APPENDICES

APPENDIX A: SITE SPECIFIC PROJECT PLAN (SSPP)

A
SITE SPECIFIC PROJECT PLAN FOR:
DEVELOPMENT OF THE
OSSIPEE LAKE WATERSHED MANAGEMENT PLAN PHASE 1:
A WATERSHED PLAN FOR DANFORTH POND AND THE LOWER BAYS OF OSSIPEE LAKE
(NHDES Project # HP-13-S-01)

Under the New Hampshire Section 319 Nonpoint Source Grant Program QAPP
RFA# 08262
August 29, 2013

First Draft
(8/26/2013)

Prepared by:
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For Review:

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Corey Lane, GMCG

Technical Project Manager: ______________________
Forrest Bell, FBE

Task Manager/QA Officer: ______________________
Jennifer Jespersen, FBE

Task Manager: ______________________
Jeremy Deeds, FBE

NHDES Project Manager: ______________________
Jeff Marcoux, NHDES

Program Quality Assurance Coordinator: ______________________
Jillian E. McCarthy, NHDES

NHDES Quality Assurance Manager: ______________________
Vincent Perelli, NHDES

For Receipt:

EPA Nonpoint Source Program Coordinator: ______________________
Erik Beck, EPA Region 1

1- Distribution List

Table 1 lists people who will receive copies of the approved Site Specific Project Plan (SSPP) under the New Hampshire Section 319 Nonpoint Source Grant Program Quality Assurance Project Plan dated October 17, 2008.

Table 1. SSPP Distribution List

SSPP Recipient Name	Project Role	Organization	Telephone number and e-mail address
Blair Folts	Executive Director	Green Mountain Conservation Group	bfolts@earthlink.net 603-539-1859
Corey Lane	Project Manager	Green Mountain Conservation Group	clane@gmcg.org 603-539-1859
John Shipman	Steering Committee	Ossipee Watershed Coalition/GMCG	shipman120@gmail.com
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Jennifer Jespersen	Task Manager	FB Environmental	jenj@fbenvironmental.com 207-221-6699
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2- Project Organization

The Green Mountain Conservation Group (GMCG) received funding under Section 319 of the Clean Water Act from the NH Department of Environmental Services (NHDES) in order to develop a Watershed Management Plan (WMP) for Danforth Pond and the Lower Bays of Ossipee Lake.

FB Environmental Associates (FBE) was selected as the technical consultant to help complete the scope of services for the GMCG. FBE Technical Project Manager, Forrest Bell, will provide project oversight, technical expertise, and serve as the main point of contact for Danforth Pond and the Lower Bays of

Ossipee Lake Watershed Plan Steering Committee. Forrest will work closely with the GMCG and the Project Team to ensure that the project stays on time and within budget.

Jennifer Jespersen will serve as Task Manager/QA Officer for the project. Jennifer is in charge of managing key project personnel, and will provide technical expertise and oversight for key modeling tasks including the land use modeling, in-lake phosphorus and assimilative capacity analysis, buildout analysis, and pollutant load reduction estimates. Jennifer will also oversee the water quality analysis. Jennifer will conduct QA/QC for the BMP reduction calculations, lake modeling and water quality analysis. As the QA Officer, Jennifer will ensure that survey results, modeling results, and water quality analysis have been reviewed and double-checked for potential inconsistencies. Task Manager, Jeremy Deeds, will conduct lake modeling and water quality analysis tasks.

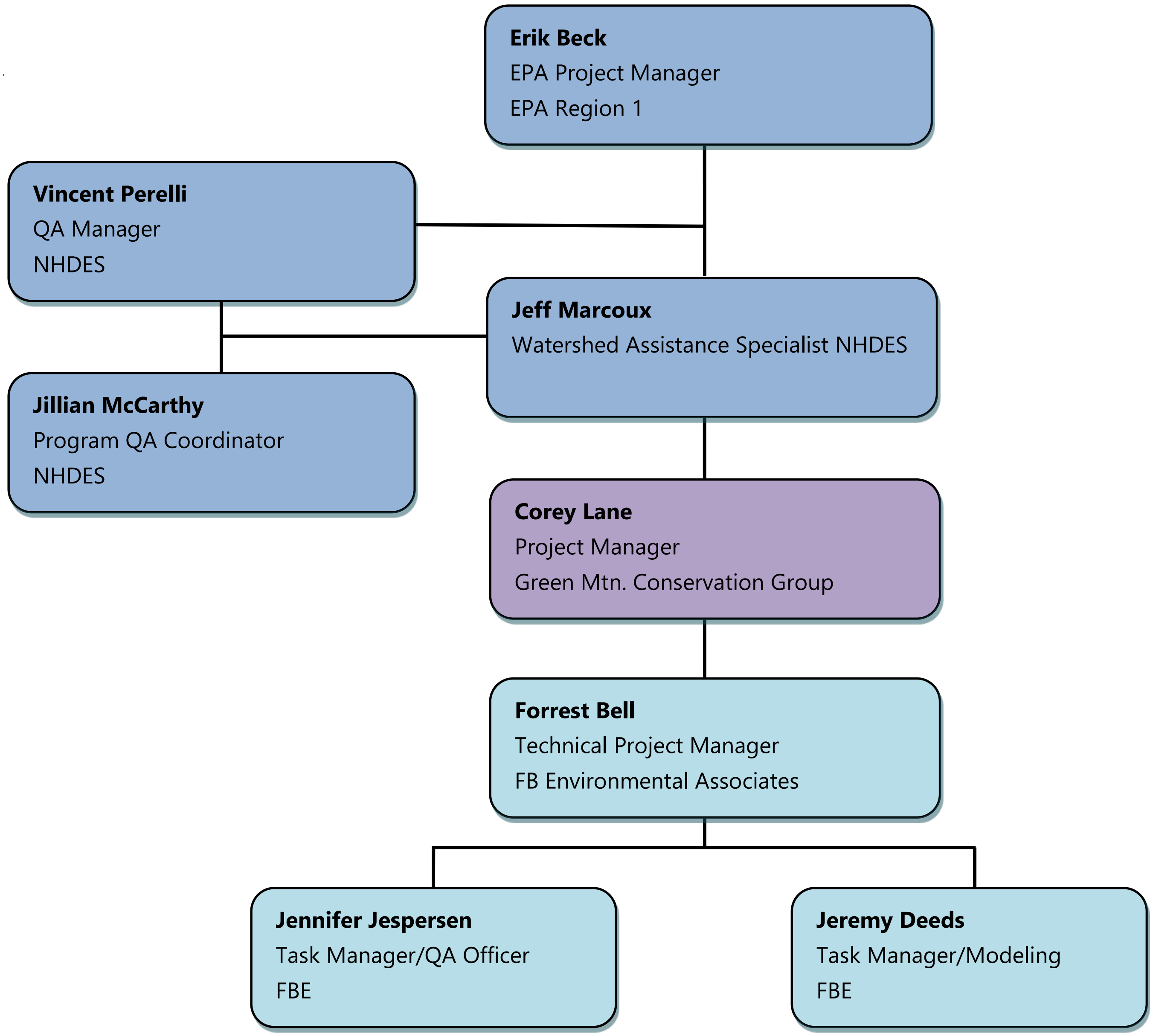
The data generated by this project will be used by NHDES, the GMCG, the Ossipee Watershed Coalition, and their subcontractors to develop a watershed management plan for Danforth Pond and the Lower Bays of Ossipee Lake.

Figure 1 outlines the organization structure of the project personnel.

Table 2. Key Project Personnel Responsibilities and Qualifications

Name and Affiliation	Responsibilities	Qualifications
Blair Folts GMCG	Executive Director	GMCG
Corey Lane GMCG	Project Manager	On file at GMCG
Forrest Bell FB Environmental	Senior Scientist; Project Manager	On file at FB Environmental
Jennifer Jespersen FB Environmental	Task Manager; Project QA/QC Officer	On file at FB Environmental
Jeremy Deeds FB Environmental	Task Manager; Pollutant Load Modeling	On file at FB Environmental
Jeff Marcoux, NHDES Watershed Management Bureau	Reviews and oversees development of the Watershed Plan	On file at NHDES
Jillian McCarthy, NHDES Watershed Management Bureau	Reviews QAPP preparation and other QA/QC activities	On file at NHDES
Vincent Perelli, NHDES Planning Prevention & Assistance Unit	Reviews and approves QAPPs	On file at NHDES
Erik Beck US EPA Region I	EPA Project Manager	On file at US EPA

Figure 1. Project Organizational Chart



3- Site Information

The watershed of Danforth Pond and the Lower Bays of Ossipee Lake is 32.7 square miles in area, with the surface area of the lakes totaling approximately 1.4 square miles. The watershed is located primarily in Eaton, Madison, Freedom and Effingham, New Hampshire. The Danforth Pond subwatershed includes Hatch, Long, Trout, Shaw and Danforth Ponds; the Lower Bays of Ossipee Lake include Broad, Leavitt and Berry Bays, as well as Duck Pond. The watershed constitutes the headwaters of the Ossipee River (see watershed map in Appendix 1).

4- Project Rationale

Phosphorus is a limiting nutrient in freshwater ecosystems. Excess phosphorus in these systems can lead to nuisance algal blooms and low water clarity. High levels of phosphorus in freshwater lakes and streams are often associated with human activities resulting from stormwater runoff, excessive use of fertilizer, and poorly maintained/malfunctioning septic systems.

This project will address sources of phosphorus enrichment to Danforth Pond and the lower bays of Ossipee Lake (Broad, Leavitt, and Berry Bays) in order to protect water quality and maintain present trophic classifications. An action plan will be developed to improve measurable water quality parameters such as dissolved oxygen, turbidity, and total phosphorus concentrations through nonpoint source pollution management measures.

This project will identify and provide recommendations to address watershed-based land use activities that may contribute to nutrient enrichment of the lakes and bays. The plan will evaluate and recommend strategies for addressing impacts in the following ways:

a) Identify areas in need of improved management of stormwater runoff from paved roads, parking lots, gravel roads and other impervious surfaces adjacent to surface waters;

b) Identify areas in need of modification of existing drainage off of agricultural and residential landscapes to limit unfiltered or erosive runoff to surface waters;

c) Identify areas in need of modification of poorly buffered shoreline to reduce and prevent erosion from wave action and bank failure due to loss of vegetative cover caused by poorly managed water access;

d) Evaluate the likely impact of septic systems within 250 feet of surface waters;

e) Review of local zoning ordinances' and planning policies' impacts on the type and intensity of development in the watershed and, consequently, the likely impact on present and future water quality.

Since 1983, 75 grab samples have been taken from lower Danforth Pond on 26 different dates between mid-May and late September using the NHDES VLAP sampling protocol. Mean total phosphorus concentrations for those samples are 11.2 ppb with a median value of 11 ppb. With 4 of the 5 samples from 1983 and 1984 at or below 9 ppb it is possible that phosphorus concentrations have increased over this time period, though this is not a large enough sample size to identify any statistically significant temporal trends. Moreover, the extent of natural nutrient inputs to Danforth Pond is not known. Danforth Pond is classified as mesotrophic by the NHDES Consolidated Assessment and Listing Methodology. However, one third of all samples had phosphorus concentrations at or above 12 ppb, average annual mean chlorophyll-a concentrations were 3.88 ppb between 2003 and 2012, and the basin regularly exhibits anoxic conditions below 6 meters, even in late spring, with occasional dysoxic conditions in the epilimnion as well.

Mean total phosphorus concentrations in Broad, Leavitt, and Berry Bays from all available data are 7.3, 7.9, and 8.1 ppb, respectively, indicating that the oligotrophic classification of New Hampshire's sixth largest lake is threatened.

Ossipee Lake and its lower bays is a heavily used recreational resource that is the driver of the local economy and settlement pattern in the region. It also overlies and is vertically continuous with the largest stratified drift aquifer in New Hampshire. Due to the poorly consolidated surficial outwash soils composed of sand and gravels, the pace of development and population growth over the last two decades (30-50 percent depending on municipality) and the steep banks of the shorelines, this water body is also relatively vulnerable to landscape change. While the DES VLAP program has recently been cut back, with state biologists only visiting lakes and pond every other year, VLAP staff have maintained an annual presence on Ossipee Lake due to its importance and vulnerability to degradation.

5- Project Approach/Study Design

Several watershed survey techniques and watershed models will be used to complete the watershed management plan. On-the-ground shoreline and stormwater impact surveys, combined with in-depth water quality analysis and computer modeling, will be used to identify sources of pollution, and to estimate pollutant load reductions needed to accommodate future watershed development.

The watershed modeling for this project will estimate total phosphorus loading into the lake, assess loading from major tributaries, predict loading from future development, and help establish water quality goals.

Shoreline and watershed stormwater surveys will be conducted in the field to collect baseline information about the state of the septic systems and stormwater runoff around the lakes. This information will be used to estimate phosphorus loading from the developed areas in the watershed, and to provide information to develop recommendations for Best Management Practices (BMPs) to reduce pollution. Results from the surveys will also be used to educate watershed citizens about nonpoint source pollution and how it affects lake water quality.

This SSPP covers the water quality data evaluation, watershed modeling, and the shoreline and stormwater impact surveys.

A- Evaluate Water Quality Data

Historical water quality monitoring data will be used for determining the median in-lake phosphorus concentrations, indirect phosphorus loading to Danforth Pond and the Lower Bays of Ossipee Lake, internal phosphorus loading, assimilative capacity, and for determining the water quality goal for each of the lakes. If available, a comparison between historical (older than 10 years), and recent (last 10 years) water quality data will be used to determine both long and short-term water quality trends. In cases where only data older than 10 years are available, in particular for evaluating nutrient attenuation rates within tributary basins within the Lake Loading Response Model (LLRM) model, those data may also be considered. Monitoring results will be collected and reviewed from in-lake sources and tributaries to calibrate modeling efforts. The New Hampshire Volunteer Lake Assessment Program (VLAP) is the primary group collecting water quality data on lakes in the study watershed. Historical data from NHDES lake trophic surveys will also be used. All data are expected to be accessible through the New Hampshire Department of Environmental Services Environmental Monitoring Database (EMD). Only data that is flagged as "Final" in the EMD will be used, as those data are considered to have been accepted by an authoritative source (NHDES) utilizing its own QA/QC processes. Tributary data provided by the GMCG, for streams within the watershed, will also be used to calibrate modeling efforts.

Previously collected water quality data for the study lakes will be used to assess pollutant levels in the lake and to help provide an estimate of inputs by subwatershed. Water quality data will be combined into a common spreadsheet for each waterbody, and then sorted by date and station for Quality Assurance/Quality Control (QA/QC) in order to avoid duplicating data sets. All duplicates will be removed. An initial analysis will be conducted to determine median Total Phosphorus (TP) based on all samples regardless of whether it was a grab or epilimnetic core (EC) sample. Minimum, maximum and median TP values will be determined for each station, sorted by epilimnion, metalimnion and hypolimnion. Data will be further refined using EC data only to calculate the median EC value (where more than one sample was collected on the same day, a mean will be used for that day). In the event that EC data are limited, grab samples taken on the same day at multiple depths near the surface may be used in conjunction with the EC samples. Best professional judgment by FBE, with input from NHDES, will be used to determine which station is most representative of the whole lake, and factors such as location, depth, and temporal pattern and extent of data will be considered. In general, stations which are closer to the deep hole, more centrally located, and with a long history of data spanning all seasons and weather conditions are preferred. If needed, and if adequate data exist, statistical analysis (e.g., paired t-test) may be used to determine whether significant differences exist between stations on the same lake. Similar methodology will be used to calculate average chlorophyll-a and Secchi disk transparency (SDT).

Using information from the historical water quality analysis, FBE will conduct an assimilative capacity analysis for Danforth Pond and the lower bays of Ossipee Lake following procedures for assimilative capacity analysis for New Hampshire waters (NHDES, 2008). This information will be used to determine if reductions of total phosphorus or chlorophyll-a are needed to ensure that the lakes fall within the appropriate water quality thresholds set by the state, or if reductions of phosphorus and chlorophyll-a are needed to improve water quality. This information will be pertinent for setting the water quality goal.

B- Water Quality Goal Setting

Based on recent analysis by the GMCG, total phosphorus concentrations in Lower Danforth Pond have increased between 1983 when sampling began, through 2012, with concentrations greater than the mesotrophic threshold of 12 ppb for total phosphorus. In addition, mean total phosphorus in Broad, Leavitt and Berry Bays indicates that the oligotrophic classification of New Hampshire's sixth largest lake is threatened. A goal of the project is to assess current water quality conditions, as described above, and then set a water quality goal that will help drive management strategies in the watershed management plan.

FBE project staff will confer with a panel of state experts to seek input on the water quality analysis and the assimilative capacity analysis as it relates to phosphorus and chlorophyll-a. FBE will document and recommend a target water quality goal for Danforth Pond and the lower bays of Ossipee Lake, and attend one meeting with the water quality goal subcommittee (consisting of representatives of the Green Mountain Conservation Group, the Ossipee Watershed Coalition, NHDES staff, and other stakeholders) to finalize the water quality goal(s).

C- Identify Current and Future Pollutant Loading

Watershed Loading Model

Geographical Information Systems (GIS) data will be obtained by FB Environmental to assist with the land use assessment and specifically for determining the total land use area by land use type (in acres) for input into the watershed loading model (see below for model selection criteria). GIS land use data are available from the State of New Hampshire GIS website (GRANIT). The NH Land Cover Assessment 2001 or NHLC01, consists of the most recent and detailed classification of land cover in New Hampshire based on satellite images acquired between 1990 and 1999, with further revisions in 2001 (GRANIT). These data will be used for the land use loading analysis as described below in the section titled, Future Loading Model/Build-Out Analysis. GIS land use coverages will be ground-truthed by FB Environmental based on field observations and using publicly available recent aerial photography to ensure the best coverages for input into the model.

The Lake Loading Response Model (LLRM) (also called SHEDMOD or ENSR-LRM) will be used to assess current nutrient loads from the watershed, and the load reductions that would result from the implementation of different best management practices (BMPs). The model was developed by AECOM for use in New England and modified for New Hampshire lakes by incorporating New Hampshire land use total phosphorus TP export coefficients and adding septic system loading into the model (AECOM, 2009). This model provides the best fit for the watershed and has been used extensively for more than 30 recent Lake TMDLs in New Hampshire. A recently completed and NHDES-approved LLRM model version, such as the one used in Lake Wentworth in 2012, will be used as the starting point. The LLRM User Guide contained in the Total Maximum Daily Load for Robinson Pond, Hudson, NH (AECOM and NHDES, 2011) will serve as the primary documentation on the model.

Data needed for input into the LLRM include: water quality monitoring data (TP, Chl-a, and transparency); physical characteristics such as lake surface area, volume and flushing rate; tributary monitoring data including discharge; corrected GIS land use data; subwatershed land area; precipitation data; septic system data (typically available from the US Census Bureau). Jeremy Deeds of FBE will be running the model. FBE has used watershed loading models for several years, and have successfully applied results from LLRM, AVGWLF, PREDICT, and the USEPA Region 5 Models to many watershed plans. FBE Senior Project Manager Jennifer Jespersen will provide technical oversight and confirm that the information used for the model is correct. NHDES will provide technical assistance and review of modeling methods and results. Jeremy will make edits to the model based on feedback from Jennifer Jespersen, NHDES, and the Steering Committee.

The LLRM model estimates total phosphorus loading from the watershed, and predicts in-lake concentrations of TP, Chl-a, SDT and algal bloom probability based on land use export coefficients for water and total phosphorus. Attenuation factors such as porous soils, wetlands, ponds along tributaries, or existing BMPs that would decrease loading will be accounted for in order to reach a close agreement between predicted in-lake TP and observed median TP. The estimated watershed load (runoff and base flow) will be combined with direct loads (atmospheric, internal load and septic systems) to calculate total phosphorus loading and will be compared to observed in-lake concentrations.

In-Lake Total Phosphorus Concentrations

Results of the total phosphorus modeling will be input into a series of empirical models that provide predictions of in-lake TP concentrations, Chl-a concentrations, algal bloom frequency and water clarity. Also referred to as total phosphorus retention modeling, the model estimates in-lake phosphorus concentrations based on physical and chemical lake characteristics including lake volume, mean depth, watershed area, flushing rate, and estimated watershed phosphorus loading. Because of the imperfect nature of any model to predict processes within natural systems, the model will compare six different in-lake phosphorus models including: Kirchner-Dillon (1975), Vollenweider (1975), Larsen-Mercier (1976), Jones-Bachman (1976), Reckhow General (1977), and Nürnberg (1998). The average of the six empirical models will be used as the predicted TP value for each of the lakes with some exceptions (it may be determined that one of the models is most representative, or a model could be eliminated as inapplicable, which will be documented both in the model spreadsheet and in all applicable reports). The predicted in-lake TP concentration will be compared to actual in-lake water quality data analysis (see 5A, above). Additional predictions (Chl-a, water clarity and bloom probability) will be determined based on the average in-lake TP concentration.

Future Loading Model/Build-Out Analysis

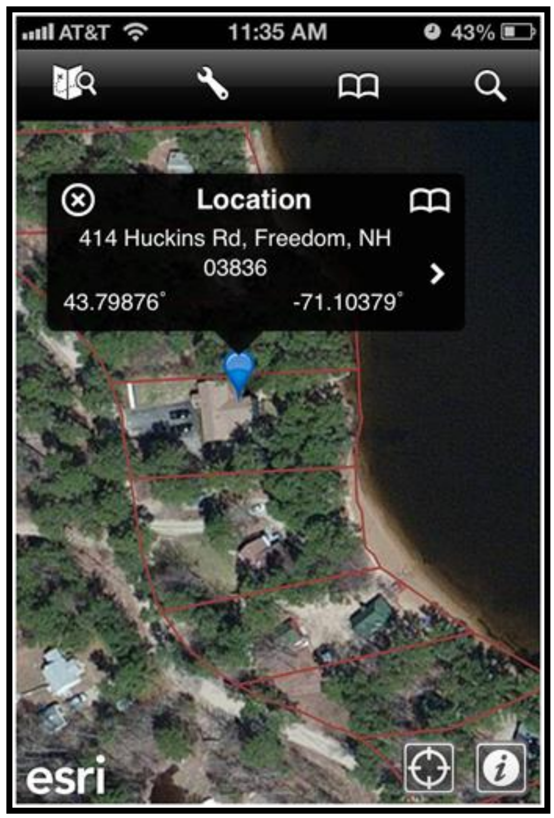
If a buildout analysis is conducted, it will assess the effects of new development for the portion of the watershed within the Town of Freedom, NH. The buildout analysis utilizes GIS zoning data and CommunityViz® software to estimate future development within the watershed. The analysis will combine projected population estimates, current zoning restrictions, and a host of additional development constraints (conservation lands, steep slopes, wetlands, existing buildings, soils with development suitability, unbuildable parcels) in order to determine the extent of buildable area in the watershed. Future phosphorus loading will be estimated under full or partial buildout (depending on the timeline of full buildout) and an assessment of the potential effects of future development as it relates to water quality goals. The buildout analysis, if conducted, will be performed by Kevin Ryan. Kevin is proficient in the use of CommunityViz, having used it for similar watershed-based planning projects in both Maine and New Hampshire. Task manager Jennifer Jespersen will provide QA/QC of the buildout data inputs and results of the analysis. This model has been used effectively for previous watershed restoration grant planning projects including Lake Wentworth and the Salmon Falls Headwaters Lakes Watershed Management Plan.

D- Shoreline Survey and Stormwater Impact Assessments

FB Environmental (FBE) in collaboration with Green Mountain Conservation Group (GMCG) and the Ossipee Watershed Coalition (OWC) will work with local volunteers to conduct an assessment of watershed properties adjacent to water resources within the watershed, in order to determine potential water quality impacts from stormwater and septic systems. The assessment will include two components: 1) a shoreline survey, and 2) a windshield survey of the watershed.

Shoreline Survey

To help characterize the effects of shoreline development (including septic systems), and to assist stakeholders with targeting and implementing shoreline best management practices (BMPs), shoreline development will be evaluated and assigned a nonpoint source (NPS) pollution impact rating. Best professional judgment will be used to establish subjective determinations of potential impact ratings. The visual survey includes a residential dwelling tally along with rating estimates for potential NPS pollution impacts based on the presence or lack of vegetated buffers, distance of dwelling from the shoreline, shoreline erosion, presence of exposed soil and percent slope of the lot (see field sheet in Appendix 2). In addition to the impact rating, shoreline surveyors will estimate the residency status of the dwelling (seasonal vs. year-round) and other notable features such as retaining walls or private boat launches. All of the field analyses will be conducted by FBE technical staff.



Screen capture of Esri® ArcGIS® smartphone application, showing current aerial imagery, parcel boundaries (red lines), and street addresses of homes. In the field, the GPS location of the phone is also included in the display.

To perform the shoreline survey, developed properties within 100 feet of the lakes will be identified by FBE using GIS. Properties will be evaluated by boat from approximately 50 feet from the shore. Properties will be identified with the use of the Esri® ArcGIS® smartphone app, which will allow surveyors to determine their current position in relation to lakeshore properties using aerial imagery, parcel boundary GIS data and real-time GPS positioning. Paper maps of lakeshores and parcel boundaries will be created for a secondary method of determining the location of individual parcels adjacent to water resources. The survey is expected to take place in late September or early October 2013.

Windshield Survey

While the shoreline survey will focus on developed land along the shoreline of the lakes and ponds in the watershed, the stormwater survey will document sources of NPS pollution throughout the rest of the watershed. This “windshield” survey will be performed by car, and include a checklist documenting sources of NPS pollution including, but not limited to: roadside runoff into tributaries, direct runoff to lakes, runoff from development, conversion of seasonal to year-round residences, use of fertilizers, gravel excavation, erosion from poorly buffered properties, and runoff from parking lots adjacent to tributaries (Appendix 3). The survey will focus on developed land outside of the immediate shoreline with an emphasis on properties within 75 feet for streams and rivers, stream crossings and other sensitive environmental areas. The survey is expected to take place in May of 2014. Technical leaders from FBE will team up with volunteers to conduct the survey. Field evaluations will be conducted by FBE staff and volunteers will help record data and can view sites and ask questions of technical staff.

Septic Loading Estimate

To estimate the phosphorus contribution from septic systems to Danforth Pond and the Lower Bays of Ossipee Lake, shoreline survey results will be entered into a septic model developed by the Maine Department of Environmental Protection (DEP). This model was developed for the Maine Lake Assessment Program in 2000 to evaluate the effects of septic systems on impaired lakes in Maine. The model inputs include: age, estimated usage, distance from the receiving waterbody, and attenuation factors which are based on Maine lakes and soils. The model was designed to utilize data collected from the shoreline survey and the project steering committee is assisting with data collection from the watershed municipalities to improve the data quality.. A similar septic loading model from the Lake Loading Response Model (LLRM, described above) will be used for comparison purposes. This model was designed specifically for New England states to determine current and future nutrient loading from a watershed.

6- Project Schedule

Project components are scheduled to be completed at different stages throughout the planning process. Below is a list of targets for completion of individual tasks.

Task 1: Final Site Specific Project Plan – September 25, 2013

Task 2: Evaluate Water Quality Data – October 1, 2013

Task 3A: Conduct Watershed Survey – November 2013

Task 4: Establish and Approve Water Quality Goal – December 1, 2013

Task 5: Identify Current and Future Pollutant Sources, including possible use of a Buildout Analysis and the Lake Loading Response Model – April 1, 2014

Task 6: Estimate Pollutant Load Reductions to Meet Water Quality Goal – April 15, 2014

Task 7: Develop First Draft of the Watershed Management Plan – May 1, 2014

Task 8: Develop Second and Final Draft of the Watershed Management Plan – August 1, 2014

7- Documents and Records

The FBE Technical Project Manager will ensure that project personnel have the most current version of the SSPP, including applicable model documentation and field data forms. Information gathered from the surveys will be entered into Excel spreadsheets by the GMCG Project Manager, and used to develop a survey report. FBE will assist with phosphorus loading estimates from septic systems in the watershed during watershed modeling, help develop a matrix of prioritized stormwater sites, and will incorporate the information into the total phosphorus loading model in the watershed management plan. Field forms will be kept on file at the GMCG office for a minimum of 3 years following completion of the project.

8- Quality Control

Quality control checks will be performed by the FBE Task Manager to ensure that information collected during the survey is accurately entered into the spreadsheets. QA/QC checks will be conducted on a series of random field survey forms, and the spreadsheets will be reviewed for inconsistencies. If errors are identified, the GMCG Project Manager will review the input values, and identify and correct the error to ensure the correct information is entered into the spreadsheets. In addition, FBE Task Manager Jennifer Jespersen will review all modeling inputs, calculations, and outputs for the purpose of QA/QC. All QA/QC issues identified will be properly documented, along with the appropriate steps taken to resolve the issues.

9- Final Products and Reporting

Final products for this project will all be submitted by FB Environmental, and include the following:

Approved Site Specific Project Plan under the New Hampshire Section 319 Nonpoint Source Grant Program QAPP for the Shoreline and Stormwater Survey (RFA# 08262, 08/29/13).

- Six meetings/training sessions with the project steering committee (and volunteers). The NPS training will include both an indoor and outdoor component.
- Summary of methods and calculations to determine Assimilative Capacity.
- Documentation of water quality goal and methods.
- Final modeling report, including final in-lake response calculations.
- Final pollutant load reduction estimates.
- Draft and final watershed action plans.
- Final monitoring plan recommendations.
- First and second (interim) drafts of the watershed management plan.
- Three public information meetings; copies of Power Point presentations.
- Final design(s) of Demonstration BMP projects approved by the UNHSC Professional Engineer.

10-References

AECOM and NHDES, 2011. Total Maximum Daily Load for Robinson Pond, Hudson, NH. Original AECOM Document Number: 09090-107-13, July 2009. Final revisions by NHDES in January 2011. Prepared for US EPA Region 1.

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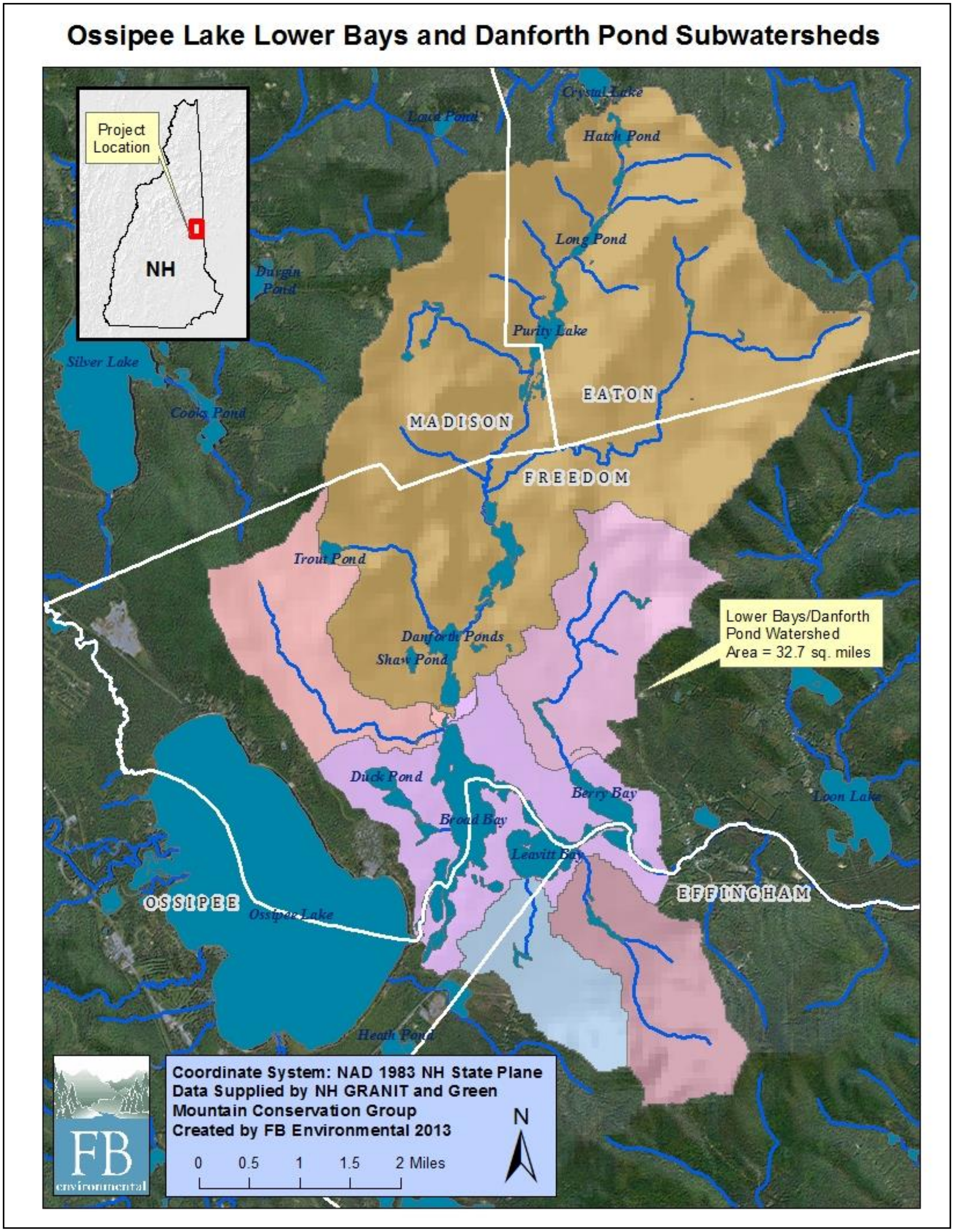
Appendix 1- Danforth Ponds and Lower Bays of Ossipee Lake Watershed Map



Appendix 2- Danforth Pond and Lower Bays of Ossipee Lake Shoreline Survey Field Sheet

Danforth Pond and the Lower Bays of Ossipee Lake Shoreline Condition Assessment

Lake:_______________________ Surveyors:____________________________

Date: ________________

Key:	
Shoreline:	B=Beach, R = Riprap/Retaining Wall, N = Natural, D = Mostly or all docks, L = Mostly Lawn, T = Trees, P = Plants, ST = Some trees
Buffer:	1 = Excellent Buffer (all natural vegetation - trees of mixed sizes and shrubs), 2 = Good (some trees and shrubs, some bare areas); 3= Moderate (a few small trees/shrubs,some lawn); 4= Minimal (mostly lawn, some shrubs); 5= No Buffer (all lawn/bare)
Bare Soil:	1=No exposed Soil, 2= minimal exposed Soil, 3= Fair amount of exposed soil,4=Large amounts of exposed soil
Shoreline Erosion:	1=No Erosion Visible, 2=Some Erosion Visible, 3=Moderate to Severe shoreline erosion
Distance:	1 = more than 150', 2 = 75 - 150', 3 = house/camp less than 75' from shore
Slope:	1=Little to no slope (3 - 8%), 2=Moderate Slope (8 - 20%), 3=Steeply sloped (>20%)
Total	Total of all columns (Buffer → Slope)

ID#	Map/Lot or brief description	S	YR	No Structure	Shoreline - B, R, N, D, L, T, P, ST	Buffer (1 - 5)	Bare Soil (1 - 4)	Shoreline Erosion (1 - 3)	Distance (1 - 3)	Slope (1 - 3)	Total	Photo?	Comments

Appendix 3- Danforth Pond and Lower Bays of Ossipee Lake "Windshield" Survey-Stormwater Impact Assessment Form

Final Site #_____________ Checked by _______ Date _________

2013 Danforth Pond and Lower Bays of Ossipee Lake Stormwater Survey

Sector & Site _____________ Date______________ Surveyor Initials ___________________________

Location *(house #, road, utility pole #)* ____

Building Color ______________________ Landowner Name ______________________________

Tax Map & Lot ______________________ Talked to Landowner? ☐ No ☐ Yes ______________

GPS Coordinates in Decimal Degrees (NAD83 or WGS84: ☐☐.☐☐☐☐☐ ☐☐.☐☐☐☐☐

Photo #'s:

Direct Flow to (check ONE): ☐ Lake ☐ Stream ☐ Ditch ☐ Vegetation

Land Use/Activity Circle ONE	Description of Problems Circle ALL that apply	
State Road	**Surface Erosion**	**Soil**
Town Road	Slight	Bare
Private Road	Moderate	Uncovered Pile
Driveway	Severe	Delta in Stream/Lake
Residential	**Culvert**	Winter Sand
Commercial	Unstable Inlet / Outlet	**Roof Runoff Erosion**
Municipal / Public	Clogged	Roof Gutter
Beach Access	Crushed / Broken	
Boat Access	Undersized	**Shoreline**
Trail or Path	**Ditch**	Undercut
Logging	Slight Erosion	Lack of Shoreline Vegetation
Agriculture	Moderate Erosion	Inadequate Shoreline Vegetation
Construction Site	Severe Erosion	Erosion
Gravel Operation	Bank Failure	Unstable Access
OTHER: Conversion from Seasonal-Yr Round	Undersized	Artificially Created Beach
	Road Shoulder Erosion	**Agriculture**
	Slight	Livestock Access to Waterbody
	Moderate	Tilled Eroding Fields
	Severe	Manure Washing off Site
	Roadside Plow/Grader Berm	**OTHER:**
		Fertilizers

Slope: ☐Flat ☐Moderate ☐Steep **Size of Area Exposed or Eroded (length x width):** _______________

Site is linked to another: Cause of Site # _________________ Result of Site # _________________

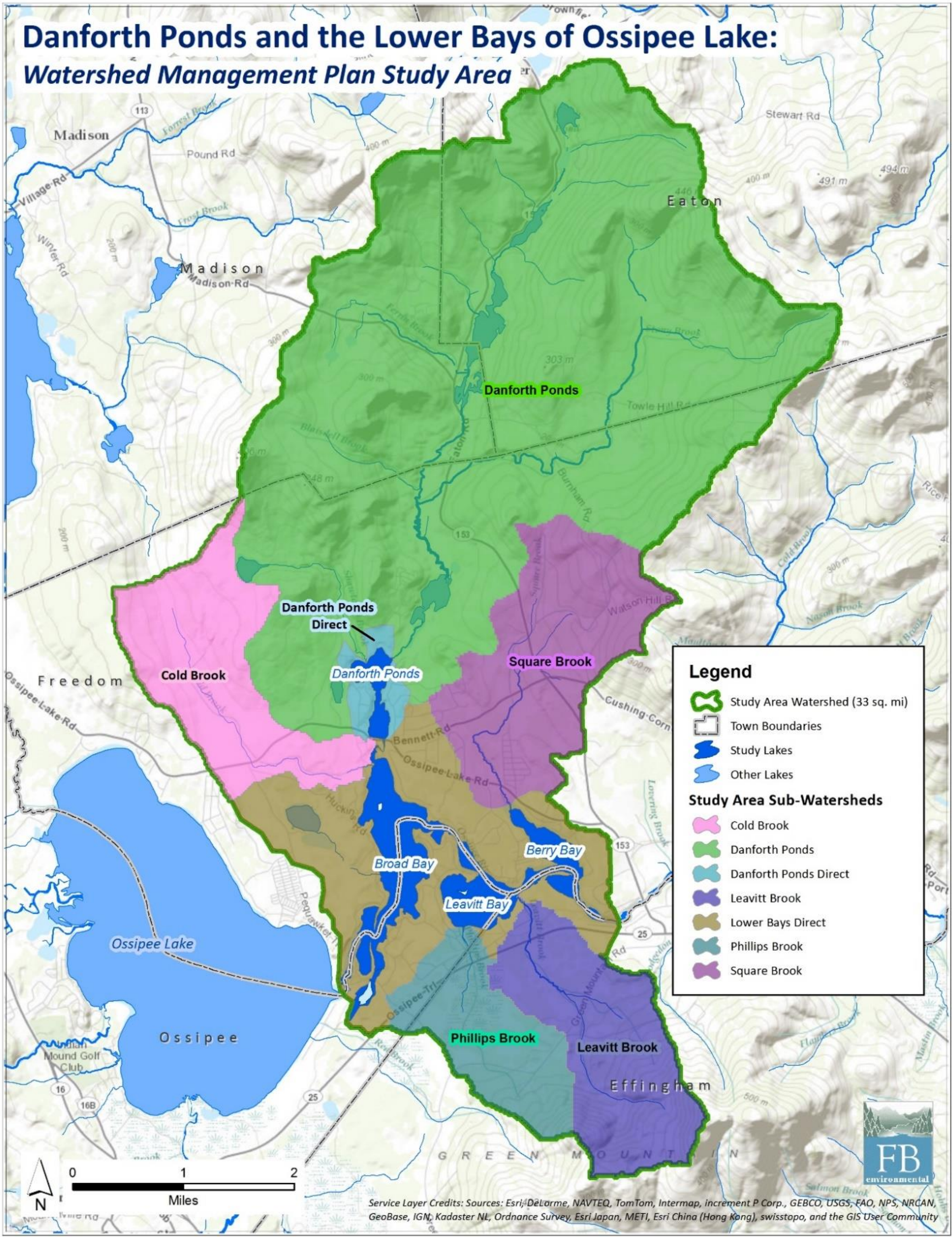
Recommendations		
Culvert	**Roads / Driveways**	**Paths & Trails**
Armor Inlet/Outlet	Remove Grader/Plow Berms	Define Foot Path
Remove Clog	Build Up	Stabilize Foot Path
Replace	Add New Surface Material	Infiltration Steps
Enlarge	• Gravel	Install Runoff Diverter (waterbar)
Lengthen	• Recycled Asphalt	**Roof Runoff**
Install Plunge Pool	• Pave	Infiltration Trench @ roof dripline
Ditch	Reshape (Crown)	Drywell @ gutter downspout
Vegetate	Grade	Rain Barrel
Armor with Stone	Vegetate Shoulder	**Other**
Reshape Ditch	Install Catch Basin	Install Runoff Diverter (waterbar)
Install Turnouts	Install Detention Basin	Mulch/Erosion Control Mix
Install Ditch	Install Runoff Diverters	Rain Garden
Install Check Dams	• Broad-based Dip	Infiltration Trench
Install Sediment Pools	• Open Top Culvert	Water Retention Swales
Other:	• Rubber Razor	**Vegetation**
	• Waterbar	Establish Buffer
	Construction Site	Add to Buffer
	Mulch	No Raking
	Silt Fence / EC Berms	Reseed bare soil & thinning grass
	Seed / Hay	
	Check Dams	

Impact: Consider size of site, slope, amount of soil eroded, proximity to water

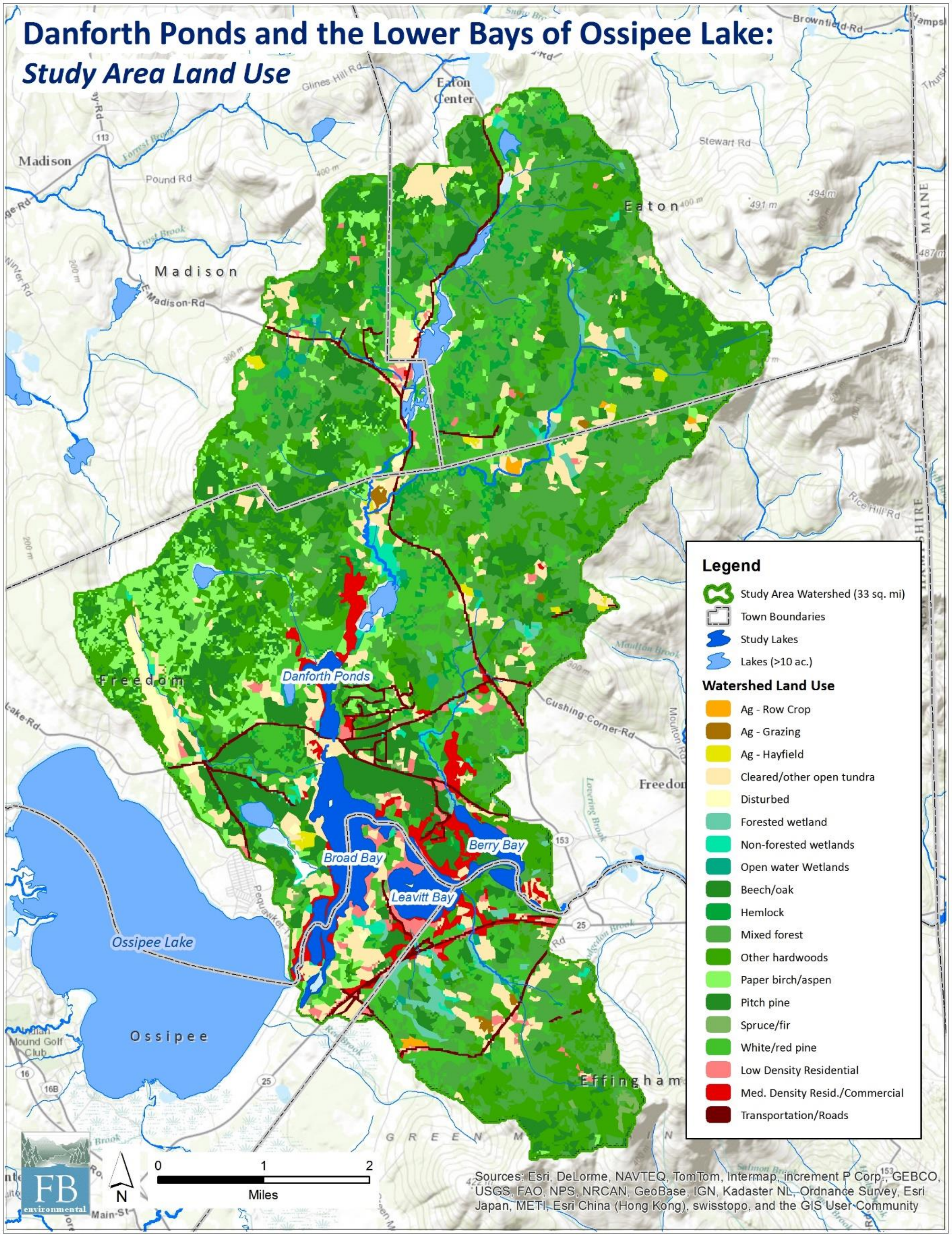
High:	Large area with significant erosion and direct flow to water
Medium:	Sediment transported off site but does not reach high magnitude
Low:	Limited transport of soil off site, small site with no evidence of rills or gullies

Cost of Materials	Cost of Labor	Definition of Cost
High	High	Greater than $2,500
Medium	Medium	$500-$2,500
Low	Low	Less than $500

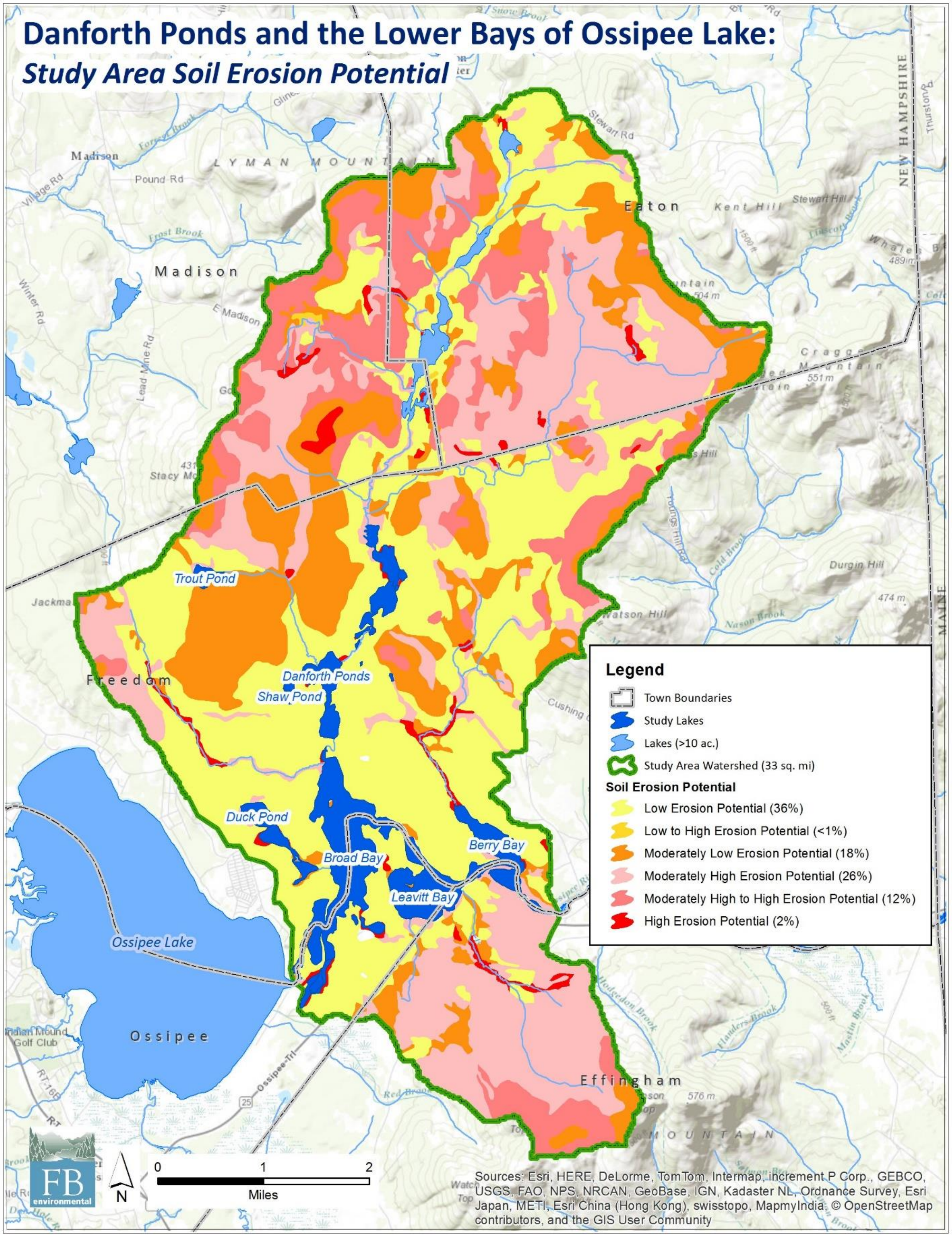
APPENDIX B: THEMATIC GIS MAPS



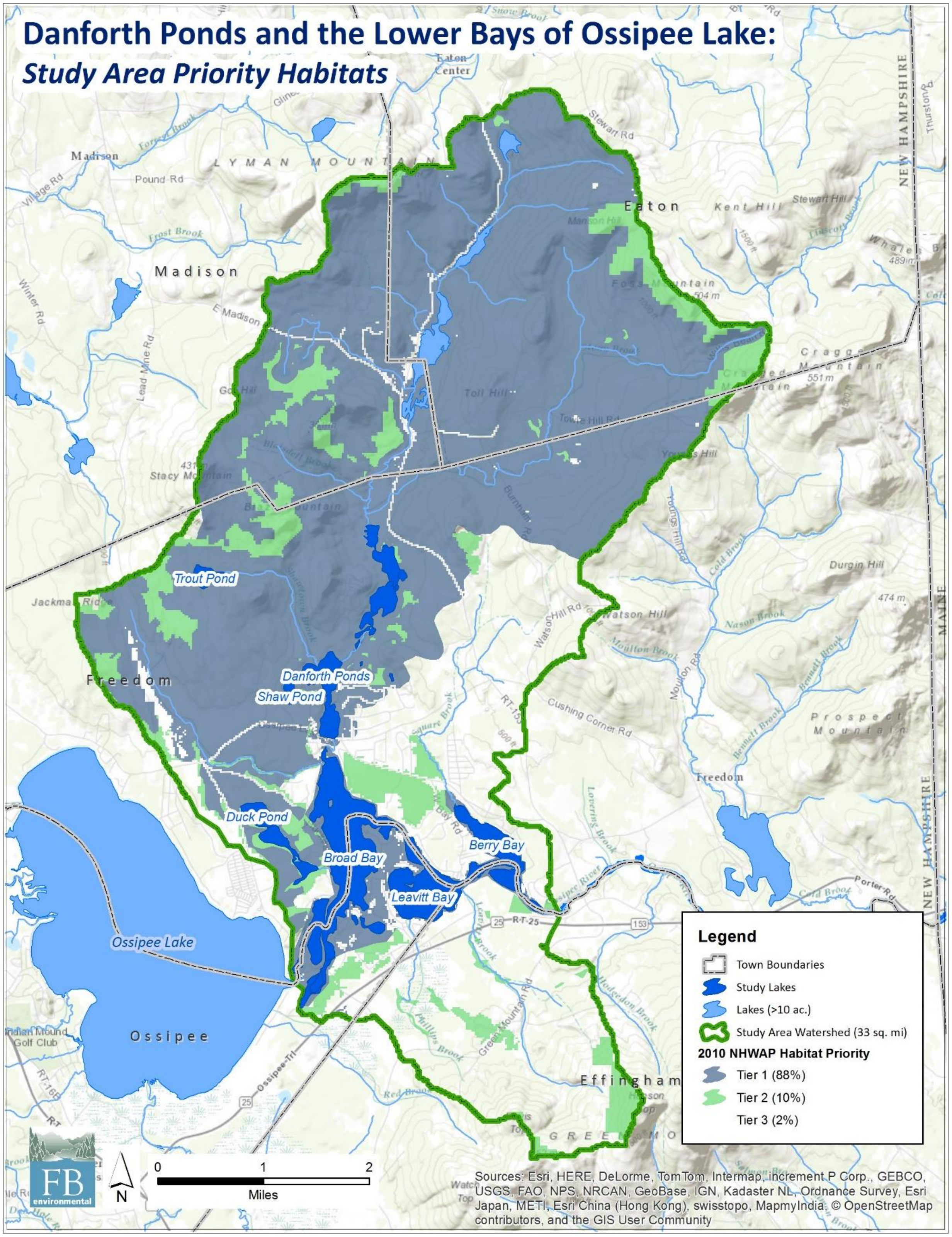
Map 1


Danforth Ponds and the Lower Bays of Ossipee Lake:
Study Area Land Use
Legend
Study Area Watershed (33 sq. mi)
Town Boundaries
Study Lakes
Lakes (>10 ac.)
Watershed Land Use
Ag - Row Crop
Ag - Grazing
Ag - Hayfield
Cleared/other open tundra
Disturbed
Forested wetland
Non-forested wetlands
Open water Wetlands
Beech/oak
Hemlock
Mixed forest
Other hardwoods
Paper birch/aspen
Pitch pine
Spruce/fir
White/red pine
Low Density Residential
Med. Density Resid./Commercial
Transportation/Roads
Danforth Ponds
Broad Bay
Berry Bay
Leavitt Bay
Ossipee Lake
Madison
Eaton
Freedom
Ossipee
Effingham
Eaton Center
0 1 2
Miles
N
Sources: Esri, DeLorme, NAVTEQ, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, and the GIS User Community

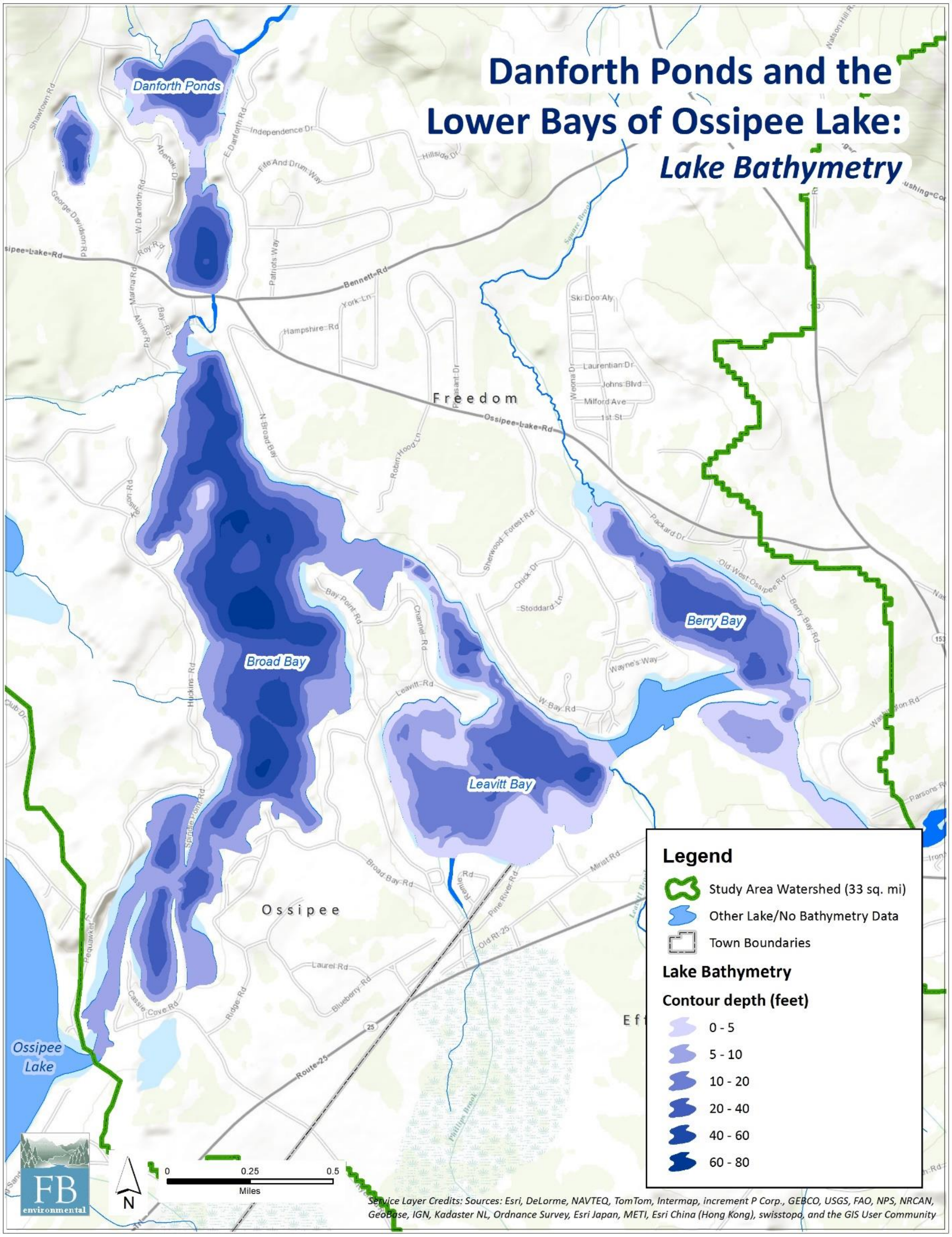
Map 2


Danforth Ponds and the Lower Bays of Ossipee Lake:
Study Area Soil Erosion Potential
Madison
Eaton
Freedom
Ossipee
Effingham
Trout Pond
Danforth Ponds
Shaw Pond
Duck Pond
Broad Bay
Berry Bay
Leavitt Bay
Ossipee Lake
NEW HAMPSHIRE
MAINE
Legend
Town Boundaries
Study Lakes
Lakes (>10 ac.)
Study Area Watershed (33 sq. mi)
Soil Erosion Potential
Low Erosion Potential (36%)
Low to High Erosion Potential (<1%)
Moderately Low Erosion Potential (18%)
Moderately High Erosion Potential (26%)
Moderately High to High Erosion Potential (12%)
High Erosion Potential (2%)
0
1
2
Miles
N
FB environmental
Sources: Esri, HERE, DeLorme, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

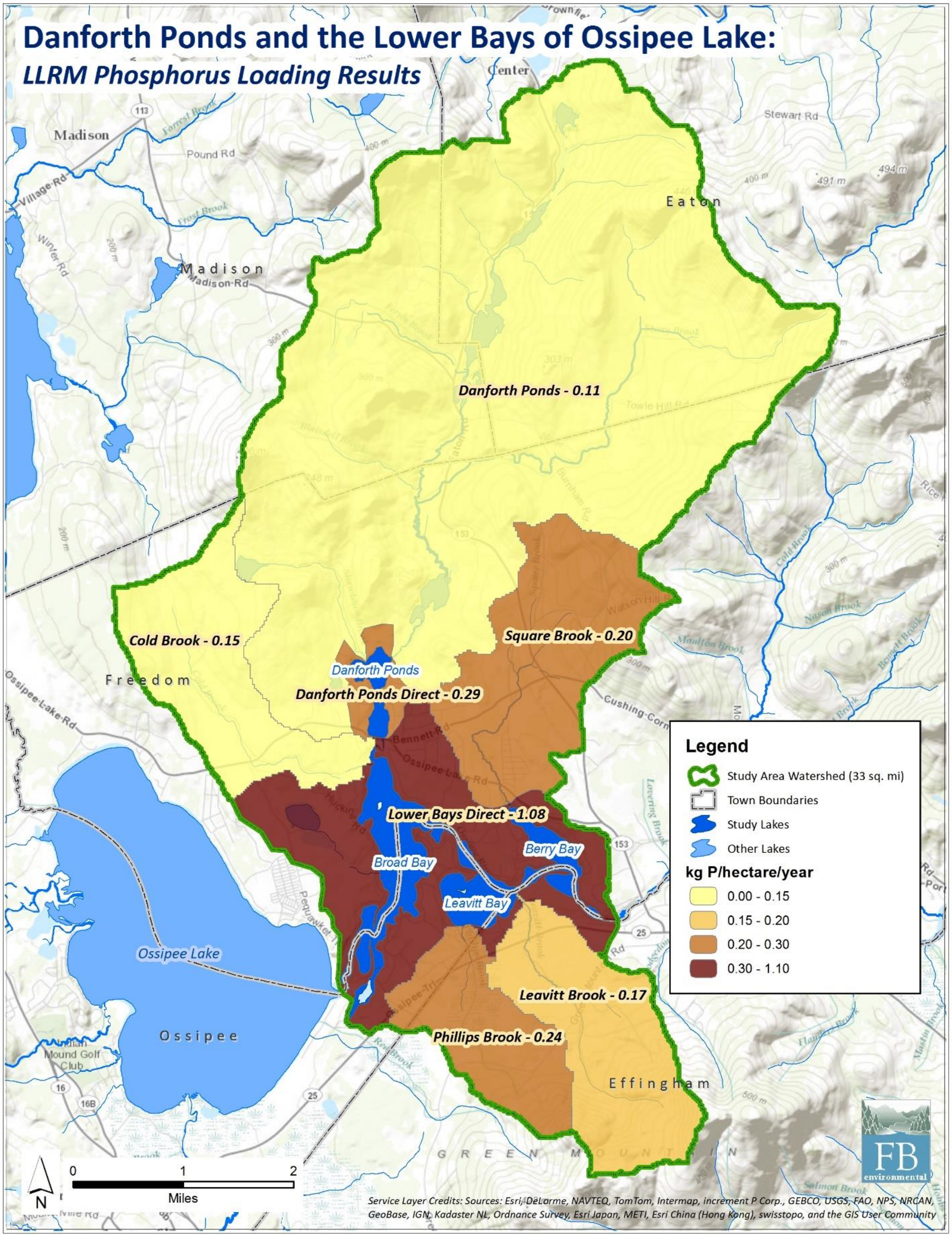
Map 3


Danforth Ponds and the Lower Bays of Ossipee Lake:
Study Area Priority Habitats
Trout Pond
Danforth Ponds
Shaw Pond
Duck Pond
Broad Bay
Berry Bay
Leavitt Bay
Ossipee Lake
Madison
Eaton
Freedom
Ossipee
Effingham
Legend
Town Boundaries
Study Lakes
Lakes (>10 ac.)
Study Area Watershed (33 sq. mi)
2010 NHWAP Habitat Priority
Tier 1 (88%)
Tier 2 (10%)
Tier 3 (2%)
0 1 2
Miles
N
Sources: Esri, HERE, DeLorme, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

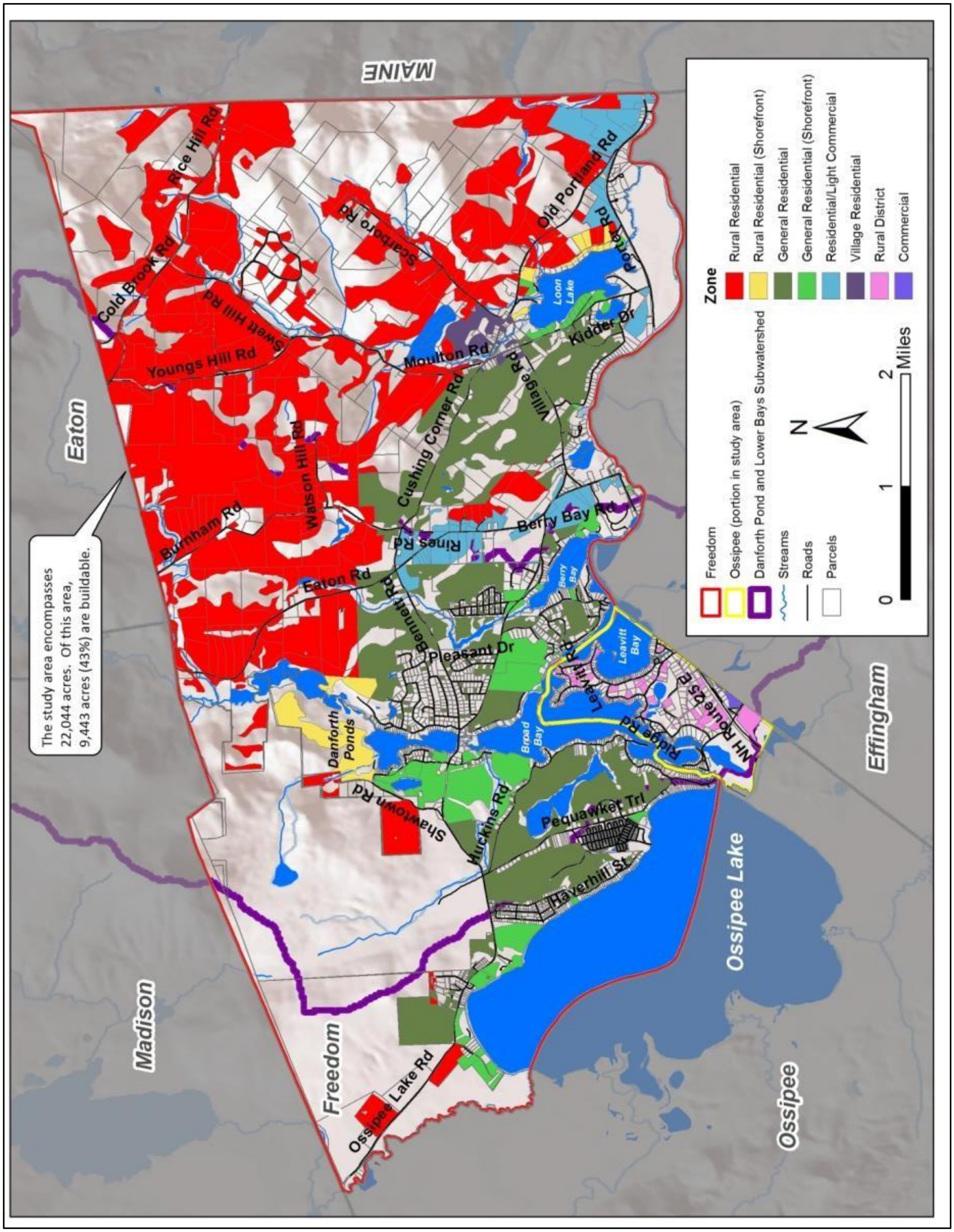
Map 4


Danforth Ponds and the
Lower Bays of Ossipee Lake:
Lake Bathymetry
Danforth Ponds
Broad Bay
Leavitt Bay
Berry Bay
Ossipee Lake
Freedom
Ossipee
Legend
Study Area Watershed (33 sq. mi)
Other Lake/No Bathymetry Data
Town Boundaries
Lake Bathymetry
Contour depth (feet)
0 - 5
5 - 10
10 - 20
20 - 40
40 - 60
60 - 80
0 0.25 0.5
Miles
N
Service Layer Credits: Sources: Esri, DeLorme, NAVTEQ, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, and the GIS User Community

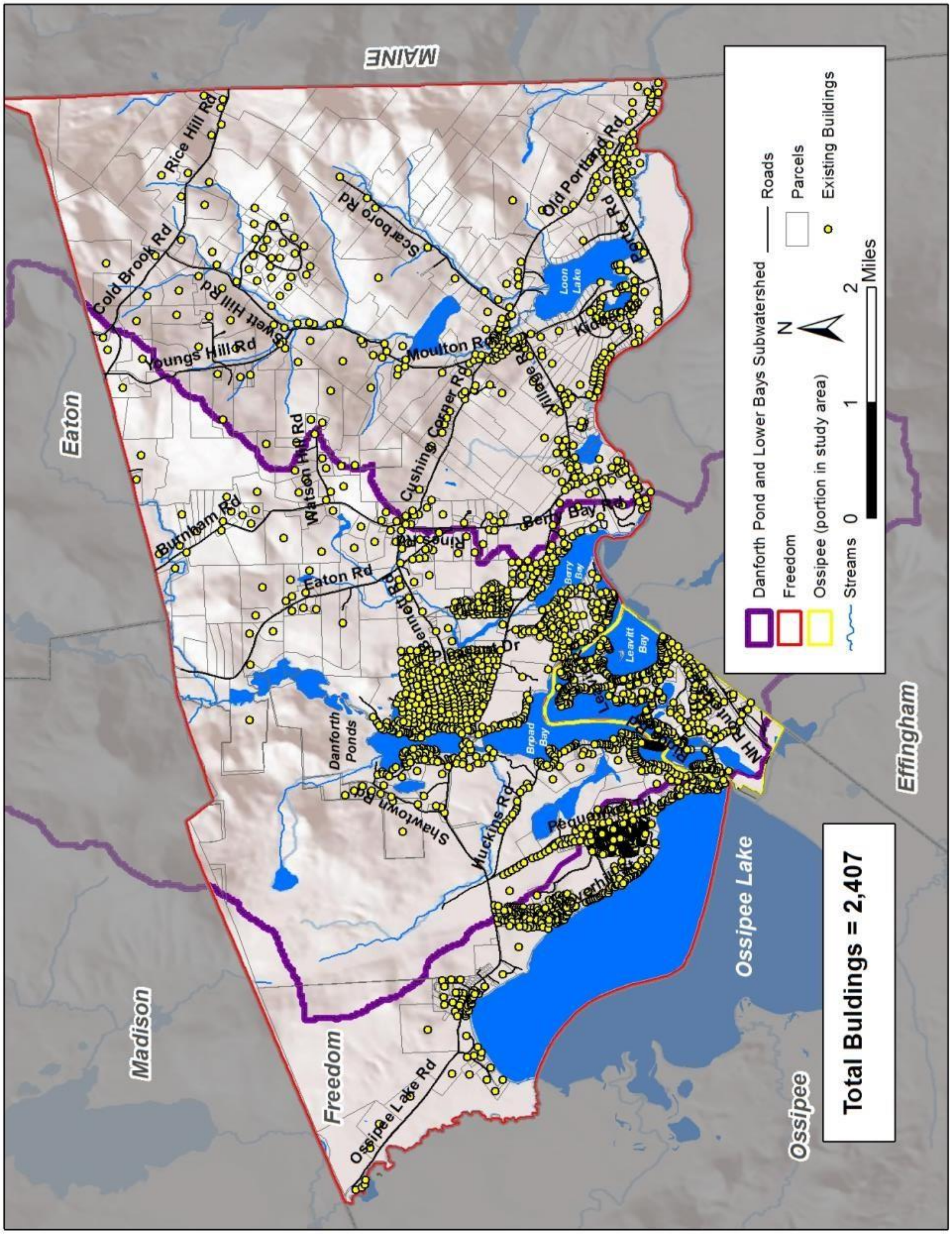
Map 5


Danforth Ponds and the Lower Bays of Ossipee Lake:
LLRM Phosphorus Loading Results
Danforth Ponds - 0.11
Cold Brook - 0.15
Square Brook - 0.20
Danforth Ponds
Danforth Ponds Direct - 0.29
Lower Bays Direct - 1.08
Broad Bay
Berry Bay
Leavitt Bay
Ossipee Lake
Leavitt Brook - 0.17
Phillips Brook - 0.24
Madison
Eaton
Freedom
Ossipee
Effingham
Center
Legend
Study Area Watershed (33 sq. mi)
Town Boundaries
Study Lakes
Other Lakes
kg P/hectare/year
0.00 - 0.15
0.15 - 0.20
0.20 - 0.30
0.30 - 1.10
0
1
2
Miles
N
Service Layer Credits: Sources: Esri, DeLorme, NAVTEQ, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, and the GIS User Community

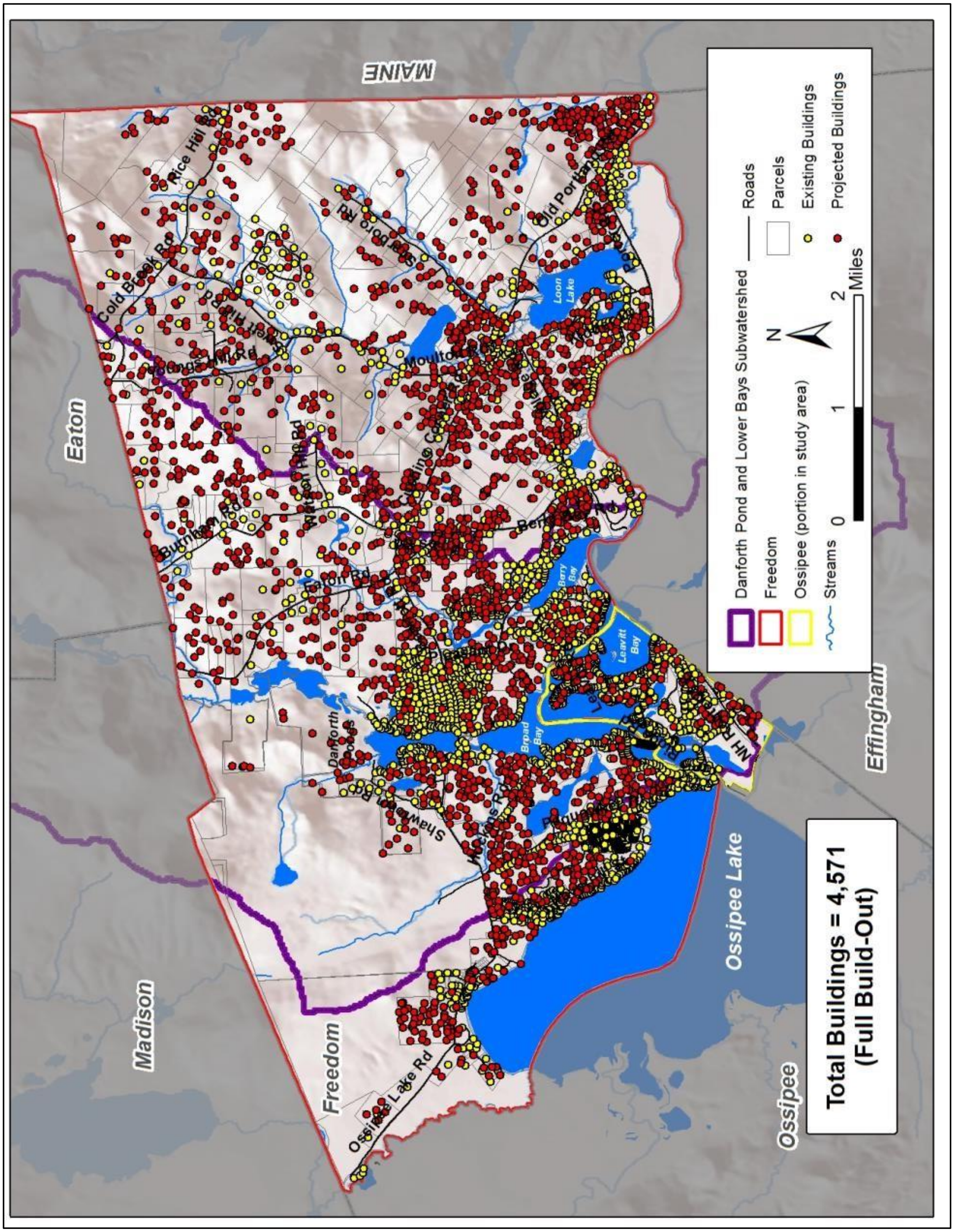
Map 6


MAINE
Eaton
Madison
Freedom
Effingham
Ossipee
Ossipee Lake
The study area encompasses 22,044 acres. Of this area, 9,443 acres (43%) are buildable.
Zone
Rural Residential
Rural Residential (Shorefront)
General Residential
General Residential (Shorefront)
Residential/Light Commercial
Village Residential
Rural District
Commercial
Freedom
Ossipee (portion in study area)
Danforth Pond and Lower Bays Subwatershed
Streams
Roads
Parcels
N
0
1
2
Miles
Rice Hill Rd
Cold Brook Rd
Swett Hill Rd
Youngs Hill Rd
Scarboro Rd
Old Portland Rd
Porter Rd
Loon Lake
Kidder Dr
Moulton Rd
Village Rd
Cushing Corner Rd
Watson Hill Rd
Burnham Rd
Berry Bay Rd
Rines Rd
Eaton Rd
Bennett Rd
Berry Bay
Pleasant Dr
Leavitt Rd
Leavitt Bay
Route 25 E
NH Route 25
Ridge Rd
Broad Bay
Danforth Ponds
Shawtown Rd
Huckins Rd
Pequawket Trl
Haverhill St
Ossipee Lake Rd

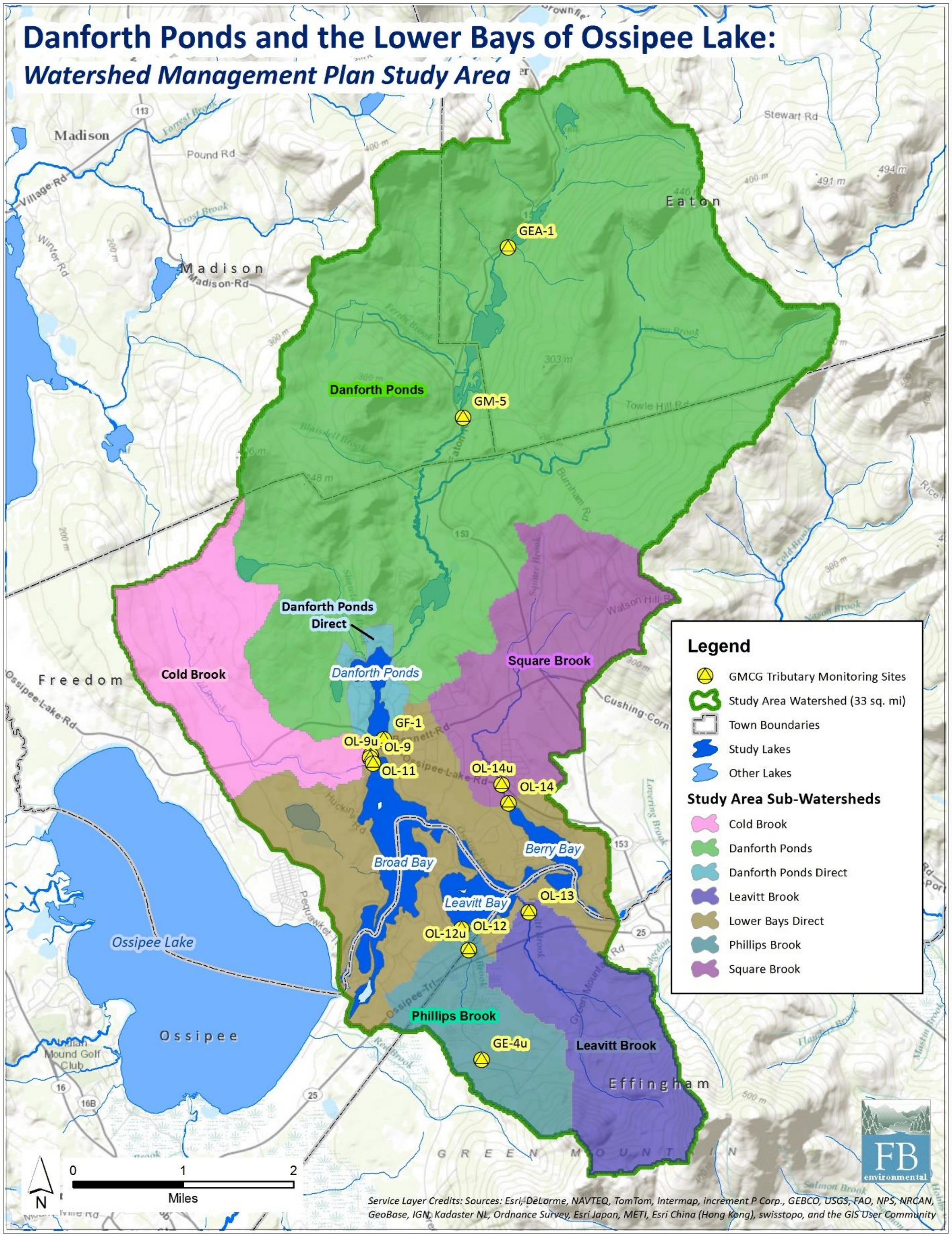
Map 7


MAINE
Eaton
Madison
Freedom
Effingham
Ossipee
Ossipee Lake
Danforth Ponds
Loon Lake
Broad Bay
Berry Bay
Leavitt Bay
Rice Hill Rd
Cold Brook Rd
Youngs Hill Rd
Scarboro Rd
Old Portland Rd
Moulton Rd
Cushing Corner Rd
Watson Hill Rd
Burnham Rd
Eaton Rd
Bennett Rd
Shawtown Rd
Muckins Rd
Ossipee Lake Rd
Danforth Pond and Lower Bays Subwatershed
Freedom
Ossipee (portion in study area)
Streams
Roads
Parcels
Existing Buildings
N
0 1 2 Miles
Total Buildings = 2,407

Map 8


MAINE
Eaton
Madison
Freedom
Effingham
Ossipee
Ossipee Lake
Loon Lake
Danforth Ponds
Broad Bay
Leavitt Bay
Berry Bay
Cold Brook Rd
Rice Hill Rd
Burnham Rd
Eaton Rd
Moulton Rd
Old Portland Rd
Shawtown Rd
Ossipee Lake Rd
Danforth Pond and Lower Bays Subwatershed
Freedom
Ossipee (portion in study area)
Streams
Roads
Parcels
Existing Buildings
Projected Buildings
N
0 1 2 Miles
Total Buildings = 4,571
(Full Build-Out)

Map 9


Danforth Ponds and the Lower Bays of Ossipee Lake:
Watershed Management Plan Study Area
Danforth Ponds
Danforth Ponds Direct
Cold Brook
Square Brook
Phillips Brook
Leavitt Brook
Broad Bay
Berry Bay
Leavitt Bay
Ossipee Lake
GEA-1
GM-5
GF-1
OL-9u
OL-9
OL-11
OL-14u
OL-14
OL-13
OL-12
OL-12u
GE-4u
Legend
GMCG Tributary Monitoring Sites
Study Area Watershed (33 sq. mi)
Town Boundaries
Study Lakes
Other Lakes
Study Area Sub-Watersheds
Cold Brook
Danforth Ponds
Danforth Ponds Direct
Leavitt Brook
Lower Bays Direct
Phillips Brook
Square Brook
0 1 2
Miles
N
Service Layer Credits: Sources: Esri, DeLorme, NAVTEQ, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, and the GIS User Community

Map 10

APPENDIX C: SELECT NUTRIENT MODELING RESULTS

Danforth Ponds and the Lower Bays of Ossipee Lake total phosphorus (P) and water loading summary.

DIRECT LOADS TO **DANFORTH PONDS**	P (KG/YR)	P (%)	WATER (M^3/YR)	WATER (%)
ATMOSPHERIC	7	1%	252,473	1%
INTERNAL	34	6%	n/a	n/a
WATERFOWL	3	1%	n/a	n/a
SEPTIC SYSTEM	27	4%	19,080	<1%
WATERSHED LOAD	526	88%	31,384,958	99%
TOTAL LOAD TO DANFORTH PONDS	596	100%	31,656,510	100%

DIRECT LOADS TO **LOWER BAYS**	P (KG/YR)	P (%)	WATER (M^3/YR)	WATER (%)
ATMOSPHERIC	63	2%	2,257,826	1%
INTERNAL	12	<1%	n/a	n/a
WATERFOWL	17	<1%	n/a	n/a
SEPTIC SYSTEM	57	1%	40,684	<1%
WATERSHED LOAD	3918	96%	404,606,597	99%
TOTAL LOAD TO LOWER BAYS	4066	100%	406,905,107	100%

Summary of Danforth Ponds and the Lower Bays of Ossipee Lake total phosphorus (P) loading by drainage basin/tributary.

Watershed Drainage/Tributary		Land Area (ha)	Water Flow (m^3/yr)	P conc. (mg/L)	P mass (kg/yr)	Attenuation Factor*
Danforth Ponds	Direct Drainage	79	561,786	0.041	23	0.95
	Watershed	4,699	30,823,172	0.016	503	0.70
Lower Bays	Direct Drainage	856	359,664,259	0.008	2,940	0.90
	Cold Brook	639	4,637,185	0.020	95	0.95
	Danforth Ponds	4,778	28,094,870	0.019	520	0.70
	Leavitt Brook	628	4,390,995	0.025	108	0.95
	Phillips Brook	411	2,705,558	0.037	99	0.90
	Square Brook	769	5,113,730	0.030	155	0.90

*1=no attenuation, 0=full attenuation

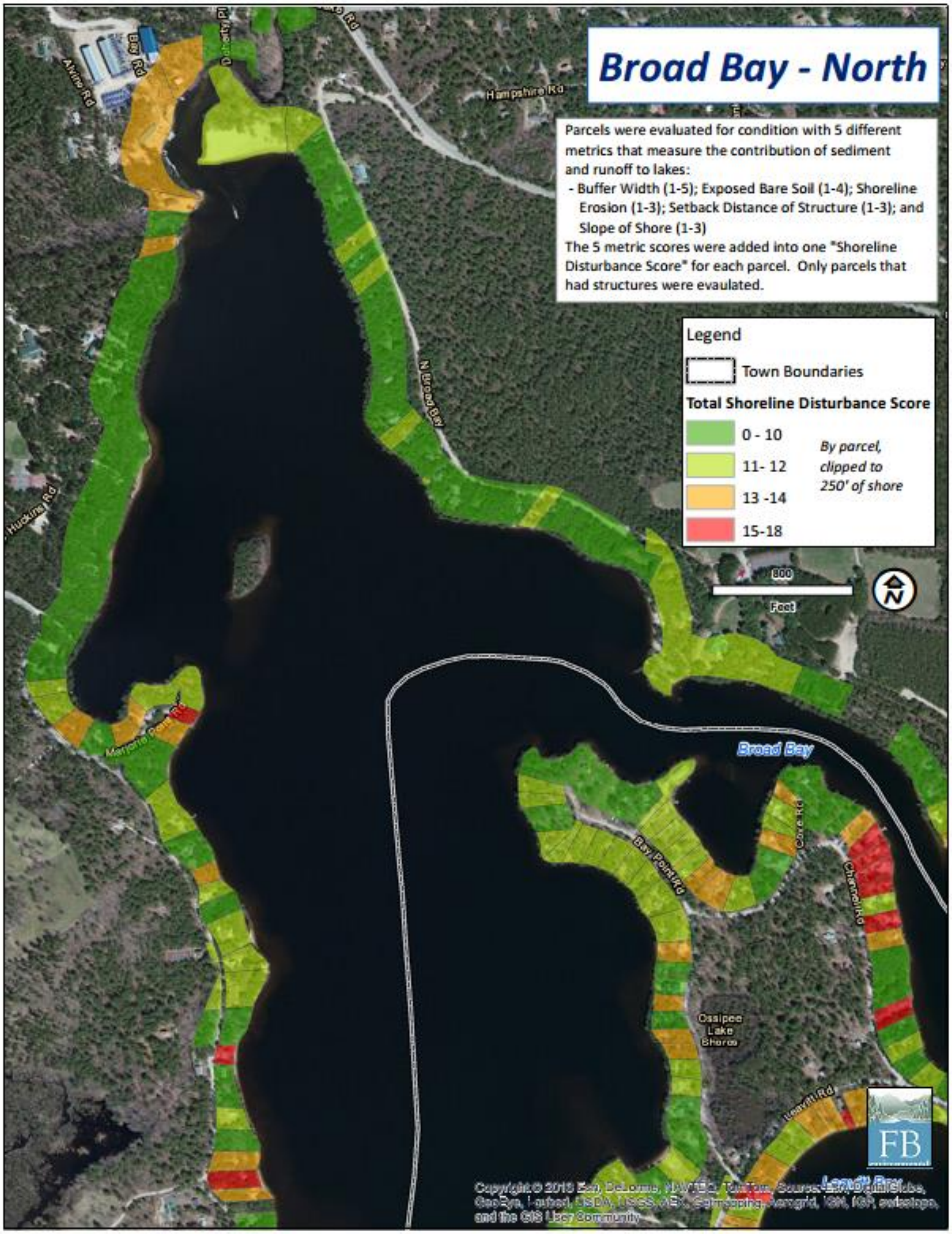
APPENDIX D: SHORELINE SURVEY RESULTS

Summary of disturbance scores for high impact (Broad, Leavitt, and Berry Bays) and moderately-high (Danforth Pond) impact shoreline parcels identified during the 2013 shoreline survey by volunteers.

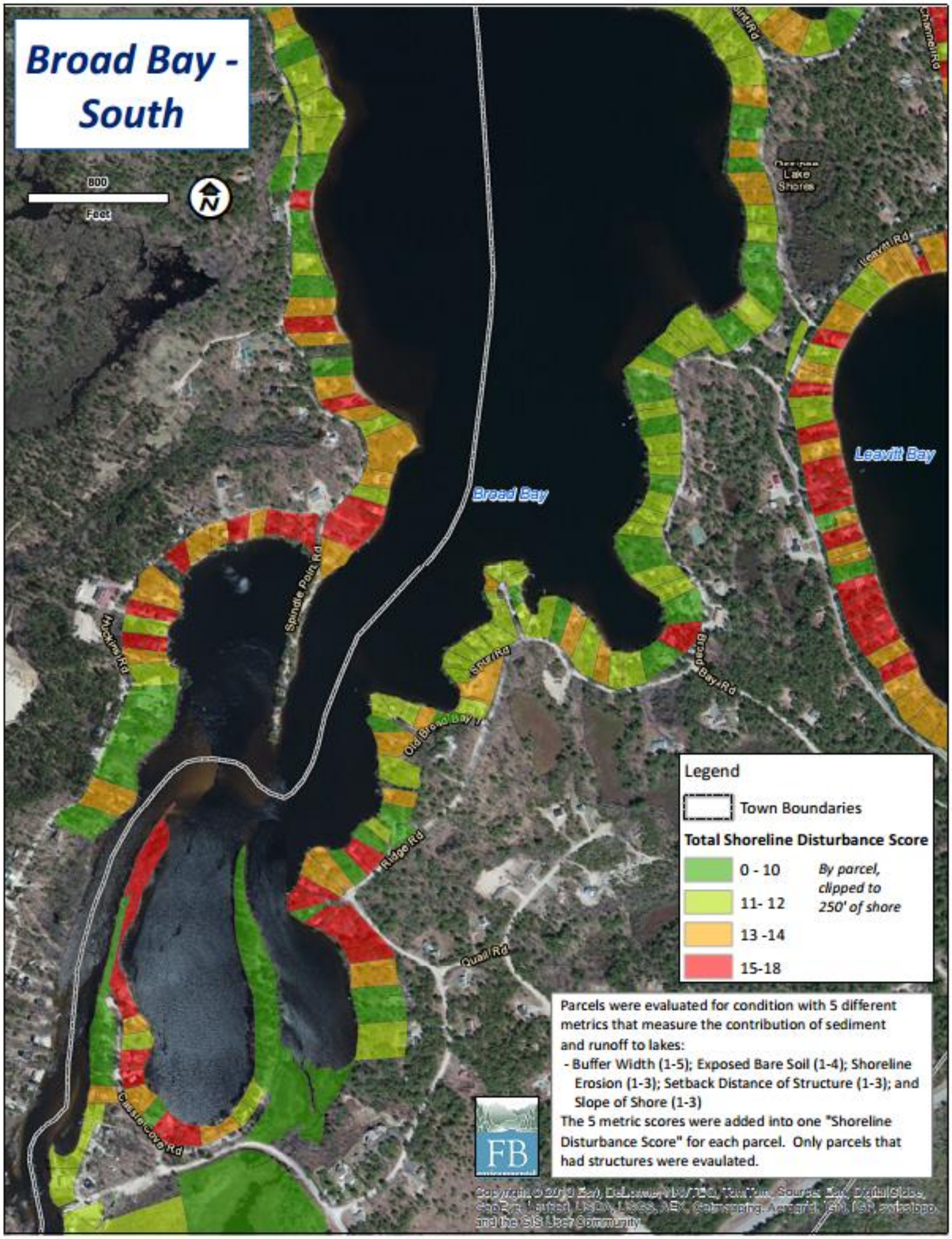
ID#	Town - Map# - Lot#	Shoreline*	Buffer (1 - 5)	Bare Soil (1 - 4)	Shoreline Erosion (1 - 3)	Setback Distance (1 - 3)	Slope (1 - 3)	Total
				Broad Bay				
33	OS-21-1	B	5	4	1	3	2	15
108	OS-34-27	B	5	4	1	3	2	15
19	FR-30-13	B,R,D,P,ST	4	3	2	3	3	15
32	FR-29-17	B,L,D,ST	5	3	2	3	2	15
38	FR-29-23	B,R,ST	5	3	2	3	2	15
43	FR-29-27	B,ST	5	4	2	3	1	15
49	FR-29-33	R	5	4	2	3	2	16
50	FR-29-34	R,ST	5	2	2	3	3	15
51	FR-29-47	R,ST,P	4	4	3	2	3	16
54	FR-29-35	D,ST	5	4	2	3	2	16
55	FR-29-36	B,ST	5	4	3	3	2	17
56	FR-29-37	B,R,ST	4	3	3	3	2	15
58	FR-29-39	B,L	5	4	2	3	1	15
61	FR-28-9	B,D,ST	5	4	3	3	1	16
62	FR-2-28-10	ST	5	4	3	3	2	17
64	FR-28-12	B,R,D	5	4	2	3	2	16
66	FR-28-14	B,ST,R	4	3	3	3	2	15
75	OS-46-16	B,R,ST	5	4	2	3	1	15
76	OS-46-17	B,D	5	4	3	3	2	17
79	OS-46-20	B,R,ST	5	3	3	3	2	16
80	OS-46-21	B,R,L	5	3	2	3	2	15
83	OS-46-24	B,R,ST,P	5	4	3	3	2	17
84	OS-46-26	B,R,ST	4.5	3	2	3	2	14.5
94	OS-46-36	B,R,ST	5	4	3	3	2	17
95	OS-35-1	B,R,ST	5	4	3	3	3	18
96	OS-35-2	B,R,P	5	4	3	3	3	18
98	OS-35-4	B,ST	5	4	3	3	3	15
99	OS-35-5	B,R	5	3	2	2	3	15
103	OS-35-9	B,R	5	3	3	3	1	15
116	OS-27-4	B	5	4	2	3	1	15
118	OS-27-6	B	5	4	2	3	1	15
				Leavitt Bay				
1	FR-38-6-4	B,R	4	4	3	3	2	16
14	FR-38-15-1	B	5	4	3	2	2	16
17	FR-38-17-1	R,B	4	4	2	3	2	15
25	FR-37-6	B,R	5	3	2	3	2	15
27	FR-37-8	B,P	3	3	3	3	3	15
31	FR-36-1	B,R	5	4	2	3	3	17
40	OS-21-2	B,R	5	3	2	3	2	15
41	OS-21-3	B	5	4	2	3	1	15
42	OS-21-4	B,P,ST	5	4	3	3	2	17
44	OS-21-6	B,ST	5	4	3	3	1	16
48	OS-21-10	B,R	5	3	2	3	2	15
58	OS-32-6	R	4	4	3	3	3	17
59	OS-32-7	R	4	3	3	3	3	16
64	OS-32-12	B	5	4	2	3	1	15
67	OS-31-40	B,D	5	4	2	3	1	15

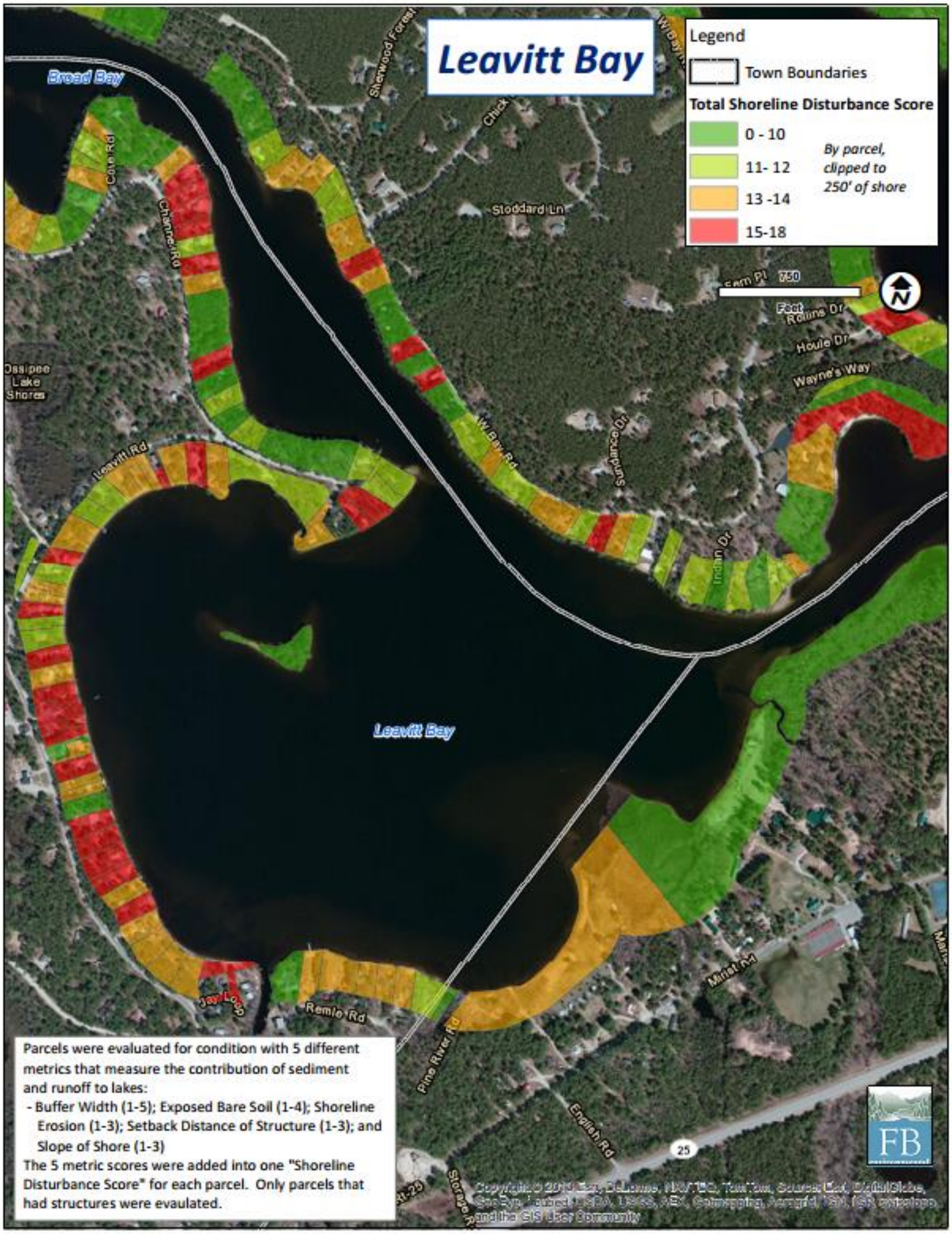
ID#	Town - Map# - Lot#	Shoreline*	Buffer (1 - 5)	Bare Soil (1 - 4)	Shoreline Erosion (1 - 3)	Setback Distance (1 - 3)	Slope (1 - 3)	Total
74	OS-31-47	B,R	5	4	2	3	1	15
78	OS-31-51	B,R	5	4	2	3	2	16
81	OS-31-54	B,ST,P	4	4	3	3	2	16
83	OS-31-56	B,P	5	4	2	3	2	16
84	OS-31-57	B,P,T	5	4	3	2	2	16
85	OS-31-58	N,P	5	3	2	3	2	15
86	OS-31-59	B,L,P	5	3	3	2	2	15
89	OS-31-62	B	5	4	2	3	1	15
93	OS-34-30	B,P,T	5	4	2	2	2	15
94	OS-34-31	B,P,ST	5	3	2	2	3	15
95	OS-34-32	P,R	4	4	2	3	2	15
96	OS-34-33	B,P,L	5	4	3	2	2	16
98	OS-34-35	B	5	4	2	3	2	16
103	OS-33-9	B	5	4	2	3	1	15
Berry Bay								
16	FR-39-8-1	R,B	5	2	2	3	3	15
18	FR-39-10	B	4	3	3	3	2	15
19	FR-39-11	B	5	3	2	3	2	15
20	FR-39-12	B,R	4	3	2	3	3	15
21	FR-39-13	R,P,ST	3	3	3	3	3	15
22	FR-39-14	B,R	5	3	2	3	3	16
23	FR-39-15	B,R,P	4	3	2	3	3	15
27	FR-38-3	B,R,P,ST	4	4	3	3	2	16
49	FR-42-8-3	B,T	4	4	3	3	2	16
Danforth Pond								
1	FR-32-4	B,P,ST	3	4	1	3	2	13
2	FR-32-5	B	4	4	1	2	2	13
13	FR-33-16	B,P	3	4	1	2	3	13
16	FR-33-13	R,ST	4	4	1	3	2	14
17	FR-33-12	R, ST	4	3	1	3	2	13
18	FR-33-11	B,P	4	4	1	3	2	14
23	FR-33-6	B,SP,L	5	3	2	3	1	14
26	FR-33-3	B,L	4	4	1	3	2	14
29	FR-60-1	B,P,T	4	4	1	3	2	14
63	FR-32-2	B,P	4	4	1	3	1	13

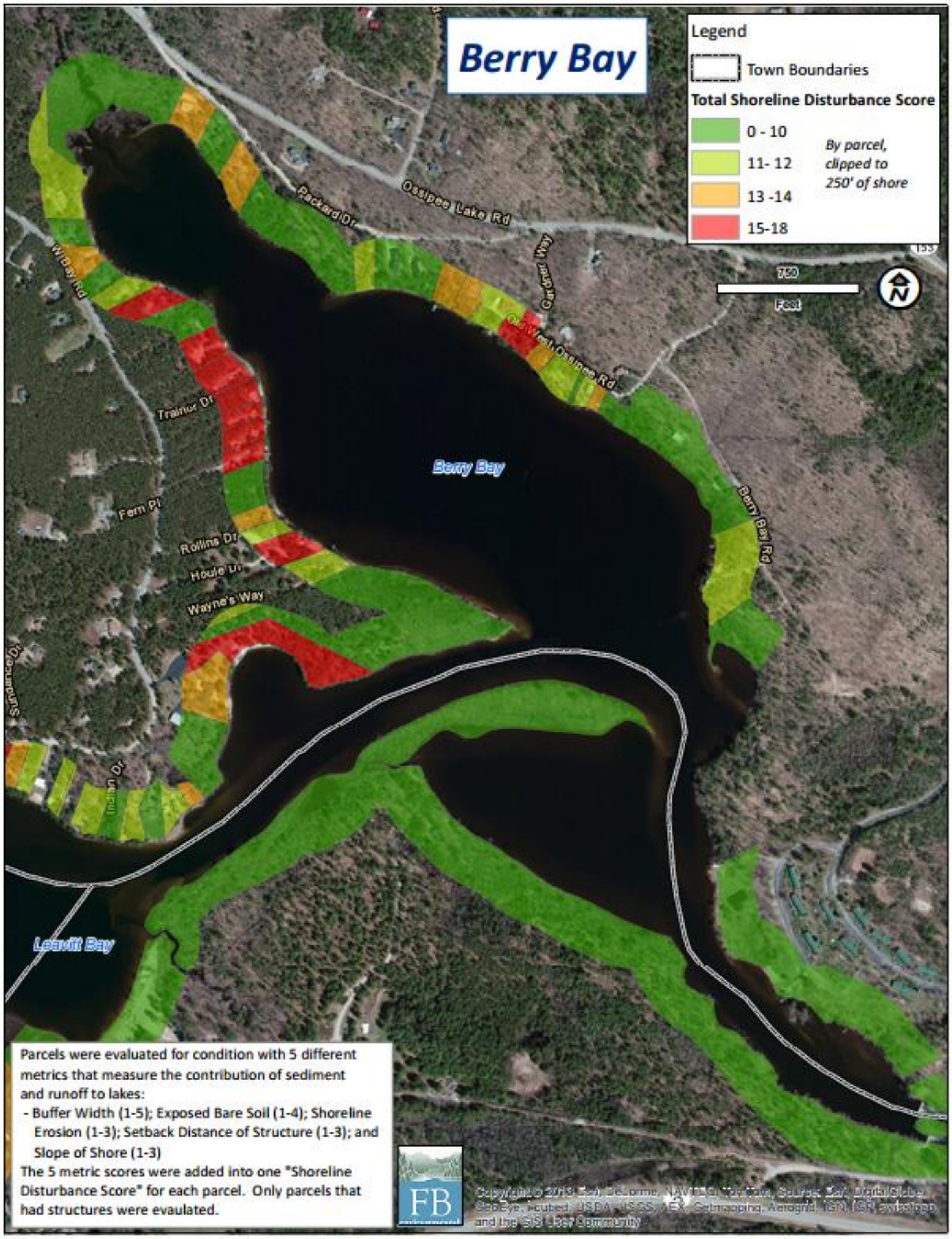
* B=Beach, R = Riprap/Retaining Wall, N = Natural, D = Mostly or all docks, L = Mostly Lawn, T = Trees, P = Plants, ST = Some trees

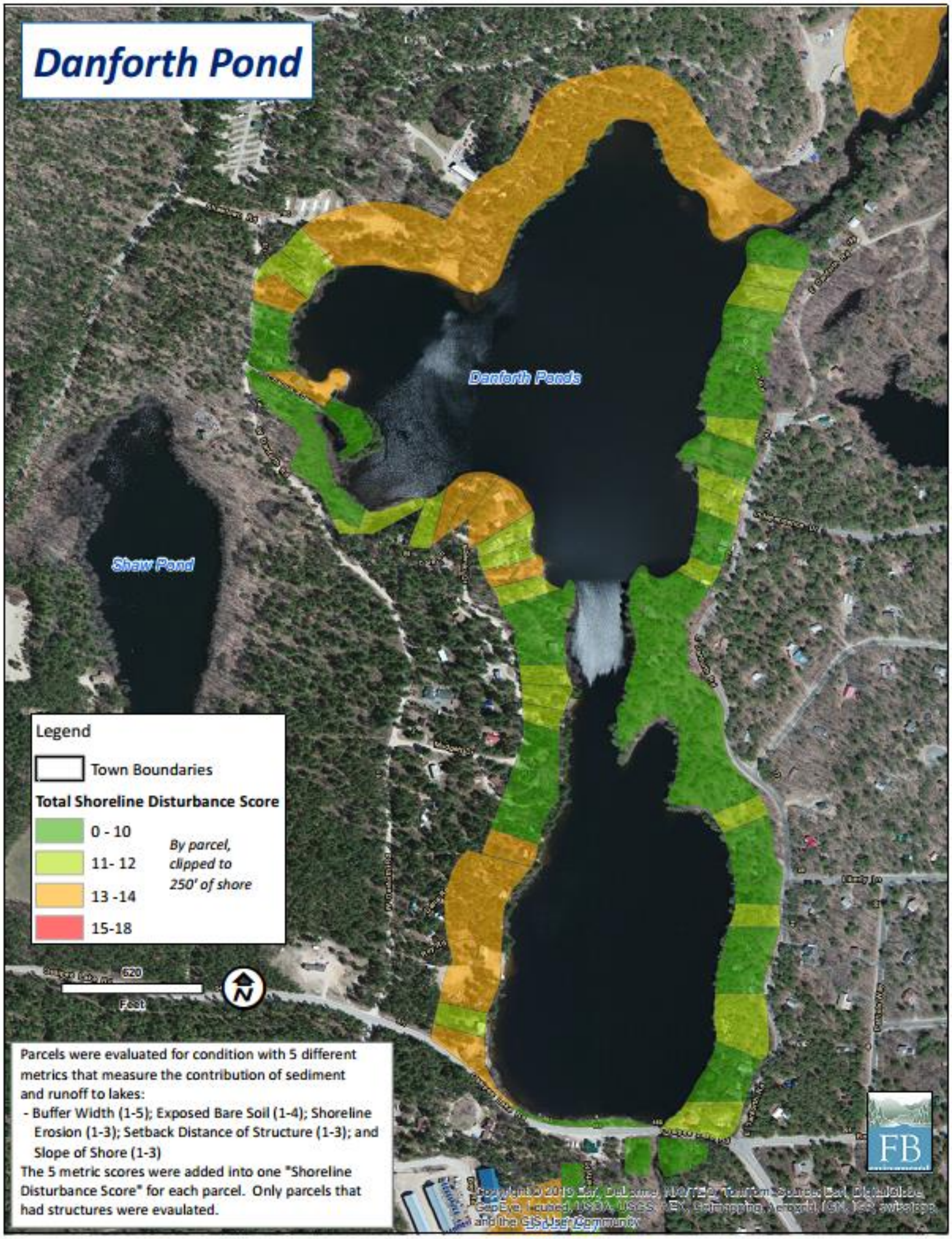


Broad Bay - North
Parcels were evaluated for condition with 5 different metrics that measure the contribution of sediment and runoff to lakes:
- Buffer Width (1-5); Exposed Bare Soil (1-4); Shoreline Erosion (1-3); Setback Distance of Structure (1-3); and Slope of Shore (1-3)
The 5 metric scores were added into one "Shoreline Disturbance Score" for each parcel. Only parcels that had structures were evaulated.
Legend
Town Boundaries
Total Shoreline Disturbance Score
0 - 10
11- 12
13 -14
15-18
By parcel, clipped to 250' of shore
800
Feet
N
Hampshire Rd
Alvino Rd
Bay Rd
N Broad Bay
Huckins Rd
Broad Bay
Bay Point Rd
Cove Rd
Channel Rd
Leavitt Rd
Ossipee Lake Shores
FB


Broad Bay - South
800
Feet
Broad Bay
Leavitt Bay
Ossipee Lake Shores
Leavitt Rd
Spindle Point Rd
Huckins Rd
Spur Rd
Broad Bay Rd
Old Broad Bay
Ridge Rd
Quail Rd
Castle Cove Rd
Legend
Town Boundaries
Total Shoreline Disturbance Score
0 - 10
11- 12
13 -14
15-18
By parcel, clipped to 250' of shore
Parcels were evaluated for condition with 5 different metrics that measure the contribution of sediment and runoff to lakes:
- Buffer Width (1-5); Exposed Bare Soil (1-4); Shoreline Erosion (1-3); Setback Distance of Structure (1-3); and Slope of Shore (1-3)
The 5 metric scores were added into one "Shoreline Disturbance Score" for each parcel. Only parcels that had structures were evaulated.
FB


Leavitt Bay
Legend
Town Boundaries
Total Shoreline Disturbance Score
0 - 10
11- 12
13 -14
15-18
By parcel, clipped to 250' of shore
750
Feet
Broad Bay
Leavitt Bay
Parcels were evaluated for condition with 5 different metrics that measure the contribution of sediment and runoff to lakes:
- Buffer Width (1-5); Exposed Bare Soil (1-4); Shoreline Erosion (1-3); Setback Distance of Structure (1-3); and Slope of Shore (1-3)
The 5 metric scores were added into one "Shoreline Disturbance Score" for each parcel. Only parcels that had structures were evaulated.


Berry Bay
Legend
Town Boundaries
Total Shoreline Disturbance Score
0 - 10
11- 12
13 -14
15-18
By parcel, clipped to 250' of shore
750
Feet
N
Ossipee Lake Rd
Packard Dr
Gardner Way
Old West Ossipee Rd
Trainor Dr
Fern Pl
Rollins Dr
Houle Dr
Wayne's Way
Sundance Dr
Indian Dr
Berry Bay
Berry Bay Rd
Leavitt Bay
Parcels were evaluated for condition with 5 different metrics that measure the contribution of sediment and runoff to lakes:
- Buffer Width (1-5); Exposed Bare Soil (1-4); Shoreline Erosion (1-3); Setback Distance of Structure (1-3); and Slope of Shore (1-3)
The 5 metric scores were added into one "Shoreline Disturbance Score" for each parcel. Only parcels that had structures were evaulated.
FB


Danforth Pond
Danforth Ponds
Shaw Pond
Legend
Town Boundaries
Total Shoreline Disturbance Score
0 - 10
11- 12
13 -14
15-18
By parcel, clipped to 250' of shore
Feet
Parcels were evaluated for condition with 5 different metrics that measure the contribution of sediment and runoff to lakes:
- Buffer Width (1-5); Exposed Bare Soil (1-4); Shoreline Erosion (1-3); Setback Distance of Structure (1-3); and Slope of Shore (1-3)
The 5 metric scores were added into one "Shoreline Disturbance Score" for each parcel. Only parcels that had structures were evaualted.

APPENDIX E: WATERSHED SURVEY RESULTS

Summary of NPS sites identified and BMPs recommended during the 2013 watershed survey by GMCG and FB Environmental. Also includes estimates for total phosphorus (TP) reduced for all BMPs implemented at each site with associated installation and maintenance costs over ten years.

Site ID	Direct flow to:	Land Use	TP (kg/yr)*	Recommendations	BMP Cost Estimate**	Annual Cost	10-yr Cost	10-yr Cost for TP removed ($/kg)
1	Leavitt Bay	Driveway, Boat Access	2.04	Add new surface material: recycled asphalt, reshape crown, grade, install open top culvert	$8,040	$500	$13,040	$6,388.51
2	Leavitt Brook	Commercial	1.54	Install infiltration trench at roof drip line, Establish buffer, Stream bank restoration-no raking	$980	$250	$3,480	$2,256.50
4	Danforth Pond	Town Road	5.08	Install runoff diverters, Stabilize foot path, Mulch/Erosion Control mix, Establish/add to buffer	$1,650	$250	$4,150	$816.89
6	Shawtown Brook, Danforth Pond	Private Road	2.45	Establish/add to buffer	$4,000	$100	$5,000	$2,041.32
5	Danforth Pond	Private Road, Beach Access	1.00	Install turnouts, Reshape crown, Install runoff diverters (open-top culvert), Install rain garden and infiltration trench	$2,075	$500	$7,075	$7,089.87
3	Square Brook, Berry Bay	Town Road	2.04	Armor ditch with stone, Install turnouts, Install sediment pools	$2,725	$250	$5,225	$2,559.81
7	Ferrin Brook, Danforth Pond	State Road, Trail or Path	1.41	Install ditch, runoff diverters, and infiltration trench	$1,050	$250	$3,550	$2,524.65
8	Purity Lake, Danforth Pond	Beach/Boat Access	2.04	Install infiltration trench, Establish buffer	$1,375	$150	$2,875	$1,408.51
10	Stony Brook, Danforth Pond	Agriculture	TBD	Further investigation needed	TBD	TBD	TBD	TBD
9	Stream downstream of Long Pond, Danforth Pond	Private Road	0.82	Vegetate Shoulder, Establish Buffer	$1,150	$100	$2,150	$2,633.30