



Diamond Lake

A Resource and Guidebook for Homeowners

Preface

As property owners around Diamond Lake, we share a collective heritage. Whether we use it for swimming, boating, fishing, or simply enjoying the view, preserving the quality of the lake is important to all of us. A primary purpose of the Diamond Lake Association is to educate riparian property owners and other interested parties about the preservation of Diamond Lake. This booklet has been prepared as a resource for homeowners to better understand and protect the lake.

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Contents

An Historical Perspective p. 1-2

Lake Facts p. 3-4

Watershed Facts p. 5-6

Water Quality p. 7-8

Aquatic Plants p. 9-10

What You Can Do p. 11-12



An Historical Perspective

Diamond Lake was formed from the movement of glaciers that sculpted the land as they advanced and receded across the landscape. In some areas, huge ice blocks were deposited that later became lakes. In an account of the history of Diamond Lake, a local historian noted:

Nature's work is slow but time is its greatest asset. With movement, almost imperceptible, the earth is in constant change. In this due process, nature occasionally adds a measure of excitement so overwhelming that man is compelled to add his own signature. When a patch of blue was dropped into the verdant green of Southwestern Michigan, man was quick to name it...Diamond Lake. (From: *A Diamond Sparkles: The Facets of Diamond Lake* by Lois Webster Welch, 1970).

Early inhabitants of Diamond Lake included Pottawatomie Indians and fur trappers. In those days, roads were lacking and ancient trails provided the only means of travel. Things changed, however, with the advent of the railroad in 1871. In fact, much of the early development around Diamond Lake can be attributed to rail travel. Passengers arrived by the thousands to visit beautiful Diamond Lake and camps and resorts were established to accommodate travelers. By rail, the trip from Chicago to Cassopolis was a mere three and one-half hours. Word soon spread that the vacation opportunities afforded by Diamond Lake were unsurpassed, further enhancing the popularity of Diamond Lake as a destination resort.

By the late 1800s, numerous resorts had been constructed near the lake; the most popular included Forest Hall, Blink Bonnie Hotel, the Diamond Lake Island Hotel, Shore Acres Hotel, and the Diamond Lake Hotel. Several steam-powered boats were constructed to ferry vacationers around the lake and to the island. Steamboats were adorned with names such as the O.W. Powers, Gauntlet, South Bend, Cassopolis, and the Glenn. The island attracted visitors far and wide; in an article printed in the local newspaper in 1879 it was noted that "there are now sufficient buildings and sheds on Diamond Lake Island to shelter 5,000 people from showers and storms on Diamond Lake." Ice was cut from the lake during the winter months in those days and stored in "ice houses" to be used later to refrigerate food. Horse and buggy were the primary mode of transportation and livery stables in nearby Cassopolis provided a means of travel to the lake. Electricity and phone service were nearly non-existent.

As the railroad played a major role in the early development of Diamond Lake, the automobile and an improved road network greatly increased accessibility to the lake. By the early 1900s, several plats were established. Property sold rapidly and cottages soon dotted the shores. In the ensuing years, most of the land around the lake was platted, lots sold, and development around the lake increased rapidly. Eventually, by the late 1990s, the density of development reached a level that septic pollution became a concern, and a sewer system was constructed around the lake. More recently, a community water system was installed. Today, nearly 1,000 year-round homes and cottages border the lake, and boats of all types and sizes are moored along the shore.

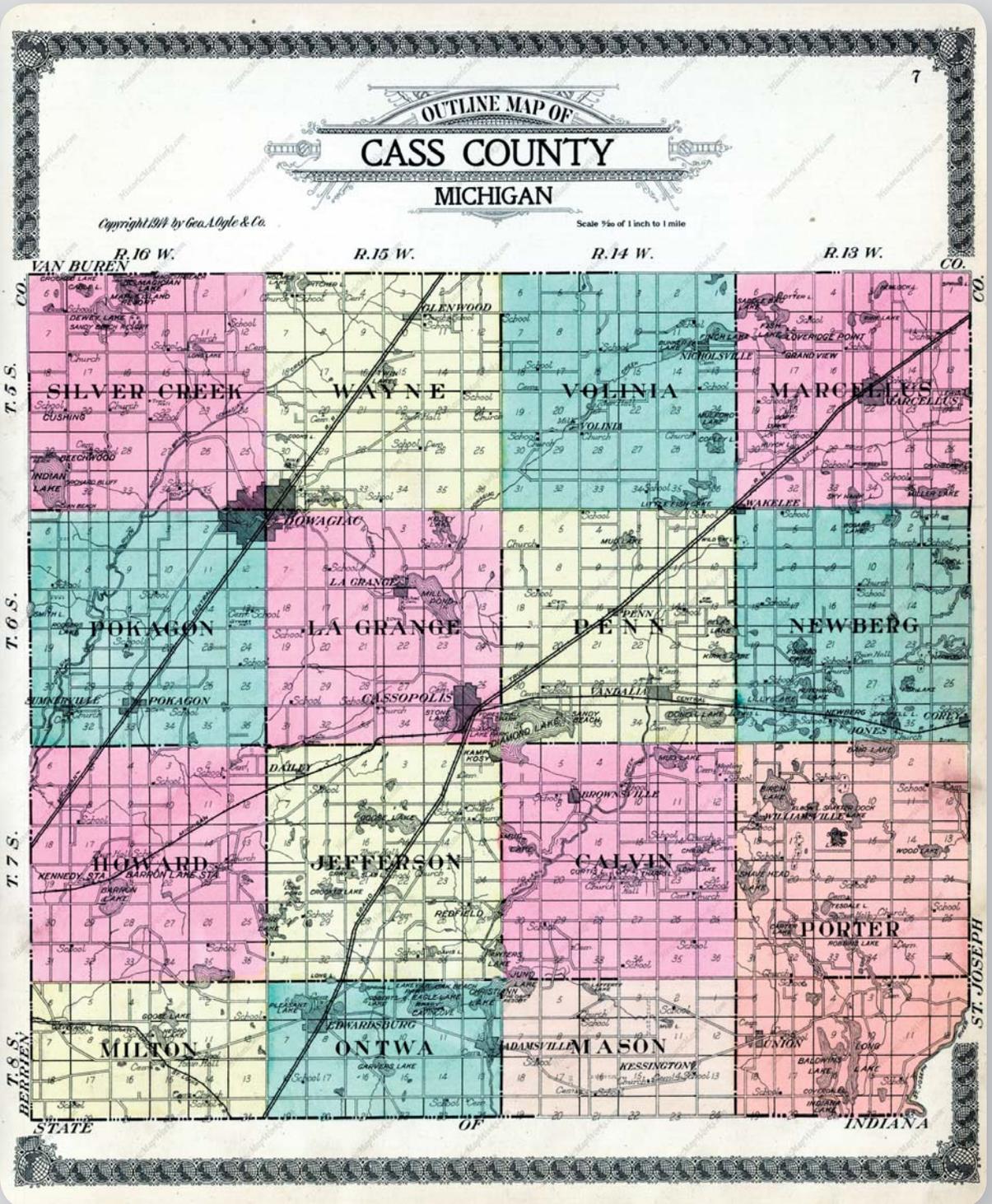
In the not so distant past, Indians and fur traders were the primary inhabitants of Diamond Lake. The area was a virtual wilderness. While the rapid transition to modern times has been nothing short of extraordinary, one thing endures—the beauty of Diamond Lake!



At Diamond Lake, Cassopolis, Mich.



Diamond Lake 1938



Lake Facts

Diamond Lake is located partially within the townships of La Grange, Penn, Jefferson and Calvin. The lake bottom was first mapped by the Michigan Department of Conservation in 1947. At that time, lake mapping was conducted during the winter months, with holes drilled through the ice and water depths measured with weighted drop lines. The original map shows gravel shoals around much of the lake and modest development along the shoreline. Over the years, several small canals were constructed along the shore of Diamond Lake, and the south end of the lake was dredged in the late 1960s to create Sail and Diamond View Bays.

With a surface area of 1,044 acres, Diamond Lake is the largest lake in Cass County, and the 94th largest lake in Michigan. The lake has a maximum depth of 64 feet and a mean or average depth of about 16 feet. Diamond Lake contains 17,133 acre-feet of water, which equates to about 5.6 billion gallons. The volume of water in Diamond Lake would cover 27 square miles to a depth of 1 foot.

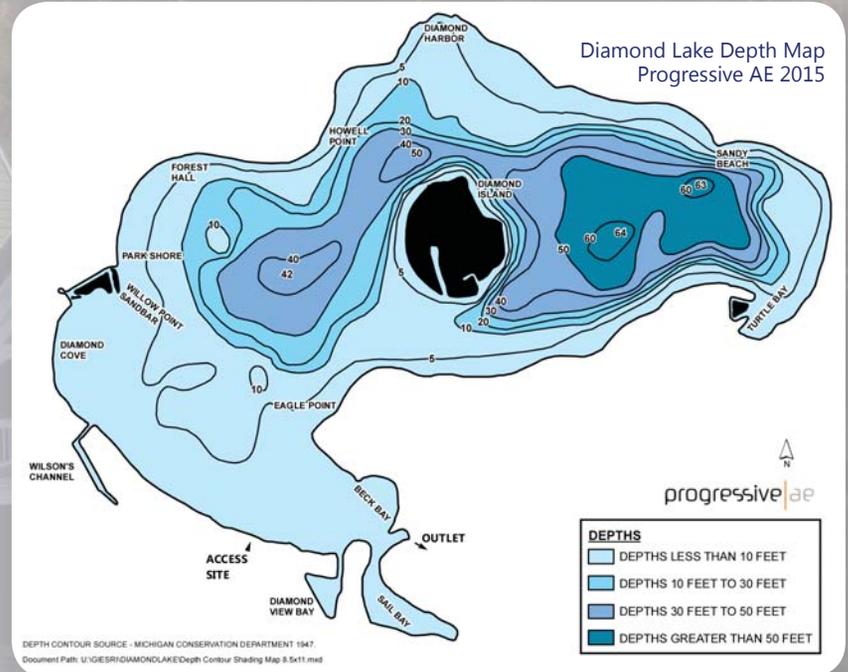
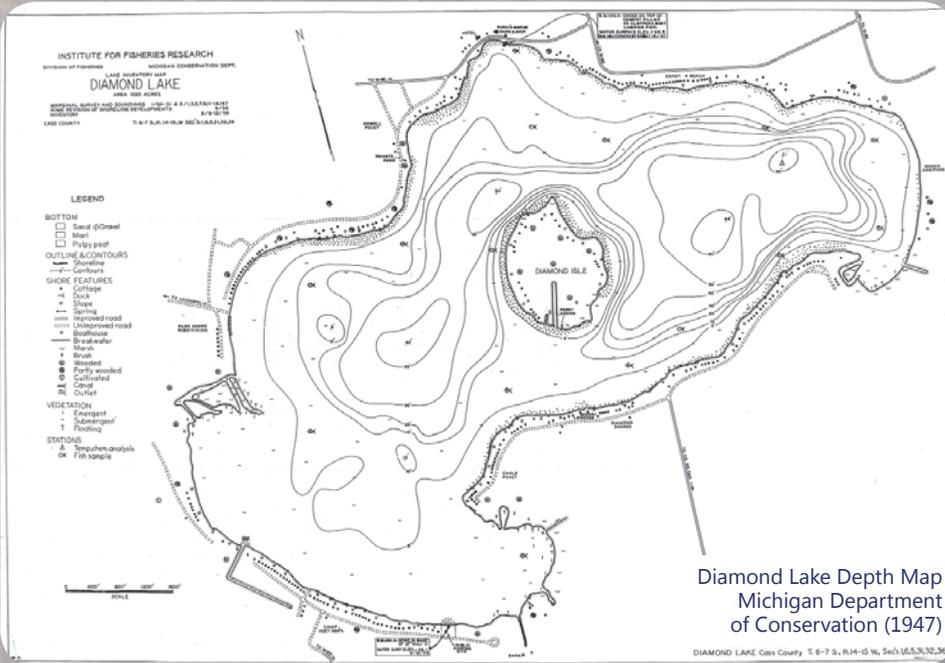
There are no direct surface water tributaries to Diamond Lake and the lake is sustained primarily via groundwater springs and direct precipitation on the lake surface. The estimated water residence time of Diamond Lake is about 2.5 years. Thus, it takes about 2.5 years for the entire volume of water in the lake to be replaced by incoming waters.

Diamond Lake has a shoreline length of 8.8 miles and shoreline development factor of 1.9. The shoreline development factor is a measure of the irregularity of the shoreline. With a shoreline development factor of 1.9, the shoreline of Diamond Lake is about 2 times longer than if the lake were perfectly round.

Historical and recent state surveys indicate the fishery in Diamond Lake is very good. The lake contains healthy populations of bluegill, yellow perch, black crappie, largemouth and smallmouth bass, and northern pike. Walleye are stocked in the lake periodically to supplement natural walleye reproduction.

In 1927, a small dam was constructed at the south end of the lake that fixed the level of Diamond Lake at 852.25 feet above sea level. A new dam was constructed in 1968 immediately west of Eagle Point Road. Water flows from Diamond Lake into Christiana Creek, through Painter, Juno, and Christiana Lakes, and on to the St. Joseph River and ultimately to Lake Michigan. The elevation of Diamond Lake is approximately 272 feet higher than Lake Michigan.





Diamond Lake Physical Characteristics

Lake Surface Area:1,044 Acres

Maximum Depth: 64 Feet

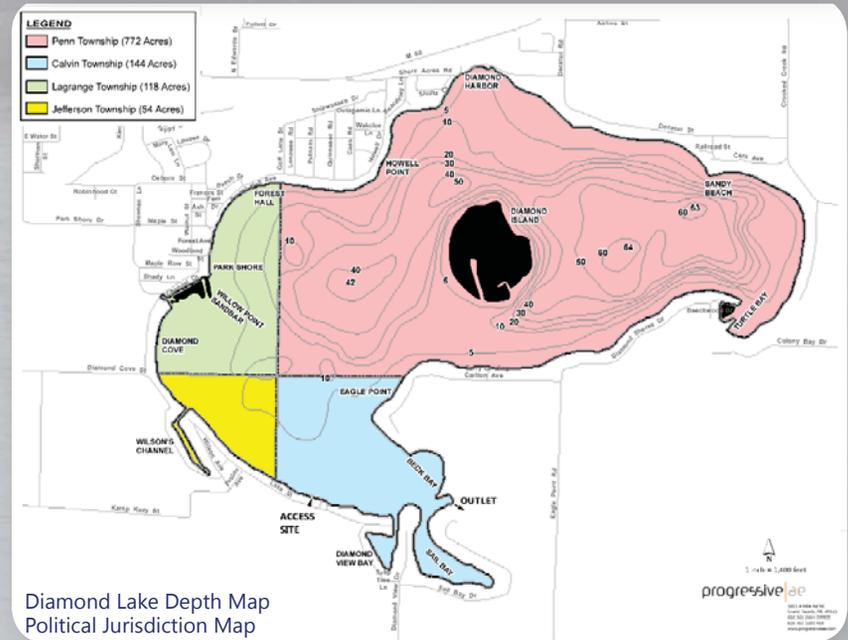
Mean (Average) Depth:16.4 Feet

Lake Volume:17,133 Acre-Feet

Shoreline Length: 8.8 Miles

Shoreline Development Factor: 1.9

Lake Elevation:852.25 Feet



Watershed Facts

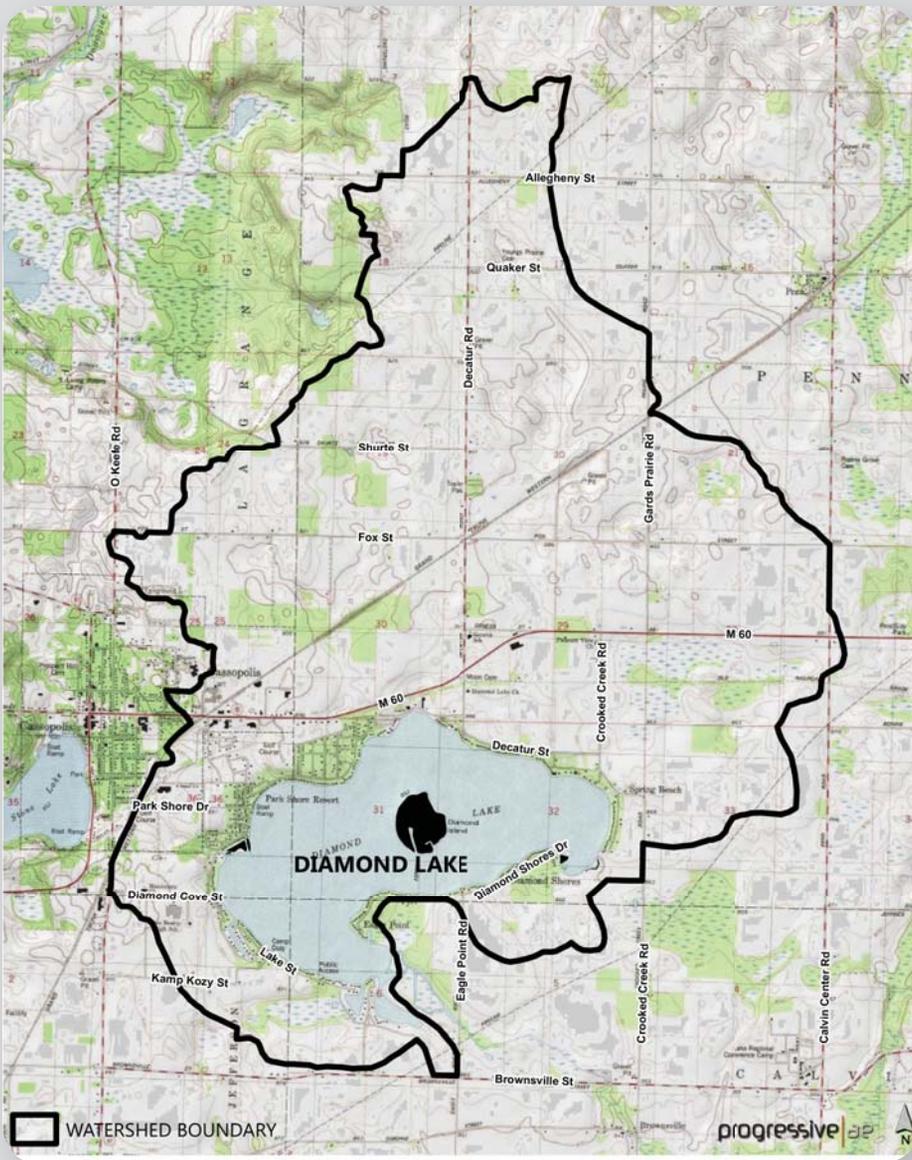
The land surrounding a lake that drains to the lake is called a watershed or drainage basin. Land use activities in a watershed can have a direct impact on lake water quality. Reducing pollution inputs from the watershed is essential to protecting water quality over the long term.

With an area of 6,828 acres, the Diamond Lake watershed is 6.5 times larger than the lake itself. Much of the upper portion of the watershed (north of M-60) is agricultural land. Fortunately, the soils in the Diamond Lake watershed are primarily well-drained sands and loams and there is little direct drainage from the farmlands in the watershed to Diamond Lake. Most of the development in the watershed is concentrated around Diamond Lake. These urbanized lands adjacent to the lake have a much greater potential to influence water quality.

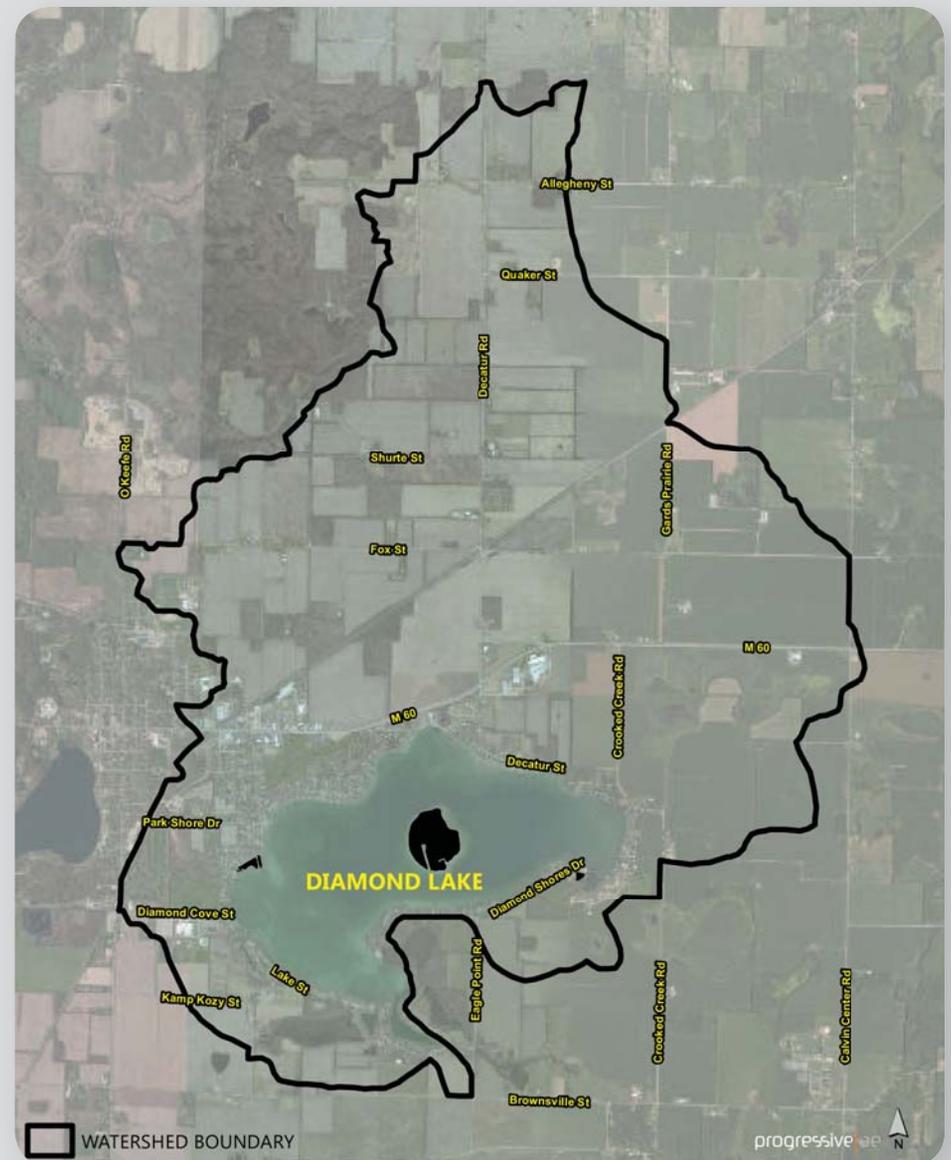
The platting of the lands around Diamond Lake in the early to mid-1900s set the stage for the development patterns that exist today. The early lake plats typically contained lots that were quite small, but probably adequate for the times as most development consisted of modest seasonal cottages. Over time, the original small cottages and boats have given way to big houses and big boats. In the late 1950s, there were less than 300 cottages bordering Diamond Lake. Today, there are over 900 homes and cottages.

With the advent of development, the shorelands around Diamond Lake were altered dramatically. Natural areas that allowed rainwater to infiltrate have been replaced by roof tops, roads, driveways, and other hard surfaces. Now, rather than infiltrating, storm water runs off these hard surfaces, potentially carrying fertilizer, oil, and other pollutants directly to the lake. A recent study completed by the U.S. Environmental Protection Agency found that the loss of natural lakeshore habitat is one of the greatest threats to the nation's lakes. Maintaining or restoring natural shoreline areas is one of the most important things lake residents can do to protect Diamond Lake.





A watershed boundary can be determined by examining a topographic map that shows the “lay of the land” around the lake.



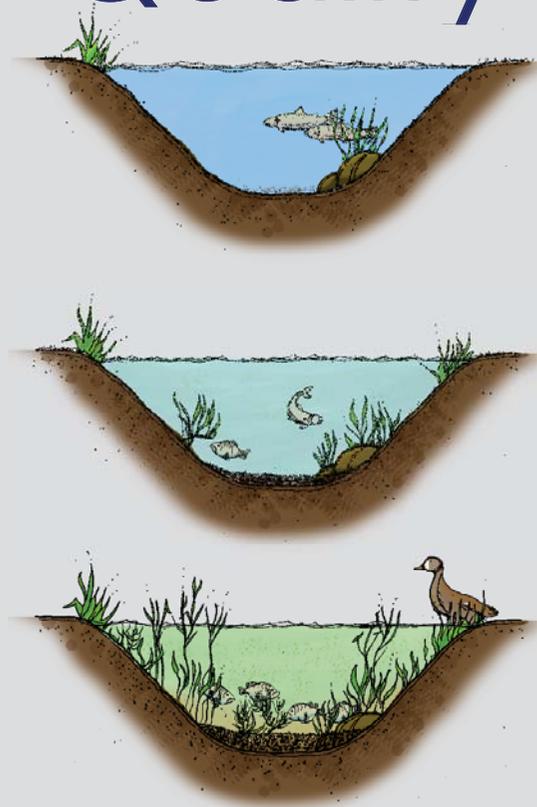
Most of the development in the watershed is concentrated around Diamond Lake.

A lake is a reflection of its watershed.

Water Quality

For many years, samples have been collected to evaluate water quality in Diamond Lake. Overall, Diamond Lake's water quality is quite good. The discussion below provides background information on water quality and some key sampling parameters.

Lakes can be classified based on their ability to support plant and animal life. When classifying lakes, scientists use the broad categories oligotrophic, mesotrophic, or eutrophic. Under natural conditions, most lakes will ultimately evolve to a eutrophic state as they gradually fill with sediment and organic matter transported to the lake from the surrounding watershed. As the lake becomes shallower, the process accelerates. When aquatic plants become abundant, the lake slowly begins to fill in as sediment and decaying plant matter accumulate on the lake bottom. Eventually, terrestrial plants become established and the lake is transformed to a marshland. The natural lake aging process can be greatly accelerated if excessive amounts of sediment and nutrients (which stimulate aquatic plant growth) enter the lake from the surrounding watershed. Because these added inputs are usually associated with human activity, this accelerated lake aging process is often referred to as cultural eutrophication.



OLIGOTROPHIC lakes are generally deep and clear with little aquatic plant growth. These lakes maintain sufficient dissolved oxygen in the cool, deep bottom waters during late summer to support cold water fish such as trout and whitefish.

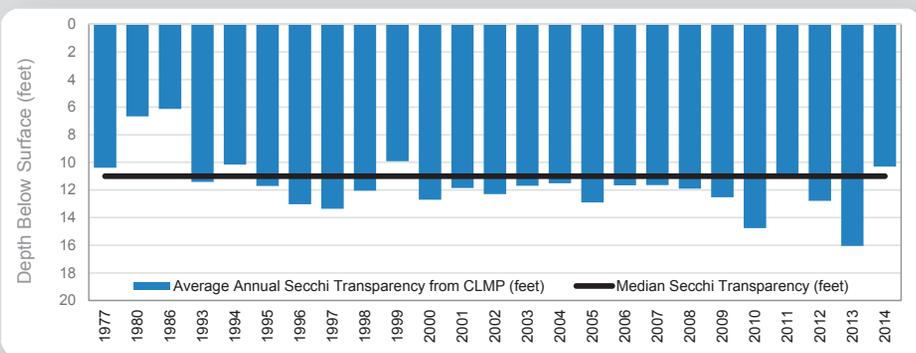
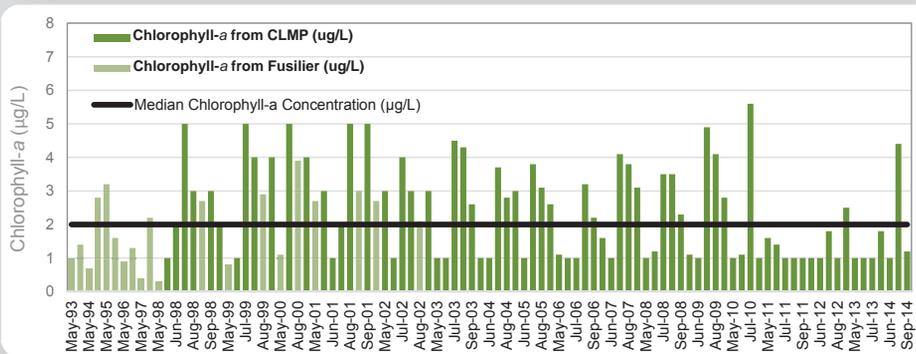
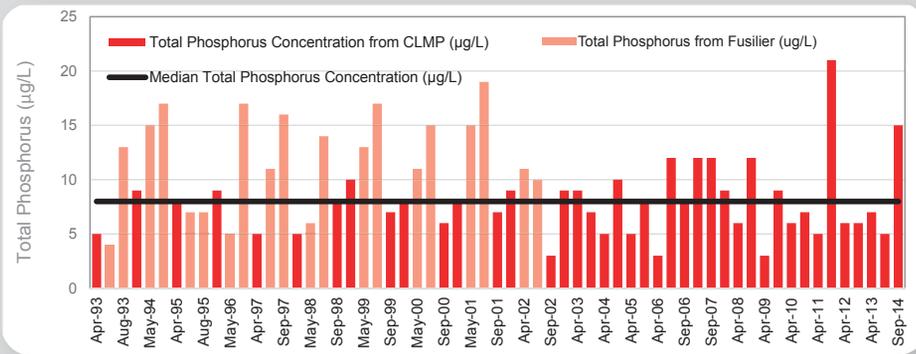
Lakes that fall between the two extremes of oligotrophic and eutrophic are called MESOTROPHIC lakes.

EUTROPHIC lakes have poor clarity, and support abundant aquatic plant growth. In deep eutrophic lakes, the cool bottom waters usually contain little or no dissolved oxygen. Therefore, these lakes can only support warm water fish such as bass and pike.



The Van Dorn underwater sampling device.





Key parameters used to classify lakes and to evaluate water quality include total phosphorus, chlorophyll-*a*, and Secchi transparency. Data collected from Diamond Lake over the past 20-plus years are summarized in the bar graphs to the left.

Phosphorus is the nutrient that most often stimulates excessive growth of aquatic plants and causes premature lake aging. By measuring phosphorus levels, it is possible to gauge the overall health of a lake. Lakes with a phosphorus concentration of 20 parts per billion or greater are considered to be eutrophic or nutrient-enriched. The median phosphorus concentration of all samples collected from Diamond Lake is 8 parts per billion.

Chlorophyll-*a* is a pigment that imparts the green color to plants and algae. A rough estimate of the quantity of algae present in the water column can be made by measuring the amount of chlorophyll-*a* in the water column. A chlorophyll-*a* concentration greater than 6 parts per billion is considered characteristic of a eutrophic condition. The median chlorophyll-*a* concentration of all samples collected from Diamond Lake is 2 parts per billion.

A Secchi disk is a round, black and white, 8-inch disk that is used to estimate water clarity. Eutrophic lakes have a Secchi transparency of less than 7.5 feet. Generally, it has been found that plants can grow to a depth of about twice the Secchi disk transparency. The median of all Secchi transparency readings taken in Diamond Lake is 11 feet.



Sampling to date indicates that Diamond Lake is a high quality, mesotrophic lake. Total phosphorus and chlorophyll-*a* levels are generally low and Secchi transparency is good. The water quality in Diamond Lake provides excellent habitat for warm- and cool-water fish (bass, pike, perch and walleye). However, the cool, deep bottom waters of the lake contain too little dissolved oxygen to support cold-water fish such as trout.

Aquatic Plants

Aquatic plants are part of a healthy lake. They produce oxygen, provide food and habitat for fish, and help to stabilize shoreline and bottom sediments.

Insects and other invertebrates live on or near aquatic plants, and become food for fish, birds, amphibians, and other wildlife.

Plants and algae are the base of the food chain. Lakes with a healthy fishery have a moderate density of aquatic plants.

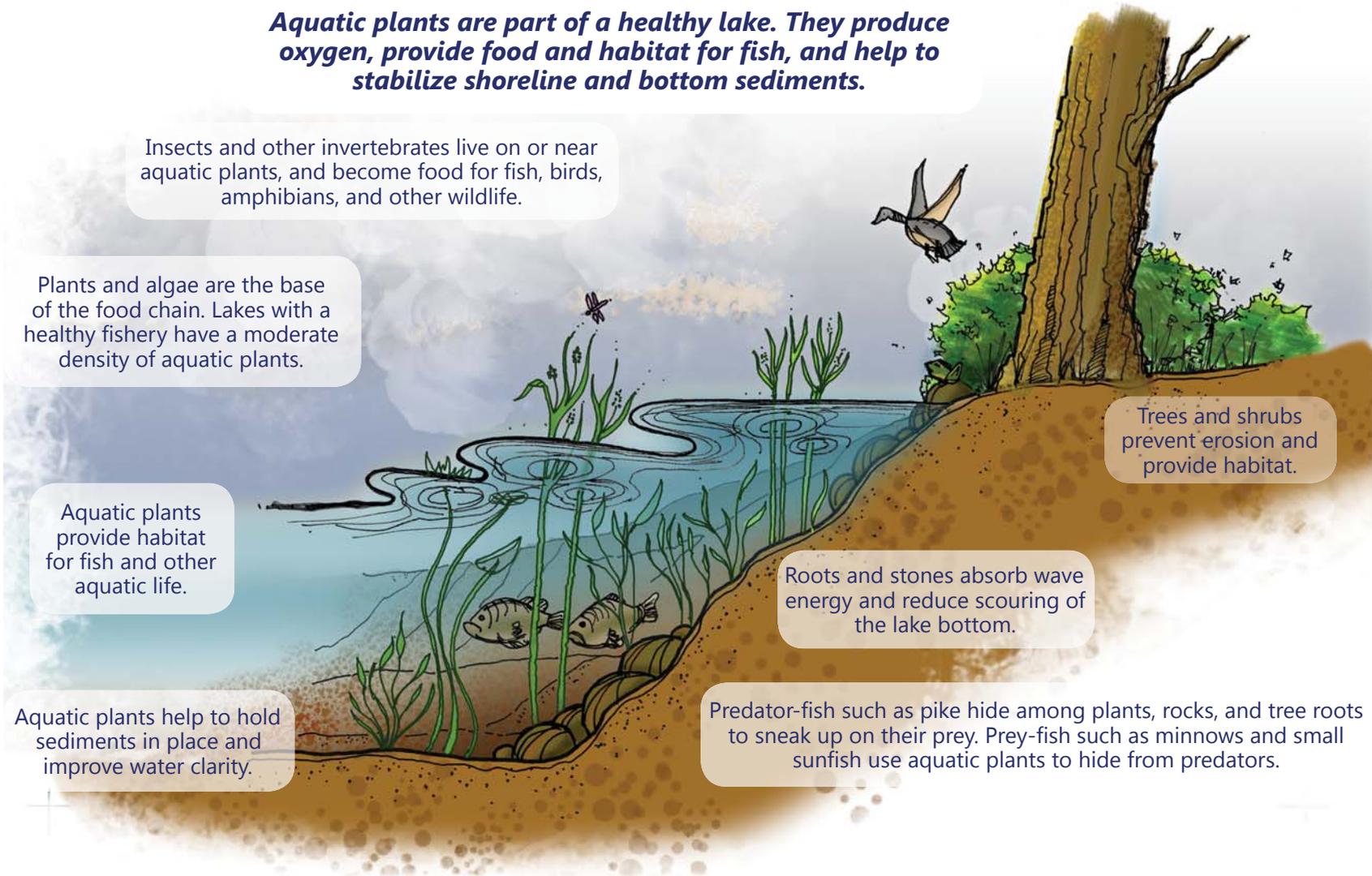
Aquatic plants provide habitat for fish and other aquatic life.

Aquatic plants help to hold sediments in place and improve water clarity.

Roots and stones absorb wave energy and reduce scouring of the lake bottom.

Predator-fish such as pike hide among plants, rocks, and tree roots to sneak up on their prey. Prey-fish such as minnows and small sunfish use aquatic plants to hide from predators.

Trees and shrubs prevent erosion and provide habitat.



The distribution and abundance of aquatic plants are dependent on several variables including light penetration, bottom type, temperature, water levels, and the availability of plant nutrients. The term “aquatic plants” includes both the algae and the larger aquatic plants or macrophytes. The macrophytes can be categorized into four groups: emergent, floating-leaved, submersed, and free-floating. Each of these plant types provides important ecological functions that are essential to sustaining a health fishery.

Plant control activities on Diamond Lake focus almost exclusively on exotic plant species. An exotic species is one that is found outside of its natural range. Outside their natural range, many exotic aquatic plants have no natural competitors or predators to help keep them in check. Exotic aquatic plants often have aggressive and invasive growth tendencies. They can quickly outcompete native plants and gain dominance. Exotic plant species that are a threat in Diamond Lake include Eurasian milfoil (*Myriophyllum spicatum*), curly-leaf pondweed (*Potamogeton crispus*) and starry stonewort (*Nitellopsis obtusa*).



Eurasian milfoil

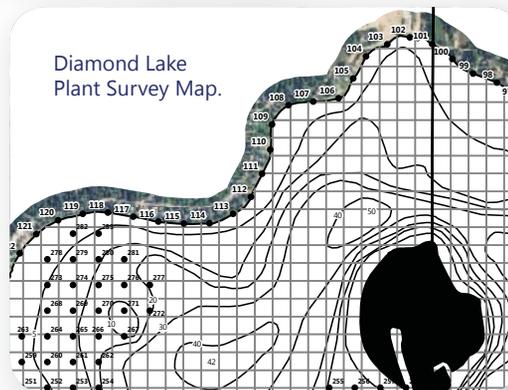


Curly-leaf pondweed



Starry stonewort

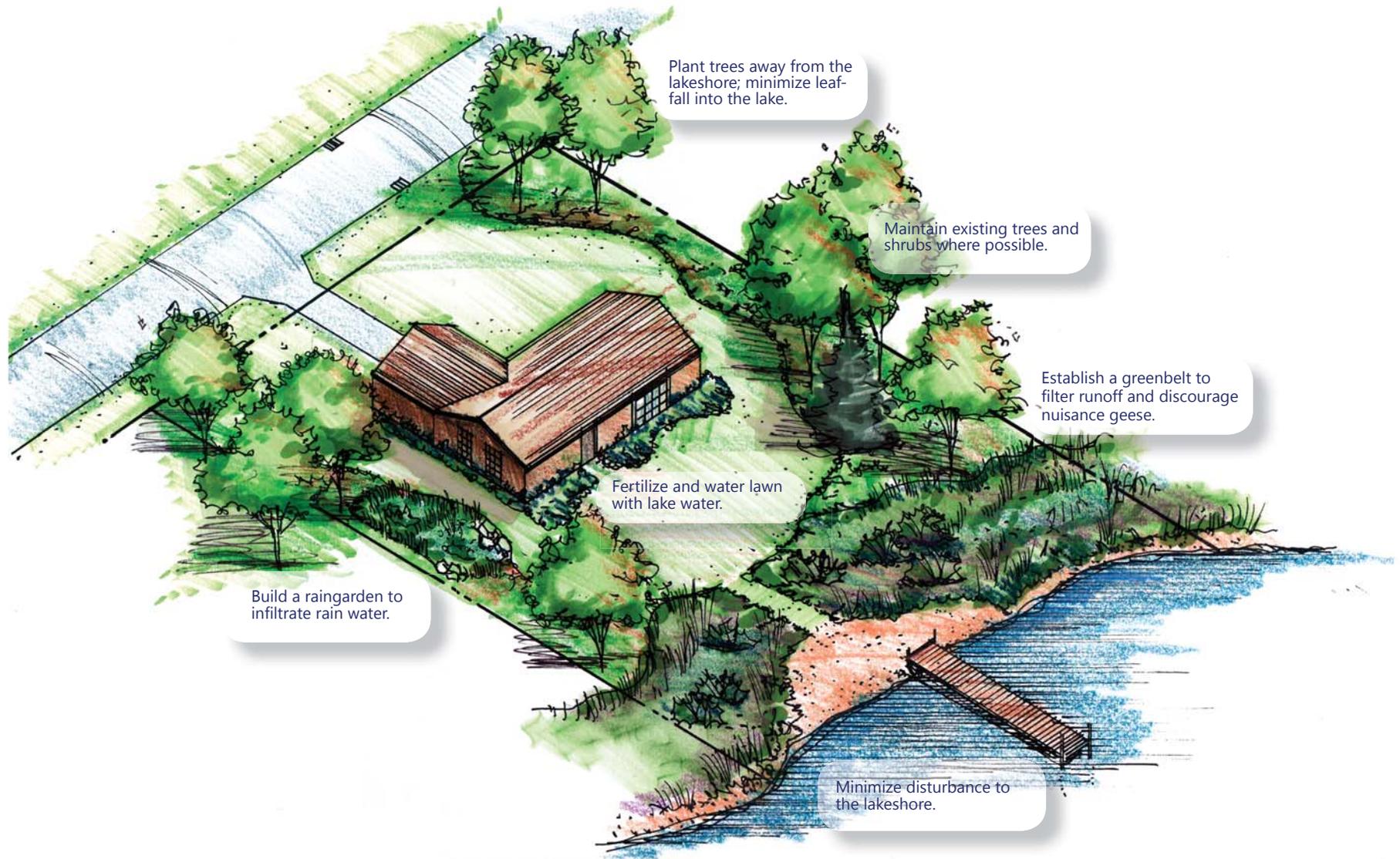
Early-detection and rapid response are key to effective control of exotic plants. In Diamond Lake, biologists conduct multiple GPS-guided plant surveys each year. Eurasian milfoil and other nuisance species are treated when found. The plant control program has prevented exotic species from gaining dominance in the lake.



Below is a listing of native plant species in Diamond Lake.

Common Name	Plant Type
Chara	Submersed
Illinois pondweed	Submersed
Naiad	Submersed
Northern milfoil	Submersed
Wild celery	Submersed
Whitestem pondweed	Submersed
Variable-leaf pondweed	Submersed
Northern Water milfoil	Submersed
Variable-leaf milfoil	Submersed
Large-leaf pondweed	Submersed
Watermeal	Free-floating
Yellow water lily	Floating-leaved
White water lily	Floating-leaved
Floating-leaf pondweed	Floating-leaved
Cattail	Emergent
Swamp loosestrife	Emergent
Arrowhead	Emergent
Bulrush	Emergent
Pickerelweed	Emergent

What You Can Do



In General

- Where possible, promote infiltration of stormwater into the ground. Build a rain garden in low areas to capture runoff from driveways and downspouts.
- To reduce runoff, maintain trees, shrubs, and ground cover.

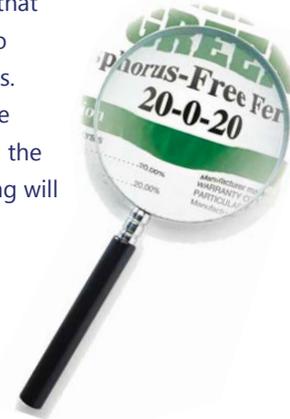


Lawn Care

- Don't cut the grass too short! Near lakes, a mowing height of 3 to 3.5 inches or higher is recommended.
- Return grass clippings back to the lawn. You can reduce the nitrogen needs of your lawn significantly by doing so. If possible, use a mulching lawn mower to aid in this process.
- Rake and dispose of leaves away from the lake. Compost if possible.
- Do not burn leaves near shore. Nutrients concentrate in the ash and are easily washed into the lake.
- Avoid using pesticides near the lake, many are toxic to aquatic life.

Fertilizer

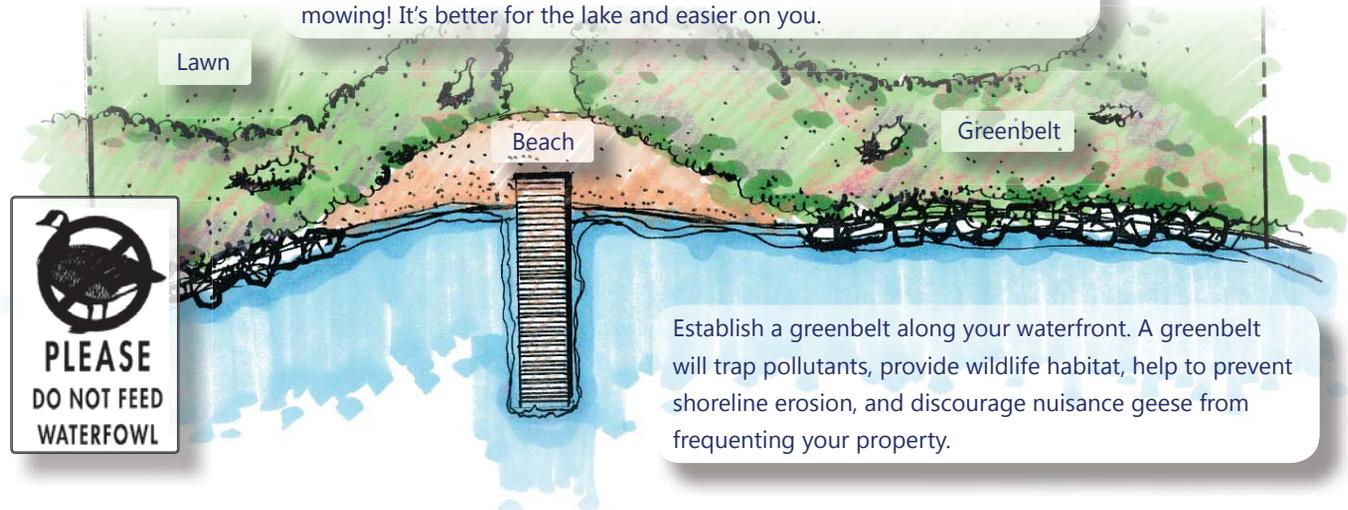
- Water lawn with lake water which contains nutrients that are good for the lawn. Water will seep through the soil back to the lake which is good for the lake.
- If you must use fertilizer, insist upon a fertilizer that contains no phosphorus. (The middle number on the fertilizer bag will be zero.)



Greenbelt

- A greenbelt is a strip of land along the lakeshore that contains plants to trap pollutants that would otherwise wash into the lake.
- A greenbelt should be at least 10 feet wide, but more than 30 feet wide is best.
- Don't fertilize the greenbelt.
- For a natural look, don't mow the greenbelt. Allow natural grasses and wildflowers to grow.
- For a landscaped look, plant groundcovers, ferns, perennials, and shrubs.
- Remember: Canada geese will often avoid properties with greenbelts.

Minimize lawn area. Less turf means less fertilizer, less pesticides—and less mowing! It's better for the lake and easier on you.



Establish a greenbelt along your waterfront. A greenbelt will trap pollutants, provide wildlife habitat, help to prevent shoreline erosion, and discourage nuisance geese from frequenting your property.

10 Ways to Protect Diamond Lake



1. Effective January 1, 2012, it's the law: Don't use lawn fertilizer that contains phosphorus. If you use a professional lawn care service, insist upon a fertilizer that does not contain phosphorus. (Phosphorus is the nutrient that most often stimulates excessive plant growth in lakes.)
2. Use the minimum amount of fertilizer recommended on the label—more is not necessarily better!
3. Water your lawn sparingly to avoid washing nutrients and sediments into the lake.
4. Don't feed ducks and geese near the lake. Waterfowl droppings are high in nutrients and may cause swimmer's itch.
5. Don't burn leaves and grass clippings near the shoreline. Nutrients concentrate in the ash and can easily wash into the lake.
6. Don't mow to the water's edge. Instead, allow a strip of natural vegetation (i.e., a greenbelt) to become established along your waterfront. A greenbelt will trap pollutants and discourage nuisance geese from frequenting your property.

7. Where possible, promote infiltration of stormwater into the ground. Build a rain garden to capture runoff from driveways and downspouts.
8. Don't dump anything in area wetlands. Wetlands are natural purifiers.
9. Everyone makes a difference! Don't be complacent.
10. Visit the Diamond Lake Association web site at www.dlacassopolis.org.

