



SHORELINE SURVEY | MEMORANDUM



TO: Pat Tarpey, Lake Winnepesaukee Association
FROM: Forrest Bell, FB Environmental Associates
SUBJECT: **2015 Moultonborough Bay Inlet and Two Ponds: Shoreline Survey Results**
DATE: March 7, 2016 (Updated July 22, 2016)
CC: Margaret Burns, FB Environmental Associates

The purpose of this memorandum is to summarize the 2015 shoreline survey results for Moultonborough Bay Inlet (MBI), Garland Pond, and Lees Pond. FB Environmental Associates (FBE) along with local volunteers led the survey of MBI, while local volunteers conducted surveys for Garland and Lees Pond. Surveyors 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 as accurately as possible given current parcel information. This documentation 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.



Photo 1. The survey group at Moultonborough Bay Inlet on August 18, 2015.

MOULTONBOROUGH BAY INLET

RESULTS

As explained above, shoreline disturbance scores were based off five individual categories (Buffer, Bare Soil, Shoreline Erosion, Setback Distance, and Slope). 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.

The MBI shoreline survey was conducted on August 18, 2015 by FBE technical staff and local volunteers. Three boats were used for surveying parcels with lake frontage. A total of 549 out of 635 parcels were evaluated along the MBI shoreline in the Town of Moultonborough, New Hampshire. The average shoreline disturbance score of 9.8 revealed that properties around MBI may be contributing erosion that is detrimental to lake water quality. Parcels shown on the map but not surveyed (Attachment A) were primarily parcels that had an insignificant amount of lake frontage. Without more detailed surveying equipment, those parcels could not be easily identified from the boat. Other non-surveyed parcels were located in channels too narrow for boat access.

Ranging from 4 to 16, high shoreline disturbance scores were primarily driven by parcels that had poor buffers (*Average Buffer Score* = 3.0; Table 1; Figure 1). A total of 6 high-priority parcels scored 15-16 out of a maximum score of 18. A total of 330 medium-priority parcels scored between 10-14. The remaining low-priority parcels (213) scored less than 10, indicating minimal impact to lake water quality.

Table 1. Average scores for each criterion evaluated and the average Shoreline Disturbance Score for Moultonborough Bay Inlet. 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)	Setback Distance (1-3)	Slope (1-3)	Shoreline Disturbance Score (0-18)
3.0	2.0	1.1	2.4	1.5	9.8

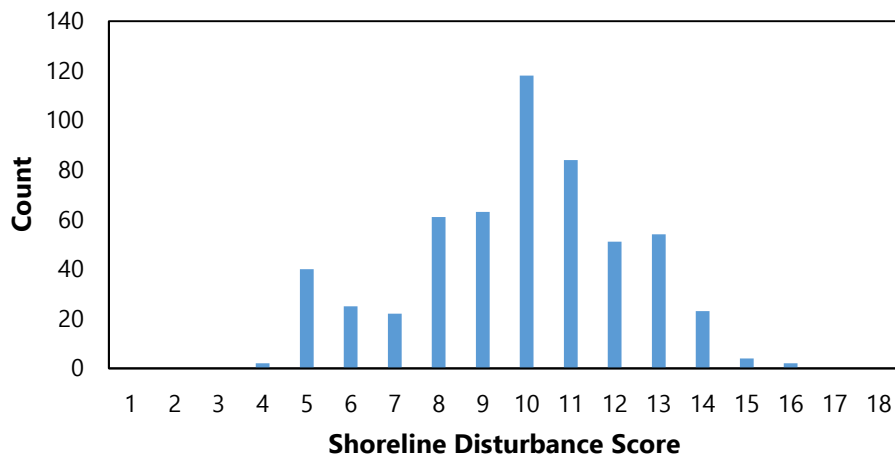


Figure 1. Moultonborough Bay Inlet Shoreline Disturbance Scores.

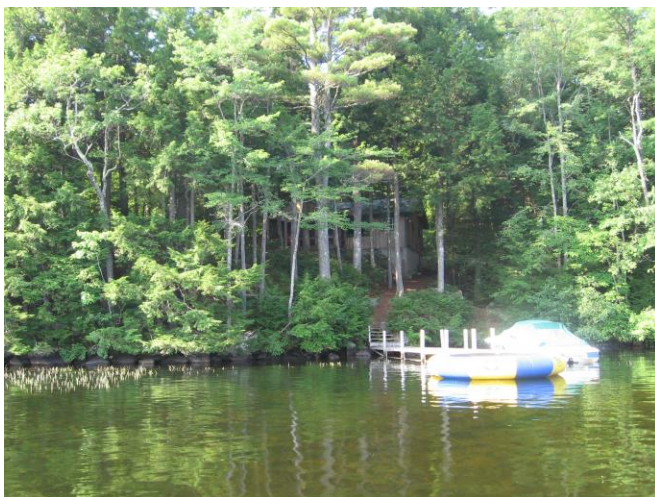


Photo 2. Moultonborough Bay Inlet parcel receiving a final score of 9.



Photo 3. Moultonborough Bay Inlet parcel receiving a final score of 14.

POLLUTANT LOAD ESTIMATES

Pollutant loading estimates were based on the shoreline disturbance scores (Figure 1). The 6 parcels with a score of 15 or greater generate an estimated 28.2 lbs. of phosphorus load to MBI annually¹. 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 14.1 lbs. of phosphorus. The 330 parcels with scores 10-14, are contributing an estimated 231.0 lbs. of phosphorus annually². Remediation efforts on all properties scoring 10-14 using a 50% BMP efficiency rate could result in the annual reduction of 115.5 lbs. of phosphorus (Figure 2).

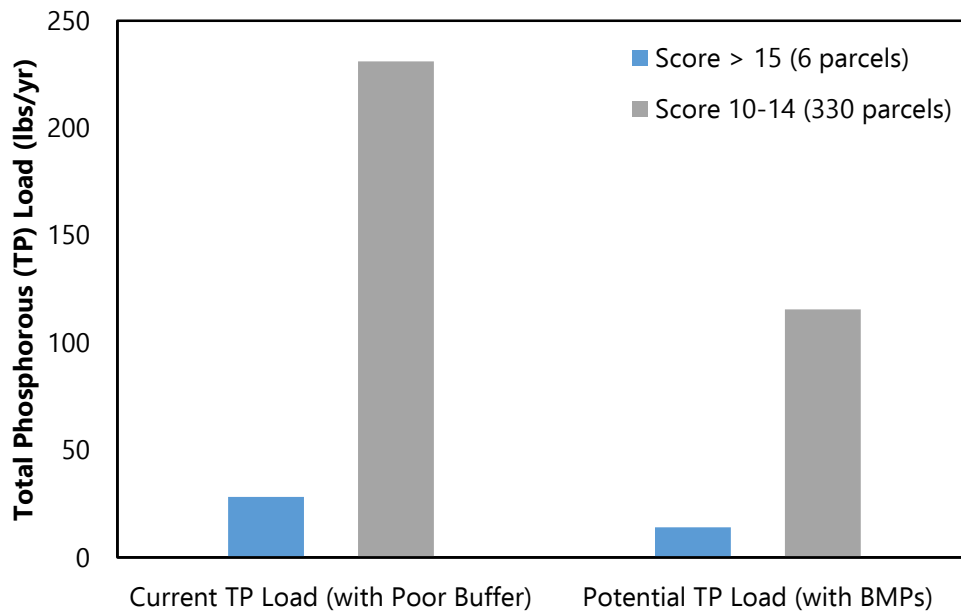


Figure 2. Moultonborough Bay Inlet current and future total phosphorus (TP) load estimates. Current TP loading is representative of the amount of TP (lbs/yr) found in runoff generated from a particular group of parcels (i.e., all parcels scoring >15 or between 10 and 14). Potential TP load is a rough estimate of the TP load from this same set of parcels if BMPs were installed at a 50% efficiency rate.

GARLAND POND

RESULTS

Eleven (11) parcels were surveyed at Garland Pond by Beverly Nelson on September 2, 2015. Of these parcels, all but one had a shoreline disturbance score of 5 (Table 2). The remaining parcel (65-10) was located in the southeast corner of Garland Pond off Route 25 and had a shoreline disturbance score of 6. The low scores at Garland Pond are a result of a large parcel of land (54-2) being owned and conserved by the Nature

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.

Conservancy. Development on the pond is limited with only one developed parcel containing a home visible from the shoreline.

Table 2. Average scores for each criterion evaluated and the average Shoreline Disturbance Score for Garland Pond. 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)	Setback Distance (1-3)	Slope (1-3)	Shoreline Disturbance Score (0-18)
1.1	1.0	1.0	1.0	1.9	5.1

POLLUTANT LOAD ESTIMATES

Pollutant load estimates were not made for parcels around Garland Pond due to the low impact scores (<10). Shoreline development is likely not a significant nutrient input to Garland Pond.

LEES POND

RESULTS

Fifty-six (56) parcels were evaluated by Beverly Nelson along Lees Pond on September 2, 2015. Ranging from 5-14, the average shoreline disturbance score for Lees Pond was 8.1 (Table 3; Figure 2). Lees Pond scored high for the setback distance of development from the shoreline (*Average Score of 2.1*; Table 3). The parcel lots on Lees Pond were smaller in comparison to Garland Pond and had more residential development aside from one small parcel owned by the Nature Conservancy.

Table 3. Average scores for each criterion evaluated and the average Shoreline Disturbance Score for Lees Pond. 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)	Setback Distance (1-3)	Slope (1-3)	Shoreline Disturbance Score (0-18)
1.8	1.6	1.2	2.1	1.4	8.1

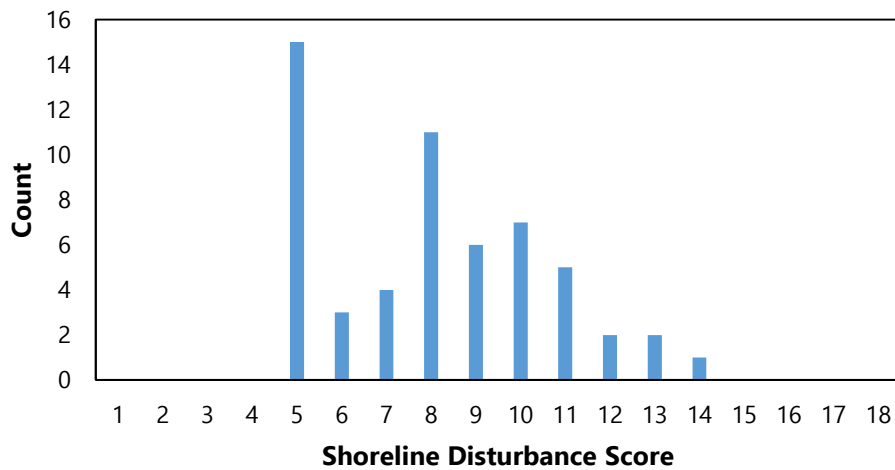


Figure 2. Shoreline disturbance scores for parcels around Lees Pond.



Photo 5. A shoreline parcel on Lees Pond receiving a final score of 7.



Photo 6. A shoreline parcel on Lees Pond receiving a final score of 10.

POLLUTANT LOAD ESTIMATES

Pollutant loading estimates were based on shoreline disturbance scores. No parcels scored 15 or greater. The 17 parcels with scores 10-14 are contributing an estimated 11.9 lbs. of phosphorus annually³. Remediation efforts on all properties scoring 10-14 using a 50% BMP efficiency rate could result in the annual reduction of 6.0 lbs. of phosphorus.

³ 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.

NEXT STEPS

The information obtained from this survey will be used to plan next steps for improving the shoreline of MBI. 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 and proximity of structures to the shoreline of the Inlet. Encouraging landowners to plant and/or maintain vegetated buffers along their shoreline, particularly in areas of bare soil, will help mitigate erosion and reduce sediment and nutrient loading to the lake.

RECOMMENDATIONS

Generally, landowners should be encouraged to revegetate their shoreline buffers with native plants, avoid large grassy lawns, and increase their mower blade height to 4 inches. Woody vegetation with deep rooting structures help to stabilize banks and intercept water flow, allowing runoff 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, 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 MBI watershed shoreline projects, site-specific recommendations should be made for each lot.

