

LEA Homeowner's Guide



*Practical ways to protect
your investment and Maine's lakes*



Lakes Environmental Association, Bridgton, Maine



In the Lakes Region, water quality protection begins at home

The Lakes Environmental Association, a private, non-profit organization founded in 1970, prepared this booklet to give landowners a guide to protecting lakes. If we want to continue to enjoy the extraordinary natural resources of this region, we must all participate in the effort to protect them. They are fragile, so every small effort to help is meaningful, especially when multiplied by what hundreds of other watershed landowners can do. We hope this guide will help you make a contribution to this important cause.



Table of Contents

About LEA Page 1

Where does the rain go
and why should you care? Page 2

The problem with phosphorous Page 4

Top five ways to protect your land
and Maine's lakes Page 5

Laws protecting water quality Page 11

A year in the life of lakes Page 13

Good plants for shorefront property Page 15

Mercury in Maine lakes Page 16

Please join LEA!

If you swim, boat, fish or simply believe Maine wouldn't be Maine without clear, clean lakes and ponds, please join the Lakes Environmental Association and protect Maine's lakes now and for future generations. Our lakes face serious threats, from erosion to invasive plants. Since 1970, LEA has worked to protect the lakes and ponds of Western Maine through water quality testing, watershed education and outreach programs.

37 lakes tested

LEA protects water quality by helping landowners avoid problems such as erosion and by testing the waters of 37 lakes in Western Maine with help from volunteers and support from the Towns of Bridgton, Denmark, Harrison, Naples, Sweden and Waterford.

LEA leads the milfoil battle

Invasive aquatic plants, such as milfoil, are not native to Maine waters. Once they invade a lake or stream, they:

- Spread rapidly and kill beneficial native plants.
- Form dense mats of vegetation, making it difficult to swim, fish or boat.
- Alter native fish habitats
- Lower waterfront property values.

Watershed education

LEA offers environmental education programs to local schools, reaching roughly 450 students annually. Many more people enjoy nature at LEA's Holt Pond Preserve and others join in the Ham Series of nature programs.



Thousands of students have learned about watersheds on LEA's "Hey You!" cruises.

You can become an LEA member with a donation of any amount. Just mail a check to LEA, 230 Main St., Bridgton, ME 04009 or join online at www.mainelakes.org.



Where does the rain go and why should you care?

As a shorefront property owner, you can spend many happy hours gazing out at “your” lake, pond, river or stream. But if you want to guard against the greatest danger to your investment and your quality of life, you need to think seriously about water coming from an entirely different direction - above.

Start by asking yourself a very important question: Where does the rain go?

The Number 1 source of pollution to surface water in Maine is soil erosion, according to the Maine Department of Environmental Protection. Each year rainstorms and snowmelt wash tons of dirt off the Maine land. Watching your valuable property being carried away is bad enough, but there’s worse news. Eroded soil particles carry pollutants such as oil, fertilizers, pesticides, and phosphorous into our lakes.

So the next time it rains, put on a raincoat or pick up an umbrella and take a look. You’ll see water pouring off your roof, rolling off your driveway and deck, and running down your lawn. But it doesn’t stop there, of course, and it isn’t just the rainwater that’s running downhill, it’s everything water can carry with it.

As a property owner and lake lover, your goal is to head off erosion or at least slow it down, so that one part of your property – soil and sediments – won’t damages a major part of your investment – the water quality.

Murky water also is tough on fish and wildlife. It makes it hard for fish to see and feed properly. Sediments can interfere with reproduction since many fish and aquatic insects





Nothing destroys shorefront property values faster than a decline in water quality. In a University of Maine study, 98 percent of shorefront home buyers rated water clarity as one of the primary reasons they bought their home.

Photo by Wisconsin Department of Natural Resources

lay their eggs in gravel beds. They can also fill in streams, making them shallower and warmer, which makes survival difficult for coldwater fish, such as trout and salmon.

“The shoreland zone is very important habitat for many of Maine’s animals,” says Bridie McGreavy, LEA’s watershed educator. “The majority of Maine mammals use the shoreland zone for a part of their habitat, whether it’s access to the water or food or nesting.”

And then there’s the economic impact of erosion. Nothing destroys the value of shorefront property faster than a decline in water quality.

In a University of Maine study, 98 percent of shorefront home buyers rated water clarity as one of the primary reasons they bought their home. That’s ahead of quality of swimming (87 percent) and even scenic beauty (82 percent). In fact, more than 51% of shorefront residents had specifically considered water clarity before buying property.

So the damage caused by erosion can ultimately result in higher building costs, lower shorefront property values, higher taxes and loss of business and jobs. But you don’t need studies to tell you how important clean, clear water is. All you need to know is that you don’t want to dive into murky water. You don’t want to fish in it or boat on it. And a scenic view isn’t very scenic if the water is covered with brown or green scum.

So the goal of this guide is to help homeowners help themselves. You can make a difference in water quality and protect your property at the same time. In fact, you can actually make your property more beautiful, but easier to maintain. And it’s far simpler than you might think.

What's wrong with phosphorous?

Phosphorus is a fertilizer. It's present naturally in soil and that's good for plants. But when it washes into lakes, it's bad because phosphorous also fertilizes tiny, floating aquatic plants called algae.

Normally phosphorus is retained and recycled in the forest ecosystem, but soil disturbance and changes in land use allow phosphorus to be transported in surface water run-off. Then it's carried to lakes in stormwater, streams and drainage channels. It can be attached to soil particles or dissolve in the water itself.

Roads, construction projects and agricultural activities all add phosphorus to lake ecosystems. Phosphorus can also come from other sources that are more concentrated such as septic systems, lawn fertilizers and soaps and detergents.

When excessive amounts of phosphorous wash into a lake, that can fuel an algae population explosion, called an algae "bloom." That deceptively pleasant name means algae have formed colonies so dense they cover lakes with a greenish-brown scum – complete with an unpleasant odor. It blocks sunlight to beneficial aquatic plants, consumes oxygen (which may lead to fish kills) and interferes with feeding cycles of other aquatic organisms. All of this makes phosphorous a huge threat to Maine's lakes.

That's why it's so important to use phosphate-free detergents (a list is available at LEA) and phosphorous-free fertilizers. Most Maine soils are already high in phosphorus, but you can check the content in your soil with a simple test, available through the Maine Soil Testing Service (<http://anlab.umesci.maine.edu>) for about \$12. If you must fertilize, many stores now carry phosphorus-free fertilizer. When buying fertilizer, remember the amount of phosphorus is represented by the middle number in the ratio on the bag.

Another way to prevent phosphorous from entering lakes is to wash vehicles and boats at public car washes or areas where there's ample soil to infiltrate run-off water. Maine law prohibits washing or bathing in lakes or ponds.

“For lake water quality, there is no other issue that compares to phosphorous.”

– Colin Holme, LEA Field Services Director



Photo by Maine Department of Environmental Protection

Top five ways to protect your property and Maine's lakes

1. *Leave it to nature*

As a shorefront property owner, you can fight nature – at great cost and effort – or you can work with it.

Just keep thinking about rain, erosion, phosphorous and all the problems they can bring to a lake. Then imagine a manicured lawn rolling to the lakefront.

When the rain comes down or the sprinkler is on, water speeds over that flat, green surface nearly as fast as it would on an asphalt driveway. So by planting, pampering, watering and mowing that lawn, you've created a slippery

chute that sends soil, sediment, phosphorous and chemicals straight into the lake.

In fact, any time you remove vegetation or expose bare soil, you're dramatically increasing surface runoff and the potential for erosion. That's why there are state and local laws regulating shoreline alterations and why many alterations that were once common practices are no longer allowed.

But there's an alternative, one that saves your time and money, and also protects the lake's water quality. Nature already has a time-tested



Native plants and trees soak up a huge amount of surface water runoff and provide erosion control, privacy, and fish and wildlife habitat.



When there's not enough vegetation to absorb rainwater, it erodes soil and washes pollutants, such as oil, fertilizers, pesticides and phosphorous, into our lakes. Erosion is the Number 1 source of pollution to Maine's surface waters.

strategy to slow rainwater down so it can be absorbed into the earth before it reaches the lake. It's called natural vegetation.

The best option is to simply leave the existing rocks and vegetation along the shore in place. Native plants along the lakefront bond the soil together. Trees soak up a huge amount of surface water runoff and provide erosion control, privacy, and fish and wildlife habitat. That's why bushes, shrubs and groundcovers within the first one hundred feet of lakes and ponds are protected by state and local laws and should be left undisturbed.

In fact, all alterations of the shoreline require state and local permitting and approval. So it's a good idea to pick up a copy of your local shoreland zoning regulations before doing any work. For example, trees may be limbed up to one third of their height to provide a view of the lake, but tree cutting standards within the shoreline zone vary from town to town. If you're not sure about the laws or have any questions, call LEA or your local Code Enforcement Officer before removing trees, disturbing soil or making any alterations.

All new structures must meet the required setback from normal high water. The setback from lakes and ponds is generally 100 feet but can be more depending on individual town

ordinances. For instance, Bridgton has a 112' setback for solid wall foundations.

If your shorefront has already been altered, you can plant a buffer of native shrubs, bushes and groundcovers or just let nature move back in on its own. If a bank is eroding, rip-rap or stone armoring can be installed with the proper state permits.

If you simply can't live without a lawn, minimize its impact with a buffer near the lake. A small garden will look great and reduce runoff, particularly if you use woody plants with deeper root systems that soak up more water.

But why spend Maine's precious sunny days mowing grass? When it comes to taking care of our lakes and lands, nature does know best.

Sand Beaches

Building new beaches is not allowed under the Natural Resources Protection Act. Temporary docks can be used as an alternative. Imported sand accelerates filling of the lake, destroys fish and wildlife habitat and adds phosphorus to the water. With a DEP permit, however, existing beaches may be raked towards shore to recover sand during periods of low water.

2. *Maintain gravel roads and driveways*

Water should never run directly from a road into a lake or stream. In fact, the vast majority of all erosion and sedimentation problems within a watershed originate from camp roads. So maintaining effective drainage is probably the most important aspect of road up-keep.

The first step to good drainage is building a road that is above the original ground level. This will allow the base and sub-base of the road to dry out and help prevent the road from rutting or becoming soupy.

Maintaining a proper crown is another critical step in providing for adequate road drainage. Crowning a road is essentially creating a slight ridge in the center of the road that water will run away from. In certain areas, it is generally better to have the road slope gently in one direction. This is called ramping. A good slope is usually about one-quarter inch of crown per foot of road width.

Regular grading is necessary to maintain the crown after winter plowing. Grading should be done with a steel tine rake, *York Rake* or *Front Runner* type grader by an experienced operator.

Good ditches also are essential for good roads. Ditches collect road run-off and subsurface water and allow them to drain away from the road.

They should be stabilized with vegetation, or lined with rock, with outlets to low, natural areas away from any water bodies or wetlands.

Ditches should be parabolic to allow for the water to flow over a wider surface area, as opposed to V-shaped ditches, which are prone to erosion.



Good ditches are essential to collect road run-off. Above, the ditch has badly eroded, but below (shown from opposite angle), it's been armored against erosion with crushed stone.



3. Use erosion control on construction

Any project that requires soil disturbance such as building a home, addition, garage, or driveway should be planned with erosion control in mind.

Crushed stone infiltration beds should be installed along the drip edges of buildings to catch roof runoff.

You can also prevent water from running directly into lakes or streams by maintaining the natural topography and natural vegetation and by diverting run-off into wooded areas.

Erosion control measures such as silt fences, erosion control mulch berms, and hay bale barriers should be installed before work begins and maintained for the duration of each project. These measures must also be installed correctly to function properly.

Here are important things to consider when installing common erosion controls:

- Erosion control barriers (silt fence, hay bales and berms) must be placed along a contour so that water does not build up in any low area.
- Silt fences must be “keyed in” by burying the bottom four to six inches of the fabric in the ground. If this can’t be done because of frozen ground, ledge or heavy roots, the bottom eight inches of the fence should be set on the ground and covered with clean three-quarter inch crushed stone.
- Hay bales must be placed in a row with their ends tightly abutting. Any gaps should be tightly stuffed with loose hay. Hay bales also need to be “keyed in” at least four inches into the ground to prevent water flow under the bales.

Erosion control berms should be at least two feet wide and one foot high and composed of erosion control mulch, stump grindings or other similar non-erosive material.



A crushed stone infiltration bed catches and controls roof run-off.

4. *Pump out your septic tank*

Septic tank sludge levels should be checked every two years. A tank should be pumped when it is half full or every two to three years for year-round residents and every five to six years for seasonal residents.

Septic tanks must be maintained to function properly. If settled solids are not removed from the tank, they will wash into and clog the leach field. A clogged leach field will cause the system to fail and require replacement.

Septic systems usually have a life span of 20 years or less. Do you know when your system was installed?

To help prolong the life of your septic system:

- Conserve water. The less water you use the better your septic system will work.
- Be cautious with drain cleaners and use bleach sparingly. Sink plungers or drain

snakes are inexpensive and more effective than chemical drain cleaners. Septic systems require living microorganisms to break down waste. Strong cleaning agents will kill these microorganisms and cause your system to fail.

- Don't install or use in-sink garbage disposals. Ground garbage and food waste overburden septic systems and slow their functions. Composting vegetable scraps is good for the environment and improves soil.
- Stay away from commercial products that claim to clean your septic tank without pumping. These products can contaminate groundwater and may clog your leach field.
- Don't put paint or chemicals into septic systems. These hazardous products kill microorganisms and can contaminate drinking and lake water.

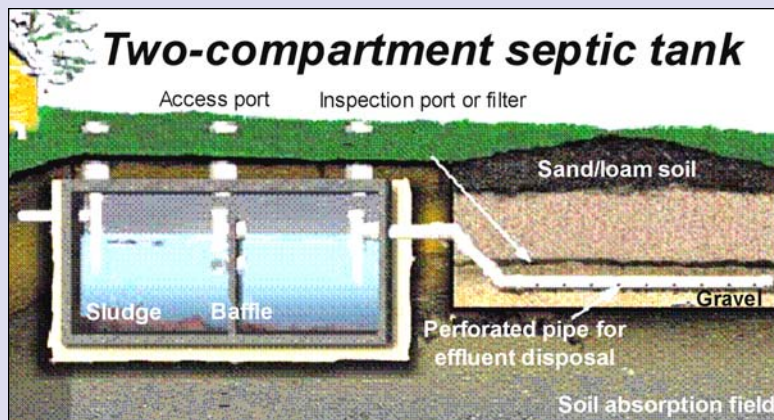
Have you noticed signs of a failing septic system?

⇒ Do your toilets flush slowly or back up easily?

⇒ Have you noticed a wet, smelly spot in your yard, especially after doing laundry?

⇒ Is the grass over or around your septic system greener than the rest of your lawn?

⇒ Is the area around your septic system or drain field wet even when it hasn't rained?





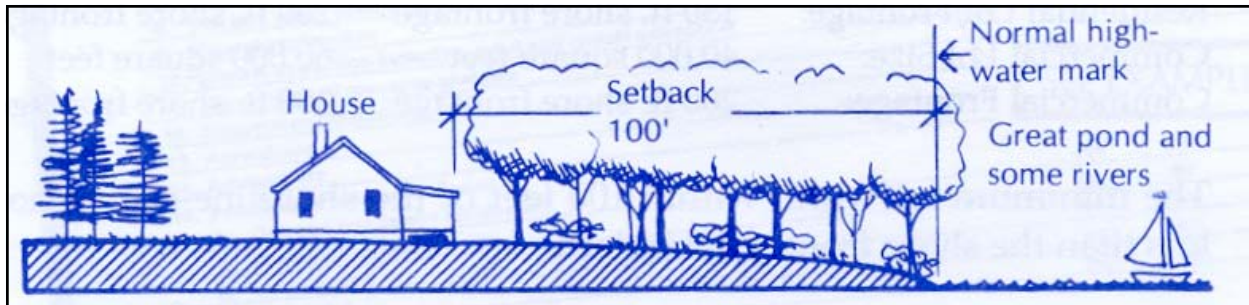
5. Watch out for invasive plants

Milfoil (above) and other aquatic invasive plants are a major threat to Maine's lakes. They can drastically change ecosystems, ruin recreation and severely reduce tourism and lakeside property values. These plants can spread quickly and infest an entire lake from a small plant fragment. Once established, they are nearly impossible to remove. Control methods are extremely costly and can cause the plant to spread throughout the lake.

Boating is the primary method by which these plants are spread between lakes and ponds. Plants get carried on motors, fishing gear, anchor lines and trailers and can survive out of water for long periods of time. Prevention is the only effective control measure.

To help avoid spreading invasive plants:

- Check your boat, trailer, gear and anchor lines thoroughly before and after visiting any lake.
- Remove all plants and plant fragments and dispose of them in trash receptacles or on high, dry land.
- Avoid boating in areas of dense plants.
- Support the invasive sticker program.
- Inform others about the dangers of aquatic invasives.



Laws protecting water quality

Since these ordinances regulate many activities, you should call your town office or LEA before planning or starting any construction or vegetative cutting near a lake or stream. Ask the Code Enforcement Officer for information and assistance. LEA can also provide consultations and free technical assistance regarding land use laws.

- **Shoreland Zoning** – This law is administered and enforced by towns with oversight from the state. Its purpose is to protect water quality, prevent erosion in shoreland areas, preserve vegetation and wildlife and conserve natural beauty by regulating lot size, construction, sewage disposal and alteration of vegetation.
- **“Shoreland Areas”** are defined as the land within 250 feet of the normal high water line of any lake or river and within 250 feet of the upland edge of freshwater wetlands of ten acres or more. Many tributaries are zoned with protective buffers that extend 75 or 100 feet from their shorelines. Shoreland zoning laws differ from town to town. They affect building and structure size; setback and location; sewage disposal; earth moving, and clearing and cutting of trees, bushes and ground cover.
- **The Natural Resources Protection Act** – This law is administered and enforced at the state level through the Department of Environmental Protection. Its purpose is to protect Maine’s natural resources from damage due to development and improper use. It applies to lakes, ponds, wetlands, rivers, streams and brooks. Projects that build, drain, dredge, fill or change the land, water or vegetation within or adjacent to these protected resources require a permit from the state. Examples include permanent docks and moorings, shoreline rip-rap, vegetative cutting, bridges and expansions of non-conforming buildings. Call DEP or LEA for information.
- **The Site Location Law and Subdivision Law** – These laws regulate large projects and land developments that subdivide property. Larger projects require review and approval under both laws by state and local boards. Smaller projects are reviewed on the local level by the municipal planning board. The purpose of both laws is to provide standards and safeguards for soil erosion, water quality, traffic safety, water supplies, sewage disposal, solid waste disposal, scenic or natural beauty, and wildlife habitat.

- **The Conversion of Seasonal Dwelling Law** -- This law is administered at the state level, but enforced locally. The purpose is to make sure that seasonal sewage disposal systems can function under year-round use without polluting nearby waters or causing other health hazards. In order to convert a seasonal cottage to a year-round dwelling, the local plumbing inspector must grant a conversion permit. The inspector will issue the permit if records show that the existing sewage system meets the State Plumbing Code Standards or if the owner can show that site conditions will allow installation of a sewage system that meets state standards.
- **The Erosion and Sedimentation Control Law** – This law is administered at the state level through the DEP and applies to all filling or earth moving that exposes soil to erosion. It applies in all areas, whether or not they fall within the shoreland zone, and requires that measures to control erosion and sedimentation are put in place before any work begins.
- **The (External) Plumbing Code** – All subsurface sewage disposal, including outhouses and gray water systems, must be installed in conformance with the Maine Subsurface Wastewater Disposal Rules. The guidelines require a valid plumbing permit or a completed application for a permit when proposed construction in the Shoreland Zone involves sewage disposal. Contact your local plumbing inspector or Code Enforcement Officer for more information.
- **Stormwater** – New federal requirements for “small construction activities” have recently taken effect. The regulations pertain to construction activities greater than one acre or projects that trigger Subdivision or Site Plan review. The regulations are statewide and there will no longer be an exemption for single-family homes as there was in past regulations. Notification forms and copies of the Maine Construction General Permit (MCGP) can be obtained by calling the Portland DEP office at 822-6300.

Need help?

Just ask for LEA’s **free** Clean Lake Check-Up. Colin Holme, LEA field services director, will answer questions, visit your property, analyze problems and design ways to prevent or control them. You’ll be safe-guarding your investment and protecting water quality.



**Call 647-8580 or email
colin_holme@yahoo.com to schedule a site visit.**

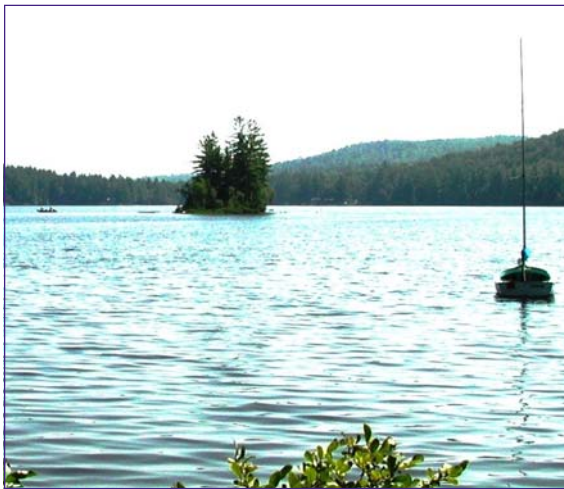
A year in the life of lakes



Winter is a quiet time. Ice blocks out the sunlight and also prevents oxygen from being replenished in lake waters because there is no wind mixing. With little light below the ice and gradually diminishing oxygen levels, plants stop growing. Most animals greatly slow their metabolism or go into hibernation.

Spring is a period of rejuvenation for the lake. After the ice melts, all of the water is nearly the same temperature from top to bottom. During this period, strong winds can thoroughly mix the water column allowing for oxygen to be replenished throughout the entire lake.

This period is called spring turnover. Heavy rains, combined with snow melt and saturated soils are a big concern in the spring. Water-logged soils are very prone to erosion and can contribute a significant amount of phosphorus to the lake. Every soil particle that reaches the lake has phosphorus attached to it.



Summer arrives and deeper lakes will gradually stratify into a warm top layer and a cold bottom layer, separated by a thermocline zone where temperature and oxygen levels change rapidly. The upper, warm layers are constantly mixed by winds, which “blend in” oxygen. The cold, bottom waters are essentially cut off from oxygen at the onset of stratification. Cold water fish, such as trout and landlocked salmon, need this thermal layering to survive in the warm summer months, but they also need a healthy supply of oxygen in these deep waters to grow and reproduce.

Fall comes and so do the cooler winds that chill the warm upper waters until the temperature differential weakens and stratification breaks down. As in Spring, strong winds cause the lake to turn over, which allows oxygen to be replenished throughout the water column.



The three layers of lakes

The critical element for understanding lake health is phosphorus. It's the link between what goes on in the watershed and what happens in the lake. Activities that cause erosion and sedimentation allow phosphorus from the land to be transported to the lake water.

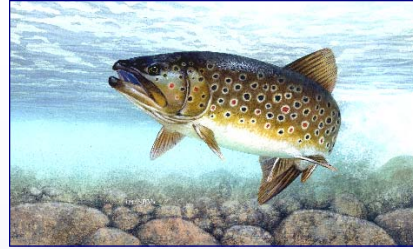
Phosphorus is a naturally occurring nutrient that's abundant on land but quite scarce in lake waters. Algae populations are typically limited by phosphorus concentrations in the water. But when more phosphorus comes into a lake, the added nutrients can spur increases in algae growth.

More algae growth causes the water to be less clear. Too much algae will also use up the oxygen in the bottom of the lake. When algae die they drift to the lake bottom and are decomposed by bacteria in a process that consumes the limited oxygen supply. If deep water oxygen levels get too low, cold water fish are unable to grow or reproduce.

If there's no oxygen available at the bottom of a lake, another detrimental process called phosphorus recycling can occur. Phosphorus from sediments on the bottom become re-suspended in the water column. That doubles the lake's nutrient problem, since phosphorus is now coming from watershed as well as the lake itself.

Lake
Depth

0-30
feet



Brook Trout

Epilimnion

The warm upper waters are sunlit, wind-mixed and oxygen rich.



Landlocked salmon

30-36
feet

Metalimnion

This layer in the water column, also known as the thermocline, acts as a thermal barrier that prevents the interchange of nutrients between the warm upper waters and the cold bottom waters.



Lake trout, also known as togue

Below
36
feet

Hypolimnion

In the cold water at the bottom of lakes, food for most creatures is in short supply, and the reduced temperatures and light penetration prevent plants from growing.



Cranberry Viburnum (*Viburnum trilobum*) is a beautiful bush with white flowers.

Good plants for shorefront property

The right plant depends on the conditions on your property. Here are some options:

- **Growlow sumac** (*Rhus aromatica* 'growlow') – It looks good all year long, requires virtually no maintenance and tolerates hot dry sites. Full sun.
- **Bush cinquefoil** (*Potentilla fruticosa*) – Tolerates a variety of soil conditions and has numerous small yellow flowers during the summer. Full sun.
- **Rhodora** (*Rhododendron canadensis*) – Intricate pink flowers in early spring before leaf out. Needs somewhat wet soils. Full sun to part shade.
- **Common juniper** (*Juniper communis*) – Super hardy, always looks good. Full sun.
- **Canadian Yew** (*Taxus canadensis*) – Hardy, deep green foliage, prunes well and has numerous small red berries in the fall. Partial shade to shade.
- **Northern bayberry** (*Myrica pensylvanica*) – Deep green, waxy aromatic leaves. Spreads nicely. Full sun to partial shade.



Blue Flag (*Iris versicolor*) is a striking native iris for damp areas.

- **Bearberry** (*Arctostaphylos uva-ursi*) – Beautiful, creeping groundcover that tolerates sandy acidic soils. Full sun.
- **Creeping juniper** (*Juniper horizontalis*) – Spreads nicely, tolerates hot, dry sites. Full sun.
- **Lowbush blueberry** (*Vaccinium angustifolium*) – Everybody loves blueberries; rarely needs maintenance. Full sun.
- **Sheep laurel** (*Kalmia angustifolium*) – Beautiful clusters of deep pink flowers in mid spring. Full sun to partial shade.

Mercury in Maine lakes

It's a sobering fact that mercury levels in Maine fish, loons, and eagles are among the highest in North America, according to the state Department of Environmental Protection. That's why DEP considers mercury "a significant health threat to humans and wildlife."

Mercury is a naturally occurring heavy metal that binds easily with other metals and conducts electricity well. So it's been used in many household, medical and industrial products.

The primary source of mercury in the environment is human activities, such as emissions from coal-burning power plants and waste incinerators. Mercury then enters lakes, streams and rivers through precipitation and improper disposal of household products.

When released into the environment it can change to methylmercury, a highly toxic compound. And since mercury doesn't break down in the environment, it's there to stay.

Methylmercury is easily taken up in living tissue and builds up over time, causing serious health effects such as neurological and reproductive disorders in people and wildlife. When ingested, it can cause weight loss, reproductive problems and early death. In humans, it slows development and impairs brain function. It can cause tremors, numbness, loss of muscle control, memory loss and kidney disease.

Currently 40 states, including Maine, have fish consumption advisories due to mercury contamination. The Maine Bureau of Health has recommends that pregnant women, women of childbearing age, and young children statewide limit their fish consumption.



Fish consumption advisory

The limit for brook trout and landlocked salmon: **ONE MEAL PER MONTH** for pregnant and nursing women, women who may get pregnant, and children under eight. **ONE MEAL PER WEEK** for all others.

The limit for all other fish species: **NO MEALS** for pregnant and nursing women, women who may get pregnant, and children under eight. **TWO MEALS PER MONTH** for all others.

For information on products that contain mercury and how to recycle them call your local town office or the Maine Department of Environmental Protection at 800-452-1942 or visit www.maine.gov/dep/mercury/.

For spills call the DEP at 800-452-4664. If human contact occurs call 800-442-6305.