

Vermont Department of Environmental Conservation

Ticklenaked Pond Phosphorus Action Plan

August, 2008

Section 303(d) of the Clean Water Act requires waters that do not meet state water quality standards have a Total Maximum Daily Load (TMDL) analysis prepared. A TMDL is a document that articulates the maximum permissible load of any given pollutant that can enter a waterbody while allowing that waterbody to attain the water quality standards for that pollutant.

Ticklenaked Pond, in Ryegate, Vermont, has had increasing water quality problems for several years. Late summer algae blooms, reduced water clarity, low deepwater dissolved oxygen, elevated pH, and recently, blooms of cyanobacteria are symptoms of systemic, excessive loadings of phosphorus to this lake. Excessive amounts of phosphorus in the lake feed algae growth to the extent that problem conditions are routinely present. Recently the Ticklenaked Pond Watershed Association (TWPA), the Natural Resources Conservation Service, and watershed landowners have worked within the watershed to reduce sources of phosphorus. Simultaneously, VTDEC has carried out a comprehensive study of phosphorus loadings to the Pond, to prepare a TMDL for the pond.

This Phosphorus Action Plan is designed as a companion to the TMDL. This plan articulates specific actions to reduce phosphorus discharges that will allow the pond to attain a long-term in-lake total phosphorus concentration that attains water quality standards. The current annual mean total phosphorus concentration in Ticklenaked Pond is 41 parts-per-billion, and the target concentration to attain water quality standards is 24 ppb. The minimum total load reduction necessary to achieve this concentration is 40 kg, or a 28% reduction of the current load of 144 kg/yr.

There are numerous combinations of reductions amongst the various non-point sources that could be invoked to achieve this reduction. One solution would be to divide the necessary reductions equally amongst the various land use categories. This is neither equitable, nor achievable. As an example, a 28% reduction in phosphorus discharge from forest lands, ponds, and wetlands is not practical. One important approach to reliably reduce loads by 24 kg/yr involves inactivation of sediment phosphorus recycling mechanisms. In lakes where internal phosphorus cycling exists but is not addressed, water quality responses to external load reductions are sometimes delayed (e.g., St. Albans Bay, Lake Champlain). Inactivating sediment phosphorus recycling mechanisms in the lake by means of an alum treatment (or other treatment approaches) would have the added benefit of ensuring that watershed reductions would improve water quality in a short timeframe. VTDEC and the partners listed in the TMDL suggest that the phosphorus reductions shown below, which would exceed the minimum necessary, are realistically achievable.

Proposed phosphorus reductions to achieve the Ticklenaked Pond TMDL.

Class	Current P loading (kg)	Proposed reduction (kg)	Proposed % reduction by class	Percent of total reduction sought	Final load (kg)
Agricultural - row crop	64	13	20%	27%	51
Agricultural - pasture/grass*	22	7	32%	14%	15
Rural residential**	6	2.5	42%	5%	3.5
Roads and driveways	5	2.5	50%	5%	2.5
Forest	16	0	0%	0%	16
Wetlands	2	0	0%	0%	2
Precipitation	2	0	0%	0%	2
Septic loads	3	1	33%	2%	2
Internal nutrient recycling	24	24	100%	49%	0
Total	144	50		100%	94

*) Includes reductions from farmsteads and barnyards

***)Not including roads and driveways.

The Ticklenaked Pond Phosphorus Action Plan has three components, or phases: 1) planning activities to identify and implement controls on non-point discharges in the watershed; 2) implementation of watershed controls, planning of in-lake controls on internal phosphorus recycling and correction lakeshore sources; 3) execution of an in-lake treatment to control internal nutrient recycling.

VTDEC, through the Basin Planning Process, is committed to ensuring the successful implementation of this TMDL. Following these four general principals is necessary for Ticklenaked Pond to meet water quality standards:

- 1) Execution of the Ticklenaked Pond Phosphorus Action Plan.
- 2) Adherence of watershed residents and businesses to applicable State regulations pertaining to septic design and maintenance, and State enforcement of these regulations.
- 3) Enforcement of Accepted Agricultural Management Practices, implementation of certain best management practices, and comprehensive nutrient management planning.
- 4) Enforcement of Accepted Management Practices for Logging jobs in Vermont, and permitting of heavy forest cuts as required by 10 V.S.A. 83 §2625.

Phase I - Watershed Planning

There are five action items necessary to prepare for implementation of this plan. They include stream and road surveys, and nutrient management planning where necessary.

Action Item: Complete initial stream surveys

Activity: Complete initial stream survey of the Scotch Burn, and east and west tributaries, to identify potential phosphorus sources and prioritize projects for action or further investigation. These surveys will be needed to determine the need and locations of many of the actions listed below.

Participants: TPWA, VTDEC, CCNRCD

Schedule: 2008-2009

Funding Source: TPWA, VTDEC Watershed Planning funds

Action Item: Phase I and II geomorphic assessments

Activity: Complete Phase I and II Geomorphic assessments of Scotch Burn, east and west tributaries. Phase I and II assessments will identify segments of streams that may need in-stream remediation actions

Participants: VTDEC – River Management Program (RMP), TPWA, CCNRCD or CCRPC.

Schedule: 2008-2009

Funding Source: VTDEC River Management Program grants

Action Item: Coordinate comprehensive nutrient management planning (NMP) for farms in the watershed

Activity: Development of comprehensive nutrient management plans will provide a menu of practices to be implemented within the agricultural sector to achieve quantifiable phosphorus reductions.

Participants: VTAAFM, NRCS.

Schedule: 2008-2009

Funding Source: VTAAFM, NRCS

Action Item: Conduct watershed road erosion inventory, evaluate town road maintenance practices

Activity: The Vermont Better Backroads Program provides planning grants to identify town-wide road runoff sites and evaluate current practices.

Participants: VT Better Backroads Program, Town of Ryegate

Schedule: 2009

Funding Source: VT Better Backroads Program

Action Item: Conduct private road erosion inventory and conduct private road maintenance workshop.

Activity: Evaluate private roads for potential erosion sources and provide information on road improvement practices in a workshop setting.

Participants: VTDEC, TPWA

Schedule: 2009

Funding Source: VTDEC Watershed planning funds, TWPA

Phase II - Watershed Implementation, Lake Planning

There are 10 actions necessary to address watershed phosphorus sources, and prepare for an in-lake treatment to inactivate phosphorus recycling from sediments. These include fixing sites identified during Phase I activities, and plan for the in-lake treatment.

Action Item: Establish native vegetation along streambanks

Activity: Where appropriate, revegetate buffers along the Scotch Burn. Buffers are essential to reducing phosphorus runoff from adjacent lands to the river, and subsequently, to the lake itself.

Participants: VTDEC RMP, TPWA, CCNRCD or CCRPC.

Schedule: 2008-2009

Funding Source: VTDEC §319 Grants Program

Action Item: Conduct stream restoration or conservation projects

Activity: Where appropriate, use geomorphic principals to guide the implementation of stream restorations. This would be appropriate in areas on bank failure or in areas of high channel adjustment processes.

Participants: VTDEC, TPWA, CCNRCD, NRCS, or CCRPC.

Schedule: 2008-2009

Funding Source: VTDEC §319 Grants Program; NRCS project implementation funds

Action Item: Install stream fencing in areas of need along Scotch Burn

Activity: Where appropriate, preclude livestock from accessing the Scotch Burn and small tributaries.

Participants: CCNRCD, NRCS.

Schedule: 2008-2009

Funding Source: NRCS EQUIP

Action Item: Consider a stream corridor protection beltway

Activity: Where geomorphic instability is high, a new approach to managing streams is to conserve the entire stream beltwidth. Beltwidth establishment removes considerable areas from potential production, but can be the most appropriate method to reduce nutrient inputs to highly degraded streams over the long-term.

Participants: RMP, CCNRCD, NRCS.

Schedule: 2010

Funding Source: NRCS EQUIP

Action Item: Implement BMPs at watershed farms as identified by NMPs

Activity: Implement BMP's

Participants: VTAAF, NRCS.

Schedule: 2009-2010

Funding Source: VTAAF, NRCS

Action Item: Revise prior manure management approach in areas adjacent to the Scotch Burn to reduce likelihood of spring manure loss to the lake.

Activity: Prior manure management approaches have involved spreading manure in the downstream-most fields most proximal to the lake, in lands drained by Trib 02 and Trib 03. VTDEC has evidence of major losses of manure to the iced surface of the lake following legal springtime spreading. Modifying the timing, location, and approach of spreading will reduce considerable loss of manure, sediments, and phosphorus to the lake.

Participants: VTAAFAM, NRCS.

Schedule: 2009

Funding Source: VTAAFAM, NRCS

Action Item: Repair high-priority road erosion sites

Activity: repair sites

Participants: VTAAFAM, NRCS.

Schedule: 2009-2010

Funding Source: VT Better Backroads Program, Town of Ryegate

Action Item: Survey lakeshore and near-lake septic systems for compliance with State regulations and functionality

Activity: There are relatively few septic systems directly adjacent to the lake or inlet stream. These need to be surveyed for their present functionality.

Participants: TWPA, Town of Ryegate, VTDEC

Schedule: 2008-2009

Funding Source: Town of Ryegate

Action Item: Generate alternatives and cost estimates for an in-lake treatment to interrupt in-lake sediment phosphorus recycling

Activity: Carrying out an in-lake treatment necessitates a systematic evaluation of alternatives among competing approaches for sediment phosphorus recycling. The alternatives need to be evaluated and monetized for Ticklenaked Pond.

Participants: VTDEC

Schedule: 2009-2010

Funding Source: VTDEC

Action Item: Acquire funding and permit authorization to implement in-lake treatment to interrupt in-lake sediment phosphorus recycling

Activity: Regardless of the approach chosen, in-lake treatments are costly, and a period of time will be necessary to raise sufficient funds to implement the project. Simultaneously, there will be the need to acquire appropriate State permits for the project.

Participants: VTDEC Aquatic Nuisance Control Program, USEPA.

Schedule: 2010

Funding Source: VTDEC (permitting processes), USEPA, other Federal funds (project funding)

Phase III – Lakeshore and in-Lake Implementation

The four actions associated with lakeshore and in-lake treatment will address phosphorus sources directly adjacent to the lake, as well as internally-recycled phosphorus.

Action Item: Host workshop on septic maintenance and organize an organization-wide collaborative septic pumpout program

Activity: Lakeshore and watershed residents will benefit from a common understanding on the best practices for septic system maintenance. In addition, TPWA residents may consider a collaborative approach to purchasing pumpout and maintenance services that would provide cost efficiencies.

Participants: Town of Ryegate, TPWA

Schedule: 2008-2009

Funding Source: Individuals and/or TPWA

Action Item: Host workshop on lakeshore property maintenance

Activity: Conduct workshops and outreach about management tips for living on the lakeshore to minimize phosphorus loading to the lake. Includes such issues as lawn fertilizers, and shoreland vegetation.

Participants: VTDEC, TPWA

Schedule: 2008-2009

Funding Source: Individuals and/or TPWA

Action Item: Repair/replace failing septic systems

Activity: Repair systems as necessary

Participants: Town of Ryegate, individual property owners

Schedule: 2009-2010

Funding Source: Individual

Action Item: Implement in-lake treatment to interrupt in-lake sediment phosphorus recycling

Activity: Treat lake

Participants: VTDEC, USEPA, contractor

Schedule: 2011

Funding Source: USEPA, VTDEC §319 Grants Program