

**Waukewan Watershed Management Plan Implementation, Phase 1:
Septic System Improvement Initiative**

RI-13-M-08

A Final Report to

The New Hampshire Department of Environmental Services

Submitted by

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Executive Summary

To address nutrient loading from failing septic systems, The Waukewan Watershed Septic System Improvement Initiative provided cost share incentives to property owners both for the evaluation of individual sewage disposal systems (ISDS), and for the repair or replacement of ISDS found in failure. The project represented a partnership in funding sources between two NHDES programs; the Source Water Protection Program, and the Watershed Assistance Grant program. The Lake Winnepesaukee Association (LWA) was awarded a Source Water Protection grant to provide cost sharing incentives to property owners located within 250 feet of Lake Waukewan to conduct individual sewage disposal system (ISDS) evaluations. Grants provided 50% of the cost of each evaluation, or \$250. Sixteen evaluations were completed through LWA's Evaluation program, with 9 ISDS passing, and 7 ISDS found in failure. Another 8 evaluations were completed independent of the Cost Share Evaluation program. Results of the independent evaluations conducted were 2 ISDS passed, 2 failed, and 4 ISDS passed with 'intermittent use'. The four ISDS that passed with 'intermittent use' were all performed by the same contractor, located in the same neighborhood, and are over 40 years in age. Two of the property owners that received the pass with 'intermittent' use grade, subsequently applied for and were awarded cost share grants to install new systems.

In total, out of the 24 evaluations completed, 11 ISDS passed, 9 ISDS failed, and 4 ISDS are in or near failure. All of the ISDS found to be in failure were over 40 years in age. Results of the inventory indicate that many of the properties on Lake Waukewan and Winona have ISDS over 40 years in age, which increases the risk of septic system failure and pollutant loading to the lake.

A second part of the Waukewan Watershed Septic System Improvement Initiative provided cost sharing grants to property owners whose septic systems were found to be in failure through the evaluation program or were documented in failure. A NHDES Watershed Assistance Grant provided funds for the improvement of 10 ISDS found in or near failure; cost share grants covered one third of the cost toward repair, upgrade, or replacement of an existing individual sewage disposal system, up to a maximum of \$4,000. Priority was given to properties with septic systems identified as high risk located within 250 feet of Lake Waukewan and Lake Winona as nutrient loading in these critical areas poses a threat to public health. Through the cost share program, 9 ISDS were replaced with new systems. In addition, because of Meredith's health regulation, five more properties had their ISDS replaced, for a total of 14 new systems installed. The estimated reduction in phosphorus loading to Lake Waukewan from the installment of new septic systems is 5.3 kg.

Introduction

Background

The Waukewan Watershed Management Plan Implementation, Phase 1: Septic System Improvement Initiative project is part of the implementation phase of the 2010 Meredith, Paugus, and Saunders Bay Sub-watershed Management Plan that addresses nutrient loading (<http://winnepesaukeegateway.org/management-plans/plan-1-meredith-paugus-and-saunders-bay/plan-recommendations/>).

Potential pollution sources in the watershed were reviewed in the development of the 2005 Waukewan Watershed Management Plan and estimates of pollutant loading for the entire watershed were generated using EPA's Spreadsheet Tool for Estimating Pollutant Load (STEPL) during development of the 2010 Meredith, Paugus, Saunders Bays Subwatershed Management Plan.

Of the developed land in the watershed, 65% is residential development comprising a mixture of seasonal and year round homes, cottages, and camps concentrated mostly around Lake Waukewan and Lake Winona. Approximately 80% of the homes have onsite wastewater disposal systems, consisting of cesspools, holding tanks, or septic systems.

The 2002 source water assessment report completed for Lake Waukewan ranked the community water source as of high susceptibility to pollutant loading from failing septic systems. Results of a survey of residents along Lake Waukewan and Lake Winona conducted in 2005 by the Waukewan Watershed Advisory Committee (WWAC) and initial research of municipal records in 2009 indicated as high as 30% of the septic systems located on Lakes Winona and Waukewan may be in failure or at high risk of failure.

Nutrient loading is a concern for Lake Waukewan and a threat to the drinking water supply because increased loading of phosphorus to the lake has the potential to result in algal blooms including cyanobacteria. Several cyanobacteria blooms have occurred on Lake Waukewan in the past few years, which are of concern as some strains have the potential to release neuro and hepatotoxins. With no technology in place at the water treatment facility to detect or treat cyanobacteria, recurring cyanobacteria blooms are a serious health threat to the 3,000 water supply users. Further degradation of the water quality could result in costly infrastructure expenses to the municipality.

The Meredith, Paugus, Saunders Bay Subwatershed Management Plan completed in 2010 estimated the total phosphorus loading for the Waukewan Watershed between 286 to 441 kilograms of phosphorus per year depending on the estimated failure rate of existing septic systems. Based on the 2009 septic system analysis completed by the WWAC, the nutrient loading from septic systems may have been significantly underestimated. Seasonal use high-risk septic systems located within 250 feet of Lake Waukewan alone are estimated to contribute 13% of the total annual phosphorus

load in the watershed. Since this loading occurs during the summer months, when algae are present and the phosphorus in effluent is in a soluble form easily taken up by algae, the potential impact of nutrient loading from septic systems is more significant.

Since 2005 a key focus of the WWAC has been the development of a comprehensive strategy to address nutrient loading from potentially failing septic systems. Components of the strategy include research and monitoring, outreach and education, and adoption of new regulations. As of January 2013, the following actions have been completed by the WWAC and the Town of Meredith:

- A septic system risk analysis of the properties located on Lake Waukewan within Meredith and the preliminary identification of potential systems at risk in New Hampton and Center Harbor; the number of potential high risk systems: Meredith – 31, New Hampton – 27, Center Harbor – 7
Properties were considered as potentially high risk if no record of the system existed or no operational approval of the system could be found.
- Mailing of a septic system brochure to Meredith property owners within 250 feet of Lake Waukewan, and updates of the activities of the WWAC.
- Cyanobacteria Forum held in August 2011.
- ‘Septic Sense’ workshop held in July 2012 and co-sponsored by the Lake Winnepesaukee Assn
- A health regulation adopted in January 2013 by the Town of Meredith to address subsurface wastewater disposal systems located wholly or in part within 250 feet of the shoreline of Lake Waukewan.

Because Lake Waukewan is the municipal water supply for Meredith, the town was able to address old and potentially failing septic systems through a health regulation. Section 5 of the health regulation requires property owners without a valid subsurface system operational approval on file with the NH Department of Environmental Services to certify to the Health Officer of the Town of Meredith that the existing on-site wastewater disposal system is not in failure as defined by NH RSA 485-A: 2 IV. The basis of the certification shall be a current, complete, written evaluation of the on-site disposal system or systems performed by a NH certified or licensed septic system evaluator.

Project Description

In order to address nutrient loading from failing septic systems, the Waukewan Watershed Septic System Improvement Initiative (SSII) consisted of two main components; the evaluation of septic systems on Lake Waukewan, and cost share grants to repair or replace systems in failure.

As Lake Waukewan is the municipal drinking water source for the Town of Meredith, funding

for the evaluation of individual sewage disposal systems (ISDS) on Lake Waukewan was provided through the NHDES Source Water Protection Grant program. This cost share program was open to properties in Meredith, New Hampton, and Center Harbor located within 250 feet of Lake Waukewan. The second cost share initiative to repair, upgrade, or replace individual sewage disposal systems (ISDS) in failure was funded through a NHDES Watershed Assistance grant; this program was open to properties located within 250 feet of Lake Waukewan and Winona Lake.

The Waukewan watershed, HUC12: 010700020108, (Figure 1) includes five towns; Meredith, New Hampton, Center Harbor, Holderness, and Ashland, NH. Developed land of 951 acres makes up 13% of the total 7,162 acres of land in the Waukewan Watershed, with over 6,000 acres of forest land accounting for 84% of the land area. Lake Winona, at 154 acres, and Lake Waukewan, 953 acres, are the largest waterbodies. Lake Winona outlets to the Snake River, which flows approximately 2 miles before emptying into Lake Waukewan.

Currently, Lake Waukewan is categorized as oligotrophic and Lake Winona as mesotrophic (NHDES, Environmental Monitoring Database). Development around the lake consists of a mix of seasonal and year-round residential homes and cottages. Businesses on the lake include some commercial and light industrial use, located mainly at the southern end of the lake.

The desired environmental outcome for this project is to reduce the nutrient loading to Lake Waukewan from failing septic systems located within 250 feet of Lakes Waukewan and Winona in order to lessen the public health risk from primary contact recreation associated with pathogens and cyanobacteria, and to protect the municipal drinking water supply.

Site Location:

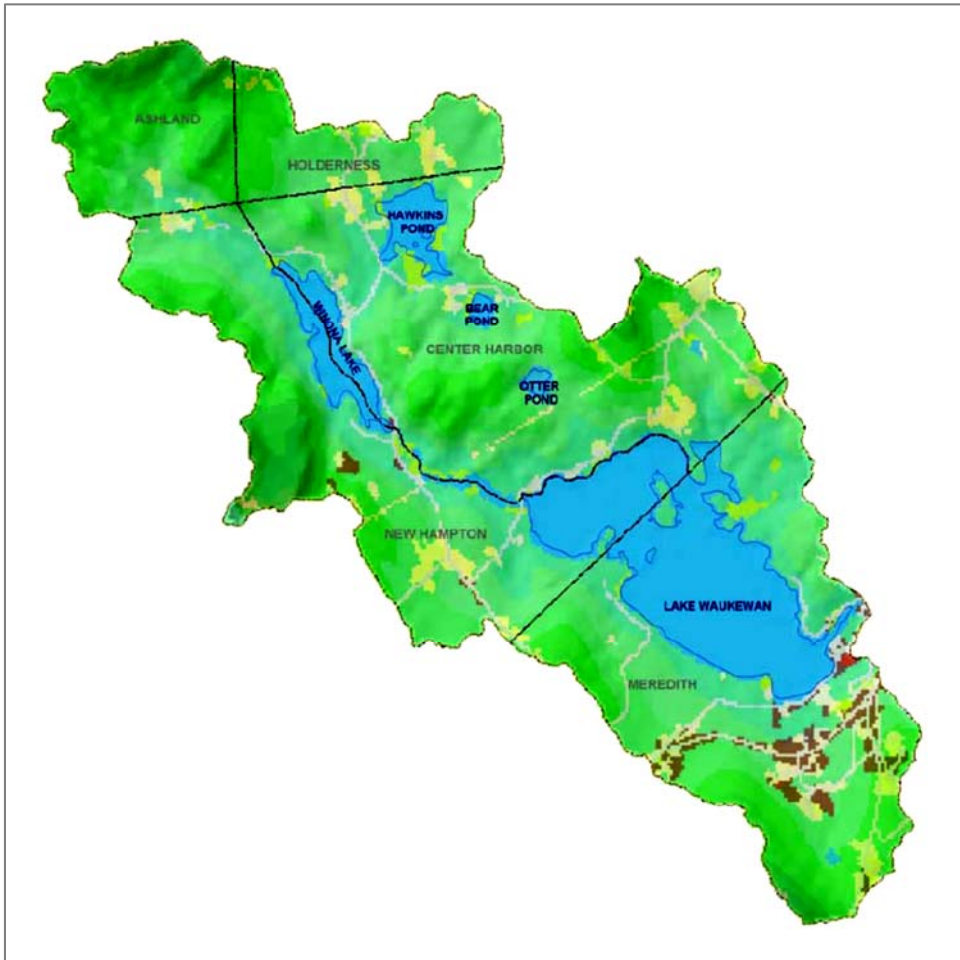


Figure 1. Lake Waukegan watershed

Project Goals and Objectives:

1. Improve and update existing records and inventories regarding septic system functioning and maintenance for properties located within 250 feet of Lake Waukegan and Winona Lake.
2. Evaluation of potential nutrient loading from septic systems on Lakes Waukegan and Winona.
3. Identification of septic systems in failure
4. Repair/upgrade of failing septic systems
5. Education of property owners on the proper functioning and maintenance of septic systems

Objective 1: Improve and update existing records and inventories regarding septic system functioning

Although the 2005 Waukegan Watershed Management Plan identified septic systems as one of the major issues for Lake Waukegan; the actual number of septic systems in failure or near failure is unknown. Communities vary in the level of detail to which they document construction and operational approvals for installation of septic systems. The Town of Meredith has the most complete information regarding age of building, construction and operational permits, size of tanks, distance from the lake, etc. While the 2009 Septic System Risk Analysis performed by the Waukegan Watershed Advisory Committee (WWAC) was able to complete a comprehensive inventory of properties in Meredith, it lacked information for New Hampton or Center Harbor tax parcels. In addition, the 2009 septic system risk analysis conducted by the WWAC focused on the ‘worst of the worst’; only those properties without an operational approval on file, or no septic system information at all. There are 183 properties with individual sewage disposal systems (ISDS) located either wholly or in part within 250 feet of the shoreline of Lake Waukegan. Conducting a comprehensive inventory of all 183 properties was an important first step in determining the potential pollutant risk to Lake Waukegan.

Center Harbor -	35 lots
New Hampton -	45 lots
Meredith -	103 lots

The 2009 septic system risk analysis identified 31 properties within Meredith that either did not have a NHDES operational approval on file for their ISDS, or no record of the system existed. In 2013 LWA’s inventory of properties located within 250 feet of Lake Waukegan identified 95 properties with septic systems over 25 years in age. As the average life span of an ISDS is between 20-30 years, results of the inventory indicated that the number of ISDS nearing their life span use may be as high as 50%.

An inventory of properties on Winona Lake was also conducted as part of the project. A total of 93 properties were identified as within 250 feet of the lake, with 65 parcels located in New Hampton, and 28 in Center Harbor. Initial analysis indicated that 64 out of the 93 septic systems were over 25 years in age.

Objective 2: Evaluation of potential nutrient loading from septic systems in the Lake Waukegan watershed.

A nutrient loading analysis was conducted to estimate the pollutant loading from high-risk septic systems and the reductions anticipated as a result of septic system improvements made. The analysis involved the following steps:

- GIS and parcel data/ tax maps were used to identify and develop an inventory of properties located within 250 feet of Lakes Waukegan and Winona with potentially high-risk

subsurface wastewater disposal systems. Local municipal records and the NHDES OneStop were reviewed for each property to ascertain the following information for determination of high risk septic systems:

- type of onsite wastewater disposal system
 - system age (25 years or older)
 - distance to the lake
 - construction and/or operational permit on file with NHDES
 - seasonal or year-round use
- The nutrient loading model used in estimating phosphorus inputs from septic systems was adapted from the Maine Department of Environmental Protection (DEP) model and the Lake Loading Response Model (LLRM) model. Both models provide rough calculations of septic system phosphorus loading to lakes based on the age of system, the number of occupants, the number of days of occupancy, the average wastewater use, and the mean effluent phosphorus concentration.

Prior to the adoption of Meredith's health regulation and the implementation of the SSII program, the estimated total phosphorus (TP) loading from septic systems around Lake Waukewan and Winona Lake was 47.9 kg, with 34.3 kg TP coming from 183 parcels on Lake Waukewan (Table 1), and 13.6 kg TP from the 93 parcels on Winona Lake (Table 2).

Table 1. Estimated TP load from Lake Waukegan septic systems prior to 2013 – New Hampton

System Age and Distance	# of systems	Avg. # occupants	Days of Occupancy/Yr	TP Attenuation Factor (portion that reaches the lake)	Distance < 100 ft. = 1.3 100-200 ft.. =1.1 > 200 ft. = 1.0	Mean TP Conc (mg/L)	LLRM Water Use (cu. m/day)	P Load (kg/yr)	Total P Load (kg/yr)
Waukegan - New Hampton									
Seasonal									
New, > 200'	0	3.5	90	0.1	1	8.0	0.25	0.0	
New, 100' - 200'	6	3.5	90	0.1	1.1	8.0	0.25	0.4	
New, < 100'	6	3.5	90	0.1	1.3	8.0	0.25	0.5	
Old, > 200'	0	3.5	90	0.2	1	8.0	0.25	0.0	
Old, 100' - 200'	12	3.5	90	0.2	1.1	8.0	0.25	1.7	
Old, < 100'	6	3.5	90	0.2	1.3	8.0	0.25	1.0	
Failure <100'	1	3.5	90	0.5	1.3	8.0	0.25	0.4	
Failure, >100'	0	3.5	90	0.5	1.1	8.0	0.25	0.0	
Year-round									
New, > 200'	0	2	365	0.1	1.0	8.0	0.25	0.0	
New, 100' - 200'	3	2	365	0.1	1.1	8.0	0.25	0.5	
New, < 100'	4	2	365	0.1	1.3	8.0	0.25	0.8	
Old, > 200'	0	2	365	0.2	1	8.0	0.25	0.0	
Old, 100' - 200'	2	2	365	0.2	1.1	8.0	0.25	0.6	
Old, < 100'	5	2	365	0.2	1.3	8.0	0.25	1.9	
Failure	0	2	365	0.5	1.3	8.0	0.25	0.0	
Totals:	45								7.7

Table 1. Estimated TP load from Lake Waukegan septic systems prior to 2013 – Center Harbor

System Age and Distance	# of systems	Avg. # occupants	Days of Occupancy/Yr	TP Attenuation Factor (portion that reaches the lake)	Distance < 100 ft. = 1.3 100-200 ft.. =1.1 > 200 ft. = 1.0	Mean TP Conc (mg/L)	LLRM Water Use (cu. m/day)	P Load (kg/yr)	Total P Load (kg/yr)
Waukegan - Center Harbor									
Seasonal									
New, > 200'	0	3.5	90	0.1	1	8.0	0.25	0.0	
New, 100' - 200'	1	3.5	90	0.1	1.1	8.0	0.25	0.1	
New, < 100'	8	3.5	90	0.1	1.3	8.0	0.25	0.7	
Old, > 200'	1	3.5	90	0.2	1	8.0	0.25	0.1	
Old, 100' - 200'	1	3.5	90	0.2	1.1	8.0	0.25	0.1	
Old, < 100'	15	3.5	90	0.2	1.3	8.0	0.25	2.5	
Failure <100'	0	3.5	90	0.5	1.3	8.0	0.03	0.0	
Failure, >100'	0	3.5	90	0.5	1.1	8.0	0.25	0.0	
Year-round									
New, > 200'	1	2	365	0.1	1.0	8.0	0.25	0.1	
New, 100' - 200'	1	2	365	0.1	1.1	8.0	0.25	0.2	
New, < 100'	2	2	365	0.1	1.3	8.0	0.25	0.4	
Old, > 200'	0	2	365	0.2	1	8.0	0.25	0.0	
Old, 100' - 200'	1	2	365	0.2	1.1	8.0	0.25	0.3	
Old, < 100'	4	2	365	0.2	1.3	8.0	0.25	1.5	
Failure	0	2	365	0.5	1.3	8.0	0.25	0.0	
Totals:	35								6.0
Total TP load from all parcels									34.3

Table 2. Estimated TP load from Winona Lake properties – New Hampton

System Age and Distance	# of systems	Avg. # occupants	Days of Occupancy/Yr	TP Attenuation Factor (portion that reaches the lake)	Distance < 100 ft. = 1.3 100-200 ft.. =1.1 > 200 ft. = 1.0	Mean TP Conc (mg/L)	LLRM Water Use (cu. m/day)	P Load (kg/yr)	Total P Load (kg/yr)
Winona - New Hampton									
Seasonal									
New, > 200'	0	3.5	90	0.1	1	8.0	0.25	0.0	
New, 100' - 200'	8	3.5	90	0.1	1.1	8.0	0.25	0.6	
New, < 100'	15	3.5	90	0.1	1.3	8.0	0.25	1.2	
Old, > 200'	6	3.5	90	0.2	1	8.0	0.25	0.8	
Old, 100' - 200'	12	3.5	90	0.2	1.1	8.0	0.25	1.7	
Old, < 100'	19	3.5	90	0.2	1.3	8.0	0.25	3.1	
Failure <100'	0	3.5	90	0.5	1.3	8.0	0.25	0.0	
Failure, >100'	0	3.5	90	0.5	1.1	8.0	0.25	0.0	
Year-round									
New, > 200'	0	2	365	0.1	1.0	8.0	0.25	0.0	
New, 100' - 200'	3	2	365	0.1	1.1	8.0	0.25	0.5	
New, < 100'	1	2	365	0.1	1.3	8.0	0.25	0.2	
Old, > 200'	0	2	365	0.2	1	8.0	0.25	0.0	
Old, 100' - 200'	0	2	365	0.2	1.1	8.0	0.25	0.0	
Old, < 100'	1	2	365	0.2	1.3	8.0	0.25	0.4	
Failure	0	2	365	0.5	1.3	8.0	0.25	0.0	
Totals:	65								8.4

Table 2. Estimated TP load from Winona Lake properties – Center Harbor

System Age and Distance	# of systems	Avg. # occupants	Days of Occupancy/Yr	TP Attenuation Factor (portion that reaches the lake)	Distance < 100 ft. = 1.3 100-200 ft.. =1.1 > 200 ft. = 1.0	Mean TP Conc (mg/L)	LLRM Water Use (cu. m/day)	P Load (kg/yr)	Total P Load (kg/yr)
Winona - Center Harbor									
Seasonal									
New, > 200'	0	3.5	90	0.1	1	8.0	0.25	0.0	
New, 100' - 200'	2	3.5	90	0.1	1.1	8.0	0.25	0.1	
New, < 100'	2	3.5	90	0.1	1.3	8.0	0.25	0.2	
Old, > 200'	2	3.5	90	0.2	1	8.0	0.25	0.3	
Old, 100' - 200'	8	3.5	90	0.2	1.1	8.0	0.25	1.1	
Old, < 100'	2	3.5	90	0.2	1.3	8.0	0.25	0.3	
Failure <100'	0	3.5	90	0.5	1.3	8.0	0.25	0.0	
Failure, >100'	1	3.5	90	0.5	1.1	8.0	0.25	0.3	
Year-round									
New, > 200'	1	2	365	0.1	1.0	8.0	0.25	0.1	
New, 100' - 200'	3	2	365	0.1	1.1	8.0	0.25	0.5	
New, < 100'	1	2	365	0.1	1.3	8.0	0.25	0.2	
Old, > 200'	0	2	365	0.2	1	8.0	0.25	0.0	
Old, 100' - 200'	3	2	365	0.2	1.1	8.0	0.25	1.0	
Old, < 100'	3	2	365	0.2	1.3	8.0	0.25	1.1	
Failure	0	2	365	0.5	1.3	8.0	0.25	0.0	
Totals:	28								5.3
									13.6

Objective 3: Identification of septic systems in failure

The voluntary cost sharing evaluation program was offered to all property owners located within 250 feet of Lake Waukewan, thereby expanding the opportunity to people outside the town of Meredith. Eligibility for the program was based on location, estimated age of the ISDS, and restricted to residential single family homes, duplexes, or seasonal camps. To ensure all properties were evaluated equally, LWA contracted with Tom Carr of Meridian Land Services, Inc., a NH licensed and certified septic system evaluator. The Septic System Evaluation Cost Share Program paid 50% or \$250 toward the cost of the evaluation.

Program Terms:

- Participation in the program is voluntary.
- Funds may only be used toward the cost of the evaluation and certification of the ISDS.
- Cost share to property owners is \$250
- Property owner must be present during the evaluation and must allow access to the interior of the home.
- If property is found to be in failure as defined by RSA 485-A: 2 IV, property owner understands that she/he/they are required by law to have the system repaired.

Eligibility Criteria:

- Property is located within 250 feet of Lake Waukewan
- Septic system is estimated to be over 25 years in age **or**
- No operational approval on file with NHDES

Evaluations:

Through the Source Water Protection grant program, LWA had funds to complete 31 evaluations. Results of the initial inventory identified 95 properties as *potentially* eligible:

Center Harbor - 18
New Hampton - 27
Meredith - 50

LWA mailed grant application packets in November 2013 to the 95 identified property owners. Packets were mailed to the year round address for each property owner on file with the Town Hall. Only two packets came back as undeliverable.

Subsequent investigation and follow up with the town of Meredith resulted in eleven (11) properties being removed from the list of eligible Meredith properties, revising the total number of eligible properties to 84. The town of Meredith also amended the list of properties subject to their health regulation from 31 to 25.

Revisions to Meredith Property list:

- 5 properties were removed as it was determined they were ineligible (over 250 feet from the lake).
 - 2 had operational approvals on file with NHDES, so they were removed.
 - 4 properties had new systems installed in 2013
- The number of Meredith properties eligible for program was revised to 39.

Results of the Evaluation Program:

LWA's Septic System evaluation program involved three components; a home inspection, mini septic seminar, and the evaluation of the ISDS. Property owners were required to be present for the evaluation and to allow access to the interior of the home in order to verify the number of bedrooms, bathrooms, laundry facilities, etc. After doing the inside inspection, Tom Carr, Meridian Land Services, would sit down with the property owner(s) and give them a mini seminar on how septic systems work, both the process in the septic tank and the leach field. His purpose was to make sure the owner understood the science of how the entire system works, so that when the evaluation was conducted, the property owner was not surprised by the findings, and understood why the system either passed or failed.

Sixteen property owners participated in LWA's Septic Evaluation program, resulting in 9 ISDS passing (56%), and 7 ISDS found in failure (44%).

- 11 Meredith properties – 6 Failed/5 passed
- 4 New Hampton – 1 Failed/3 passed
- 1 Center Harbor – Passed

In addition to the 16 above, the following is known about some Meredith properties:

5 properties had new systems installed:

4 in 2013 (S26-34, U13-1, U13-4-A, U13-8)

1 in 2015 (S26-32) This property had been on Meredith's very high risk list.

8 properties had evaluations done outside of the grant program in order to comply with the town of Meredith's health regulation; 2 passed (U08-19, S16-40), 2 failed (U03-16, U09-9), and 4 passed with 'intermittent use'. The passed with 'intermittent use' was not a result anticipated by the town of Meredith; however, all ISDS that received a passing grade are required to have the systems re-evaluated every five (5) years.

Objective 4: Repair/upgrade of failing septic systems

Implementation of the second part of the grant program, the cost share initiative for upgrade or replacement of failing septic systems was begun in August 2014. Implementation was delayed to allow time for the evaluation of ISDS to be completed. LWA sent letters to 142 property owners on Lakes Waukewan and Winona announcing the opening of the program and inviting their voluntary participation.

Eligibility:

- Property must be located wholly or in part within 250 feet of Lake Winona or Lake Waukegan.
- Funding is only for residential single-family homes, duplexes, or seasonal camps.
- Must have high risk or failing individual sewage disposal system on property. New home construction or expansion is not eligible.
- Type of ISDS, age, and distance to surface water are criteria that will be used to assess risk. Cesspools and holding tanks are considered high risk.

Program Terms:

- Participation in the program is voluntary.
- Funds may only be used toward the cost for repair, replacement, or upgrade of the ISDS.
- The application must be approved by LWA BEFORE any work is started on the system.
- The reimbursement for cost-share is for one-third (1/3) of the total cost of construction, not to exceed \$4,000, to repair, upgrade, or replace a failing system.
- Funding is available to repair/replace 10 ISDS

Results:

All 10 cost share grant awards available were applied for and approved. Seven (7) property owners whose ISDS failed LWA's Evaluation program applied to the second cost share program. The remaining three applicants had independent evaluations of their ISDS conducted; one system was found in failure, and two ISDS passed with 'intermittent use'. Grant awards were approved for the 'passed with intermittent use' as the property owners acknowledged that use of the property was more than 'intermittent', and the systems were likely in failure. Unfortunately, only 9 new systems were installed under the grant program as personal family issues prevented the 10th property owner from meeting the grant deadline.

In addition to the 9 systems installed through the SSII cost share program, five new systems were installed after January 2013. These were properties all located in Meredith that either recently sold or the owners knew the ISDS were in failure and with the passing of Meredith's health regulation, went ahead and replaced the systems. As of December 31, 2015, at least three properties have ISDS in failure that have not been repaired; the 10th grantee, and two other properties whose ISDS failed their evaluations.

Due to the replacement of 14 ISDS in failure, the revised estimated nutrient load from total phosphorus has been reduced by 5.3 kg, from 34.3 to 29.0 kg.

Objective 5: Education of property owners on the proper functioning and maintenance of septic systems

The following is a summary of outreach efforts to residents and community officials regarding both the Septic System Evaluation Program and the Septic System Improvement Initiative.

LWA Outreach

- 12/3/12 Meredith's Selectmen's Meeting – Public Hearing about the Health Regulation regarding septic systems.

Pat Tarpey, LWA attended and spoke at the meeting; letting the Selectmen and public know that LWA had submitted two grant applications to assist with cost share for evaluations and repairs/replacements.

- 1/23/13 Press Release issued about the two grant programs. It was carried in the Laconia Daily Sun on 1/25/13, and in the Union Leader on 1/24/13.
- 11/5/13 95 letters mailed to shorefront property owners on Lake Waukewan regarding the septic system evaluation program
- Posted on LWA's website
- 5/14/14 Reissuance of press release about the Septic Evaluation program
- 8/11/14 emailed request to Lake Waukewan Association President and Lake Waukewan and Winona Watershed Protective Association VP for assistance in notifying their members about the program.
- 8/28/14 142 letters mailed to shorefront property owners on Lake Waukewan and Winona Lake advising of the opening of cost share grant for the repair or replacement of failing systems.
- 9/15/14 Meredith Selectmen's Meeting – provided Select board with update on both programs
- 9/17/14 Press release in the Laconia Daily Sun regarding grant funds for septic system evaluations.
- 2014-2015 Pat Tarpey, LWA attended meetings of the Waukewan Watershed Advisory Committee (WWAC), a town of Meredith appointed committee, to keep them updated as to the progress of the two Septic System grant programs.

Septic Sense Presentations

- 3/8/14 Septic Sense Presentation to 45 people at meeting of Gilford Island Association
- 8/5/14 Septic Sense Presentation, Balmoral Improvement Association, Moultonborough, 20 attendees
- July 2014 through August 2015 – mini septic seminars held with 16 property owners at their properties.

WWAC Outreach - The email distribution list for the Waukewan Watershed Advisory Committee consists of 117 property owners: 82 Meredith, 19 New Hampton, 16 Center Harbor.

- 2/1/13 – email notice to lake shore property owners
- 5/22/13 – email to distribution list of lake shore property owners
- 12/19/13 – Waukewan Watershed Advisory Committee Year End Report
- 5/15/14 – Emailed reminder notice to distribution list of lake shore property owners
- 12/31/14 Waukewan Watershed Advisory Committee Year End Report – included in the Town of Meredith’s year-end report

Town of Meredith

- 1/24/13 Letter sent from Bill Edney, Health Officer to 25 property owners on Meredith’s high risk septic system list. Letter included a copy of the press release that LWA issued on 1/23/13.
- Town website has had the grant programs posted since January 2013 – first the announcement and then in November when it was available to apply.
- November 2014 Reminder letters of the deadline to comply with the town’s health regulation went out to the list of property owners identified by the town as very high risk.

Conclusions and Recommendations

The desired environmental outcome for this project was to reduce nutrient loading to Lake Waukewan from failing septic systems located within 250 feet of Lakes Waukewan and Winona in order to lessen the public health risk from primary contact recreation associated with pathogens and cyanobacteria, and to protect the municipal drinking water supply. The project was successful as the total estimated TP load to Lake Waukewan was reduced by 5.3 kg; from 34.3 to 29.0 kg.

At the beginning of 2013 when the town of Meredith’s health regulation went into effect, the total number of properties eligible for the Septic Evaluation Program equaled 88, with 49% located in Meredith, 31% in New Hampton, 20% in Center Harbor. Prior to the health regulation, at least 17 ISDS were in failure (based on inventory, evaluation results and number of new systems installed since 2013). All of the systems found to be in failure were over 40 years old.

We can only determine the overall pass/failure rate of existing ISDS based on the 29 properties that either had evaluations completed or installed new systems. Fourteen (14) out of the 29 ISDS were in failure (48%), 11 passed (38%), and 4 passed with intermittent use. The ‘passed with intermittent use’ evaluation is questionable, as 2 of the properties have since installed new systems, indicating they were likely in or close to failure.

In conclusion the SSII program was a large success. Tom Carr, Meridian Land Services, stated *“Now that I’m into these, I’m surprised more people didn’t go for it. \$250 out of pocket for the*

inspection that is being done is a huge bargain. It's been a good program and I'm glad we won the bid."

One of the participants in the program sent along this note: *"Tom Carr arrived at the appointed time, did a thorough and professional inspection, and kept us informed of each aspect of the inspection. We're very glad we took advantage of your program and very pleased with the outcome as well as the process."*

And a recipient of grant funds for the replacement of their system was overjoyed: **WOW !! AWESOME !!!!!!!! We are THRILLED, and will let you know when it arrives! THANK YOU SO VERY MUCH !!!!!!!!!!!!!!!! Sharon and I are thrilled with this help and support. Thank you!!**

Several key aspects, lessons learned, and benefits realized from the program should be noted:

- The Septic System Risk Analysis/Inventory was time intensive. Town records are incomplete and it proved challenging to match properties with records in the NHDES Subsurface Query. When this project began, the NHDES Subsurface Query tool did not include a search option by map/lot parcel number. Records were linked to the original owner or developer of the property; thereby making it difficult to query properties that have been sold over the years. In addition, some communities have changed their tax parcel numbering system, as well as street names. The NHDES Subsurface Query tool does now have a search option by map/lot parcel number.
- Scheduling of the evaluations was challenging. To be cost effective, Meridian Land Services needed to do two evaluations per day. Since the property owner was required to be present, most evaluations needed to occur during the summer/ early fall.
- It was a great educational program for both the municipalities and the property owner, but more education is needed. Community outreach through brochures and Septic Sense presentations need to continue for both homeowners and municipalities to understand the functioning of septic systems and the potential impact to groundwater and surface water quality from failing systems.
- The communities of Meredith, Center Harbor, and New Hampton have a Septic System Inventory of properties located within 250 feet of Lake Waukewan. This provides a starting point for towns to track and manage septic system information.
- Cost Share information and materials have been developed that can be used by other grantees to implement similar programs.
- Outreach has fostered interest in the program from other lake associations and municipalities located in NH and Maine. LWA and the town of Meredith have presented the Septic System Improvement Initiative at numerous conferences, several Septic Sense

workshops have been held, press releases and news articles have been published in the local papers and in local lake association newsletters.

- The amount of effluent containing pathogens, pharmaceuticals, and nutrients, reaching Lake Waukewan has decreased due to the replacement of fourteen septic systems in failure. The total estimated TP load to the lake has been reduced by 5.3 kg; from 34.3 to 29.0 kg.
- Results of the Septic System Risk inventory of properties on Lake Waukewan and Winona Lake indicate the number of ISDS in failure may be high due to age of existing systems. Forty-nine percent (49%) of the 88 eligible properties for the program had ISDS that pre-dated 1967.

APPENDICES

APPENDIX A

INVENTORY OF SEPTIC SYSTEM PROPERTIES

APPENDIX B

NUTRIENT MODEL CALCULATIONS OF SEPTIC SYSTEMS ON LAKE WAUKEWAN AND WINONA LAKE