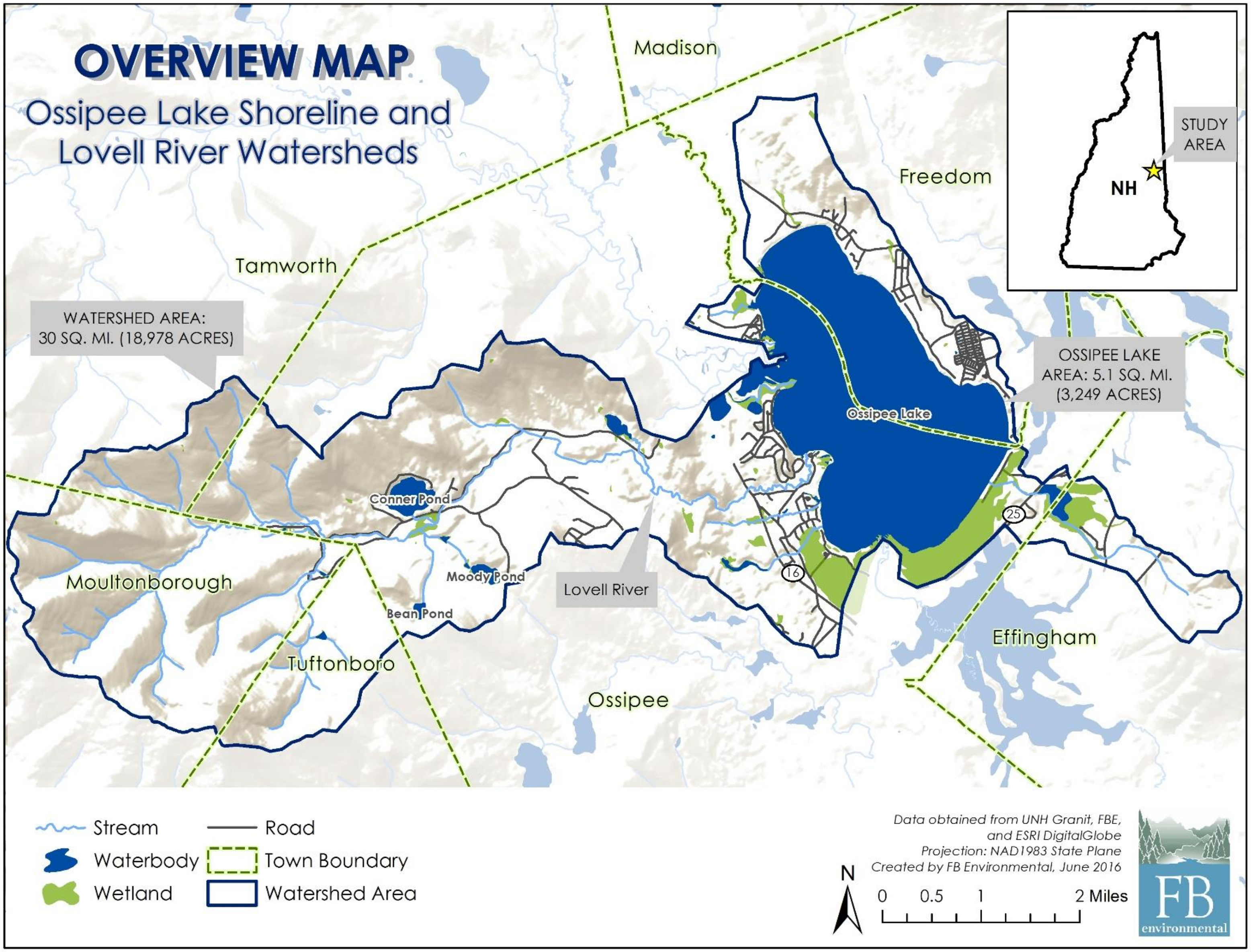
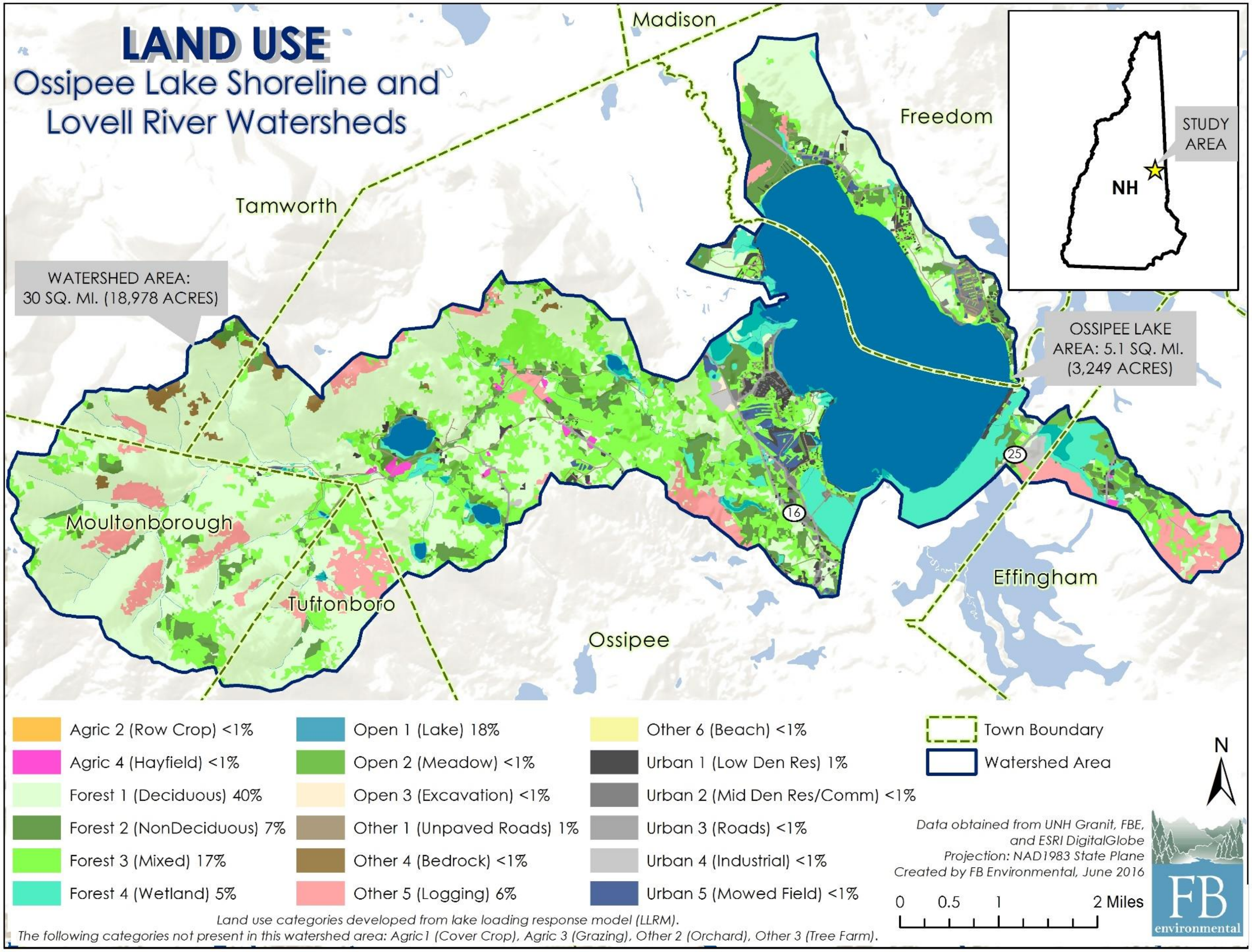
APPENDICES

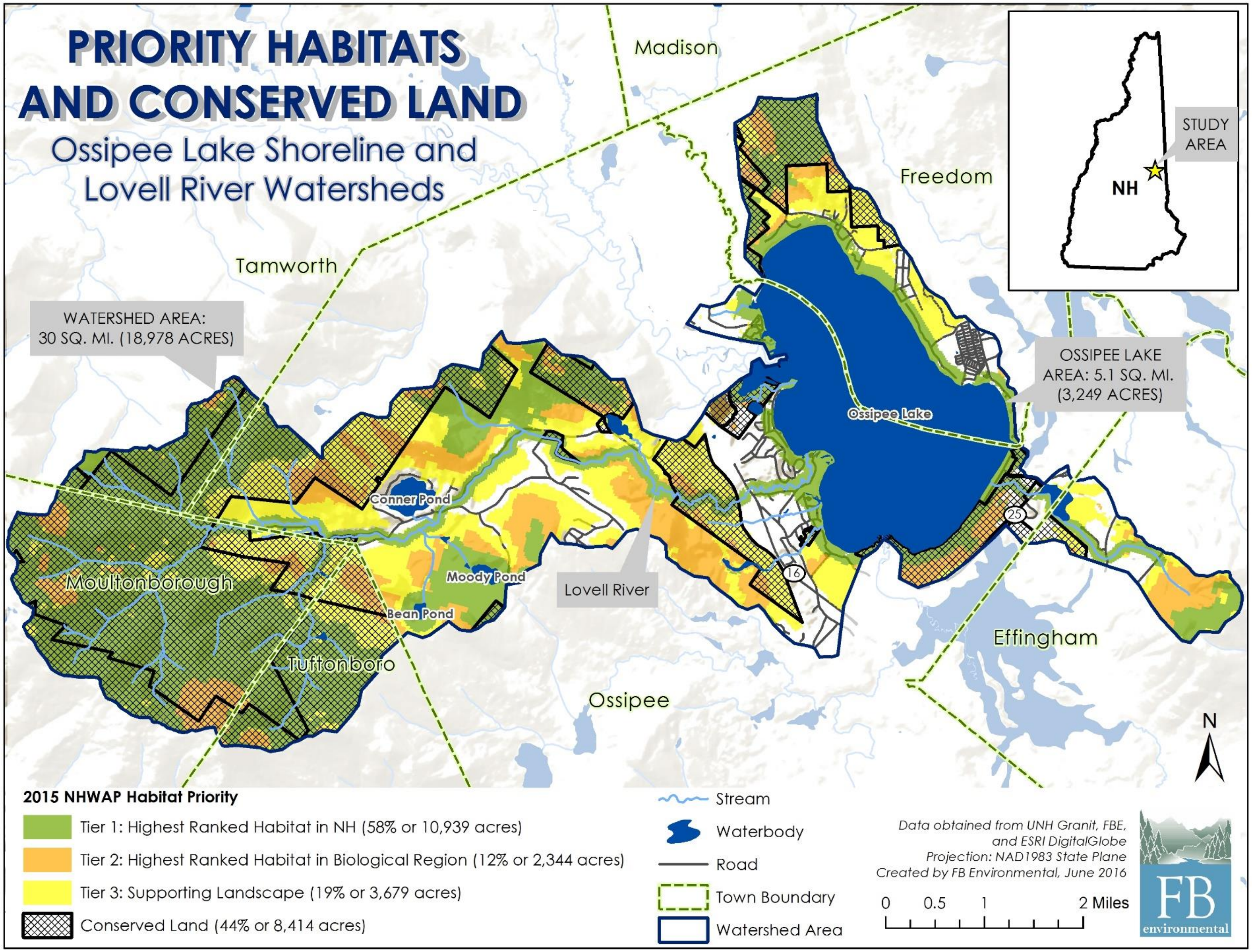
APPENDIX A - Thematic Maps



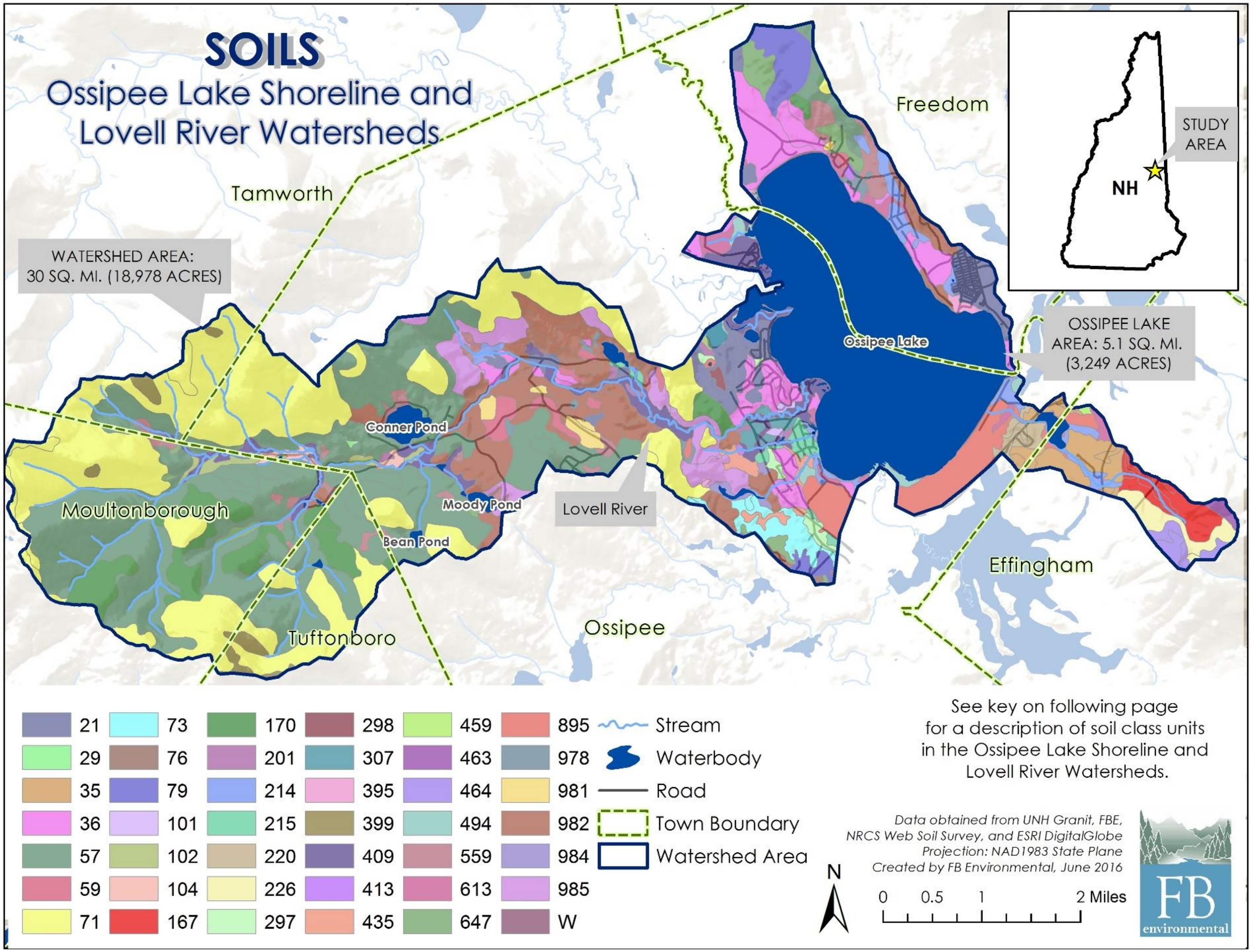
Map 1


LAND USE
Ossipee Lake Shoreline and Lovell River Watersheds
Madison
Freedom
Tamworth
STUDY AREA
NH
WATERSHED AREA: 30 SQ. MI. (18,978 ACRES)
OSSIPEE LAKE AREA: 5.1 SQ. MI. (3,249 ACRES)
25
16
Moultonborough
Tuftonboro
Ossipee
Effingham
Agric 2 (Row Crop) <1%
Agric 4 (Hayfield) <1%
Forest 1 (Deciduous) 40%
Forest 2 (NonDeciduous) 7%
Forest 3 (Mixed) 17%
Forest 4 (Wetland) 5%
Open 1 (Lake) 18%
Open 2 (Meadow) <1%
Open 3 (Excavation) <1%
Other 1 (Unpaved Roads) 1%
Other 4 (Bedrock) <1%
Other 5 (Logging) 6%
Other 6 (Beach) <1%
Urban 1 (Low Den Res) 1%
Urban 2 (Mid Den Res/Comm) <1%
Urban 3 (Roads) <1%
Urban 4 (Industrial) <1%
Urban 5 (Mowed Field) <1%
Town Boundary
Watershed Area
N
Data obtained from UNH Granit, FBE, and ESRI DigitalGlobe
Projection: NAD1983 State Plane
Created by FB Environmental, June 2016
0 0.5 1 2 Miles
FB environmental
Land use categories developed from lake loading response model (LLRM).
The following categories not present in this watershed area: Agric1 (Cover Crop), Agric 3 (Grazing), Other 2 (Orchard), Other 3 (Tree Farm).

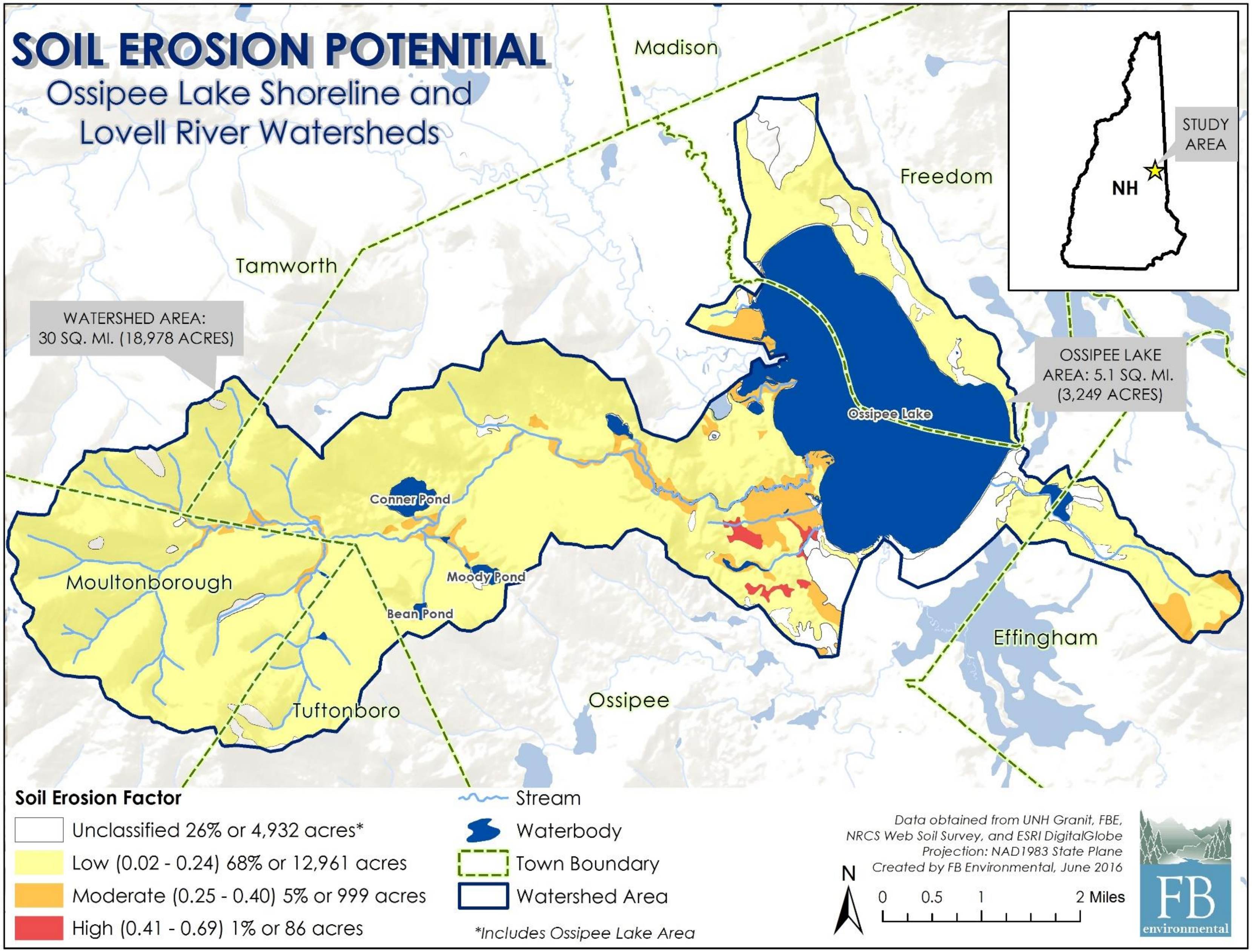
Map 2


PRIORITY HABITATS
AND CONSERVED LAND
Ossipee Lake Shoreline and
Lovell River Watersheds
WATERSHED AREA:
30 SQ. MI. (18,978 ACRES)
OSSIPEE LAKE
AREA: 5.1 SQ. MI.
(3,249 ACRES)
STUDY
AREA
NH
Madison
Freedom
Tamworth
Moultonborough
Tuftonboro
Ossipee
Effingham
Ossipee Lake
Conner Pond
Moody Pond
Bean Pond
Lovell River
16
25
N
2015 NHWAP Habitat Priority
Tier 1: Highest Ranked Habitat in NH (58% or 10,939 acres)
Tier 2: Highest Ranked Habitat in Biological Region (12% or 2,344 acres)
Tier 3: Supporting Landscape (19% or 3,679 acres)
Conserved Land (44% or 8,414 acres)
Stream
Waterbody
Road
Town Boundary
Watershed Area
Data obtained from UNH Granit, FBE,
and ESRI DigitalGlobe
Projection: NAD1983 State Plane
Created by FB Environmental, June 2016
0 0.5 1 2 Miles
FB
environmental

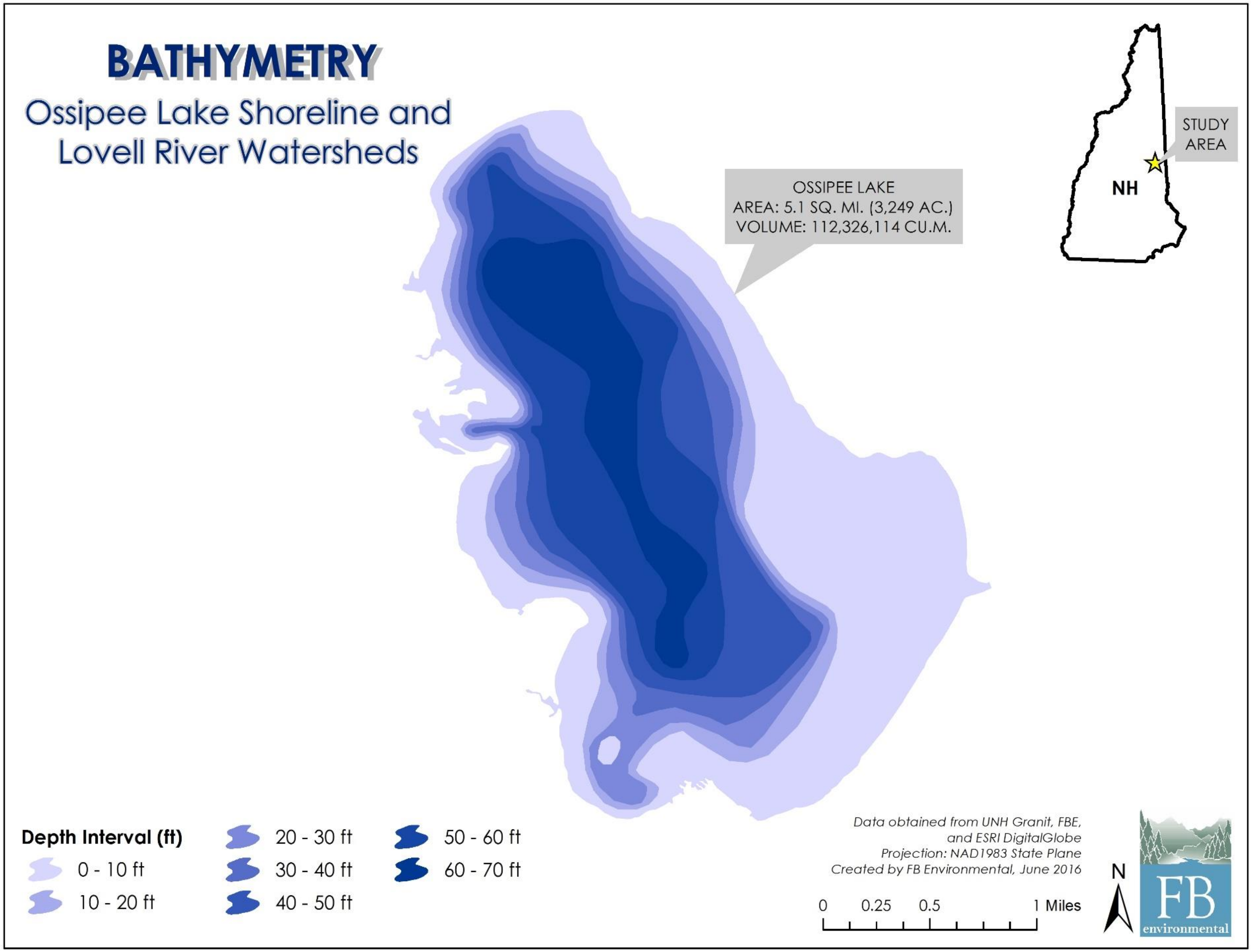
Map 3


SOILS
Ossipee Lake Shoreline and Lovell River Watersheds
Tamworth
Freedom
STUDY AREA
NH
WATERSHED AREA: 30 SQ. MI. (18,978 ACRES)
OSSIPEE LAKE AREA: 5.1 SQ. MI. (3,249 ACRES)
Ossipee Lake
Conner Pond
Moody Pond
Bean Pond
Lovell River
Moultonborough
Tuftonboro
Ossipee
Effingham
21
29
35
36
57
59
71
73
76
79
101
102
104
167
170
201
214
215
220
226
297
298
307
395
399
409
413
435
459
463
464
494
559
613
647
895
978
981
982
984
985
W
Stream
Waterbody
Road
Town Boundary
Watershed Area
See key on following page for a description of soil class units in the Ossipee Lake Shoreline and Lovell River Watersheds.
Data obtained from UNH Granit, FBE, NRCS Web Soil Survey, and ESRI DigitalGlobe
Projection: NAD1983 State Plane
Created by FB Environmental, June 2016
N
0 0.5 1 2 Miles
FB
environmental

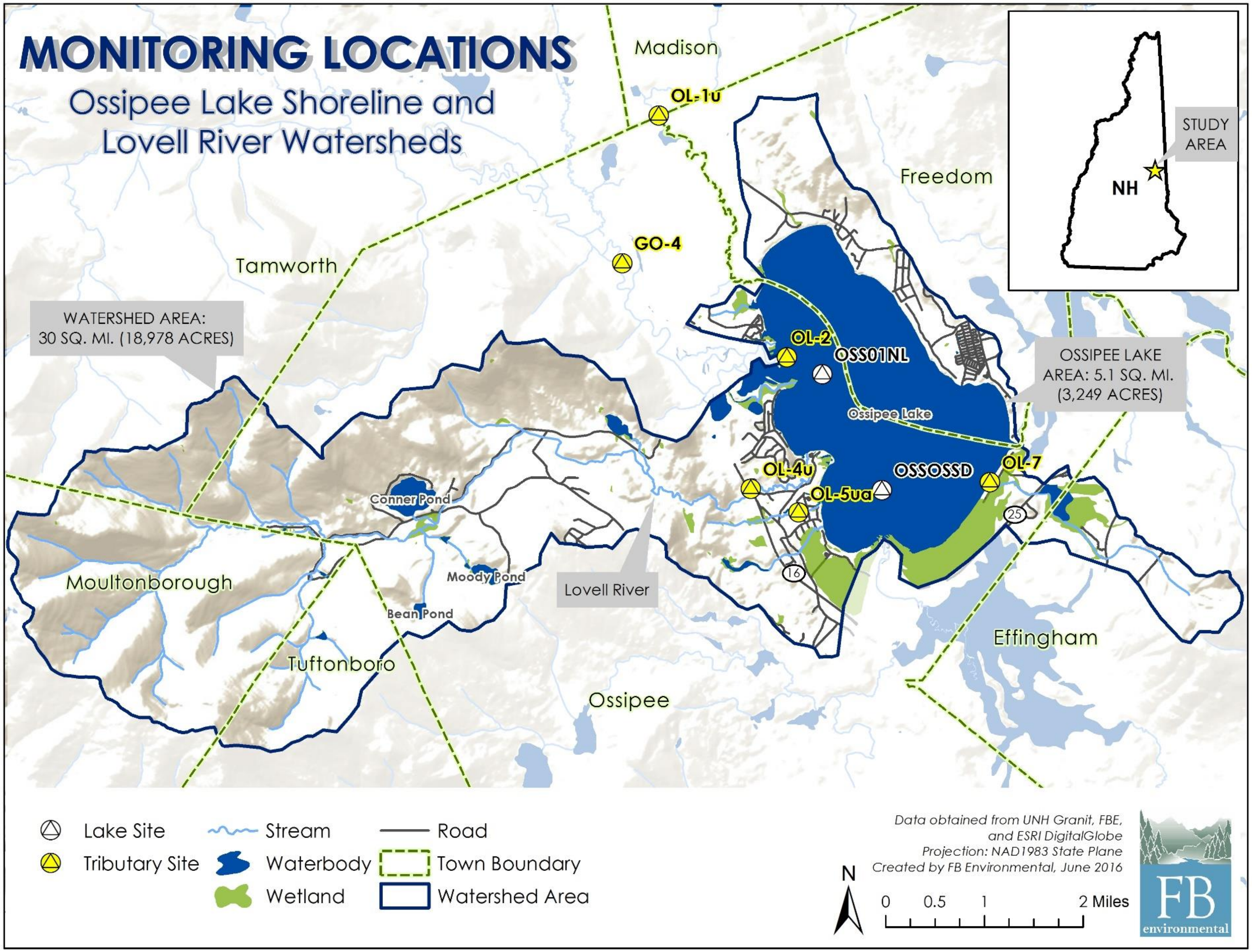
Map 4


SOIL EROSION POTENTIAL
Ossipee Lake Shoreline and Lovell River Watersheds
Madison
Freedom
Tamworth
STUDY AREA
NH
WATERSHED AREA: 30 SQ. MI. (18,978 ACRES)
OSSIPEE LAKE AREA: 5.1 SQ. MI. (3,249 ACRES)
Ossipee Lake
Conner Pond
Moody Pond
Bean Pond
Moultonborough
Tuftonboro
Ossipee
Effingham
Soil Erosion Factor
Unclassified 26% or 4,932 acres*
Low (0.02 - 0.24) 68% or 12,961 acres
Moderate (0.25 - 0.40) 5% or 999 acres
High (0.41 - 0.69) 1% or 86 acres
Stream
Waterbody
Town Boundary
Watershed Area
*Includes Ossipee Lake Area
Data obtained from UNH Granit, FBE, NRCS Web Soil Survey, and ESRI DigitalGlobe
Projection: NAD1983 State Plane
Created by FB Environmental, June 2016
N
0 0.5 1 2 Miles
FB environmental

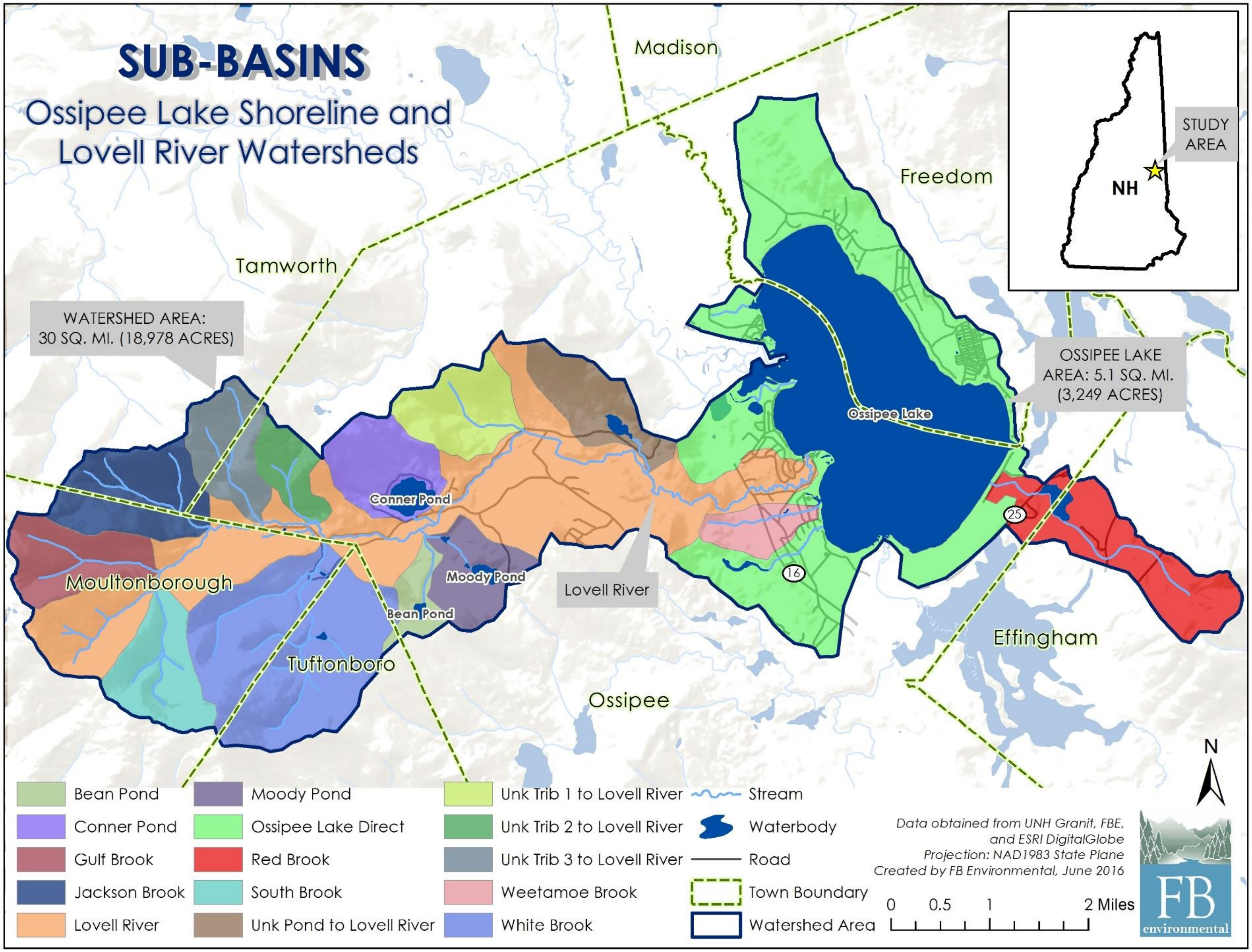
Map 5


BATHYMETRY
Ossipee Lake Shoreline and
Lovell River Watersheds
OSSIPEE LAKE
AREA: 5.1 SQ. MI. (3,249 AC.)
VOLUME: 112,326,114 CU.M.
STUDY
AREA
NH
Depth Interval (ft)
0 - 10 ft
10 - 20 ft
20 - 30 ft
30 - 40 ft
40 - 50 ft
50 - 60 ft
60 - 70 ft
Data obtained from UNH Granit, FBE,
and ESRI DigitalGlobe
Projection: NAD1983 State Plane
Created by FB Environmental, June 2016
0 0.25 0.5 1 Miles
N
FB
environmental

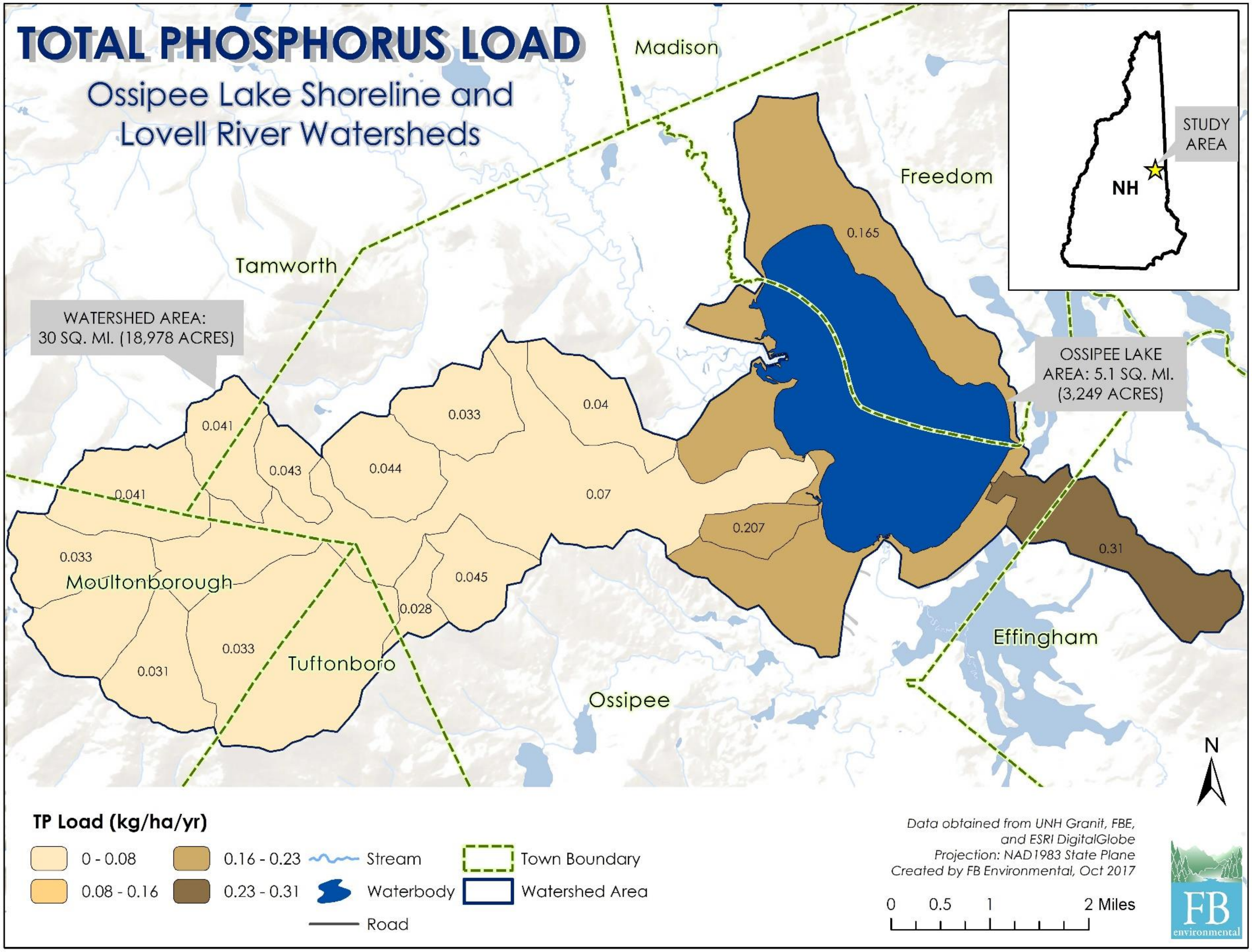
Map 6


MONITORING LOCATIONS
Ossipee Lake Shoreline and Lovell River Watersheds
Madison
OL-1u
Freedom
STUDY AREA
NH
GO-4
Tamworth
WATERSHED AREA: 30 SQ. MI. (18,978 ACRES)
OL-2
OSS01NL
OSSIPEE LAKE AREA: 5.1 SQ. MI. (3,249 ACRES)
Ossipee Lake
OL-4u
OSSOSSD
OL-7
OL-5ua
Conner Pond
25
Moody Pond
Moultonborough
16
Lovell River
Bean Pond
Effingham
Tuftonboro
Ossipee
Lake Site
Tributary Site
Stream
Waterbody
Wetland
Road
Town Boundary
Watershed Area
Data obtained from UNH Granit, FBE, and ESRI DigitalGlobe
Projection: NAD1983 State Plane
Created by FB Environmental, June 2016
N
0 0.5 1 2 Miles
FB environmental

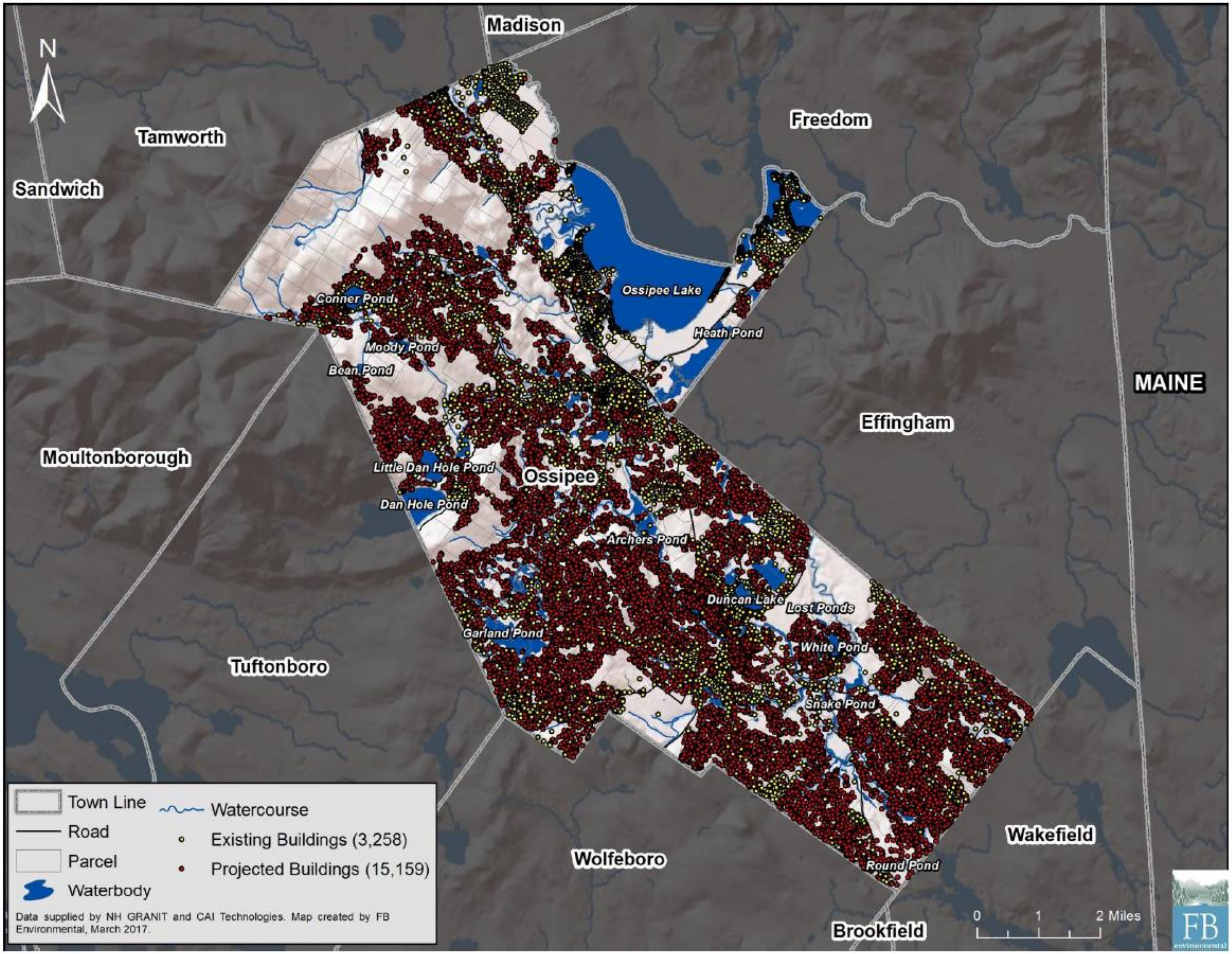
Map 7


SUB-BASINS
Ossipee Lake Shoreline and Lovell River Watersheds
WATERSHED AREA: 30 SQ. MI. (18,978 ACRES)
OSSIPEE LAKE AREA: 5.1 SQ. MI. (3,249 ACRES)
STUDY AREA
NH
Madison
Freedom
Tamworth
Moultonborough
Tuftonboro
Ossipee
Effingham
Ossipee Lake
Conner Pond
Moody Pond
Bean Pond
Lovell River
25
16
Bean Pond
Conner Pond
Gulf Brook
Jackson Brook
Lovell River
Moody Pond
Ossipee Lake Direct
Red Brook
South Brook
Unk Pond to Lovell River
Unk Trib 1 to Lovell River
Unk Trib 2 to Lovell River
Unk Trib 3 to Lovell River
Weetamoe Brook
White Brook
Stream
Waterbody
Road
Town Boundary
Watershed Area
Data obtained from UNH Granit, FBE, and ESRI DigitalGlobe
Projection: NAD1983 State Plane
Created by FB Environmental, June 2016
0 0.5 1 2 Miles
N
FB environmental

Map 8


TOTAL PHOSPHORUS LOAD
Ossipee Lake Shoreline and
Lovell River Watersheds
Madison
Freedom
Tamworth
WATERSHED AREA:
30 SQ. MI. (18,978 ACRES)
OSSIPEE LAKE
AREA: 5.1 SQ. MI.
(3,249 ACRES)
STUDY
AREA
NH
0.165
0.041
0.043
0.044
0.033
0.04
0.07
0.041
0.207
0.31
0.033
Moultonborough
0.045
0.028
0.033
0.031
Tuftonboro
Ossipee
Effingham
N
TP Load (kg/ha/yr)
0 - 0.08
0.08 - 0.16
0.16 - 0.23
0.23 - 0.31
Stream
Waterbody
Road
Town Boundary
Watershed Area
Data obtained from UNH Granit, FBE,
and ESRI DigitalGlobe
Projection: NAD1983 State Plane
Created by FB Environmental, Oct 2017
0 0.5 1 2 Miles
FB
environmental

Map 9


N
Madison
Tamworth
Sandwich
Freedom
Ossipee Lake
Heath Pond
Conner Pond
Moody Pond
Bean Pond
MAINE
Effingham
Moultonborough
Little Dan Hole Pond
Ossipee
Dan Hole Pond
Archers Pond
Duncan Lake
Lost Ponds
Garland Pond
White Pond
Tuftonboro
Snake Pond
Wakefield
Wolfeboro
Round Pond
Brookfield
Town Line
Road
Parcel
Waterbody
Watercourse
Existing Buildings (3,258)
Projected Buildings (15,159)
Data supplied by NH GRANIT and CAI Technologies. Map created by FB Environmental, March 2017.
0 1 2 Miles
FB

Map 10

APPENDIX B – Soil Series Descriptions

Code (MUSYM)	Soil Series Description	Acres	Percentage
W	Water	3,447	18%
71E	Lyman-Berkshire-Rock outcrop complex, 25 to 60 percent slopes	3,416	18%
57E	Becket fine sandy loam, 25 to 35 percent slopes, very stony	2,371	12%
57D	Becket fine sandy loam, 15 to 25 percent slopes, very stony	1,253	7%
170E	Lyman-Berkshire fine sandy loams, 25 to 35 percent slopes, very rocky	601	3%
409A	Limerick silt loam, cool, sandy substratum, 0 to 3 percent slopes, frequently flooded	577	3%
982C	Monadnock and Berkshire soils, 8 to 15 percent slopes, very stony	559	3%
895A	Bucksport mucky peat, 0 to 3 percent slopes	500	3%
982D	Monadnock and Berkshire soils, 15 to 25 percent slopes, very stony	449	2%
57C	Becket fine sandy loam, 8 to 15 percent slopes, very stony	382	2%
985D	Monadnock and Berkshire soils, 8 to 25 percent slopes, extremely stony	339	2%
36A	Adams loamy sand, 0 to 3 percent slopes	289	2%
36B	Adams loamy sand, 3 to 8 percent slopes	269	1%
214B	Naumburg loamy sand, 0 to 8 percent slopes	250	1%
647B	Pillsbury fine sandy loam, 0 to 8 percent slopes, very stony	209	1%
21B	Colton gravelly loamy fine sand, 3 to 8 percent slopes	207	1%
79C	Peru fine sandy loam, 8 to 15 percent slopes, very stony	205	1%
35B	Champlain loamy sand, 3 to 8 percent slopes	203	1%
73C	Berkshire fine sandy loam, 8 to 15 percent slopes, very stony	163	1%
21A	Colton gravelly loamy fine sand, 0 to 3 percent slopes	152	1%
559C	Skerry fine sandy loam, 8 to 15 percent slopes, very stony	148	1%
167D	Paxton fine sandy loam, cool, 15 to 25 percent slopes, very stony	146	1%
71D	Lyman-Berkshire-Rock outcrop complex, 8 to 25 percent slopes	146	1%
559B	Skerry fine sandy loam, 3 to 8 percent slopes, very stony	140	1%
226D	Bice fine sandy loam, 15 to 25 percent slopes, very stony	128	1%
494A	Ossipee mucky peat, ponded, 0 to 3 percent slopes	126	1%
982E	Monadnock and Berkshire soils. 25 to 60 percent slopes, very stony	126	1%
59B	Waumbek fine sandy loam, 3 to 8 percent slopes, very stony	123	1%
170D	Lyman-Berkshire fine sandy loams, 15 to 25 percent slopes, very rocky	121	1%
399	Rock outcrop	116	1%
21E	Colton gravelly loamy fine sand, 15 to 60 percent slopes	111	1%
985E	Monadnock and Berkshire soils, 25 to 60 percent slopes, extremely stony	111	1%
982B	Monadnock and Berkshire soils, 3 to 8 percent slopes, very stony	110	1%
36C	Adams loamy sand, 8 to 15 percent slopes	104	1%
36E	Adams loamy sand, 15 to 60 percent slopes	94	<1%
215B	Nicholville silt loam, sandy substratum, 0 to 8 percent slopes	86	<1%
435A	Raynham silt loam, cool, sandy substratum, 0 to 3 percent slopes	86	<1%
102A	Sunday loamy fine sand, 0 to 3 percent slopes, occasionally flooded	75	<1%
613A	Croghan loamy fine sand, 0 to 3 percent slopes	69	<1%
613B	Croghan loamy fine sand, 3 to 8 percent slopes	65	<1%
981B	Monadnock and Berkshire soils, 3 to 8 percent slopes	60	<1%
307A	Lovewell very fine sandy loam, 0 to 3 percent slopes, frequently flooded	60	<1%
104A	Podunk fine sandy loam, 0 to 3 percent slopes, frequently flooded	59	<1%
297B	Salmon very fine sandy loam, sandy substratum, 3 to 8 percent slopes	56	<1%
464E	Woodstock-Bice-Rock outcrop complex, 25 to 60 percent slopes	56	<1%
79B	Peru fine sandy loam, 0 to 8 percent slopes, very stony	53	<1%
984A	Whitman loam, cool, 0 to 3 percent slopes, very stony	44	<1%
167C	Paxton fine sandy loam, cool, 8 to 15 percent slopes, very stony	43	<1%
35C	Champlain loamy sand, 8 to 15 percent slopes	35	<1%
220B	Boscawen gravelly loamy sand, 3 to 8 percent slopes	35	<1%
464D	Woodstock-Bice-Rock outcrop complex, 8 to 25 percent slopes	34	<1%
201A	Ondawa fine sandy loam, 0 to 3 percent slopes, occasionally flooded	33	<1%
21C	Colton gravelly loamy fine sand, 8 to 15 percent slopes	31	<1%
35A	Champlain loamy sand, 0 to 3 percent slopes	30	<1%
220C	Boscawen gravelly loamy sand, 8 to 15 percent slopes	30	<1%
463E	Woodstock-Bice fine sandy loams, 25 to 35 percent slopes, very stony	28	<1%
978B	Leicester-Moosilauke fine sandy loams, cool, 3 to 8 percent slopes, very stony	27	<1%
978A	Leicester-Moosilauke fine sandy loams, cool, 0 to 3 percent slopes, very stony	27	<1%
395A	Chocorua mucky peat, 0 to 3 percent slopes	25	<1%
981C	Monadnock and Berkshire soils, 8 to 15 percent slopes	20	<1%
298	Pits, gravel	17	<1%
59C	Waumbek fine sandy loam, 8 to 15 percent slopes, very stony	16	<1%
220E	Boscawen gravelly loamy sand, 15 to 60 percent slopes	16	<1%

Code (MUSYM)	Soil Series Description	Acres	Percentage
101A	Ondawa fine sandy loam, 0 to 3 percent slopes, frequently flooded	15	<1%
413B	Duane fine sandy loam, 3 to 8 percent slopes	1	<1%
76B	Marlow fine sandy loam, 3 to 8 percent slopes	7	<1%
73D	Berkshire fine sandy loam, 15 to 25 percent slopes, very stony	6	<1%
459B	Metacomet fine sandy loam, 3 to 8 percent slopes, very stony	6	<1%
226C	Bice fine sandy loam, 8 to 15 percent slopes, very stony	6	<1%
167B	Paxton fine sandy loam, cool, 3 to 8 percent slopes, very stony	5	<1%
73E	Berkshire fine sandy loam, 25 to 35 percent slopes, very stony	4	<1%
297A	Salmon very fine sandy loam, sandy substratum, 0 to 3 percent slopes	3	<1%
413A	Duane fine sandy loam, 0 to 3 percent slopes	3	<1%
170C	Lyman-Berkshire fine sandy loams, 8 to 15 percent slopes, very rocky	1	<1%
	TOTAL:	**18,978**	**100%**

APPENDIX C – Site Specific Project Plan

A SITE SPECIFIC PROJECT PLAN FOR:

DEVELOPMENT OF THE

OSSIPEE LAKE WATERSHED MANAGEMENT PLAN PHASE 2:

A WATERSHED PLAN FOR THE OSSIPEE LAKE SHORELINE AND LOVELL RIVER WATERSHEDS

(NHDES Project #HP-15-S-07)

Under the New Hampshire Section 319 Nonpoint Source Grant Program QAPP

RFA# 08262

August 23, 2013

Final Draft

8/25/15

Prepared by:

FB Environmental Associates

97A Exchange Street, Suite 305

Portland, ME 04101

For Review:

Blair Folts, GMCG, Program Director: ______________________________

Corey Lane, GMCG, Project Manager: ______________________________

Forrest Bell, FBE, Technical Project Manager: ______________________________

Jeff Marcoux, NHDES, NHDES Project Manager: ______________________________

Jillian McCarthy, NHDES, Program Quality Assurance Coordinator: ______________________________

Vincent Perelli, NHDES, NHDES Quality Assurance Manager: ______________________________

For Receipt:

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

Table of Contents

Tables

Figures

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 August 23, 2013.

Table 1. SSPP Distribution List

SSPP Recipient Name	Project Role	Organization	E-mail address and Phone Number
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
Forrest Bell	Technical Project Manager	FB Environmental	info@fbenvironmental.com 207-221-6699
Laura Diemer	Task Manager/QA Officer; WQ Analysis; Pollutant Load Modeling	FB Environmental	laurad@fbenvironmental.com 207-221-6699
Jeff Marcoux	NHDES Project Manager	NHDES, Watershed Management Bureau	jeff.marcoux@des.nh.gov 603-271-8862
Jillian McCarthy	Program QA Coordinator	NHDES, Watershed Management Bureau	jillian.mccarthy@des.nh.gov 603-271-8475
Vincent Perelli	NHDES QA Manager	NHDES, Planning, Prevention, & Assistance Unit	vincent.perelli@des.nh.gov 603-271-8989
Erik Beck	USEPA Project Manager	USEPA New England	beck.erik@epa.gov 617-918-1606

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) to develop a Watershed Management Plan (WMP) for the Ossipee Lake and Lovell River watersheds.

FB Environmental Associates (FBE) was selected as the technical consultant to help complete the scope of services for GMCG. FBE Technical Project Manager, Forrest Bell, will provide project oversight, technical expertise, and serve as the main point of contact for the Ossipee Lake Shoreline and Lovell River Watershed Plan Steering Committee. Forrest will work closely with GMCG and the Project Team to ensure that the project stays on time and within budget.

Laura Diemer will serve as Task Manager/QA Officer for the project. Laura will provide technical expertise and oversight for key modeling tasks, including the land use modeling, in-lake phosphorus and assimilative capacity analysis, water quality analysis, and pollutant load reduction estimates. Laura will conduct QA/QC for the lake modeling and water quality analysis. As the QA Officer, Laura will ensure that survey results, modeling results, and water quality analysis have been reviewed and double-checked for potential inconsistencies.

The data generated by this project will be used by NHDES, GMCG, and their subcontractors to develop a watershed management plan for the Ossipee Lake shoreline and the Lovell River. Figure 1 outlines the organizational structure of project personnel. Table 2 provides a list of key project personnel responsibilities and qualifications.

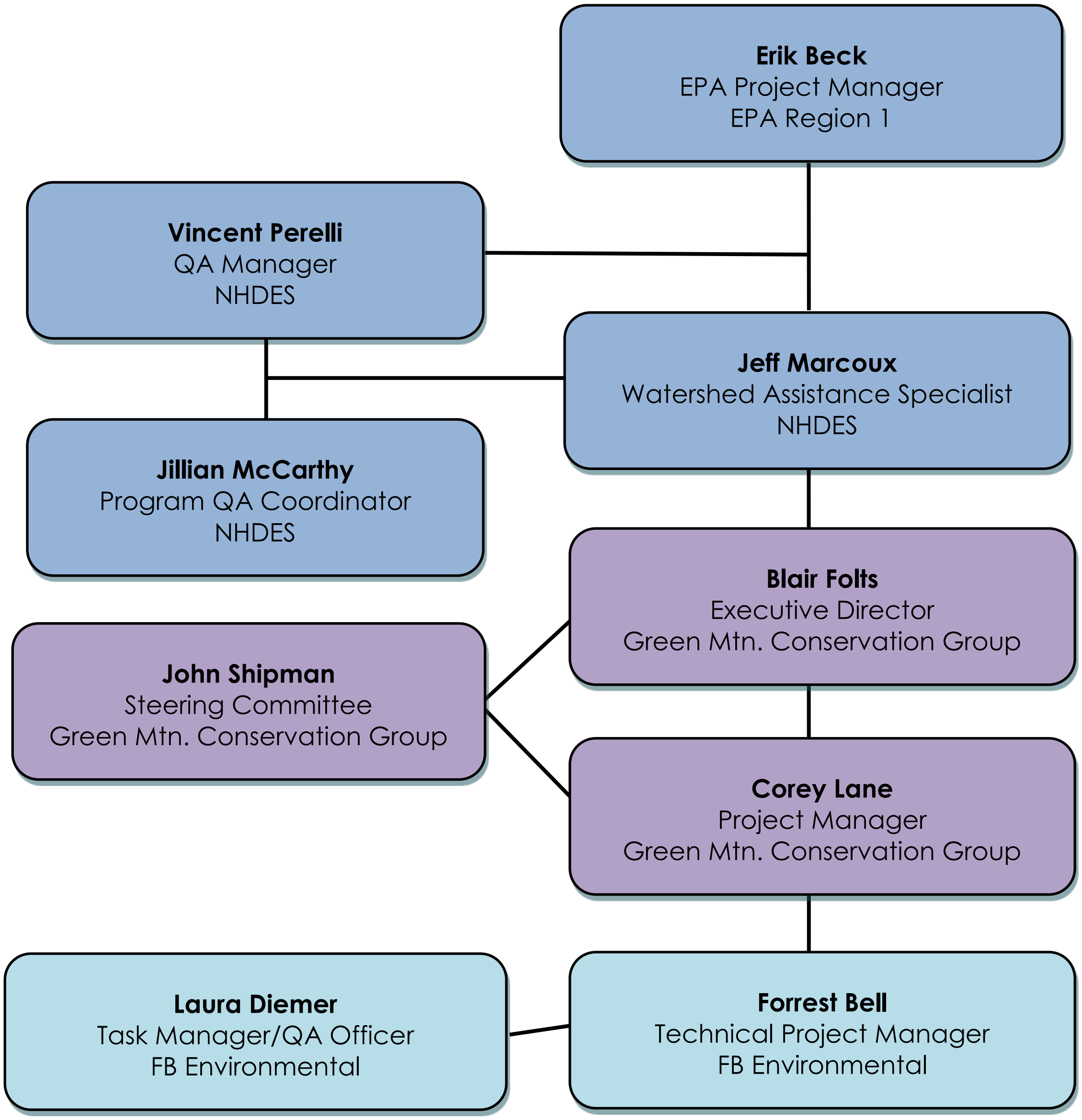


Figure 1. Project Organizational Chart.

Table 1. 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
John Shipman	Steering Committee	
Forrest Bell FB Environmental	Senior Scientist; Project Manager	On file at FB Environmental
Laura Diemer FB Environmental	Task Manager; Project QA/QC Officer	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

3- Site Information

Ossipee Lake is classified by NHDES as an oligotrophic waterbody. Located in the Towns of Ossipee and Freedom, Ossipee Lake has a surface area of 3,092 acres. The Ossipee Watershed covers over 242,000 acres in eastern NH, contains the largest stratified drift aquifer in New Hampshire, and is the primary source of drinking water for this region (see watershed map in Appendix A). Land cover is primarily forested, but human development has been increasing at a steady pace over the last several decades.

4- Project Rationale

Phosphorus is a limiting nutrient in freshwater ecosystems. Excess phosphorus can lead to nuisance algal blooms and low water clarity, and is often associated with human activities (e.g., stormwater runoff, excessive use of fertilizer, and poorly maintained/malfunctioning septic systems).

This project will address sources of phosphorus enrichment to Ossipee Lake by studying the Lovell River Watershed and the shoreline around "the big lake." An action plan will be developed to improve measurable water quality parameters, such as total phosphorus, total suspended sediment, and total nitrogen through nonpoint source (NPS) pollution management measures. This will likely improve dissolved oxygen concentrations and water clarity over time.

This project will identify and provide recommendations to address watershed-based land use activities that may contribute to nutrient enrichment of the lake. 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 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' impact on the type and intensity of development in the watershed and, consequently, the likely impact on present and future water quality;

f) Adjust land use data, calibrate, run, and correct pollutant loading model for the Ossipee Lake shoreline drainage and the Lovell River watershed;

g) Conduct Ossipee Lake and Lovell River watershed and shoreline survey assessment.

h) Develop watershed based management plan;

i) Update Danforth Pond and Lower Ossipee Bays subwatershed plan and model based on new information from this project; and

j) Install Best Management Practices (BMPs) in the Danforth Pond and Lower Ossipee Bays subwatershed.

Ossipee Lake 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 gravel, the pace of development and population growth over the last two decades (30-50 percent depending on the municipality) and the steep banks of the shorelines, this valuable waterbody is also vulnerable to landscape change. While the NHDES Volunteer Lake Assessment Program (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.

Water quality in Ossipee Lake is generally very good but there are concerns with pH (less than 6.3), phosphorus (possible degrading trend), and chlorophyll-a (possible degrading trend) based on recent data results compiled by the VLAP program. The watershed plan will allow for an historical analysis of these data to identify trends and potential issues.

As part of the nearly-completed Danforth Ponds and the Lower Bays Subwatershed Plan, it became evident that analysis of the "big lake" was necessary to fully complete this Plan. The land draining to the lake needs to be analyzed, as well as the in-lake water quality, to see if there are specific trends that are affecting Ossipee Lake or the downstream lower bays.

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 estimate pollutant load reductions needed to accommodate future watershed development.

The watershed modeling for this project will estimate total phosphorus loading to the lake, assess loading from major tributaries, 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 stormwater runoff around Ossipee Lake and the Lovell River. This information will be used to estimate phosphorus loading from the developed areas in the watershed, and to develop recommendations for BMPs that reduce pollution. Results from the surveys will also be used to educate watershed citizens about NPS pollution and how it affects lake water quality.

This SSPP covers water quality data evaluation, water quality goal setting, 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 concentration, indirect phosphorus loading, internal phosphorus loading, assimilative capacity, and the water quality goal for Ossipee Lake. 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. 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 NHDES Environmental Monitoring Database (EMD). Only data that are flagged as "Final" in the EMD will be used, as those data have been accepted by an authoritative source (NHDES) utilizing its own QA/QC processes. Tributary data provided by GMCG for streams within the watershed (including the Lovell River), will also be used to calibrate modeling efforts.

Previously collected water quality data for Ossipee Lake 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 sorted by date and station for Quality Assurance/Quality Control (QA/QC) to avoid duplicating data sets. All duplicates will be averaged together into a single data point. 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 also 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 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 lake falls 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

As noted above, water quality is generally very good, but there are concerns with pH (less than 6.3), phosphorus, (possible degrading trend), and chlorophyll-a (possible degrading trend) based on recent data results complied by the VLAP program. 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 Don Kretchmer of Water Resources Consulting on the water quality and assimilative capacity analyses. Don has extensive experience with lake modeling and is a certified lake manager. FBE will document and recommend a target water quality goal for Ossipee Lake, and attend one meeting with the water quality goal subcommittee (consisting of representatives of GMCG, the Ossipee Watershed Coalition, NHDES staff, and other stakeholders) to finalize the water quality goal(s).

C. Identify Current Pollutant Loading

Watershed Loading Model

The Lake Loading Response Model (LLRM) (also called SHEDMOD or ENSR-LRM) will be used to assess current nutrient loads from the watershed. The model was developed by AECOM for use in New England and modified for New Hampshire lakes by incorporating New Hampshire land use TP export coefficients and adding updated 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 for the Danforth Ponds and Lower Bays in 2014-15, 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 primary documentation on the model.

The LLRM model estimates TP 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 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 TP loading and will be compared to observed in-lake concentrations. It is important to note that the entire Ossipee Watershed will be divided into subwatersheds for input to the model, but only the Ossipee shoreline and Lovell River watersheds will be surveyed in the field. Other subwatersheds will be included in the future, as funding allows.

Data needed for input to the LLRM include: water quality monitoring data (TP, Chl-a, and transparency); physical characteristics (lake surface area, volume, and flushing rate); tributary data (discharge; TP); corrected GIS land use data; subwatershed land area; precipitation data; and septic system data (typically available from the US Census Bureau). Geographical Information Systems (GIS) data will be obtained by FBE to assist with the land use assessment, particularly for determining the total land use area by land use type (in acres) for input to 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, is 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). GIS land use coverages will be ground-truthed by FBE based on field observations and publicly-available recent aerial photography to ensure the most accurate land use for input to the model.

Laura Diemer of FBE will be running the model with final technical review by Don Kretchmer of Water Resources Consulting. FBE has used watershed loading models for several years, and has successfully applied results from LLRM, AVGWLF, PREDICT, and the USEPA Region 5 Models to many watershed plans. NHDES will provide technical assistance and review of modeling methods and results. Laura will make edits to the model based on feedback from Don Kretchmer, NHDES, and the Steering Committee.

In-Lake Total Phosphorus Concentrations

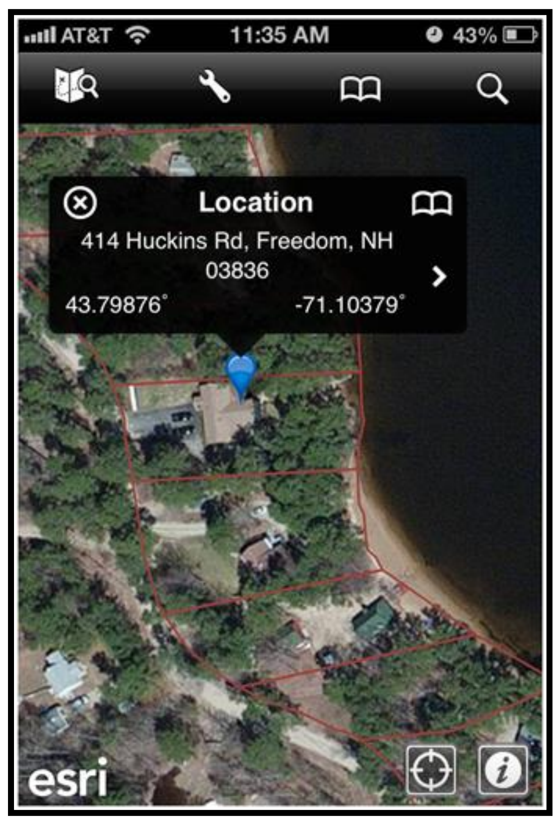
Results of the watershed loading calculations within the LLRM will be input to a series of empirical models that provide predictions of in-lake TP concentrations, Chl-a concentrations, algal bloom frequency, and water clarity. This portion of the LLRM estimates in-lake phosphorus concentrations based on physical and chemical lake characteristics, including lake volume, mean depth, watershed area, flushing rate, and 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 Ossipee Lake, with some exceptions (e.g., 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.

D. Shoreline Survey and Stormwater Impact Assessments

FBE, in collaboration with 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 Ossipee Lake shoreline and Lovell River watersheds. This work with identify hotspots with potential water quality impacts from stormwater runoff and septic systems. The assessment will include two components: 1) a shoreline survey of Ossipee Lake, and 2) a windshield survey of the Ossipee Lake shoreline and Lovell River watersheds.

Shoreline Survey

To help characterize the effects of shoreline development and assist stakeholders with targeting and implementing shoreline BMPs, shoreline development will be evaluated and assigned an 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



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

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 B). 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 field analyses will be conducted by FBE technical staff.

To perform the shoreline survey, developed properties within 100 feet of the lake 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 the lakeshore 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 the Fall of 2015.

Windshield Survey

While the shoreline survey will focus on developed land along the shoreline of Ossipee Lake, the stormwater survey will document sources of NPS pollution throughout the Ossipee Lake shoreline and Lovell River watersheds. This "windshield" survey will be performed by car, and will include a checklist that documents sources of NPS pollution, including, but not limited to: roadside runoff to 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 (see Appendix C for example from Phase I: Danforth Pond and Lower Bays). The survey will focus on developed land outside of the immediate shoreline with an emphasis on properties within 75 feet of streams and rivers, stream crossings, and other sensitive environmental areas. The survey is expected to take place in Fall of 2015. 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 have the opportunity to view sites and ask questions of technical staff.

Identified NPS sites with associated BMP recommendations will be input to the Region 5 Model to quantify potential pollutant load reductions as a result of implementation.

Septic Loading Estimate

In order to estimate the phosphorus contribution from septic systems to Ossipee Lake, shoreline survey results will be entered into a septic model developed by the Maine Department of Environmental Protection (MEDEP). 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 based on soils. The model was designed to utilize data collected from the shoreline survey. Any available seasonal versus year-round property estimates will be obtained from the watershed municipalities and/or the 2010 US Census Bureau. These estimates will be input to the LLRM to determine current nutrient loading from the watershed to the lake as a result of septic systems.

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 2/4: Kick-off Meeting – Jun 2015 – COMPLETE

Task 5: Steering Committee Meeting #1 – July 28, 2015 - COMPLETE

Task 6: Site Specific Project Plan – Sept 2015

Task 7A: Evaluate Water Quality Data – draft by – Sept-Oct 2015; add 2015 data by Feb 2016

Task 7B: Establish and Approve Water Quality Goal – March 2016

Task 8: Run the Lake Loading Response Model – draft by Nov 2015

Task 9: Steering Committee Meeting #2 – Oct 2015

Task 10: Estimate Pollutant Load Reductions for Ossipee Lake shoreline and Lovell River watersheds to Meet Ossipee Lake Water Quality Goal – Mar 2016

Task 11: Conduct Ossipee Lake Shoreline Survey – Fall 2015

Task 12: Conduct Ossipee Lake shoreline and Lovell River Watershed Surveys – Sept/Oct 2015

Task 20: Develop Action Plan- Jan 2016

Task 21-22: Develop Draft and Final Watershed Management Plan – Nov 2015 - Mar 2016

Task 23: Present to Ossipee Board of Selectman – Oct 2015

Task 24: Incorporate Edits to Watershed Management Plan – Mar 2016

Task 25: Update Danforth Pond and Lower Bays Subwatershed Plan & Model – Mar-Apr 2016

Task 26: Final Presentation to Towns – Spring 2016

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 FBE, and used to develop a survey report. FBE will estimate phosphorus loading from septic systems in the watershed during watershed modeling, develop a matrix of prioritized stormwater sites, and complete the watershed management plan. Field forms will be kept on file at the FBE 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 FBE Task Manager will review the input values, and identify and correct the error to ensure the correct information is entered into the spreadsheets. In addition, the FBE Task Manager will review all modeling inputs, calculations, and outputs for the purpose of QA/QC. All identified QA/QC issues 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 be submitted by FBE, 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, 08/23/13).
- Kick-off meeting and materials for GMCG.
- At least two meetings with the project steering committee.
- 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.
- Memo of the watershed survey results, and a BMP matrix of the top 20 critical sites in the watershed.
- First and second (interim) drafts of the watershed management plan for Ossipee Lake shoreline and Lovell River watersheds.
- Updated Danforth Pond and Lower Bays Subwatershed Plan (Phase 1).
- One public or Steering Committee meeting to discuss draft watershed management plan; final community presentation to four towns (Freedom, Ossipee, Effingham, Tamworth); copies of Power Point presentations.

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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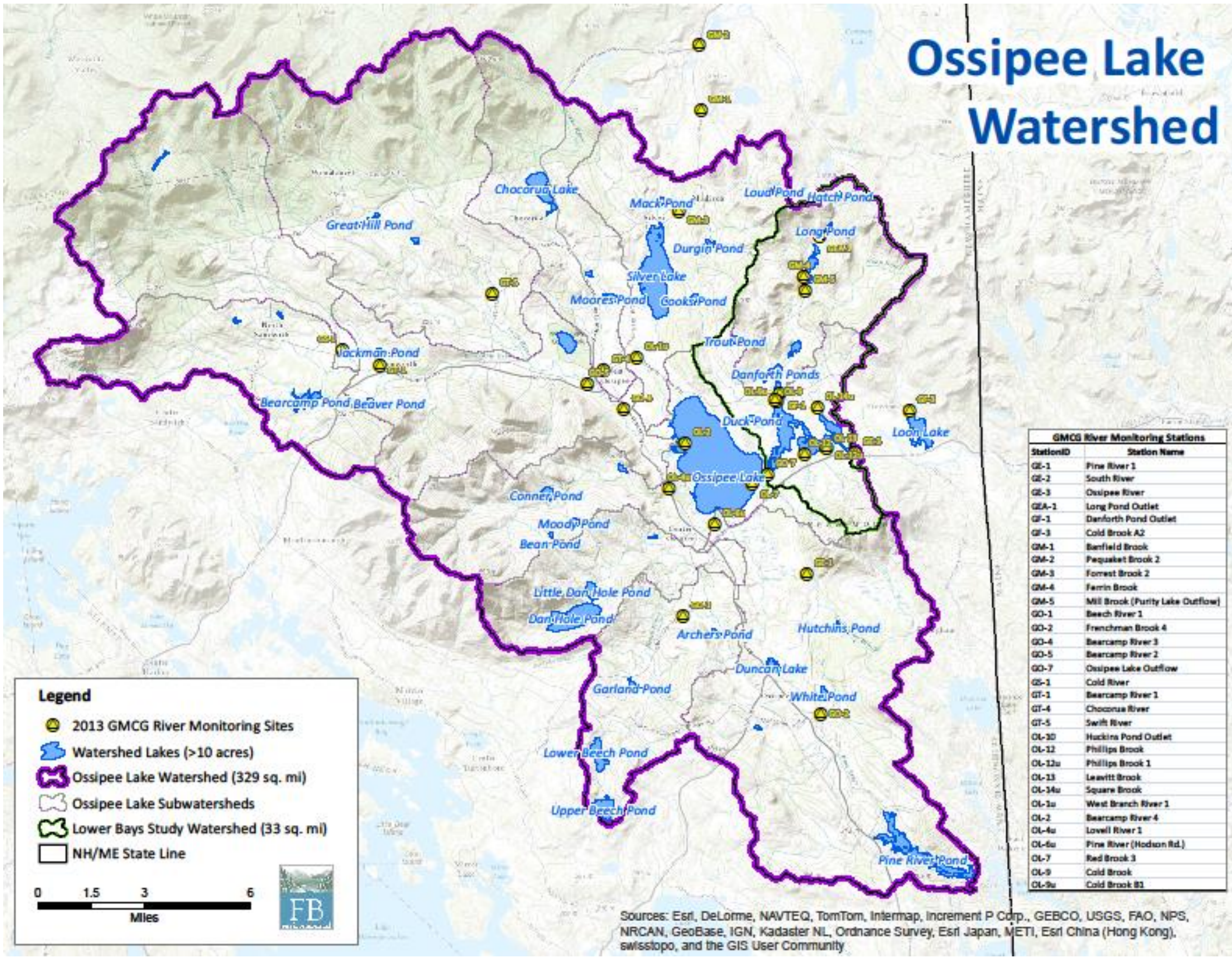
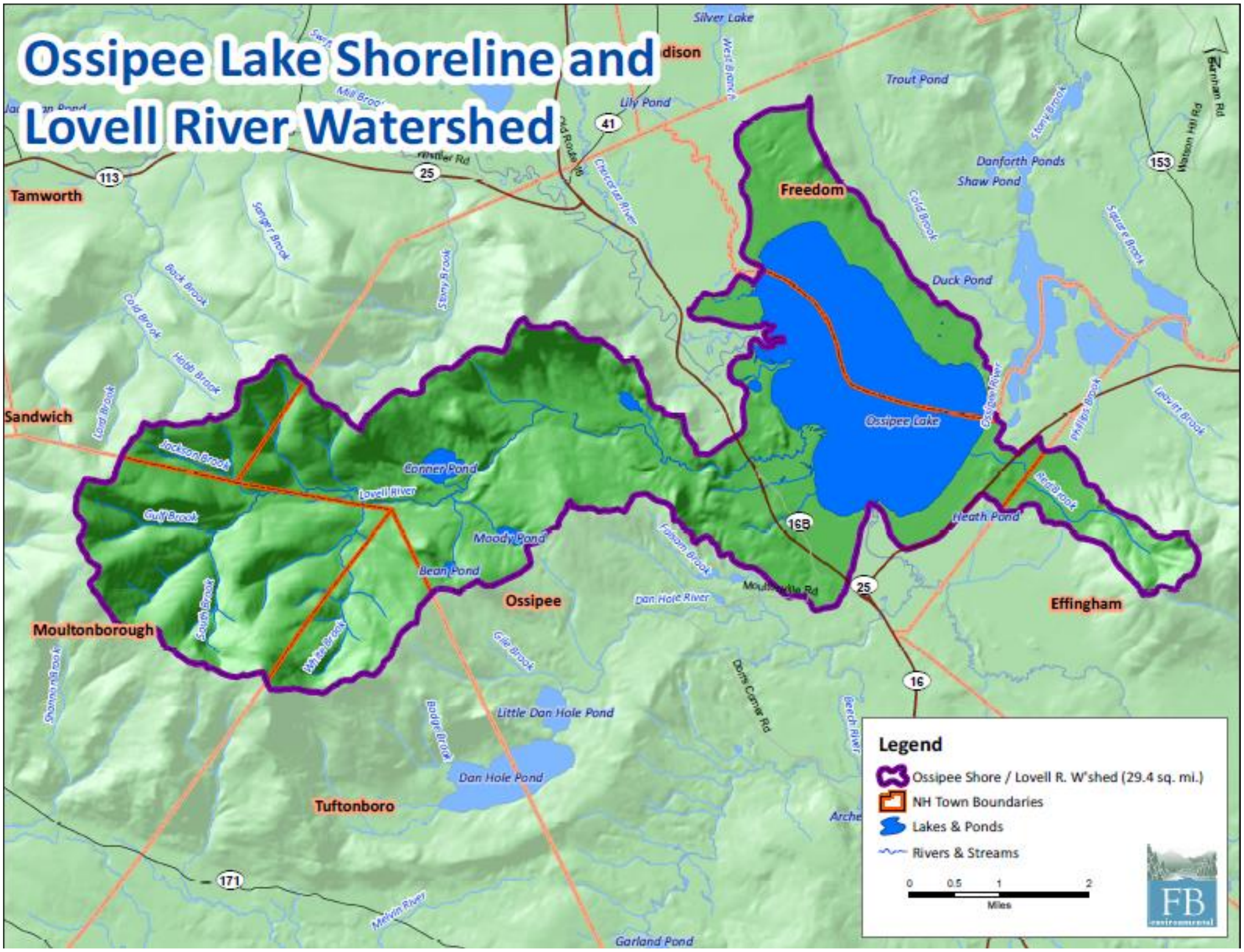
Vollenweider, R.A. 1975. Input-output models with special references to the phosphorus loading concept in limnology. Schweiz. Z. Hydrol. 37:53-62.

Appendix A- Ossipee Lake Watershed Map




Ossipee Lake Shoreline and Lovell River Watershed
Legend
Ossipee Shore / Lovell R. W'shed (29.4 sq. mi.)
NH Town Boundaries
Lakes & Ponds
Rivers & Streams
0 0.5 1 2
Miles
Tamworth
Sandwich
Moultonborough
Freedom
Ossipee
Effingham
Tuftonboro
Ossipee Lake
Conner Pond
Moody Pond
Bean Pond
Heath Pond
Duck Pond
Trout Pond
Danforth Ponds
Shaw Pond
Silver Lake
Lily Pond
Little Dan Hole Pond
Dan Hole Pond
Garland Pond
Lovell River
Jackson Brook
Gulf Brook
South Brook
White Brook
Dan Hole River
Melvin River
Ossipee River
Chocorua River
Cold Brook
Back Brook
Hobb Brook
Stony Brook
Sanger Brook
Folsom Brook
Gile Brook
Bodge Brook
Beech River
Leavitt Brook
Phillips Brook
Square Brook
Lord Brook
Dorrs Corner Rd
Moultonville Rd
Watson Hill Rd
Burnham Rd
113
25
41
153
16B
16
171
FB

Appendix B- Ossipee Lake Shoreline Survey Field Sheet

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 C- 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:	Undersized	Artificially Created Beach
Conversion from Seasonal-Yr Round	**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	

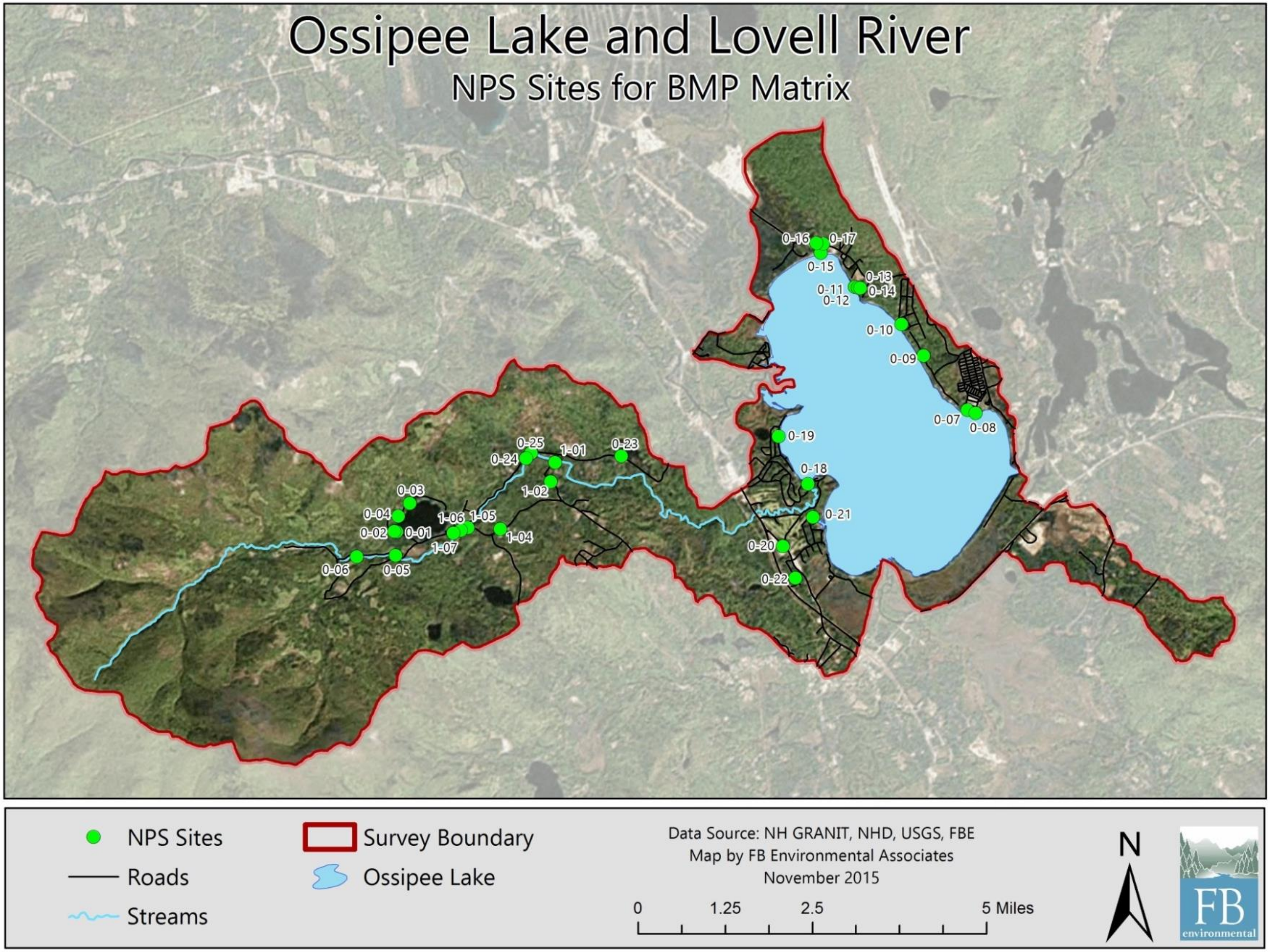
Impact: Consider size of site, slope, amount of soil eroded, proximity to water

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 D – BMP Sites

Rank	Site	Land Use	Sediment (t/yr.)	Phosphorus (lbs./yr.)	Phosphorus (kg/yr.)	Nitrogen (lbs./yr.)	Impact Rating	10-yr Cost	Priority Ranking (Impact-Weighted 10-yr $ / kg TP removed)
1	0-25	Town Road	7.8	6.6	3.0	13.3	High	$1,440.00	$481.01
2	1-02	Town Road	9.4	8.0	3.6	15.9	Low	$1,188.00	$982.16
3	1-06	Town Road	5.8	5.0	2.3	9.9	Medium	$1,930.00	$1,701.97
4	0-21	Private Road	1.0	0.8	0.4	1.7	High	$740.00	$2,039.28
5	0-11	Private Road	1.7	1.5	0.7	2.9	Medium	$1,000.00	$2,939.50
6	1-05	Town Road	1.2	1.0	0.5	2.0	Medium	$682.00	$3,007.11
7	0-20	State Road	5.0	4.2	1.9	8.4	Low	$2,000.00	$3,149.46
8	0-02	Private Road	1.0	0.9	0.4	1.8	Medium	$850.00	$4,164.29
9	0-22	Town Road	1.1	1.0	0.5	2.0	Medium	$980.00	$4,321.06
10	0-13	Private Road	8.0	6.8	3.1	13.8	Low	$12,260.00	$11,924.42
11	0-06	Private Road	0.5	0.4	0.2	0.9	High	$2,180.00	$12,015.20
12	1-04	Town Road	0.5	0.4	0.2	1.0	Low	$1,050.00	$17,361.42
13	0-14	Private Road	0.2	0.3	0.1	1.8	Low	$750.00	$18,643.23
14	1-01	Town Road	0.4	0.3	0.1	0.7	Low	$980.00	$21,605.32
15	0-03	Private Road	0.1	0.1	0.0	0.1	High	$1,050.00	$23,148.56
16	0-09	Private Road	0.9	0.8	0.4	1.5	Low	$2,940.00	$24,305.98
17	0-05	Private Road	0.3	0.2	0.1	0.5	Medium	$1,236.00	$27,249.16
18	0-24	Town Road	0.2	0.2	0.1	0.6	Medium	$1,250.00	$27,557.81
19	1-07	Town Road	0.2	0.1	0.0	0.3	Medium	$665.00	$29,321.50
20	0-15	Beach Access	2.6	2.2	1.0	4.5	Medium	$21,908.00	$43,908.10
21	0-18	Boat Access	1.2	1.0	0.5	2.0	Medium	$11,485.00	$50,640.22
22	0-04	Private Road	0.2	0.1	0.0	0.3	Medium	$1,500.00	$66,138.73
23	0-19	Private Road	0.6	0.5	0.2	1.0	Medium	$7,588.00	$66,914.76
24	0-10	Private Road	0.1	0.1	0.0	0.1	Medium	$1,700.00	$74,957.23
25	0-01	Private Road	0.1	0.1	0.0	0.1	Medium	$2,760.00	$121,695.27
26	0-08	Private Lawn	0.0	0.1	0.1	0.3	Low	$2,750.00	$147,233.74
27	0-17	Town Road	0.1	0.1	0.0	0.1	Medium	$3,798.00	$167,463.27
28	0-23	Town Road	0.0	0.0	0.0	0.3	Medium	$2,961.00	$262,296.05
29	0-07	Private Road	0.3	0.4	0.2	0.8	High	NA	NA
30	0-12	Private Road	NA	NA	NA	NA	Medium	$1,700.00	NA
31	0-16	Town Road	0.0	0.0	0.0	0.1	Low	$800.00	NA
		TOTAL:	**50.6**	**43.2**	**19.6**	**88.7**		**$94,121.00**	


Ossipee Lake and Lovell River
NPS Sites for BMP Matrix
0-01
0-02
0-03
0-04
0-05
0-06
0-07
0-08
0-09
0-10
0-11
0-12
0-13
0-14
0-15
0-16
0-17
0-18
0-19
0-20
0-21
0-22
0-23
0-24
0-25
1-01
1-02
1-04
1-05
1-06
1-07
NPS Sites
Roads
Streams
Survey Boundary
Ossipee Lake
Data Source: NH GRANIT, NHD, USGS, FBE
Map by FB Environmental Associates
November 2015
0
1.25
2.5
5 Miles
N
FB
environmental

APPENDIX E – Shoreline Survey Results

Summary of disturbance scores for shoreline parcels identified during the 2015 shoreline survey by volunteers and technical staff from FB Environmental Associates.

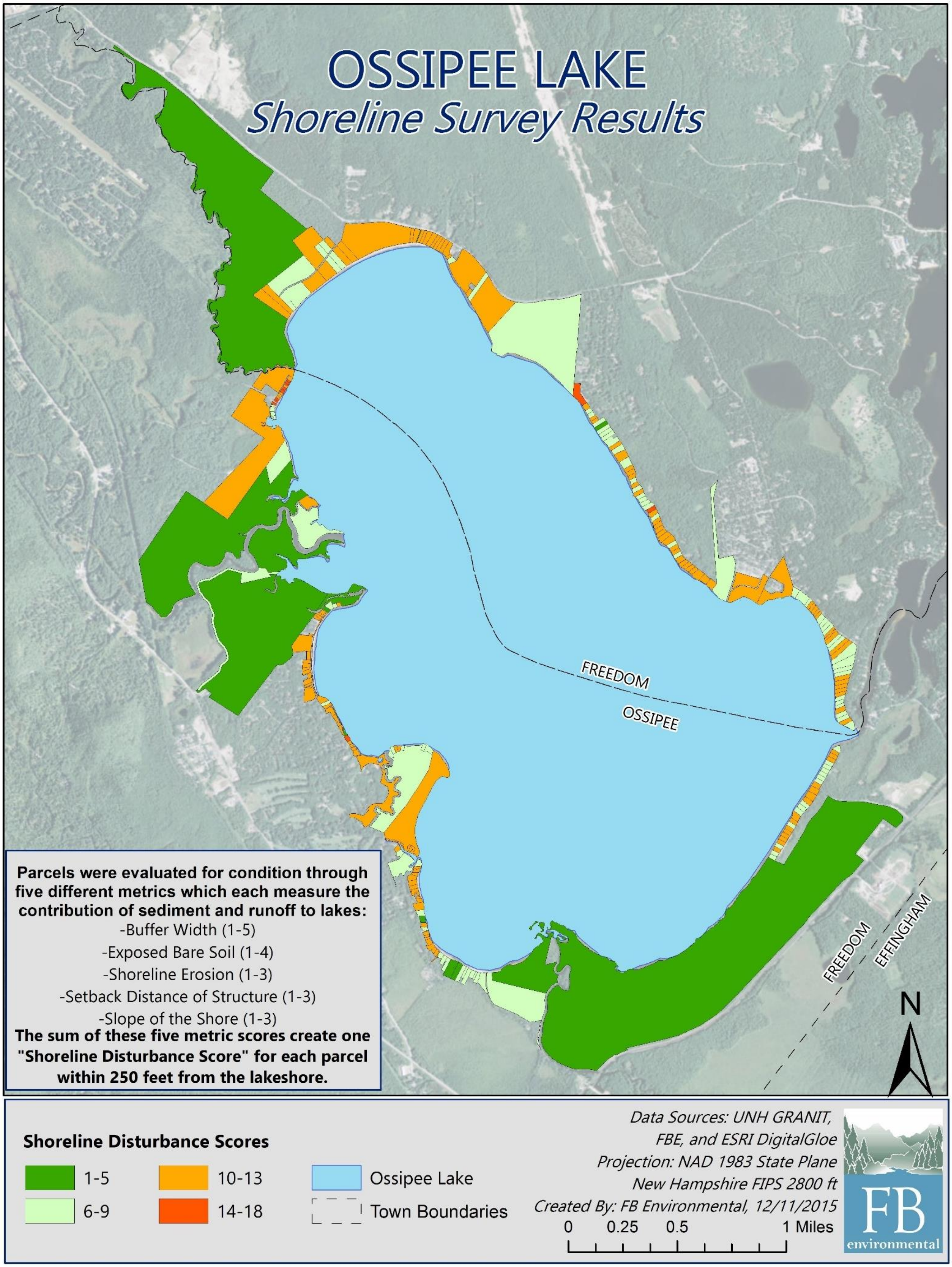
Map and Lot #	Town	Buffer (1-5)	Bare Soil (1-4)	Shoreline Erosion (1-3)	Distance (1-3)	Slope (1-3)	Shoreline Disturbance Score
20-10	Ossipee	5	4	2	3	1	15
20-11	Ossipee	5	4	2	3	1	15
20-13	Ossipee	5	4	2	3	1	15
20-14	Ossipee	5	4	2	3	1	15
20-17	Ossipee	5	4	2	3	1	15
20-18	Ossipee	5	4	2	3	1	15
20-20	Ossipee	5	4	2	3	1	15
20-9	Ossipee	5	4	2	3	1	15
23-2	Ossipee	5	4	2	3	1	15
23-3	Ossipee	5	4	2	3	1	15
52-5	Ossipee	4	4	1	3	3	15
23-13	Freedom	5	4	2	1	2	14
24-6-1	Freedom	4	4	2	3	1	14
19-10	Freedom	4	4	1	2	2	13
19-11	Freedom	4	4	1	3	1	13
19-4	Freedom	4	3	2	2	2	13
19-6	Freedom	4	4	1	2	2	13
19-7	Freedom	4	4	1	2	2	13
19-8	Freedom	4	4	1	2	2	13
20-5	Freedom	4	3	1	3	2	13
24-2	Freedom	3	3	1	3	3	13
25-6-1	Freedom	3	3	2	2	3	13
26-10	Freedom	4	2	1	3	3	13
20-12	Ossipee	4	3	2	3	1	13
20-15	Ossipee	4	3	2	3	1	13
20-16	Ossipee	4	3	2	3	1	13
20-6	Ossipee	4	3	2	3	1	13
23-1	Ossipee	4	4	2	2	1	13
37-3	Ossipee	5	2	1	3	2	13
44-68	Ossipee	4	4	1	2	2	13
45-2	Ossipee	2	4	1	3	3	13
5-5	Freedom	3	4	2	2	1	12
19-3	Freedom	3	3	2	2	2	12
19-5	Freedom	4	3	1	2	2	12
20-2	Freedom	3	4	1	2	2	12
24-5	Freedom	3	3	2	2	2	12
25-3	Freedom	4	3	1	3	1	12
25-5	Freedom	3	2	1	3	3	12
25-5-1	Freedom	4	2	1	3	2	12
26-11	Freedom	4	2	1	3	2	12
20-8	Ossipee	3	3	2	3	1	12
23-8	Ossipee	4	3	1	3	1	12
37-29	Ossipee	4	3	1	3	1	12
37-30	Ossipee	4	3	1	3	1	12
37-31	Ossipee	4	3	1	3	1	12
45-5	Ossipee	4	3	1	2	2	12
52-27	Ossipee	4	3	1	3	1	12
52-3	Ossipee	4	2	1	2	3	12
52-4	Ossipee	3	2	1	3	3	12
66-49	Ossipee	4	3	1	3	1	12
18-1-1	Freedom	2	4	1	3	1	11
18-5	Freedom	3	3	1	2	2	11
18-9-1	Freedom	3	2	1	2	3	11
1B-457	Freedom	5	3	1	1	1	11
20-2-4	Freedom	2	2	2	3	2	11
21-1-1	Freedom	3	3	1	2	2	11
24-1	Freedom	3	2	1	3	2	11
24-10	Freedom	2	3	2	3	1	11
24-11	Freedom	2	3	1	3	2	11
24-12	Freedom	3	2	1	3	2	11

Map and Lot #	Town	Buffer (1-5)	Bare Soil (1-4)	Shoreline Erosion (1-3)	Distance (1-3)	Slope (1-3)	Shoreline Disturbance Score
24-14	Freedom	3	2	2	3	1	11
24-8	Freedom	2	3	1	3	2	11
25-5-2	Freedom	3	2	1	3	2	11
25-9-1	Freedom	4	2	1	3	1	11
26-11-1	Freedom	4	2	1	2	2	11
26-2	Freedom	2	3	1	2	3	11
27-21	Freedom	4	2	1	3	1	11
27-22	Freedom	4	2	1	3	1	11
27-23	Freedom	4	2	1	3	1	11
27-24	Freedom	4	2	1	3	1	11
27-26	Freedom	4	2	1	3	1	11
37-21	Ossipee	4	2	1	3	1	11
37-22	Ossipee	4	2	1	3	1	11
37-23	Ossipee	4	2	1	3	1	11
37-27	Ossipee	4	2	1	3	1	11
37-28	Ossipee	4	2	1	3	1	11
37-32	Ossipee	4	2	1	3	1	11
37-9	Ossipee	4	2	1	3	1	11
44-62	Ossipee	3	2	1	3	2	11
44-66	Ossipee	4	2	1	2	2	11
44-67	Ossipee	4	2	1	2	2	11
44-69	Ossipee	4	2	1	2	2	11
44-70	Ossipee	4	2	1	2	2	11
44-75	Ossipee	4	2	1	3	1	11
50-3	Ossipee	4	2	1	3	1	11
50-4	Ossipee	4	2	1	3	1	11
51-6	Ossipee	4	2	1	3	1	11
52-1	Ossipee	3	2	1	2	3	11
52-2	Ossipee	3	2	1	2	3	11
66-35	Ossipee	3	3	1	3	1	11
66-50	Ossipee	4	2	1	3	1	11
66-51	Ossipee	4	2	1	3	1	11
66-52	Ossipee	4	2	1	3	1	11
66-53	Ossipee	4	2	1	3	1	11
66-54	Ossipee	4	2	1	3	1	11
66-55	Ossipee	4	2	1	3	1	11
66-57	Ossipee	4	2	1	3	1	11
66-58	Ossipee	4	2	1	3	1	11
67-14	Ossipee	5	1	1	3	1	11
73-124	Ossipee	4	2	1	3	1	11
73-128	Ossipee	4	2	1	3	1	11
73-129	Ossipee	4	2	1	3	1	11
73-130	Ossipee	4	2	1	3	1	11
73-131	Ossipee	4	2	1	3	1	11
73-132	Ossipee	4	2	1	3	1	11
73-133	Ossipee	4	2	1	3	1	11
73-36	Ossipee	4	2	1	3	1	11
18-2	Freedom	1	4	1	3	1	10
18-6	Freedom	2	2	1	2	3	10
18-9	Freedom	3	2	1	2	2	10
19-1	Freedom	3	1	1	3	2	10
19-2	Freedom	3	2	1	2	2	10
20-4	Freedom	4	2	1	1	2	10
23-11	Freedom	3	2	1	3	1	10
23-1-2	Freedom	3	2	1	2	2	10
23-6	Freedom	3	2	1	3	1	10
23-7	Freedom	4	1	1	2	2	10
24-3	Freedom	2	2	1	3	2	10
24-7-4	Freedom	3	2	1	3	1	10
25-1	Freedom	3	3	1	2	1	10
25-10	Freedom	3	2	1	3	1	10
25-2	Freedom	2	2	2	3	1	10
25-4	Freedom	2	2	1	3	2	10
25-4-1	Freedom	2	2	1	3	2	10
25-7	Freedom	2	2	1	2	3	10
25-9-3	Freedom	4	2	1	2	1	10
26-15	Freedom	4	2	1	2	1	10

Map and Lot #	Town	Buffer (1-5)	Bare Soil (1-4)	Shoreline Erosion (1-3)	Distance (1-3)	Slope (1-3)	Shoreline Disturbance Score
26-3-1	Freedom	2	2	1	2	3	10
26-3-2	Freedom	2	2	1	2	3	10
26-8	Freedom	2	2	1	2	3	10
26-9	Freedom	2	2	1	2	3	10
27-14	Freedom	3	2	1	3	1	10
27-17	Freedom	4	2	1	2	1	10
27-25	Freedom	3	2	1	3	1	10
27-29	Freedom	2	3	1	1	3	10
27-30	Freedom	2	3	1	1	3	10
20-7	Ossipee	3	2	1	3	1	10
29-2	Ossipee	3	2	1	3	1	10
36-2	Ossipee	3	3	1	2	1	10
37-24	Ossipee	4	1	1	3	1	10
44-60	Ossipee	3	2	1	2	2	10
44-61	Ossipee	3	2	1	2	2	10
44-61	Ossipee	3	2	1	2	2	10
44-63	Ossipee	3	2	1	2	2	10
44-64	Ossipee	3	2	1	2	2	10
44-71	Ossipee	3	2	1	2	2	10
44-72	Ossipee	3	2	1	2	2	10
45-3	Ossipee	3	2	1	1	3	10
45-4	Ossipee	3	2	1	2	2	10
50-5	Ossipee	3	2	1	3	1	10
51-10	Ossipee	3	1	1	3	2	10
51-11	Ossipee	3	1	1	3	2	10
51-12	Ossipee	4	1	1	3	1	10
51-13	Ossipee	4	1	1	3	1	10
52-44	Ossipee	4	1	1	3	1	10
52-45	Ossipee	4	1	1	3	1	10
66-31	Ossipee	4	2	1	2	1	10
67-16	Ossipee	4	1	1	3	1	10
67-17	Ossipee	4	1	1	3	1	10
67-18	Ossipee	4	1	1	3	1	10
67-19	Ossipee	4	1	1	3	1	10
67-20	Ossipee	4	1	1	3	1	10
67-22	Ossipee	4	1	1	3	1	10
73-127	Ossipee	3	2	1	3	1	10
73-135	Ossipee	3	2	1	3	1	10
73-37	Ossipee	4	1	1	3	1	10
18-3	Freedom	1	4	1	2	1	9
18-8	Freedom	2	2	1	2	2	9
20-1	Freedom	2	2	1	3	1	9
20-3	Freedom	2	1	1	2	3	9
23-10	Freedom	3	2	1	2	1	9
23-4-1	Freedom	3	2	1	2	1	9
23-4-2	Freedom	3	2	1	2	1	9
23-8	Freedom	3	2	1	2	1	9
24-6-2	Freedom	3	2	1	2	1	9
24-7-1	Freedom	5	1	1	1	1	9
24-7-2	Freedom	5	1	1	1	1	9
24-7-3	Freedom	5	1	1	1	1	9
24-7-5	Freedom	3	1	1	3	1	9
24-9	Freedom	2	2	1	3	1	9
25-6	Freedom	2	1	1	2	3	9
25-8	Freedom	2	2	1	3	1	9
26-14	Freedom	3	2	1	2	1	9
26-5	Freedom	1	2	1	2	3	9
26-6	Freedom	1	2	1	2	3	9
27-13	Freedom	3	2	1	2	1	9
27-16	Freedom	3	2	1	2	1	9
27-18	Freedom	3	2	1	2	1	9
27-19	Freedom	3	2	1	2	1	9
27-20	Freedom	4	2	1	1	1	9
27-27	Freedom	3	2	1	2	1	9
27-28	Freedom	3	2	1	2	1	9
23-4	Ossipee	3	1	1	3	1	9
50-1	Ossipee	3	1	1	3	1	9

Map and Lot #	Town	Buffer (1-5)	Bare Soil (1-4)	Shoreline Erosion (1-3)	Distance (1-3)	Slope (1-3)	Shoreline Disturbance Score
50-2	Ossipee	3	1	1	3	1	9
51-14	Ossipee	3	1	1	3	1	9
51-15	Ossipee	3	1	1	3	1	9
51-16	Ossipee	3	1	1	3	1	9
51-17	Ossipee	3	1	1	3	1	9
51-7	Ossipee	3	1	1	3	1	9
51-8	Ossipee	3	1	1	3	1	9
51-9	Ossipee	3	1	1	3	1	9
52-42	Ossipee	3	1	1	3	1	9
52-43	Ossipee	3	1	1	3	1	9
52-46	Ossipee	3	1	1	3	1	9
52-47	Ossipee	3	1	1	3	1	9
52-48	Ossipee	3	1	1	3	1	9
52-49	Ossipee	3	1	1	3	1	9
66-36	Ossipee	4	2	1	1	1	9
66-42	Ossipee	3	3	1	1	1	9
67-12	Ossipee	3	1	1	3	1	9
67-13	Ossipee	3	1	1	3	1	9
67-15	Ossipee	3	1	1	3	1	9
67-21	Ossipee	3	1	1	3	1	9
73-122	Ossipee	3	1	1	3	1	9
73-136	Ossipee	3	1	1	3	1	9
73-140	Ossipee	3	1	1	3	1	9
73-141	Ossipee	3	1	1	3	1	9
18-4	Freedom	1	3	1	2	1	8
23-4-4	Freedom	2	1	1	2	2	8
24-4	Freedom	2	1	1	3	1	8
25-22-1	Freedom	1	2	1	3	1	8
26-13	Freedom	3	1	1	2	1	8
26-7	Freedom	1	1	1	2	3	8
27-15	Freedom	2	2	1	2	1	8
27-31	Freedom	1	2	1	1	3	8
23-7	Ossipee	2	3	1	1	1	8
36-1	Ossipee	2	2	1	2	1	8
44-74	Ossipee	2	1	1	2	2	8
50-6	Ossipee	3	1	1	2	1	8
66-48	Ossipee	3	2	1	1	1	8
72-8	Ossipee	3	1	1	2	1	8
73-125	Ossipee	2	1	1	3	1	8
81-2	Ossipee	3	1	1	2	1	8
23-2	Freedom	2	1	1	2	1	7
23-3	Freedom	2	1	1	2	1	7
24-13	Freedom	2	1	1	2	1	7
26-1	Freedom	1	1	1	1	3	7
26-4	Freedom	1	1	1	1	3	7
27-28-1	Freedom	2	1	1	2	1	7
72-5	Ossipee	3	1	1	1	1	7
72-6	Ossipee	2	1	1	2	1	7
18-7	Freedom	1	2	1	1	1	6
21-1	Freedom	1	2	1	1	1	6
23-1	Freedom	2	1	1	1	1	6
26-12	Freedom	2	1	1	1	1	6
29-3	Ossipee	1	2	1	1	1	6
37-1	Ossipee	1	2	1	1	1	6
37-26	Ossipee	1	2	1	1	1	6
37-26	Ossipee	1	2	1	1	1	6
72-2	Ossipee	2	1	1	1	1	6
72-3	Ossipee	2	1	1	1	1	6
72-4	Ossipee	2	1	1	1	1	6
72-7	Ossipee	2	1	1	1	1	6
5-1	Freedom	1	1	1	1	1	5
19-9	Freedom	1	1	1	1	1	5
23-4-3	Freedom	1	1	1	1	1	5
29-1	Ossipee	1	1	1	1	1	5
29-4	Ossipee	1	1	1	1	1	5
36-3	Ossipee	1	1	1	1	1	5
37-2	Ossipee	1	1	1	1	1	5

Map and Lot #	Town	Buffer (1-5)	Bare Soil (1-4)	Shoreline Erosion (1-3)	Distance (1-3)	Slope (1-3)	Shoreline Disturbance Score
45-1	Ossipee	1	1	1	1	1	5
68-1	Ossipee	1	1	1	1	1	5
72-1	Ossipee	1	1	1	1	1	5
73-123	Ossipee	1	1	1	1	1	5
73-143	Ossipee	1	1	1	1	1	5


OSSIPEE LAKE
Shoreline Survey Results
FREEDOM
OSSIPEE
FREEDOM
EFFINGHAM
N
Parcels were evaluated for condition through five different metrics which each 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)
-Slope of the Shore (1-3)
The sum of these five metric scores create one "Shoreline Disturbance Score" for each parcel within 250 feet from the lakeshore.
Shoreline Disturbance Scores
1-5
6-9
10-13
14-18
Ossipee Lake
Town Boundaries
Data Sources: UNH GRANIT, FBE, and ESRI DigitalGloe
Projection: NAD 1983 State Plane New Hampshire FIPS 2800 ft
Created By: FB Environmental, 12/11/2015
0 0.25 0.5 1 Miles
FB environmental