

Bauneg Beg Lake Watershed 2018 Survey Report



November 2018

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ACKNOWLEDGMENTS

The following people and organizations were instrumental in the Bauneg Beg Lake Watershed Survey Project and deserve special recognition for their efforts:

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Gary Wetzel	Jacky Weaver
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Julia O'Connell	Rick Boisvert
Daniel Johnson	Peter Newkirk, Maine DOT
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Project Donors

Thanks to a grant by the Lake Stewards of Maine and the following individuals and businesses

Bob & Claire Createau, Createau Photography
Craig & Crystal Dionne, Timber Tek Construction
Ron & Jeannine Descoteaux
Sanford Institution for Savings, Blaine Boudreau, President
Debbie & Rick Scialdone, Scialdone Painting
Steve & Sandy Gray, Steve Gray Plumbing
Denise & John Carsti
Waban Projects Inc.
Great Works Regional Land Trust
Augusta Von Wellsheim, Carpe Diem Coffee

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INTRODUCTION

This report was specifically designed for citizens living in the Bauneg Beg Lake Watershed. It provides the results and analysis of a watershed survey conducted during the summer of 2018. In addition, the report includes basic information about how to protect lake water quality.

The Bauneg Beg Lake watershed survey was conceived when concerned partners formed a committee to organize the survey, and invited watershed residents to participate. The steering committee was fortunate to be supported by an engaged community that recognizes that Bauneg Beg Lake is central to the quality of life in its surrounding communities. With the collaboration between two local governments (the Town of North Berwick and the City of Sanford), and two state agencies (Maine DOT & Maine DEP), local municipal employees were trained and jointly surveyed the streets and roads within the watershed. This survey is one of many steps in protecting the lake for future generations.

THREATS TO LAKE WATER QUALITY

What puts water quality at risk? The biggest pollution culprit in Bauneg Beg Lake and other Maine lakes is **polluted runoff or nonpoint source (NPS) pollution**. Polluted runoff is found in stormwater runoff from rain and snowmelt. During and after storms and snowmelt, streams and overland flow washes soil into lakes from the surrounding landscape. Nutrients, such as phosphorus and nitrogen, become stormwater runoff hitch-hikers and can easily be carried to the lake.

In an undeveloped, forested watershed, stormwater runoff is slowed and filtered by tree and shrub roots, understory plants, leaves, and other natural debris on the forest floor. It then soaks into the uneven forest floor and filters through the soil. In a developed watershed, however, stormwater does not always receive the filtering treatment the forest once provided. Runoff shed from impervious surfaces, such as rooftops, compacted soil, and gravel camp roads collects and speeds up, often channelized. The runoff becomes a destructive erosive force as it is greater in both velocity and volume than stormwater in an undeveloped landscape.

POLLUTED RUNOFF

Also called non-point source pollution or NPS. Pollution from diffuse, seemingly insignificant sources (such as erosion, roads, septic systems) that, when combined, add up to a significant amount of pollution to a watershed.

Not only is the increase in stormwater volume and velocity problematic in a developed watershed, but the nutrients and sediment in the stormwater runoff can also be bad news. Large volumes of sediment can settle out in the lake, creating an ideal substrate for nuisance and invasive aquatic plants such as variable-leaved water milfoil. **Phosphorus**, a nutrient that is common on land and in stormwater runoff, is a primary food for all plants, including **algae**. In natural conditions, the scarcity of phosphorus in a lake limits algae growth. However, when a lake receives extra phosphorus from the watershed, algae growth increases dramatically. Sometimes this growth causes choking blooms, but more often it results in small, insidious changes in water quality that, over time, damage the ecology, aesthetics, and economy of lakes.

BAUNEG BEG LAKE WATER QUALITY

Historically, Bauneg Beg Lake has exhibited substantial dissolved oxygen depletion in the deepest areas of the lake, particularly in August and September. According to the Maine Department of Environmental Protection (DEP) this loss of dissolved oxygen in Bauneg Beg Lake may be associated with the release of phosphorus from the bottom sediments, also known as phosphorus recycling. Because the Great Works River flows into and out of the lake, the flushing rate of Bauneg Beg Lake is higher (8.8 flushes) than the average flushing rate for Maine lakes of 1 to 1.5 flushes per year (Maine VLMP, 2000). Water quality data for Bauneg Beg Lake has been collected since 1975.

Based on measures of total phosphorus (TP), and chlorophyll-a (Chl-a), the water quality is generally considered to be below average in Bauneg Beg Lake (Maine DEP 2006). Historically, Bauneg Beg Lake has an average TP concentration of 17.9 ppb and an average Chl-a concentration of 5.8 ppb. These numbers fall above the average for Maine lakes, indicating below average water quality. Bauneg Beg's historical Secchi disk transparency (SDT) has also been below the average for Maine lakes, but since Bauneg Beg is naturally a very colored lake, the SDT by itself may not indicate poor water quality. The relatively high TP is linked to the lake's tea-color (dissolved organic carbon and does not indicate that the phosphorus is biologically available. This is why measuring other parameters in Bauneg Beg is so important. Even though the natural color of the lake tends to reduce the likelihood of high algal growth, "the lake shows high phosphorus in its deeper, low oxygen water, making it susceptible to future problems".

NPS Priority Watersheds

Maine DEP maintains a list of watersheds where water quality is impaired or considered particularly threatened by polluted runoff.

A watershed must be listed by as a NPS Priority Watershed in order to be eligible to apply for 319 grant funding under the Clean Water Act.

Bauneg Beg Lake is on the 2018 NPS Threatened Lakes Priority list.

WHY SHOULD WE PROTECT THE LAKE FROM POLLUTED RUNOFF?

- The lake contains valuable habitat for fish, birds and other wildlife. Algae blooms and invasive plant growth due to sediment and nutrients washing into the lake negatively impact wildlife habitat.
- Bauneg Beg Lake provides recreational opportunities to watershed residents and to visitors. It is an important contributor to the local economy.
- A 1996 University of Maine study demonstrated that lake water quality affects property values. For every meter (3 ft) decline in water clarity, shorefront property values can decline as much as 10 to 20 percent!¹ Declining property values affect individual landowners as well as the economics of the entire community.
- Once a lake has declined, it can be difficult and prohibitively expensive to restore.
- Other potential negative impacts due to NPS pollution include possible growth of toxic cyanobacteria, beach/property loss due to run-off and wave erosion, and danger/damage/navigation hazards from fallen shoreline trees.

¹ Bouchard, Roy; Boyle, Kevin; Michael, Holly, "Water Quality Affects Property Prices: A Case Study of Selected Maine Lakes," 1996. University of Maine.

WHAT IS BEING DONE TO PROTECT THE LAKE FROM POLLUTED RUNOFF?

The steering committee for the Bauneg Beg Lake Watershed Survey formed in order to identify soil erosion issues in the watershed, raise funds to conduct a survey, and begin educating users of the lake how to protect it now and for future generations. Volunteer watershed surveys have been found to be one of the most effective ways to protect lake water quality by getting citizens involved in identifying existing and potential sources of polluted runoff.

It is the hope of the steering committee that through the survey and the creation of the watershed plan, the local community will find the social and financial resources it needs to prevent the degradation of Bauneg Beg Lake. The survey is the foundation of an overall watershed plan, which is required to apply for federal funding to remedy some of the issues identified during the survey. Already, the community has secured municipal and private support. Both the financial and community support will need to grow in order for the plan to be put into action.

BAUNEG BEG LAKE AND ITS WATERSHED

For the purposes of this report, “the watershed” refers to the network of streams, ditches, and ground water that flow to Bauneg Beg Lake (Figure 1). Bauneg Beg Lake is a 200-acre colored waterbody located in North Berwick and Sanford in York County, and serves as a political boundary line between the two Townships. Bauneg Beg Lake is located within the larger Great Works River watershed. The lake has a direct watershed area of approximately 16.4 square miles, a maximum depth of 29 feet, a mean depth of 9 feet, and a flushing rate of 8.8 flushes per year.

WATERSHED

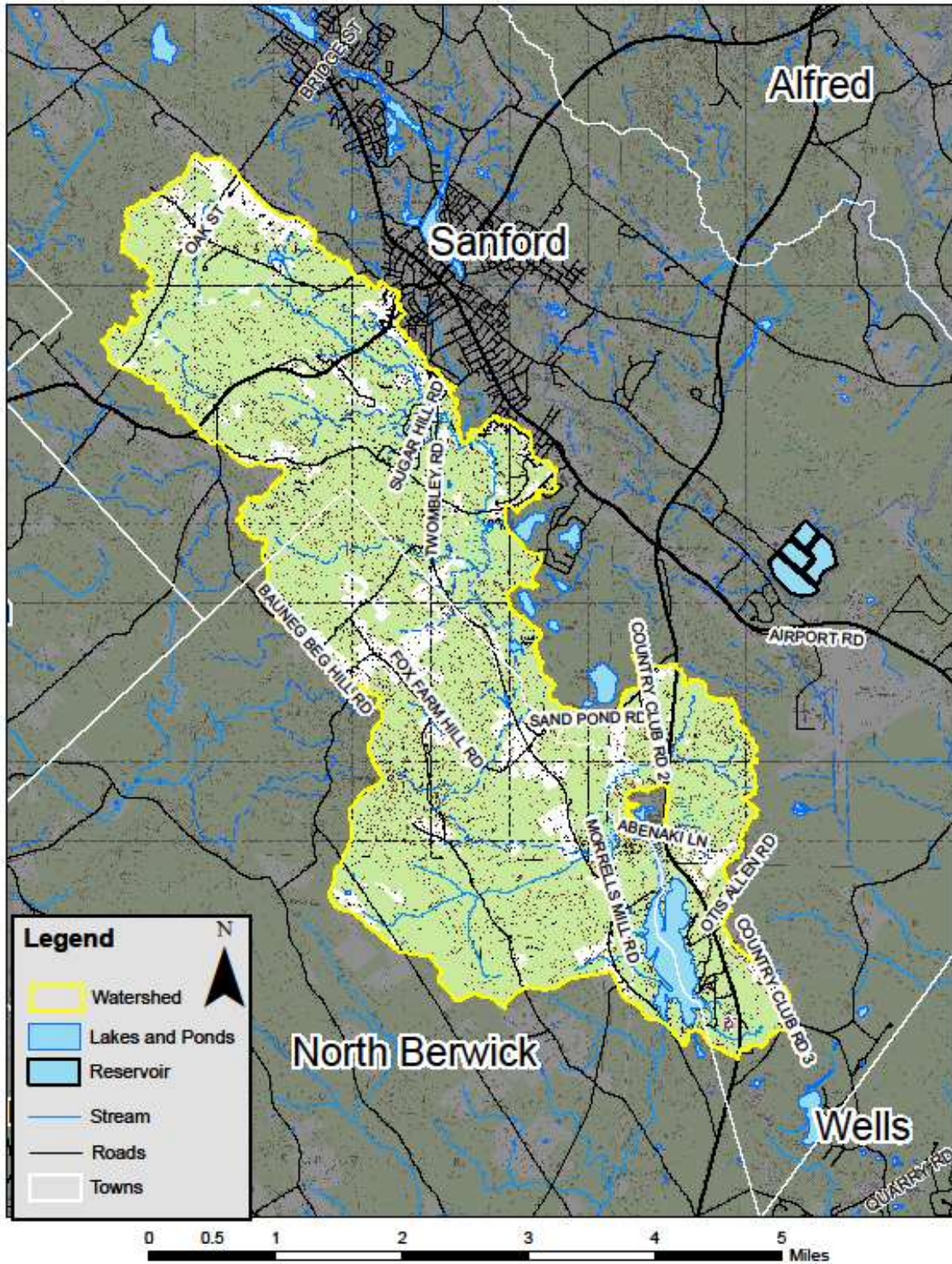
All the land that surrounds a lake that drains or sheds its water into the lake through streams, ditches, directly over the ground surface or through ground water.

In earlier times, Bauneg Beg Lake was most likely a large bog-like area through which the river flowed with one or two ice-age kettle ponds providing deeper water. Where the swampy ground yielded to a more channelized flow at its southern end was a favored summer camping ground for several clans of Abenaki Native Americans. A major east-west Native American trail also ran by this spot. As Europeans arrived they began to move inland to harvest the great stands of lumber growing here, and sometime before 1700, the first dam and sawmill was erected at the outlet to fell, move, and cut this resource. This displacement of their camping grounds raised and focused the anger of the natives who reportedly burned the mill five times in an effort to chase away the lumbermen. Fire could burn the buildings but they had little effective weapons against the granite and earthen dam that still exists and serves to this day.

Today, Bauneg Beg Lake provides the local community with recreational opportunities such as swimming, boating, and fishing. Bauneg Beg Lake supports an occasionally robust warm water fishery which includes species of brown bullhead (hornpout), chain pickerel, common shiner, largemouth bass, pumpkinseed sunfish, white and yellow perch, crappie, and white sucker. In general, fish need at least 5 parts per million (ppm) of dissolved oxygen (DO) in the water to survive, and even higher levels to grow. In recent years residents have seen attempts at a comeback of native lake wildlife species, as some species are making a re-emergence. One example is a mating pair of loons which, after a lengthy absence, have returning to the lake for the past 12 -15 years. The lake is also now regularly patrolled by over-wintering bald eagles hoping for ice shanty hand-outs.

Figure 1: Bauneg Beg Lake Topographic Watershed Map

Bauneg Beg Lake Watershed



PURPOSE OF THE WATERSHED SURVEY

The primary purpose of the watershed survey was to:

- Identify and prioritize existing sources of polluted runoff, particularly non-point source (NPS) soil erosion sites, in the Bauneg Beg Lake Watershed.
- Raise public awareness about the connection between land use and water quality, and the impact of soil erosion on Bauneg Beg Lake.
- Inspire people to become active watershed stewards.
- Provide the basis to obtain additional funds to assist in fixing identified erosion sites.
- Make general recommendations to landowners for fixing erosion problems on their properties.
- Use the information gathered as one component of a long-term lake protection strategy.

The purpose of the survey was **NOT** to point fingers at landowners with problem spots, nor was it to seek enforcement action against landowners not in compliance with ordinances.

Watersheds are complex and interconnected. While it is important to be accountable for the problems that arise, there is no individual or single entity responsible for the water quality issues of Bauneg Beg Lake. Rather it is the accumulation of all inputs, past and present, that are responsible for water quality degradation. It is the hope that through future projects, the steering committee can work together with landowners to solve erosion problems on their properties, or at minimum help them learn how best to accomplish solutions on their own to increase stewardship of Bauneg Beg Lake.

Local citizen participation was essential in completing the watershed survey and will be even more important in upcoming years. With the leadership of the steering committee and assistance from agencies concerned with lake water quality, the opportunities for stewardship are limitless.

The steering committee hopes that you will think about your own property as you read this report, and then try some of the recommended conservation measures. Everyone has a role to play in lake protection!

THE SURVEY METHOD

Watershed surveys give a general idea of soil erosion impacts within a watershed at a specific point in time. The Bauneg Beg watershed survey was conducted by volunteers with the assistance of trained technical staff from the DEP, Sanford Department of Public Works, and hired independent consultants. On June 2, 2018, 19 volunteers recruited by the Bauneg Beg Lake Association & the Great Works Regional Land Trust were trained in survey techniques during a two hour classroom workshop. Following the classroom training, the volunteers and technical staff spent the remainder of the day documenting erosion on roads, properties, driveways, and trails in their assigned sectors using cameras, GPS units and standardized forms. The teams worked together throughout June and July to complete any unfinished sectors.

Problem sites are classified as such in areas where soil erosion reaches a stream, wetland, or ditch that connects with the lake. The attached or dissolved phosphorus can eventually reach the lake regardless of distance.

Technical staff, including staff from MaineDOT, also conducted extensive road survey work in the upper watershed and performed follow-up examinations of sites in July and August 2018 to verify data accuracy. It is important to note that not every property was surveyed, as owners were given the option to opt-out.

Volunteers rated the overall impact of each site using the rating system shown below (Figure 2). Project staff attempted to minimize variance in ratings by carefully reviewing surveyor notes and photos. Follow-up site visits were also conducted for sites where the documentation was insufficient. Adjustments were made to ratings that clearly deviated from these general guidelines.

Figure 2: Method of Assigning Impact

Volunteers circled one choice in each column, added the three selected numbers together, and then circled the site's corresponding impact rating (high, medium, or low).

Type of Erosion	Area	Buffers and Other Filters	IMPACT
Gully - 3	Large - 3	No filter, all channelized direct flow into lake or stream - 3	<u>High</u> : 8-9 pts
Rill - 2	Medium - 2	Some buffer or filtering, but visible signs of concentrated flow and/or sediment movement through buffer and into lake - 2	<u>Med</u> : 6-7 pts
Sheet - 1	Small - 1	Significant buffer or filtering* - 1	<u>Low</u> : 3-5 pts

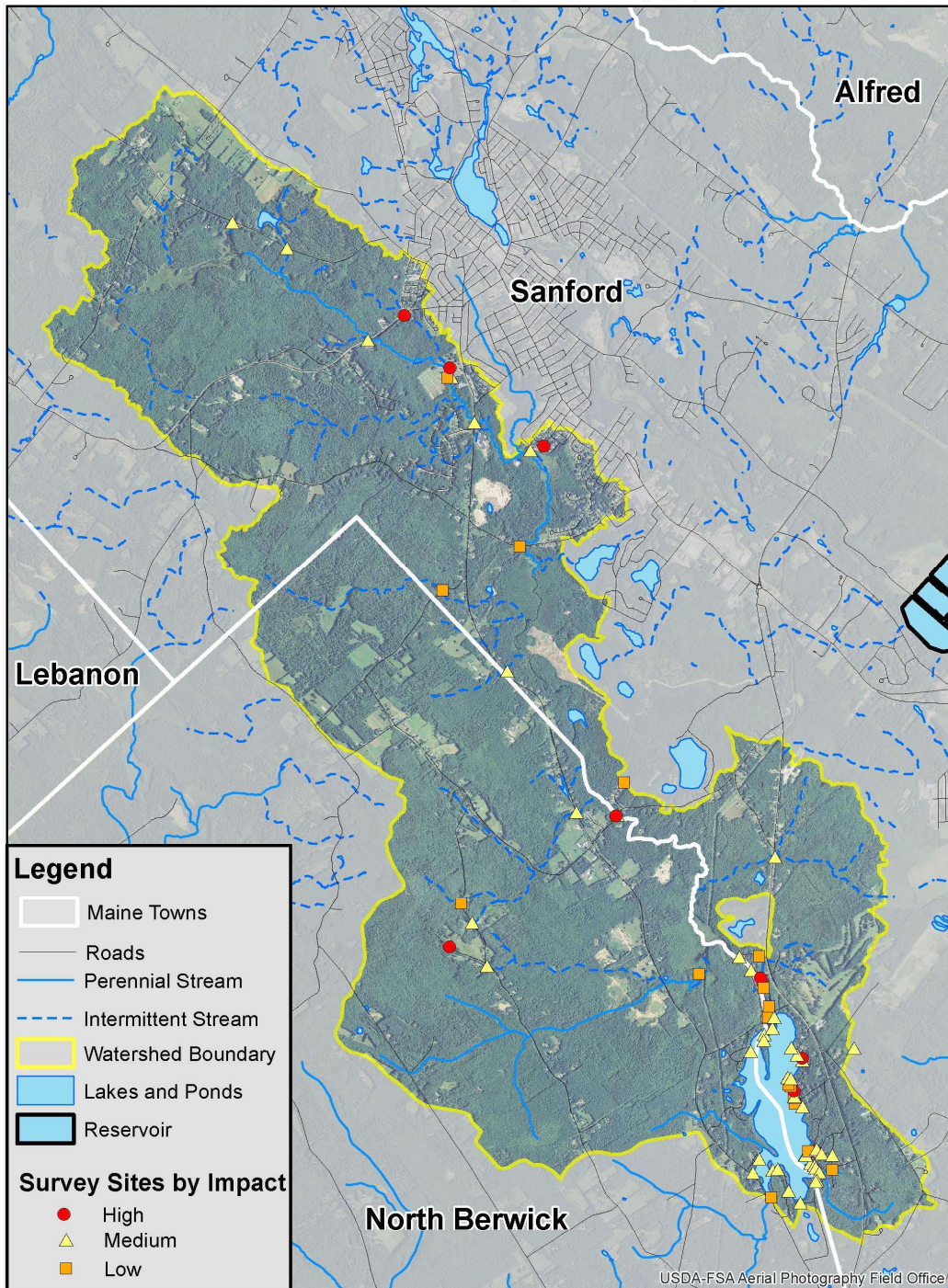
* Confirm there is likely sediment/runoff delivery. If not, do not write up as a site.

The collected data were entered into a computer database to create a spreadsheet, and the documented erosion sites were plotted on maps. The sites were broken out into categories (such as recreational trails, roads, and private residences) and ranked based on their impact on the lake, the technical ability needed to fix the problem, and the estimated cost of fixing the problem.

A description of sites and associated rankings are discussed in the next section of this report. Maps of the erosion sites are located in Appendix A, and a spreadsheet with data from the documented sites is located in Appendix B. Contact the Bauneg Beg Lake Watershed Survey Committee for additional site information. As land use in the Bauneg Beg Lake watershed is constantly changing, all sites that were fixed after or throughout the survey could not be captured here. There may be improvements to, or degradation of, the watershed that is not represented in the report. It will be up to future surveyors to incorporate those changes.

2018 Bauneg Beg Lake Watershed Survey

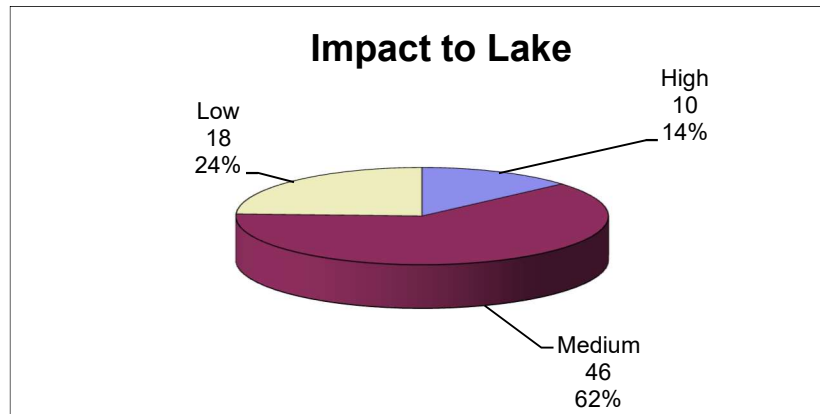
Watershed-wide Survey Results by Impact



SUMMARY OF WATERSHED SURVEY FINDINGS

The watershed survey documented 74 problem sites. As previously stated, each site was rated high, medium or low impact based on the type of erosion, the size of the area eroded, and the type of buffering or filtering that the erosion underwent before entering a stream, ditch, or the lake. Of these, 18 sites were rated as low impact, 46 sites as medium impact and 10 as high impact(Figure 3). Overall, 76% of the sites found were rated high or medium impact. It is important to note however, that not every property within the watershed was surveyed, as 101 properties (<5% of properties surveyed) opted out of the survey.

Figure 3: Impact Rating by Number and Percent



LAND USE FINDINGS

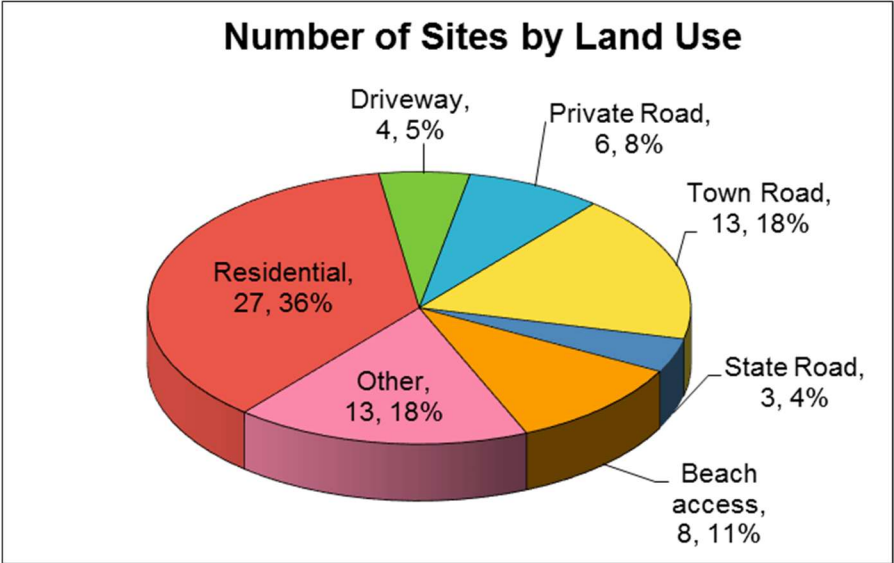
While documenting erosion sites, surveyors were also asked to select land use categories associated with each site. These categories included recreational trails, public and private roads, driveways, residential, commercial, beach access, boat access, trails & paths, and undeveloped shoreline. For the purposes of some analysis, driveways were included in the total number of residential sites.

Table 1: Land Use by Impact Rating

	High	Medium	Low	Total
Residential	3	18	6	27
Boat access	0	1	1	2
Driveway	1	2	1	4
Private Road	0	5	1	6
Town Road	3	7	3	13
State Road	1	2	0	3
Cemetery	1	2	1	4
Stream crossing	0	0	1	1
Trail/path	1	1	2	4
Beach access	0	6	2	8
Commercial	0	2	0	2
Grand Total	10	46	18	74

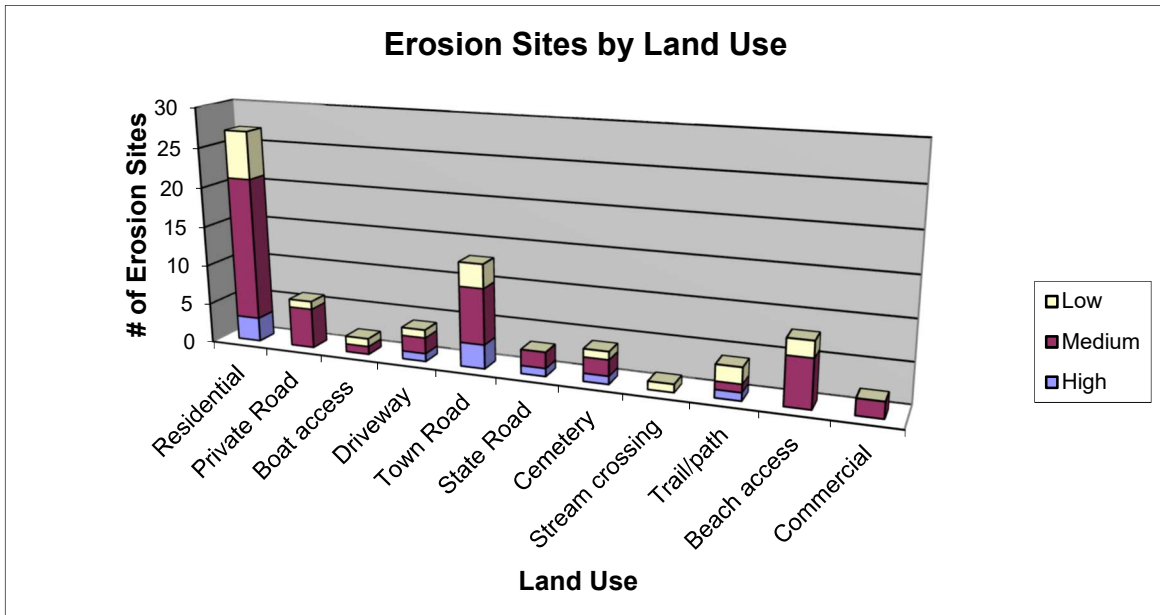
Residential land use sites accounted for the greatest number of sites (Table 1 and Figure 4). There were a total of 27 sites, which was 37% of all sites identified. Town Roads followed with 18% (13), beach access with 11% (8), and private roads with 8% (6) of sites identified. Boat access, driveways, state roads, cemeteries, stream crossings, trail/paths, and commercial categories combined for 26% of all sites with twenty total sites documented as having an impact. Each of these categories will be explained in more detail in the subsequent land use sections.

Figure 4: Number and Percent of sites identified by land use category



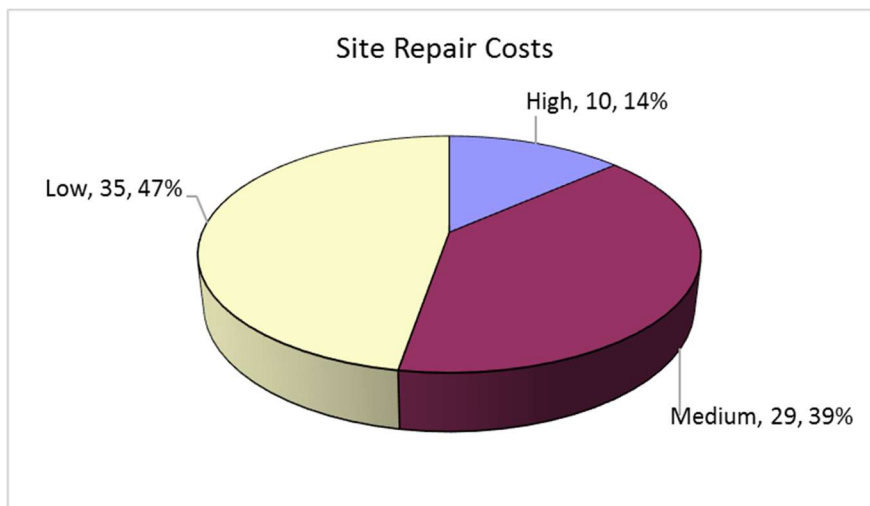
Another way of looking at the data is to compare impact ratings for each land use category (Figure 5). Impact rating is a point system that considers erosion type, impact area size, and presence of buffers or other filters (Figure 2). Residential areas contributed the most high and medium impact sites (21 total). Town Road sites included 10 high and medium impact sites. Beach access sites contributed 6 medium impact sites. Although all sites are important in the overall picture of a healthy watershed, these aforementioned land uses dwarf the number of high and medium impact sites documented as driveways, state roads, cemeteries, and trail/paths. These land uses had a combined total of eleven high and medium impact sites.

Figure 5: Impact ratings of each land use category



The final method of looking at the data collected, is by site repair cost (Figure 6). Estimated costs to fix are evaluated by surveyors (low cost < \$500, medium cost \$500-\$2,500, high cost >\$2,500). Town roads contributed the most to high cost impacts at 7% (5), followed by private roads at 3% (2), and residential areas, state roads, and commercial areas each with one impact site. Residential areas contributed the most to medium and low cost sites at 16% (12) and 19% (14) respectively. Town roads also contributed to medium cost sites at 7% (5), followed by private roads 4% (3), driveways/state roads/cemeteries each 3% (2 sites each), and boat access at one site. Beach access contributed 11% (8) to low cost sites, and all other sites contributing less than 5% each for a total of 17% (13).

Figure 6: Number and Percent of Repair Costs



RESIDENTIAL

Residential sites (31) included any erosion that occurred on a residential property, including foot paths, driveways, roof runoff, ditches, shoreline erosion, and any other bare soil areas that delivered soil to a surface water body. The majority of residential sites were medium or low impact, with fewer than 13% of residential sites rated as having high impacts on the lake. Of the 31 residential sites, 30 were determined to be low or medium cost for restoration. In some watersheds, driveways tend to be problematic. In the Bauneg Beg Lake watershed, driveways contributed a small percentage of the overall residential impacts, with a total of four sites. One of the driveway sites was rated as high impact, two were medium impact, and one was low impact. Sheet surface erosion, rill surface erosion, bare soil, and inadequate shoreline vegetation were common problems throughout residential sites.

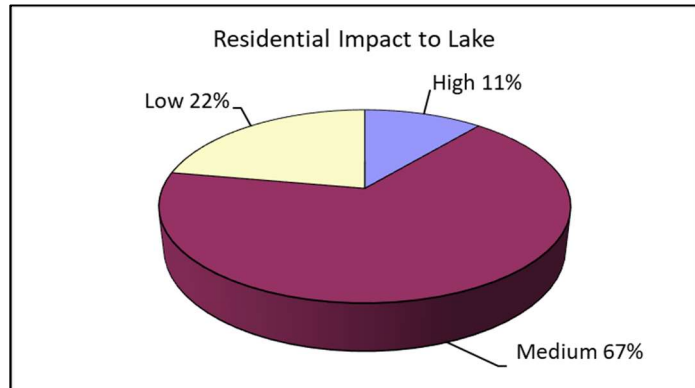


Figure 7: Impact as a Percentage of Total Residential Sites



Rill surface erosion and lack of/inadequate shoreline vegetation make residential areas and driveways very susceptible to erosion.

Suggestions for improvements for residential sites included:

- ❖ Establish a vegetative buffer to protect shoreline or other residential areas.
- ❖ Add Erosion Control Mix (ECM)² to flat bare areas where vegetation does not grow easily.
- ❖ Better define or limit footpaths, access to water, and parking areas.
- ❖ Install drywells at gutter downspouts and infiltration trenches at roof drip line.
- ❖ Limit raking of vegetated areas to allow plants and natural duff layer to protect soil.
- ❖ Discontinue use of multiple boat or beach access points.
- ❖ Properly size, repair and replace culverts.
- ❖ Pave or add hard packing gravel to steep driveways.

² List of ECM suppliers: http://www.maine.gov/dep/land/training/suppliers_mix.pdf ECM fact sheet: http://www.pwd.org/pdf/water_resources/conservation%20fact%20sheets/erosion_control_mix.pdf

ROADS

There were a total of 15 town road sites in Sanford and 7 in North Berwick. The majority of road sites were located in Sanford, mostly near the lake shore. Surveyors identified a total of 22 road sites, consisting of 6 private road sites, 13 town road sites, and 3 state road sites. Of the 22 road sites, 4 were determined to be high impact and high cost, 14 were of medium impact with varying costs, and 3 were of low impact with low or medium cost. Frequent issues found included sheet/rill/gully surface erosion, unstable culverts, and sheet/gully shoulder erosion. Other, less common issues included roadside plow/grader berm, crushed/broken culverts, bare soil, and winter sand.

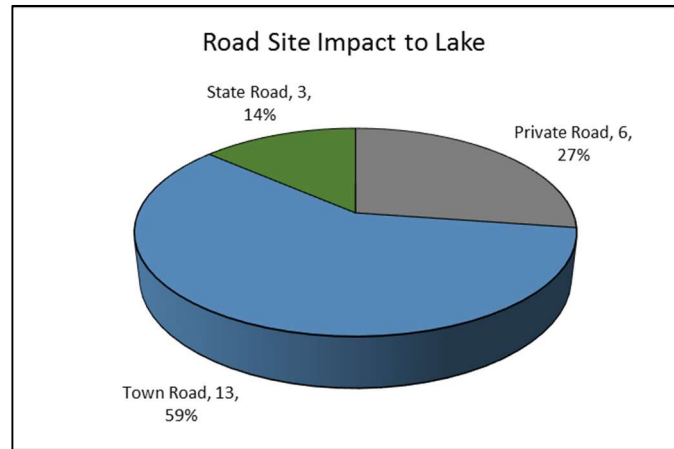


Figure 8: Percent Impact of Road Sites by Category



Top Left: Gully surface erosion, sheet/gully shoulder erosion, and unstable culverts contribute to this site's NPS pollution.
Top Right: Rill shoulder erosion, unstable culvert, and bare soil contribute to this site's NPS pollution.

The suggestions for improvements to roads include:

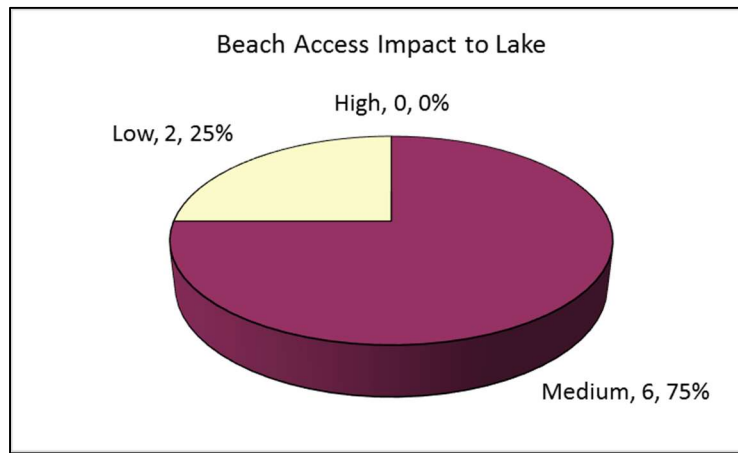
- ❖ Repair, replace, armor, and otherwise improve upon culverts.
- ❖ Add plunge pools, sediment pools, catch basins where appropriate.
- ❖ Remove grader berms on edge of road.
- ❖ Build up road and add new surface material.
- ❖ Armor ditches with stone.
- ❖ Reshape road and tilt away from brook.
- ❖ Remove sand from road near bridge or install diverters to prevent sand from entering water.
- ❖ Stabilize road shoulder with compacted gravel or vegetate where possible.
- ❖ Employ Maine DEP certified contractors for road work.
- ❖ Utilize Maine DEP's guidance documents for forming road association and road maintenance.³

³ See sections on "Where Do I Get More Information?" and Conservation Practices for Home Owners.

BEACH ACCESS

Beach access contributed 8 sites to the overall 74 documented sites (11%), 2 of which were noted to have been located on private beaches. There were no high impact, or high or medium cost sites identified. Common issues found include sheet surface erosion, bare soil, and lack of shoreline vegetation. Less common issues included shoreline erosion, unstable access, and rill surface erosion. Beach access sites are of specific concern due to the ease at which NPS pollution, as well as people, gain direct entry into the lake. By installing runoff diverters, vegetative buffers, and defined erosion-resistant foot paths, impacts from beach access sites may be reduced.

Figure 9: Impact as a Percentage of Total Beach Access Sites



Both sites shown above have sheet surface erosion and bare soil, but the top left also has a lack of shoreline vegetation.

The suggestions for improvements to beach access include:

- ❖ Define and stabilize foot paths & install infiltration steps.
- ❖ Establish vegetative buffer zones.
- ❖ Reseed bare soil & thinning grass.
- ❖ Install road/path runoff diverters such as waterbars.
- ❖ Add a mulch/erosion control mix.

SITES IN OTHER CATEGORIES

The remaining thirteen sites were found in the land use categories boat access, cemetery, commercial, stream crossing, and trail/path. A brief overview of the boat access, stream crossing, and trail/path issues (7) follows. Of the three, trail/path had the most sites (4), ranging from low to high impact. Common erosion problems between the three categories included gully, surface, and rill erosion, and bare soil. Common recommendations for repairing sites included the addition of new gravel surface material, stabilizing road shoulder/foot path, and installation of path runoff diverters. All sites within these three categories are of medium or low cost to repair.



Both sites pictured above have sheet surface erosion and bare soil. The upper right picture also depicts rill surface erosion, an unstable/clogged culvert, and winter sand deposits.

The suggestions for improvements to other site categories include:

- ❖ Establishing buffers.
- ❖ Armoring, unclogging, enlarging & lengthening culverts.
- ❖ Install road/path runoff diverters.
- ❖ Defining & stabilizing foot paths.
- ❖ Installing infiltration steps.
- ❖ Creating rain gardens for diverted runoff.
- ❖ Install ditch turnouts & sediment ponds.
- ❖ Reseed bare soil and thinning grass.

WHERE DO WE GO FROM HERE?

The Bauneg Beg Lake Steering Committee intends to utilize the information from the survey report in creating a Watershed Protection Plan to be approved by the Maine DEP. This initial plan will include action steps towards:

- Organizing a continuous group effort for watershed protection and steer plan into action.
- Fundraising for remediation projects.
 - Contracted improvement projects for town & city roads in need of restoration.
 - Contracted improvement projects for private roads & properties with owner approval.
 - Provision or discounts on materials for private property improvement projects for owners to complete.
 - Access to technical assistance for design, installation approval, and the York Soil & Water District as a liason between the DEP and CEOs (code enforcement officers).
- Considering application for federal 319 grant funding under the Clean Water Act to help carry out the plan.
- Continued monitoring and updating of survey site database.
- Expanding and continuing outreach and education efforts.

WHERE DO I GET MORE INFORMATION?

Contacts

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CONSERVATION PRACTICES FOR HOMEOWNERS

After reading this report, you probably have a general idea about how to make your property more watershed-friendly. However, making the leap from concept to construction may be a challenge.

The Maine DEP and Portland Water District produced a series of 24 fact sheets that answer many common how-to questions. The fact sheets profile common conservation practices that homeowners can use to protect water quality and include detailed instructions, diagrams and color photos about installation and maintenance. The series includes the following:

Construction BMPs	Infiltration Trench	Rain Gardens
Dripline Trench	Open-Top Culverts	Rubber Razors
Drywells	Paths and Walkways	Shoreline Stabilization
Erosion Control Mix	Permitting	Turnouts
Infiltration Steps (2)	Rain Barrels	Waterbars

The series also includes six native plant lists. Each one is tailored to different site conditions (e.g., full sun and dry soils). The lists include plant descriptions and color photos of each plant to make plant selection easier.



Fact sheets are available to help you install conservation practices on your property.

Download at <http://www.maine.gov/dep/land/watershed/materials.html>

PERMITTING BASICS

Protection of Maine's watersheds is ensured through the goodwill of lake residents and through laws and ordinances created and enforced by the State of Maine and local municipalities. The following laws and ordinances require permits for activities adjacent to wetlands and waterbodies.

Shoreland Zoning Law—Construction, clearing of vegetation and soil movement within 250 feet of lakes, ponds, and many wetlands, and within 75 feet of most streams, falls under the Shoreland Zoning Act, which is administered by the Town through the Code Enforcement Officer and the Planning Board.

Natural Resources Protection Act (NRPA) - Soil disturbance & other activities within 75 feet of the lakeshore or stream also falls under the NRPA, which is administered by the DEP.

Contact the DEP and Town Code Enforcement Officer if you have any plans to construct, expand or relocate a structure, clear vegetation, create a new path or driveway, stabilize a shoreline or otherwise disturb the soil on your property. Even if projects are planned with the intent of enhancing the environment, contact the DEP and town to be sure rules are properly followed.

How to apply for a Permit by Rule with DEP:

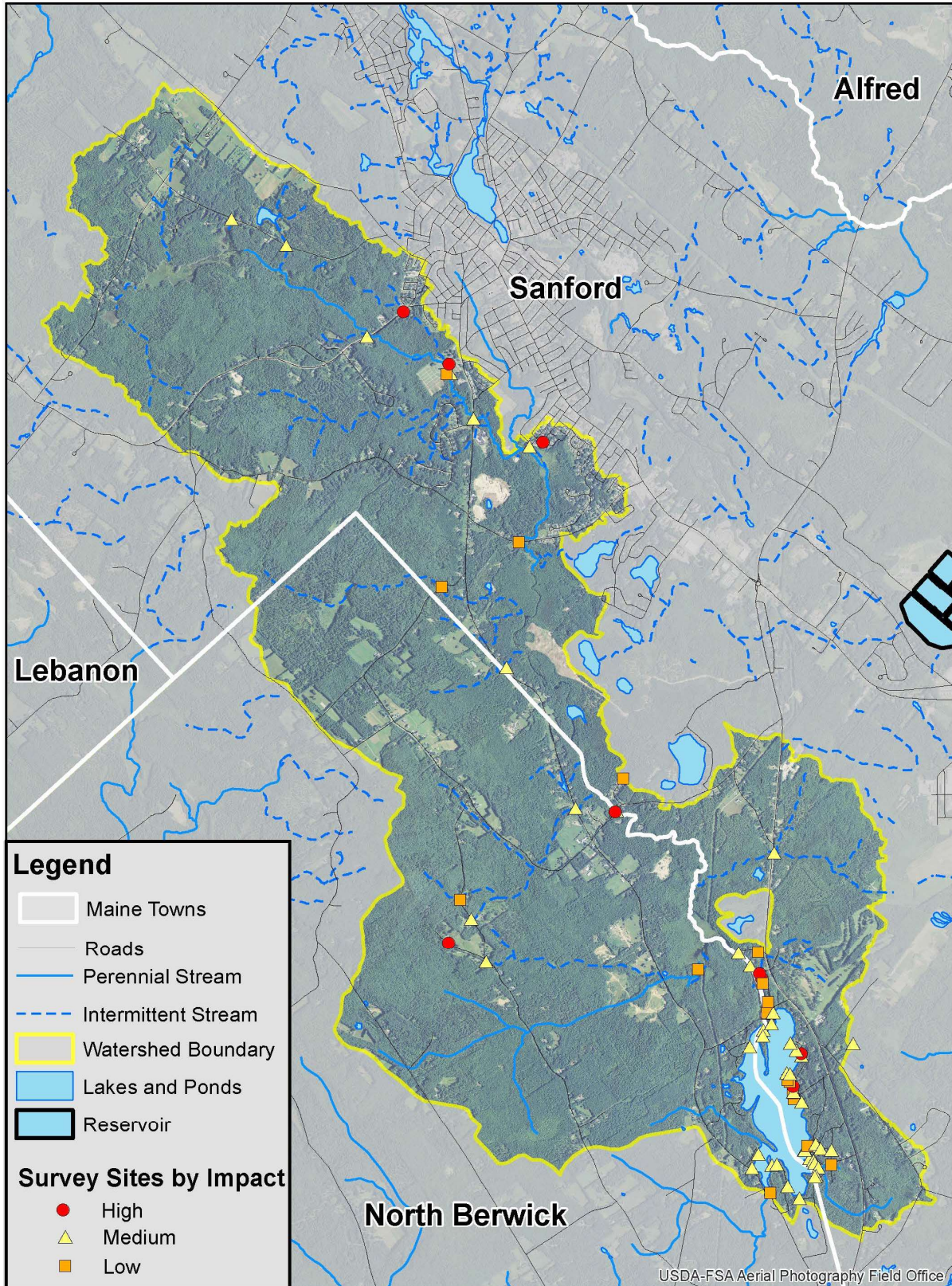
To ensure that permits for small projects are processed swiftly, the DEP has a streamlined permit process called **Permit by Rule**. These one page forms (shown here) are simple to fill out and allow the DEP to quickly review the project.

- Fill out a notification form and submit fee and any required materials before starting any work. Forms are available from your town code enforcement officer, Maine DEP offices, or online at www.maine.gov/dep/land/nrpa/pbrform.pdf
- The permit will be reviewed by DEP within 14 days. If you do not hear from DEP in 14 days, you can assume your permit is approved and you can proceed with work on the project.
- Follow all standards required for the specific permitted activities to keep soil erosion to a minimum. It is important that you obtain a copy of the standards so you will be familiar with the law's requirements.

11/14/2013 DEPARTMENT OF ENVIRONMENTAL PROTECTION NRPA PERMIT BY RULE NOTIFICATION FORM (For use with DEP Regulation, Natural Resources Protection Act—Permit by Rule Standards, Chapter 305)			
PLEASE TYPE OR PRINT IN BLACK INK ONLY			
Name of Applicant (owner)	Name of Agent:		
Applicant Mailing Address:	Agent Phone # (include area code)		
Town/City:	PROJECT Information		
State and Zip code:	Name of Wetland or Waterbody:		
Daytime Phone # (include area code):	Map #:	Lot #:	
Detailed Directions to Site:			
		UTM Northing: (if known)	UTM Easting: (if known)
Description of Project:			
Part of a larger project? (check one) <input type="checkbox"/> Yes <input type="checkbox"/> No	After the Fact? (check one) <input type="checkbox"/> Yes <input type="checkbox"/> No	Check one <input type="checkbox"/> This project does (or) does not involve work below mean low water (average low water).	
NRPA PERMIT BY RULE (PBR) SECTIONS: (Check at least one)			
<input type="checkbox"/> Sec. (2) Act. Adj. to Protected Natural Res.	<input type="checkbox"/> Sec. (10) Stream Crossing	<input type="checkbox"/> Sec. (17) Transfers/Permit Extension	
<input type="checkbox"/> Sec. (3) Intake Pipes	<input type="checkbox"/> Sec. (11) State Transportation Facil.	<input type="checkbox"/> Sec. (18) Maintenance Dredging	
<input type="checkbox"/> Sec. (4) Replacement of Structures	<input type="checkbox"/> Sec. (12) Restoration of Natural Areas	<input type="checkbox"/> Sec. (19) Activities Involving significant wetland or riparian habitat	
<input type="checkbox"/> Sec. (5) REPEALED	<input type="checkbox"/> Sec. (13) F&W Creative/Enhance/Water Quality Improvement	<input type="checkbox"/> Sec. (20) Activities located in/over high or moderate value inland water- low & wading bird habitat or shore- bird feeding & roosting areas.	
<input type="checkbox"/> Sec. (6) Movement of Rocks or Vegetation	<input type="checkbox"/> Sec. (14) REPEALED		
<input type="checkbox"/> Sec. (7) Outfall Pipes	<input type="checkbox"/> Sec. (15) Public Boat Ramps		
<input type="checkbox"/> Sec. (8) Shoreline Stabilization	<input type="checkbox"/> Sec. (16) Coastal Sand Dune Projects		
<input type="checkbox"/> Sec. (9) Utility Crossing			
NOTIFICATION FORMS CANNOT BE ACCEPTED WITHOUT THE NECESSARY ATTACHMENTS:			
<input type="checkbox"/> Attach a check for the correct fee, payable to: "Treasurer, State of Maine". The current fee for NRPA PBR Notifications can be found at the Department's website: http://www.maine.gov/dep/feesched.pdf			
<input type="checkbox"/> Attach a U.S.G.S. topo map or Maine Atlas & Gazetteer map with the project site clearly marked.			
<input type="checkbox"/> Attach Proof of Legal Name if applicant is a corporation, LLC, or other legal entity. Provide a copy of Secretary of State's registration information (available at http://soss.informs.org/DE/SS/CS/CS2/Main/Pages.x).			
<input type="checkbox"/> Attach all other required submissions as outlined in the PBR Sections checked above.			
I authorize staff of the Departments of Environmental Protection, Inland Fisheries & Wildlife, and Marine Resources to access the project site for the purpose of determining compliance with the rules. I also understand that this permit is not valid until approved by the Department or 14 days after receipt by the Department, whichever is less.			
By signing this Notification Form, I represent that the project meets all applicability requirements and standards in the rule and that the applicant has sufficient title, right, or interest in the property where the activity takes place.			
Signature of Agent or Applicant:	Date:		
<i>Keep a copy as a record of permit. Send the form with attachments via certified mail or hand deliver to the Maine Dept. of Environmental Protection at the appropriate regional office listed below. The DEP will send a copy to the Town Office as evidence of the DEP's receipt of notification. No further authorization by DEP will be issued after receipt of notice. Permits are valid for two years. Work carried out in violation of any standard is subject to enforcement action.</i>			
AUGUSTA DEP 17 STATE HOUSE STATION AUGUSTA, ME 04333-0017 (207)535-5901	PORTLAND DEP 312 CANICO ROAD PORTLAND, ME 04103 (207)623-4300	BANGOR DEP 106 HOGAN ROAD BANGOR, ME 04401 (207)841-4476	PRESQUE ISLE DEP 1235 CENTRAL DRIVE PRESQUE ISLE, ME 04769 (207)784-0477
OFFICE USE ONLY	Ck.#	Staff	Staff
PBR #	FF	Acc. Date	Def. Date
Date			After Photos
DEPLW0311-02013			

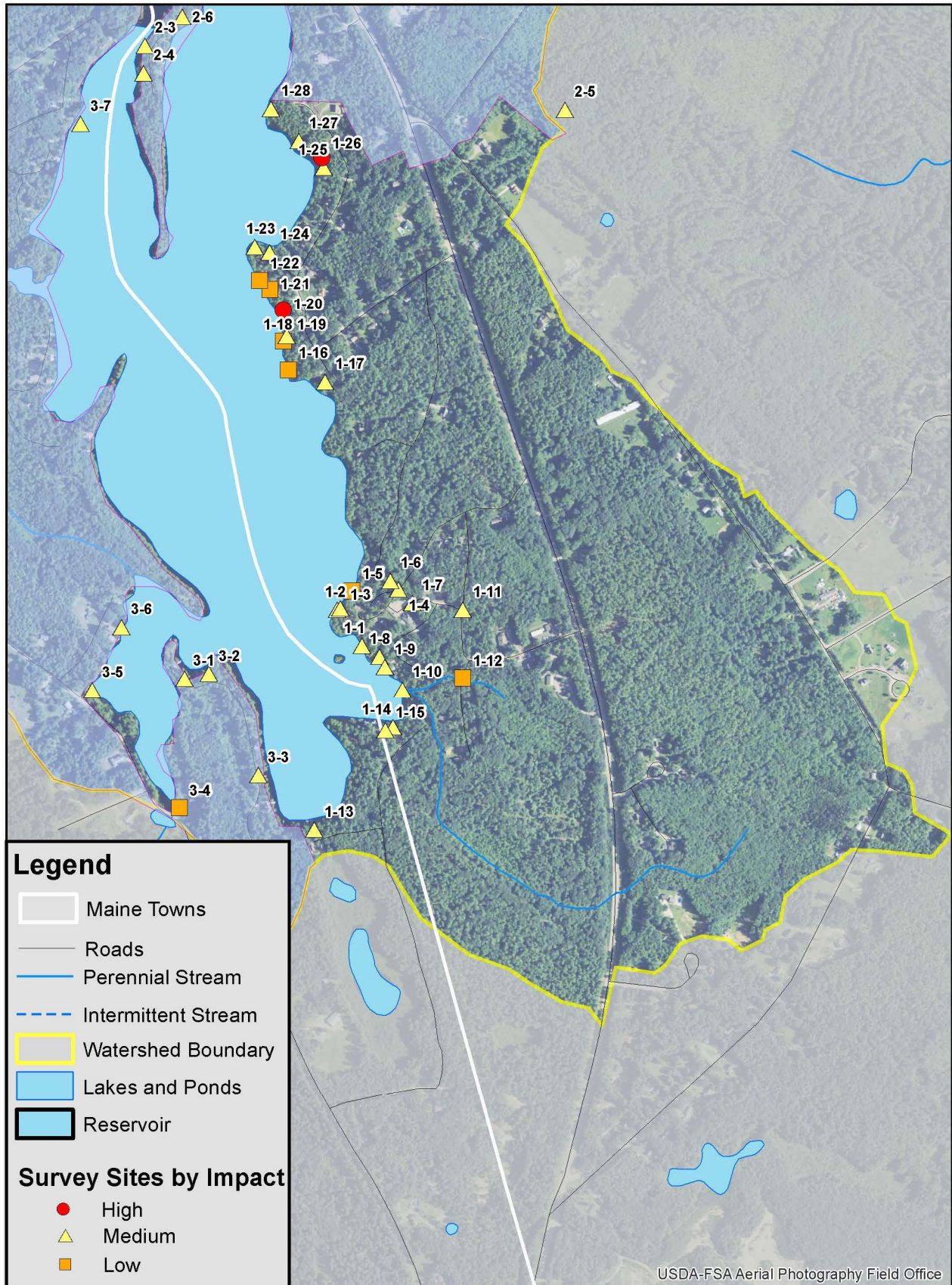
2018 Bauneg Beg Lake Watershed Survey

Watershed-wide Survey Results by Impact



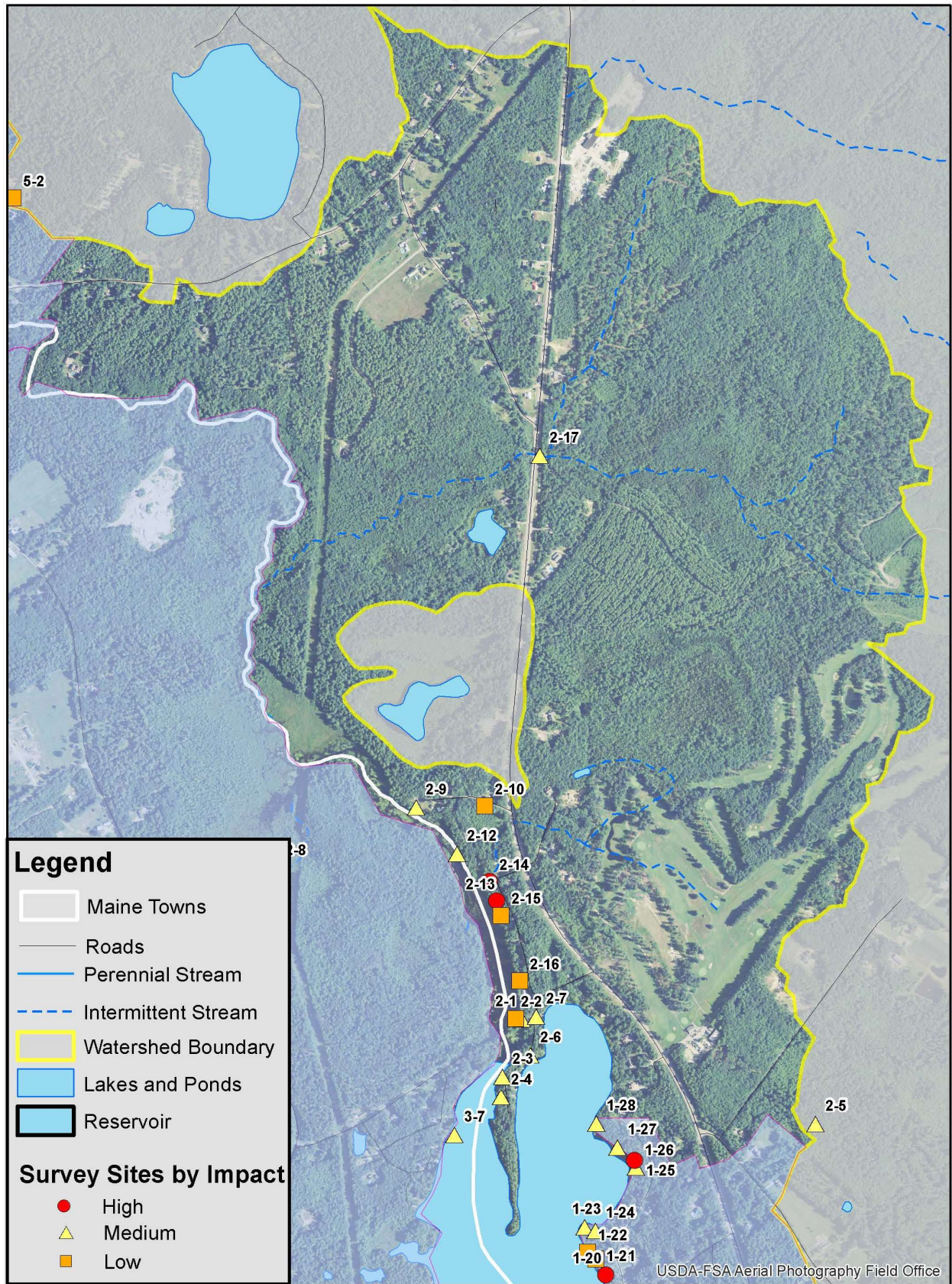
2018 Bauneg Beg Lake Watershed Survey

Sector 1 Survey Results by Impact



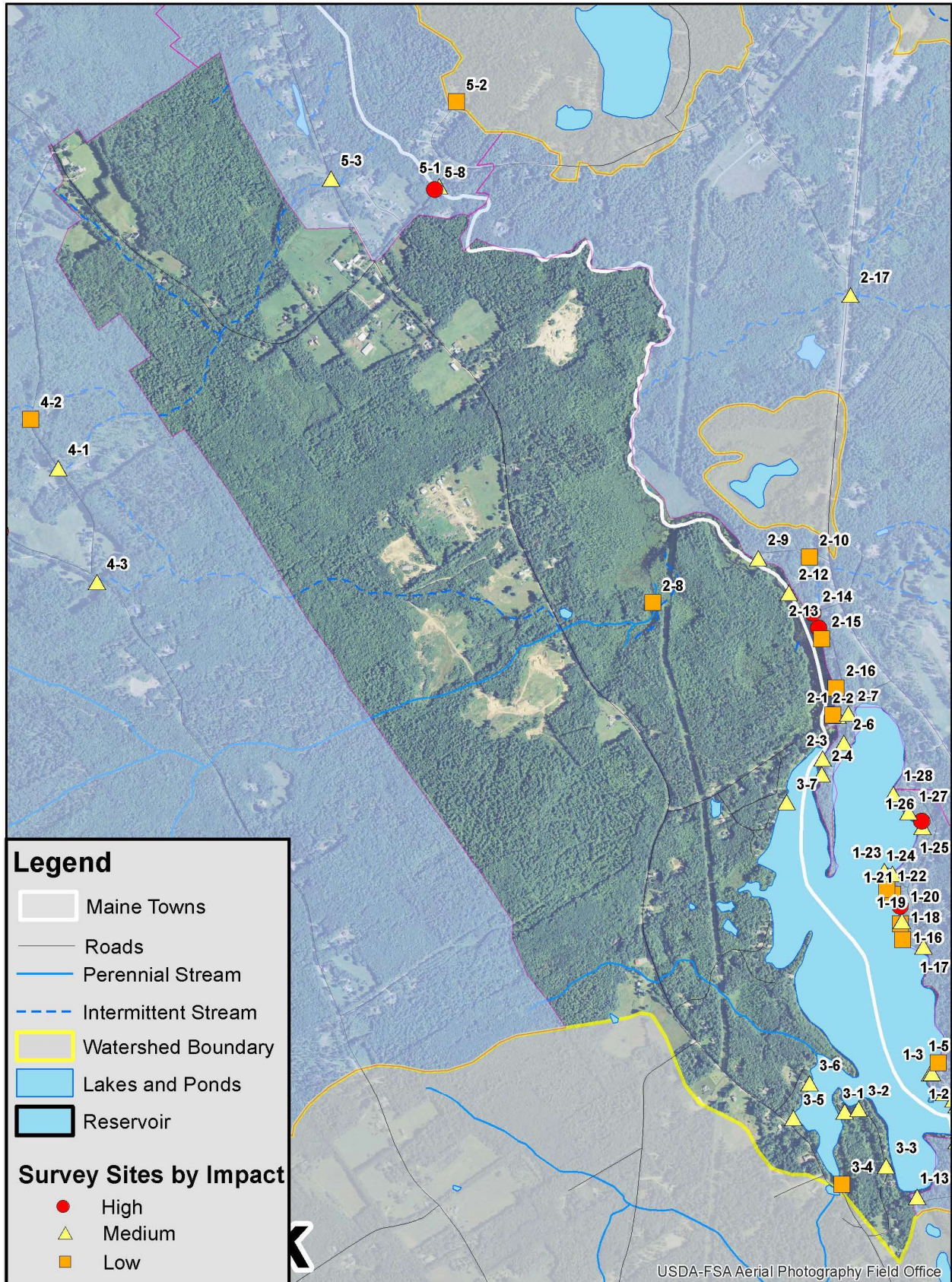
2018 Bauneg Beg Lake Watershed Survey

Sector 2 Survey Results by Impact



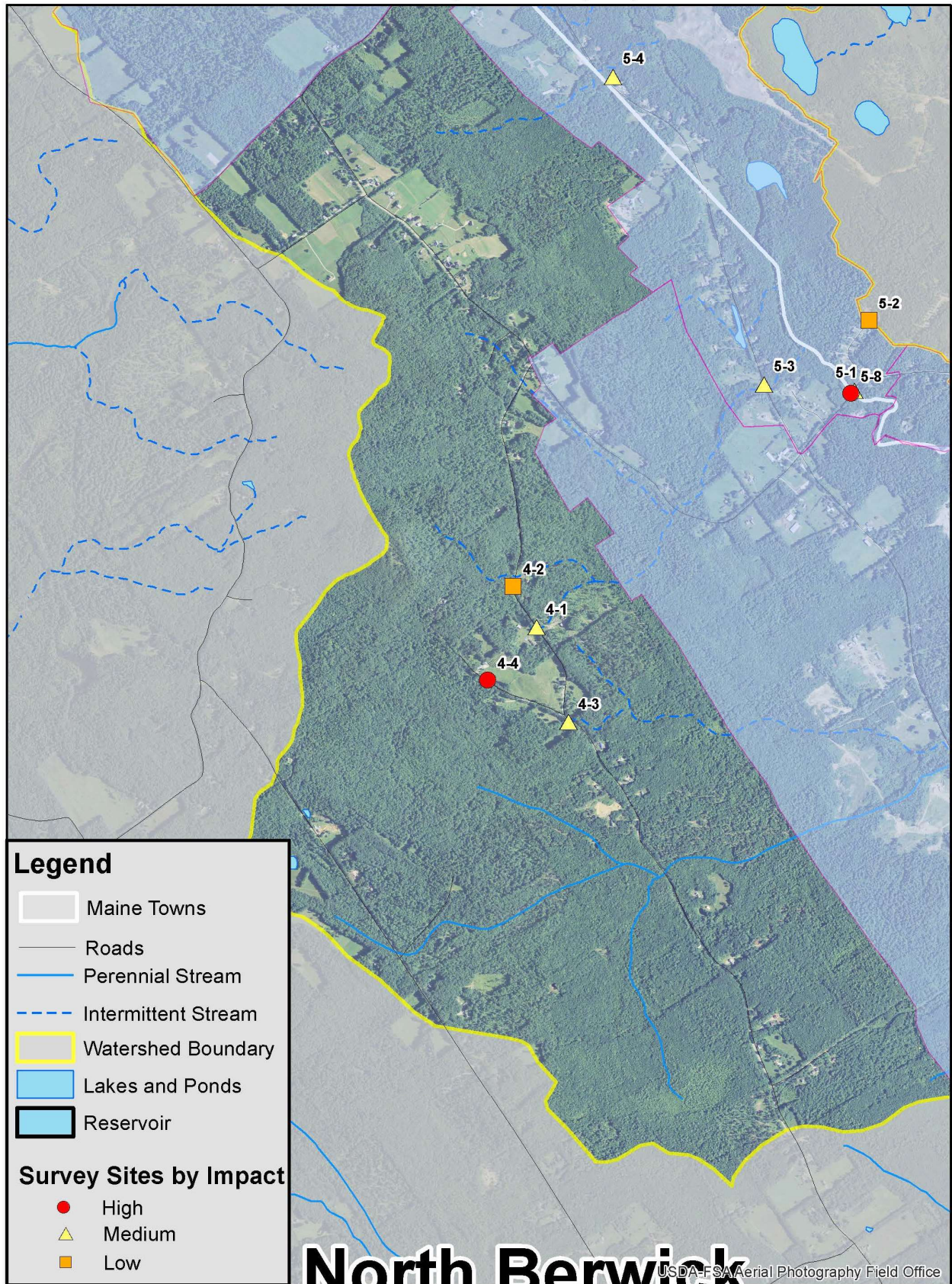
2018 Bauneg Beg Lake Watershed Survey

Sector 3 Survey Results by Impact



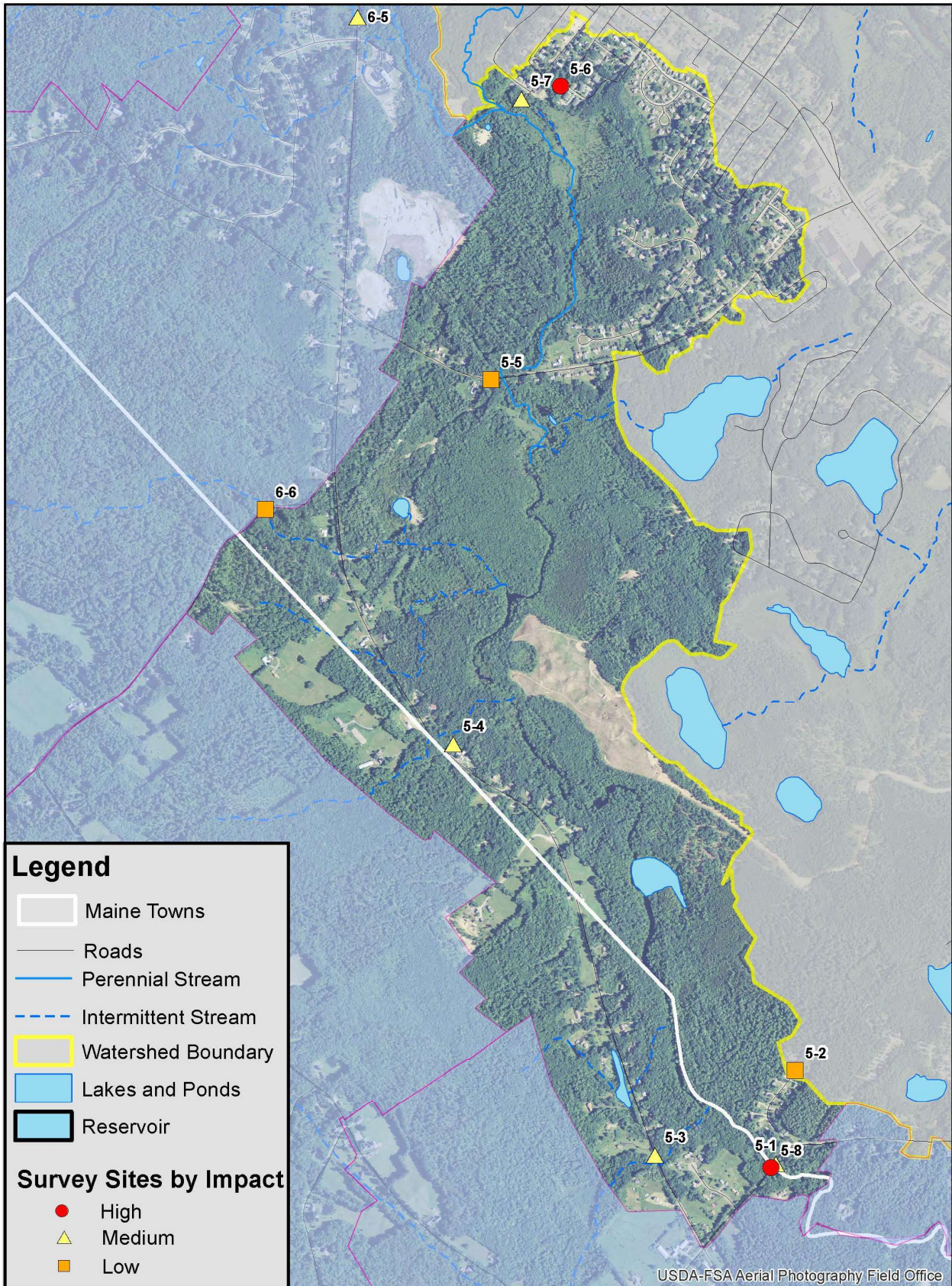
2018 Bauneg Beg Lake Watershed Survey

Sector 4 Survey Results by Impact



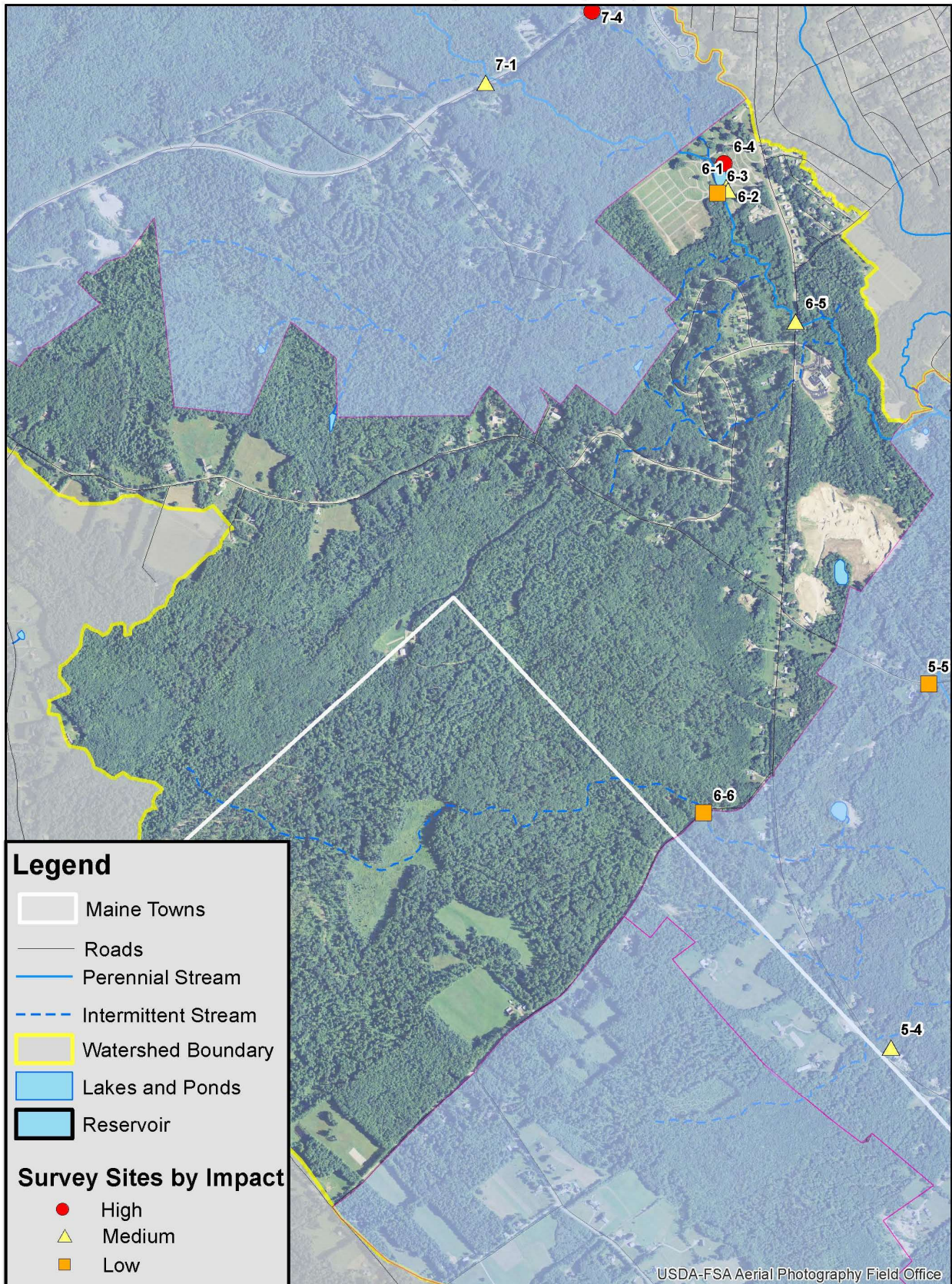
2018 Bauneg Beg Lake Watershed Survey

Sector 5 Survey Results by Impact



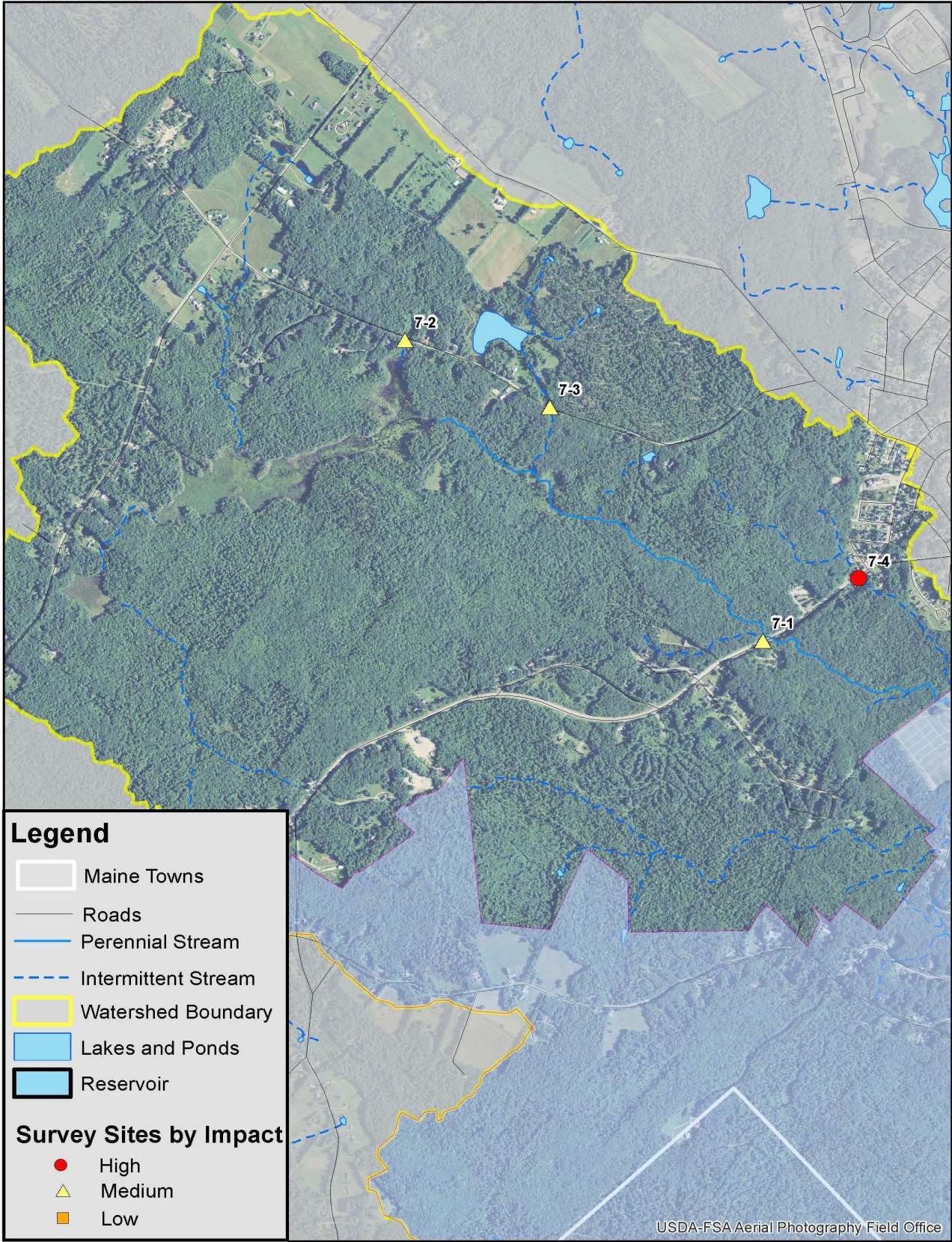
2018 Bauneg Beg Lake Watershed Survey

Sector 6 Survey Results by Impact



2018 Bauneg Beg Lake Watershed Survey

Sector 7 Survey Results by Impact



APPENDIX B – SURVEY DATA

Mapsite #	Land Use	Type of Problem	Area	Recommendations	Impact	Cost
1-1	Beach access	Sheet surface erosion; rill surface erosion; bare soil; inadequate shoreline vegetation	30 x 50	Define foot path; infiltration steps; install path runoff diverter; mulch/erosion control mix; rain garden; establish buffer; add to buffer; reseed bare soil and thinning grass	Medium	Low
1-2	Commercial	Sheet surface erosion; bare soil; lack of shoreline vegetation; shoreline erosion	50 x 50	Mulch/erosion control mix; rain garden; no raking	Medium	Low
1-3	Beach access	Sheet surface erosion; bare soil; lack of shoreline vegetation; unstable access	30 x 40	Establish buffer; reseed bare soil and thinning grass	Medium	Low
1-4	Private Road	Sheet surface erosion; rill surface erosion; unstable culvert; clogged culvert; crushed/broken culvert; undersized culvert; sheet shoulder erosion	15 x 30	Armor culvert; replace culvert; lengthen culvert; remove grader/ plow berms; crown road; install waterbar runoff diverter	Medium	High
1-5	Beach access	Sheet surface erosion; bare soil	15 x 50	Infiltration steps- add crushed stone; mulch/erosion control mix; reseed bare soil and thinning grass	Low	Low
1-6	Private Road	Unstable culvert; clogged culvert; crushed/broken culvert; undersized culvert	15 x 20	Armor culvert; remove clog; replace culvert; enlarge; lengthen; add new gravel surface material; crown road; install road runoff diverters-into buffer	Medium	High
1-7	Commercial	Sheet surface erosion; rill surface erosion; unstable culvert; clogged culvert; undersized culvert; bare soil; winter sand	20 x 60	Armor culvert; remove clog; replace; enlarge; lengthen; vegetate shoulder; install road runoff diverters; rain garden; establish buffer; add to buffer	Medium	High
1-8	Residential	Sheet surface erosion; bare soil; lack of shoreline vegetation	15 x 70	Define foot path; drywell 2 gutter downspout; rain barrel; mulch/erosion control mix; rain garden; establish vegetation buffer; no raking; reseed bare soil & thinning grass	Medium	Medium
1-9	Residential	Sheet surface erosion; rill surface erosion; borderline gully erosion; bare soil; roof runoff erosion; lack of shoreline vegetation; inadequate shoreline vegetation; erosion on footpath	10 x 60	Stabilize foot path; infiltration steps; drywell @ gutter downspout; rain barrel; mulch/erosion control mix; establish vegetation buffer; reseed soil & thinning grass	Medium	Low
1-10	Residential	Sheet surface erosion; bare soil; undercut shoreline; lack of shoreline vegetation; inadequate shoreline vegetation; unstable access	10 X 30	Define foot path; infiltration steps; mulch/erosion control mix; rain garden; add to vegetation buffer; reseed bare soil & thinning grass	Medium	Medium
1-11	Private Road	Sheet surface erosion; ditch sheet erosion; sheet road shoulder erosion; roadside plow/grader berm; bare soil; winter sand	5 x 100	Remove grader/ plow berms; vegetate shoulder; reseed bare soil & thinning grass	Medium	Medium
1-12	Private Road	Sheet road shoulder erosion; roadside plow/grader berm	5 x 10	Armor culvert; remove grader/ plow berms	Low	Medium
1-13	Residential	Sheet surface erosion; rill surface erosion; roof runoff erosion; inadequate shoreline vegetation; shoreline erosion	15x 40	Infiltration steps; infiltration trench @ roof dripline; drywell @ gutter downspout; mulch/erosion control mix; rain garden; add to vegetation buffer	Medium	Medium
1-14	Driveway	Rill surface erosion; bare soil; other- from parking/street area & around end of retaining wall	20 x 40	Infiltration steps; install path/trail runoff diverter (waterbar); install runoff diverter (waterbar); mulch/erosion control mix; water retention swales	Low	Low
1-15	Driveway	Sheet surface erosion; bare soil		Install road/driveway runoff diverters; install runoff diverter (waterbar); rain garden	Medium	Medium
1-16	Residential	Sheet surface erosion; bare soil; lack of shoreline vegetation; inadequate shoreline vegetation; unstable access	10 x 20	Define foot path; infiltration steps; mulch/erosion control mix; rain garden; establish vegetation buffer; add to vegetation buffer; no raking; reseed bare soil & thinning grass	Low	Low
1-17	Residential	Rill surface erosion; bare soil; slight undercut shoreline; lack of shoreline vegetation; shoreline erosion	15 x 60	Define foot path; stabilize foot path; infiltration steps; install path runoff diverter (waterbar); install runoff diverter (waterbar); mulch/erosion control mix; add to vegetation buffer	Medium	Medium
1-18	Residential	Sheet surface erosion; bare soil; inadequate shoreline vegetation; shoreline erosion	12 x 20	Armor culvert; drywell @ gutter downspout; install runoff diverter (waterbar); mulch/erosion control mix; add to vegetation buffer	Low	Low

Mapsite #	Land Use	Type of Problem	Area	Recommendations	Impact	Cost
1-19	Residential	Sheet surface erosion; rill surface erosion; bare soil; uncovered pile; inadequate shoreline vegetation; shoreline erosion; unstable access	15 x 30	Tarp over soil pile; stabilize foot path; infiltration steps; mulch/erosion control mix; establish vegetation buffer; add to vegetation buffer	Medium	Medium
1-20	Residential	Sheet surface erosion; rill surface erosion; gully surface erosion; bare soil; uncovered pile in adjoining lot; roof runoff erosion; lack of shoreline vegetation; inadequate shoreline vegetation; shoreline erosion; unstable access	20 x 100	Define foot path; stabilize foot path; infiltration steps; install path runoff diverter (waterbar); mulch/erosion control mix; establish vegetation buffer; no raking	High	Medium
1-21	Residential	Sheet surface erosion; bare soil- potential for erosion @ end of retaining wall	20 x 20	Define foot path; infiltration steps; mulch/erosion control mix; add to vegetation buffer; reseed bare soil & thinning grass	Low	Low
1-22	Residential	Sheet surface erosion; bare soil; inadequate shoreline vegetation	20 x 30	Define foot path; infiltration steps; install path runoff diverter; mulch/erosion control mix; add to vegetation buffer; no raking; reseed bare soil & thinning grass	Low	Low
1-23	Beach access	Sheet surface erosion; bare soil; lack of shoreline vegetation; shoreline erosion		Install path runoff diverter (waterbar); install runoff diverter (waterbar); establish vegetation buffer; add to buffer; no raking; reseed bare soil & thinning grass	Medium	Low
1-24	Private Road	Sheet surface erosion	20 x 100	Add new gravel surface material; crown road; install road waterbar runoff diverter	Medium	Medium
1-25	Residential	Sheet surface erosion; bare soil; roof runoff erosion; lack of shoreline vegetation; inadequate shoreline vegetation; shoreline erosion	40 x 50	Define foot path; install path runoff diverter (waterbar); infiltration trench @ roof dripline; drywell @ gutter downspout; rain barrel; mulch/erosion control mix; establish vegetation buffer; no raking; reseed bare soil & thinning grass	Medium	Low
1-26	Residential	Gully surface erosion		Crown road; infiltration steps; install path runoff diverter (waterbar); mulch/erosion control mix	High	Medium
1-27	Residential	Sheet surface erosion; bare soil		Infiltration trench at roof dripline; mulch/erosion control mix; add to buffer; reseed bare soil & thinning grass	Medium	Medium
1-28	Residential			Define foot path; infiltration steps; install path runoff diverter (waterbar); infiltration trench at roof dripline; drywell @ gutter downspout; rain barrel	Medium	Medium
2-1	Driveway	Rill surface erosion	10 x 50	Crown road; install runoff diverters; rain garden	Medium	Low
2-2	Residential	Sheet surface erosion; bare soil; roof runoff erosion	10 x 30	Infiltration trench at roof dripline; mulch/erosion control mix; establish buffer; reseed bare soil and thinning grass	Low	Low
2-3	Residential	Sheet surface erosion; bare soil; lack of shoreline vegetation	?	Install detention basin; install runoff diverters; define foot path; infiltration trench at roof dripline; mulch/erosion control mix; establish buffer	Medium	Medium
2-4	Residential	Sheet surface erosion; bare soil; lack of shoreline vegetation	10 x 50	Minimize foot path; install path runoff diverter; mulch/erosion control mix; install runoff diverter	Medium	Low
2-5	Residential	Rill surface erosion; bare soil. Concerning the recommendation to remove culvert- surveyor noted there were two existing open top culverts at site.	30 x 60	Remove culvert; install road runoff diverters; define foot path; mulch/erosion control mix; establish buffer	Medium	Low
2-6	Residential	Sheet surface erosion; bare soil	20 x 50	Define foot path; infiltration trench; establish buffer	Medium	Low
2-7	Residential	Sheet surface erosion; bare soil; lack of shoreline vegetation	20 x 60	define foot path; mulch/erosion control mix; establish buffer	Medium	Low
2-8	Beach access	Sheet surface erosion; bare soil; unstable shoreline access	15 x 15	Define foot path; infiltration steps; mulch/erosion control mix; establish buffer; add to buffer; reseed bare soil and thinning grass	Low	Low
2-9	Residential	Sheet surface erosion; rill surface erosion; unstable culvert; lack of shoreline vegetation; shoreline erosion. Unstable outlet from dry well in road	40 x 20	Armor culvert; clean out dry well; define foot path; infiltration steps; mulch/erosion control mix; rain garden; infiltration trench; establish buffer; add to buffer; no raking; reseed bare soil and thinning grass	Medium	Low
2-10	Town Road	Sheet shoulder erosion	2 x 30	Install ditch turnouts; install check dams; remove grader/ plow berms	Low	Medium
2-11	State Road	Gully surface erosion; unstable culvert; rill shoulder erosion; gully shoulder erosion	30 x 120	Armor culvert; lengthen culvert; install ditch turnouts; vegetate shoulder; install runoff diverters; mulch construction site; install path runoff diverter	High	High
2-12	Beach access	Sheet surface erosion; bare soil	30 x 60	Install road runoff diverters; define foot path; stabilize foot path; infiltration steps; install path runoff diverter; no raking	Medium	Low

Mapsite #	Land Use	Type of Problem	Area	Recommendations	Impact	Cost
2-13	Driveway	Sheet surface erosion; rill surface erosion; bare soil; uncovered pile; winter sand	100 x 100	Remove grader/ plow berms; add new surface material; crown road; install road runoff diverters; define foot path; stabilize foot path; infiltration steps; establish buffer; add to buffer; no raking; reseed bare soil and thinning grass	High	Medium
2-14	Residential	Sheet surface erosion; rill surface erosion; bare soil	?	Install road runoff diverters; mulch/erosion control mix; establish buffer; add to buffer; no raking; reseed bare soil and thinning grass	High	medium
2-15	Residential	Sheet surface erosion; bare soil; dog waste			Low	Low
2-16	Trail/path	Sheet surface erosion	5 x 10	Install road runoff diverters; mulch construction site; define foot path; stabilize food path; infiltration steps; install path runoff diverter	Low	Low
2-17	State Road	Unstable culvert; undersized culvert. ATV trail over crossing	8 x 50	Armor culvert; enlarge culvert; install turnouts; install sediment pools; define ATV path	Medium	Medium
3-1	Private Road	Sheet surface erosion; rill surface erosion; uncovered pile; inadequate shoreline vegetation. The surveyor also noted a boat ramp was present.	5 x 12	Add new gravel surface material; install rubber razor runoff diverters; install waterbar runoff diverters	Medium	Low
3-2	Residential	Sheet surface erosion; sheet shoulder erosion; bare soil; lack of shoreline vegetation	?	Install ditch turnouts; mulch/erosion control mix	Medium	Low
3-3	Residential	Sheet surface erosion; rill surface erosion; ditch rill erosion; sheet shoulder erosion; bare soil; undercut shoreline; lack of shoreline vegetation; shoreline erosion	50 x 4	Install ditch turnouts; install catch basin; mulch construction site; establish buffer	Medium	Medium
3-4	Boat access	Gully surface erosion; ditch gully erosion; bare soil	?	Add new gravel surface material	Low	Low
3-5	Boat access	Sheet surface erosion; bare soil; shoreline erosion	10 x 12	Add new gravel surface material; establish buffer	Medium	Medium
3-6	Beach access	Sheet surface erosion; bare soil; lack of shoreline vegetation. Private beach access	20 x 5	Establish buffer; add to buffer; no raking	Medium	Low
3-7	Beach access	Sheet surface erosion; bare soil; lack of shoreline vegetation. Private beach access	15 x 10	Infiltration trench; establish buffer	Medium	Low
4-1	Town Road	Sheet shoulder erosion; rill shoulder erosion; roadside plow/ grater berm; winter sand; unstable culvert. Site has unstable culvert outlet along road shoulder. Plugged and extremely overhung culvert with a 5' drop.	200 x ?	Replace culvert; vegetate shoulder	Medium	Medium
4-2	Town Road	Sheet surface erosion; sheet shoulder erosion; bare soil	20 x 5	Vegetate shoulder; establish buffer	Low	Low
4-3	Residential	Clogged culvert; undersized ditch; delta in stream; winter sand. Winter sand and gravel depositing in ditches along Hartford Lane to stream crossing on Ford Quint.	400 x ?	Install ditch turnouts; install ditch; remove sediment/ debris; install sediment pools; reseed bare soil and thinning grass	Medium	High
4-4	Town Road	Rill surface erosion; ditch rill erosion; undersized ditch. Small pond adjacent to road has overflow to road ditch.	?	Install ditch turnouts; install ditch; add new recycled asphalt material; crown road	High	High
5-1	Town Road	Sheet surface erosion; gully surface erosion; ditch gully erosion; gully shoulder erosion; roadside plow/grader berm; winter sand	300 x 15	Armor ditch with stone; install ditch turnouts; remove grader/plow berms; pave and crown roads; vegetate shoulder	Medium	High
5-2	Trail/path	Roadside plow/ grater berm; bare soil	30 x 50	Remove grader/ plow berms; add new gravel surface material	Low	Low
5-3	Town Road	Ditch gully erosion; gully shoulder erosion; roadside plow/ grater berm	200 x 5	Vegetate ditch; armor ditch with stone; reshape ditch; install ditch turnouts; pave road	Medium	Medium
5-4	Town Road	Sheet surface erosion; gully surface erosion; gully shoulder erosion	roadside-20 x 10: bank issues-100 x 20	Install sediment pools; vegetate shoulder; mulch/ erosion control mix; establish buffer	Medium	High
5-5	Town Road	Sheet surface erosion; rill shoulder erosion; roadside plow/grader berm	100 x 10	Armor ditch with stone; remove grader/plow berms; vegetate shoulder	Low	Low

Mapsite #	Land Use	Type of Problem	Area	Recommendations	Impact	Cost
5-6	Trail/path	Gully surface erosion	80 x 15	Stabilize foot path; install path runoff diverter; add to buffer	High	Medium
5-7	Trail/path	Rill surface erosion	150 x 5	Install ditch turnouts; install sediment ponds; install path runoff diverter	Medium	Medium
5-8	Town Road	Gully surface erosion; unstable culvert; sheet shoulder erosion; gully shoulder erosion. Shoulder washes down to crossing on both sides	10 x 100	Armor culvert; install plunge pool; armor ditch with stone; reshape ditch; install ditch turnouts; install sediment pools; define foot path; stabilize foot path; install runoff diverter; mulch/erosion control mix	High	High
6-1	Cemetery	Lack of shoreline vegetation. 1000' of buffer empoundment shoreline, mowing to waterline	?	Establish buffer	Medium	Low
6-2	Cemetery	Undercut and erosion of shoreline	15 x 15	Establish buffer	Medium	Medium
6-3	Cemetery	Sheet surface erosion; bare soil; Paved swale directing stormwater to stream	15 x 15	Rain garden; reseed bare soil and thinning grass	Low	Low
6-4	Cemetery	Gully surface erosion; bare soil; lack of shoreline vegetation; erosion of shoreline	60 X 20	Establish buffer; reseed bare soil and thinning grass	High	Medium
6-5	Town Road	Gully shoulder erosion	20 x 5	Remove grader/ plow berms	Medium	Low
6-6	Stream crossing	Rill shoulder erosion; delta in stream; broken road edge pavement	50 x 10	Stabilize road shoulder	Low	Low
7-1	State Road	Rill surface erosion; crushed/broken culvert; rill shoulder erosion; bare soil	5 x 10	Replace culvert; mulch/erosion control mix	Medium	Medium
7-2	Town Road	rill shoulder erosion; bare soil	40 x 3	Vegetate ditch; mulch/erosion control mix	Medium	Medium
7-3	Town Road	Unstable culvert; rill shoulder erosion; bare soil	5 x 30	Armor culvert; vegetate shoulder; seed/hay construction site	Medium	Medium
7-4	Town Road	Unstable culvert; crushed/broken culvert. Downstream erosion with some upstream impact	20 x 20	Replace and armor culvert	High	High