PHOSPHORUS CONTROL ACTION PLAN

and Total Maximum Daily (Annual Phosphorus) Load Report

THREECORNERED POND

Kennebec County

Threecornered Pond PCAP-TMDL Report

Maine DEPLW 2002 - 0562

Maine Department of Environmental Protection

and Maine Association of Conservation Districts

Final EPA Review Document

July 2, 2003 (Revised September 4, 2003)

THREECORNERED POND

Phosphorus Control Action Plan (PCAP)

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ACKNOWLEDGMENTS

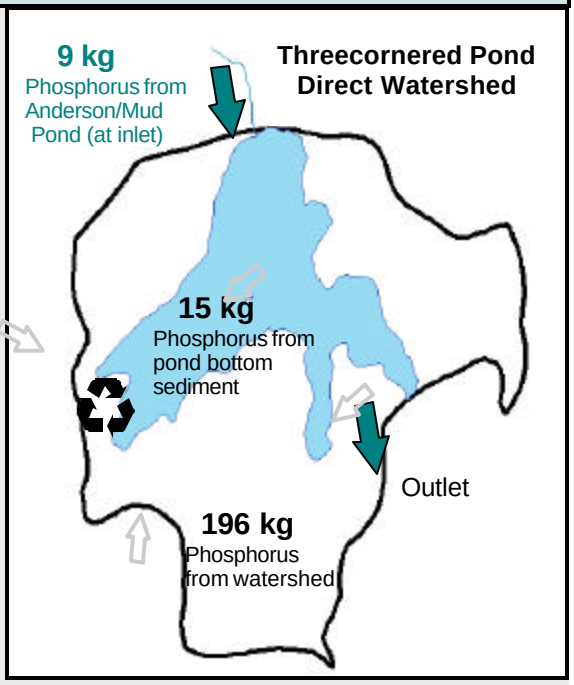
In addition to Maine DEP and US-EPA New England Region I staff, the following individuals and groups were instrumental in the preparation of this Threecornered Pond Phosphorus Control Action Plan and Total Maximum Daily (Annual Phosphorus) Load report: MACD watershed inventory staff (Jodi Michaud Federle, Tim Bennett and Forrest Bell); Kennebec County SWCD (Nate Sylvester and Dale Finseth); China Region Lakes Alliance (Reb Manthey and Jon Van Bourg); the City of Augusta (Leif Dahlin, Leo St. Peter, Bruce Keller) and Town of Vassalboro officials and office staff; the Threecornered Pond Improvement Association (with special thanks to Phil and Jany Choate for providing lake access for sampling, and current President Joan Jones for her assistance); past and present VLMP monitors (Jane Weeks, Joyce Small, Joan Jones and Leo St. Peter); the Maine Forest Service (Morten Moesswilde); the Maine Department of Agriculture (David Rocque); and the Maine Department of Inland Fish & Wildlife (Jim Lucas).

THREECORNERED Pond Phosphorus Control Action Plan

Background

THREECORNERED POND is a 180-acre, lightly-colored waterbody situated in Augusta in Kennebec County, south central Maine. Threecornered Pond has a direct **watershed** area of 3,272 acres (5.1 square miles) and is located within the towns of Augusta, Vassalboro and to a lesser extent, Windsor. This pond has a maximum depth of 33 feet, a mean depth of 12 feet; and a **flushing rate** of 3.24 times per year. Threecornered Pond drains into Threemile Pond as part of the total Webber Pond watershed drainage area (23 square miles).

Threecornered Pond is a waterbody that has impaired water quality due primarily to **nonpoint source pollution**, however, to a much lesser extent than downstream associated Threemile and Webber ponds. Phosphorus is naturally occurring in area soils and soil erosion in lake watersheds can have far-reaching lake consequences. Soil particles transport the phosphorus, which essentially "fertilizes" the lake and decreases water clarity. Excess phosphorus can also harm fish habitat and lead to nuisance algae blooms, which significantly reduces water clarity and shoreline property values.

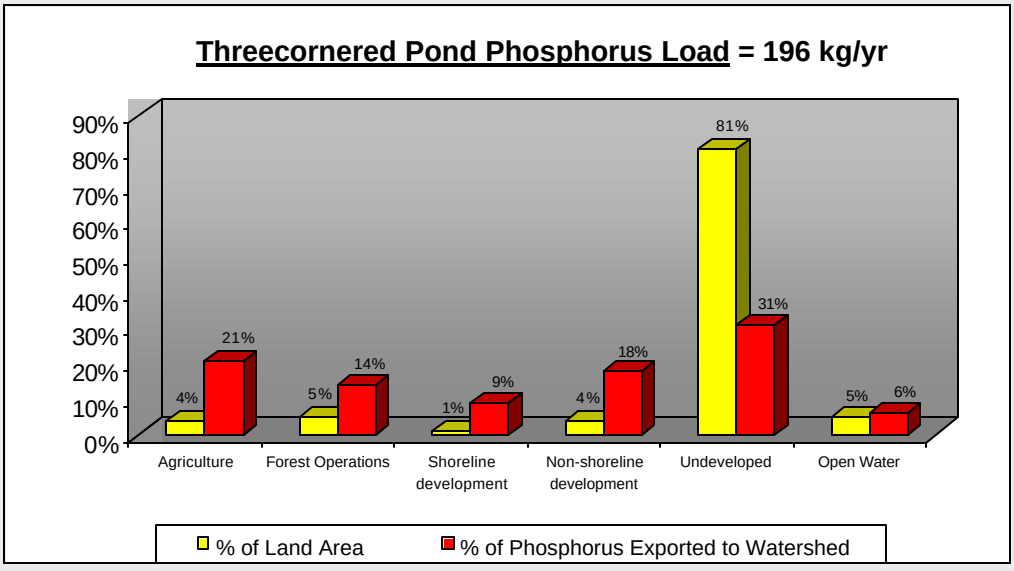


Stakeholder Involvement

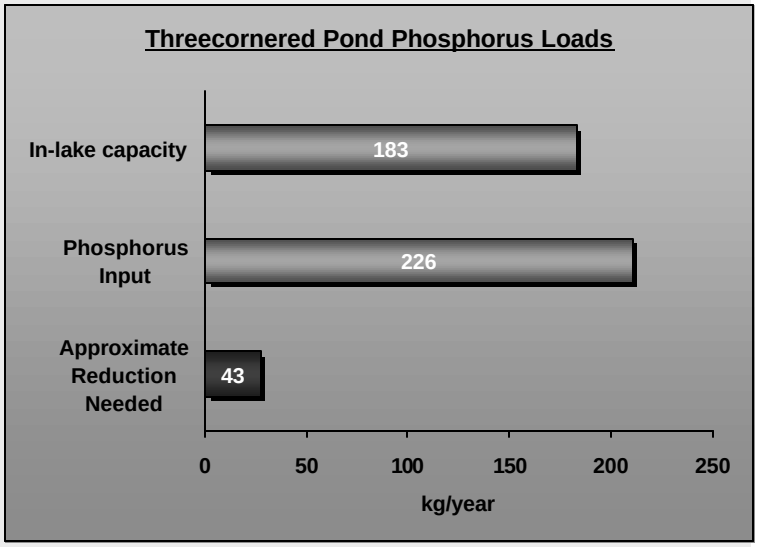
With these issues in mind, federal, state, county, and local groups have been working together to address water quality problems in Threecornered Pond. In 2001, the Maine Department of Environmental Protection funded a project in cooperation with the Maine Association of Conservation Districts, Kennebec County Soil and Water Conservation District, China Region Lakes Alliance, and the Threecornered Pond Improvement Association to identify and quantify the potential sources of phosphorus and identify the need for **Best Management Practices** to be installed in the watershed. A final draft report, completed in late spring of 2003, is entitled "Threecornered Pond Phosphorus Control Action Plan" and doubles as an official **TMDL** report that will be submitted to the US EPA for their final review and approval.

What We Learned

Representative land use was assessed for the Threecornered Pond watershed to determine all potential sources of phosphorus that may run off from different land areas during storm events and springtime snow melting. This assessment involved generating and interpreting topographic maps, inspecting aerial photos, and conducting



watershed and shoreline surveys.



Based on land use assessments, an estimated 196 kilograms (kg) of phosphorus per year is exported to Threecornered Pond directly from the surrounding watershed. An additional 9 kg is contributed from Anderson Pond indirect drainage. Only 15 kg of phosphorus is being recycled internally from the bottom sediments during the summertime, while another 6 kg is added on an annual basis to account for future development. The graph (right) depicts Three-cornered Pond total P-loads approximating 226 kg/yr, which exceeds its capacity (183 kg) to effectively process/assimilate phosphorus. Therefore, the minimum amount needed to be reduced on an annual basis to ensure that Threeecornered Pond continues to be free of nuisance summertime algae blooms approximates 40-50 kg of phosphorus.

What You Can Do To Help!

As a watershed resident there are many things you can do to protect and enhance the water quality of Threecornered Pond. Lakeshore owners can use phosphorus-free fertilizers, have naturally vegetated buffers adjacent to the lake and perform regular septic system maintenance. Agricultural and commercial land users can consult the Kennebec County Soil and Water Conservation District or Maine DEP for information regarding Best Management Practices for reducing phosphorus pollution. All watershed residents can become more involved by participating in events sponsored by China Region Lakes Alliance.

This shoreline dwelling has a naturally vegetated buffer that will help to reduce runoff into Threecornered Pond.

Watershed residents can learn more about their lake & water quality by reviewing the Threecornered Pond PCAP-TMDL report. Following final US EPA approval, copies of this detailed report, with recommendations for future nonpoint source BMP work, will be available online at www.state.me.us/dep/blwq/docmonitoring/tmdl2.htm, or can be viewed and/or copied (at cost) at Maine DEP offices in Augusta (Bureau of Land & Water Quality).

Key Terms

- ***Watershed*** *is a drainage area or basin in which all land and water areas drain or flow toward a central collector such as a stream, river, or lake at a lower elevation.*
- ***Flushing rate*** *refers to how often the water in the entire lake water is replaced on an annual basis.*
- ***Nonpoint Source (NPS) Pollution*** *is polluted runoff that originates from numerous, small overland sources as opposed to a direct or point source.*
- ***Phosphorus****: is one of the major nutrients needed for plant growth. It is naturally present in small amounts and limits plant growth in lakes. Generally, as phosphorus increases, the amount of algae also increases.*
- ***Best Management Practices*** *are techniques to reduce sources of polluted runoff and their impacts. BMP's are low cost, common sense approaches to reduce storm runoff and velocity to keep soil out of lakes and tributaries.*
- ***TMDL*** *is short for Total Maximum Daily Load, which represents the total amount of a pollutant (e.g., phosphorus) that a waterbody can receive and still meet acceptable water quality standards.*

Project Premise

This project, funded through a 319-grant from the United States Environmental Protection Agency (EPA) was directed and administered by the Maine Department of Environmental Protection (DEP) in partnership with the Maine Association of Conservation Districts (MACD), from the summer of 2001 through the late spring of 2003.

The objectives of this project were twofold: First, a comprehensive land use inventory was undertaken to assist Maine DEP in developing a Phosphorus Control Action Plan (PCAP) and a Total Maximum Daily Load (TMDL) report for the Threecornered Pond watershed. Simply stated, a TMDL is the total amount of **phosphorus** that a lake can receive without harming water quality. The Maine DEP, with the assistance of the MACD project team, will address and incorporate public comments before final submission to the US-EPA New England regional offices. *(For more specific information on the TMDL process and results, refer to the Appendices or contact Dave Halliwell at the Maine DEP Augusta Office at 287-7649 or at David.Halliwell@maine.gov*).

Secondly, watershed survey work, including a shoreline, septic and town roads survey evaluation, was conducted by the MACD project team to help assess direct drainage **nonpoint source (NPS) pollution** sites and **total phosphorus** reduction techniques that would be beneficial for the Threecornered Pond watershed. The MACD Project Team did not attempt to conduct a full-scale watershed survey for Threecornered Pond since the China Region Lakes Alliance (CRLA) intends to conduct an extended watershed survey later in 2003. Instead, a limited survey focused on the state and town roadways and numerous camp/private roads as well as the shoreline of Threecornered Pond. The results of this limited survey are intended to be a source of additional information on NPS pollution sites for the CRLA, the Threecornered Pond Improvement Association (TPIA), and the watershed municipalities of Augusta, Vassalboro and Windsor. It is anticipated that the mitigation of these sites can be addressed using available programs and resources through the CRLA, the TPIA, the Kennebec County Soil and Water Conservation District and Maine DEP. **Note:** *In order to protect the confidentiality of landowners in the watershed, site-specific information has not been provided as part of this report.*

Nonpoint Source (NPS) Pollution *- is polluted runoff that cannot be traced to a specific origin or starting point, but appears to flow from many different sources.*

Total Phosphorus (TP) *- is one of the major nutrients needed for plant growth. It is generally present in small amounts and limits the plant growth in lakes. Generally, as the amount of lake phosphorus increases, the amount of algae also increases.*

The Phosphorus Control Action Plan project compiles and refines land use data that was derived from various sources, including watershed municipalities, Threecornered Pond Improvement Association, Kennebec County Soil and Water Conservation District, and the CRLA. Local citizens, watershed organizations, and conservation agencies should benefit from this compilation of data as well as the watershed assessment and Best Management Practice (BMP) recommendations. Above all, this document is directly intended to help Threecornered Pond stakeholder groups effectively prioritize future BMP work in order to obtain the resources necessary for implementation of NPS pollution mitigation work in their watershed.

Study Methodology

Threecornered Pond background information was obtained using several methods, including (1) review of a 314 Diagnostic Feasibility study of the watershed area completed by Maine DEP in 1982; (2) water quality monitoring data provided by the Maine DEP supported Volunteer Lake Monitoring Program (VLMP); (3) numerous phone conversations and personal interviews with municipal officials, regional organizations and state agencies; and (4) several field tours of the watershed, including boat reconnaissance of the lake and shoreline.

Land use data were determined using several methods, including (1) **Geographic Information System (GIS)** map analysis, (2) analysis of topographic maps, (3) analysis of town property tax maps and tax data, (4) analysis of aerial photographs (1992 & 1997) and (5) field visits. Much of the undeveloped land use area (i.e., forest, wetland, reverting fields) were determined using GIS maps utilizing data from the Penobscot Bay Land Cover 1995/96 for the Coastal Change Analysis Program. The developed land use areas were obtained using the best possible information available through analysis of methods 2 through 5 listed above. Necessary adjustments to the GIS data were made using best professional judgment.

> ***GIS**—or **geographic information system** combines layers of information about a place to give you a better understanding of that place. The information is often represented as computer generated maps.*

Roadway data were gathered by taking actual road width measurements of the various types of roads (state, town, private/camp) in the watershed. The roads were measured between the two outer edges of the roadside ditches or berms. Final measurements for all roadways within the watershed were extrapolated using GIS and USGS topographical maps. The roadway area was determined using linear distances and the average of three to five width measurements for each of the three main road types. Additional land use data (i.e. residential, institutional) were determined using GIS, aerial photos, topographic and property tax maps as well as personal consultation and field visits.

Agricultural information within the Threecornered Pond Watershed was provided by the Kennebec County Soil and Water Conservation District (SWCD). Information regarding forestry harvesting operations was provided by the Maine Forest Service, Department of Conservation.

Additional land use data (i.e., non-shoreline residential, institutional) were determined using GIS cover mapping, aerial photos, topographical and property tax maps as well as personal consultation and field visits, where necessary.

Study Limitations

Land use data gathered for the Threecornered Pond watershed is as accurate as possible given available information and resources utilized. However, the final numbers for the land use analysis and phosphorus loading numbers are approximate at best, and should be viewed as carefully researched estimations only.

THREECORNERED POND Phosphorus Control Action Plan

DESCRIPTION of the WATERBODY and WATERSHED

*The **direct watershed** refers to the land area that drains to the lake without first passing through another lake or pond.*

Threecornered Pond is a single-basin, 180-acre drainage lake, located in Augusta (DeLorme Atlas, Map 13), within Kennebec County in south central Maine. Threecornered Pond has a **direct** watershed area of 3,272 acres (5.1 square miles) within Augusta, Vassalboro and Windsor. Threecornered Pond is a lightly colored waterbody (mean 36 SPU's) with a maximum depth of 33 feet, an overall mean depth of 12 feet and a flushing rate of 3.24 times annually. The total Threecornered Pond watershed drainage area includes the subwatershed of Anderson Pond (a.k.a. Little Mud or Evers Pond), which is considered in this report as an indirect external watershed load.

Drainage System: Threecornered Pond is the headwater source for a chain of lakes that make up the entire Webber Pond watershed. Threecornered Pond, to the southwest, flows southeast to join with the non-303(d) listed Mud Pond outlet stream, and continues to flow northeast to drain into Threemile Pond at its southern end. Threemile Pond outlets to Webber Pond via Seaward Mills Stream, located at the northwest end of the pond. Webber Pond then flows southwest into the Kennebec River via its outlet (Sevenmile) stream. A number of intermittent and perennial streams drain into Threecornered Pond with Stony Brook being the major tributary, located at the north end of the pond (Maine DEP 1982). Threecornered Pond has a single outlet at the dam closest to the Weeks Mills Road.

*Waterbodies within designated **NPS Priority Watersheds** have significant value from a regional or statewide perspective and have water quality that is either impaired or threatened to some degree due to NPS water pollution. This list helps to identify watersheds where state and federal agency resources for NPS water pollution prevention or restoration should be targeted.*

Water Quality Information

Threecornered Pond is listed on the Maine Department of Environmental Protection's 303(d) list of lakes that do not meet State water quality standards as well as the State's **Nonpoint Source Priority Watersheds** list. Hence, a draft action plan (and TMDL) was publically reviewed and finally completed in the late spring of 2003.

***Secchi Disk Transparency**—a measure of the transparency of water (the ability of light to penetrate water) obtained by lowering a black and white disk into water until it is no longer visible.*

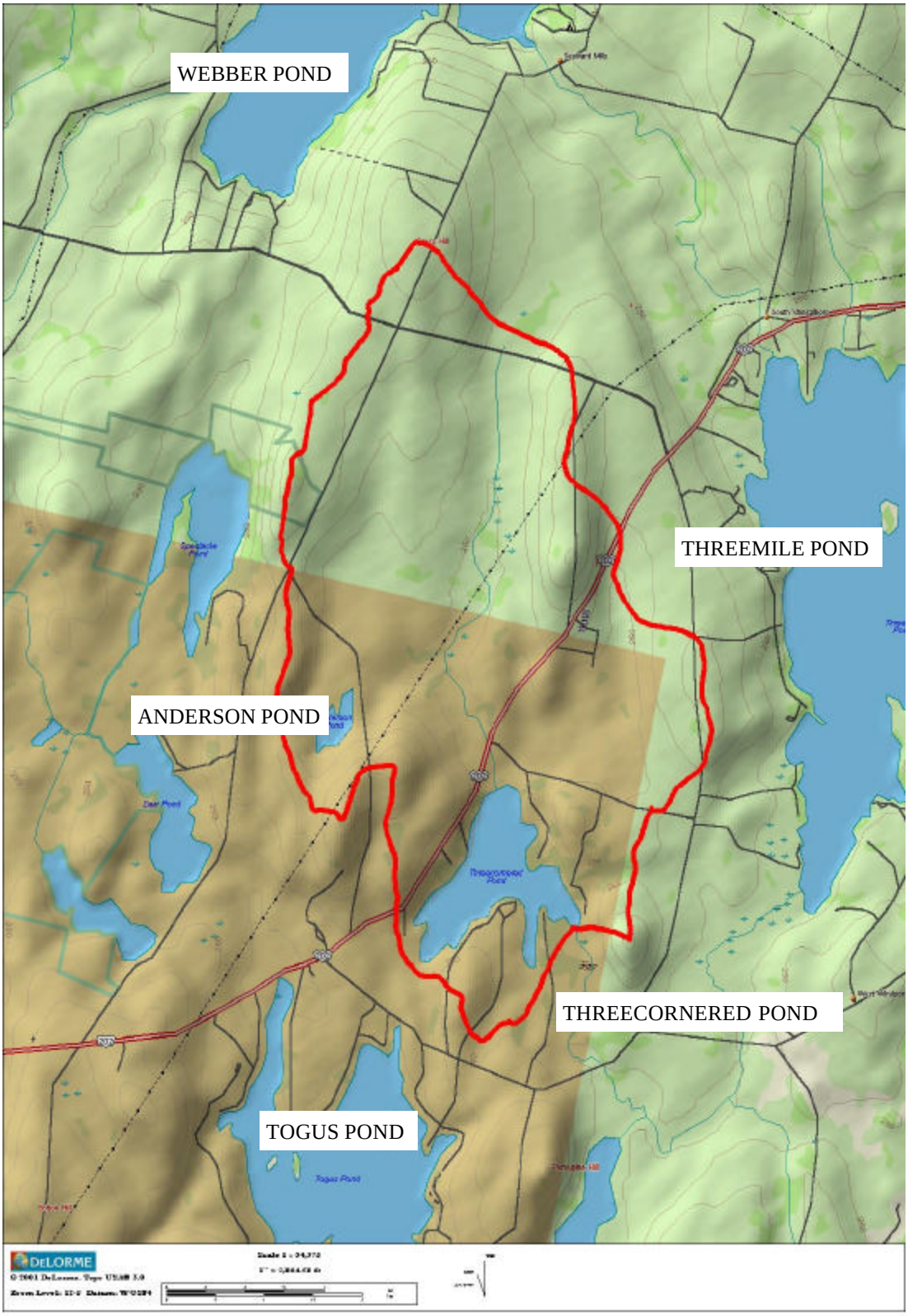
Water quality data for Threecornered Pond has been collected on a non-continuous basis since 1976 through Maine DEP and VLMP efforts. Based on **Secchi disk transparencies** and measures of total phosphorus, **dissolved oxygen**/ temperature profiles and **chlorophyll-a**, the water quality of Threecornered Pond is appears to be on the decline and the potential for nuisance summertime algae blooms is moderate (VLMP 2002).

***Dissolved Oxygen**—refers to the amount of oxygen measured in the water. It is used by aquatic organisms for respiration. The higher the temperature, the less oxygen the water can hold. Oxygen will naturally decline during the summer months as water temperatures rise.*

***Chlorophyll-a** is a measurement of the green pigment found in all plants including microscopic plants such as algae. It is used as an estimate of algal biomass—the higher the chlorophyll-a number, the higher the amount of algae in the lake.*

Nonpoint source (overland) pollution is the major reason for declining water quality in Threecornered Pond. During and following storm events, nutrients (phosphorus in particular), naturally found in Maine soils– drain into the lake from the

Figure 1. THREECORNERED Pond Watershed



surrounding watershed by way of streams and overland flow.

Phosphorus can be thought of as a fertilizer—a primary food for all plants, including algae, and is naturally limited in lakes. When lakes receive excess phosphorus from NPS pollution, it "fertilizes" the lake by feeding the algae. Too much phosphorus can result in nuisance algae blooms, which can damage the ecology/aesthetics of a lake, as well as the economic well-being of the entire community.

The swimming area of the Bicentennial Nature Park.

Public Access: The City of Augusta owns and operates the *Bicentennial Nature Park*, which began operating in July of 2001 and is limited to Augusta residents only. The park encompasses approximately 25 acres on the southeastern shore of Threecornered Pond off of Route 3. There is not a sandy beach area, but a docking system that provides lake access to a cordoned swim area, complete with a floating dock (see photo at right). There are picnic tables and grills on-site. Access for canoes and kayaks (hand-carry only) is provided as well as a designated fishing area and limited nature trails that connect the park to the parking area, which consists of two larger gravel parking areas and several smaller parking 'pods' designated for cars with canoes or kayaks. The maximum capacity is 54 cars or 150 people.

An "unofficial" public access site is located off the Lamson Road at the inlet stream where people park on the side of the road and hand carry canoes and kayaks to the water. There are no public campgrounds available, nor is there any official public access site for non-Augusta residents.

Human Development: Dominant human use of the Threecornered Pond shoreline is residential (both seasonal and limited year-round occupancy) and recreational – including fishing, boating, and beach use. Threecornered Pond is a relatively undeveloped lake with many large shoreline lots, especially on the western and northeastern shorelines of the pond. Only about 20 to 25 percent of the shoreline area is currently developed (MACD 2002). There are 43 shoreline dwellings, of which 72% are seasonal cottages and 28% are year-round homes (Augusta Tax Records, MACD 2002). The threat of seasonal to year-round conversions is apparently not of great concern at this time. Within the last decade, there has been only a single conversion from seasonal to year-round (George Soucy, Augusta CEO, personal communication).

The Fox Glen subdivision is a 1930's subdivision located at the south end of Threecornered Pond, encompassing an area of approximately 155 acres. According to the City of Augusta tax records, this subdivision is not completely developed. The perimeter of the subdivision borders Threecornered Pond on three sides, with the interior lots having access to the pond via designated right-of-ways. This Fox Glen subdivision area is generally recognized for its future development potential.

The entire Threecornered Pond watershed is located within the towns of Augusta (49%), Vassalboro (47%) and, to a smaller extent, Windsor (4%) (KC-SWCD GIS). Vassalboro and Windsor are rural, residential suburbs. The City of Augusta proper is the commercial and employment center for the area. Population growth rates have increased during the 1990-2000 time period for the towns of Vassalboro (10%) and Windsor (16.3%), while Augusta's population decreased by 13% (US Census 1990, 2000). The estimated Threecornered Pond watershed population is 530 (MACD 2002).

Threecornered Pond lies within the Lower Kennebec River drainage system, which has the state's highest concentration of threatened lakes and lakes in non-attainment of water quality standards (Maine DEP 1998). Threecornered Pond is on the State's list of lakes that are designated at "Most at Risk From Development".

Outlet (Dam Management: The Threecornered Pond Improvement Association owns and maintains the dam located at the outlet at the southeastern corner of the pond. The dam features a wide opening (or runoff bay) with provisions to add and remove stop boards. Each year a representative of the Association volunteers to adjust the stop boards to manage water levels. It is the goal of the Association to maintain natural flow and water level conditions to the maximum extent possible (TPIA Draft Plan 2002).

The Association's proposed water level policy for 2002 was to remove two stop boards in late September/early October and replace the boards by mid-November with the intent to drain the high algae-laden waters and to minimize winter ice damage as well as habitat disturbance to fur-bearing animals (TPIA Draft Plan 2002).

Fish Assemblage - Fisheries Status Report

Based on records provided by the Maine Department of Inland Fisheries and Wildlife (Maine DIFW) and a recent phone conversation with fish biologist Jim Lucas (Region B, Sidney Maine DIFW office), **Threecornered Pond** (Augusta, Kennebec River – Seven Mile Stream drainage) is currently managed as a warmwater fishery only and was last surveyed in 1963 (revised 2002). There is currently no stocking of fish since there is no official public access. Unlike downstream lakes (Threemile and Webber ponds), Threecornered Pond is not currently part of the Maine Department of Marine Resources anadromous fish (alewife) restoration program.

A total of **12** fish species are listed, including: **9** native indigenous fishes (American eel, Golden shiner, White sucker, Brown bullhead, Chain pickerel, Banded killifish, Redbreast sunfish, Pumpkinseed, and Yellow perch); and **3** introduced fishes of uncertain origin (White perch, Smallmouth and Largemouth bass). These latter three non-indigenous sportfish species, along with Chain pickerel, provide for a popular warmwater fisheries in Threecornered Pond. Similar to neighboring Webber Pond (June 2002), there have been recent (1998) unverified records of illegally introduced adult Northern pike being angled from Threecornered Pond.

Based on the premise that reducing algal productivity will ultimately reduce dissolved oxygen losses - then a significant reduction in the external (watershed) load of total phosphorus to **Threecornered Pond** can serve to enhance and protect its warmwater fisheries.

Watershed Topography and Characteristic Soils: (Source: USDA SCS 1978) Soils dominating the Threecornered Pond watershed are fine to medium textured and are easily erodible when vegetation is removed (CRLA 1999). They are classified by the three soil associations:

1. **Hollis-Paxton-Charlton-Woodbridge** (82%). Shallow and deep, somewhat excessively drained to moderately well-drained, gently sloping to moderately steep, moderately coarse textured soils, on hills and ridges.
2. **Buxton-Scio-Scantic** (12%). Deep, moderately well-drained to poorly drained, nearly level to sloping, medium textured soils, in flat areas near waterways.
3. **Scantic-Ridgebury-Buxton** (6%). Deep, poorly drained to moderately well-drained nearly level to sloping, medium textured soils in valleys and moderately coarse textured soil in flat areas or depressions on upland ridges.

Land Use Inventory

Results of the Threecornered Pond watershed land use inventory are depicted in Table 1 (following page). The various land uses are categorized by developed vs. undeveloped land. The developed land area comprises 14% of the watershed and the undeveloped land, including the surface area of Threecornered Pond, comprises approximately 86% of the watershed. These numbers may be used to help make future planning and conservation decisions relating to the Threecornered Pond Watershed. Information from this table was used as a basis for preparing the Total Maximum Daily Load report (see Appendices).

Descriptive Land Use and Phosphorus Export Estimates

Agriculture: In 1982, Maine DEP completed a Diagnostic Feasibility Study for the entire Webber Pond Watershed, inclusive of both Threemile and Threecornered Pond watersheds. In this study, high external watershed phosphorus loading was attributed to poor manure handling techniques (winter spreading on cropland) and inappropriate nutrient management. In 1983, a watershed management plan, including a comprehensive listing of needed agricultural conservation practices for the Webber, Threemile and Threecornered Pond watersheds, was developed by the Kennebec County Soil and Water Conservation District (SWCD) and Natural Resources Conservation Service (NRCS).

Recent agricultural land use data for the Threecornered Pond direct watershed were provided by the Kennebec County SWCD and confirmed by aerial photo analysis (1992 and 1997) and ground-truthed with the assistance of Kennebec County SWCD staff. Today, there are approximately 133 acres of agricultural land within the Threecornered Pond watershed, comprising 4% of the total land area and 20.9% of the external phosphorus load.

Forestry: Forestry operations generally have the potential to negatively impact waterbodies by soil erosion and sedimentation from highly disturbed logging sites. Many local consulting foresters have worked with the CRLA to minimize potential negative impacts. Also, many local loggers are *Certified Logging Professionals* trained to reduce potential environmental impacts associated with forestry (CRLA 1999).

Table 1. THREECORNERED Pond Direct Watershed - Land Use Inventory

LAND USE CATEGORY	Total Land Area Acres		Total Land Area %	TP Export Load %
Agricultural & Forest Operated Land		**Threecornered Pond**		
Cropland	31		0.9	9.5
Hayland (Manured)	65		2.0	8.7
Low-Intensity Hayland	37		1.1	2.7
Operated Forest Land	171		5.2	14.1
Sub-Totals	**303**	**acres**	**9%**	**35%**
Shoreline Development		**Threecornered Pond**		
Low Impact Residential	9		0.3	0.4
Medium Impact Residential	11		0.3	1.1
High Impact Residential	3		0.1	0.4
Shoreline Septic Systems	—		0.0	2.6
Camp and Private Roads	9		0.3	3.8
Recreational	4		0.1	0.7
Sub-Totals	**35**	**acres**	**1%**	**9%**
Non-Shoreline Development		**Threecornered Pond**		
State Roads	19		0.6	5.7
Town Roads	23		0.7	7.2
Trails	1		0.0	0.6
Low Density Residential	66		2.0	3.4
Commercial Property	5		0.2	1.5
Sub-Totals	**115**	**acres**	**4%**	**18%**
Total: DEVELOPED Land	**453**	**Threecornered**	**14%**	**63%**
Inactive/Passively Managed Forest	1,904		58.2	15.7
Wetlands	266		8.1	1.1
Scrub Shrub	262		8.0	5.4
Reverting Fields	204		6.2	8.4
Open (Bare) Land	2		0.1	0.4
Total: NON-DEVELOPED Land	**2,639**	**Threecornered**	**81%**	**31%**
Total: Surface Water (Atmospheric)	**180**	**acres**	**5%**	**6%**
TOTAL: DIRECT WATERSHED	**3,272**	**Threecornered**	**100%**	**100%**

Maine landowners who harvest more than 2 acres of forest (or 5 acres if partially cut) are required to submit a Forest Operations Notification, including a location map, to the Maine Forest Service, Department of Conservation. After harvest, a Landowner Report of acres actually harvested in a given year is required. These reports provide a reasonable average annual estimate of those acres where some type of partial timber harvesting took place. The estimated "operated forest" acreage for the Threecornered Pond watershed, based on Landowner Reports submitted for 1998 – 2001, is 171 acres. No clearcutting operations were reported for the 1998 –2001 time period in the Threecornered Pond watershed.

Harvested forest acres in Maine typically regenerate as forest, whether or not they are under any type of planned forest management or under the supervision of a Licensed Forester. Forest areas without harvesting may be managed passively, or may be under an active management program with no commercial activity occurring during the 1998-2001 time period. Landowner reports show that no forest acres have been cleared with the intention of converting the land to another use.

Acreage of "operated forest" is an estimate of forest acres harvested annually in the Threecornered Pond watershed. The 171 acres of operated forestland within the Threecornered Pond watershed represents 5.2% of the land area and 14.1% of the total phosphorus load. (Forestry data and interpretation provided by Morten Moesswilde, Maine Forest Service).

Shoreline Residential (House and Camp Lots): In order to evaluate the potential impact of lakeshore homes, Maine DEP and MACD project staff conducted a shoreline residential survey in the summer of 2002. This visual survey was carried out from a canoe while observing the Threecornered Pond shoreline and the results are based on subjective determinations of potential impact rates using best professional judgment. The visual survey included a residential structure tally along with estimating a potential impact rating ranging from 1 to 5, with 1 being low impact and 5 being high-impact. A lot given a score of 1 would be a best case scenario, generally undeveloped and having a full naturally occurring vegetated buffer. Conversely, a lot given a score of 5 would be a worst case scenario, exhibiting little or no vegetative buffer (natural or ornamental) and evidence of bare (eroding) soil - a visible source of phosphorus input to the lake. In addition to the impact rating, project staff evaluated the residency status of the dwelling (seasonal vs. year-round) and estimated the relative distance of the dwelling to the lake and the percent slope of the lot.

There are 31 seasonal and 12 year-round dwellings on the immediate shoreline of Threecornered Pond (MACD 2002). A summary of the survey findings for Threecornered Pond is depicted in Table 2. In order to protect landowner confidentiality, site-specific information is not provided as part of this report.

Relevant findings of the shoreline residential survey show a low percentage (10%) of high impact lots on Threecornered Pond and a high percentage of lots (50%) with "good" natural vegetation present. There is also a relatively high percentage of steep slopes along the shoreline (28%) and a high percentage of dwellings less than 100 feet from Threecornered Pond (56%).

Phosphorus loading from Threecornered Pond shoreline residential areas is categorized into low, medium, and high impact rating classes. Phosphorus loading coefficients were developed using

information on residential lot stormwater export of algal available phosphorus (Dennis et al. 1992). Shoreline lake residences, comprising only 0.7% of the total land area of the watershed, contribute approximately 2% of the total watershed (external) phosphorus load to Threecornered Pond (not inclusive of septic systems) . Low impact sites contribute 0.4%, medium impact sites contribute 1%, and high impact sites contribute 0.4% of the watershed derived TP-load to Threecornered Pond.

Table 2. Threecornered Pond Shoreline Survey Results (2002).

Variable	Number	Percent
Total number of lots surveyed	60	n/a
Number of developed lots	43	72%
Average impact rating	2.7	n/a
Dwellings less than 100' from lake	24	56%
Dwellings on steep slope of more than 10%	12	28%
"Good" natural vegetation present	30	50%
"High impact" lots	6	10%
"Medium impact" lots	20	33%
"Low impact" lots	17	28%

Septic Systems: It is important to consider the potential for total phosphorus loading from shoreline septic systems, keeping in mind that more than half of the dwellings are less than 100' from the lake and the prevalence of steep slopes. Much of the shoreline is dominated by Paxton-Charlton very stony fine sandy loams, with slopes ranging from 3 – 30% (USDA SCS 1978). These soils are nearly ideal for septic systems with enough silt and clay for treatment of the effluent, but coarse enough to handle the hydraulics as well as a restrictive layer that protects the true water table (David Rocque, ME Dept. of Agriculture, personal communication). Currently, there are no public sewer services for the land areas within the Threecornered Pond shoreland zone area (City of Augusta).

In order to estimate total phosphorus loading from shoreline septic systems, a simple model was developed based on the following attributes: occupancy status (seasonal or year-round); estimated age of the system; and estimated distance of the system to the lake. These latter attributes were determined by shoreline survey, town records and personal interviews with City of Augusta officials. An average occupancy rate of 3 people per dwelling was used (see original East Pond model).

- *To convert kg of total phosphorus to pounds—multiply by 2.2046*
- *To convert kg/hectare to lbs/acre—multiply by .892*

Estimates of the total phosphorus loading from residential septic systems on Threecornered Pond ranged from a low of 5 to a high of 16 kg (5 kg/yr average) of total phosphorus per year. Estimates of the phosphorus loading from the recreational (*Bicentennial Park*) septic system ranged from a low of 1 to a high of 3 kg total phosphorus per year. Combined residential and commercial shoreline septic system loading approximates an average watershed phosphorus export of 2.6% or 5 kg TP annually.

Recreational (Shoreline): Included in this category is Augusta's *Bicentennial Nature Park* comprising approximately 4 acres out of 25 total currently "developed". The park includes a swimming area (see page 10), a designated fishing area and hand-carry boat launch, walking trails, picnic area, a changing area and bathrooms, gravel roadways and parking areas. The City park property also encompasses a seasonal cottage and garage, located on the property prior to the City's acquisition. This shoreline land use accounts for 0.7% of the total phosphorus load to Threecornered Pond.

A gravel path leading to the swimming and picnic area of the Bicentennial Nature Park.

Private/Camp Roadways: Camp roads have the potential to negatively impact water quality due to close proximity to the lake, steep slopes and poor gravel road maintenance. There are four miles of private/camp roads on a total of six private/ camp roads adjacent to Threecornered Pond. This shoreline land use accounts for 0.3% of the total land area and 3.8% of the total phosphorus load.

Overall, shoreline development comprises 1% of the total watershed area and contributes an average of 18 kg of phosphorus annually, which approximates 9% of the estimated externally (watershed) generated phosphorus load.

Other Development and Land Uses

Non-Shoreline Development: These areas consist of all lands outside the immediate shoreline of Threecornered Pond, including development such as state and town roadways, low-density residential areas and commercial areas. These land use areas were calculated using GIS land use coverage provided by the Kennebec County Soil and Water Conservation District, as well as municipal tax data, aerial photos and field visits.

Public Roadways: Public roads are divided into two categories – state public highway and town public roadway. There are only 2 miles of state roadway and 6 miles of town roads and less than 1 mile of trails. Public roadways account for a much greater percentage of the phosphorus load (12.9%) versus its land area (1.3%) in the Threecornered Pond watershed.

Non-Shoreline Residential Areas in the watershed were determined using GIS land use cover provided by the KC-SWCD, the City of Augusta and the Town of Vassalboro tax assessors' records and property tax maps, and ground-truthing by MACD project staff (traveling all roads within the watershed). Non-shoreline residential areas are characterized by dispersed, low-density, single-family homes. Residential area was determined by counting every dwelling away from the immediate shoreline (133 dwellings) and multiplying by the estimated average cleared lot area (0.5 acres)—for an estimated 66 acres of non-shoreline residential area in the watershed. Low-density residential areas represents 2% of the total land area and 3.4% of the total phosphorus load.

Commercial: Commercial development within the watershed is limited to a small area – about 5 acres — consisting of a restaurant/bar establishment and several small retail shops. Commercial land area accounts for only 0.2% of the watershed area and 1.5% of the total phosphorus load.

Overall, the developed land area comprises 14% of the total watershed area and contributes an average of 123 kg of phosphorus annually, which approximates 63% of the estimated externally (watershed) generated total phosphorus load.

Phosphorus Loading from Non-Developed Lands

Non-Operated Forests: Of the total land area within the Threecornered Pond watershed, 58.2% (1,904 acres) is naturally forested, characterized by privately-owned deciduous and mixed forest plots (KC-SWCD GIS, MACD 2002). About 16% of the phosphorus load is estimated to be derived from unmanaged forested areas within Threecornered Pond's direct drainage area.

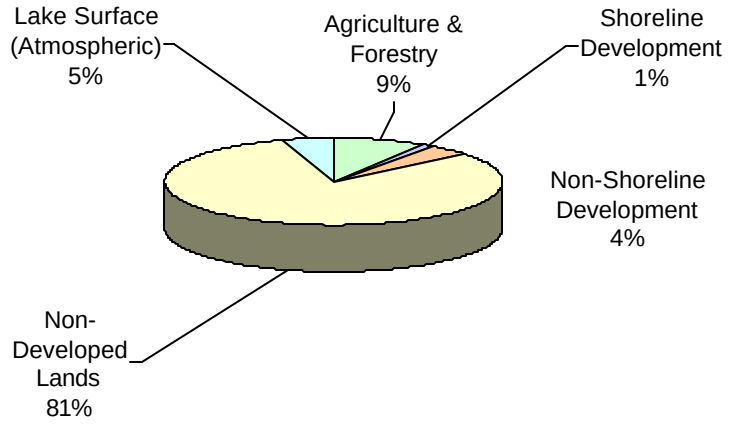
Other Non-Developed Land Areas: Combined wetlands, reverting fields, scrub shrub and open land account for the remaining 15.3% of the 'undeveloped' lands total phosphorus export load.

Atmospheric Deposition (Open Water): Threecornered Pond surface waters (180 acres) comprise 5% of the total watershed area (3,272 acres), representing 6% of the total phosphorus load entering Threecornered Pond.

Summary: Overall, the non-developed land area comprised 81% of the total watershed area and contributes an average of 61 kg of phosphorus annually, which approximates 31% of the estimated externally (watershed) generated total phosphorus load.

Figure 2 (below) depicts the percentage of total land area covered by representative land uses within the Threecornered Pond watershed.

Figure 2. Threecornered Pond Direct Watershed - Total Land Area



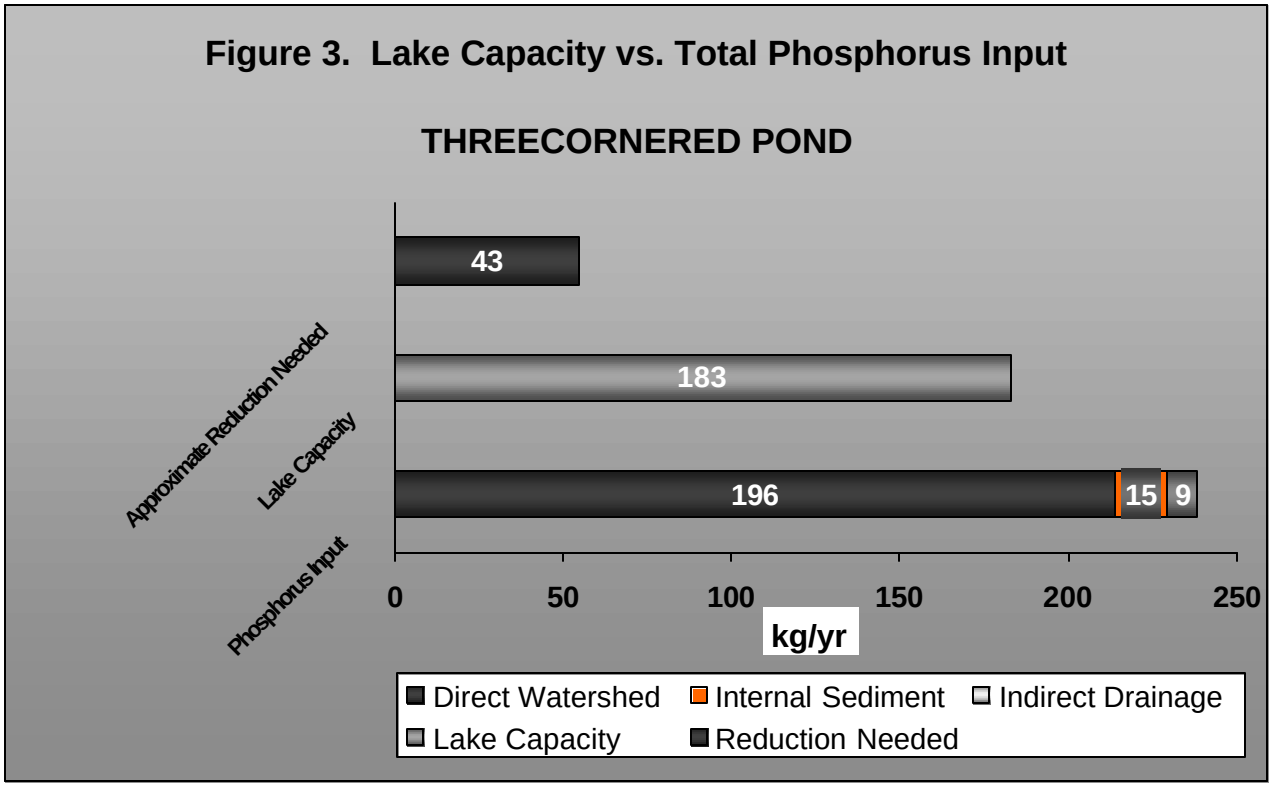
PHOSPHORUS LOADS – Watershed, Sediment and In-Lake Capacity

Supporting documentation for the phosphorus loading analysis includes both water quality monitoring data from Maine DEP and Volunteer Lake Monitoring Program and development of a phosphorus retention model (see Appendices for more detailed information).

- Total phosphorus loadings to Threecornered Pond originate from a combination of external (watershed) and limited internal (pond bottom sediment) sources of phosphorus. External watershed phosphorus sources, averaging 196 kg annually, have been identified and accounted for by direct watershed land uses alone.
- Total phosphorus loading from the associated upstream Anderson Pond (9 kg) accounts for external loading from the indirect watershed, determined on the basis of *flushing rate x volume x TP concentration,* and typical area gauged streamflow calculations (Jeff Dennis, Maine DEP, personal communication).
- The relative contribution of internal sources of total phosphorus within Threecornered Pond - in terms of pond bottom sediment phosphorus recycling - range from 10 to 20 kg with an average annual value of 15 kg.
- The annual contribution to account for future development is an additional 6 kg, for a total phosphorus load (internal and external sources) of 226 kg per year.
- The load allocation (lake assimilative capacity) for all existing and future non-point pollution sources for Threecornered Pond is 183 kg of total phosphorus per year, based on a target goal of 15 ppb.

  Figure 3 (below) depicts these estimates.

Figure 3. Lake Capacity vs. Total Phosphorus Input



THREECORNERED POND

PHOSPHORUS CONTROL ACTION PLAN

Recent and Current NPS/BMP Efforts

The Threecornered Pond Improvement Association took an important step forward by joining the China Region Lakes Alliance (CRLA) in late 2001. Joining this Alliance enables watershed residents to benefit from the established watershed management framework and available expertise.

During the 2002 season, the CRLA began working in the watershed, notably with technical assistance with camp roads and providing free labor and supervision of the Conservation Corps. The Conservation Corps provide free labor to landowners to implement identified watershed nonpoint source Best Management Practices. The Corps operate for an eight to ten-week period during the summertime. Initial work performed by the Corps in 2002 included erosion control work on trails and roads at the Augusta Bicentennial Nature Park.

The CRLA has several activities planned for 2003, including hosting educational meetings in conjunction with the TPIA, developing a newsletter, implementing demonstration projects using landowner cost-sharing, and providing technical assistance for roads, drainage, buffers, and erosion control. The CRLA will assess in more detail the needs, including a potential watershed survey and watershed management plan.

In December of 2000, the CRLA initiated the Camp Road Runoff Abatement Project (#2001 R-09) which makes cost share funds available to organized road associations for help with road repairs. This project educates camp road users about the importance of good design and maintenance of camp roads and its connection to water quality. This successful project concluded in the fall of 2002 and similar funding will be sought in order to continue this type of NPS mitigation. Future funding granted to the CRLA will be available to Threecornered Pond watershed residents.

Implementing an adequate combination of both residential property and associated roadway non-point source best management practices will help to reduce the existing total external phosphorus load to Threecornered Pond.

Recommendations for Future Work

Threecornered Pond is a waterbody that has impaired water quality due primarily to nonpoint sources of phosphorus which periodically drain overland during high flow storm events. Specific recommendations regarding Best Management Practices (BMPs) and actions to reduce external watershed total phosphorus loadings in order to improve the water quality conditions in Threecornered Pond are as follows:

Watershed Management: There are many resources available to watershed stakeholders. An important step in lake restoration efforts for Threecornered Pond was joining the China Region Lakes Alliance in 2001. The CRLA provides education and outreach, offers free technical assistance to landowners for NPS BMP recommendations as well as free labor and potential cost-share funding for BMP implementation. The KC-SWCD also offers free technical assistance and potential grant project oversight and coordination. Interagency cooperation between the China Region Lakes Alliance, the Kennebec County Soil & Water Conservation District, the Threecornered Pond Improvement Association, the Maine DEP and watershed municipalities will help to maximize resources and efforts dedicated to protecting and enhancing the water quality of Threecornered Pond.

Action Item # 1: Promote Available Technical/Financial/Educational Resources		
Activity	**Participants**	**Schedule & Cost**
Host a meeting for watershed citizens	CRLA, TPIA, KCSWCD, Maine DEP, watershed citizens	Immediately—minimal cost

Shoreline Residential areas have the greatest potential to negatively impact the water quality of Threecornered Pond. Much of the shoreline was noted for the presence of naturally vegetative buffers although some lots were rated as higher impact due to the need for more natural vegetation. It appears that sites lacking adequate buffers tended to be dwellings that were more recently constructed. These new construction sites had large cleared areas and lawns. An effort should be undertaken to educate landowners (especially new homeowners) about the water quality benefits of adequate and effective naturally vegetated buffers along the shoreline.

Action Item # 2: Educate Watershed Citizens About Buffers		
Activity	**Participants**	**Schedule & Cost**
Develop a Buffer Awareness and Planting Campaign	CRLA, TPIA, watershed citizens, local nurseries	Annually beginning in 2003 **$5,000/yr**

Roadways: Generally, lakeshore camp roads are not always designed and maintained properly, and can be a major source of soil erosion and sedimentation to lakes. During the summer of 2002, a survey of camp roads was conducted by MACD project staff with the assistance of the CRLA. Potential NPS pollution sources relating to roads include poor shaping, moderate to severe shoulder erosion and unstable culverts. More detailed information about potential NPS sites is available at the CRLA and will be used to assist in future BMP implementation.

A survey of state and town roads was conducted during the summer of 2002 by MACD project staff and the Lakes Specialist from the KC-SWCD. Roads should be resurveyed in the springtime as potential problem areas may have been masked by summer vegetation. State and Town roads in the watershed would benefit from improved maintenance, including the removal of winter sand at tributary crossings. All municipal officials should attend the Maine DEP's Voluntary Contractor Certification Program through the Nonpoint Source Training and Resource Center (Contact the Division of Watershed Management at 287-2111). Municipalities should also consider seeking the assistance of the Maine Local Road Center to help with the development of a road maintenance plan.

For free technical assistance on proper road maintenance and potential cost-sharing on NPS BMP projects, contact the CRLA (445-5021) or the KC-SWCD (622-7847 ext 3).

Action Item # 3: Implement Roadway Best Management Practices		
Activity	**Participants**	**Schedule & Cost**
Implement roadway BMPs on camp roads and public roads	CRLA, KCSWCD, TPIA, MDEP, private road associations, municipal officials, watershed citizens	Annually beginning in 2003 **$10,000/yr**

Non-Shoreline Residential and Commercial: These properties should be considered as potential problem areas, especially those adjacent to lake tributary brooks and streams. These areas should be included in future education and outreach efforts as all residents within the watershed benefit from improved water quality in Threecornered Pond.

Action Item # 4: Develop Stewardship Initiatives for Threecornered Pond tributaries		
Activity	**Participants**	**Schedule & Cost**
"Adopt" local streams to promote stewardship efforts including education and water quality monitoring	CRLA, KCSWCD, TPIA, Maine DEP Stream Team, watershed citizens, local schools	Annually beginning in 2003 **$500/yr**

Agriculture and Forestry: Since the early 1980's the KC SWCD and USDA NRCS have worked cooperatively with landowners to install conservation practices in the watershed. For free technical assistance, potential cost-share funds or for more information about appropriate agricultural BMPs, contact the Kennebec County SWCD or NRCS offices in Augusta (622-7847 ext 3).

Landowners, loggers, and foresters working in the watershed should consult with municipal officials for information about permit requirements and contact the Maine Forest Service (1-800-367-0223 or 207-287-2791) for technical assistance and to obtain a copy of the Forestry BMP Guidelines.

Action Item # 5: Conduct Workshops for Agriculture and Forestry Operators		
Activity	**Participants**	**Schedule & Cost**
Conduct workshops encouraging the use of phosphorus control measures	CRLA, KCSWCD, NRCS, MFS, forestry and agriculture community	Annually beginning in 2003 **$1,000/yr**

Watershed Group - The Threecornered Pond Improvement Association should consider becoming a watershed group as opposed to a lakeshore group. A broader, more active membership base will help ensure that watershed education and lake restoration efforts will be successful in the long run.

Action Item # 6: Form a Threecornered Pond Watershed Group		
Activity	**Participants**	**Schedule & Cost**
Expand the membership of the TPIA by becoming a watershed group	TPIA, CRLA, KCSWCD	ASAP-minimal cost

Individual Action by all watershed residents should be encouraged through continued education and outreach efforts. Actions should include retention or planting of natural vegetation of buffer strips, elimination of phosphorus-containing fertilizers, use of non-phosphate cleaning detergents and routine maintenance of septic systems.

Watershed residents are also encouraged to become active members of a Threecornered Pond watershed group.

Action Item # 7: Expand Watershed-Wide Homeowner Education		
Activity	**Participants**	**Schedule & Cost**
Increase outreach and education efforts to watershed citizens, including technical assistance	CRLA, KCSWCD, TPIA, Maine DEP	Annually beginning in 2003 **$1,500/yr includes printing of educational materials**

Threecornered Pond Improvement Association – the TPIA should work with regional land trusts and the municipalities of Augusta and Vassalboro to ensure that the undeveloped land within the watershed remains in a pristine state.

Action Item # 8: Investigate Land Conservation Opportunities within the Watershed		
Activity	**Participants**	**Schedule & Cost**
Coordinate land conservation efforts to ensure the future protection of sensitive areas within the watershed	TPIA, Regional Land Trusts, watershed municipalities	Immediately—Unknown

Municipal Actions should include ensuring public compliance with local and state water quality laws and ordinances (Shoreland Zoning, Erosion and Sedimentation Control Law, plumbing code, phosphorus control ordinance) primarily through education, and enforcement action only when necessary.

All municipal officials should attend the Maine Nonpoint Education for Municipal Officials (NEMO) workshop entitled "Linking Land Use to Water Quality". For more information, contact Maine NEMO at 771-9020. Municipalities should consider seeking the assistance of the KC SWCD (622-7847 ext 3) and/or the CRLA (445-5021) when developing a maintenance plan to consider road impacts on water quality. For a copy of Environmental Management, A Guide for Town Officials, Best Management Practices to Control Nonpoint Source Pollution, contact the Maine DEP at 289-3901.

Action Item # 9: Educate Municipal Officials on Nonpoint Source Pollution		
Activity	**Participants**	**Schedule & Cost**
Educate all Municipal Officials on how to best control nonpoint source pollution	Watershed municipalities, Maine DEP, Maine NEMO, KCSWCD	Immediately—minimal

WATER QUALITY MONITORING PLAN

Historically, the water quality of Threecornered Pond has been monitored for 17 years since 1976 (Maine DEP and VLMP). Continued long-term water quality monitoring within Threecornered Pond will be conducted bi-weekly, from May to October, through the continued efforts of Maine VLMP and the CRLA in cooperation with Maine DEP. Under this planned, post-PCAP water quality-monitoring scenario, sufficient data will be acquired to adequately track seasonal and inter-annual variation and long-term trends in water quality in Threecornered Pond. A post-PCAP adaptive management status update report will be prepared five to ten years following EPA approval of this PCAP (TMDL) report.

PCAP Closing Statement

Threecornered Pond is a unique waterbody relative to other area lakes by having a large amount of undeveloped shoreline and a relatively high lake flushing rate, over 3 times per year (twice the Maine state average of 1.5). Keeping this undeveloped land in a pristine state will undoubtedly benefit the future preservation of the water quality of Threecornered Pond. Watershed stakeholders, including Augusta and Vassalboro, the CRLA, the TPIA and the KC-SWCD provide an ideal framework for effectively managing the watershed and assuring that watershed citizens receive proper guidance on phosphorus mitigation. The extent of technical and financial resources available to watershed residents indicates that there is a high probability that future BMP implementation and educational outreach will begin to take place – a necessary part of restoring and protecting the water quality of Threecornered Pond.

APPENDICES

THREECORNERED POND

Total Maximum Daily (Annual Phosphorus) Load

Introduction to Maine Lake TMDLs - Total Maximum Daily (Annual Phosphorus) Loads and Phosphorus Control Action Plans (PCAPs)

You may be wondering what the acronym 'TMDL' represents and what it is all about. TMDL is actually short for 'Total Maximum Daily Load.' This information, no doubt, does little to clarify TMDLs in most people's minds. However, when we think of this as an annual phosphorus load (*Annual Total Phosphorus Load),* it begins to make more sense.

Simply stated, excess nutrients or phosphorus in lakes promote nuisance algae growth/blooms - resulting in the violation of water quality standards as measured by water clarity depths of less than 2 meters. A lake TMDL is prepared to estimate the total amount of total phosphorus that a lake can accept on an annual basis without harming water quality. Historically, development of TMDLs was first mandated by the Clean Water Act in 1972, and was applied primarily to *point sources* of water pollution. As a result of public pressure to further clean up water bodies, lake and stream TMDLs are now being prepared for watershed-generated *Non-Point Sources* (NPS) of pollution.

Nutrient enrichment of lakes through excess total phosphorus originating from watershed soil erosion has been generally recognized as the primary source of NPS pollution. Major land use activities contributing to the external phosphorus load in lakes include residential-commercial developments, roadways, agriculture, and commercial forestry. Statewide, there are 31 lakes in Maine which do not meet water quality standards due to excessive amounts of in-lake total phosphorus.

The first Maine lake TMDL was developed (1995) for Cobbossee Lake by the Cobbossee Watershed District (CWD) - under contract with Maine DEP and US-EPA. TMDLs have been approved by US-EPA for Madawaska Lake (Aroostook County), Sebasticook Lake, East Pond (Belgrade Lakes), and China Lake. PCAP-TMDLs are presently being prepared by Maine DEP, with assistance from the Maine Association of Conservation Districts (MACD) and County Soil and Water Conservation Districts (SWCDs) - for Mousam and Highland Lakes in southern Maine (final EPA review). Ongoing PCAP-TMDL lake studies include: Long and Highland lakes (Bridgton); Annabessacook and Little Cobbossee lakes and Pleasant and Upper Narrows Ponds - the latter four under separate contract with Cobbossee Watershed District. A non-MACD supported PCAP-TMDL for Unity Pond (Waldo County) is also being developed with the assistance of Unity College staff. PCAP-TMDL studies have also been initiated for Sabattus, Togus, and Lovejoy ponds.

Lake PCAP-TMDL reports are based in part on available water quality data, including seasonal measures of total phosphorus, chlorophyll-a, Secchi disk transparencies, and dissolved oxygen-water temperature profiles. Actual reports include: a lake description; watershed GIS assessment and estimation of NPS pollutant sources; selection of a total phosphorus target goal (acceptable amount); allocation of watershed/land-use phosphorus loadings, and a public participation component to allow for stakeholder review.

PCAP-TMDLs are important tools for maintaining and protecting acceptable lake water quality. They are primarily designed to 'get a handle' on the magnitude of the NPS pollution problem and to develop plans for implementing Best Management Practices (BMPs) to address the problem. Landowners and watershed groups are eligible to receive technical and financial assistance from state and federal natural resource agencies designed to reduce watershed total phosphorus loadings to lakes. **Note:** *For non-stormwater regulated lake watersheds (e.g., Threecornered Pond), the development of phosphorus-based lake PCAP-TMDLs are not intended by Maine DEP to be used for regulatory purposes.*

For further information, please contact Dave Halliwell, Maine Department of Environmental Protection, Lakes PCAP-TMDL Program Manager, SHS #17, Augusta, ME 04333 (287-7649).

Water Quality Monitoring: (Source: Maine DEP and VLMP 2002) Water quality monitoring data for Threecornered Pond has been collected in 17 of the past 27 years since 1976. This water quality assessment is based on 17 years of Secchi disk transparency (SDT) measures, combined with 12 years of epilimnion core total phosphorus (TP) data, and 15 years of chlorophyll-a and associated water chemistry monitoring data.

Water Quality Measures: Threecornered Pond, a lightly colored water (30-35 SPUs) has an overall range of SDT measures from 1.1 to 4.7 meters, with an average of 3.2 meters (10.5 ft.); an epilimnion core TP range of 9 to 31 with an average of 20 parts per billion (ppb), and chlorophyll-a measures ranging from 2.5 to 28.7 with an average of 9.4 ppb. Recent dissolved oxygen (DO) profiles indicate low levels of DO in deep areas of the lake and historical records of severe oxygen depletion below the thermocline date back to the 1940's (Maine DEP 1982). Late summer dissolved oxygen levels in 2002 remained fairly low (0-4 ppm) with about 50% of the water column (lower 4-5 meters) unsuitable for salmonid species (e.g., brown trout). The potential for total phosphorus to leave the lake bottom sediments and become available to algae in the water column (internal loading) is at a moderate level, according to Maine DEP (2002).

Priority Ranking, Pollutant of Concern and Algae Bloom History: Threecornered Pond is listed on the State's 1998 and 2002 (draft) 303(d) list of waters in non-attainment of water quality standards, and was moved upward from the 2008-2011 schedule as a result of both stakeholder interest and need to adjust to an accelerated lakes TMDL development schedule. The Threecornered Pond TMDL has been developed for total phosphorus, the major limiting nutrient to algae growth in freshwater lakes in Maine.

The water quality of Threecornered Pond during 2002 appeared to improve markedly as the summer progressed. Minimum water transparencies of 2.7 to 2.8 meters were observed in May and June and maximum water clarity (3.8 to 3.9 meters) was measured in mid to late August. Epilimnion core total phosphorus measures (14-36 ppb) and chlorophyll-a (13-32 ppb) levels remained fairly high. Based on minimum water transparencies, nuisance blue-green algae blooms were evident only during the summers of 1985 (1.8 m), 1988 (1.1 m), and 1990 (1.2 m), however, lake water quality in many of the intervening years were not monitored (1982-83, 1993, 95, 96, 97, 99).

Natural Environmental Background Levels for Threecornered Pond were not separated from the total nonpoint source load because of the limited and general nature of available information. Without more and detailed site-specific information on nonpoint source loading, it is very difficult to separate natural background from the total nonpoint source load (US-EPA 1999). There are no known point sources of pollutants to Threecornered Pond (MACD 2002).

WATER QUALITY STANDARDS and TARGET GOALS

Maine State Water Quality Standard: Standards for nutrients which are narrative, are as follows *(July 1994 Maine Revised Statutes Title 38, Article 4-A*): "Great Ponds Class A (GPA) waters shall have a stable or decreasing trophic state (based on appropriate measures, e.g., total phosphorus, chlorophyll a, Secchi disk transparency) subject only to natural fluctuations, and be free of culturally induced (summertime) algae blooms which impair their potential use and enjoyment."

Maine DEP's functional definition of nuisance algae blooms include episodic occurrence of Secchi disk transparencies (SDTs) < 2 meters for lakes with low levels of apparent color (<26 SPU) and for higher color lakes where low SDT readings are accompanied by elevated chlorophyll a levels. Threecornered Pond is a lightly colored lake (average color 30 - 35 SPU), with an average SDT of 3.2 m (10.5 feet), in association with average chlorophyll a levels of 9.4 ppb (VLMP 2002). Currently, Threecornered Pond does not meet water quality standards due to sporadic historically recorded annual summertime nuisance algae blooms. This water quality assessment uses historic documented conditions as the primary basis for comparison. Given the context of "impaired use and enjoyment," along with a realistic interpretation of Maine's goal-oriented Water Quality Standards (WQS), we have

determined that episodic, non-cyanobacteria based algae blooms (e.g. diatoms), limited to the fall or spring periods only, are in WQS attainment for GPA waters.

Designated Uses and Antidegradation Policy: Threecornered Pond is designated as a GPA (Great Pond Class A) water in the Maine DEP state water quality regulations. Designated uses for GPA waters in general include: water supply; primary/secondary contact recreation (swimming and fishing); hydroelectric power generation; navigation; and fish and wildlife habitat. No change of land use in the watershed of a Class GPA water body may, by itself or in combination with other activities, cause water quality degradation that would impair designated uses of downstream GPA waters or cause an increase in their trophic state. Maine's anti-degradation policy requires that "existing in-stream water uses, and the level of water quality necessary to sustain those uses, must be maintained and protected."

Numeric Water Quality Target: The numeric (in-lake) water quality target for Threecornered Pond is set at 15 ppb total phosphorus (183 kg TP/yr). Since numeric criteria for phosphorus do not exist in Maine's state water quality regulations - and would be less accurate targets than those derived from this study - we employed Best Professional Judgment to select a target in-lake total phosphorus concentration that would attain the narrative water quality standard. Spring-time (epilimnion core) total phosphorus levels in Threecornered Pond approximated 15 ppb during the time period 1979 - 1992. In-lake (epilimnion core) total phosphorus summer-time (June through August) measures averaged 16.5 ppb (non-bloom conditions). In summary, the numeric water quality target goal of 15 ppb for total phosphorus in Threecornered Pond was based on available water quality data (average epilimnion grab/core samples) corresponding to non-bloom conditions, as reflected in suitable (water quality attainment) measures of both Secchi disk transparency (> 2.0 meters) and chlorophyll-a (< 8.0 ppb).

ESTIMATED PHOSPHORUS EXPORT BY LAND USE CLASS

Table 3 details the numerical data used to determine external phosphorus loading for the Threecornered Pond direct watershed. The following key explains the columns as related to each of the representative land use classes.

Key for Columns in Table 3

Land Use: The land use category that was analyzed for this report

Land Area In Acres: The area of each land use as determined by GIS mapping, aerial photography, DeLorme Topo USA software, and field reconnaissance.

Land Area %: The percentage of the watershed covered by the land use.

TP Coeff. Range kg TP/ha: The range of the coefficient values listed in the various literature associated with the corresponding land use.

TP Coeff. Value kg TP/ha: The selected coefficient for each land use category. The phosphorus coefficient is determined from previous research – typically the median value, if available. The coefficient is often adjusted using best professional judgment based on conditions including soil type, slope, and best management practices (BMP's) installed.

Land Area Hectares: 1.0 acre = 0.404 hectares

TP Export Load kg TP: = Total hectares x total phosphorus coefficient

TP Export Total %: The percentage of estimated total phosphorus export by the land use.

Table 3. THREECORNERED Pond Direct Watershed - Phosphorus Export by Land Use

LAND USE CLASS	Land Area Acres	Land Area %	TP Coeff. Range kg TP/ha	TP Coeff. Value kg TP/ha	Land Area Hectares	TP Export Load kg TP	TP Export Total %
Agricultural & Forested Land			**3-Cornered**	**Pond**			
Cropland	31	0.9%	0.26 - 18.6	1.50	12.4	18.6	9.5%
Hayland (Manured)	65	2.0%	0.65 - 1.81	0.65	26.2	17.0	8.7%
Low-Intensity Hayland	37	1.1%	0.35 - 1.35	0.35	15.0	5.3	2.7%
Operated Forestland	171	5.2%	0.20 - 0.60	0.40	69.2	27.7	14.1%
Sub-Totals	**303**	**9%**	**3-Cornered**	**Pond**	**123**	**69**	**35%**
Shoreline Development							
Low Impact Residential	9	0.3%	0.25 - 1.75	0.25	3.4	0.9	0.4%
Medium Impact Residential	11	0.3%	0.40 - 2.20	0.50	4.2	2.1	1.1%
High Impact Residential	3	0.1%	0.56 - 2.70	0.70	1.2	0.8	0.4%
Septic Systems	**Threecornered**		**Pond**	**Septic**	**Model**	5.0	2.6%
Camp and Private Roads	9	0.3%	0.60 - 10.0	2.00	3.7	7.4	3.8%
Recreational (Augusta City Park)	4	0.1%	0.14 - 4.90	0.80	1.6	1.3	0.7%
Sub-Totals	**35**	**1%**	**3-Cornered**	**Pond**	**14**	**18**	**9%**
Non-Shoreline Development							
State Roads	19	0.6%	0.60 - 10.0	1.50	7.5	11.3	5.7%
Town Roads	23	0.7%	0.60 - 10.0	1.50	9.4	14.1	7.2%
Trails	1	0.0%	0.60 - 10.0	2.00	0.6	1.1	0.6%
Low Density Residential	66	2.0%	0.25 - 1.75	0.25	26.9	6.7	3.4%
Commercial	5	0.2%	0.77 - 4.18	1.50	2.0	3.0	1.5%
Sub-Totals	**115**	**4%**	**3-Cornered**	**Pond**	**46**	**36**	**18%**
Total: DEVELOPED Land	**453**	**14%**	**3-Cornered**	**Pond**	**183**	**123**	**63%**
Non-Developed Land							
Inactive/Passively Managed Forest	1,904	58.2%	0.01 - 0.04	0.04	770.3	30.8	15.7%
Wetlands	266	8.1%	0.00 - 0.05	0.02	107.7	2.2	1.1%
Scrub Shrub	262	8.0%	0.10 - 0.20	0.10	106.2	10.6	5.4%
Reverting Fields	204	6.2%	0.10 - 0.20	0.20	82.5	16.5	8.4%
Open (Bare) Land	2	0.1%	0.25 - 1.75	0.98	0.7	0.7	0.4%
Total: NON-DEVELOPED Land	**2,639**	**81%**	**3-Cornered**	**Pond**	**1,067**	**61**	**31%**
Total: Surface Water (Atmospheric)	**180**	**5%**	0.11 - 0.21	0.16	**73**	**12**	**6%**
TOTAL: DIRECT WATERSHED	**3,272**	**100%**	**3-Cornered**	**Pond**	**1,323**	**196**	**100%**

Total Phosphorus Land Use Loads

Estimates of total phosphorus export from different land uses found in the Threecornered Pond direct watershed are presented in Table 3 and represent the extent of external phosphorus loading to the lake. Total phosphorus loading from the associated upstream Anderson Pond account for loading from the indirect watershed (9 kg/TP/yr), determined on the basis of *flushing rate x volume x TP concentration*, and typical area gauged streamflow calculations (Maine DEP, Jeff Dennis, personal communication).

Total phosphorus loading measures are provided as a range of values to reflect the degree of uncertainty associated with such relative estimates (Walker 2000). Watershed total phosphorus loadings were primarily determined using published literature and locally-derived export coefficients as found in Reckhow et al. (1980), Dennis (1986), Dennis et al. (1992), and Bouchard et al. (1995) for roadways, agriculture and other types of land uses.

In some cases (primarily roads and shoreline residential), selected phosphorus loading coefficients were reduced to more realistically account for the estimated bioavailability of the runoff sources according to available literature (Lee et al. 1980 and Sonzogni et al. 1982) and to better account for algal available-P export values as reflected in Dennis et al (1992). These adjustments accounted not only for the readily available SRP (soluble-reactive phosphorus) in the runoff, but also a substantial portion of the particulate inorganic component, particularly the P which is weakly adsorbed on the surface of the soil particles (relative to discussion in Chapra 1997, pg 524). **Note:** *These adjustments in P-load coefficients did not measurably alter the overall conclusions and final recommendations of the Threecornered Pond PCAP-TMDL report regarding identified needs & NPS/BMP implementation plans for the Threecornered Pond watershed.*

Agricultural and Forest Operational Lands: Phosphorus loading coefficients as applied to agricultural practices were adopted, in part, from Reckhow et al. 1980: manured hayland 0.65 kg TP/ ha; Dennis and Sage 1981: low-intensity hayland 0.35 kg TP/ha; and from past Maine DEP (1982) studies and discussions with Kennebec County SWCD/NRCS offices: row crops 1.50 kg TP/ha.

The total phosphorus loading coefficient applied to managed/operated forestlands (0.40 kg TP/ha) was derived (best estimate) from the original Cobbossee Lake TMDL report (Monagle 1995).

Shoreline Residential Lots (House and Camp): Residential land use comprised three relative impact categories - low, medium and high impact (Table 3). The range of total phosphorus loading coefficients used (0.25 – 2.70 kg/ha/yr) were developed using information on residential lot stormwater export of algal available phosphorus from Dennis et al (1992) .

Private Camp Roads and Trails: Total phosphorus loading coefficients for private camp roads and trails (2.00 kg TP/ha) were chosen, in part, on previous studies from rural Maine highways (Dudley et al. 1997).

Public Roadways: Town and state roadways (17 ha) were assigned a phosphorus loading rate of 1.50 kg per hectare per year. This coefficient was chosen based, in part, on previous studies from rural Maine highways (Dudley et al. 1997).

Non-Shoreline Development: Consists of all lands outside the immediate shoreline of Three-cornered Pond, including residential areas and commercial areas. Non-shoreline residential areas in the watershed are best characterized as low density residential (reflected in the 0.25 TP loading coefficient) and limited commercial development.

Non-Cultural Phosphorus Loading: The phosphorus loading coefficient for inactive-passively managed forested land (0.04) is based on a New England regional study (Likens et al 1977).

Atmospheric Deposition (Open Water) represents the lake surface waters (180 ha) . The total phosphorus loading coefficient chosen (0.16 kg TP/ha) is similar to that used for the China Lake TMDL (Kennebec County). The upper range (0.21 kg TP/ha) generally reflects a watershed that is 50 percent forested, combined with agricultural areas interspersed with urban/suburban land uses (Reckhow et al. 1980).

Phosphorus Load Summary

It is our professional opinion that the selected phosphorus export coefficients are appropriate for the Threecornered Pond watershed. Results of the land use analysis indicates that a best estimate of the present total phosphorus loading from external (watershed generated) nonpoint source pollution approximates 196 kg TP/yr. This annual external watershed generated loading to Threecornered Pond equates to a total phosphorus loading modeled at 16 ppb (195 kg TP/year) - only 12 kg above the TMDL target goal of 15 ppb (183 kg TP/year).

LINKING WATER QUALITY and POLLUTANT SOURCES

Assimilative Loading Capacity: The Threecornered Pond TMDL is expressed as an annual load as opposed to a daily load. As specified in 40 C.F.R. 130.2(i), TMDLs may be expressed in terms of either mass per unit time, toxicity, or other appropriate measures. It is thought appropriate and justifiable to express the Threecornered Pond TMDL as an annual load because the lake basin has a flushing rate of 3.24 – more than twice the average for Maine lakes (1.50).

The Threecornered Pond basin lake assimilative capacity for all existing and future nonpoint source pollution sources is capped at 183 kg TP/yr of total phosphorus as derived from the empirical phosphorus retention model based on a target goal of 15 ppb. This value reflects the modeled annual phosphorus loading responsible for existing trophic state conditions, based on a long-term goal of maintaining average phosphorus concentrations at or below 15 ppb.

Future Development: The Maine DEP water quality goal of maintaining a stable trophic state includes a reduction of current P-loading which accounts for recent P-loading and potential future development in the watershed. The methods used by Maine DEP to estimate future growth (Dennis et al. 1992) are inherently conservative, as they provide for relatively high-end regional growth estimates and largely unmitigated P-export from new development. This provides an additional un-quantified margin of safety for attainment of state water quality goals. Previously unaccounted for P-loading for future development is 6 kg annually (based on a 1 ppb change in trophic state = 12 kg).

Undoubtedly, human growth and development will continue to occur in the watershed, contributing new sources of phosphorus to the lake. Hence, existing phosphorus load sources must be reduced to allow for anticipated new sources of phosphorus to the lake. Overall, the continued threat of nuisance algae blooms in Threecornered Pond can be lessened, along with halting the trend of increasing trophic state, if the existing watershed phosphorus load is reduced by approximately 50 kg annually.

Internal Lake Sediment Phosphorus Mass: The relative contribution of internal sources of total phosphorus within Threecornered Pond - in terms of sediment recycling - were analyzed (using lake volume-weighted mass differences between early and late summer) and estimated on the basis of water column TP data from 1991-92 and 2001-02. These were the only years for which complete lake profile TP concentration measures were available to derive reliable estimates of internal lake loads. Among these years, nuisance algae blooms were not evident. The estimated annual internal TP loading within the sediments of Threecornered Pond (10 to 20 kg) is fairly minimal at this time, but has more than doubled in the past decade (1991-2002).

Linking Pollutant Loading to a Numeric Target: The basin loading assimilative capacity for Threecornered Pond was set at 183 kg/yr of total phosphorus to meet the numeric water quality target

of 15 ppb of total phosphorus. A phosphorus retention model, calibrated to in-lake phosphorus data, was used to link phosphorus loading to the numeric target.

Supporting Documentation for the Threecornered Pond TMDL Analysis: includes the following: Maine DEP and VLMP water quality monitoring data and specification of a phosphorus retention model – including both empirical models and retention coefficients.

Total Phosphorus Retention Model (after Dillon and Rigler 1974 and others)

L = P (A z p) / (1-R) where,

183 = **L** = external total phosphorus load capacity (kg TP/year)
15.0 = **P** = spring overturn total phosphorus concentration (ppb)
0.73 = **A** = lake basin surface area (km^2)
3.3 = **z** = mean depth of lake basin (m) **A z p = 7.8**
3.24 = **p** = annual flushing rate (flushes/year)
0.64 = **1- R** = phosphorus retention coefficient, where:
0.36 = **R = 1 / (1+ sq.rt. p)** (Larsen and Mercier 1976)

Previous use of the Vollenwieder (Dillon and Rigler 1974) type empirical model for Maine lakes, e.g., Cobbossee, Madawaska, Sebasticook, East Pond and China, Mousam and Highland Lake, Webber and Threemile TMDLs (Maine DEP 2000-2003) have shown this approach to be effective in linking watershed total phosphorus (external) loadings to existing in-lake phosphorus concentrations.

Strengths and Weaknesses in the Overall TMDL Analytical Process: The Threecornered Pond TMDL was developed using existing lake water quality monitoring data, derived watershed export coefficients (Reckhow et al. 1980, Maine DEP 1981 and 1989, Dennis 1986, Dennis et al. 1992, Bouchard et al. 1995, Soranno et al. 1996, and Mattson and Isaac 1999) and a phosphorus retention model which incorporates both empirically derived and observed retention coefficients (Vollenwieder 1969, Dillon 1974, Dillon and Rigler 1974 a and b, and 1975, Kirchner and Dillon 1975). Use of the Larsen and Mercier (1976) total phosphorus retention term, based on localized data (northeast and north-central U.S.) from 20 lakes in the US-EPA National Eutrophication Survey (US-EPA-NES) provides a more accurate model for northeastern regional lakes.

Strengths:

- Approach is commonly accepted practice in lake management
- Makes best use of available water quality monitoring data
- Export coefficients were derived from extensive data bases, and were determined to be appropriate for the application lake.

Weaknesses:

- Inherent uncertainty of TP load estimates (Reckhow 1979, Walker 2000) and associated variability and generality of TP loading coefficients.

Critical Conditions: Occur in Threecornered Pond during the summertime, when the potential (occurrence and frequency) of nuisance algae blooms are greatest. The loading capacity of 15 ppb of total phosphorus was set to achieve desired water quality standards during this critical time period, and will also provide adequate protection throughout the year (see Seasonal Variation section).

LOAD ALLOCATIONS (LA's): The load allocation for Threecornered Pond is 183 kg TP on an annual basis. External TP sources, averaging 196 kg annually have been identified and accounted for in the land-use breakdown portrayed in Table 3.

Reductions in nonpoint source phosphorus loadings are expected from the continued implementation of best management practices (see BMP Implementation Plan summary). As previously mentioned, it was not possible to separate natural background from nonpoint pollution sources in this watershed because of the limited and general nature of the available information. As in other Maine TMDL lakes, in-lake nutrient loadings in Threecornered Pond originate from a combination of external (watershed) and to a much lesser extent, internal (sediment) sources of total phosphorus.

WASTE LOAD ALLOCATIONS (WLA's): As there are no known existing point sources of pollution (including regulated stormwater sources) in the Threecornered Pond watershed, the waste load allocation for all existing and future point sources is set at 0 (zero) kg/year of total phosphorus.

MARGIN OF SAFETY (MOS): An implicit margin of safety was incorporated into the Threecornered Pond TMDL through the conservative selection of the numeric water quality target, as well as the selection of relatively conservative phosphorus export loading coefficients for cultural pollution sources (Table 3). Based on both the Threecornered Pond historical records and a summary of statewide Maine lakes water quality data for colored (> 26 SPU lakes) - the target of 15 ppb (183 kg TP/yr) in Threecornered Pond) represents a highly conservative goal to assure attainment of Maine DEP water quality goals of non-sustained and non-repeated blue-green summer-time algae blooms due to NPS pollution or cultural eutrophication. The statewide database for naturally colored Maine lakes indicate that summer nuisance algae blooms (growth of algae which causes Secchi disk transparency to be less than 2 meters) are more likely to occur at 17 ppb or above. The difference between the in-lake target of 15 ppb and 16 ppb represents a 6% implicit margin of safety for Threecornered Pond.

SEASONAL VARIATION: The Threecornered Pond TMDL is protective of all seasons, as the allowable annual load was developed to be protective of the most sensitive time of year – during the summer, when conditions most favor the growth of algae and aquatic macrophytes. With a hydraulic retention time of 3.24 flushes/year, the average annual phosphorus loading is most critical to the water quality in Threecornered Pond. Maine DEP lake biologists, as a general rule, use more than six flushes annually (bi-monthly) as the cut-off for considering seasonal variation as a major factor (to distinguish lakes vs. rivers) in the evaluation of total phosphorus loadings in aquatic environments in Maine. The best management practices (BMPs) proposed for the Threecornered Pond watershed have been designed to address total phosphorus loading during all seasons.

PUBLIC PARTICIPATION: Adequate ('full and meaningful') public participation in the Threecornered Pond TMDL development process was ensured - during which land use and phosphorus load reductions were discussed - through the following avenues:

1. From December of 2001 to August of 2002, MACD project staff Jodi Michaud Federle attended numerous CRLA board meetings. Updates on the lake TMDL development process were provided. (*The board is made up of members of the lake associations of Webber Pond, Threemile Pond, Threecornered Pond and China Lake, as well as the Kennebec Water District and the meetings are attended by the Executive Director of the CRLA).*

2. During the summer and fall of 2001 and 2002, MACD project staff - particularly Threecornered Pond coordinator Jodi Michaud Federle - made numerous visits to the Vassalboro town office, the City of Augusta, and to the Kennebec County SWCD office in order to compile necessary watershed inventory information.

3. On February 28, 2002, a locally-lead Watershed Conservation meeting was hosted by the Kennebec County SWCD at the China Town Office. The meeting was attended by 12 people, including residents of the Webber, Threemile and Threecornered Pond watersheds. The Lake TMDL studies were explained and discussed. A follow-up Watershed Conservation meeting was held on March 28, 2002, hosted by the KC-SWCD at the Vassalboro Town Office. This meeting was attended

by 14 people, including residents of the Webber, Threemile and Threecornered Pond watersheds. Water quality information used in creating the TMDL report was supplied to watershed residents.

4. The China Region Lakes Alliance's 2002 spring newsletter featured an article about the TMDL studies for Webber, Threemile and Threecornered ponds.

5. A TMDL presentation was made at the Threecornered Pond Improvement Association's 2002 annual meeting, attended by 30 to 35 people.

Stakeholder and Public Review Comments

A preliminary stakeholder review draft Threecornered Pond TMDL report was submitted to 13 individuals who received an electronic or hard copy version of the report on December 20, 2002, and were requested to comment by the end of a three-week review period. The following summarized comments were provided:

Joan Jones, President, Threecornered Pond Improvement Association—provided written comments regarding clarifications to help the layperson better understand the report as well as specifics regarding how to best reduce the external phosphorus input to the lake.

Reb Manthey, CRLA, Executive Director—provided written general comments and minor edits.

Morten Moesswilde, Maine Forest Service– provided written comments to better distinguish between foresters and loggers mentioned in the report as well as more detail regarding contact information for technical assistance and/or BMP guidelines.

Public Review Comment (Review Period: **March 8 - April 7, 2003**)

The Public Review document was posted on the Maine DEP website on March 7, 2003 and 'legal' advertising in local newspapers appeared March 15-16, 2003. The following ad was printed in the Morning Sentinel (Waterville) and the Kennebec Journal (Augusta):

> **Webber-Threemile-Threecornered Ponds (Kennebec County) Watershed/Lake Nutrient Control/Management Reports (PCAP-TMDL)**
> In accordance with Section 303(d) of the Clean Water Act, and implementation regulations in 40 CFR Part 130 - the Maine Department of Environmental Protection has prepared combined Phosphorus Control Action Plan (PCAP) and Total Maximum Daily Load (TMDL) nutrient reports (DEPLW 2002-0556/0058/0562) for the Webber, Threemile and Threecornered ponds/watersheds, located in the towns of Vassalboro, China, Windsor, and Augusta, within Kennebec County. These PCAP-TMDL reports identify and estimate non-point source phosphorus loadings within all representative land use classes of the Webber-Threemile-Threecornered ponds/watersheds and the phosphorus reductions needed to establish and maintain acceptable water quality conditions. Public Review drafts of these reports may be viewed at Maine DEP Central Offices in Augusta (Ray Building, Hospital Street-Route 9). Send all comments, in writing-by April 7, 2003, to Dave Halliwell, Lakes TMDL Program Manager, Maine DEP, State House Station #17, Augusta, ME 0433. 207-287-7649 or e-mail: David. Halliwell@maine.gov. Files: Webber Pond; Threecornered Pond; Threemile Pond.

Note: ***Maine DEP/MACD response to comments appear in italics.***

Public Review Comment (Joan M. Jones, President, Threecornered Pond Improvement Association)

Date: April 7, 2003
To: David Halliwell
From: Joan M. Jones, Pres. Three Cornered Pond Association
Subject: Comments on ThreeCornered Pond PCAP-TMDL Report; Public Draft Review

Overall the report is very well done and the changes made to the earlier draft are significant and a great improvement.

1. Page 5 the "What you can do to help?" is well thought out. A little more would be helpful, see comment 4.

Comments taken into consideration and Summary Fact Sheet adjusted accordingly.

2. On Table 1, Land Use Inventory, it is not an easy table to follow when trying to differentiate between the developed versus the undeveloped areas. The bolding helps some however, the percentages just discussed in the earlier text doesn't really match up with the percentages in the table. This causes some confusion. Could someone take another look at how these numbers are being used to explain things?

Comments taken into consideration and Table 1 adjusted accordingly.

3. On page 15, six high impact sites are mentioned. How will these 6 sites be approached to make improvements? How should suggestions or help be offered?

Site-specific information is not provided as part of this report. For technical assistance and education/outreach suggestions, contact the China Region Lakes Alliance and/or the Kennebec County Soil and Water Conservation District.

4. On page 18, clearer guidance on where key reductions in P-loading are needed. Could the top three impacts to focus on by residents be identified? Is it protected buffers, driveway water bars, camp or town roadways, or septic systems that folks should be focusing on? Some suggestions here would be helpful.

All residents should be encouraged to incorporate Best Management Practices on their properties (see Action Plan—'Individual Action'). With NPS pollution, there is not always one big problem to focus on, rather many smaller ones—so it is important that people understand that every little bit helps when it comes to addressing NPS pollution mitigation.

5. There is a conflict on maximum depth of the pond in the text. On page 4 it lists depth of 41 ft, then on page 8, it states max. depth is 33 ft. Please resolve the discrepancy.

Thank you for noting this inconsistency. Page 4 has been corrected.

6. On page 19, I believe the Association joined the CRLA in 2001.

Thank you for noting this error. Page 19 has been corrected.

7. On page 23, under Municipal Action. I would recommend additional language that advises municipal CEOs keep closer watch over building permits and actual construction when issued for new or upgrades to residential dwellings. Major cuttings always seem to happen when someone starts building and septic systems get installed. More handholding is warranted at such critical times during development.

Public Review Comment (Morten Moesswilde, Maine Forest Service)

Jodi,

Thanks again for your work on these. The forestry information on all three looks ok to me. Thanks for keeping me posted as well.

Let me know if you are doing more of these in the coming field season.

Best regards,
Morten

Public Review Comment (Leo St. Peter, Park Manager, *Augusta Bicentennial Nature Park*)

The overall readability of the report was excellent. The material was covered in a manner that was very understandable to the laymen and at the same time professional in nature. The entire document was outlined in a logical and practical format that was far superior and more understandable to the reader than the previously presented document of 2002.

As always, the use of illustrations and graphs provide the reader with a three-dimensional view of the scope of the watershed and the issues affecting it. As with any good study or scientific research, there should always be as many questions asked as where answered. This is the case to an extent with this report.

Question #1 - The water quality in Threecornered pond is compared to and considered better than the water quality in Threemile and Webber pond, yet I failed to locate in the report an illustration statistically, or otherwise, what was meant by poor water quality in Threemile and Webber pond. Page 4, paragraph 2, declares Threemile and Webber ponds as having worse water quality than Threecornered pond. Compared to what?

The reference to other lakes has been taken out of the text and more specific information regarding Threecornered Pond's water quality has been added.

Question #2 - Page 8, under the "Water Quality Information" section, paragraph 3, eludes to nonpoint source (overland) pollution without adequately defining said terminology in order to equip stakeholders with information and strategies to combat an issue; there may be no strategy of correction.

NPS pollution is defined on Page 6 under "Project Premise" and further discussed on Page 9 under 'Water Quality Information". Strategies for mitigating NPS pollution are set out in the "Phosphorus Control Action Plan".

Question #3 - There is mention in the report that Threecornered pond association maintains and controls water levels. However, the report does not address the advantages for raising or lowering the water levels other than to minimize winter ice damage and drain high algae-laden waters. This is a questionable scientific view at best. If the report could sanctify such questionable practices by providing scientific data to prove the benefit of such practices, then the reports mention of such human intervention could be viewed as beneficial and thus continued.

Since regulated lake water level issues are subjective in nature and not directly related to this TMDL (PCAP)study, this aspect of lake management was not elaborated on as part of this study.

In conclusion, the report as submitted demands reflection and action in order that the amount of phosphorus reduction required is obtained. Data and scientific research are valuable assets when applied strategically and in earnest to situations in need of assistance. Hopefully, stakeholders involved in this study will apply themselves to the improvement of the Threecornered pond water quality as outlined in this report.

Thank you
=====
Leo St. Peter
Park Manager, Bicentennial Nature Park
City of Augusta, Community Services
207- 626-2352 EX. 4110
Park Phone: 620-7010

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