

**Watchic Pond Watershed
Nonpoint Source Pollution Survey Project**



Prepared by :

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The following people were instrumental in the Watchic Lake Watershed Survey Project and deserve special recognition:

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Is there a water quality problem with Watchic Lake?

The 1996 Maine Water Quality Assessment report to Congress, prepared by the Maine Department of Environmental Protection (MDEP), concluded that Watchic Lake does not meet the water quality standards for Maine lakes for dissolved oxygen concentrations in lake water established by Maine state law. The magnitude of the problem was listed as high, and the primary source was attributed to shoreline development, although development throughout the watershed is also a factor. The deteriorating water quality is evident by such problems as nuisance *algal blooms* that have occurred in some southern coves and the depletion of *coldwater fishery* habitat over 15 years ago.

Watchic Lake's pollution is caused, in great part, by ***nonpoint source pollution (NPS)*** - pollution that includes but is not limited to soil, nutrients (such as phosphorus and nitrogen) and debris. During storm events and snowmelt, these pollutants are picked up by stormwater runoff and washed into the lake from its surrounding ***watershed***. A watershed includes all the land that surrounds a lake that drains water into the lake through streams, ditches, or directly over the ground's surface (see Figure 1, page 2a: Watchic Lake Watershed).

In an undeveloped, forested watershed, stormwater runoff is slowed and filtered by trees, shrubs and other vegetation. It then filters through the soil and soaks into the uneven ground of the forest. In a developed watershed, stormwater velocity increases on impervious surfaces like rooftops and pavement and does not always receive the filtering treatment the forest once provided. Therefore, lake water quality is directly impacted by the land uses in its surrounding watershed.

One way to visualize how NPS pollution works is to think of rain and snow melt and the resulting ***runoff*** as a giant broom that sweeps over the watershed. The broom sweeps the watershed debris and bare soil into the lake through connecting streams.

Why is it important to protect Watchic Lake from NPS pollution?

- ◆ The lake provides recreational opportunities to Watchic residents and visitors alike.
- ◆ Watchic Lake contains valuable habitat for fish, birds and other wildlife.
- ◆ Watchic Lake is a drinking water resource for many of the shorefront property owners.
- ◆ A 1996 University of Maine study demonstrated that lake water quality affects property values! For every meter (3 ft) decline in lake water clarity, shorefront property values can decline as much as 10-20%. Declining property values affect individual landowners as well as the economics of an entire community.
- ◆ Once a lake has declined, it can be difficult or impossible to restore.
- ◆ **Bottom line:** *Protecting the quality of our lakes is a sound investment for everyone!*

What is being done to protect Watchic Lake?

The Watchic Lake Association, founded in 1956, has worked with agencies and watershed citizens to promote environmental stewardship. Volunteer watershed surveys have been found to be one of the most effective ways to protect lake water quality through getting local residents involved in identifying existing and potential NPS problems. During the spring and summer of 1998, the Watchic Lake Association joined forces with the Cumberland County Soil and Water Conservation District (CCSWCD) and the MDEP to conduct a watershed survey.

This report is specifically designed for citizens living in the Watchic Lake Watershed, and contains a summary of the citizen survey findings and recommendations.

Purpose of the Watershed Survey

The primary purpose of the watershed survey was to identify and prioritize *existing* sources of ***polluted runoff***, particularly soil erosion sites, in the Watchic Lake Watershed. However of equal importance was to:

- ◆ raise awareness in the town of Standish and surrounding areas of the connection between land use and water quality, and the impact of polluted runoff
- ◆ inspire people to become active stewards
- ◆ use the information gathered as one component of a long term lake protection strategy.

Local citizen participation was essential in completing the watershed survey and will be even more important in upcoming years. Through the leadership of the Watchic Lake Association and assistance from groups and agencies concerned with water quality of the lake, the opportunities for stewardship are limitless. We hope that you will find this report interesting and informative.



Exposed roots are the result of:

- *erosion and soil compaction from uncontrolled foot traffic and water flow (from roofs and upland areas)*

The solution is to:

- *limit foot traffic to a defined pathway*
- *slow water flow (by directing it towards vegetation)*
- *apply bark mulch to protect the roots from further deterioration*

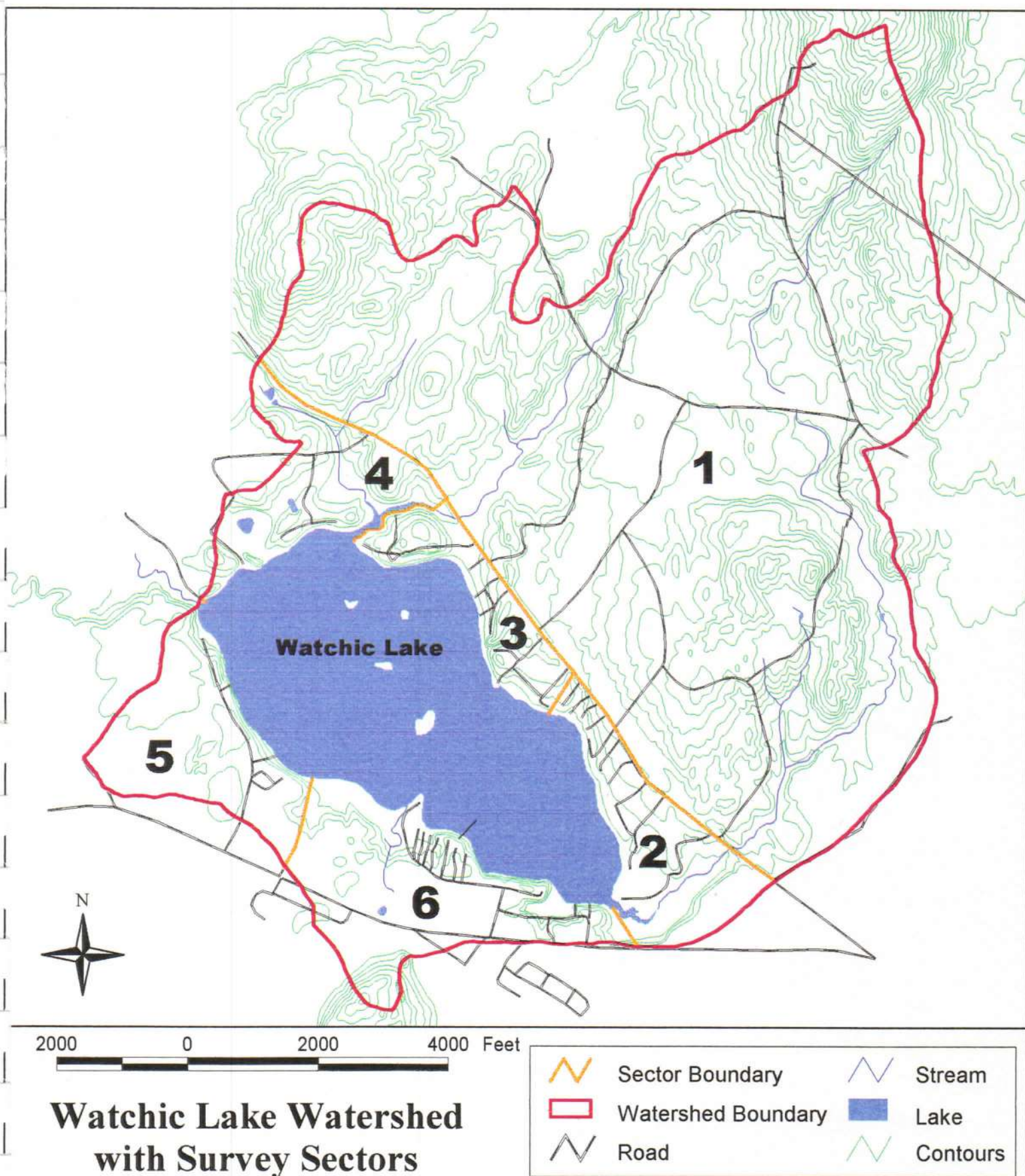


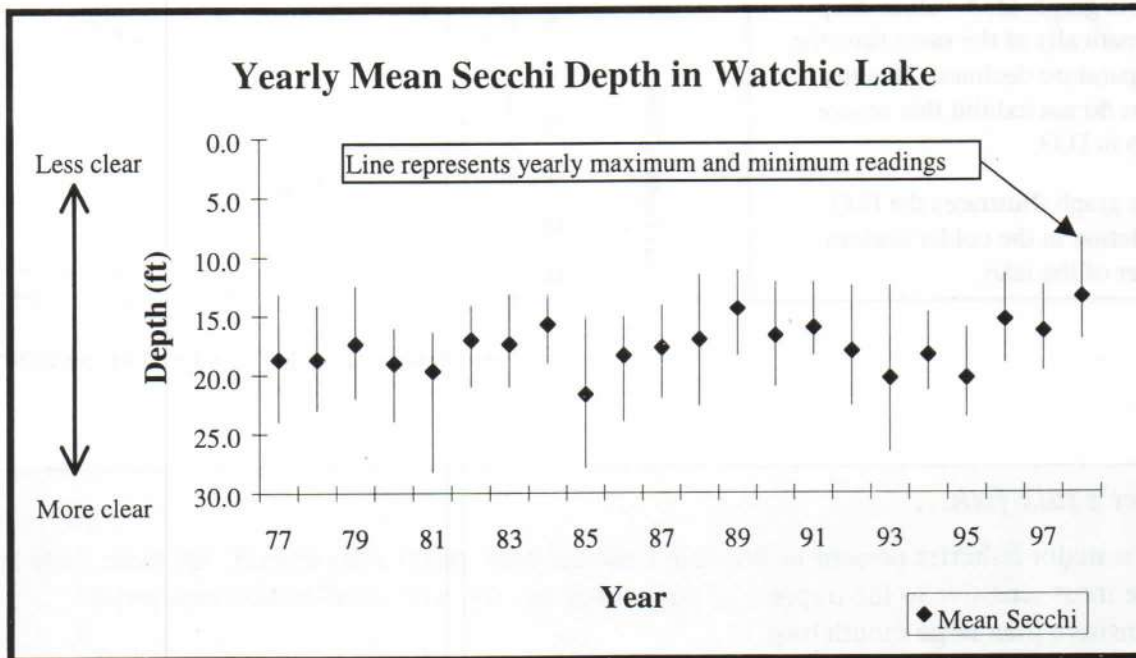
Figure 1

Watchic Lake Water Quality Information

Water Clarity

No single feature of lakes affects people's enjoyment of the resource more than water clarity. Secchi disk depth is a measure of water clarity. Factors that affect water clarity include:

- ◆ **algal growth** – as the growth of algae increases, water clarity decreases. As algal growth continues, green mats can form that will affect clarity, property values, and overall enjoyment of the resource.
- ◆ **suspended solids** – any particles floating in the water, most commonly soil and plant material.
- ◆ **color** – a natural yellow-brown color associated with lakes that receive wetland drainage. Many Maine lakes were more highly “tea” colored than normal during the summer of 1998 due to heavy rains in June.



- ◆ The variability in secchi disk yearly data has been exacerbated by the normal fluctuations in weather (i.e., '97: very dry, '98: very wet). This variability makes it hard to determine a trend from secchi data.
- ◆ MDEP biologists suggest that dissolved oxygen values paint a much better picture of the decline in water quality.

Dissolved Oxygen

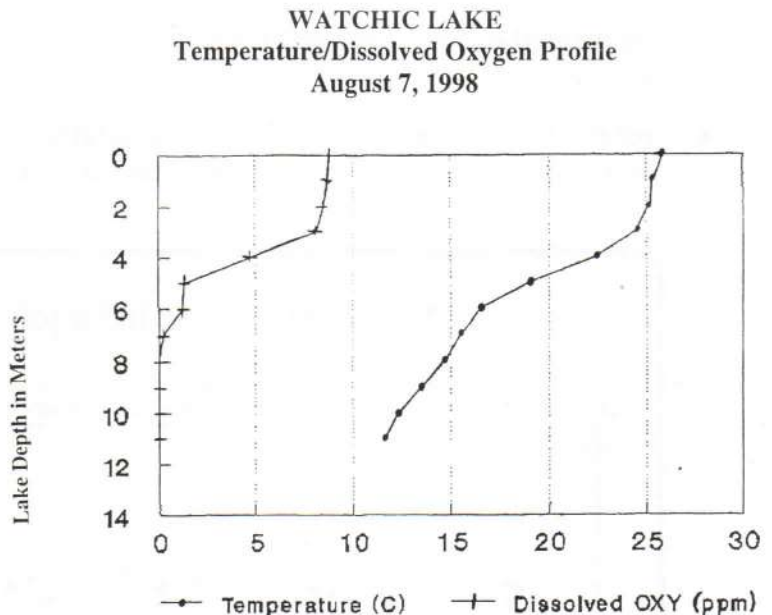
All aquatic plants and animals need oxygen to survive. The amount of dissolved oxygen (D.O.) in the water is used as an indicator of water quality and the level of life that a lake can support.

Volunteers have been taking water quality samples from Watchic Lake since 1974. The 70's and 80's showed some decreases in D.O. Since the start of the 90's, the trend has worsened. These consistently low D.O. levels are the primary reason the MDEP has shifted the status of Watchic Lake from non-attainment to impaired.

This graph shows the temperature and D.O. readings taken on the 7th of August for every meter of Watchic Lake from the surface (0 m) to the bottom (11 m).

In this graph, D.O. values drop dramatically at the same time the temperature declines. Healthy lakes do not exhibit this severe drop in D.O.

This graph illustrates the D.O. depletion in the colder bottom water of the lake.



Let's talk fish...

The major fisheries present in Watchic Lake are bass, perch and pickerel. Of these, bass are the most sensitive to the impacts of poor water quality, with small mouth bass more sensitive than large mouth bass.

In general, fish need 5 ppm dissolved oxygen to survive, and even higher levels to grow and reproduce. Once a system is stressed (i.e. low levels of dissolved oxygen), viral pathogens can start to impact the fish.

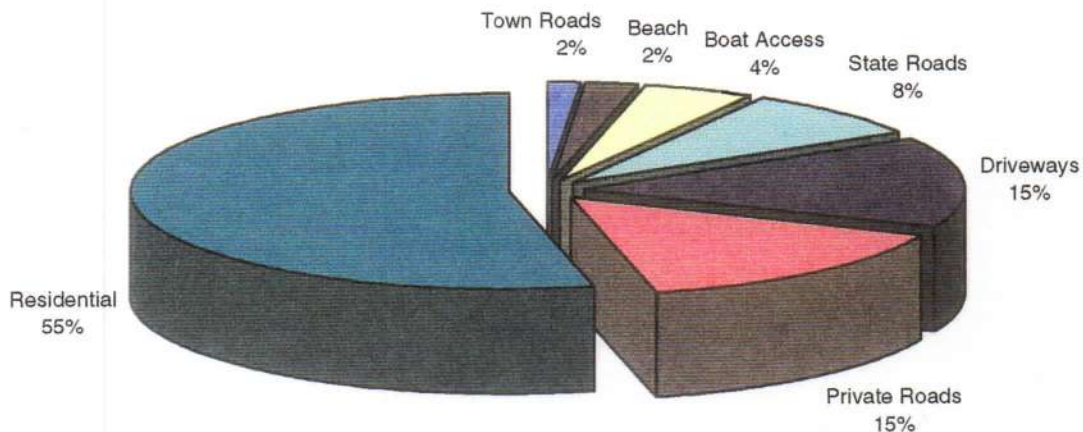
Poor water quality in a lake will always impact the inhabitants of the lake.

Bottom line: Watchic Lake is extremely sensitive! Low dissolved oxygen, the shape of the lake bottom, and the position of the lake make it susceptible to a severe algal bloom.

Summary of Watershed Survey Findings

Volunteers and technical staff identified 135 sites that may be having an impact on the water quality of Watchic Lake.

Percentage of Sites by Land Use



Land Use Breakdown

A total of seven land use types were associated with the identified sites. These included:

Town Roadways

Two sites found. Both of the sites were low impact with low cost, easy solutions.

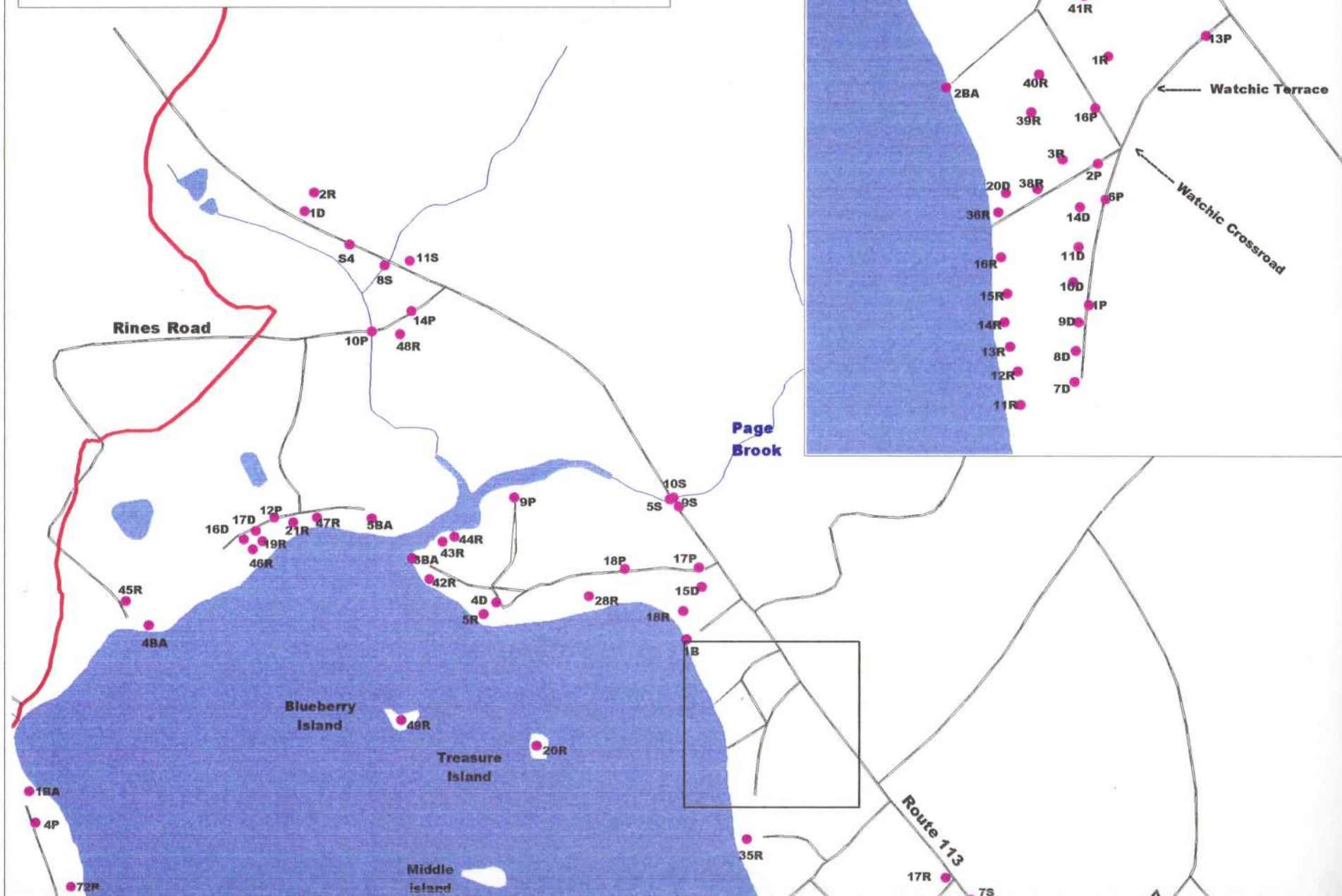
Boat Access

Six sites found. Three were low impact, one was medium impact and two were high impact. Most solutions are easy fixes with low costs.

Residential, Private Roads, Driveways, State Roads and Beach

Detailed descriptions of these sites are on the following pages.

Watchic Lake with Identified Sites



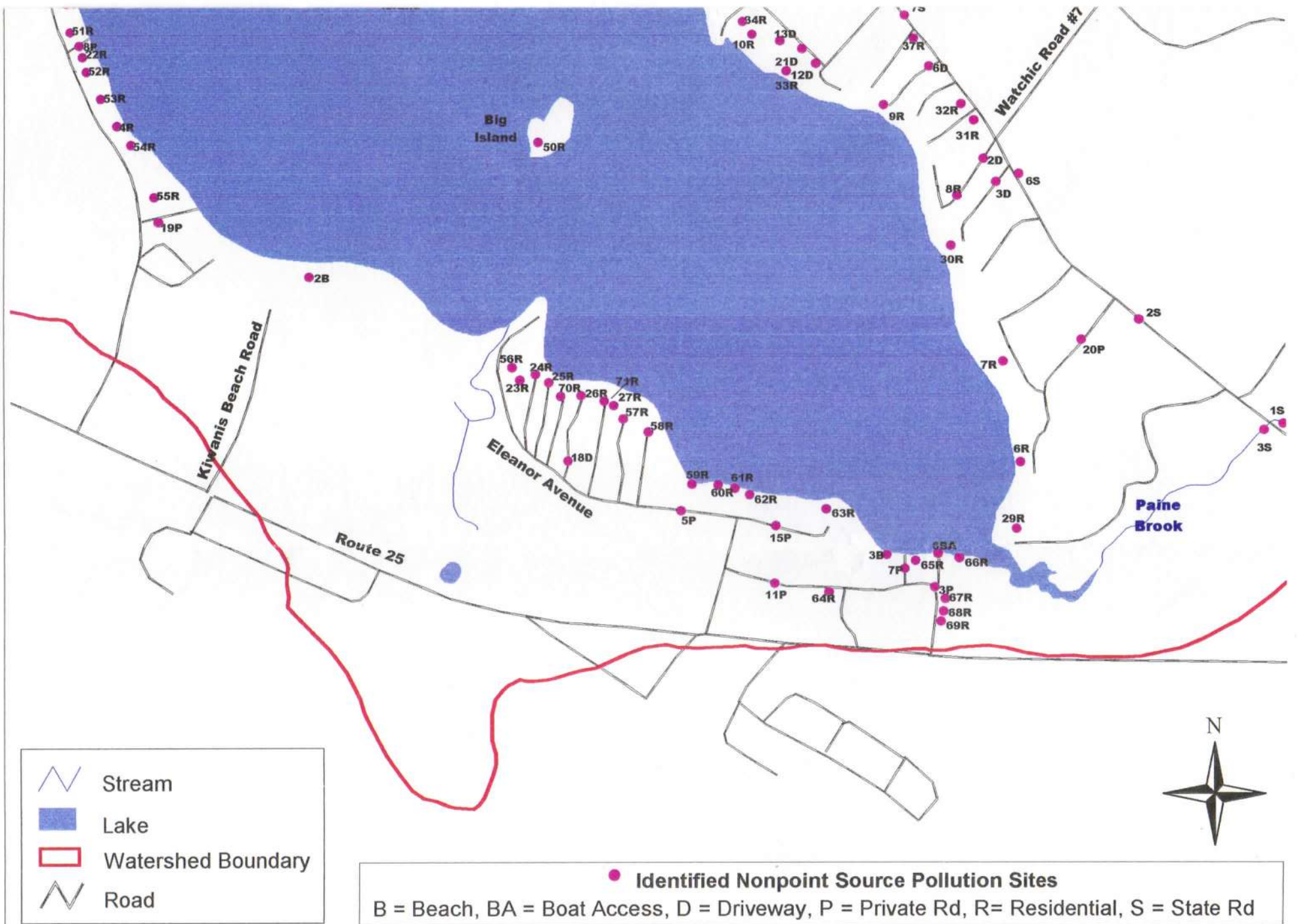


Figure 2

RESIDENTIAL SITES

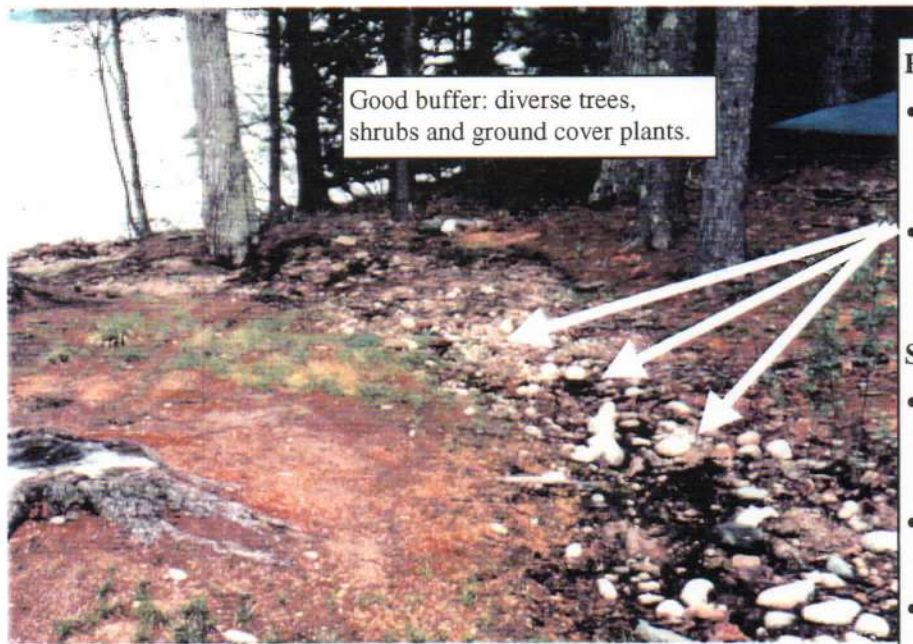
Seventy-two sites found. Of the 72 sites, 45 were low impact, 23 were medium impact and 4 were high impact. Sixty-six of the solutions are easy fixes with low costs.

Common Problems Identified:

- surface erosion
- bare and sparsely vegetated soil
- lack of buffer
- shoreline erosion
- bare, sandy beach
- direct flow of runoff to tributary/lake

Recommended Solutions:

- seed and mulch
- establish/enhance buffer
- rock line the shore to stabilize
- reduce the size of the beach
- limit foot traffic in eroding areas
- stop raking the buffer because it decreases its effectiveness



Problem:

- arrows point to land that has eroded down to rock and sand
- area closest to the lake needs more trees, shrubs and ground cover plants

Solution:

- direct stormwater into the established area of trees (to the right)
- seed and mulch the eroded strip
- a diverse mix of trees, shrubs and ground cover plants will stabilize this area better than grass

Even though most residential sites are low impact, they are the largest percentage of sites found on Watchic Lake.

REMEMBER...

It is the cumulative impact of all small and large sites that causes water quality to decline.

PRIVATE ROAD SITES

Twenty sites found including 5180 ft of impacted road. Of the 20 sites, 6 were low impact, 7 were medium impact and 7 were high impact.

Common Problems Identified:

- road surface erosion
- poor shaping
- improper surface material
- lack of ditch
- shoulder erosion

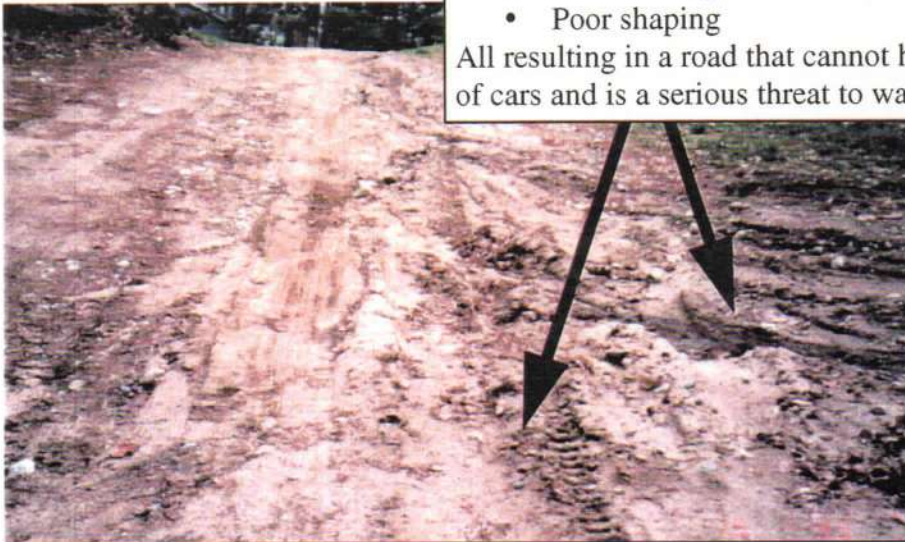
Recommended solutions:

- apply less erodable surface material
- build up road surface
- reshape road surface
- install turnouts/diversions to divert runoff to wooded areas
- install waterbar or broad based dip to divert runoff to wooded areas

Problem:

- Poor surface material
- Poor drainage from road
- Poor shaping

All resulting in a road that cannot handle the impact of cars and is a serious threat to water quality.



Solution:

- apply less erodable surface material
- install turnouts to direct water off road into vegetated buffer areas
- reshape road surface

Private Roads are the second highest source of nonpoint source pollution to Watchic Lake. A one-time fix can reduce maintenance costs on the road and your vehicle.

DRIVEWAY SITES

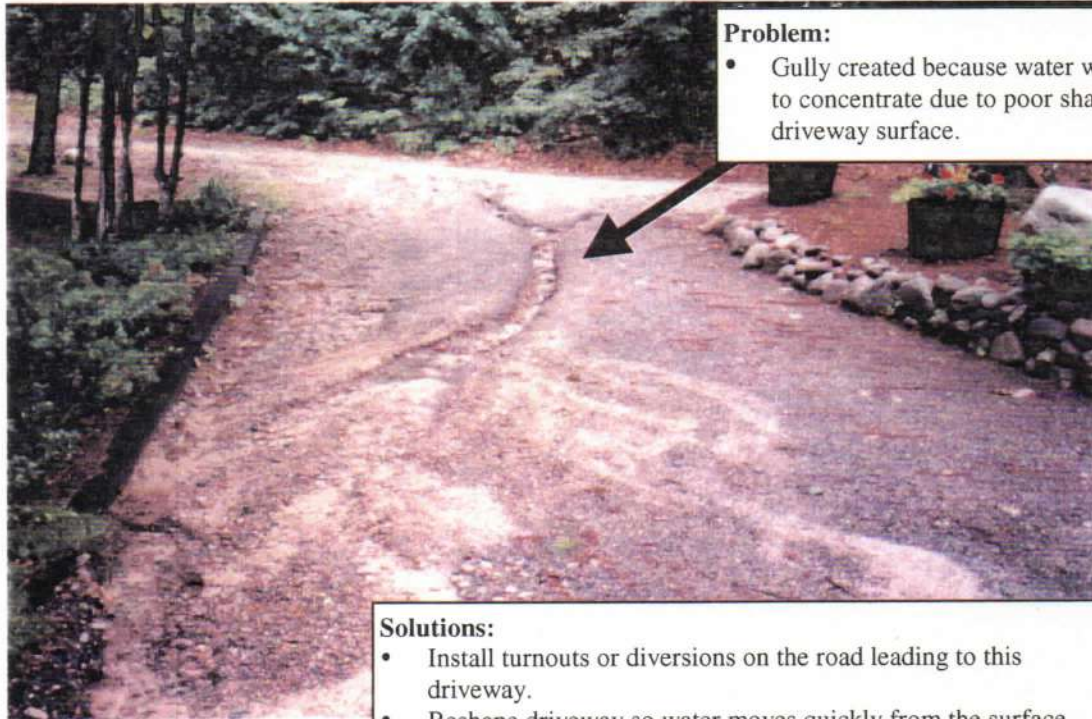
Twenty sites found. Of the 20 sites, 9 were low impact, 10 were medium impact and 1 was high impact. Eighteen of the 20 solutions are easy fixes with low costs.

Common Problems Identified:

- surface erosion
- bare soil
- poor shaping of driveway surface
- direct flow of driveway runoff to tributary

Recommended solutions:

- add less erodable surface material
- reshape driveway surface
- install turnouts, broad based dip, waterbar or diversion to direct runoff to vegetated buffer area



Problem:

- Gully created because water was able to concentrate due to poor shape of driveway surface.

Solutions:

- Install turnouts or diversions on the road leading to this driveway.
- Reshape driveway so water moves quickly from the surface (there should be $\frac{1}{2}$ " of crown for each foot of width).

Did you know that sometimes – simple maintenance, such as changing the course of stormwater and adding a better surface material, could keep your driveway from looking like this?

STATE ROAD SITES

Eleven sites found and 2810 ft of impacted road. Of the 11 sites, 2 were low impact, 4 were medium impact and 5 were high impact. Therefore even though these sites were a small percentage of the total, they tended to be greater in severity.

Common Problems Identified:

- ditch erosion
- no ditch
- shoulder erosion
- winter sand build-up
- collapsed culvert
- unstable culvert inlet/outlet

Recommended solutions:

- install turnouts to divert flow of water to a vegetated buffer area
- create ditch to keep water off the road
- remove winter sand
- stabilize ditches and shoulders with vegetation
- rip rap around culvert inlet/outlet
- replace culvert

Solution:

- remove winter sand
- reditch and vegetate to stabilize ditch
- install turnouts or plunge pools, as needed, to break the flow of water in ditches



Problem:

- Road shoulder has "blown out" because water was able to concentrate.

Even though the state road sites were a small percentage of the total, they tended to be greater in severity causing medium to high impact to the Watchic Lake resource.

BEACH SITES

Three sites found. All three sites were medium impact with low cost, easy fixes.

Common Problems Identified:

- bare soil
- surface erosion
- lack of buffer
- unstable beach access

Recommended solutions:

- seed and mulch high use areas
- reduce the size of the beach
- establish buffer vegetation along shore to prevent sand from washing into the water



Problem:

- bare soil
- exposed roots
- moderate surface erosion

Solution:

- seed and mulch between trees and picnic tables (high use area needs vegetation to prevent erosion)
- install erosion controls, as needed
- reduce size of beach, if possible

Even a small beach can have a negative impact on the lake.

REMEMBER...

It is the cumulative impact of all the small and large problems that are causing the water quality in Watchic Lake to decline.

Cost Analysis of using Best Management Practices (BMP's)¹

Problem:

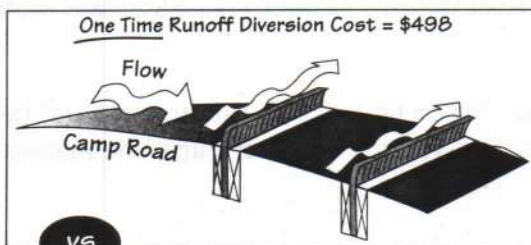
During periods of heavy rain, the long, steep road leading to a lakefront club experienced road washouts and resulting siltation of the local swimming area.

Solution:

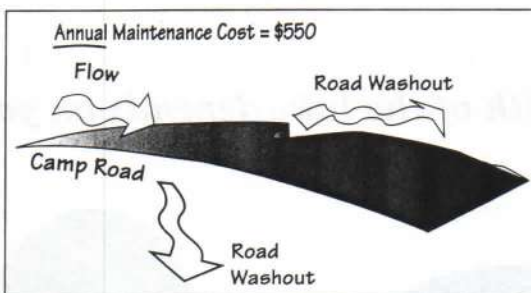
- Stabilize existing eroded areas with hardy grass seed mix (inexpensive and creates a natural look).
- Provide a diversion dip along the midsection of the roadway to intercept stormwater and discharge to side of road.
- Construct *rubber razor blades* that also divert stormwater to stable roadside to reduce erosion. (Pieces of rubber sandwiched between lumber; lumber is flush with the road surface while rubber stands about 1" above the road surface allowing traffic and plowing)

Cost Analysis:

BMP:



Alternative:



Cost-effectiveness:

The total cost to install the BMPs was \$498 including labor and materials, including "rubber razor blades", and stabilizing eroded areas. If no BMPs were installed, the estimated annual maintenance cost for the 350 foot road is \$550, including regrading the entire road and replacing 10% of the road surface

¹ BMP's: Cost-Effective Solutions to Protect Maine's Water Quality, Casco Bay Estuary Project Publication, July 1995.

Next Steps/Where Do We Go From Here?

Individuals

- ✓ Prevent stormwater from running directly into streams and the lake. Detain in depressions or divert flow to flat, wooded areas.
- ✓ Reduce the amount of cleared land and road surfaces on your property.
- ✓ Avoid removal of natural vegetation (trees, shrubs and ground cover).
- ✓ Let lawn and raked areas revert to natural plants (if you stop mowing and raking and leave the area alone, it will revert back).
- ✓ Avoid the exposure of bare soil.
- ✓ Support watershed efforts at town meetings.
- ✓ Don't alter the shoreline. Leave existing rocks and vegetation in place.
- ✓ Don't rebuild beaches without permits and technical assistance.
- ✓ Consult with the town Code Enforcement Officer before cutting trees. Shoreland Zoning laws and harvesting limitations may apply.
- ✓ Check sludge levels in septic tanks every year. When tank is half-full, pump it out (average is every 2 to 3 years for year round residences; 4-5 years if seasonal); upgrade marginal systems.
- ✓ Get involved with Watchic Lake Association and become a **steward** of Watchic Lake.

Remember, the long term health of the lake depends on you!



Road Associations (and private roads without associations and driveways)

- ✓ Attend a camp road workshop - one will be held in Cumberland County in the spring.
- ✓ Minimize road runoff by planning a regular, comprehensive maintenance schedule - and then adhere to it.
- ✓ Use appropriate Best Management Practices on the road.
- ✓ Develop a funding plan for long-term road repair and maintenance.
- ✓ Get a copy of "Camp Road Maintenance Manual - A Guide for Landowners," this reference is a must for anyone managing a dirt road. (Copies can be obtained at a cost of \$4.50 from Kennebec County SWCD - 9 Green ST, Rm 307, Augusta, ME 04330)
- ✓ For more extensive problems, seek a professional engineer's help. Contact the Cumberland County SWCD to request technical assistance. **Note:** This assistance is currently subject to very limited resources.

Municipal Officials

- ✓ Review public policy and ordinances to assure full protection of Watchic Lake.
- ✓ Participate in and support Watchic Lake watershed projects.
- ✓ Participate in the development of a Watchic Lake watershed management plan.
- ✓ Promote training for road crews, planning boards and conservation commissions.
- ✓ Help the MDEP enforce the Erosion and Sediment Control Law that requires landowners to properly install and maintain erosion control practices (such as staked hay bale barriers, silt fences, and hay mulch) anytime filling or soil disturbance activities are conducted.

Lake Association

- ✓ Continue to work with CCSWCD and DEP to bolster public support for watershed projects.
- ✓ Participate in the development of a Watchic Lake watershed management plan.
- ✓ Provide educational materials and guidance to residents of Watchic Lake.
- ✓ Develop long-term educational outreach program.
- ✓ Continue to provide water quality monitoring information in an understandable format to the Watchic Lake community.

Permitting ABC's

In some cases landowners and road associations will need to receive permits prior to implementing some of the *BMP's* suggested in this report. As a general rule of thumb, a permit is required from the Maine Department of Environmental Protection when soil is disturbed within 100 feet of a protected natural resource (i.e. lake or stream) in an area where dirt can wash into the water.

Some guidelines are listed below. However, Maine DEP reserves the right to make a judgement call about whether a permit is needed. If you have any doubt about whether you need a permit, call the MDEP Field Services at 822-6300. Staff will be able to answer your questions and possibly visit your property.

Activities requiring permits:

- tilling
- bulldozing
- adding soil to establish vegetation
- filling

Activities that do not require a permit:

- planting a few shrubs or creating minor soil disturbance associated with reseeding
- activities carried out in an area with existing barriers (i.e., ice berms, retaining walls) or site conditions (i.e., negative slopes) such that material could not wash into a water resource

How to apply for Permit by Rule with the MDEP:

1. Fill out a notification form. Forms are available from your town code enforcement officer or Maine DEP Office on Canco Rd in Portland (822-6300).
2. Permit by rule requires that you follow performance based standards. It is important that you obtain a copy of the standards so you will be in compliance with the law.
3. The permit will be reviewed within 14 days, so if you do not hear from Maine DEP within 14 days, you can assume that your permit is valid.
4. If you "walk in" to Maine DEP, they have the ability to sign off on the project at that time and you can avoid the 14-day wait.

Glossary

Algal Bloom: A growth of algae resulting from excessive nutrient (phosphorus) levels or other physical and chemical conditions that enable algae to reproduce rapidly. The overgrowth of algae can form scums and mats that reduce the amount of oxygen in water when they decay.

Best Management Practices (BMP's): Techniques to reduce nonpoint source impacts from construction, agriculture, timber harvesting, marinas and stormwater. The State of Maine has developed manuals describing these techniques and these are available through Maine DEP.

Nonpoint Source pollution: An indirect discharge, not from a pipe or other specific source, usually as a result of stormwater runoff.

Phosphorus: An element found throughout the environment; it is a nutrient essential to all living organisms. Phosphorus binds to soil particles, is found in fertilizers, sewerage, and motor oil, and is often found in high concentrations in stormwater runoff. The amount of phosphorus present in a lake determines the lake's production of algae. A very small increase in phosphorus levels can dramatically expand algae growth.

Polluted Runoff: Runoff that has picked up contaminants or nutrients from the landscape (or air), as it flows over the surface of the land to a waterbody.

Vegetated Buffer: Areas of vegetation, left undisturbed or planted between a developed area and a waterbody that are used to capture pollutants from surface water and groundwater. Buffer vegetation can include trees, shrubs and ground cover plants.

Watershed: The geographic region within which water drains to a particular river, stream or body of water. A watershed includes hills, lowlands, and the body of water into which the land drains. Watershed boundaries are defined by the ridges of land separating watersheds. All land is located in a watershed.