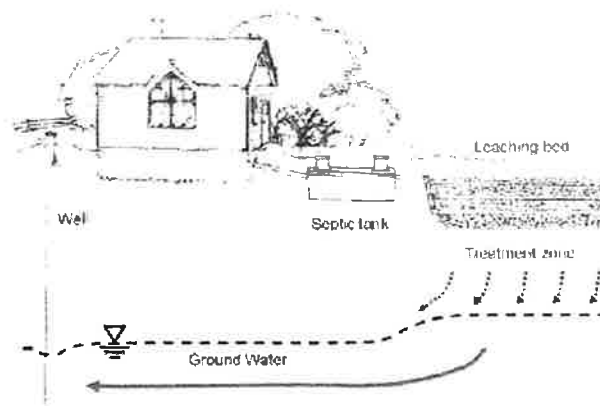
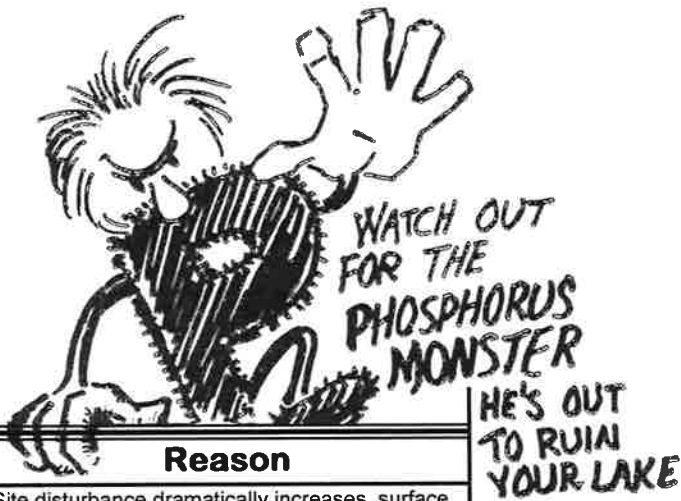


For Waukewan's Sake

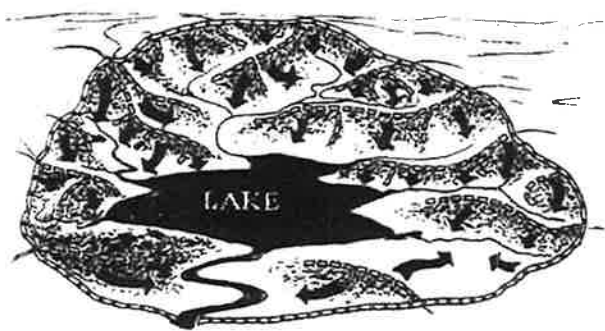
What can be done? Everyone can contribute by following the suggestions listed below. The goal is to preserve or mimic as many natural processes in the watershed as possible; let nature do the purification which it does so well. For example, leave buffer strips along the edges of the lakes, tributary streams, and

seasonal, intermittent streams or plant vegetation which will slow surface runoff: minimize disturbance of natural soil; direct surface runoff into natural depressions where the water can seep into the ground slowly; and keep use of chemicals and other harmful substances which cannot be removed by nature to a minimum.



Land Use/Land Area	DO's and DON'TS	Reason
1.Site Disturbance, Yardwork, Clearing, Landscaping	DO keep site disturbance to a minimum, especially removal of natural vegetation and exposure of bare soil.	Site disturbance dramatically increases surface runoff and erosion which contributes phosphorus to lakes.
	DO seed and mulch bare soil within two weeks of clearing and install hay bales downslope of cleared areas.	Hay bales trap sediments and the phosphorus they carry.
	DO leave naturally vegetated areas (buffer strips) along lake shores, streambeds, road ditches, intermittent streams. Leave at least 25 feet of undisturbed buffer ,with more on poor soils or steep soils.	Buffer strips intercept runoff and filter sediment and phosphorus from water before it reaches the lake or stream.
	DO plant deep-rooted, woody vegetation along lake shores, streambeds, and road ditches.	Plant roots stabilize shoreline, prevent erosion and take up nutrients carried by water before they reach the lake.
	DO preserve natural topography and natural drainage systems.	Natural drainage systems evolve over years and effectively control sediment and phosphorus.
	DO use fertilizer sparingly and in multiple applications. Hay mulch is preferable.	Solid, inorganic fertilizers are readily dissolved by water and transported in runoff.
	DON'T use herbicides and pesticides in excess on your garden and lawn. Avoid their use if possible	Many of these products are toxic and can get into the water.
2 Shore frontage	DON'T put leaves, branches or any kind of organic matter into the lake.	Plant debris carries phosphorus and other nutrients directly into the lake.
	DO stabilize eroding areas near the shoreline (NH DES permit may be required).	Erosion contributes nutrients and sediments to the water body that promotes algal and weed growth resulting in reduction in water clarity and quality.
3 Tree cutting, Forestry	DO minimize shoreline alteration and limit shorezone development (NH DES permit may be required per RSA 483-B	Natural, undisturbed shorelines are generally stable due to years of wind, wave, and ice action. Alteration of the natural shoreline de-stabilizes the shoreline, increases erosion and impairs fish and wildlife habitat.
	DO leave trees and natural ground cover along the shoreline or stream-front. Consult with NH DES shoreland protection program before removing trees and/or ground cover.	Trees and natural cover best protect against shoreline erosion and sedimentation of lakes. Trees take years to grow and only minutes to cut down.
4. Septic Systems	DO have your septic tank pumped out every 2-3 years subject to the amount of use and tank size. (NH DES Rule Env-Wq1023.01)	Septic systems must be maintained if they are to function properly. If settled solids are not removed from the tank, they will wash into and clog the leach-field thereby contributing to system failure.
	DO organize neighborhood septic tank pumping.	Pumpers usually reduce the price for large volume jobs.
	DO conserve water and give the septic system time to rest after heavy use.	The less water you use, the better your septic system will work.
	DON'T flush strong cleaning agents or toxic materials into your septic sysrem (NH DES Env-Wq 1023.03)	Septic tanks are living systems. Strong cleaners kill the microorganisms that break down the waste.
	DON'T flush bulky waste or grease into your septic system. (NH DES Rule Env-Wq1023.02)	These items can clog your system distribution or leach field lines and contaminate ground water.
	DON'T use commercial products that claim to clean your septic tank without pumping.	These products can cause clogging of your leachfield, and many contain chemicals which can contaminate groundwater.
5. Lawns & Landscaping	DON'T use a garbage disposal unless your septic system has been designed to accommodate one(NH DES Env-Wq 1010(f)). Use of a garbage disposals is highly discouraged.	Ground up food waste can overburden the septic tank.
	DO use low or 0 phosphorus fertilizer if needed in areas beyond 25 feet of the water.	Phosphorus is already naturally present in many NH soils and the application of phosphorus near the water allows for it to easily runoff into the lake.
	DON'T apply fertilizer to vegetation or soil located within 25 feet of the lake. (NHRSA 483-B:9-II(d))	The use of phosphorus promotes algal and aquatic weed or cyanobacteria growth in the lake.
6. Surface runoff from developed areas, (driveways, roofs, sheds)	DON'T apply pesticides within 250 feet of Lake Waukewan, Meredith's water supply, without first obtaining a Special Use Permit from NH Dept. of Agriculture (NH Rule 502.05(a)).	Pesticides applied to lawns and landscaping can contaminate nearby streams and lakes. Toxic pesticides cannot be filtered or treated from the public water supply or private wells.
	DO prevent water from running directly into lakes and streams. Detain in depressions or divert flow to flat, wooded areas.	Flowing water carries sediment and phosphorus. Detaining or dispersing water allows it to filter into the soil where sediment and phosphorus are filtered out.
	DO maintain or establish vegetative shoreline buffers as required within 50 feet of the lake (NH RSA 483-8).	Buffers perform a number of significant ecological functions including filter pollutants and nutrients prior to entering the lake.
7. Construction Activities (buildings, driveways, docks, beaches)	DO maintain or establish a buffer in wetlands, streams and drainage ditches.	Buffers help manage stormwater, they intercept and slow flows acting as a filter and may keep sediment and pollutant from reaching open water.
	DO determine/obtain state and local permits if you plan to initiate any construction activity within 250 feet of the lake (NH RSA 483-B).	Due to the environmental sensitivity of the shoreland area, it is regulated by the state of NH and some municipalities.
8. Storage of hazardous materials	DON'T undertake any shoreline activities including the importing of sand or repair or construction of a dock without obtaining state and local permits (NH RSA 482-A).	Sand contains phosphorus. Sand which is not stabilized by vegetation washes into the lake, where it accelerates filling of the lake and provides poor bottom habitat for fish and wildlife.
	DO store household hazardous materials in a contained area and participate in your local, annual household hazardous waste collection day.	Containment prevents contamination of water supplies and lake waters by undetected leaks.
	DON'T store hazardous materials outside.	

Watershed



This drawing illustrating the concept of a watershed points out that even land uses far from a water body drain into that water body, although often indirectly through small brooks and streams.

What is a watershed?

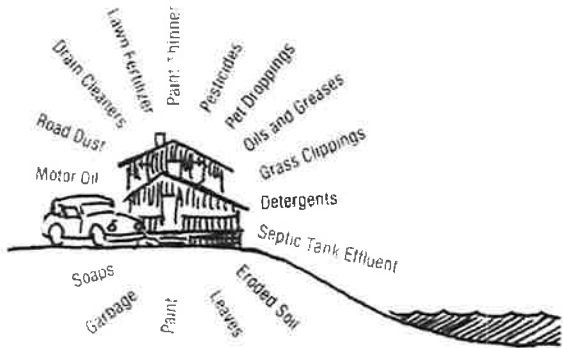
A watershed consists of all of the land which contributes water to a specific body of water. To outline watershed boundaries, connect the points of the highest elevation around a lake on a topographic map. Water falling within this bowl flows by gravity, in streams and groundwater, to the lake. Any substance within the watershed which can be transported by water eventually reaches the lake and affects water quality. Past lake protection efforts have focused on shoreline land use, perhaps mistakenly creating the impression that only activities along the shore influence water quality. In truth land use anywhere within a lake’s watershed affects lake health.

Influences on Water Quality –

Phosphorus is Number One

Residential homes introduce new substances into a watershed, many of which degrade water quality. In a developed watershed, water picks up salt, oil, gas and lead from roads; pesticides and fertilizers from home gardens and landscaping; effluent from septic systems; and substances disposed of on the ground by homeowners. The primary influence on water quality in NH lakes today is phosphorus. Phosphorus is a fertilizer. It promotes plant growth in lakes, just as it does in home gardens. In lakes, however, the crop is algae, rather than garden vegetables. The increased volume of water running off developed land contains much higher amounts of phosphorus than runoff from undisturbed woodland. This phosphorus comes from lawn fertilizers, road dust, grass clippings, yard debris, pet droppings, eroded soil, motor oil, septic system effluent and other sources.

Every lake can utilize a specific amount of phosphorus without experiencing a significant change in water quality. However, if the amount of phosphorus entering a lake increases above the baseline and remains high over time, the lake will eventually become over-fertilized and produce excessive amounts of algae. Algal blooms turn water green, reduce water transparency, deplete the oxygen supply, and smell terrible. Ultimately, these blooms alter wildlife habitat, impair scenic views, reduce recreational appeal and lower property values. The above drawing shows typical sources of phosphorus and other contaminants generated by a home on a lake. A significant source of phosphorus in some areas is caused by eroded soil as soil is washed into the lake due to lack of appropriate vegetation.



How Does Phosphorus

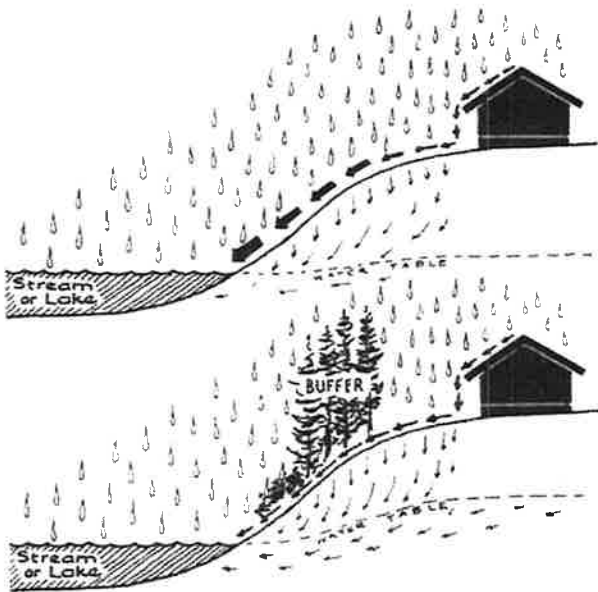
Get Into Lakes?

Most phosphorus is carried to lakes by surface water running into the lake after rainfall or snowmelt. Surface water picks up phosphorus from organic and inorganic materials, soil particles, fertilizer, road dust and other materials as it travels over the ground surface. This phosphorus goes directly into the lake unless the water transporting it slows enough to seep into the soil where phosphorus can be removed. When water seeps into the ground, organic matter and soil particles bind phosphorus and hold it for use by plants. Groundwater can also transport phosphorus to lakes. The primary sources of phosphorus in groundwater are malfunctioning and poorly-sited septic systems.

Land Use and Phosphorus— Undisturbed Watersheds vs. Disturbed Watersheds

The amount of phosphorus carried off a piece of land depends on two things: 1) how the land is being used; and 2) the amount of surface water running off the land. The amount of phosphorus entering a lake from an undisturbed forested watershed is very small because the forest system exports little phosphorus. Water is stored in small depressions, seeps into the ground and becomes groundwater. Most phosphorus is recycled within the system plants.

Dramatic changes occur when forestland is developed. Most of these changes directly or indirectly increase phosphorus output from the system. Without vegetative cover present to catch and store rainfall, more water reaches the ground quickly. Paved areas and buildings reduce the amount of soil available to absorb water. Grading flattens small-scale irregularities in the forest floor and the spongy surface soil which stores water. As a result, surface water accumulates quickly in developed watersheds and runs off in much greater volume than it did prior to development.



This diagram shows how buffer strips along lakes and streams protect water quality. Without a buffer strip, surface water accumulates rapidly and carries phosphorus directly into the lake. A densely vegetated buffer strip retains and filters

Since moving water picks up sediment from the ground, the increase in surface runoff accelerates soil erosion. Erosion is a familiar sight, obvious in gullies carved by water running off roads and through construction sites, but less obvious on lawns and along shorelines. Since sediment carries phosphorus, soil erosion is a significant source of phosphorus in developed watersheds. Also, phosphorus is more easily washed from the smooth surfaces common to developed watersheds, such as roofs and driveways. A recent study found that even careful development of woodland into 2-acre house lots caused a two- to ten-fold increase in phosphorus concentrations in stormwater runoff.

Once polluted, recovery of a lake is extremely slow. Unlike rivers and streams, lakes are slow to exchange their water, and the amount of phosphorus entering a lake from its watershed remains relatively constant. Water quality will not improve until specific actions are taken to reduce sources of phosphorus in the watershed.

Potential Dangers of Cyanobacteria

Cyanobacteria have been found in Lake Waukegan. Cyanobacteria produce toxins that can adversely affect animals and humans. The NH Department of Environmental Services advises against swimming in any waters experiencing a cyanobacteria bloom and pets and children especially should not make contact with the water. Cyanobacteria occur naturally; however when excess nutrients enter the water, cyanobacteria cell concentrations may increase. The only way to decrease the likelihood of a cyanobacteria bloom is through continued watershed management practices that reduce the amount of nutrients entering the lake. Assess your surroundings and your habits. Be aware of restrictions regarding the use of fertilizers along the shoreline, pick up after your pets, do not deposit yard wastes in the lake and be aware of the potential for septic system failure. Call the NH Department of Environmental Services Cyano Hotline to report a bloom at (603) 419-9229.

Lake Waukegan is a Public

Drinking Water Supply

Lake Waukegan is the water supply for the Town of Meredith’s municipal water system. The water system provides drinking water to approximately 1272 residential dwellings or roughly 3000 people. Additionally the local village economy is also dependent upon the municipal water system including restaurants, hotels, retailers, banks, professional services, public facilities, care providers and churches. As a surface water supply, Lake Waukegan is vulnerable to direct and indirect impacts stemming from polluted stormwater runoff. Pollution prevention is the key to maintaining the high quality of Lake Waukegan.

Might you need a permit? Check this link:

<http://des.nh.gov/organization/divisions/water/lrm/documents/got-permits.pdf>

Useful links:

[New Hampshire Homeowner’s Guide to Stormwater Management – Do-It-Yourself Stormwater Solutions for Your Home, NHDES](http://des.nh.gov/organization/divisions/water/lrm/documents/got-permits.pdf) <http://des.nh.gov/organization/commissioner/pip/publications/wd/documents/wd-11-11.pdf>

[Landscaping at the Water’s Edge An Ecological Approach- A Manual for New Hampshire Landowners and Landscapers, UNH](http://des.nh.gov/organization/commissioner/pip/publications/wd/documents/wd-11-11.pdf) http://extension.unh.edu/resources/files/resource001799_Rep2518.pdf

NH DES Shoreland Water Quality Protection Act, A Summary of the Standardshttp://des.nh.gov/organization/divisions/water/wetlands/cspa/documents/summary_standards.pdf

What to do?

Obviously, it is not possible to maintain all watersheds in a pristine, undisturbed state. But the impacts of land use on water quality can be dramatically reduced if everyone cooperates. It is the cumulative effect of many people living, working, and playing in the watershed that contributes to changes in water quality over time. Consequently, only by changing or breaking old bad habits can we lessen our impact on water quality, by learning to live in a more equal partnership with nature and her resources.

For Waukegan’s Sake



Pristine lake waters add beauty and diversity to the landscape and provide recreational opportunities throughout the seasons. These waters are one of New Hampshire’s prime resources, and it is in our own best interests to protect them. In undisturbed watersheds, nature purifies water flowing to lakes. When we alter watersheds to build houses and clear land, we impair natural purification processes. Moreover, as the number of people living in each watershed increases, the number of contaminants in the watershed increases. Consequently, we must all assume responsibility for maintaining water quality by breaking old habits and taking positive actions which will limit the amount of phosphorus and other contaminants which reaches the lake. This pamphlet explains how lakes are affected by land use and explains how homeowners can protect water quality for their own future and for generations to come.