

# Your Lake & You!

Simple, Concrete Steps You Can Take in Your Home, Yard, and Community to Protect Your Lake.

## Be a Lake Protection Champion

The purpose of this newsletter is to help you better understand the fascinating things that you may not know about your lake and to guide you on how you can use your power as an individual to make a positive impact. The lake that you know and love may look like it is just a body of water that is fun to explore and enjoy, but it is actually a complex system made up of many different parts, both living and non-living. It is important for your lake to have responsible citizens like you to look out for it.

Being a lake's caretaker may seem overwhelming and complicated; however, with some work and dedication, the rewards of your efforts will be fulfilling. Without your help, your lake could quickly change into a different type of environment that may not be as fun for you and your family to enjoy in the years to come. These changes would not only affect you, but they would also affect the fish, birds, turtles, frogs, flowers, dragonflies, and other animals that are a part of your lake's ecosystem. But, with the right attitude, anybody can be a lake protection champion. Are you up for the challenge?

## Nature's Network

Even though you are a person and your lake is a body of water, your lake and you are more connected than you may think. One of the first ways you can make a difference to the health of your lake is to think about how your everyday habits may affect it. Small changes in the way that you wash your dishes or mow your lawn matter. Even if you live far away from your favorite lake, the products you buy, the car you drive, and the way that you use natural resources all are connected back to the environment.

## Table of Contents

What is a Lake?	2
What Can Go Wrong?	6
What You Can Do to be a Good Lake and Watershed Steward	9
Advanced Steps: Working with Others to Get Your Watershed in Shape	14
Who To Turn To For Help	16

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## What is a Lake?

All lakes, no matter how big or small, are connected to the system that moves water around the planet. Unlike most rivers that have water flowing through them constantly, lakes are deep basins that hold water for an extended period of time. Lakes can be formed naturally by glaciers, volcanic eruptions, the movement of the Earth's crust, and other physical processes. Humans also have the power to form lakes artificially when we build dams in rivers that hold moving water in place. Do you know if your lake is natural or artificial?



Water is constantly moving throughout watersheds in streams, lakes, groundwater, and even in the atmosphere.

Image by Conservation Ontario.

Water enters and exits lakes in different ways. In **drainage lakes**, water flows into and out of the lake's basin via "inlet" and "outlet" streams. Other lakes, called **spring-fed lakes**, get their water through a combination of surface inputs like rain and melting snow, and "springs" connected to groundwater that is held in the soil or aquifers.

Lakes can be very big, very small, or somewhere in between. Some are less than an acre while others are thousands of square miles in area, like Lake Superior, the Earth's largest freshwater lake.

## Where Does A Lake Get Its Water?

Every lake on the planet is a part of a **watershed**. Water starts at the highest point of land that surrounds your lake and travels down through rivers, streams, or even other lakes and ponds before it reaches a lake. As water flows toward the lake it carries soil, chemicals, nutrients and other materials with it. When the water finally reaches a lake, it could stay within its basin for as long as hundreds of years or as short as just a few days before it continues flowing through the rest of the watershed. Knowing where your lake's water comes from can help you identify actions that will help keep it clean.

**Learn More!** [Understanding Your Watershed—Utah State University Extension](#)

## LAKE OR POND?

*Many people often question the difference between a lake and a pond. The answer is not as straightforward as you may think.*

*Generally, most experts who study lakes look to see how deep the light from the sun can travel through the water column. If sunlight reaches the bottom at the deepest section of a waterbody, then it would be classified as a pond. If the waterbody's deepest location is dark at the bottom so plants cannot grow, then it would usually be classified as a lake. This is a good rule of thumb to keep in mind, but remember that it is not exact and there are many exceptions to it.*

# The Lake Ecosystem

The word “eco” comes from the Greek word *oikos* meaning “home.” An **ecosystem** is a biological community of organisms interacting with their physical environment. Just like you may rely on your friends and family, members of an ecosystem interact to survive. Your lake's ecosystem is made of many living animals such as frogs, fish, insects, ducks, beavers, crayfish, microbes, birds, and people as well as nonliving things like water, sunlight, sand and nutrients.

## Lake Zonation

When you're out observing your lake, you may notice the same species of plants and animals in the same types of spots no matter when you are looking for them. Scientists who study lakes (called “**limnologists**”) have divided lakes into different zones based on the physical properties that naturally form different types of habitats for aquatic organisms around the lake.

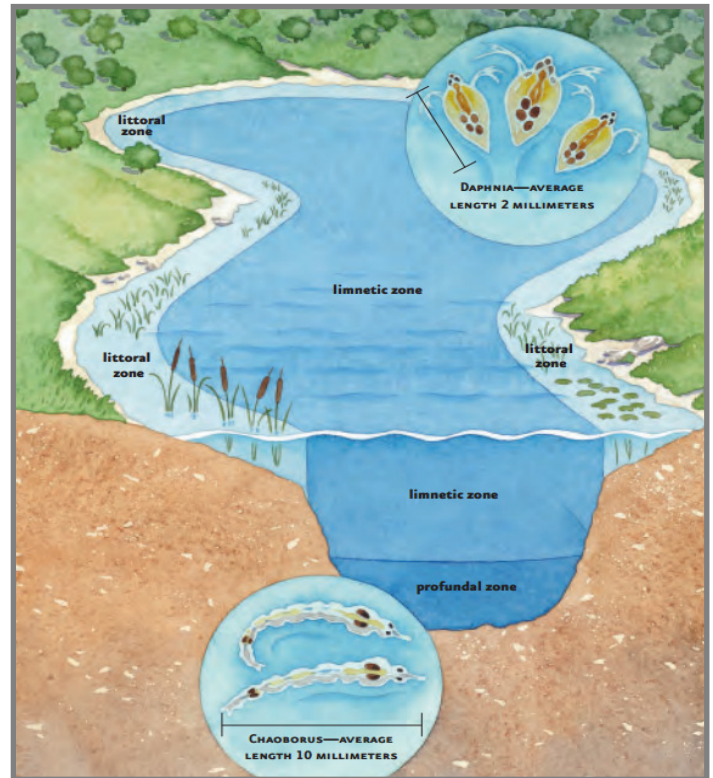
The edge of the lake is called the **littoral zone**.

This area supports the aquatic plants that require a lot of sunlight and are able to grow above and underwater. You may notice that many different types of birds and insects spend time in this area. Birds especially love this zone because many of them eat the insects or even small fish that occupy this space. If you are lucky, you may also get to see some of these small fish, frogs, water snakes, or turtles that like to be in your lake's littoral zone.

As you move deeper into your lake, about where you might like to swim, you reach the **limnetic zone**. This zone stretches along the surface of the entire lake, but only goes as deep as the sunlight can reach. This means that it could extend all the way to the bottom of the lake or only part way. Although it may seem like nothing goes on in this zone of your lake, it is actually bursting with the activity of tiny, microscopic plants (called “phytoplankton”) and animals (called “zooplankton”). You may find larger fish in this zone as well, enjoying the space to swim freely.

If your lake is deep enough, it also has a **profundal zone**, which includes the water below the limnetic zone where sunlight can't reach. Because sunlight doesn't get to this area, it is usually dark and cold—even in the summer. But, there are still some organisms that love this part of your lake and have very important roles in maintaining the ecosystem balance. Down here, you may find some species of worms and clams adapted to live in the deep sediments (also called the **benthic zone**). There are also lots of hard-working bacteria and fungi that break down the organic matter from the plant and animal remains that settle on the lake's bottom. When they do this, they release important nutrients that other creatures can use throughout the rest of the lake.

[Learn More!](#) [Fish in the Zone by Roland Sigurdson, Minnesota DNR](#)



Lake zones with zooplankton species *Daphnia* and *Chaoborus* featured. Can you believe how small these animals are?  
Illustration by: Bill Reynolds

## The Properties of Lakes

Just like all things in nature, your lake is influenced by the interrelated scientific properties of physics, chemistry, and biology. Some physical properties are the water's waves, wind, and the radiation from the sun. Many different chemical elements, like nitrogen, phosphorus, carbon, and oxygen move through a lake all year round and are affected by the physical properties. Biology in and around your lake is determined by physical and chemical elements as well as the interactions between organisms that live within and around the water.

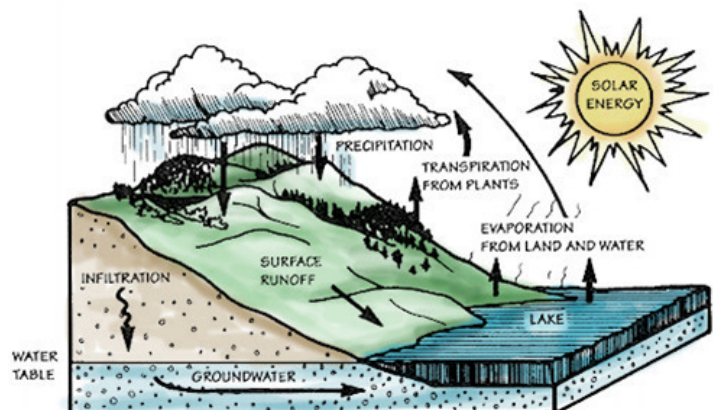
## Oxygen in the Environment

Oxygen is an essential element of life for animals and humans in cellular processes. But where does it come from? All of the trees, shrubs, flowers, phytoplankton, and other plants on Earth produce oxygen through the process of **photosynthesis** and release it into the atmosphere where it can be taken in by other organisms that need it.

The fish and other animals in your lake rely on oxygen, too. Once it is in the atmosphere, oxygen can dissolve into the water and become accessible to your freshwater friends. Some properties that affect the amount of dissolved oxygen in the water include the water's temperature, saltiness, biological activity, and the weather. For instance, cold lake water holds more dissolved oxygen than warmer lake water, and lakes with high biological activity in the water tend to have less dissolved oxygen than lakes with low biological activity. The healthiest lakes and ponds have high levels of dissolved oxygen from top to bottom that support their living ecosystem.

## The Water Cycle

The water cycle is an important process that occurs on Earth. Water is constantly moving over Earth's landscape, throughout the atmosphere, and even under the ground. Most of the water on the planet is stored in the oceans. But, how does water get from the ocean to your lake? With the help of heat energy from the sun, the water in the ocean is transformed into a gas in the atmosphere. This process is called **evaporation**. While the water vapor is in the atmosphere, it can go through the process of **condensation**, which changes the gas back into a liquid and forms clouds in the sky. When clouds get cooler or too heavy with water, the water falls back down onto the Earth as **precipitation**, which could be in many forms including rain, snow, sleet, or hail. Once it falls back onto Earth, water moves through the landscape as rivers, streams and groundwater to places like your lake.



The water cycle is an important physical process that your lake relies on.

Image by the League of Women Voters Water Resource Education Network.

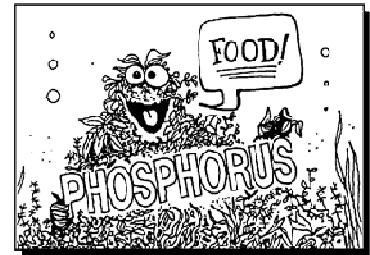
# Your Lake and Nutrients

## Phosphorus

Phosphorus is an important chemical element that is essential for all living things to grow; it's even in our DNA! One of phosphorus's main jobs is to help us store energy. Most of the phosphorus in the world is locked up in its solid form in rocks and sediments. It becomes available to organisms after it is physically, chemically, or biologically removed from the Earth and released into the environment where it can be converted into different, usable forms.

Humans have altered the natural phosphorus cycle by mining it and creating phosphorus-rich fertilizers and animal feed. When we add phosphorus to the environment, it can offset the natural balance and organisms tend to grow faster.

In many freshwater ecosystems, phosphorus is known to be a **limiting factor** because its abundance in the system has a large influence on the success of the organisms that rely on it. Just like the amount of money you have determines how many things you can buy, the amount of phosphorus in your lake determines how many organisms can survive.



## Nitrogen

Like phosphorus, nitrogen is another chemical element that is vital to all life on our planet. Although you can't exactly see it, nitrogen is found all over the place – it's in the air, soil, water and all of the plants, animals and bacteria on Earth. It is most abundant in its gas form,  $N_2$ , which makes up almost 80% of Earth's atmosphere.

Even though nitrogen makes up so much of the air that we breathe, our bodies can't use it when it's in its gas form. Humans and most other animals rely on bacteria to biologically "fix" it, or convert the gas into a form that we can use. These forms include ammonium ( $NH_4$ ) and nitrate ( $NO_3$ ), which are compounds that plants can easily absorb and turn it into energy through photosynthesis. Nitrogen is cycled throughout the environment as the plants die and are decomposed by bacteria.

Humans have a significant impact on the nitrogen cycle. Many of the activities that we engage in such as burning fossil fuels and fertilizing our crops and lawns add a large amount of nitrogen into the environment. We have even figured out how to "fix" nitrogen in factories without the help of the bacteria that we find in nature.

### A Closer Look: Algae Blooms

*Algae usually respond first when excess nutrients are added to a lake due to their position at the base of the ecosystem. When an algae bloom occurs, you can sometimes sense a difference in the lake water if it becomes murky, turns a greenish color, or has an unpleasant smell. Once the overabundance of algae starts dying off and decomposing, the dissolved oxygen concentration in the water decreases and other organisms in your lake like fish have a difficult time surviving, causing even more problems in the ecosystem.*

*Once algae blooms occur, it is difficult to control them. This is yet another reason it's best to avoid adding extra nutrients to your lake in any form. Small steps that you can take include avoiding using fertilizers on your lawn, maintaining a natural shoreline, and ensuring that your septic system is leak-free. These efforts will make a big difference in keeping your lake healthy and happy for years to come.*

## What Can Go Wrong?

Lakes age as people do; only their natural life span is much longer. A lake may start out as a large body of water, but over many centuries it will fill with sediments, plants and debris and gradually get shallower and shallower. Eventually a lake will become a wetland, then a soggy area, and finally it will no longer be a lake at all. This process of natural aging is called **eutrophication**, a Greek word meaning “well-nourished”. It generally takes hundreds, if not thousands of years for a waterbody to undergo this process naturally.

## The Big Danger: Cultural Eutrophication

The problem is that lakes age more quickly when humans get involved. We have become very good at overfeeding the environment with nutrients such as phosphorus and nitrogen. Many of the everyday practices that have become a norm in our culture—such as adding fertilizers to our lawns and farm fields and allowing untreated sewage to enter our waterways—contribute a great deal of nutrient pollution. These extra nutrients speed up the natural eutrophication process. The balance within our lake ecosystems can become unsteady, causing our lakes to age and “die” more quickly. This phenomenon is called **cultural eutrophication** because the natural process of eutrophication is accelerated by human actions. This sped-up aging could lead to eutrophication in decades instead of centuries.

### Learn More!

- \* [What is Nutrient Pollution – National Oceanic and Atmospheric Administration \(NOAA\)](#)
- \* [Nutrient Pollution: Solutions and Sources – United States Environmental Protection Agency](#)
- \* [Eutrophication – The Open University](#)



# Your Lake's Condition

Your lake's **trophic state** defines where it falls on the spectrum of eutrophication. Lakes categorized as **oligotrophic** have low concentrations of nutrients, do not support much biological activity such as fish or plant growth, have high amounts of dissolved oxygen, and have relatively clear water. They are often deep and have rocky or sandy shorelines. Lakes with high concentrations of nutrients are called **eutrophic**. These lakes often have a mucky bottom, support large amounts of plant and fish growth, have low amounts of dissolved oxygen in bottom waters, and often look murky. Lakes in between oligotrophic and eutrophic are known as **mesotrophic**, and they have a range of intermediate conditions.

One of the best things you can do for your lake is to accept its natural state and not try to change it into something that it's not. For example, if your shoreline is a place where aquatic plants like to grow and it may have a mucky bottom that you don't like to swim in, try to think of ways that you can enjoy it without digging it up and creating a disturbance within the ecosystem which can lead to more problems. Perhaps you can invest in a swim platform that you can use in the deeper portions of your lake away from where the plants and muck may get in your way.

## Lake Assessment Programs

Scientists all over the world have dedicated a lot of time and resources to assess lakes. In the United States, the US Environmental Protection Agency organizes and executes the National Lakes Assessment, a program that collects data on many of the lakes across the country and uses it to evaluate their status.

The results from research to date indicate that nutrient pollution, or cultural eutrophication, is a significant problem in lakes around the country. At least 35% of the lakes surveyed were impacted by nutrient pollution. This explains why many lakes around North America are becoming unhealthy over time. While these results were not what we were hoping for, they guide us to make better, smarter decisions for lake management.

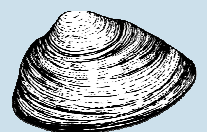
Many lakes are also regularly monitored by many other groups such as individual state entities, private organizations, colleges, and local volunteers. If you are interested in learning more about your lake or other waterbodies in your area, get in touch with your state environmental group to see what information they have and, if you're able to, get involved in monitoring!

[Learn More! National Lakes Assessment – United States Environmental Protection Agency](#)

### A Closer Look: Freshwater Mussels

*While many people associate mussels with the seacoast and often find them in the tide pools exposed during low tide at the ocean, they can also be found burrowed in the sand in your favorite freshwater lake. In fact, freshwater mussels play an important role in the lake ecosystem because they get their food by filtering the small organisms like phytoplankton, zooplankton and organic particles out of the water column. When they do this, they also filter out harmful toxins from the water and improve water quality.*

*Mussels in lakes can act as a **bioindicator species**, meaning that their presence or absence can tell scientists about the state of the environment. They are highly vulnerable to water quality changes and tend to thrive in clean, well-cared for lakes. So, if you happen to notice these around your lake, this is a good sign!*



## Other Substances in Your Water

Although nutrient pollution from excess nitrogen and phosphorus is a serious problem that your lake may be facing, there are also many other ways that humans contaminate the water in your watershed. When any substance is added to the environment that it isn't used to handling, it could lead to devastating consequences.

Sometimes, humans add harmful substances to the environment without even realizing it. For example, many people who take medication dispose of extra pills by flushing them down the toilet or sink. While this seems like a responsible and harmless act, it is actually concerning. Our septic systems and water treatment facilities have not been designed to detect or remove medicines, so they are passed into the environment. To prevent this, look into drug take-back days in your area so you can properly dispose of your old medications while also protecting the environment.

Humans also contribute a great deal of salts, detergents, caffeine, fire retardants, manufacturing chemicals, heavy metals and others to water bodies around the world. Even when water looks clear and clean, it could have dissolved substances that negatively affect aquatic ecosystems. It is important for you to be conscious of the waste that you produce and where it is going to most effectively protect the environment from exposure to toxic pollution. Look into programs in your local community like hazardous waste collection days that encourage you to properly dispose of your trash that could be potentially harmful if it gets out into the environment.



### Fireworks and Your Lake

On a hot summer's night, it's not uncommon for us to find ourselves enjoying a spectacular view of fireworks from a dock, boat, or shorefront. While every explosion of color and light brings happiness and amazement, many people don't realize that the pyrotechnic event could be harmful for the environment, especially your lake.

Inside every firework, there are many different toxic elements that are released when it explodes. These are necessary to produce the vibrant colors that we see and the body-shaking blasts that we can hear. Some of these elements include lead, barium, strontium, copper, aluminum, cadmium, and sulfur. Scientists have studied these elements for many years and know the negative impacts that they have on nature. Lead, for example, is known for its ability to pass through the food web and accumulate to toxic concentrations, which is especially harmful to top predators like eagles and loons. There are now laws and regulations to prevent the spread of lead throughout the environment. When it falls from the sky as a byproduct of a fireworks show, we are encouraging the introduction of this toxic element to the environment and threatening the wildlife that we love and cherish.

So, next time you are thinking about buying fireworks to light off for you and neighbors to enjoy, or are invited to watch a fireworks show on the water, be sure to consider how these impact your lake and your environment.



## What Can You Do to Be a Good Lake and Watershed Steward?

There are many things that you can do right in your home and yard to protect your lake. By keeping pollutants out of your lake, you can actually prevent problems. Be a lake and watershed **steward**

*As a steward, some of the most important things you can do are:*

- Conserve water
- Manage your shoreline
- Take care of your lawn responsibly
- Dispose of waste properly (including your pet's waste!)
- Be an educator

## Conserve Your Water: It Makes a Difference

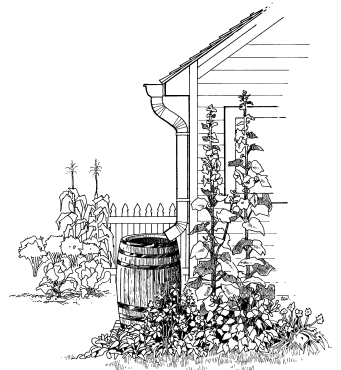
When you conserve water in your home and yard, you also reduce the amount of harmful substances that can find their way into your lake. One small drop of water can carry many different types of toxic materials with it, so think about how you can re-focus your water use to only what you really need.

**Runoff** is when water drains throughout the environment. When water flows over surfaces that it can't filter through (called **impervious surfaces**), it picks up all of the materials that have settled upon them over time, such as car fluids, excess sediments, and bacteria. Eventually, those materials are released into the environment, including your favorite lake. Decreasing the amount of water you use and the amount of impervious surfaces that you have around your property decreases the impact that runoff can have on your lake.

### What YOU Can Do:

Making minor changes in your everyday routine can make a big difference. Try to take shorter, less frequent showers, install water-saving devices like toilet dams or low-flow shower heads, repair leaky faucets, avoid washing your car or boat in areas that drain directly into your lake, and only run your washing machine and dishwasher when they are full. If possible, don't water your lawn. If you must water your lawn, change your habits. You can install pistol spray heads, water in small amounts, and water in the morning instead of the afternoon so your plants can make best use of the water.

Also, take advantage of the rain. Collecting rainwater in a rain barrel or a cistern is a fun and easy way to conserve water. Not only are you able to give your usual water supply a break by using rainwater instead, you also reduce water pollution by trapping water before it accumulates contaminants that can be transported to your lake. Do you like to garden? Consider creating a rain garden! These are gardens designed to have storm water drain into them. They act as a natural filter so harmful pollutants in runoff water are trapped.



#### Learn More!

\* [Conserving Water Around Your Home – Michigan State University Extension](#)

\* [Soak up the Rain NH – New Hampshire Department of Environmental Services](#)

\* [Impervious Surfaces: How They Impact Fish, Wildlife, and Waterfront Property Values - University of Wisconsin](#)

## Managing Your Shoreline

If managed properly, your shoreline provides many benefits to your lake, including filtering out harmful pollutants in runoff, providing habitat for all sorts of lake-loving creatures, and stabilizing the soil around the lake so it doesn't wash away over time. Some lakefront property owners over-manage their shoreline and morph it into a wide open green space that may look aesthetically pleasing but is unable to perform all of the functions that it once did naturally. Most lake experts recommend that lakefront property owners leave an unmanaged area of land between their house and the water where grasses and shrubs can mature to promote a healthy shoreline. This is often referred to as a **buffer zone**. Does your shoreline have a buffer zone? Buffer zones not only help your lake, but they also provide privacy, defend against noise pollution and provide a perfect habitat for many different types of wildlife. If your property does not have a buffer zone between your yard and the water, or perhaps has one that isn't adequate, consider designing your landscape to support one.

Within and around your buffer zone, try to minimize impervious surfaces as much as possible. Use the [New Hampshire Residential Loading Model](#) to estimate how much nutrient pollution your property may be contributing to the environment through stormwater runoff. Once you've modeled your "stormwater footprint" think of ways that you can decrease your impact such as replacing impervious surfaces around your house (such as your driveway and walkways) with porous materials such as gravel, mulch, or green spaces.

When working in and around your buffer zone, be careful about work that may require a permit from your state government. Laws and regulations vary in different parts of North America, but often activities such as dredging and filling the land around your lake need to be well-planned and approved before you can do the work.

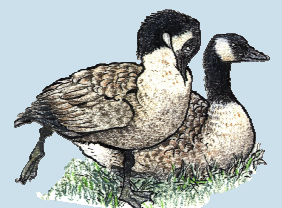
### Learn More!

- \* [Landscaping at the Water's Edge: An Ecological Approach – University of New Hampshire Cooperative Extension](#)
- \* [Why Shorelines are Important – Love Your Lake Canada](#)
- \* [The Water's Edge: Helping Fish and Wildlife on Your Waterfront Property – Wisconsin DNR](#)

## A Closer Look: Canada Geese

Canada Geese are easily identifiable by their large bodies, tall black necks, white cheeks and chinstrap, and their loud, communal "honking" habits. They tend to stay together in flocks and forage on aquatic plants growing in shallow portions of a waterbody and on grasses found along a lake's shoreline. Due to all of the munching of grass and vegetation they do during the day, Canada Geese naturally produce a lot of waste. Studies have shown that one average goose can generate three pounds of nutrient-rich waste every day that contribute to nutrient pollution reaching your lake.

While Canada Geese are cool, interesting birds, it is important that we take measures to ensure they avoid the shoreline of your cherished lake. Easy steps can include: keeping a natural zone of vegetation between your grassy lawn and the lake shore, avoiding feeding the geese extra snacks from your dock or beach, creating a simple rope barrier around your shoreline, or investing in other scaring tactics such as fake animals or noises that will deter the birds from hanging out near your property.



## Less Lawn Care Means More Lake Protection

If we love our lakes, we need to change our idea about what looks good. That short, weed-free lawn that many of us admire can actually hurt our lake. Avoid using fertilizers and pesticides on your lawn, especially around your lake. Otherwise it's easy for them to get into the system and impact the chemical, physical, and biological properties of the water. If fertilizer use is a must, try to use phosphorus-free fertilizers, slow-release nitrogen, and leave a vegetated buffer area near your lake in which no harmful substances are used.

Even organic material such as grass clippings and fallen leaves contribute extra nutrients to the ecosystem when they breakdown. Bag grass clippings and fall leaves and dispose of them properly or add them to a compost bin away from the water to prevent concentrated nutrients from decomposing material from entering your lake.

## Maintaining Your Septic System

Conscientious maintenance of your septic system is a very important step that you can take to protect your lake. A septic system is a multi-step process to treat human wastes. Wastes flow into a tank where the solids settle out. The liquids then flow into a drain field or another type of system where they are decomposed by soil microbes. These wastes are very high in nutrients. When properly sized, located, and maintained, septic systems can effectively reduce the amount of nutrients entering your lake. Remember, if a public sewer line is available, the best thing you can do for your lake is to hook up to the sewer system.

There are quite a few emerging technologies that you may want to consider such as composting toilets and waterless urinals. Remember that it is your responsibility to ensure that your septic system is functioning properly and not polluting your lake and its surrounding environment.

### Be a responsible septic system owner!

- Make sure your system is the right size for your household
- Keep your septic system at least 100 feet away from your lake
- Make sure that your septic system stays clean by pumping the tank as needed (every 3-5 years)
- Inspect it regularly to make sure that it is properly functioning and does not have any leaks
- Avoid using toxic chemicals inside your home so that they stay out of your drain field

#### Learn More!

\* [How Do Septic Systems Affect the Health of Your Lake? – Love Your Lake Canada](#)  
\* [Septic System Owner's Guide—North Carolina State University](#)

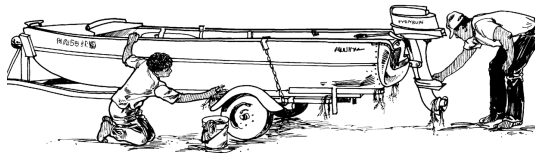


## Prevent the Spread of Invasive Species!

An **invasive species** is an organism whose native habitat is somewhere other than where it is now. Because they are not native, invasive species don't have natural predators or competing vegetation to keep them from spreading. Once an invasive species becomes established in a lake, it is very difficult to completely get rid of it and management usually takes a great deal of time and resources. Invasive species are often spread by boats that move from an infested lake to a non-infested lake.

An infestation in your lake is definitely something that you should aim to avoid. Often, the presence of invasive species makes activities like boating, swimming and fishing difficult to enjoy. They also have serious impacts on your lake's ecology and economic value. Managing your lake's invasive species infestation can be expensive and usually takes many years.

One of the easiest things you can do to prevent the spread of invasive species to your lake is to inspect your boat for any potential invaders before you launch it. There are some types of invasive species that are very small and difficult to see such as the spiny water flea that is taking over the plankton community in the Great Lakes, or the Asian clam that is found all over the United States. To prevent these, a thorough cleaning and drying of your boat would make a big difference.



Don't forget to inspect your boat for aquatic invasive hitchhikers!

Image from: University of Wisconsin—Cooperative Extension

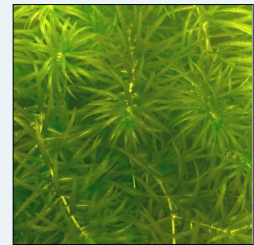
While you can monitor your own efforts to prevent invasive species, often it is hard to control the efforts of your neighbors, community members, and visitors to your lake. Get familiar with the invasive species that threaten your lake and actively look for any signs of them in your lake. Early detection and rapid response to an invasive species infestation makes management efforts much more effective compared to when working on an established invasion. Don't be afraid of asking your local experts questions.

Different areas experience different types of invasive species in their waterways. Some examples include zebra mussels, *Hydrilla*, Eurasian watermilfoil, Asian carp, and purple loosestrife. The pictures to the right provide some examples of invasive species to North America.

Can you recognize any of these invasive species?



Variable Milfoil *Myriophyllum heterophyllum*



*Hydrilla verticillata*



Brazilian Elodea  
*Egeria densa*



Parrot Feather  
*Myriophyllum aquaticum*

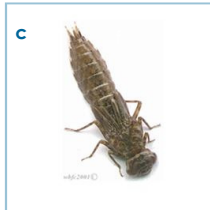
## Etiquette for Boaters and Jetskiers

While it may seem like boating is a harmless activity, it actually can have many hidden physical, chemical, and biological impacts on your lake. Follow these basic tips to reduce your impact while boating.

- \* **Cleaning your boat.** The chemical mixture that you may use to clean and polish your boat every season most likely contains chemicals that could harm your lake's ecosystem, such as chlorine, ammonia, and phosphates. Instead, skip the chemicals and use old-fashioned elbow grease and absorbent drying cloths that can keep any unwanted materials from entering the lake. Never clean your boat while it is in the water; trailer it and clean it on shore away from your lake.
- \* **Fueling your boat.** When the hydrocarbons that make up gas and oil get into water, they change the amount of oxygen that is available to organisms and can cause serious problems throughout the ecosystem. Be extra careful not to spill any gasoline when fueling up your boat, and if possible, let trained professionals help you.
- \* **Driving your boat.** Waves and wakes from your boat carry a lot of energy. When they crash into the shore, they can actually weaken the shoreline and cause erosion. Lakeshore erosion increases the amount of sediment in the water making it turbid, or murky. When driving your boat, make sure that you follow all of the established boating guidelines such as "No Wake" zones, obey set speed limits and be courteous to other boaters and swimmers.
- \* **Boating in shallow and vegetated areas.** When you boat in shallow waters, the propeller can stir up the bottom sediments and vegetation. Avoid shallow areas to minimize harming the habitat of aquatic organisms that use shallow portions of the lake and to avoid increasing the water's turbidity.
- \* **Clean, Drain, and Dry!** Getting into the habit of inspecting and cleaning your boat is one of the easiest ways you can protect your lake from invasive species. This not only saves your lake but it also saves you money, time, and frustration. Be aware of any special laws and regulations that some states have put into place to enforce this practice as well.

### Your Lake and You: TRIVIA!

How much do you really know about your lake? Test yourself by trying to identify these critters that may be a part of your lake's ecosystem.



**ANSWERS:**  
 a. Filamentous green algae  
 b. Lily Tuber c. Dragonfly nymph  
 d. Freshwater jellyfish  
 e. Capapod (Species of zooplankton)

Images by: New Hampshire Department of Environmental Services

## Advanced Steps: Working with Others to Get Your Watershed in Shape

### Is My Lake Sick?

Most people consider a green lake a “sick” lake. But that may not be true. Both algae and aquatic plants are green and they are natural, important aspects of all lake ecosystems. The majority of the time, green things are harmless.

However, in some cases, the quantity and type of green things can indicate problems. If you think that invasive species are taking over your lake or you have a harmful algae bloom, then you should consider contacting a professional for help.

### When To Call For Help

A lake manager is called a limnologist. Limnologists study the living and nonliving features of lakes. While other types of professionals can work on specific problems on your lake, most limnologists are trained to look at your lake as a whole and assess its overall health.

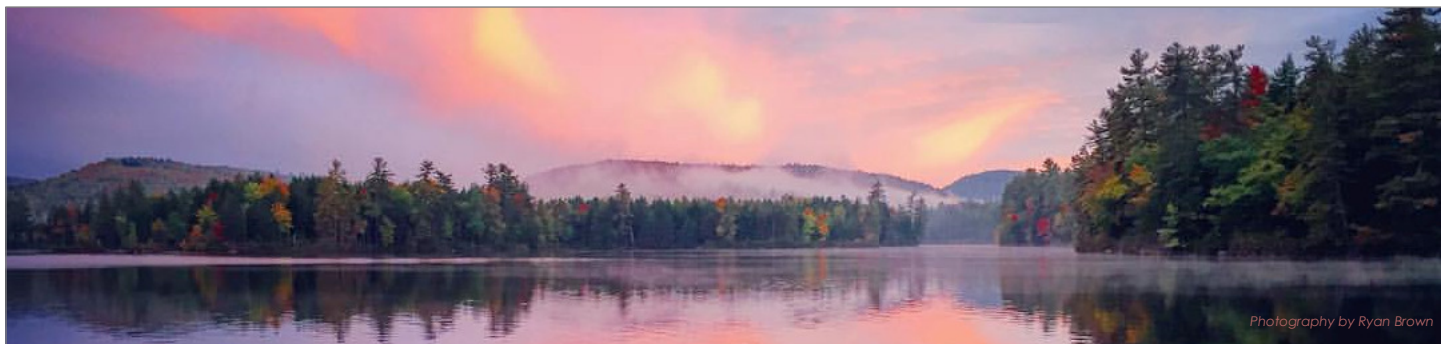
Limnologists are helpful to have as a part of your team. They can answer questions and guide you on caring for a lake that may be unhealthy. Depending on the problems occurring in your lake, limnologists can help form long-term plans that your community can follow to help fix your lake and prevent them from happening again. Never hesitate to contact an expert if you feel your lake may need some extra attention.

### Watershed Protection for Lake Protection

The water in your lake is not only influenced by the activities that occur in and around it, but also throughout its watershed. As a community, you and your neighbors should work together to protect your lake and its watershed to keep your lake as clean and healthy as possible.

Many of the lake-protection habits that waterfront property owners should develop can also be adopted by watershed property owners to provide the best care for your lake and its surrounding waterbodies.

There are many ways to engage people who may not live on the waterfront and don't understand how they could possibly affect the lake. Perhaps you can start a community garden, lead a nature walk, or replace some impervious surfaces around your town with green space or other porous materials.



# Develop a Lake and Watershed Protection Strategy

Strategies are helpful for sports, business, studying, board games, etc. Lake protection strategies are no different. Your lake will benefit greatly if you and your neighbors establish a strategy to prevent or remediate problems in your lake.

## *The How-To's of Making Your Lake and Watershed Protection Plan*

- 1) **Study Your Lake:** Take time to gather basic information about your lake and its watershed such as: its boundaries, its water sources, and how the land surrounding your lake is used. Contact your local governmental agency that deals with the environment or natural resources to see if there is any recently-collected data which you can examine.
- 2) **Determine the Potential Issues:** Examine the information from your study of your lake. Make a list of all of the things that could raise some red flags when it comes to the health of your lake. These could be small-scale things like a leaf-pile that's positioned too close to the shoreline, or large-scale items like a wastewater treatment plant on one of the streams that enter your lake.
- 3) **Prioritize:** Use your list of potential issues to make decisions on what the most important things to focus your attention on are. It may be a good idea to start with the smaller, more manageable issues and work your way up to the ones that may be harder to tackle.
- 4) **Act:** Use what you know to put your plan into action. Work as a team with your neighbors who live on the lake and your local community. Reach out to local or state organizations for help and advice.

## What is a Lake Association?

A lake association is a group of people working together to address issues on a particular lake. They can include anybody who is concerned with the well-being of a lake, whether they are lakefront property owners or just frequent visitors to the lake. Associations may provide educational forums, monitoring programs, volunteer projects, social events and more. Your lake may have an established association, but if there isn't one, you might want to get your friends and neighbors together and organize one.

Lake associations are the grassroots organizations that provide the power and coordination that is necessary to get things done. Often, local government entities provide support for projects that lake associations take on because the lake is also an important aspect to the broader public. Many state, regional, and federal groups are often more willing to work with lake associations on larger projects by providing money, educational material, or guidance than they would be with individual lakeshore residents. Check these groups and try to identify people who your lake association can establish relationships with for large-scale issues that may arise around your lake.

Visit the North American Lake Management Society website to find the contact information of professionals in your local and regional community. There are also many other resources available there that can help you organize a new lake association.

### **Learn More!**

[People of the Lakes: A Guide for Wisconsin Lake Organizations by the Wisconsin Lakes Partnership](#)

## Who to Turn to for Help

Your local lake association will often have information, educational forums, and networks of people that you can work with to improve the quality of your lake. Your county extension office is a good source for advice about lakes, lawn care, composting, soil testing, water conservation, chemical use, and many other subjects. As you get more interested in lake protection, you may want to join and get active in your state lakes organization. Your state lakes organization will be able to answer broader questions about lake care and water laws, refer you to lake experts, help you locate or organize a lake association, introduce you to others concerned about lakes and promote good lake policies at the state level.

## NALMS and Its Affiliates

Contact the **North American Lake Management Society (NALMS)** if you have technical questions or want to tap into the national and international lake network. NALMS is the only North American organization working solely for the protection of lakes.

NALMS currently has 17 affiliated organizations in the United States and Canada that are active in lake management issues on the state, provincial, and local level. Contact the NALMS office for contact information for your local NALMS affiliation.

### North American Lake Management Society

PO Box 5443, Madison, WI 53705-0443

Phone: (608)233-2836

Email: [info@nalms.org](mailto:info@nalms.org)

Website: [www.nalms.org](http://www.nalms.org)

- California Lake Management Society (CALMS)
- Colorado Lake & Reservoir Management Association (CLRMA)
- Florida Lake Management Society (FLMS)
- Georgia Lakes Society (GLS)
- Illinois Lakes Management Association (ILMA)
- Indiana Lake Management Society (ILMS)
- Lake and Watershed Association of South Carolina
- Lower Qu'appelle Watershed Stewards Inc. (LQWS)
- Michigan Chapter of NALMS (MCNALMS)
- New England Chapter of NALMS (NECNALMS)
- Oklahoma Department of Environmental Quality (ODEQ)
- Oklahoma Clean Lakes and Watersheds Association (OCLWA)
- Oregon Lake Association (OLA)
- Pennsylvania Lake Management Society (PALMS)
- Property Owner's Association of Deep Creek Lake, Inc.
- Virginia Lakes and Watersheds Association (VLWA)
- Washington State Lake Protection Association (WALPA)

## Become a Member of NALMS!

Visit <https://www.nalms.org/nalms-memberships/> to join or renew your membership to the society.



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