Province Lake Golf Club:

Recommendations for Phosphorus Control

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Prepared for
Province Lake Golf Club
Province Lake Association

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Background

FB Environmental is assisting the Province Lake Association, Acton-Wakefield Watersheds Association and New Hampshire Department of Environmental Services to prepare a watershed management plan to address phosphorus loading to the lake that is contributing to cyanobacteria blooms. The following DRAFT map indicates the watershed area that we are evaluating. The following maps illustrate the watershed area and land use.

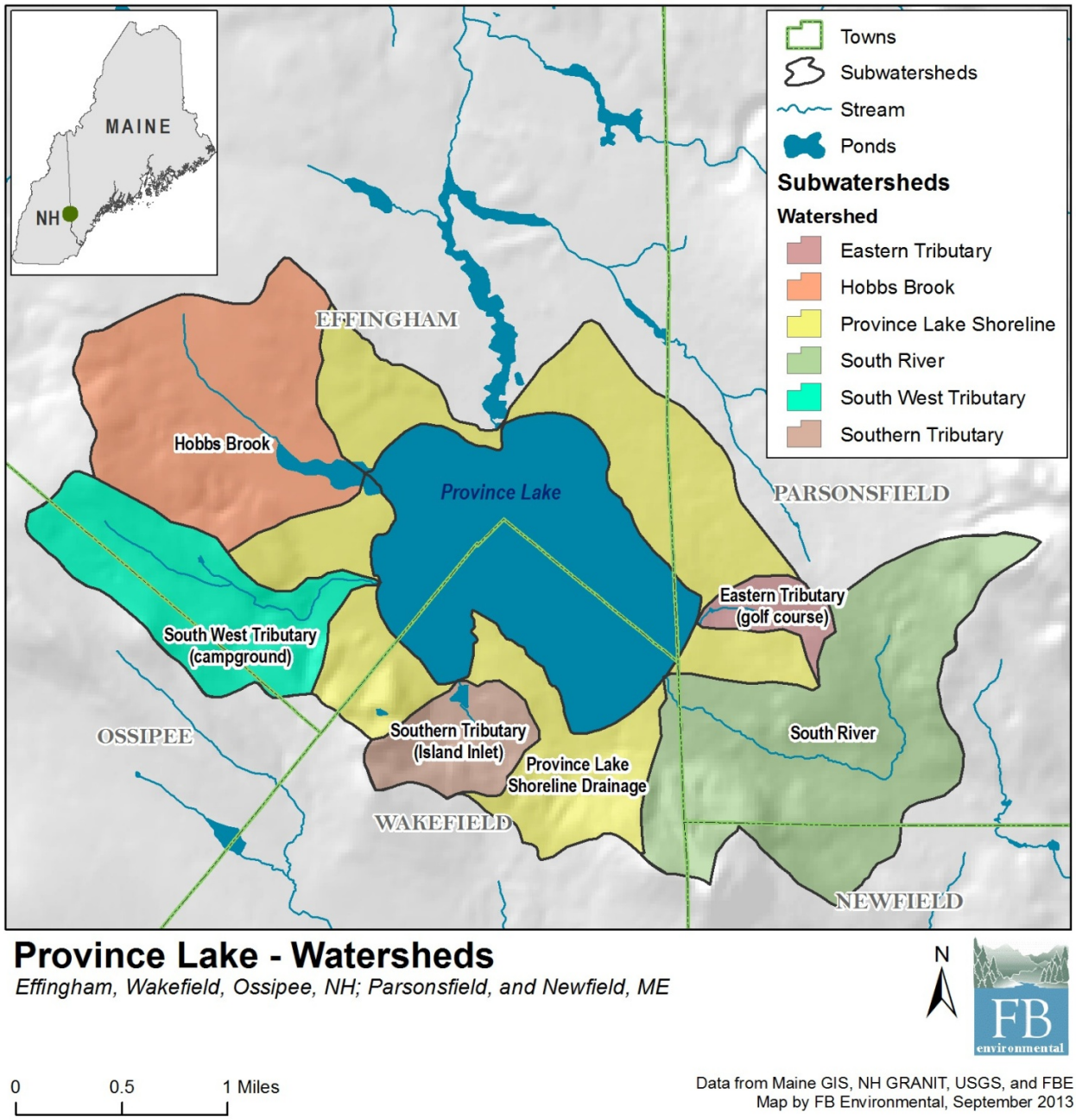

Figure 1: Province Lake watershed and catchment basins.

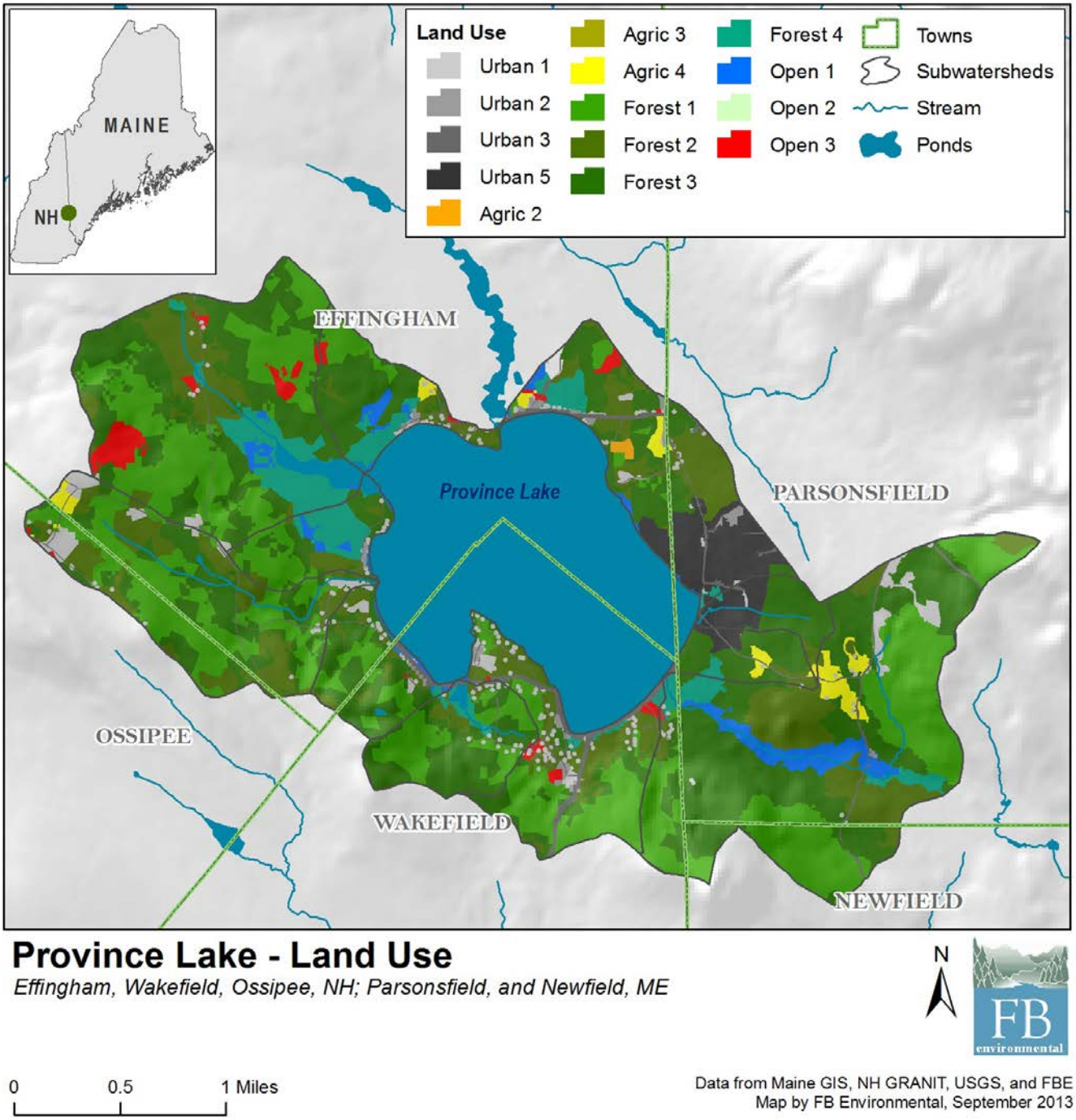

Figure 2: *Land uses in the Province Lake watershed.*

There is no "golf course" land used indicated in the phosphorus loading model we used for this project. The golf course has been labeled "urban 5" and uses a phosphorus coefficient equivalent to what has been documented in previous studies of New England lake watersheds.

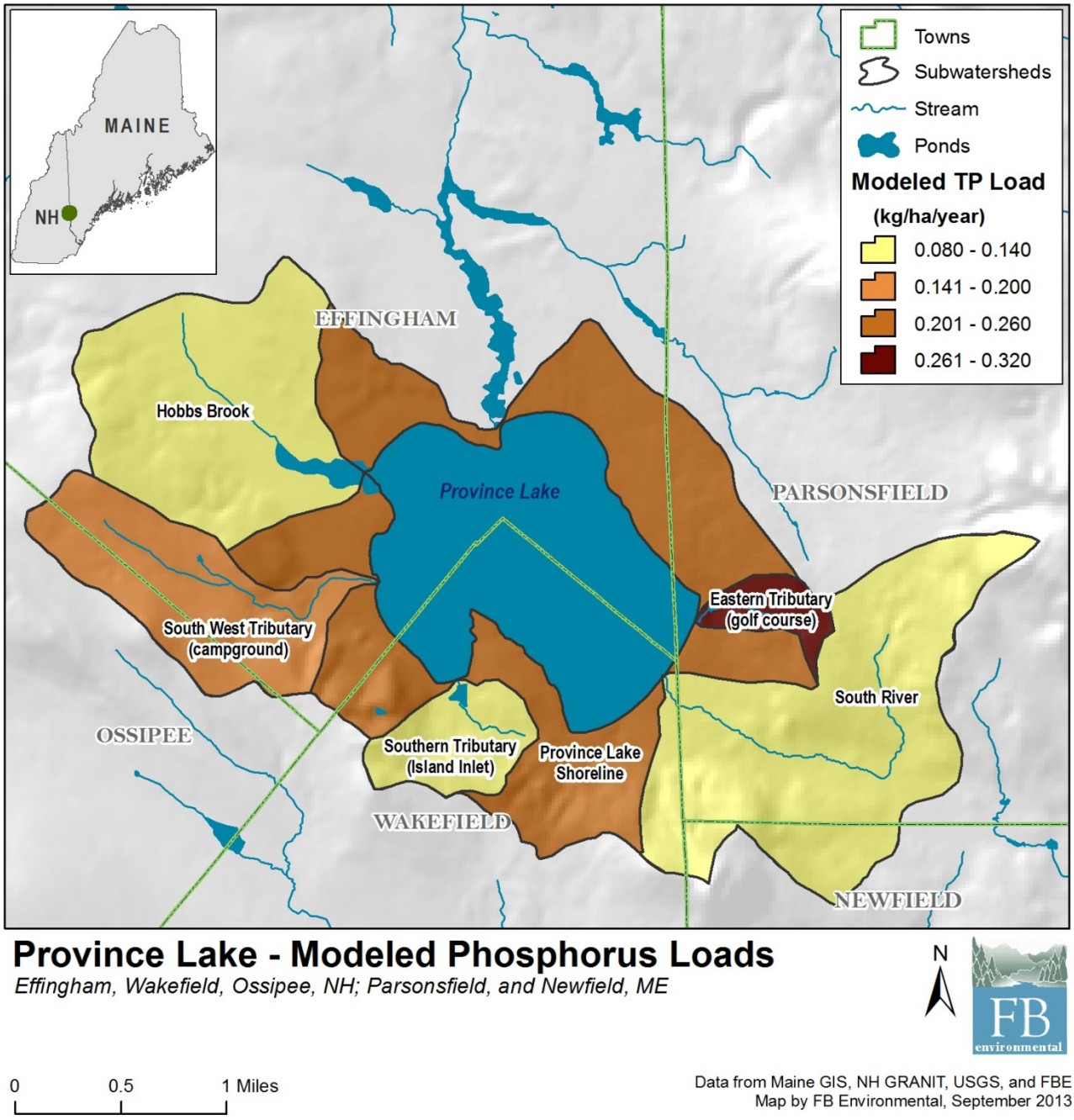

Figure 3: *Total Phosphorus loading by unit watershed area.*

The Province Lake Golf Club has a substantial portion of land (just under 300 acres) in the watershed. The tributary that is draining a portion of the golf course has high phosphorus levels based on water quality sampling results when compared with water quality data from the other tributaries. With these issues in mind Forrest Bell (FB Environmental Principal) and Jon Samuelson (PLA President) toured the course on June 19, 2013 for several hours with Bill Sherman of the Province Lake Golf Club. It became obvious during the tour that the course is taking many measures to be environmentally friendly. However, there is still potential to further treat the water that runs off of the course. The following pages offer some recommendations that will help reduce phosphorus loading from the golf course.

Chemical and Nutrient Treatment

Mr. Sherman estimated the amount of chemical and fertilizer treatment of the course:

Fungicide – applied to greens 4x per year

Insecticide – applied as needed

Herbicide – applied as needed on tees and fairways

Fertilizer – Phosphorus free fertilizer has been used since 2001. It is possible that historic phosphorus export from the golf course is still found in lake sediments. Current NPK rating is: 18-0-18 as needed on greens and 19-0-19 on tees and fairways.

Milorganite – used at times to melt ice on the greens.

Recommendations

We recommend that the Province Lake Golf Course continue to use phosphorus free fertilizers and take special care to reduce soil erosion on the course and to buffer drainage areas. Specific recommendations:

Hole #1. While this drainage has minimal flow of water most of the year we recommend an improved vegetative buffer of at least 10 feet on each side of the stream. This will allow for better filtering of nutrients and less erosion.

Hole #2 provides an example of an area where a large area of the course has not been mown. This area will promote better wildlife habitat for some species and may result in less surface runoff from the course. Nesting boxes could be added to this area. We recommend this practice in other areas of the course, where possible. We also believe this improves the aesthetic appeal of the course.

Hole #5. The area on the lake side of the hole would benefit from a wider vegetative buffer. This could be done by expanding the no-mow zone.

Hole # 6 (above) This cart path is eroding and the phosphorus laden runoff is directly entering the lake. Stabilization of the path with erosion controls in place is recommended.

Hole #6 (below) The area near the green should not be mown and plantings will help enhance the area and nutrient treatment.

Hole #7 The wetland system (above) and pond (below) provide some level of treatment of phosphorus from the upslope portions of the course. The drainage to the pond should have an enhanced vegetated buffer and no-mow zone. We recommend testing the water at the outlet of the pond to ensure that phosphorus export is minimal. We also recommend building an outlet structure at the pond where it discharges.

Hole #13 – This stream would benefit from an increased buffer. Simply letting the grass grow within the hazard would promote better nutrient treatment in this area of the course.

Hole # 15 – This well buffered stream could be marked as an environmentally sensitive hazard with signage to indicate that golfers cannot enter the area. This approach has been effective at other courses including Sable Oaks Golf Club in South Portland, Maine.

Additional Recommendation:

We recommend that the Province Lake Golf Club enroll in the Audubon Cooperative Sanctuary Program. This program certifies golf courses for meeting goals in six categories:

- Environmental Planning
- Wildlife and Habitat Management
- Chemical Use Reduction and Safety
- Water Conservation
- Water Quality Management
- Outreach and Education

For more details on this successful nationwide program please view the website:

http://www.audubonintemational.org/acspgolf

If you have any questions regarding this program or have questions about this report please contact Forrest Bell at 207-221-6699.