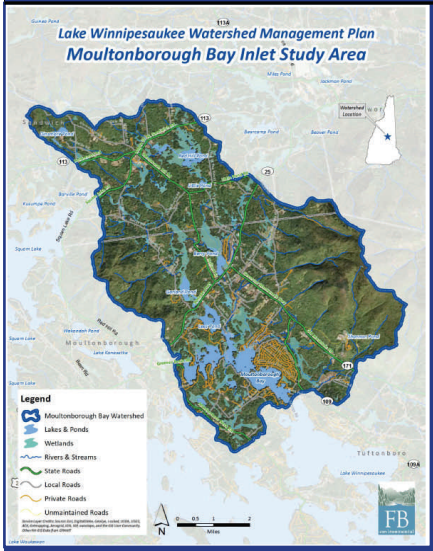
Moultonborough Bay Inlet Watershed Restoration Plan Development and Implementation: Phase 1

October 2014



Prospective Partners:

- *Lake Winnipesaukee Watershed Association (LWWA)*
- *Town of Moultonborough*
- *FB Environmental Associates*
- *NHDES*
- *Granite State Rural Water Assn*
- *Lakes Region Planning Commission (LRPC)*
- *New Hampshire Lakes Association (NH LAKES)*
- *University of New Hampshire (UNH) Center for Freshwater Biology*
- *Plymouth State University*
- *Town of Sandwich*
- *Carroll County Conservation District*

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Project Background

The Moultonborough Bay Inlet Watershed Restoration Plan Development and Implementation: Phase 1 project represents part of a long term strategy developed by the Lake Winnipesaukee Watershed Association and Lakes Region Planning Commission to protect the water quality of Lake Winnipesaukee through the reduction of nonpoint source pollution (NPS). NPS pollution occurs when rainfall, snowmelt, or irrigation water runs over land or through the ground, transporting materials which are then deposited into rivers, lakes, and coastal waters, or introduced into the groundwater. Pollutants can include chemicals, sediments, nutrients, and toxics. These materials can have harmful effects on drinking water supplies, recreation, fisheries, and wildlife. Land development or changes in land use can also cause NPS pollution by disrupting the natural hydrology of a waterbody, increasing impervious surfaces, and contributing to the loss of aquatic habitat.

Moultonborough Bay Inlet (MBI), the northernmost feature of Lake Winnipesaukee, historically has exhibited excessive levels of in-lake total phosphorus (TP) when compared to the other seven sub-basins which comprise Lake Winnipesaukee. In addition to Lake Winnipesaukee's current impairment for cyanobacteria, several waterbodies within the MBI sub-watershed are listed on the State's 305(b)/303(d) list for failure to fully support aquatic life use due to elevated concentrations of chlorophyll-*a*, insufficient dissolved oxygen, excessive total phosphorus (TP), and non-native aquatic plants (milfoil).

The Moultonborough community has made water quality protection a high priority, investing considerable resources (both financial and voluntary labor) over the past five years. To assist the community in focusing their efforts, the Lake Winnipesaukee Watershed Association (LWWA) has been awarded a NHDES Watershed Assistance grant to begin the development and implementation of a restoration plan that will identify sources of pollutants within the Moultonborough Inlet sub-watershed that have led to the impairments and propose measures to address those sources.

Project Team

Patricia Tarpey, Executive Director, LWWA
Forrest Bell, Principal, FB Environmental Associates
Don Kretchmer, Principal, DK Water Resource Consulting
University of NH Stormwater Center
NH Department of Environmental Services

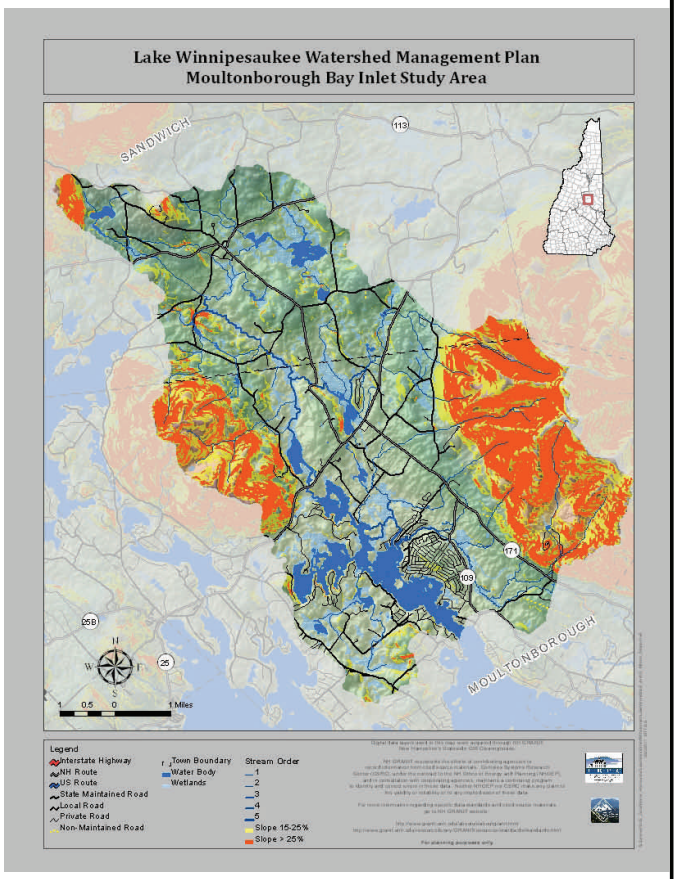
Moultonborough Bay Inlet Subwatershed

Subwatershed Characteristics

- Watershed Area: 31,556 acres
- MB Inlet water area: 1,017 acres
- Watershed/lake ratio: 31.0
- Mean Depth: 1.6 m
- Areal Water Load: 15.84 m/yr
- Flushing Rate: 9.96

Steep Slopes
- 2709 ac at > 25%
- 2338 ac between 15 — 25%

Communities	Area (acres)	% of Watershed
Moultonborough	21,514.7	68
Sandwich	10,038.3	31.8
Tamworth	3.3	



Land Use

- primarily rural residential
- seasonal

Potential nonpoint sources of pollutants
- Individual sewage disposal systems (i.e. septic systems)
- Roads –
  51.6 miles private roads
  44 miles Local
  27.4 miles State
- Large shorefront residential developments

Water Quality

Surface Waters: 10 Ponds - 4 are listed as marginal or severe for non support of aquatic life; Dinsmore, Garland, Lees and Meadow Brook

Dinsmore Pond—50 acres
Red Hill Pond - 172.8 acres
Berry Pond - 88 acres
Garland Pond—101.9 acres
Lees Pond - 153.5 acres

	Median TP (µg/L)	Mean Chl a (µg/L)
2010-2012	10.6	3.4

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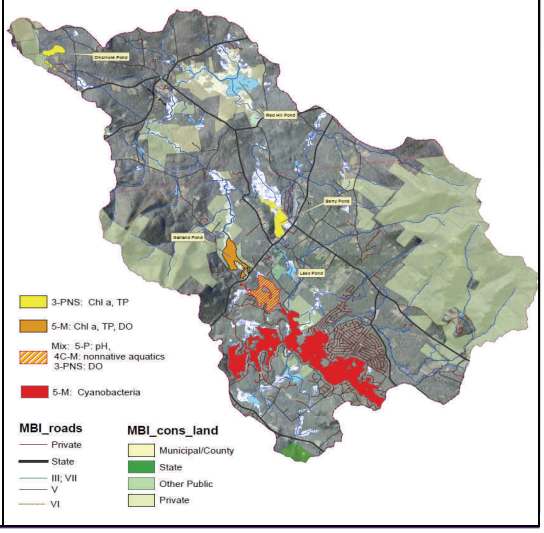
2012 Draft 305(b) Assessment Summary



Moultonborough Bay Inlet Sub-watershed

Project Scope

Desired outcome: In-lake TP and Chl-*a* concentrations in the MB Inlet are reduced to a level that the Inlet is no longer impaired for the aquatic life designated use.

Future phases and scope of work will focus on completing the restoration plan for the MB Inlet and implementation of the plan.

Restoration Management Plan Outcomes:

* stakeholder-driven process
* identification of pollutant sources
* In-lake total phosphorus (TP) threshold or goal
* recommendations and implementation strategies for public education,
* implementation of best management practices,
* site restoration projects,
* reduction of pollution source inputs.

Plan of Work

* Subwatershed delineations and maps
* Analysis of existing water quality data and Assimilative Capacity analysis
* Estimation of pollutant loading to the lake
* Input from local knowledge of residents, community officials to identify causes and sources
* Prioritization of sub-watersheds
* On the ground watershed assessments for a subset of the sub-watersheds
* Modeling of the in lake response to the phosphorus loading
* Setting of local water quality goal
* Review and analysis of relevant municipal regulations
* Estimate Pollutant Reductions needed to meet WQ goals
* Determine actions to reduce pollution in the selected sub-watersheds
    - Identify Management Measures and Restoration Sites
    - Identify land at risk, land to target for conservation
    - Incorporate Innovative Land Use Techniques and recommended BMPs from the NH Stormwater Manual
* Implementation Strategy will be developed which will identify responsible entities, resources, costs, and time table
* Conduct Outreach and Education

* Monitoring Success and Evaluation of the plan
* Implementation of best management practices

* Web based Interactive management plan - integrated with the Winnipesaukee Gateway website: www.winnipesaukeegateway.org

Moultonborough Bay Inlet Subwatershed

Examples of potential implementation projects:

States Landing—some recommendations by NH LAKES

Remove asphalt apron along ramp. On both sides of ramp, install a series of stone check-dams and pocket rain gardens planted with native vegetation.

Install an open top culvert across top of access road that will convey flow into naturally vegetated areas.

Improve boat launch into lake by upgrading to a concrete ramp with drywells located on either side to collect runoff and allow for infiltration.