SHORELINE SURVEY | MEMORANDUM

TO: Jack Munn, Southern New Hampshire Planning Commission

FROM: Forrest Bell, FB Environmental Associates

SUBJECT: **2015 Pleasant Lake Shoreline Survey Results**

DATE: October 22, 2015

Enclosed: Shoreline Survey Photos, Maps, and Spreadsheet

The Pleasant Lake Shoreline Survey was conducted on August 26, 2015 by FB Environmental Associates (FBE) technical staff and local watershed association volunteers. Two boats were used for surveying parcels with lake frontage. FBE staff and volunteers documented the condition of the shoreline for each parcel using a scoring system that evaluates vegetated buffer, presence of bare soil, extent of shoreline erosion, distance of structures to the lake, and slope. These scores were summed to generate an overall "Shoreline Disturbance Score" for each parcel, with high scores indicating poor shoreline conditions. Photos were taken at each parcel and were cataloged by tax map-lot number. These photos will provide project stakeholders with a valuable tool for assessing shoreline conditions over time. It is recommended that a shoreline survey be conducted in mid-summer every 5 years to evaluate changing conditions.

RESULTS

A total of 180 parcels were evaluated; 104 parcels were in the Town of Deerfield and 76 were in the Town of Northwood. When averaged, parcels scored relatively low across the 5 different metrics; however, the average Shoreline Disturbance Score for the entire lake was 10.4 (Table 1). About 73% of the shoreline (or 132 parcels) scored 10 or greater (Figure 1). A disturbance score of 10 or above indicates shoreline conditions that may be detrimental to lake water quality. These shoreline properties tend to have inadequate buffers, evidence of bare soil, and structures within 75 ft. of the shoreline.

Table 1. Average scores for each criteria evaluated and the average Shoreline Disturbance Score for Pleasant Lake. Lower values indicate shoreline conditions that are effective at reducing erosion and keeping excess nutrients out of the lake.

Average Scores Per Parcel					Total
Buffer (1-5)	**Bare Soil (1-4)**	**Shoreline Erosion (1-3)**	**Distance (1-3)**	**Slope (1-3)**	**Shoreline Disturbance Score (0-18)**
3.2	2.2	1.1	2.4	1.6	**10.4**

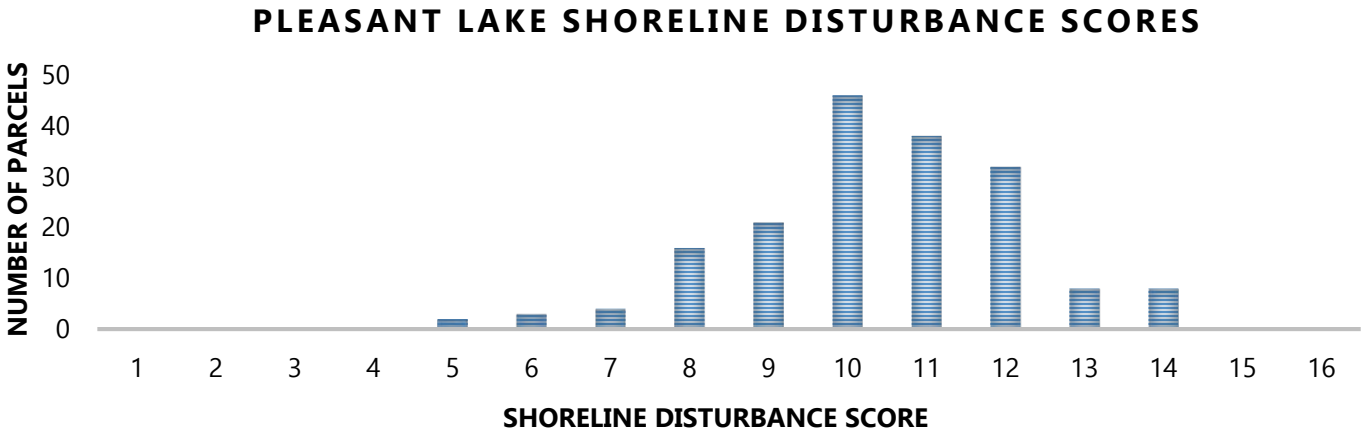


Figure 1. Pleasant Lake Shoreline Disturbance Scores.

Pleasant Lake parcel receiving a final score of 14.

Pleasant Lake parcel receiving a final score of 7.

The pollutant loading estimates are based on the shoreline survey disturbance scores (Figure 2). Eight (8) parcels with a score of 14 generate approximately **37.4 lbs. of phosphorus** load to Pleasant Lake annually[1]. If shoreline landowners were to create adequate buffers and install other shoreline Best Management Practices (BMPs) on all properties (at a 50% BMP efficiency rate), **the annual reduction would be 18.7 lbs. of phosphorus.** The 124 parcels with scores 10-13, are contributing approximately **87.0 lbs. of phosphorus annually**[2]. Remediation efforts on all properties using a 50% BMP efficiency rate could result in the annual reduction of **43.5 lbs. of phosphorus**. These results can help inform the Lakes Loading Response Model (LLRM) that will be developed for Pleasant Lake; we can use this information to assess whether land use coefficients for shorefront properties in the direct subdrainage are adequately reflecting observed conditions and potential phosphorus loading to the lake.

[1] Based on Region 5 model bank stabilization estimate for sandy soils, using 100 ft (length) by 5 ft (height) and moderate lateral recession rate of 0.2 ft/yr.
[2] Based on Region 5 model bank stabilization estimate for sandy soils, using 50 ft (length) by 3 ft (height) and moderate lateral recession rate of 0.1 ft/yr.

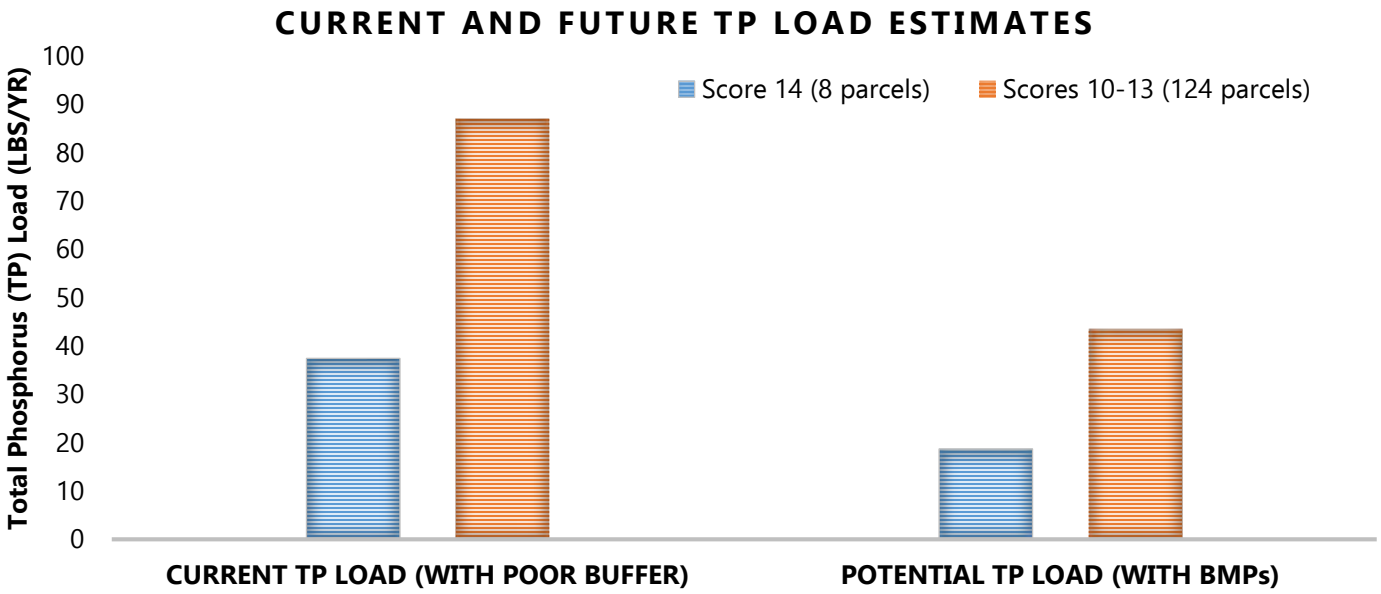


Figure 2. Pleasant Lake current and future total phosphorus (TP) load estimates.

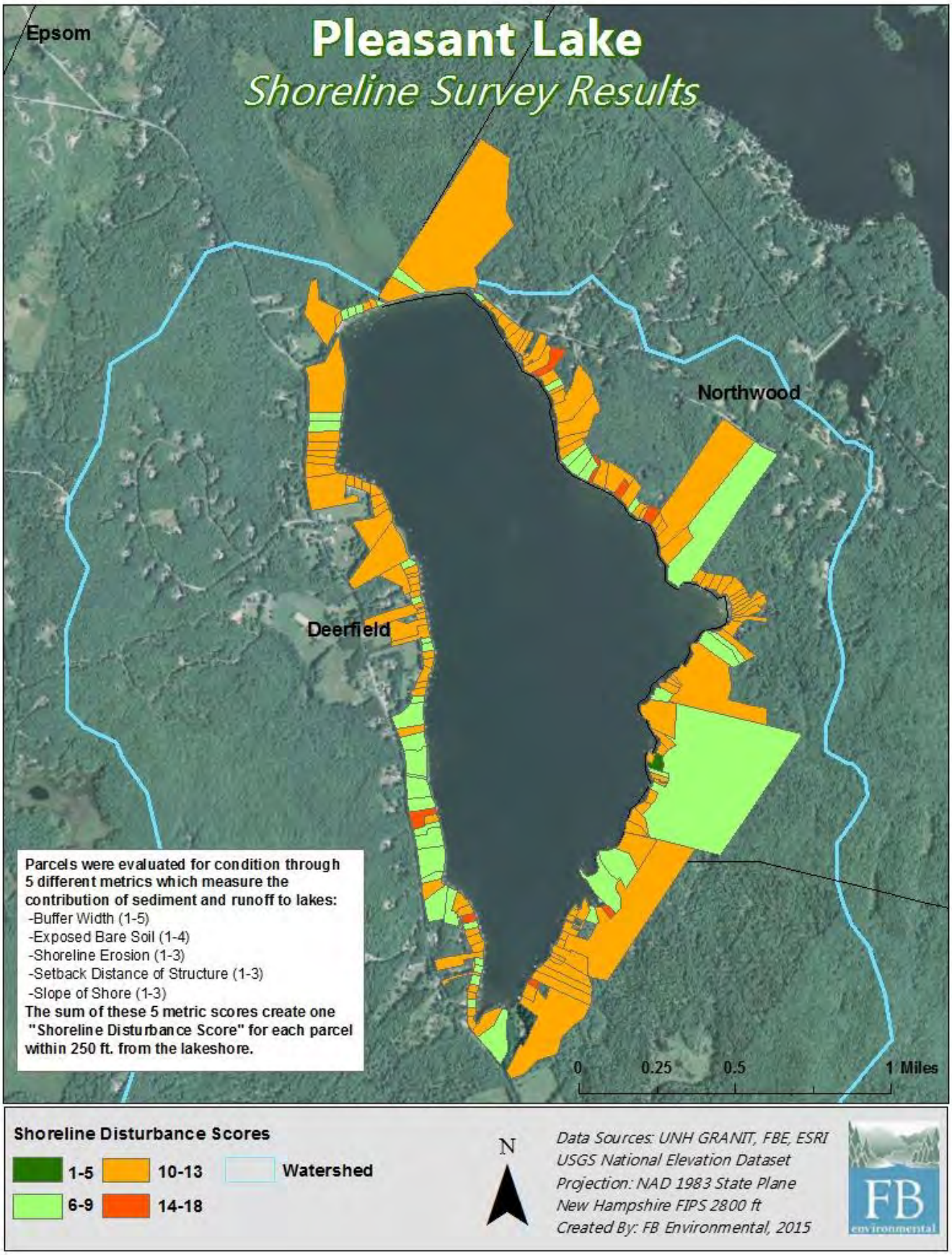
NEXT STEPS

The information obtained from this survey will be used to plan next steps for improving the shoreline of Pleasant Lake and further inform the watershed loading model. The survey map and database highlight areas that are possibly contributing to nonpoint source (NPS) pollution, and the shoreline disturbance scores should be used to prioritize areas of the shoreline for remediation. Recommendations largely stem from lack of buffer. Encouraging landowners to plant and/or maintain vegetated buffers as a BMP along their shoreline, particularly in areas of bare soil, will help mitigate erosion and reduce sediment and nutrient loading to the lake.

RECCOMENDATIONS

Generally landowners should be encouraged to revegetate their shoreline buffers with native plants, avoid large grassy lawns, and increase the mower blade height to 4 inches. Woody vegetation with deep rooting structures stabilize banks and intercept water flow, allowing it to spread out, slow down, and be filtered by the soil.

- Plant native shrubs along shoreline such as: blueberry, willows, elderberry, viburnums, dogwoods, winterberry, buttonbush, pepperbush, serviceberry, swamp azalea, and leatherleaf.
- Use survey results to target future implementation efforts on residential shoreline properties.
- Locate willing volunteers to "demonstrate" what an ideal shoreline buffer looks like and how it functions.
- Team up with volunteers to complete residency status estimations (seasonal vs. year round).
- Continue to monitor for bare soil, shoreline erosion, and slope conditions.
- Re-survey the lake in 5-10 years when updating the watershed plan.
- For future Pleasant Lake projects, site-specific recommendations should be made for each lot.


Epsom
Pleasant Lake
Shoreline Survey Results
Northwood
Deerfield
Parcels were evaluated for condition through 5 different metrics which 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 Shore (1-3)
The sum of these 5 metric scores create one "Shoreline Disturbance Score" for each parcel within 250 ft. from the lakeshore.
0
0.25
0.5
1 Miles
Shoreline Disturbance Scores
1-5
6-9
10-13
14-18
Watershed
N
Data Sources: UNH GRANIT, FBE, ESRI
USGS National Elevation Dataset
Projection: NAD 1983 State Plane
New Hampshire FIPS 2800 ft
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