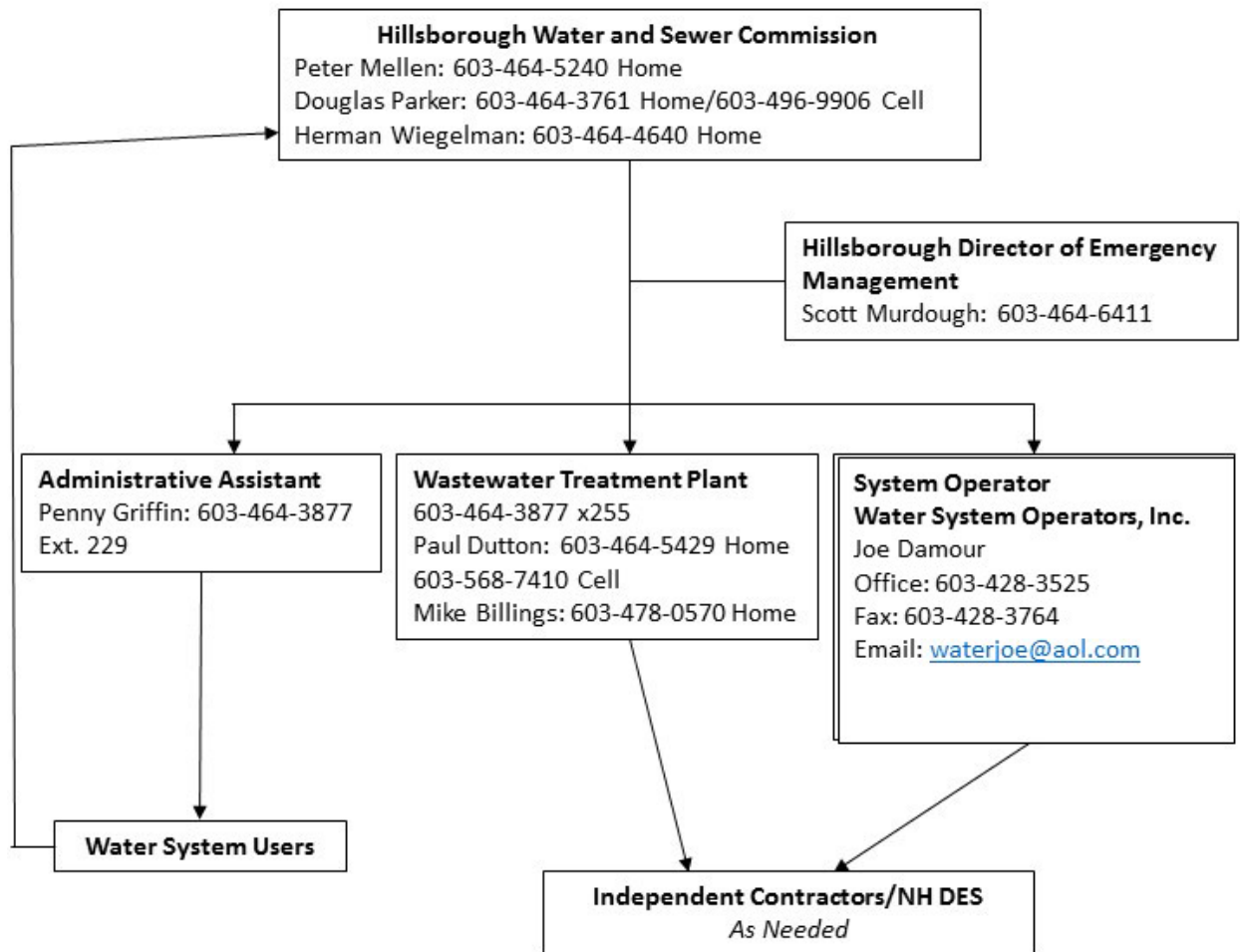
1. Be responsible for and maintain up-to-date notification lists and contacts.
2. Implement the system user and service/repair notification procedures.
3. Prepare notices to the public as required.

Treatment Plant Staff

1. As assigned by Commissioners, assist with user notification, repairs, alternate water efforts, and/or water conservation measures.

Hillsborough Water Users

1. Immediately notify the Commissioners of the presence of a water emergency. Keep informed of public information provided by Town Water & Sewer officials.



Local Notification List

FIRE (day) 911	FIRE (night) 911
POLICE (day) 911	POLICE (night) 911
Ambulance service (day) 911	Ambulance service (night) 911
Local Emergency Management Office (day) 603-464-6411	Local Emergency Management Office (night) 603-464-5512
Local Health Officer (day) 603-464-3877 x230	Local Health Officer (night) 603-464-3877 x230
Local Newspaper (day) Concord Monitor 603-224-5301, Fax: 603-224-8120 Union Leader: 603-668-4321 Fax: 603-668-0382 Villager: 603-464-3611 Fax: 603-464-2777	City/Town Officials 603-464-3877 x222 Town Administrator 603-464-3877 x223 Town Offices
City/Town Officials (day) 603-464-3877 x223	Television Stations WMUR: 603-669-9999 Fax: 603-641-9005
Local Radio Station (day) 603-228-8910 NHPR 603-225-5521 WKXL 603-225-1160 WNNH	Power Company (day) PSNH 800-662-7764
Road Agent Bill Goss: 603-464-3877 x253	Osram-Sylvania 603-464-5533 Fax: 603-464-5538
Hillsborough Nursing Home 603-464-5561 Fax: 603-464-6368	Maple Leaf Village (EJL Management Company) 603-352-9105 May need to go door-to-door

State Notification List

State Police	603-223-4381
Drinking Water and Groundwater Bureau	603-271-2513 or 603-271-3503
Bureau of Emergency Management	603-271-2231 or 1-800-852-3792
Health and Human Services	603-271-4496

Service/Repair Notification List*

Electrician (day) Moonlight Electric: 603-428-7903 Mamakating Electric: 603-478-5514	Plumber (night) Hilltop Heating & Plumbing: 603-464-5311 James Dumais Plumbing & Heating: 603-464-3268
Soil Excavator (day) Eugene Edwards & Sons: 603-478-0116 Connor Backhoe Service: 603-428-3788 Double Diamond Farms: 603-496-3268	Pump Specialist Barrie Miller: 603-464-4806 Plummer Well & Pump: 603-464-4420
Engineering Consultants Stantec: 603-669-8672. Cell: 603-315-1446 Wright Pierce: 603-430-3728 Hoyle, Tanner & Associates: 603-669-5555	Granite State Rural Water Association 603-753-4055
Laboratory Eastern Analytical: 1-800-287-0525	Instrumentation AD Instruments: 603-382-4667 NE Instruments: 603-736-8337 EOS Research: 603-332-2099

Section 3. Emergency Notification Procedures

Section 3A. Boil Orders / Do Not Drink Orders

If a bacteria sample fails to pass, the system will be notified by NH DES with instructions about what actions need to be taken. In the event that the Commissioners or Operator becomes aware of the need for a boil order prior to NH DES contacting the system, public notification will be made as soon as possible. DES approval is required to lift a boil order.

Customers would be given notification of a boil order by the methods outlined in the DES Boil Order Directions attached to this plan.

Section 3B. Critical Users

The Hillsborough Water Department has several unique water users.

Hillsboro House Nursing Home and Maple Leaf Village Elderly Housing may have medical considerations

Osram-Sylvania is a large industrial user. They employ nearly 1,000 individuals and use 20,000-60,000 GPD for industrial and domestic uses.

During emergencies causing interruptions of service, the Commissioners are responsible for providing priority notification to these facilities.

Alternate water will be provided to the Hillsboro House Nursing Home and Maple Leaf Village Elderly Housing and priority notification will be given in the event of a boil order.

If the Commissioners cannot reach these facilities by phone, then a visit will be made. A phone number is available for EJM Management, which manages the Maple Leaf Village Elderly Housing Facility, however door-to-door contact will be made if no response is received from that number.

Osram-Sylvania will receive priority notification of water system emergencies due to their large number of employees and their industrial usage requirements.

Section 4. System Components

Section 4A. System Equipment & Chemicals

The Hillsborough Water Treatment Plant is a slow sand treatment facility with UV disinfection that draws its water from Loon Pond. The plant is designed to treat 1.0 MGD. Design and capacity information is on file at the treatment plant.

Filter Cells:	3 cells, 0.05gpm/sf 14,175 ft ²
Clear Well:	110,000 gallons
Chemical Feed:	Sodium Hypochlorite 1,500 gal storage Potassium Hydroxide 1,500 gallon storage
Emergency Pumping:	Worthington 50hp pump 800 gpm
Plant Water:	Dual 50gpm pumps with hypopneumatic tank
Plant Generator:	Caterpillar 65KW
Tractor:	John Deere 855 with front bucket, York rake and mower deck
UV Disinfection:	Hydro-Optic UV Disinfection System

Treated water flows from the plant to the Bible Hill storage tank, which holds 1,000,000 gallons in two, separate 500,000 gallon cells.

Repair parts and supplies are stored at the water treatment plant, the Bible Hill storage tank garage, and the wastewater treatment plant.

A lawn tractor, pickup truck with snowplow, confined space equipment, portable pumps, pressure washer and other safety and mechanical equipment are owned by the Water & Sewer Department, these items are stored at the wastewater treatment plant.

The water treatment plant is designed with three cells, each cell can be taken off-line individually, providing some level of flexibility in the event of an emergency.

The storage tank on Bible Hill can be operated as two separate cells so one can be taken off-line for repairs or to isolate contaminated water while retaining some storage capacity.

The distribution system is looped wherever possible to provide options in feeding around areas where there are problems.

Section 4B. System As-Built Plan

The system plans and tie measures to main gate valves and curb valves are kept in the Water and Sewer Department office at 4 Church St. Hillsborough, NH. Distribution plans are on file at the Hillsborough Waste Water Treatment Plant and at Water System

Operators' office in Henniker, NH. Water Treatment Plant plans, O&M Manual and documentation are kept at the Water Treatment Facility at Loon Pond.

Section 4C. System Demand

What is the total production capacity of this system?	Gallons per day = 1,000,000
What is the total storage capacity of this system?	Gallons = 1,000,000
What is the average daily demand of this system?	Gallons per day = 342,000
What is the maximum daily demand of this system?	Gallons per day = 877,000
Estimated Available Water (divide total storage capacity by average daily demand)	Days = 2.9

Section 5. Alternate Water Source

Section 5A. Bulk and/or Bottled Water

Bottled Water

Bottled water may be purchased locally.

Bulk Water Suppliers

Bulk water supplies are not a realistic option for this system due to the volume used daily.

If used, bulk water deliveries must be made in compliance with NH DES rules. Water must be from an approved source; tanks must be dedicated to hauling clean water or properly disinfected. Water System Operators, Inc. will contact NH DES to ensure the required paperwork is submitted after using bulk water.

If the need for bulk water arises, the following bulk water hauler should be called:

R & TJ's Trucking
873 Cass Mill Rd.
Alexandria, NH 03222
603-744-9855
603-393-9855 Cell
6,000 gallon tanker available for \$175.00/trip.

If this hauler is not available in a timely manner, consult the NH DES approved listing attached to this plan.

Section 5B. Interconnections with Adjacent Water Systems

There are no interconnected or adjacent water systems.

Section 5C. New Source / Reactivation

There are no plans to develop a new source or activate an in-active source.

Section 6. Alternate Power Supply

A back-up power supply is located at the water treatment facility and is capable of powering all equipment.

Section 7. Water Use Restrictions

The Commissioners will implement the following water conservation measures as necessary in the event of a water system emergency.

1. Watering gardens, lawns or other landscaped areas will be restricted at a minimum or banned entirely.
2. Washing cars, trucks, boats, RV's, ect., will be restricted at a minimum or banned entirely.
3. Using water from a hose to rinse or clean sidewalks, driveways, decks, ect. will be restricted at a minimum or banned entirely.
4. Filling swimming pools will be restricted at a minimum or banned entirely.
5. Residents will be required to follow indoor water use restrictions adopted from NH DES fact sheet #WD-WSEB-26-2 that lists water efficiency practices for indoor water use.
6. In a prolonged or dire emergency, rationing will be implemented.

Section 8. Return to Normal Operation

For severe health risk issues, NH DES will determine when the system can be returned to normal operations. Under most other circumstances, Water System Operators Inc., will recommend to the Commissioners, when it is prudent to return to normal operations. Based on recommendation: boil orders, rationing, bans or restrictions shall be lifted in phases if required- or all at once if the system can safely handle it. The same methods used to announce the emergency may be used to inform consumers of the change in system status.

Section 9. Vulnerability Assessment (optional)

No vulnerability assessment was prepared for this plan.

Section 10. Plan Readiness and Training

The Commissioners, Administrative Assistant, and Water System Operators, Inc. all have current copies of the emergency plan. A copy is posted at the Water Treatment Facility. Previous versions of the Emergency plan shall be discarded.

Section 11. Signatures

Owner	Date
Owner	Date
Owner	Date
Operator	Date



Public Water System Notification Card Emergency Procedures



In the event of an emergency such as flooding, power outage, tampering, contamination, or loss of key facilities:

- Implement the system's emergency response plan and contact local first responders as necessary.
- Call the DES Drinking Water & Groundwater Bureau within 24 hours (or sooner) at:

(603) 271-2513*



{It is required and DES may be able to help you obtain important resources}



Drinking Water & Groundwater Bureau (DWGB)

NH Department of Environmental Services

29 Hazen Drive, Concord, NH 03302-0095

<http://des.nh.gov/organization/divisions/water/dwgb/index.htm>



Public Water System Notification Card Important DES Numbers (Monday - Friday, 8 a.m. to 4 p.m.)



Emergency calls to DWGB:(603) 271-2513 or (603) 271-3503*

Security calls to DWGB:(603) 271-7017 or above numbers*

Other important DES numbers*:

Lab(603) 271-3445
Spills; hazardous materials & petroleum.....(603) 271-3899
Dam failures(603) 271-3406
Toxic air releases(603) 271-1370
Wastewater operations(603) 271-2001
Lake issues (603) 271-3414 or (603) 419-9325 (weekends)



***After hours, contact DES via the NH State Police at 603-223-4381
and ask for the on-call person at DES.**



Drinking Water & Groundwater Bureau (DWGB)

NH Department of Environmental Services

DIRECTIONS FOR ISSUING BOIL ORDER & CERTIFICATION

Notice shall be provided as soon as possible, but **no later than 24 hours** after the system learns that a water sample has shown the presence of fecal coliform or *E. coli* bacteria. The boil order shall remain in effect until a minimum of two consecutive sets of samples show the absence of total, fecal, and *E. coli* bacteria; the source of the contamination has been identified and corrected; and DES notifies the system owner that the boil order may be lifted. Proof of public notice of the boil order, as described below, shall be completed and sent to DES within **10 days** of issuing the boil order notice.

Complete the public notice on the reverse side/following page by filling in the blanks and delivering the notice in accordance with the appropriate methods listed below. The language in *italics* on the public notice is **mandatory** and must remain unchanged. The water system must retain the public notice and certification page on file for 3 years. If the system serves a consecutive system, you must deliver a copy to the owner or operator of the consecutive system.

Complete this page by filling in the applicable boxes and blanks below. **Submit a copy of both pages** to the address or fax number listed below. To request extensions, limited distribution of notice, or for questions, please call us at (603) 271-2542.

A public water system shall notify each customer receiving a bill and the owner of any other service connection through which water is delivered to the public in such a manner that is calculated to reach all persons served by the system, by using *at least one* of the following forms of delivery.

Please check all that apply:

- ☐ Broadcast media, such as radio and television, by furnishing a copy of the public notice for broadcast to radio or television stations, or both, that broadcast in the area served by the system.
- ☐ Publication in 3 consecutive issues of a daily newspaper.
- ☐ Door to door hand delivery.
- ☐ Reverse 911, provided that current phone numbers are known for **all** service connections, and a receipt mechanism confirms that notice was received within 24 hours of transmittal. If all phone numbers are not known, the water system must also use at least one of the 3 above options for each person for whom the number is not known.

For NON-COMMUNITY SYSTEMS ONLY, the following option is available:

- ☐ Posting the notice in conspicuous locations throughout the system frequented by persons served by the system. [Notices must remain in place for as long as the violation persists, or 7 days, whichever is longer.]

If other persons regularly served by the system would not normally be reached by the methods described above (such as hospitals and schools), the water system shall also use *at least one* of the following methods.

Please check all that apply:

- ☐ Delivery of multiple copies for distribution by customers that provide the water to others, such as apartment building owners, schools or large private employers.
- ☐ Posting on the internet or email broadcast to all persons served by the system.
- ☐ Delivery of one or more copies to community organizations.

SUBMITTING PROOF OF PUBLIC NOTICE TO DES and CERTIFICATION

Within **10 days** after issuing the notice, the owner of the water system shall provide proof of public notice to DES, which shall include this completed certification page and a copy of each notice that was distributed. If notice was by newspaper, include one of the 3 full pages of newspaper notices or the tear sheet with invoice showing print dates.

I hereby affirm that public notice has been provided to all consumers, including consecutive systems, in accordance with the delivery, content, and format requirements in NH Admin. Rule Env-Dw 800, in the timeline outlined above.

DES's Drinking Water and Groundwater Bureau was consulted on _____
(date)

Signature of Water System
Owner, Operator, or Designee

Print Name

Water System Name and PWS ID

Proof of public notification should be faxed to (603) 271-3490 or mailed to:
Department of Environmental Services
Drinking Water and Groundwater Bureau - Bacteria Monitoring Section
29 Hazen Drive, PO Box 95
Concord, NH 03302-0095

BOIL ORDER NOTICE

This water system is contaminated with fecal coliform or *E. coli* bacteria
BOIL YOUR WATER BEFORE USING

Fecal coliform or *E. coli* bacteria were found in the _____ water system from
(name of water system)
samples collected on _____ in the _____. These bacteria can
(date) (distribution system / source(s) or both)
make you sick, and are a particular concern for people with weakened immune systems.

What does this mean?

Fecal coliforms and E. coli are bacteria whose presence indicates that the water may be contaminated with human or animal wastes. Microbes in these wastes can cause short-term effects, such as diarrhea, cramps, nausea, headaches, or other symptoms. They may pose a special health risk for infants, young children, some of the elderly, and people with severely compromised immune systems.

Fecal Coliforms and *E. coli* are subgroups of the collection of total coliforms. Coliforms are bacteria that are naturally present in the environment and are used as an indicator that other, potentially-harmful, bacteria may be present. Coliforms were found in more samples than allowed and this was a warning of potential problems.

The symptoms above are not caused only by organisms in drinking water. If you experience any of these symptoms and they persist, you may want to seek medical advice. People at increased risk should seek advice about drinking water from their health care providers.

What happened?

Bacterial contamination can occur when increased run-off enters the drinking water source (for example, following heavy rains). It can also happen due to a break in the distribution system (pipes) or a failure in the water treatment process.

What should I do?

DO NOT DRINK THE WATER WITHOUT BOILING IT FIRST. Bring all water to a boil, let it boil for 2 minutes, and let it cool before using, or use bottled water. Pre-boiled or bottled water should be used for drinking, brushing teeth, washing vegetables, food preparation, washing dishes, making infant formula, and making ice **until further notice**. Boiling kills bacteria and other organisms in the water. Fact sheet WD-DWGB 4-12, provides guidance to consumers under a boil order and is available online at www.des.nh.gov, click on A to Z list, and select fact sheets.

General guidelines on ways to lessen the risk of infection by microbes are available from the EPA Safe Drinking Water Hotline at 1(800) 426-4791. **You will be notified when the water quality problem is corrected. Until that time, the water should be boiled as described above.**

Steps We Are Taking: _____
(describe corrective action(s) such as chlorination and flushing, switching to another source, etc)

We anticipate resolving the problem within _____. For more information, please
(estimated time frame)

contact _____ of _____ at _____
(name of water system contact) (name of system or company) (telephone #)

or _____
(address)

Please share this information with all the other people who drink this water, especially those who may not have received this notice directly (for example, people in apartments, nursing homes, schools, and businesses). You can do this by posting this notice in a public place or distributing copies by hand or mail.

PWS ID: _____ Date Distributed: _____

ENVIRONMENTAL Fact Sheet



29 Hazen Drive, Concord, New Hampshire 03301 • (603) 271-3503 • www.des.nh.gov

WD-DWGB-26-2

2007

Water Efficiency Practices for Domestic Indoor Water Use

Only 1 percent of the earth's water is available for drinking. The average American uses 100 gallons of water a day. Our excessive water use habits deplete potable drinking water supplies and return trillions of gallons of wastewater to streams and coastal waters. The following indoor water efficiency practices can save as much as 25,000 gallons of water per person per year. Water efficiency practices not only save water, they save money. See fact sheet WD-DWGB-26-15, "[Performing a Domestic Water Use and Conservation Audit](#)" for a description of how to determine water use in your home. To save water on outdoor use please see fact sheet WD-DWGB-26-3, "[Water Efficiency Practices for Outdoor Water Use](#)."

General Water Efficiency Practices

The following water efficiency practices apply to general domestic water use. Bathroom, kitchen and laundry water use are addressed in later sections.

- Shut off water when not in use, such as when you brush your teeth or shave.
- Install low flow faucet aerators or laminar flow restrictors that limit flow to <2.5gpm on all faucets in the house. These devices are readily available at most hardware and building supply stores.
- Never put water down the drain when you can use it for something else, such as watering plants.
- Insulate water pipes and hot water heaters. This retains heat so that you don't have to run the water as long for it to get hot. It also saves on energy costs.
- As they wear out, replace water-wasting appliances, such as washing machines and dishwashers, with water efficient ones.
- Avoid water softening systems unless absolutely necessary. Backwashing these systems uses large quantities of water. If you do use a water softener, run the minimum amount of regenerations recommended to maintain softness.
- Turn off pumps, water softeners, and other water-using equipment while on vacation.
- Check for leaks and repair discovered leaks. Not only will you save water but you will save energy and money. A large percentage of energy costs can be attributed to pumping, treating, heating, and cooling water.

- If you are on municipal water and have a meter at your house, check the meter over a period of time when no one is using water. If the meter moves, you have a leak.
- If you have a well, the pump shouldn't run at times when no water is being used.

Water Efficiency Practices in the Bathroom

More than one fourth of all domestic indoor water consumption is used in the bathroom. The following water efficiency practices will help you save water in the bathroom.

- Install ultra-low flow toilets (ULF) that use a maximum of 1.3 gal/flush (6.0L/flush) or retrofit existing toilets with displacement bottles or dams. Dual flush toilets offer a choice between the 1.6-gallon flush for solid wastes and a 1.0-gallon flush for liquid only. Never put bricks in toilet tanks; they disintegrate over time. Use a squat, fat glass jar, like a pickle jar, no more than 6" high, filled with water. Glass is heavier than plastic and less apt to shift around in the tank.
- Don't use the toilet as a garbage disposal. Avoid unnecessary toilet flushing by disposing of tissues, cigarette butts and the like in the trash and composting vegetable food waste.
- Replace or repair toilet flush handles that stick in the flush position.
- Avoid using automatic bowl cleaners in your toilet tank. These chemicals rapidly degrade flapper valves and other tank components, causing the toilet to leak.
- Adjust the toilet tank float level so that water fills no higher than 0.5"-1.0" below the top of the overflow pipe. At higher levels water can flow down the pipe and leak through to the bowl. The refill valve then tops off the tank, causing a continuous cycle of drain and fill.
- Install low flow showerhead devices that limit flow to <2.5gpm and take shorter showers.
- Fill bathtubs no more than half full.
- Detect leaks in toilet tanks by dropping food coloring in the tank (12 drops). Do not flush the toilet for at least an hour. If the tank leaks the dye will show up in the bowl.

Water Efficiency Practices in the Kitchen

The following water efficiency practices can be applied to routine kitchen chores to save water.

- Operate dishwashers with full loads only. Use the water-save cycle if your dishwasher is equipped with one.
- If washing dishes by hand, rinse them in a basin rather than under running water.
- Store drinking water in the refrigerator rather than running the tap for cold water.
- Compost food scraps rather than using a garbage disposal. Not only do disposal units waste water; the fine particles they produce can clog a septic system.
- Consider installing an instant water heater on the kitchen faucet. This reduces the time needed to run water until it becomes hot.

- Do not run water to melt ice or thaw frozen foods. Defrost them in a microwave or in the refrigerator overnight.
- Rinse vegetables in a pan of water rather than under running water.

Water Efficiency Practices in the Laundry

Water use in the laundry is usually the second highest domestic indoor water use. The following water efficiency practices are designed to save water in the laundry.

- Wash full loads only. If unable to wash a full load, set your washer to the appropriate water level setting.
- Consider replacing your top loading, vertical axis washer with a more efficient horizontal axis washer. Most of these are front loading like laundromat machines, but some newer models are also top loading. These washers rotate clothes rather than agitating them and use much less water, an average of 20 gallons per load compared to an average of 43 gallons for conventional washers. See the EPA's Energy Star website listed at the end of this document for a catalog of Energy Star approved efficient washing machines.

For Additional Information

Please contact the Drinking Water and Groundwater Bureau at (603) 271-2513 or dwgbinfo@des.state.nh.us or visit our website at www.des.nh.gov/dwgb. All of the bureau's fact sheets are on-line at www.des.nh.gov/dwg.htm.

Resources

Woodinville, WA Water District. In-depth water-saving tips, how to check for leaks. www.woodinvillewater.com/indoor.html

Michigan State University Extension. Water-saving tips, a graphic explaining how to make and install a toilet dam www.msue.msu.edu/imp/mod02/01500570.html

National Exemption Service, Inc. Indoor water-saving tips. www.hocut.com/savewater1.htm

US EPA. Listing of Energy Star rated washing machines. www.energystar.gov/products/clotheswashers/commercial-cw.shtml

References:

_____, *MRI Water Conservation Technical Bulletin #5, Water Conservation Best Management Practices for Domestic/Sanitary Water Use*; New England Interstate Water Pollution Control Commission, Wilmington, MA; 1996.

_____; *MIL-Handbook-1165, Water Conservation*; US Dept. of Defense; 1997; pp 25-37.
Vickers, Amy; *Handbook of Water Use and Conservation*; WaterPlow Press, Amherst, MA; 2001; pp 23-75, 87-133.

Note: This fact sheet is accurate as of January 2007. Statutory or regulatory changes, or the availability of additional information after this date may render this information inaccurate or incomplete.

Appendix G. NH DES Residential Septic System Fact Sheet

ENVIRONMENTAL Fact Sheet



29 Hazen Drive, Concord, New Hampshire 03301 • (603) 271-3503 • www.des.nh.gov

WD-SSB-13

2011

You and Your Septic System

A Homeowner's Guide to Septic System Maintenance

Your septic system is a highly efficient biological system that can effectively digest and disperse your household sewage and other organic wastes. Properly designed, installed and maintained, it should give you many years of trouble-free service, **but only if it is properly maintained**. The key to the life and service of any septic system is proper maintenance.

How Does Your Septic System Work?

A septic system is designed to condition untreated liquid household waste (sewage) so that it can be readily dispersed and percolated into the subsoil. Percolation through the soil accomplishes much of the final purification of the effluent, including the destruction of disease-producing bacteria.

Your septic tank is the first step in the process of sewage conditioning. Without it, the untreated sewage would quickly clog the receiving soil and prevent the purification process of leaching and soil percolation. Septic tanks serve three functions:

- Removal of solids.
- Bacterial action.
- Sludge and scum storage.

In the first step, as sewage enters the septic tank, its rate of flow is reduced so that the larger solids sink to the bottom or rise to the surface. These solids are retained in the tank, and the clarified effluent with suspended and dissolved solids is discharged.

Bacterial action is the second function. The solids and the liquids in the tank are partially decomposed by bacteria and other natural processes. These bacteria are called anaerobic because they thrive in the absence of free oxygen. This decomposition of sewage under anaerobic conditions is termed "septic," hence the name of the system (and the cause of the odor).

Storage is the third function of your system. Sludge is the accumulation of solids at the bottom of the tank, while scum is a partially submerged mat of floating solids that may form at or near the surface. Space must be provided in the tank to store the residues during the intervals between cleaning. Otherwise, the sludge and scum will eventually be scoured from the tank and will clog the leach field and receiving soil. **PERIODIC CLEANING OF YOUR TANK IS ESSENTIAL TO ITS PROPER FUNCTION.**

Finally, the treated effluent from the septic tank is discharged to the leach field where it percolates through suitable gravel and finally into the subsoil for further purification.

Remember: A properly maintained septic system will adequately treat your sewage. A septic system failure is unhealthy, illegal if not corrected and a nuisance. Also, replacing an existing system can be costly! The life of the system can be prolonged by proper maintenance and frequent tank pumping.

What You Can Do to Properly Maintain Your Septic System

First and foremost, inspect your septic tank every year. If the sludge and surface scum combined are as thick as 1/3 the liquid depth of your tank, have the tank pumped out by a licensed pumper. Your tank should be pumped out **at least every two to three years**.

Do not flush bulky waste or grease into the system. It can plug the sewer and/or distribution lines.

Do not flush toxic materials into the system. Paint thinner, gasoline, pesticides, chlorine, drain cleaners and other caustic or toxic substances can kill the naturally-occurring bacteria in the tank and impair its function. If in doubt, don't flush it.

Conserve water. Too much water can overload your system and adversely affect its function.

Don't allow vehicles or livestock on your leach field. The weight can compact the soil and/or break pipes.

Any soggy areas around the system, or disagreeable odors, could indicate system failure. Have it checked.

Additional Suggestions

Minimize or eliminate use of kitchen "disposal" units, which grind up food wastes and place a burden on the septic tank, especially if the original septic design did not accommodate one.

If water treatment system backwash has been directed into the home septic system, check to make sure that the additional volume from the discharge can be accommodated by your septic system. Unfortunately the majority of treatment systems are installed after the home and septic system are built. The additional water to the septic tank and leaching field may cause problems with septic system operation or may overload the existing leaching area and result in premature failure. Additionally, some experts believe that the brine from backwashing may have detrimental effects on bacteria growth and may influence the soil's ability to infiltrate water.

Maintaining a Record

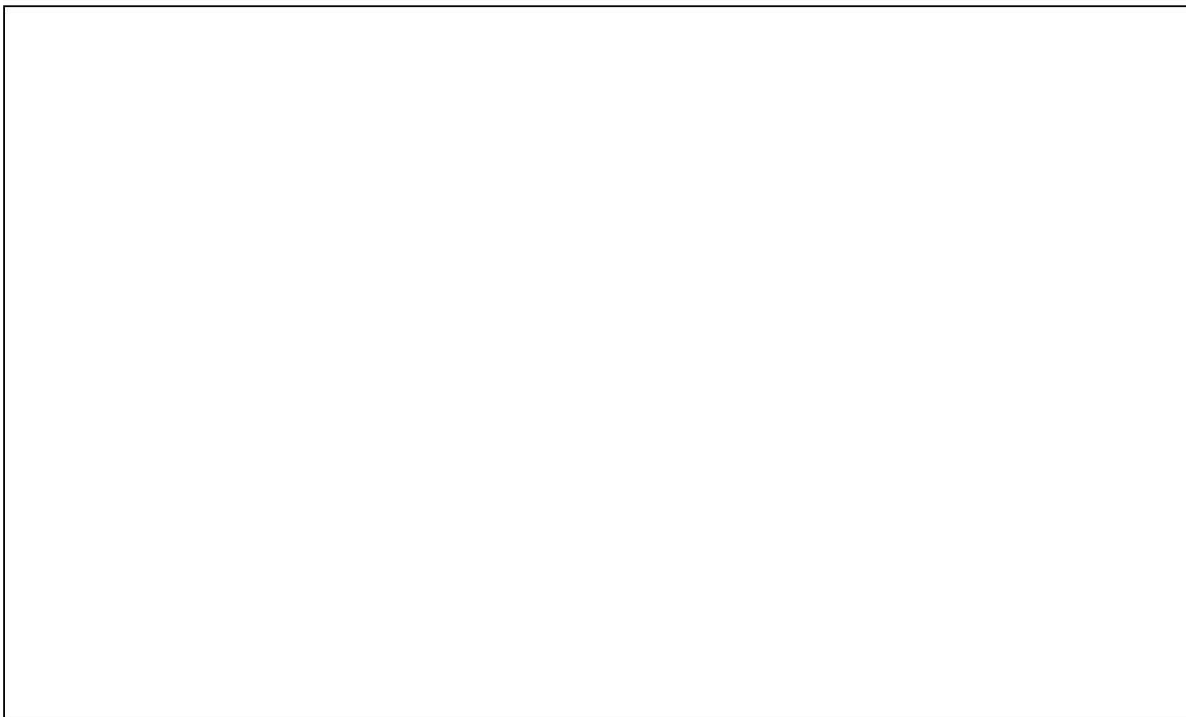
On the next page, is a template for creating a permanent maintenance record of your septic system for your files.

For More Information

For more information, please contact the DES Subsurface Systems Bureau at (603) 271-3501 or go on-line at <http://des.nh.gov/organization/divisions/water/ssb/index.htm> for detailed information.

Septic System Maintenance Record for: _____

First, in the space below, make a sketch of the location of your septic tank in relation to your house. Measure and record on your sketch the distances from the house foundation to the septic tank or cesspool cover, to the distribution box, leaching system and to other permanent features such as nearby trees or rocks.



Date System Installed: _____ Installer: _____

Record of Pumping Service/Maintenance	
Date	Septic Service Provider

For More Information

For more information, please contact the DES Subsurface Systems Bureau at (603) 271-3501 or go on-line at <http://des.nh.gov/organization/divisions/water/ssb/index.htm> for detailed information. Subsurface Systems Bureau; 29 Hazen Drive, PO Box 95; Concord, NH 03302-0095.

Appendix H. NH Lakes Association Lake Host Program Summary

New Hampshire Lakes Association (NH LAKES) Lake Host™ Program

Goal: To prevent the introduction and spread of aquatic invasive species—plants and animals—in New Hampshire's lakes and ponds.

Target Audience: Resident and out-of-state recreational boaters and anglers who launch onto freshwater resources, lawmakers and the general public.

Objectives: To place trained Lake Hosts at boat launch sites to: educate visiting boaters about aquatic invasive species by distributing brochures, answering questions, and completing a brief boater survey; conduct courtesy boat and trailer inspections of vessels both entering and leaving public waters; show boaters where to look for hitchhiking aquatic invasive plants and animals encourage them to conduct self-inspections according to the "Clean, Drain & Dry" method; remove and properly dispose of all plant and animal material and other debris found, and; send samples of suspicious species removed from vessels to the New Hampshire Department of Environmental Services (NHDES) for identification.

Program Need: Aquatic invasive species infestations make recreation in and on lakes, ponds and rivers dangerous and unpleasant, they disrupt the ecological balance of waterbodies, reduce shoreline property values through the reduction of aesthetic and recreational uses of the water body, and are difficult and expensive to control once they infest a waterbody. The main way invasive aquatic plants and animals are spread in New Hampshire is through the transportation of fragments or larvae or on boats and trailers from infested waterbodies to uninfested waterbodies.

Background: In 2002, NH LAKES received a two-year grant from the National Oceanic and Atmospheric Administration (NOAA) as a result of an appropriation secured by U.S. Senator Judd Gregg. The grant supported a comprehensive aquatic invasive plant education and prevention program involving the creation of two videos, the development of plant identification cards, and the staffing of public motorized boat ramps with trained Lake Hosts.

Also in 2002, state legislation was passed to raise boat registration fees by three dollars, effective January 1, 2003. The money collected by this increase, approximately \$300,000 per year, would fund milfoil and other exotic plant prevention and research activities through a grants program administered by NHDES. Up to two-thirds of this amount would be available annually as grants to support exotic aquatic species education and prevention activities (such as the Lake Host™ program). In 2010, this amount was legislatively amended to up to three-quarters. In the winter of 2003, NH LAKES applied for, and was awarded, a \$165,000 grant from NHDES to administer the Lake Host™ program that summer. Subsequent state grants for 2004 through 2013 are indicated below.



Lake Host Program Statistics 2002 – 2014

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Participating Groups (#)	38	46	51	56	57	68	70	71	74	73	77	81	81
Paid Lake Hosts (#)	102	149	190	175	204	221	240	236	230	219	238	247	258
Volunteer Lake Hosts (#)	59	167	216	318	353	429	470	420	517	475	500	500	500
Waterbodies with Lake Hosts (#)	37	45	50	56	56	64	70	71	74	74	78	82	82
Ramps Covered (#)	45	59	61	61	66	83	88	86	90	92	100	103	102
Inspections Conducted (#)	15,878	26,583	31,629	34,878	34,573	44,183	55,924	53,756	62,295	68,158	77,254	76,005	83,463
"Saves" (# aquatic invasive species found)	4	7	16	54	54	157	224	297	267	39	137	153	58
Federal Funds	\$260,100	\$10,000	\$85,300	\$35,000	\$117,000	\$117,000	\$89,206	\$89,206	\$0	\$0	\$0	\$0	\$0
State Funds	\$0	\$165,000	\$150,000	\$185,000	\$185,000	\$185,000	\$161,000	\$123,333	\$133,367	\$169,000	\$200,000	\$210,000	\$230,000
Foundations								\$4,000	\$22,000	\$23,000	\$14,500	\$18,250	\$22,500
Local Funds (hard cash and cash-equivalents)	\$37,155	\$112,382	\$151,238	\$200,756	\$183,179	\$292,017	\$334,061	\$341,535	\$393,273	\$404,751	\$486,455	\$494,248	\$503,170
TOTAL PROGRAM	\$297,255	\$287,382	\$386,538	\$420,756	\$485,179	\$594,017	\$584,267	\$558,074	\$548,640	\$596,751	\$700,955	\$722,507	\$755,670

Additional Funding Sources: Supplemental funding has been secured from the following sources: EPA New England Office (2003); NOAA (2004, 2006, 2008, 2009); Watershed Assistance Grant (319 Clean Water Program); EPA's