Cold Stream Pond
Watershed-based Protection Plan

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The Cold Stream Campowners' Association, with assistance from the Penobscot County Soil and Water Conservation District

1. Background

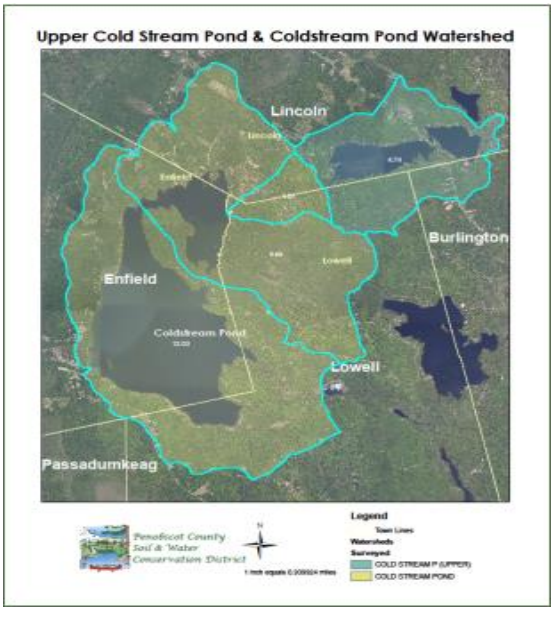
A. Purpose and Scope

The intent of the plan is to lay out a strategy for the mitigation of non-point source (NPS) pollution and protection of water quality in the Cold Stream Pond watershed for the next ten years (2016 – 2026). This document (the "plan") was developed by the Cold Stream Campowners' Association (CSCOA), with the assistance of the Maine Department of Environmental Protection (MDEP) and the Penobscot County Soil and Water Conservation District (PCSWD) and input from the United States Environmental Protection Agency (EPA).

This plan was developed to satisfy watershed planning guidelines provided by the U.S. Environmental Protection Agency (EPA). EPA requires nine-element plans for impaired watersheds, but allows alternative plans for protection of high quality or unimpaired waters. MDEP accepts alternative plans for unimpaired lakes that have completed a recent watershed survey provided that the plans follow EPA and MDEP guidance and include minimum planning elements. This plan, which covers the direct watershed of Cold Stream Pond meets these requirements. Following MDEP guidance the following documents provided much of the background for the plan:
Cold Stream Pond Watershed Survey Report, 2011 (Appendices A and B)
Outreach Plan for Cold Stream Campowners' Association, 2012 (Appendix C)

The Watershed

In the MDEP's 2014 *Maine Nonpoint Source Management Program Plan,* 2015-2019, Cold Stream Pond is listed as a Priority Watershed due to threats to its "outstanding water quality." It lies within the Penobscot River watershed, which has been designated by The National Oceanic and Atmospheric Agency (NOAA) as a "Habitat Focus Area". With its close proximity to Lincoln, Old Town, and Bangor, Cold Stream Pond is a popular recreation lake both with property owners and day users. The Town of Enfield maintains a public boat launch and lake access and a public beach facility (Morgan's Beach).



In recent years, the number of camp owners residing at the lake year-round has increased significantly. There has been considerable construction of new residences and access roads around the lake during the last 30 years, particularly along the previously undeveloped north and east shores. Since the 1970s, the number of lakefront residences has nearly doubled, to about 420. Previously narrow cottage roads have been widened and receive considerably more use than in the past. Many are maintained for year-round use. Of the lake's approximately 34 km (21 mi) of shoreline, 4.8 km (3 mi) are zoned for "resource protection" and require a 76 m (250 ft.) setback for new construction.

Cold Stream Pond is an uncolored, oligotrophic lake with an area of 1,465 ha (3,619 ac) and a maximum depth of 32 m (104 ft). Mean depth is 12 m (40 ft). Total watershed area is 5,620 ha (22 sq mi). The lake is in Penobscot County, in the towns of Enfield, Lincoln, and Lowell. Cold Stream Pond is comprised of two distinct basins separated by a narrows. The upper (northern) basin is has significantly shallower depths. Inlets to the lake include Smelt Brook, Miles Brook, and several other small streams. The lake's outlet is Cold Stream, in Enfield.

The lake is managed by the Maine Department of Inland Fish and Wildlife (MDIFW) as a cold-water fishery and is popular with anglers who fish primarily for lake trout and landlocked salmon. MDIFW has instituted regulations designed to reduce a small mouth bass population that was established by illegal stocking several years ago. Continued high water quality is essential for the operation of the MDIFW fish hatchery in Enfield, which draws water from the lake. The annual count of loons on the lake for the last ten years has averaged 20 adults and 1-2 chicks. Bald eagles are often observed.

B. Prior Watershed Work

The CSCOA was first established in the 1970s, primarily due to concerns about a proposed 1,500-unit development along the east shore of the lake. The association, now with over 140 members, was reconstituted in 1994 with a focus on shoreline protection and water quality issues.

In 1999 a project funded by a grant under Section 319 of the Clean Water Act (CWA), "Cold Stream Pond Watershed Survey & BMP Demonstrations" was implemented which consisted of a watershed survey, technical assistance to landowners to implement sound conservation practices, and the installation of five Best Management Practices demonstration projects.

In 2010 The CSCOA partnered with PCSWCD and the University of Maine Extension Cooperative Extension Service (Extension) to conduct a watershed survey. The sites were documented by trained CSCOA members in 2010 and reviewed by technical staff (Sarah Johnson and Chris Brewer) for the PCSWCD and Laura Wilson for Extension in 2011.

Other activities funded by the CSCOA have included:

- Demonstration projects along roads that show how to control runoff and reduce erosion
- Semi-annual newsletters sent to all members
- Other direct mailings to all 400 + lake front property owners
- A CSCOA website: www.coldstreampond.com
- An annual water quality grant (funding up to $1,500 each for 1-2 projects designed to protect or improve lake water quality)
- Annual 50% matching funding (up to $500 each) for 1-3 lakeside buffer projects
- Annual donation to support the Maine Lakes Society
- Member volunteers and annual donation to Volunteer Lake Monitoring Program
- Coordination of annual loon count in cooperation with the Maine Audubon Society
- Funding a high school student to work with fishery biologists to do creel surveys at the public boat ramp

In addition, the association receives financial aid from the Town of Enfield for lake water quality protection. Using those donations, CSCOA has upgraded most Enfield camp roads to reduce uncontrolled storm water runoff. Actions have included:

- Grading and crowning roads to move storm water off
- Reshaping, re-vegetating and/or cleaning out roadside ditches
- Rip-rapping ditches and erecting check dams on steep slopes
- Installing larger culverts to prevent freezing that allows runoff to overflow and erode roads
- Building plunge pools and settling ponds to prevent erosion and trap silt

2. Causes of Non-Point Source Pollution

A. Water Quality Summary

The excellent water quality of Cold Stream Pond makes it an especially valuable recreational and fishery resource worthy of special protection. Water quality data have been periodically collected by the MDEP and the Maine Volunteer Lake Monitoring Program (VLMP) since 1970. A summary of data from samples taken from the lower basin (MIDAS 2146 Sample Station 1) in 2011 showed "a mean Secchi disk transparency (SDT) of 10.2 m (33 ft.). Total phosphorous (TP) ranged from 3 to 7 parts per billion (ppb) with an average of 5 ppb. Chorophyll-a ranged from 0.4-3.4 ppb with an average of 1.6 ppb. Dissolved oxygen (DO) readings have shown minimal depletion in the lower basin's deeper parts. In the upper basin (MIDAS 2146 Sample Station 2), SDT averaged 6.6 m (22ft). The range of TP was 4-8 ppb with an average of 6 ppb. Chla ranged from 1.1-3.4 ppb with an average of 2.12 ppb."

Both lake basins stratify thermally. Dissolved oxygen in the lower basin is suitable for cold-water fish species. In the shallower upper basin, however, the deepest parts often become oxygen-deficient in late summer with DO levels frequently falling below 3 parts per million (ppm.)

B. Watershed NPS Threats

As with other lakes in Maine, the greatest threat to water quality in Cold Stream Pond is polluted run-off. During and after storms, soil and nutrients, particularly phosphorous, are carried into the lake via ditches, roads, and overland flow. Phosphorous is a common element in soils around the lake and also may enter the lake from use of fertilizers or from inadequate septic systems. Another threat comes from growth which, if managed improperly, can result in conversion of forest lands into developed lands and contribute to a gradual decline in water quality.

The 2011 watershed survey (Appendices A and B) identified 142 sites where erosion was occurring or where shoreline protection measures were inadequate. The majority of the sites were found on individual residential properties. About half (70 properties) lacked an adequate shoreline buffer. Most of these issues on individual properties can be addressed with low cost (<$500) actions. About 20 percent of the identified sites were associated with private roads. This represents an improvement from conditions documented in a 1999 watershed survey which found that 55 percent of problem sites were associated with private roads.

Private roads however, remain a concern since they can be a major contributor of soil that enters the lake across either properties lacking effective shoreline buffers or via stream channels connected to road ditches. Many road issues could be addressed through annual road maintenance programs conducted by road associations. Taken individually, most problems identified in the watershed survey were rated as having low to moderate impact. Collectively however, they have the potential to seriously impact water quality of Cold Stream Pond in the long run. Additionally, new problems have been identified since the 2011 survey.

3. Vision, Goals, and Objectives

Vision (*Overall Goal*): "Cold Stream Pond remains beautiful, clear and cold, free of invasive plants, and retains its outstanding water quality."

This will be achieved through the following objectives and actions over the next ten years (2016-2026).

- Reduce current sources of phosphorus by addressing the highest water quality impact sites listed in the Cold Stream Pond Watershed Survey. This will be achieved by providing targeted outreach and arranging technical assistance through partnership with Penobscot County Soil and Water Conservation District.

- Increase the capacity of the CSCOA to help create an educated and aware public throughout the watershed that values and supports the vision for Cold Stream Pond. Implementation of LakeSmart screenings and demonstrations will be a key mechanism for accomplishing this objective.

- Prevent new sources of phosphorus from entering the lake by promoting improved land use and development practices and prompting maintenance of existing camp roads. This objective will be met by conducting outreach and providing technical assistance to residents, road associations, and municipal officials.

- Conduct ongoing assessment of lake and watershed conditions by monitoring lake water quality and setting up and maintaining the NPS Site Tracker to track project accomplishment.

- Prevent the introduction of invasive aquatic plants through volunteer monitoring at the Enfield boat launch.

4. Implementation actions and milestones

A. Actions

Table 1 presents an estimated schedule for plan implementation. Implementation is planned for a ten-year period. The schedule of action will be reviewed and revised after five years of implementation (2012)
Table 2 outlines the actions needed to accomplish plan objectives.

Table 1. Estimated Schedule

2016- 2017	• Update priority site list and set up NPS site tracker • Through partnership with PCSWCD advertise availability of technical assistance to help fix NPS sites throughout the watershed • Apply for EPA Section 319 Clean Water Act (CWA) grant in partnership with PCSWCD • Notify landowners regarding availability of funds to address residential NPS sites if awarded grant
2017- 2018	• Implement EPA 319 grant, if funded, with cost-sharing and matching funds for high priority sites • Implement LakeSmart and outreach, training, and education efforts described in the Outreach Plan for CSCOA developed in 2012
2016- 2026	• Conduct water quality and invasive species monitoring. • Continue fund-raising, outreach, education, and funding of lake stewardship work. • Land-owners self-fund and provide matching funds for application of best management practices (BMPs) at NPS sites. • Update priorities as needed and maintain site tracker.

Table 2 Actions	When	Who	Potential Funding
Reduce current input of sediment and phosphorous to lake			
Update 2011 watershed survey with names and addresses	2016	CSCOA	CSCOA
Confirm priority of sites identified in 2011 watershed survey	2016, 2021	CSCOA, PCSWD, MDEP	CSCOA
Offer cost-sharing assistance to install BMPs at NPS sites Private Roads (16 sites) Residential Sites (40 sites) Additional sites to be identified	2016-2021 2022-2026	CSCOA	CSCOA, EPA (319)
Continue to offer buffer and watershed grants	annual	CSCOA	CSCOA
Prevent future inputs of sediment and phosphorus to lake			
Use Town Of Enfield grant for watershed protection (roads)	annual	CSCOA	CSCOA
Provide training and informational materials for road maintenance crews, plow operators, and road associations.	2016, 2021	PCSWCD KCSWCD***	CSCOA, EPA (319)
Determine if invasive plants are present in the lake			
Train volunteers in plant identification	2016	CSCOA, MVLMP	CSCOA, MVLMP
Survey lake for invasive plant species	2016, 2021	CSCOA	CSCOA,
Establish ways of preventing future introductions of invasive species in the lake			
Post sign and interpretive display at Enfield boat ramp	2016	CSCOA	CSCOA
Spread information via web site, newsletter, newspaper articles	annual	CSCOA	CSCOA
Conduct volunteer boat inspections at ramp	annual	CSCOA, MVLMP	CSCOA
Expand education and demonstration projects			
Upgrade and interpret buffer demonstration project at Enfield boat ramp	2016-2017	CSCOA, MDIFW, Town	CSCOA, EPA (319)
Hold tours to highlight conservation projects	annual	CSCOA, PCSWCD	CSCOA
Provide LakeSmart designations for qualified properties	annual	CSCOA, MLS**	CSCOA
Expand website, publish articles, expand newsletter	2016	CSCOA	CSCOA

Table 2 (Cont.)

Increase number of committed volunteers			
Continue annual meeting and fund-raising events	annual	CSCOA	CSCOA
Train additional LakeSmart screeners	annual	CSCOA, MLS**	private
Continue annual loon count	annual	CSCOA	private
Conduct on-going lake and watershed assessment			
Continue lake water quality monitoring	annual	CSCOA, MDEP, MVLMP*	private
Utilize NPS site tracker	annual	CSCOA	CSCOA

*Maine Volunteer Lake Monitoring Program **Maine Lakes Society

*** Kennebec County Soil and Water Conservation District

B. Plan Oversight and Partner Roles

The Cold Stream Pond Watershed-based Plan will be carried out by the Coldstream Campowners' Association with on-going support from the Penobscot County Soil and Water Conservation District. Other partners include the Maine Department of Environmental Protection; the Maine Lakes Society; the Towns of Enfield, Lowell and Lincoln; private road associations; and landowners.

- The **Coldstream Campowners' Association** will conduct water quality monitoring through the Volunteer Lake Monitoring Program (VLMP), facilitate outreach activities, promote watershed stewardship through its website and newsletter, coordinate watershed protection projects funded by the Town of Enfield, and raise and distribute funds for stewardship work. They will also utilize the NPS Site Tracker to identify new NPS sites and monitor progress.
- The **Penobscot County Soil and Water Conservation District** will support the CSCOA with Plan implementation; provide technical assistance and training; and will administer the EPA Section 319 Clean Water Act grant.
- The **Kennebec County Soil and Water Conservation District** will provide technical assistance.
- The **Town of Enfield** will provide annual funding for water quality maintenance and improvement.
- The **Maine Department of Environmental Protection** will conduct baseline water quality monitoring every five years, provide technical assistance and provide the opportunity for financial assistance through the NPS Grant Program.
- The **US Environmental Protection Agency** may provide CWA Section 319 funds and guidance.
- The **Maine Lakes Society** will support CSCOA volunteers in the implementation and recognition of LakeSmart designations for qualifying properties.

C. Plan Milestones and Outcomes

Organizational Milestones

- Update of priority site list and utilization of Site Tracker.
- Contact made with all property owners and road associations with sites identified in the watershed survey.
- Application for and administration of a CWA 319 grant.
- Implementation of LakeSmart (number of properties reviewed).

NPS Mitigation Milestones

- Number of NPS sites fixed by voluntary landowner initiative.
- Number of high and medium impact NPS sites fixed with cost-sharing assistance.
- Number of technical assistance visits.
- Number of training sessions conducted.
- Estimated pollutant load reductions achieved by installed BMPs.

Water Quality Outcome Measures

- Stable or improved trend for lake water clarity (Secchi disk readings).
- Stable or improved trend in total phosphorous from lake sampling.
- No presence of invasive plant species.

5. Proposed Management Measures

The *Coldstream Pond Watershed Survey Report, 2011* (Appendices A and B) lists all identified erosion sites in the watershed that are contributing sediment and phosphorus to the lake. Overall, 142 sites within the watershed were found to be either contributing eroded soil to the lake or were areas where lake protection measures were inadequate.

Cost of addressing problems was estimated as low for 89, medium for 41, and high for 11 of the sites identified. The technical level of measures necessary was estimated as low for 99, medium for 36, and high for 6 of the sites. The impact of applying appropriate measures was estimated as low for 21 sites, medium for 112 sites, and high for 8 sites.

Typical problems for the land uses identified in the watershed survey are described in the sections below. Recommendations follow guidelines found in MDEP publications including the *Gravel Road Maintenance Manual*, *Conservation Practices for Homeowners* fact sheet series, and *Erosion and Sediment Control Manual*. The recommended BMPs accomplish the plan goal of reducing phosphorus and sediment loading to the lake by stabilizing bare soil and erosion and diverting, infiltrating or filtering polluted runoff before it reaches the lake.

In addition to structural BMPs recommended for each problem, public education and outreach efforts will also be needed to promote responsible stewardship and ongoing maintenance activities. The NPS Site Tracker will be used by the CSCOA on an ongoing basis to record new problems and document maintenance of sites fixed through the plan.

A. Residential Sites

The watershed survey identified 70 residential properties that lack an adequate shoreline buffer. Other residential property issues include rooftop runoff, extensive parking areas, and driveways that sometimes lead directly to the lake.

Based on the survey findings, the most common applicable BMPs will include:

- Installing or enhancing vegetated buffers
- Installing rain gardens
- Mulching or planting open areas
- Installing runoff diverters on driveways and lake access points
- Installing infiltration trenches

The plan intends to address 40 of the residential erosion problems identified by the watershed survey, starting with the 8 sites identified has having the greatest impact. These sites will be fixed by providing landowners with small matching grants for plants, erosion control mulch or other materials. Since many of the low impact sites are low cost and easy to fix, we believe that once a good example of appropriate fixes has been demonstrated, other homeowners will see the benefits and will independently fix their identified problems after recommended solutions are brought to their attention through targeted outreach, fact sheets, and/or technical assistance visits. Properties designated by the LakeSmart program will serve as examples of “best practices.”

B. Private Roads

The watershed survey identified problems at 26 private road sites. 16 of the identified sites were listed as high or medium priority. Common problems included unstable culverts (inadequate size, unstable inlets and outlets); presence of berms (resulting in ditch, shoulder, and surface erosion); lack of proper crown or lead-out ditches

resulting in surface and gully erosion).

The most common BMPs to address these issues include:

- Install new culverts and stabilize the ends with stone
- Clean, reshape, and armor ditches with angular stone or vegetation
- Crown and reshape roads and install lead-out ditches to allow for proper drainage

The intent of this plan is to address the 16 medium to high priority private road sites found in the watershed survey. Sites will be addressed by providing cost-sharing funds to road associations and by watershed improvement funding from the Town of Enfield. Technical assistance and training will also be provided to road associations and road maintenance contractors.

Ongoing maintenance (e.g., grading, removing accumulated sediment from culvert inlets and outlets and turnouts) is critical to long term performance of these BMPs and prevention of new NPS problems. As a result, the plan calls for periodic inspections of implemented BMPs through the NPS Site Tracker. Follow up contact will be made by the CSCOA to road associations and landowners for any maintenance needs.

6. Pollutant Load Reductions

Pollutant load reductions will be estimated and reported to DEP for any work funded by 319 grants using methods approved and recommended by the DEP and EPA.

7. Water Quality Results Monitoring

The CSCOA has four volunteers trained by VLMP who will monitor Secchi disk transparency, temperature, and dissolved oxygen in both the upper and lower basins twice a month from May through September annually. Total phosphorous will be sampled in both basins once a month from May through September annually.

Periodically, MDEP will evaluate transparency data to assess trends in water quality conditions of the lake. The results of the transparency and phosphorous readings will assist in determining whether the Plan meets its goal of having stable or improving water quality over time.