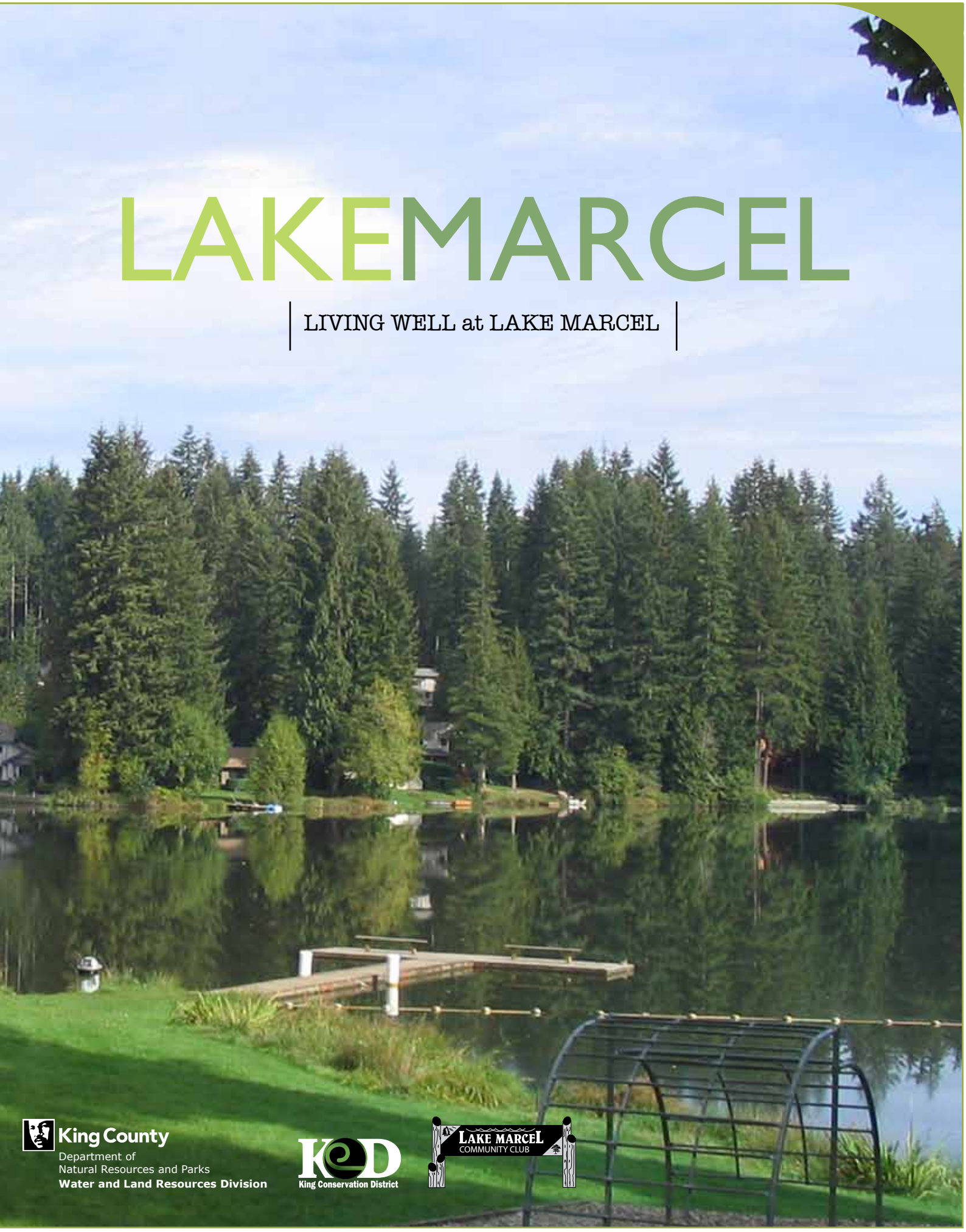
LAKEMARCEL

LIVING WELL at LAKE MARCEL



King County
Department of
Natural Resources and Parks
Water and Land Resources Division

King Conservation District

LAKE MARCEL
COMMUNITY CLUB



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From the Lake Marcel Community Club Board of Directors

The Lake Marcel Community Club (LMCC) Board of Directors is pleased to provide community members with this educational and informational guide about lakeside living. We are fortunate to live in this wonderful community and we all share responsibility for its stewardship. We should all strive to "live well at Lake Marcel".

LMCC would like to thank the King Conservation District for funding this project and the King County Department of Natural Resources and Parks for writing and producing this guide, including Sally Abella, Beth leDoux, and Megann Devine. We also thank the community volunteers who contributed their time and expertise to develop and obtain funding for the project, including Mary Harenda, Lee Culverwell, Chuck Willis and Art Grabb.

Lake Marcel: a short history

The history of today's Lake Marcel community began in the early 1960s when Pyramid Investment Company of Bellevue announced plans to develop the area around a man-made lake into 385 lots, of which 135 would have lake shore frontage and 250 would have lake access through community-held beach properties.

The lake was created by dredging an existing beaver pond, damming the outlet to create depth, and using the dredge spoils to build the island in the north end of the lake. It was named Marcel for a brother of the original owners of a large tract of property surrounding the lake, who died in a tragic accident.

While the original earthen dam to regulate the lake level was completed in 1964, the 1965 edition of Lakes of Washington by Ernest Wolcott still listed Marcel as an unnamed, shallow 1.0 acre lake.

The company planned to provide utility hook-ups and paved roads, but prospective lot owners were to be responsible for building cabins, homes, and structures. While in 1974, summer cabins were more common than permanent residences in the community, today the reverse is true, with most of the 330 homes occupied year round.

A homeowners' Community Club was planned at the very beginning of the project in order to manage the community property and address the safety and environmental quality of the lake and shoreline, operate and maintain the dam, set standards for covenants, review design plans for development of individual lots, and coordinate lake-oriented activities such as the fishing derby. The Lake Marcel Community Club was activated in 1966, and periodic newsletters since then have kept the residents informed of community news, events, and management actions, as well as hints and tips for living near lakes. An annual meeting is generally held in the spring, when the Board receives input from the community on activities and suggestions for the upcoming year.

Some of the lake management activities in the past that have been reported in the newsletter have included the stocking of approximately 2,000 rainbow trout annually for recreational fishing and an occasional stocking of about 100 grass carp to control aquatic weeds. An annual accounting has been made of work done to control aquatic plant growth, and fecal bacterial testing has also been reported.

An Aquatics Committee was formed in 1987 to deal more directly with lake issues that arose as the community grew from a summer vacation spot to one focused on year-round activities of permanent residents. Recent aquatic noxious weed surveys carried out by volunteers (Weed Watchers) are in conjunction with the King County Noxious Weed Program, with the idea of catching new infestations while small. One such finding was the Class A noxious weed *Glyceria maxima* (reed sweetgrass), which was recently identified along the shoreline and eradicated before it could spread. Other weed control activities have included contracting with private companies for herbicide treatment of Eurasian watermilfoil, drawing down the lake level, placing bottom barriers, and the running of a mechanical harvester between 1977 – 1988.

Bacteria in the water at the swimming beaches have been monitored routinely for health and safety risks, and volunteers worked with the King County Lake Stewardship program to monitor water quality between 2000 – 2008. Residents are currently assisting King County in a grant-funded multiple county project to assess bluegreen algae blooms in the Puget lowlands for potential toxin production.

Efforts to discourage Canada geese and ducks from hanging out on the beaches have included harassment with loud, sudden noises such as air horns. An ongoing project to protect shoreline trees from beaver damage has been carried by residents who volunteer their time to inspect trees for damage and to wrap those at risk with chicken wire to discourage gnawing. Another effort over time has been to assess and encourage a native population of cutthroat trout, who attempt to spawn in the inlet stream with the fish ladder.

The dam that holds back the water in Lake Marcel was built as an earthen structure in the early 1960s and underwent repair in 1965. Further repairs were made in 1997. Yearly inspections are now made by the Washington Department of Ecology dam safety division.

Welcome to Lake Marcel: stats about your lake

Basic Statistics and location information

Lake Marcel is located above the eastern slope of the Snoqualmie River Valley in the Puget lowlands at an elevation of 290 feet above sea level (msl), in the area designated by Washington State as WRIA-7 (Water Resource Inventory Area), which drains to Puget Sound via the Snohomish River. It is about 4,000 feet north of the local unincorporated area called Stillwater and about 9,000 feet west of Lake Joy.

The lake is mapped in the Carnation unit of the USGS 1:24000 topographic series, which was last updated in 1993. Its township-range location is T26N R07E, in section number 33. The midpoint of the lake is located at latitude N 47°41' 44.1012" and longitude -122° 55' 4.5658". The Thomas Guide to King County streets map number is 539.

The main roads running through the watershed are the Big Rock Road, which originates from State Highway 203 south of Duvall and runs NW to SE to the Kelly Road, remaining north of Lake Marcel, while the Fay Road, which originates from the Big Rock Road, runs south to Highway 203, remaining west of Lake Marcel (Figure 1).

The lake is 33 acres in surface area, with a reported maximum depth of 17 feet. The watershed draining to the lake is approximately 1290 acres, with six identifiable inlet streams flowing into the lake; the largest one, Stillwater Creek, originates about 1.5 miles to the north (Figure 1). Its entry into Lake Marcel is a concrete-lined channel built in 1963, with fish-ladder steps incorporated. In addition to the inlet streams and direct runoff from properties, there are six outfalls draining to the lake that deliver collected rainwater and surface water runoff (Figure 2).

The outlet is dammed, and a controlled spillway maintains lake level at a fairly constant elevation throughout the year, unlike natural lakes in the region that have high water levels in winter followed by dwindling levels through the summer into mid-fall. The outflow from Lake Marcel is also named Stillwater Creek, which joins Harris Creek at the bottom of the valley slope, shortly before entering the Snoqualmie River system.

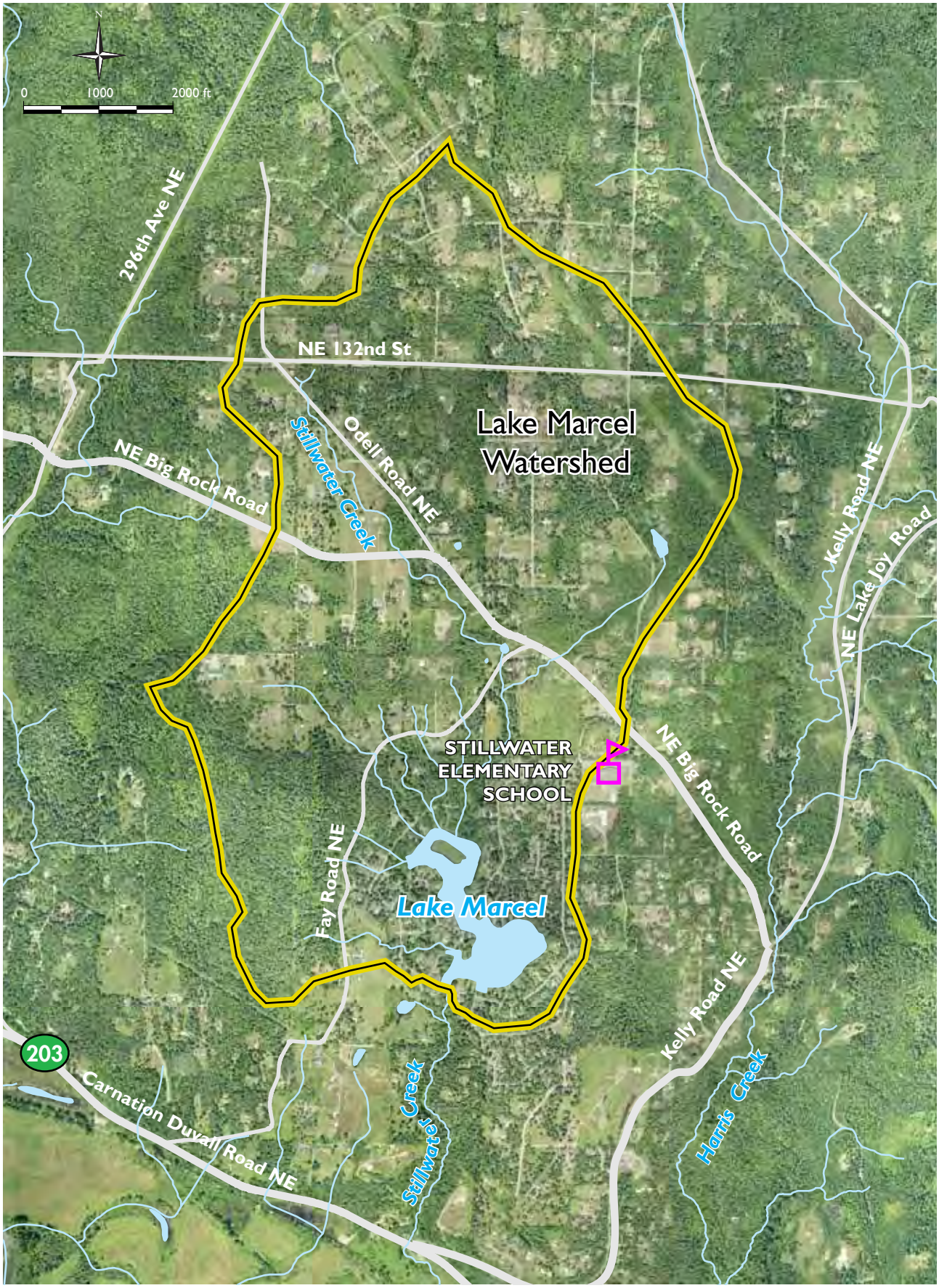


Figure 1: Watershed Map of Lake Marcel

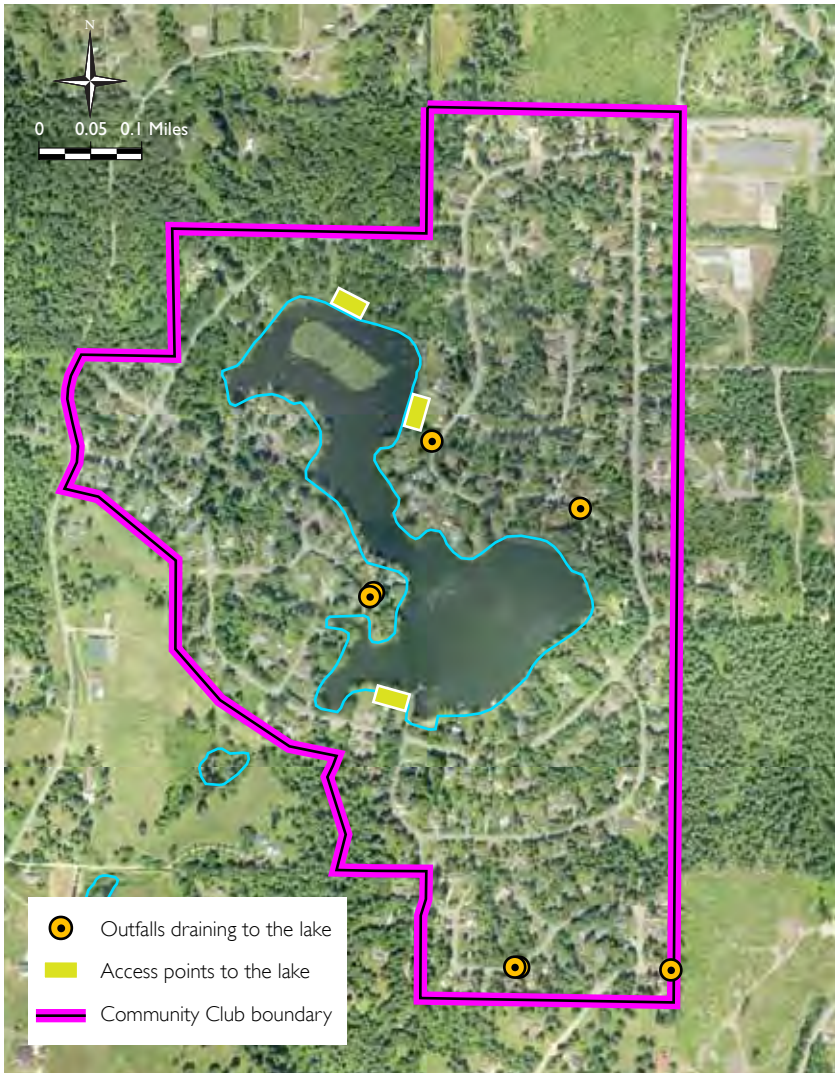


Figure 2. Outfalls and access points at Lake Marcel

The community club maintains three access points to the lake available for residents via community-owned beach properties (Figure 2) for member use, but which are not open for use by the general public. Small boats belonging to owners with no lake frontage can be kept at two of these properties. Lake Marcel has a no internal combustion engines policy for boats.

Most of the watershed is zoned RA-5, which means one dwelling is allowed per 5 acres of land. This area is characterized by rural land uses, including hobby farms. The land inside the boundaries of the Lake Marcel Community Club and just to the north is currently zoned RA-2.5 to allow for increased density. Because smaller parcels that are currently undeveloped were generally considered as buildable at the time of plating, they are grandfathered and can be permitted for building.

Water quality of Lake Marcel

The data collected between 1998 and 2008 indicate that Lake Marcel is relatively high in primary productivity (mesotrophic to eutrophic) with fair to good water quality that has remained relatively stable over time. This means that algae blooms may occasionally

cloud the water, but in general the lake is in good condition for recreational use and there is enough algae produced to support the tiny animals (zooplankton) that feed the fish. Similar conditions are very commonly found in shallow lakes, especially those created from beaver ponds or wetlands that are naturally very productive water bodies with lots of biological activity.

Data from different depths in the lake suggest that thermal stratification (warm temperatures on top, cool temperatures in deep water) is not stable through summer, and the water will mix with windiness or summer storms. Therefore, phosphorus concentrations do not build up in deep water and algae generally have nutrients available to them through the whole water column. The nitrogen to phosphorus ratio drops below 20:1 in late summer, which indicates that bluegreen algae may be favored over other algae at that time period. However, for most of the growing season, phosphorus remains the nutrient that is least available to algae, thus it limits their growth and managing the phosphorus levels will allow the community to control algae growth to some degree.

Phosphorus in Lake Marcel: algae fertilizer

What is phosphorus?

Webster's Dictionary defines "nutrients" as something that nourishes or a nourishing ingredient in a food. Nutrients are the building materials that algae need from their environment in order to grow and reproduce. The more nutrients plants and algae have, the better they grow.

The primary food nutrients for algae are phosphorus and nitrogen, which they need in addition to the sugars they make in order to grow. Other nutrients necessary in smaller amounts include calcium, magnesium and iron.

In most King County lakes, phosphorus is less available than nitrogen and is called the "limiting nutrient" because as the algae are taking up nutrients from the water, the phosphorus supply runs low first. When the limiting nutrient runs out, the algae must stop growing. This means that when the phosphorus supply in the lake is increased, the algae in the lake can also grow more. This increase in growth, left unchecked in a lake or stream, can result in unsightly and nuisance algal blooms.

Where does phosphorus come from?

Phosphorus is a naturally occurring element in the environment that is essential to plant growth. It is vital in lakes to help algae and aquatic plants grow, which in turn support a healthy lake ecosystem by providing food and habitat for fish and other aquatic animals. Phosphorus is found naturally in plant and animal tissue, and we all need some phosphorus in order to live, grow and reproduce. When watersheds are developed, new or modified sources of phosphorus in the landscape can produce big increases in the amount of phosphorus getting into the water.

There are a variety of phosphorus sources to consider. For example, when aquatic plants in shallow water die back and decay in the autumn, phosphorus is released into the water. Aquatic plants are essential as refuge for fish, snails and amphibians, but an overabundance of aquatic plants can mean big phosphorus releases to the water in the fall when they die back.

Phosphorus is also excreted by animals as part of their feces. This can create a problem if the waterfowl population becomes very large. Big-bodied animals such as horses and cattle can also release phosphorus through their feces into water bodies,

Some sources of phosphorus in the watershed

particularly when they have direct access to a stream or lake, or if the runoff from their pastures enters nearby surface waters and their excreta are not picked up and collected into managed manure piles. Domesticated pets can also be contributors if their droppings remain in places where they can wash into the surface waters.

Failing septic systems can contribute phosphorus from human feces to nearby surface waters. Some synthetic detergents and other cleaning agents still contain soluble phosphorus. Soaps and detergents flushed down the drain into a septic system can end up in nearby waters when the binding properties of the soil can't hold any more phosphorus. Washing your car at home can also contribute nutrients from the soap and the car surface into nearby surface waters through storm drains. Fertilizers for lawns and gardens also contain soluble phosphorus and when improperly used in our yards, they can wash into our lakes and streams.

What does it do?

All this extra phosphorus encourages nuisance algae blooms and excessive plant growth in lakes. When phosphorus increases greatly over the natural concentrations, the resulting algae can severely impact recreational uses. For example, activities such as swimming, boating and fishing all can be affected by algae blooms, both in terms of enjoyment and even health and safety.

Not only can excessive phosphorus hinder beneficial uses for humans, it also changes lake processes. Cloudiness caused by the algae shades the water and changes conditions for plants and animals that use vision to catch prey. Bacteria that decompose algal remains use up oxygen in the water that fish depend on, particularly in the cool deep habitats that trout love. If blue-green algae blooms become dominant, there is also the possibility of toxin production that could affect the health of animals and humans.

What can you do?

To minimize the amount of phosphorus your own activities may be contributing to nearby water, there are a number of very helpful things that people living in the watershed can do:

- **Minimize use of phosphorus cleaners.** Clothes-washing detergents have been phosphorus free since the 1970s and in July 2010 a ban on phosphorus in dishwashing detergents went into effect across Washington State. Read the labels to see which products contain phosphorus and try the ones without it. With our soft water, they should be very effective.
- **Wash your car at a car wash** that recycles its water, keeping soaps and road dirt out of the surface waters of the watershed. If you must wash your car at home, use water only.
- **Use low or no phosphorus fertilizers** on your lawn. Grass needs nitrogen and potassium in fertilizers to become lush and green. It doesn't need the phosphorus for good color or leaf production and the excess phosphorus will leach out when you water, getting into streams and lakes.
- **Don't dispose of grass clippings in or near water.**
- **Don't feed the geese and ducks.** They will congregate on beaches near good food sources and their feces will wash into the surface water and eventually into the lake.
- **Scoop your pet's poo**p and dispose of it in the trash or into the septic system.
- **Keep your septic system maintained** and functioning properly. Have it checked every three to five years and don't put anything down the toilet that the system can't handle.

Along the shoreline

Lake shorelines are special places in the landscape, where human recreational activities, natural environmental qualities and ideals of aesthetic beauty all meet. Because there are so many different needs and uses for shorelines, as well as differing opinions about them, there are often disagreements about how they should be managed and preserved. The following includes a general discussion of the permitting framework that King County uses for the shorelines of Lake Marcel, some information on docks and bulkheads and a section on how to deal with hazard trees.

Shoreline regulation and management

King County initiated special shoreline management through assessment and permitting in 1975 with the completion and acceptance of the first Shoreline Master Program (SMP) for the County following passage of the Shoreline Management Act in 1971. Lake Marcel was not included among the lakes listed for shoreline management for the first master program, although it was in existence by that time and was large enough in surface acreage to have been included. Instead, Lake Marcel first was included as a #2 rated wetland HC-9 (Harris Creek) under the Sensitive Areas Ordinance (SAO) implemented in the early 1990s. This action invoked extra regulatory considerations of project proposals on land near or adjacent to the shorelines of Lake Marcel in order to maintain their ecological functions, while still allowing some water-dependent uses such as boating and swimming activities. The SAO was replaced by the Critical Areas Ordinance (CAO) in January 2005, and it is this set of regulations that is currently invoked by the County for development and land use along Lake Marcel.

The County is currently updating the original SMP, and Lake Marcel will be included in the revised program once it is accepted, as one of the county lakes larger than 20 acres in surface area. However, state guidelines for the master program updates include a requirement that the SMP, while allowing for water dependent uses, should not be less protective than the CAO in effect, so it is likely that the transition in regulation from CAO to SMP will be hardly noticeable for property owners. Dock and bulkhead requirements may differ somewhat from past policies based on County experiences with regulating under the CAO.

How docks & piers affect shoreline areas

Building docks and piers from the shoreline out into the water makes it easy to moor small watercraft as well as provide a place for diving directly into the water when going for a swim. People also simply enjoy sitting out on their docks on summer evenings, enjoying the cooling breezes and light reflections that come off the water.

However, docks can have direct impacts on the animals and plants living in lakes, both as structures that shade the water and impede movement, as well as the inadvertent introduction into the water of hazardous products that are used to preserve and maintain them. In addition, vegetation is commonly removed in order to build or maintain docks. Armoring of the shoreline may be included as part of the structure as well.

Fish have complicated reactions to docks and piers. Native vegetation overhanging the water often sheds small bits of debris, including insects that provide meals for many small fish. In addition, small fish such as young trout rely on a complex structure of submerged tree branches, root wads and other forms of natural cover along the shoreline as refuge from predators. Docks and piers are relatively simple structural elements that provide very little protection for small creatures. In fact, piscivorous fish such as bass will use the shade from docks to conceal themselves from small fish before they attack, thus giving the predators a big advantage. Blockage of both water movement and light can disturb the ability of aquatic plants to grow in the shallow areas under the dock, as well as sediment processes and may disturb bottom dwelling animals as well.

Ducks on dock

In lakes where motors with propellers can be used, docks can also promote localized sediment erosion due to the increased boat traffic coming in to land.

Dock Maintenance

Remember, when it's time for periodic maintenance, existing docks can be made more lake-friendly by replacing some of the decking with surface grating to allow more light in the lake.

Many wood maintenance products contain toxic chemicals, since their purpose is to reduce the natural process of decomposition. Spilling these chemicals into the water can definitely have impacts on the animals of the lake. There are a number of oil products on the market now that are advertised as "natural deck oils" which do not contain toxins and rely in filling the wood with oils/resins to drive out the water needed by decomposers and preserve it over time.

There are a number of design features that can be built into docks to reduce the impact on the shoreline, water, animals and plants of the lake. These include:

- building narrower ramps and structural pilings
- using materials other than wood that are stronger
- using larger spans between pilings that allow more water movement as well.
- leaving off skirts or fascia boards to let more light in under the dock
- adding light permeable elements on the deck such as surface grating to reduce shading.

Deck grating is made either from wood such as teak or ironwood (which does not need chemical treatment) or from recycled plastic lumber that comes in a variety of colors to match the rest of the dock. The surface is non-skid – and splinter-free. Homeowners like its low maintenance and durability.

Bulkheads and shoreline stabilization

Bulkheads or armoring are man-made structures constructed along shorelines to reduce shoreline erosion or, in some cases, as a design element to make the property look tidy and under control. Construction materials commonly used include wood pilings, large boulders stacked to form walls, or hard surfaced walls built of concrete or another similar material.

Although they are generally considered a form of shoreline protection, studies over the past few decades have shown that bulkheads can actually increase erosion of the shoreline waterward of the bank armoring

On the lake: natural shoreline, summer fun, and partial bulkheading

by changing the energy, direction and movement of wave action, particularly in areas that are downwind from the prevailing winds. Increased scouring action can transform a silty, organic, or sandy bottom into one composed of larger rocks such as cobble or hard clay. Such changes in sediments can negatively impact the fish and wildlife habitat associated with offshore shallow areas by affecting plants and animals that live there, as well as the adjacent land and vegetation. Over time, scouring can also lead to sediment buildup under bulkhead footings, thereby causing these structures to become more vulnerable to failure. In addition, bulkheads may direct wave and water energy to adjacent neighboring properties, causing erosion problems that did not previously exist.

Bulkhead construction often entails the removal of plants that stabilize bank soils and contribute organic matter to shoreline areas, thereby also reducing habitat quality for fish and wildlife. Bulkheading may also permanently prevent regrowth of native shoreline vegetation, which often shades the ground and water beneath it, creating the necessary cool, dark refuges that certain fish and other wildlife need to survive and reproduce.

Better alternatives to shoreline armoring

Natural shorelines are a great model to look for ways to enhance nature's ability to absorb energy and stabilize the shore, while introducing the designed look that many property owners want to achieve. Setting back structures from the shore in combination with preservation or revegetation of a designed native plant buffer can be an important part of these plans. Slopes are naturally vulnerable to erosion simply through gravity on rainfall. Allow for a natural beach contour free of hard structures for greatest benefit.

Retaining and planting native plants along the shoreline has many advantages:

- The roots bind soils and help buttress and stabilize slopes.
- Branches and leaves shade underlying areas, thereby helping maintain temperature that certain wildlife need to survive and reproduce.
- The leaves and bark provide habitat for terrestrial insects that are important food sources for aquatic organisms, including salmon that forage along our freshwater and marine shorelines throughout the year.
- The leaves deflect raindrop energy and help reduce the erosive effects of surface runoff on slopes.
- Native plants provide escape cover in which fish and wildlife can evade predators, as well as perching and roosting sites for terrestrial wildlife to rest and search for food.
- Native plant shoreline buffers help filter pollutants in stormwater such as lawn fertilizer.
- Native plants are naturally drought resistant, requiring less irrigation water to thrive.
- Native plants enhance the natural beauty of the property, while strategically placed trees can frame and actually improve views from the house.
- Native plants do not change the natural rates of sediment input and transport along beaches.
- Even after death, the remaining woody debris continues to provide benefits to shoreline areas. This is part of the natural cycle of life at the water's edge.

Understanding trees: up & down, in the water & out

During our often windy Northwest winters, trees can blow down, which can be a serious safety problem. Susceptible or diseased trees that could fall on property or people, often known as "hazard trees," can be dealt with in advance. Yet, as we know, healthy trees can also be blown down even in their prime at the whim of the wind. This poses a particular challenge for lake side dwellers, since their properties include the fragile, highly regulated edges of some of the most important natural resources in our county.

Lakes and their upland edges are considered "sensitive areas." For a variety of environmental reasons—including water quality, water storage and wildlife habitat—it is especially important to make sure trees are not moved unnecessarily in these areas. Logs and branches that have fallen into the water can make excellent habitat and refuge for many creatures, as well as provide underwater structures that can slow down erosion and sediment movement along the shoreline.

If a tree falls...do you need a permit to move it?

Prior to removing a tree, check for what permits are required from the King County Department of Development and Environmental Services (DDES) and/or other local, state or federal agencies.

If a tree falls down and does not obstruct anything, the best thing to do is leave it to become a wildlife tree. However, if a diseased or downed tree poses a safety or structural damage risk, the King County Code states that you may remove it without a permit as long as report your actions to DDES immediately. Also note, that once a tree falls into a lake it is considered habitat; removing habitat requires a Hydraulic Project Application Permit from the Washington State Department of Fish and Wildlife.

It is important to know that DDES addresses each situation individually. There is no blanket rule for dealing with trees at risk of falling, and it is important to contact DDES prior to any tree removal within a sensitive area.

Trees can be down, but not totally out

Is the damaged or downed tree out of the way? Not threatening structures or safety? Snapped off eight or more feet above the ground but otherwise sound? Partially submerged in a lake or stream? If it is, consider leaving the tree for the numerous native wildlife species that make good use of dead and dying trees.

Pileated woodpeckers, wood ducks, hooded mergansers and chickadees nest in cavities of dead trees, also known as "snags." Kingfishers, eagles and osprey search for fish from branches overhanging the water, while juvenile salmon and trout hide in tangled underwater branches, and bats roost under loose bark on decaying snags. Once decay starts, wood boring insects move in and attract many other species who feed on them, from woodpeckers to raccoons.

Working with a tree service provider, experienced in creating wildlife trees, can be a win-win. A chainsaw in the right hands can simulate all sorts of natural habitats and bring wildlife to you without danger. To locate a company near you, contact the Plant Amnesty referral service at 206-783-9813 or go to www.plantamnesty.org.

Hazard Tree Recognition

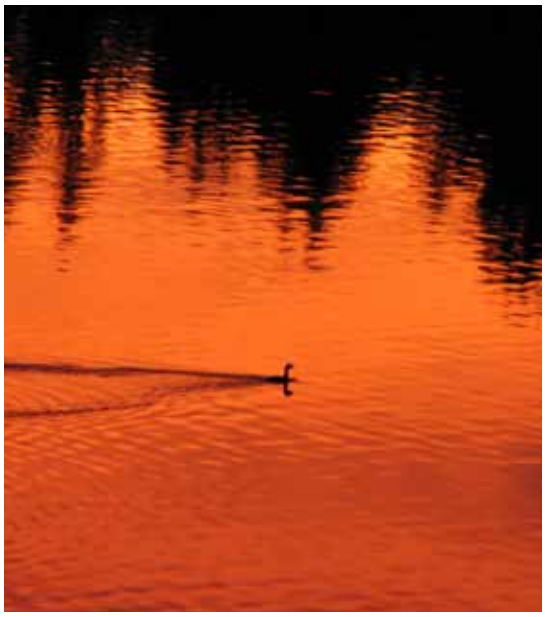
Trees, or parts of trees, that are structurally weak may pose a threat to people and property. Check trees near your home for the following signs:

- Dead or dying, poorly attached limbs.
- Leaning trees or cracks in soil around the base, which indicates root movement.
- Old wounds and obvious signs of decay (fungal conks, hollow trunks).
- Shortened height of new growth or sudden large crop of cones.
- Signs of root damage (including compaction, fill over the root zone, or eroded, exposed roots with foot traffic marks).
- Yellowing, reddening or thinning foliage. (Some discoloration and loss of older foliage is normal in the fall. This may be more pronounced in drought years and in pines and cedars.)

If the problem is confined to a single branch, corrective pruning may solve the problem. If all or most of the tree is affected, removal may be necessary. Trees that exhibit symptoms of overall decline can rarely be saved. Be aware, permits may be necessary prior to tree removal.

For more information, call the Washington State DNR Forest Health Program at 360-902-1300, e-mail forest_health@wadnr.gov or ask a certified arborist.

For King County DDES, go to http://www.kingcounty.gov/property/permits.aspx for more information.



Tips for keeping your lake healthy

The following text includes a variety of tips on household activities and products that will keep your rural property attractive, cared-for and won't add to problems in the nearby lake!

Use low impact gardening and lawn care

The lush green lawn concept originated on the east coast of the U.S. where frequent summer rains kept the open spaces regularly watered and growing freely. However, in the West where we commonly have summer droughts, keeping a lawn looking good can still be accomplished by using some lake-friendly practices. With some simple techniques, you can be well on your way to a healthier garden and lawn, while reducing your impact on Lake Marcel. Here are some tips to get you started:

- **Reduce the size of your lawn** to the area you actually use frequently and replace the turf with native plants that provide habitat for wildlife and make landscape pictures for you to enjoy year-round from the house, as well as the street. A good resource for learning about native plants can be accessed online at http://green.kingcounty.gov/GoNative/Index.aspx.
- **Add pavers.** Make your garden look designer-perfect by installing paver steps and grasscrete instead of solid concrete or asphalt driveways and walks. Edging of flower beds with cobble or untreated wood and fences of natural materials can finish the look and fit in with the charm of the rural neighborhood.
- **Plant native plants** as shoreline buffers to help filter pollutants in stormwater such as lawn fertilizer.
- **Install a rain garden.** If you have a low spot on your property, consider installing a rain garden—an area that is designed and planted with rain collection and percolation in mind. The soils are modified to increase rain penetration and plants are chosen with occasional standing water in mind. You can direct runoff to the spot and reduce the amount of rain that leaves your property and runs directly into the lake by creating free-flow, ditches or pipes. Information on rain gardens in the northwest can be found at http://www.pierce.wsu.edu/Lid/index.html.

- **Only water once a week.** If you water, do it thoroughly and only once a week. Place tuna cans here and there in the sprinkler range and continue watering until an inch of water has collected in the cans. This will also let you know if your sprinkler is applying the water evenly over the lawn area; you can make adjustments if it is spotty and places are being missed.
- **Improve lawns with aeration** and overseeding in the fall or spring. Aeration gets needed oxygen to the roots of the grass and increases water penetration. Thick turf behaves like an impervious surface and can actually prevent water from percolating downward. Aerating will help compensate for this and will encourage healthy root growth, which will make grass less dependent on summer watering. Overseeding will reduce bare patches and replace older grasses that have stopped growing well. Doing this during seasons when there is more rain and mild temperatures will encourage new grasses to sprout and grow.
- **Become a "grasscycler"** by setting your mower on "high" and leaving those grass clippings behind, which as they dry and shrivel will settle between the growing blades and will decompose to recycle nutrients back to your lawn. Mulching mowers work best for this, because they shred the clippings into very small pieces that compost in place.
- **Use low or no phosphorus fertilizer** on your lawn. Most soils in the Pacific Northwest have sufficient phosphorus already present and do not need any more applied. Excess phosphorus will run off the lawn with watering and will drain into Lake Marcel. Nitrogen is the nutrient most needed by grass in our area for a good green color and healthy growth, and luckily, it is usually available in excess in fresh water bodies here, so more added to the lake will not have such major impact. You can always get your soil tested to determine if you need phosphorus.

Partial shoreline armoring

NOTE: In 2011, it will be illegal in King County to apply chemical fertilizers containing phosphorus on your lawn unless a soil test has shown your soil is deficient in that nutrient, or you are establishing new turf.

- **Apply fertilizer sparingly.** If a soil test determines you need to fertilize, apply it moderately in September and May and use natural organic or slow release fertilizers – these will provide small steady doses of nutrients as grasses need them, during the periods for best growth.
- **Sweep up any fertilizer** that has spilled on hard surfaces such as walks and driveways. Otherwise, the nutrients (especially the phosphorus) will be carried by water directly to the lake and give the algae a meal.
- **Use pesticides and herbicides only as a last resort:**

o Read labels carefully; most will specify use restrictions for waterfront areas because of their potential harm to nearby fish and wildlife.

o Do not apply pesticides when it is windy to avoid the possibility of it drifting off your target and landing where it can cause harm.

o Use the least toxic and most readily degradable pesticide – those with "caution" on the label are considered least toxic whereas the word "warning" indicates moderate toxicity.

o Purchase only what you need to control the problem for the current season; it's not good to store pesticides long term and accidents can happen.

o Dispose of pesticides properly – make sure to take them to a household hazardous waste drop-off site, like the Wastemobile or the nearest King County hazardous waste collection location.

For more information, go to http://your.kingcounty.gov/solidwaste/naturalyardcare/lawncare.asp.

Things you can do to keep your lake healthy: be a grasscycler, use fewer pesticides, and choose your cleaning products carefully

Learn about the chemicals in your daily life

At Home

There are some common sense alternatives to store-bought chemical products and the recipes below can be used to make them, along with some suggestions for their best use.

All-purpose household cleaner:

2 quarts water

½ cup household ammonia

½ cup white vinegar

¼ cup baking soda

This can be used to clean countertops, windows, walls, appliance faces, sinks and many other surfaces.

Laundry Bleach:

½ cup of borax per load of laundry will whiten and remove spots. If you need to use a bleach, use an "oxygen bleach" like sodium perborate instead of chlorine bleach (sodium hypochlorite or sodium dichloroisocyanurate). You can find these names in the ingredient list on the label.

NOTE: Many products found in homes can be harmful to lakes and are considered corrosive, toxic or flammable. Common offenders include oven cleaners, floor wax, furniture polish, drain cleaner and spot removers. Check for the following toxic components on the label of these household products:

- **lye**
- **phenols**
- **petroleum distillates**
- **trichlorobenzen**

Home maintenance products such as paints, preservatives, strippers, brush cleaners and solvents also contain a wide range of manufactured chemicals as well, some of which are suspected carcinogens.

Drain Cleaner:

Pour the following down the drain:

- First add ½ cup of baking soda
- Follow with ½ cup vinegar
- Cover and let sit for 15 minutes, then rinse with 2 quarts boiling water. Treating drains once a week with the recipe above will prevent problems and keep your drains smelling fresh. For a bad clog, remove the trap and clean out the obstruction with a plunger or a plumber's snake.

Oven Cleaner:

- 2 tablespoons of borax or baking soda
- 1 gallon of water

Wear gloves and scrub with very fine steel wool. For difficult baked-on spots, try scrubbing with pumice (available at hardware stores.) As a last resort, use an aerosol oven cleaner that includes the statement "No caustic fumes" on the label.

Purchased home maintenance products

If you need to use products containing any of the substances on the list in the blue box to the near left, read the label carefully and use the product precisely as directed, wear appropriate protective clothing and always have good ventilation in the space where you are using the product.

Important consideration: these products should never go down the drain or be thrown out in the trash. Dispose of them at a hazardous waste site.

Quick tips for handling and disposing of household chemicals

(from *The Lake Book*, 1992)

- Read the label at least twice before buying – find out exactly what is in the product and what the potential hazards may be.
- Always store products in their original containers so the label can be referred to whenever the product is used.
- Choose alternative, less harmful products whenever possible.
- Use the least toxic product you can find and never buy more than you need.
- Dispose of all household chemicals at a King County Hazardous Waste site.

In Your Car

Cars are wonderfully useful and our modern life often depends on them. However, they do have an environmental cost. Motor oil, battery acid, gasoline, car wax, engine cleaner, antifreeze, degreasers, radiator flushes and rust preventatives are all common car care materials and they all contain toxic chemicals.

Many people still change their own oil and some even pour it down the nearest storm drain, directly polluting nearby waterways. You can now recycle your oil by putting it in a sturdy container like a plastic milk jug, and taking it to nearly any waste transfer station. Antifreeze can also be taken to transfers stations for disposal.

Maintain your car

Below are some alternatives that help maintain your car and protect your environment:

Automotive Antifreeze

Proplylene glycol-based antifreeze is significantly less toxic than ethylene glycol-based products. Ask for it or check the ingredient label when you buy antifreeze.

Automotive degreaser

Use water-based cleaner such as Simple Green or a citrus-based product. Look for the words "non-toxic," "biodegradable," or "non-flammable" on the label.

For grease spots on the garage floor: sprinkle kitty litter or cornmeal on the spot, sweep up after several hour and dispose of it in the garbage

Even better, take your car to a service station nearby and they will take care of recycling and disposing of all your cars fluids and parts so you don't have to worry about it!

Disposing of household chemicals

Lake Marcel residents can take products containing toxins to King County Household Hazardous Waste. To find a location near you and what can be accepted at King County Household Hazardous Waste sites go to the following website for more information: http://www.govlink.org/hazwaste/house/index.cfm.

Maintain your septic system

Homeowners new to rural living may not be used to having a sanitary septic system receiving their wastewater instead of a sewer line that leads to a treatment plant many miles away. The whole concept of on-site wastewater treatment may be a new idea to them, and sometimes information is not provided on what they as country homeowners are expected to do.

Septic systems can work well, but there are a few basic rules and activities that must be followed to keep them in top shape and functioning the way they are designed. By treating your septic system properly you can save money on costly repairs, or better yet, avoid replacing your entire system. They need a regular schedule of inspection and maintenance.

Septic systems are sized and designed to fit the number of residents expected to live in a home. This usually means that the number of bedrooms in the house is the key to understanding how many people can use the system on a daily basis for proper functioning. If you have 10 people routinely using the wastewater facilities in a house with two bedrooms, your daily activities may be overloading the system and you may be headed for problems.

What exactly is a septic system?

A typical septic tank is a buried, watertight container made of concrete, fiberglass, or polyethylene that is designed to pre-treat domestic wastewater that is sent to it by means of outlet pipes from the home.

It clarifies wastewater by holding it long enough to allow for solid material to settle out (sludge), be reduced by bacterial decomposition, or float to the surface (scum). The clarified wastewater is then pushed out of the tank and into the accompanying drain field for further treatment every time new wastewater enters the tank.

Helpful hints to make sure your septic system works properly:

- **Have your septic tank checked** by a professional service every two or three years and cleaned or pumped out when necessary.
- **Use phosphate-free, liquid detergents** and wash only full loads of clothes. Schedule running your washer a number of times throughout the week to avoid overloading the system on any one day with multiple loads, which can push water out of the tank and into the drain field before solids have been treated in the tank.
- **Use water-saving shower heads** and flushing toilets to decrease the amount of water entering your septic system.
- **Do not use kitchen sink garbage disposals**. They increase the amount of solid material entering your septic tank and contribute to drain field failures.
- **Do not use commercial septic system additives**. Keep all solvents and chemical cleaners out of the system.
- **Do not dispose of plastics** of any kind, Q-tips or tissues (other than the necessary toilet paper), diapers, feminine products or any other similar items down the toilet and into your septic system. There is a tradition started many years ago of posting folk poems in bathrooms to remind (and inform) users of what can and cannot go into a septic tank for treatment. There are many variations and it's easy to find different versions online. The poem to the left is one example that gets the message across in a light-hearted way.
- **Do not pave or park on your drain field.** The soil above the field needs to breathe to work properly and compaction or impervious surfacing will cause problems.
- **Do not plant large trees and shrubs over septic tanks** or drain fields. The water-seeking roots of these plants can damage the system. Grass and small plants will work better and allow for easier access to the tank and drain field for maintenance or repair.

Those of us with septic tanks,

Would like to give a word of thanks,

For putting nothing in the pot

That isn't guaranteed to rot.

Kleenex is bad, cigarettes too,

Feminine products are taboo,

No hair combings - use the basket.

There's a darn good reason why we ask it!

With your kind cooperation

We'll keep our tank in operation!

What can you look for as indicators that your septic system might be failing?

- Offensive odors, surfacing fluids looking like sewage, wet spots or especially lush vegetation over the drain field (especially in summer dry conditions when the rest of the yard is brown)
- Toilet back-ups into the tub or shower
- Slow-draining toilets or sinks (but check first for clogged pipes).

For more information on your septic system and trouble-shooting tips: http://www.wsg.washington.edu/mas/pdfs/SepticSense.pdf.

Lake Marcel plants: the good, the bad, and the microscopic

There are numerous of signs of life everywhere you look when you live in the country. Plants sprout, grow and bloom, followed by shedding leaves and dropping fruit as the seasons change. Birds sing, fly overhead and bounce in and out of shrubbery. Squirrels and mice scamper through the grass to find food and shelter, while the occasional deer nibbles on your favorite garden ornamentals and vegetables. Bears may browse through your garbage cans, raccoons eat from the pet dishes and moles are very busy underground.

There are plenty of earth-bound plants and animals to hold your interest through the year, but there are also other worlds of creatures living in the water of Lake Marcel, from organisms too small to see with the naked eye, to sizeable fish and mammals such as beavers and muskrats.

This section will introduce you to some of the good and "not-so-good" (from a human or ecological perspective) animals and plants that use the lake or call it home.

Green links in the chain of life

In fresh water, algae are very small to tiny aquatic plants that grow either as single living cells, in variously-shaped colonies, or attached end-to-end in long filaments. Their shapes, forms and colors can be very beautiful when viewed under a microscope.

Algae are one of the first links in the aquatic food chain, using sunlight, dissolved gases and water to make and store energy. They also take up inorganic nutrients to use for growth and reproduction, such as nitrogen and phosphorus compounds. Algae make good food for microscopic aquatic animals called zooplankton, which in turn are food for many fish and other larger aquatic animals. Algae also give off oxygen into the water as a by-product of photosynthesis, which aquatic animals can use to breathe. However, when large quantities of algae or aquatic plants die, the bacteria that decompose the cells can rob the water of that oxygen, taking it away from other lake organisms.

An algae bloom is a sudden explosion of algal growth, typically encouraged by good weather conditions and abundant available

nutrients in the water. Quite often one or two species will out-compete the others present to become the predominant form in the group. Most algae blooms die back naturally as conditions change or as nutrients are used up, but overlapping blooms of different species can appear as one continuous bloom over time to lake users. King County lakes can experience blooms throughout the year, but the onset of warmth and sunlight in the spring and summer and the wind mixing of deep water nutrients up to the surface in the fall are all common triggers for blooming.

Blooms usually last several weeks, then "crash" as conditions change to slow down growth. Some algae are buoyant, occasionally causing colorful scums to form on the water surface, particularly along the downwind shorelines where they can accumulate. Certain species are known for causing unpleasant smells or tastes to the water. In rare instances, the species producing an algal bloom may produce toxins, causing stomach aches in people who ingest the water or unexplained illness and even deaths among small wildlife and pets.

Toxic algae

Cyanobacteria, also known as bluegreen algae, are actually more closely related to bacteria than to algae. These ancient organisms are found among the first fossilized signs of life preserved in rocks on earth and species have persisted up to the present in a variety of wet or humid habitats. They are similar in size to algae, and like algae, can convert light in the presence of the pigment chlorophyll to carry out photosynthesis, capturing energy by making sugars for cell growth and metabolism. Cyanobacteria also have other special pigments that aid in photosynthesis, which can turn them a variety of colors,

Bluegreen algae

including blue-green, bright green, brown, olive green, reddish-brown and maroon.

The bluegreen genera *Anabaena, Aphanizomenon* and *Microcystis* are among the most commonly found bluegreens in lakes of the Puget lowlands during the summer. All three can produce toxins on occasion that may cause liver or neurological damage to mammals. The toxins stay inside the cells until released by cell death or rupture. This toxicity can remain in lake water from a few days to a week after a bloom disappears.

Signs of toxic damage to the liver include jaundice, shock, abdominal pain and severe thirst; while signs of neurological toxins include staggering, paralysis and involuntary muscle movement. Both types of toxins have been reported to kill fish, waterfowl and animals. No confirmed human deaths in the United States have been reported from contact with a toxic bloom, but skin irritation and gastroenteritis have been documented.

The mere presence of cyanobacteria does not mean toxic conditions are present, as most blooms appear not to produce the toxins or only in trace amounts. However, there is no change in

Be algae aware

Cyanobacteria blooms can look like green, blue-green, olive, red-maroon, or brownish paint spilled across the surface of water. They are buoyant and can be blown downwind to accumulate along a leeward shoreline.

If the lake water looks like pea soup or has an unusual color or offensive smell, it is probably undergoing an algal bloom that might be dominated by cyanobacteria. If an algea bloom is spotted, take these steps:

- Call the Washington State Department of Ecology freshwater algae program at 425-649-7288 to report the bloom and ask for a toxicity determination.
- Rinse your skin with tap water immediately after contact, especially if swimming in an algae-filled lake and dry off vigorously with a towel.
- Never drink untreated lake water, regardless of its clarity or algae content. Keep animals and livestock from drinking the water if scum is visible along the shoreline.
- Stay out of the water if a bloom is present, especially small children and animals who are more susceptible to the toxins.
- **NOTE: If you, your child or animal come in contact with a suspicious algae bloom, consult a doctor or veterinarian as soon as possible and be sure to mention the algae bloom.**



Lake Marcel aquatic plants: submerged coontail, wetland rushes, and quillwort

appearance between a toxic and nontoxic bloom. Specific testing must be completed to make the determination as to whether or not a bloom presents a health and safety risk. Because of the expense, toxicity testing is often limited to those lakes where other signs of toxicity have been observed. Studies are underway to understand whether environmental conditions or genetic background are better determinants of what causes the cyanobacteria to produce toxins.

Macrophytes: plants along the shoreline and in the water

Aquatic plants growing in shallow water and along the edge of a lake play significant roles in the delicate system of ecological checks and balances. Native plant species, which evolved along with other plants and animals in the Northwest, offer many benefits for healthy lakes. They provide food and shelter for fish and wildlife, stabilize shorelines, produce oxygen in the water and keep sediments from being re-suspended in the water. Native aquatic plants also add to the natural beauty of lakes.

Branches and trunks of terrestrial plants that fall into the water can also provide shade and refuge for fish, turtles and amphibians such as frogs and salamanders, as well as a place to attach for many microscopic aquatic creatures such as rotifers and juvenile stages of insects. There can be whole unseen worlds of small creatures in and around rocks and large wood. Late in the summer, freshwater sponges and colonies of bryozoans (relatives of marine corals) can make jelly-like masses attached to underwater branches or logs. Bryozoans may even be found free-floating, looking like clear, squishy baseballs.

There are many different aquatic plant species found in our regional lakes, including plants that have floating-leaves, are grass-like, may be fully submerged and or only have their "feet" in the water. A good source for identifying the plants in your lake is an easy-to-use handbook published by the Washington State Department of Ecology in June 2001 as publication number 01-10-032, entitled "*An Aquatic Plant Identification Manual for Washington's Freshwater Plants*." Information on acquiring the manual, as well as an online version can be found at http://www.ecy.wa.gov/Programs/wq/plants/plantid2/index.html.

Aquatic plants are necessary to the well-being of lake ecosystems, but they can also grow out of control when changes to the system occur that interrupt the balance of life in the lake, such as invasions of non-native species, new diseases or predators, large-scale plant management efforts or increased nutrient sources.

When unidentified plants suddenly begin to grow prolifically, possibly out-competing other plants and even causing problems for those who live around and use the lake, they may well be non-native and invasive, a sign of trouble to come.

Non-native species can cause a number of different problems in lakes:

- By crowding out species that provide quality food and shelter for aquatic life, they can lower fish growth and reproduction, causing fish populations to become unhealthy or decline in numbers.
- Plant masses can form large, loose mats over the water surface, which can entangle boat motors, rudders and oars, as well as posing a danger to swimmers.
- When they die back in the fall, bacteria decomposing the plant material can reduce oxygen levels, release nutrients and impart

an unpleasant smell and taste to lake water.

- Nutrients released from decaying aquatic plant material become available for algal growth, sometimes causing additional water quality problems.

How weeds spread

Weeds are aggressive plants that can escape backyard gardens and ponds with the help of birds or by hitchhiking on tires, shoes, or animals. Boats and boat trailers may carry plant fragments between lakes and thoughtless dumping of aquarium into the water can introduce exotic aquatic plants to lakes. In addition, natural water flow moves weed seeds and fragments down stream to other areas.

Both non-native and native aquatic plants can grow faster and denser than normal when too many nutrients enter a lake. These nutrients come from many sources: failing septic systems, runoff from fertilized lawns and gardens, animal wastes, stormwater runoff and erosion from construction sites. Nutrients and soil from these sources help to enrich lake bottom sediments, providing "fertile ground" for aquatic plants. With all this extra plant food, aquatic plants can grow rapidly and become a nuisance.

Prevention

- **Build water gardens away from lakes** – choose a site that is isolated from any potential flooding situations and make sure your ornamental pond does not drain to the lake at any time.
- **Familiarize yourself with invasive plants** of regional and national concern. Visit the King County Noxious Weed Program at http://www.kingcounty.gov/environment/animalsandplants/noxious-weeds.aspx.

Milfoil on an outboard motor

- **Use regional native plants** in your garden instead of unknown horticultural varieties that could seed freely and expand over the landscape. Ivy, butterfly bush, purple loosestrife, yellow flag iris and reed canary grass are just a few examples of these bullies that got their start as ornamental plants.
- **Choose a reputable nursery.** Ask if the vendor is aware of what species are regionally and federally restricted.
- Ensure that your purchases are free of any "hitchhikers" in the soil or on the plant. Rinse plants in a bucket of tap water until they are clean. The dirtier the plant, the more likely it is to have hitchhikers. Be on the lookout for snails and other invasive animals as well as plant fragments. This is most likely how the European slugs that eat holes in our produce got here!
- **Dispose of aquatic plants** from aquaria or winterized water gardens into the garbage if there is any possibility they could spread into nearby waterways.

Noxious weeds in Lake Marcel

Lake Marcel has had a history of several different noxious weed introductions, including Eurasian water milfoil, purple loosestrife, fragrant water lily and yellow flag iris. In some cases these may have moved in by means of boat trailers or migrating animals. But in others they were introduced by people who wanted to beautify the landscape or couldn't bear to throw the inhabitants of an aquarium in the trash. The aquatic weed staff of the King County Noxious Weed Program can answer questions from interested citizens and urges everyone to keep their eyes open for the occurrence of noxious weeds. Many infestations have been found by reports from people who noticed a plant that they didn't recognize or that suddenly became abundant or spread quickly.

Plant control techniques

If you have identified a noxious aquatic weed in the lake, there are a few methods of control that you can follow. Some of these require a permit in order to work in the water, while others may not. There are four main categories of aquatic plant control techniques: manual, mechanical and chemical, as well as biological (which we won't cover here).

Manual methods

- **Hand pulling** – similar to pulling weeds out of a garden; be sure to remove the entire plants (leaves, stems and roots) from the area of concern and dispose of them where they cannot reinfest the lake.
- **Cutting** - Cutting differs from hand-pulling in that plants are cut and the roots are not removed. This may control the plants, but is not likely to eradicate them.

Washington's noxious weeds law

Similar to most states, Washington has noxious weed laws (RCW 17.10 and WAC 16-752) that identify which alien species are legally "noxious" and defines how they are to be treated when an infestation is found. There are various levels of response, from refraining from purchase and removing plants when possible, to mandated control if found, to an obligation to work toward complete eradication. Although there is an over arching state noxious weed list that is updated annually, the counties in Washington have the authority to edit the list for their own situations. The noxious weed list was originally initiated in response to alien plants causing economic damage to agricultural activities, but it was soon recognized that environmental threats were equally important to state resources and native species diversity.

To get more information on the current list in King County, visit the King County Noxious Weed Program's website at http://www.kingcounty.gov/environment/animalsAndPlants/noxious-weeds.aspx.

Harvesting weeds

Treating weeds

- **Bottom barriers** - A weighted bottom screen or barrier covers the bottom sediment of the lake like a blanket, keeping plants from rooting and growing, while reducing or blocking light to the bottom.

Advantages

- Manual methods are easy to use around docks and swimming areas.
- The equipment is generally inexpensive; usually aquatic weed rakes and cutters can be found online.
- They are environmentally safe.
- Manual methods do not require expensive permits and can be performed on a small scale with a Hydraulic Project Approval obtained just by reading and following the practices in the published pamphlet Aquatic Plants and Fish (publication #APF-1-98) available from the Washington Department of Fish and Wildlife.

Disadvantages

- Plants can re-grow or fragments can re-colonize the cleared areas, so the treatment may need to be repeated several times each summer.
- These methods are labor intensive, they may not be practical for large areas or for thick weed beds.
- Some plants, like water lilies have massive rhizomes, are very difficult to remove by hand pulling.
- Hand-pulling and raking disrupts bottom-dwelling animals.

Mechanical methods

- **Diver Dredging** – Diver or suction dredging is carried out by SCUBA divers using hoses attached to small dredges (similar to dredges used by miners for mining gold from streams) that suck plant materiel out of the sediment. The purpose of diver dredging is to remove all parts of the plant, including the roots.
- **Rotovation** – Rotovators are machines that use underwater rototiller-like blades to uproot plants. The rotating blades churn seven to nine inches deep into the lake sediment to dislodge plant root crowns that are generally buoyant and float to the surface when freed from the bottom. The plants material may then be removed from the water, using a weed rake attachment to the rototiller head or by harvester or manual collection.

Lake Marcel aquatic weeds: Eurasian water milfoil, purple loosestrife, and fragrant water lily

- **Harvesting** – Mechanical harvesters are large machines, which both cut and collect aquatic plants. Cut plants are removed from the water by a conveyor belt system and stored on the harvester until disposal. Harvested weeds are disposed of in landfills, used as compost, or in reclaiming spent gravel pits or similar sites.

Advantages

- Divers can remove plants around docks and in other difficult to reach areas.
- Can be used in situations where herbicide use is not an option for aquatic plant management.
- Rotovation be a less expensive option than hiring divers, particularly if the rotovator can be rented or a contractor can do the job quickly.
- Roots of plants are removed, unlike mechanical cutting and harvesting.
- Harvesting is appropriate for very large infestations that cannot be controlled effectively by other means and provides open water immediately for recreation.
- Harvesting can target specific areas, leaving other conserved areas alone.

Disadvantages

- Can be very expensive.
- Stirs up large amount of sediment and interferes with bottom-dwelling animals. This may lead to the resuspension of nutrients or long-buried toxic materials into the water column.
- Plants growing in rocky or hard sediments may not be entirely removed by the suction, leaving a viable root crown or tuber behind to initiate regrowth.
- An HPA permit it is required for rotovation because it disturbs bottom sediments.
- May be difficult to find and remove all fragments created by rotovation, thus increasing the potential for reinfestation at the site and elsewhere in the lake.
- May be difficult to maneuver rototillers around docks and large woody debris or rocks in the water.
- It's necessary to know where underwater utility lines are located in order to avoid them when using rotovation.
- Rotovation and harvesting are methods for control, but are not considered an eradication tool.
- Harvesting may need to be done several times each season.
- Purchase and operation of harvesters can be very expensive.
- It may be difficult to find and remove all fragments created by harvesting, thus increasing the potential for reinfestation at the site and elsewhere in the lake.
- Some small animals such as fish and amphibians may be killed by harvester operations.

Chemical methods

- **Aquatic Herbicides** –Aquatic herbicides are chemicals specifically formulated for use in water to eradicate or control aquatic plants. Aquatic herbicides are sprayed directly onto floating and emergent aquatic plants or are applied to the water in either a liquid or pellet form. Because of the environmental risks from improper application or use of herbicides with specific dangers or safety hazards, aquatic herbicide use in Washington State waters is regulated and has certain restrictions.

In order to treat lake weeds with herbicide you must have an herbicide applicator's license from the Washington State Department of Agriculture or hire a firm that has licensed staff. You must also make sure that the herbicide preparation is approved for use in Washington

Yellow flag iris

State. While nearly all retail stores in the state follow the guidelines and do not offer banned products for sale, it is possible to buy online some products banned for use in Washington State; therefore, it is extremely important to check the active ingredients of any chemical to be sure that it is legal to use it in or near water.

Advantages

- Can sometimes be less expensive than other aquatic plant control methods.
- Easily applied around docks and underwater obstructions.
- Sometimes appropriate when weeds are widely dispersed, when total eradication is the goal or when a whole lake treatment is found to be necessary.

Disadvantages

- Some herbicides have swimming, drinking, fishing, irrigation and water use restrictions.
- Non-targeted plants may be killed by certain herbicides.
- Depending on the herbicide used, it may take several days to weeks or several treatments during a growing season before the herbicide controls or kills treated plants.
- Some herbicides linger in the water for long period.
- Some people have strong feelings against using any chemicals in water.
- Some cities or counties may have policies forbidding or discouraging the use of aquatic herbicides.
- Using a licensed applicator and acquiring necessary permits can slow down the treatment schedule.

How to find out more about weed control

Contact King County Water and Land Resources Division (WLRD) to learn which of these permits you will need for a particular project and the steps to obtain them. King County WLRD has a limited supply of rakes and weed cutters to lend out to community groups who have obtained the necessary permits for removing aquatic plants. Contact the WLRD Lake Stewardship Program to borrow these or other weed control tools at 206-296-8382.

The Washington State Department of Ecology has developed a step-by-step guidance manual for developing an Integrated Aquatic Vegetation Management Plan. The goal of this plan is to define the problem, assess methods of control relative to the lake and recommend preferred solutions that respect beneficial uses and the balance of life in the lake and the watershed, are affordable and really work. For more information about this planning program, contact the Department of Ecology at 360-407-6562.

butterfly bush

Aquatic Weed Resources

Aquatic Plants: Identification, Benefits and Management, available from King County Surface Water Management 206-296-6519; ask for publications.

A Citizen's Manual for Developing Integrated Aquatic Vegetation Management Plans available from the Washington State Department of Ecology, 360-407-6562.

Also visit WDOE's aquatic plant management Web page at http://www.ecy.wa.gov/programs/wq/plants/management/index.html.

Or the King County Lake Stewardship Web page at http://www.kingcounty.gov/environment/waterandland/lakes.aspx for more information.

Lake Marcel creatures: meet your neighbors

Most everyone enjoys watching turtles basking on logs, frogs slipping behind the cat tails and fish gliding near the lake bottom. When the lake edge has lots of good habitat, animals will move in to use it. Some are native creatures, while others are introduced either intentionally or by accident.

There are also many animals living in the water too small to be seen without a hand-lens or microscope, as well as larger animals so well camouflaged that you could be inches from them without ever knowing they are there.

Small worlds

Just up the chain from the algae discussed in the plant life section are the tiny creatures that feed on them, as well as on bacteria and small organic particles. Protozoa and rotifers are not much bigger than algae, but will feed off them and then are eaten by larger zooplankton, such as copepods and cladocerans, which are crustaceans that are the freshwater relatives of shrimp. There are many different species of these tiny creatures and they can be very abundant at certain times of the year. Sometimes you can see them swarming in patches on the lee side of docks, and if you throw a fine-meshed net in the water and then look at what you've caught with a hand-lens, you will be amazed at the colors and details of the creatures swimming in your catch. One of the most commonly found animals is *Daphnia* (water flea) which can be seen swimming in a jerky fashion. They are rarely larger than 1 mm in length and they make tasty meals for little fish.

There are too many other creatures living in lakes to list in this short guide, but a fine book for introducing those who are interested is *Pond Life* by George K. Reid, in the Golden Guide series. Many insects have aquatic juvenile stages, from the ubiquitous mosquitoes and midges to the more elegant dragonflies and damselflies. *Pond Life* has a good general introduction to the various groups of insects with aquatic life stages, but for more information on local dragonflies, there is a small book available from the Seattle Audubon Society called *The Dragonflies of Washington* by Dennis Paulson. Another book that has information on dragonflies and larger animals is *Pond and River* by Steve Parker, in the Eyewitness Books series.

Lake Marcel creatures: copepods

Some mollusks

While there historically have been native freshwater snail and mussel populations in the lakes of the Puget lowlands, many of these populations have been decreased greatly by development, hydrological changes, their interrelatedness to salmon life histories and as collateral loss when fish management techniques have included applying rotenone to water bodies to kill undesirable fish.

Native mollusk communities have not been described for Lake Marcel. However, there is documentation of one non-native species that has been introduced into the lake and one that should be monitored because it can inhibit dam operations. For more invasive freshwater invertebrates, please go to the Washington Invasive Species Council home page at http://www.invasivespecies.wa.gov/.

Chinese Mystery Snail

The Chinese mystery snail (Cipangopaludina malleata var chinensis) was first documented in the Pacific Northwest more than forty years ago, but very little is known of its spread or impacts on native snails or the ecosystems of local lakes. There are anecdotal reports as far back as 1892 that the snail was offered for sale as a food item in Chinese markets in both San Francisco and Vancouver, BC. However, it is equally likely that it was introduced into our fresh waters from hobby aquariums emptied into nearby ponds and lakes because it was sold as a tank glass cleaner, a job that it actually doesn't do very well.

While they may be eaten routinely in some parts of Asia, the lack of information about the snail's hosting parasites should make the would-be gourmet pause before gathering and cooking them. In their native habitat, they are known to harbor parasites such as flukes and schistosomes (the parasite group responsible for swimmer's itch around here). Eating them is definitely not recommended until more is known.

Describing the impact these snails have had on native species may prove a difficult task. Various local lakes have been managed in the past for fish communities, sometimes with little known about the effects that management techniques might have on other animals living in the water. For example, several lakes were treated with toxic chemicals such as rotenone to kill off nuisance fish species, which could have also affected other animal species. The introduction of the Chinese

Bacteria

While bacteria are not considered either plants or animals, certain kinds can have major consequences for recreational activities. Most bacteria do not pose a problem for people. In fact, their work of breaking down organic material is essential to keep the whole planet's processes healthy and life moving forward. However, there are several kinds of bacteria that can make people sick if ingested, and these can get into Lake Marcel from several sources, including septic systems that have not been properly maintained or tested, and waste from domesticated animals and other warm-blooded animals such as geese.

The Lake Marcel Community Club tests the water near the community beaches to be sure it is safe for swimming. There are several standards in use for categorizing risk associated with human exposure to fecal coliform bacteria. The "Ten State Standard", used by King County's Swimming Beach Monitoring Program, calls for closure of swimming beaches when the geometric mean of fecal coliform values is above 200 colony forming units per 100 milliliters (cfu/100mL), or if any single sample is above 1000cfu/100ml. Because Lake Marcel's beaches are private community-only access, the decision to post warnings or close the beaches is left to the Lake Marcel Community Club, using similar guidelines.

Suggestions on how residents can help to prevent bacterial contamination of the lake are included in the daily activities and household hints section (page 14 - 18).

Lake Marcel creatures: Chinese mystery snail

mystery snail might have been into environments that were already under extreme stress.

Other lakes in King County with known populations are mostly located in the southern part of the county, including Sawyer, Spring, Desire, Wilderness, Pipe, Lucerne, Killarney, Meridian, Morton, Dolloff, Kathleen and Shady.

Zebra Mussels

Zebra mussels could be considered the most troublesome freshwater animal to have entered the United States. It is thought that the zebra mussels came over from Europe in the ballast of a ship that made a transatlantic trip into the Great Lakes in the mid-1980s.

Female zebra mussels can produce up to one million veligers (larval stage of the mussel), which may spend several weeks in the water column until they become heavy enough to settle on the nearest hard surface (rock, wood, rubber, glass, fiberglass, metal, gravel). While they are floating, they may be transported to other bodies of water through hydrological connections or recreational boat engine cooling systems or bilges. Adult mussels can also transport themselves on the backs of other animals such as crayfish attach to boat hulls and to boat trailers. The mussels are rampant throughout the Midwest and have been detected as far west as Lakes Powell and Mead and have recently entered the southern California water delivery system reservoirs.

The mussels clog intake pipes at dams. They colonize docks, break boat bottoms and encrust engine parts. Recreational shorelines have been abandoned due to the sharp-edged shells littering the beaches and the stink from decomposing mussel flesh. It is critical to be able to identify these mollusks, so that if they do find their way into King County swift action can be taken to eradicate them before they become established.

Alien zebra mussel

NOTE: if you suspect you've found a zebra mussel, collect it; keep it in water in a cool, dark place; and call the Department of Fish and Wildlife to ask how to proceed.

Zebra mussels look like small clams, with a yellow or brownish D-shaped shell, often with dark and light-colored stripes.

- They can be up to two inches long, but most are under an inch.
- They usually grow in clusters and are generally found in shallow (6-30 feet) water.
- Zebra mussels are the only freshwater mollusk that can attach itself firmly to solid objects - submerged rocks, dock pilings, boat hulls, water intake pipes, etc.

Fish

The most commonly found native fish in the Puget lowlands include several species of trout, but there are also many varieties of introduced warm water fishes native to the eastern and midwestern areas of the USA. Because Lake Marcel is a man-made lake, there appear to be no records available of established native fish populations in the beaver pond before its excavation in the 1960s.

Fish that are documented to live in the lake today include cutthroat and hatchery-raised rainbow trout, sterile grass carp, largemouth bass, and bluegill. The plant-eating grass carp were introduced to keep nuisance aquatic vegetation under control and not supposed to be able to reproduce. Bass and bluegill are popular recreational fishing targets, and are found in most freshwater lakes in the area, probably stocked informally by interested fishermen. Other commonly found warm water fish, such as yellow perch and brown bullhead may be in the lake but are not documented as present.

An annual planting of rainbow trout is sponsored by the Lake Marcel Community Club; usually 1000 – 2000 fish are put in each spring for the fishing enjoyment of the community.

Amphibians and reptiles

A number of frogs and salamanders can be found in the damp spots along the shorelines of lakes and streams in the Puget lowlands, it is very likely that they could be found under logs and along the shoreline of Lake Marcel, both as tadpoles and as adults. A good identification book is published by the Seattle Audubon Society, entitled *Amphibians of Washington and Oregon* by William P. Leonard. Some species that might be found include the northwestern salamander and the long-toed salamander. Many frogs and toads have been undergoing severe population decreases in recent years, several previously common species include



Lake Marcel creatures: Pacific tree frog, cutthroat trout, turtles basking on a log

the western toad, the Pacific chorus frog (tree frog) and the red-legged frog.

Bullfrogs

The bullfrog is probably one of the most commonly found amphibian species now in the Puget lowlands, but it is not native to the area and has been implicated in the decreases in native frogs, turtles and even some water birds due to both competition and predation. The bullfrog is classified in the Washington administrative code as a prohibited aquatic animal species (WAC 220-12-090). No license is required to hunt bullfrogs, there are no bag limits and the season is open year round.

Destroying bullfrog egg masses when discovered is another way to control populations, but you must be certain that the masses are positively identified as bullfrog eggs in order not to endanger the native species further. In general, the native frog and salamander egg masses are produced early in the year and will thrive in cool temperatures, whereas bullfrogs must have warm water and lay their eggs mostly in June and July. One exception is the native Western toad that lays eggs in flowing water in the summer, however, its egg masses look quite different from those of a bullfrog. The toad lays its thousands of eggs in dual strings, while the bullfrog lays big circular masses of thousands of eggs that are dark on top and light on the underside. The Washington Department of Fish and Wildlife addresses bullfrog management and includes some illustrations of egg masses at http://wdfw.wa.gov/wlm/living/frogs.htm.

Turtles

The native western pond turtle and painted turtle are rarely seen in Western Washington anymore, although there are local programs at zoos to raise young western pond turtles and release them in the hope of reestablishing viable populations. Frequently, the turtles seen basking on logs in the Puget lowlands are slider turtles, introduced from eastern North America and sold in pet stores, then released by soft-hearted owners. There are also a number of records of snapping turtles found, they can be recognized by their massive heads and legs, as well as very long tails. Of the snakes found in Western Washington, only the several varieties of native garter snakes are found near water.

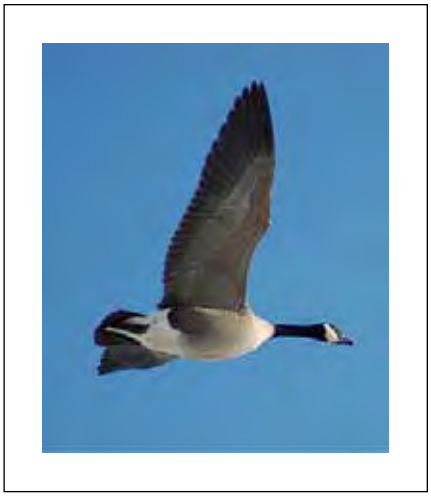
Birds

Many different birds make Lake Marcel their home for at least part of the year. Eagles and ospreys are commonly seen hunting over the water and a number of different kinds of ducks and waterfowl frequent the lake.

Many good bird identification books can be checked out from the library or purchased. Be sure that the book you use deals with birds found in the Western United States because there are East and West coast variations in some species.

Canada geese

The native, migratory populations of Canada geese in our area were in decline before the 1960s when U.S. Fish and Wildlife Service, along with state wildlife agencies, purchased goose eggs from elsewhere and reared them in hopes of providing more game birds for local hunters. The eggs were hatched from incubators and the birds were reared by humans until they were old enough to survive on their own. When released in the Puget Sound lowlands, these young transplanted geese did not have parents to teach them to migrate and the climate was mild enough, with plenty of food available year round to sustain the birds all year.



Animals of Lake Marcel: Canada geese, nutria, and muskrat

The geese are a problem for lake residents largely because of the copious amount of feces they produce. The waste material is not only unsightly; it contributes to fecal coliform pollution in the lake as well as increases nutrients.

Geese can definitely be seen as a nuisance, but there are a few ways to deal with them. Landscape adaptations can be very effective. Maintaining grass lawns at a height of 10 inches rather than 2 inches works well. Breaking up visibility of lawn from the water with clumps of shrubbery along the shoreline makes them less comfortable in an area, apparently fearing predators.

A harmless repellent (ReJeXITTM or Goose ChaseTM) derived from grapes is effective in keeping geese away from specific areas like golf courses, parks and lawns because they apparently don't like the taste of it on the grass. Other methods to make areas inhospitable to geese include stringing low wires or very firmly secured (to avoid entanglement) fishing line on their landing sites, mylar tape or flags that flash and make a noise in the wind, and noisemakers. All these methods are most effective if begun in the spring before geese get in the habit of grazing where they are not wanted.

Aquatic mammals

Many different aquatic mammals live around and use Lake Marcel, either as a watering hole or as habitat. This booklet focuses on those that can occasionally collide with human activities and goals.

Muskrats

Muskrats (*Ondatra zibethicus*) are quite a bit smaller than nutria or beavers, usually weighing between 2-5 pounds, but can be mistaken for them as they swim through the water with just a furry head showing. However, muskrats nearly always have their tails sticking out of the water behind them, while beavers never do. They are somewhat difficult to tell from the non-native nutria that is currently spreading in our area. Muskrats can stay under the water for as long as 20 minutes and can also remain motionless in vegetation with only their noses and eyes above water, making them very hard to detect when hiding.

They are good habitat providers for birds by keeping water open, but they can be considered pests because they burrow into banks for dens, which can destabilize the bank and cause it to fail. In addition they find certain wetland species very tasty, which can jeopardize some restoration work.

Nutria

Nutria (Myocastor coypus) are rodents native to Argentina that were raised by farmers in Washington extensively between the 1930s to the 1950s. Feral populations have recently been discovered in several Western Washington lakes. At a glance, nutria appear similar to beavers or muskrats. However, they are generally smaller than beavers and larger than muskrats – adult nutria average from 11 to 22 pounds. The main distinguishing trait is the tail: unlike the beaver's flat, paddle-shaped tail or the muskrat tail, which is hairless and flattened vertically, nutria have thin, round, hairy tails that are pointed at the tip.

Their voracious eating habits have resulted in billions of dollars in damage to native wildlife habitats and agricultural lands throughout the United States. Nutria breed at an alarming rate, so once they migrate to a new area, they can quickly become a problem. Nutria inhabit riverbanks, sloughs and drainage ditches and rear their young in large dens burrowed into banks, often creating bank and

Busy beaver

dike erosion problems. Nutria are also well-adapted to traveling long distances over land, meaning that it's likely that they will eventually migrate to other King County lakes.

If you spot what you believe to be nutria at your lake, you can contact the Washington Department of Fish and Wildlife to discuss next steps.

Beavers

Beavers have lived in King County since the last ice age. In the 1800s beavers were heavily hunted for their fur and almost became extinct, but now their numbers are on the rise and people who are not used to cohabiting with beavers are being surprised by the changes they can make.

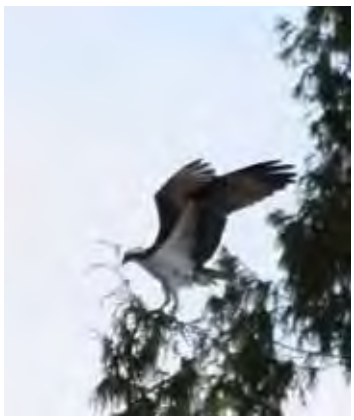
Beavers are able to engineer the environment to suite their needs. They build dams and canals in order to create deep water near their food source, for safety and to facilitate the transport of tree limbs. By this process, beavers also make homes for many other animals and plants. However, beavers can become a nuisance if their feeding requirements and dam building instincts endanger your property. It is illegal to kill beavers in King County or to remove beaver dams without obtaining the appropriate permits from the Washington Fish and Wildlife (WDFW) and King County. Luckily, there are a number of techniques that may allow you to live with these animals in harmony.

Trickle Levelers: A trickle leveler—a perforated pipe placed through the dam—can be installed to regulate the water level after a beaver dam is constructed. The current created by the pipe's many intake holes is so small it goes undetected by the beavers. However, Installation of trickle levelers is complicated and requires careful research. You most likely will need permits to complete this task such as an hydraulic permit for working in the water, so contact the regional office of the WDFW for help.

Fencing: If beavers are eating your trees, a four-foot high fence of heavy wire mesh placed around the trunk and dug one foot into the soil will discourage them.

Live trapping: Trapping and/or relocation requires a permit from the WDFW. However, trapping is not considered to be an effective long-term solution because generally other beavers will move into the site once it is vacated.

Motion detectors: Outside motion detectors with automatic bright lights can deter beavers from your property. Some systems can also be equipped so that an outdoor sound system goes on with the sound of barking dogs or other loud noises. The sound has to be changed from time to time to keep the beavers from becoming habituated and ignoring it. It is VERY important to talk with any neighbors before employing this beaver-deterrent tactic.



Osprey hunting for fish

Report Credits:

Content: Sally Abella, Beth leDoux, Katie Messick and the Lake Marcel Community Club Board of Directors

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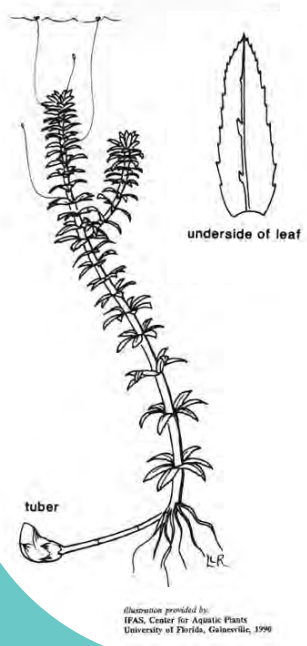
Hydrilla

Hydrilla verticillata

noxious

- leaves in whorls of **five** (3-6)
- leaf margins **visibly toothed**
- plants grow from **tubers**
- flowers tiny, not likely to be present in King County
- **rare**



Brazilian elodea

Egeria densa

noxious

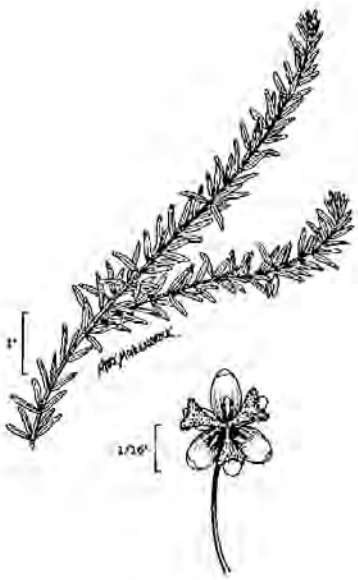
- leaves in whorls of **four** (3-6)
- leaf margins visibly **smooth**
- flowers fragrant and white with three petals, 18mm wide
- flowers float on water surface, attached to base of leaf whorls

American waterweed

Elodea canadensis

native

- leaves in whorls of **three**
- leaf margins visibly **smooth**
- white flowers 8mm wide, often absent
- flowers float on water surface, attached to base of leaf whorls



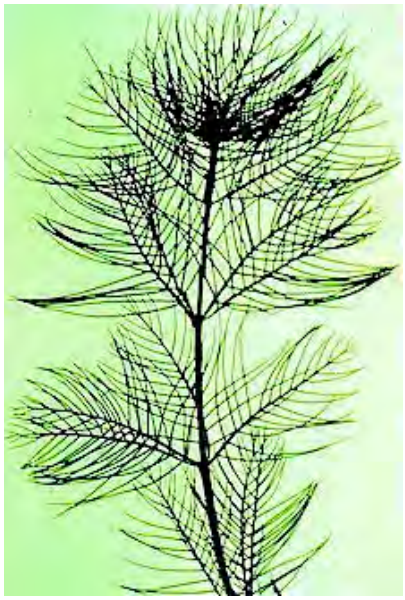
USDA-NRCS PLANTS Database / **USDA NRCS.** ***Wetland flora: Field office illustrated guide to plant species.*** **USDA Natural Resources Conservation Service.**

Eurasian watermilfoil

Myriophyllum spicatum

noxious

- leaves feathery, with **14 or more leaflet pairs**
- leaves **collapse** against stem when removed from water
- flowers on emergent spikes with tiny leaves (<1mm) below each flower
- does not have turions

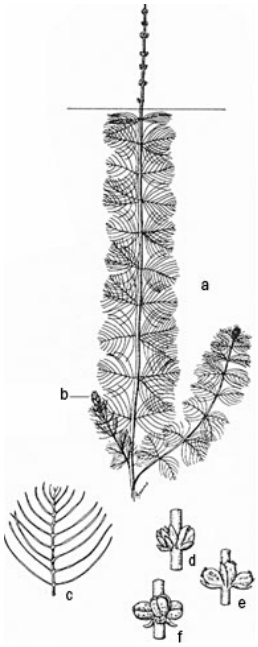


Western milfoil

Myriophyllum sibiricum

native

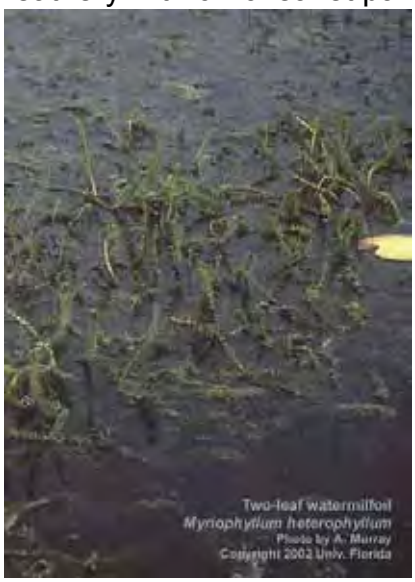
- leaves feathery, with **fewer than 14 leaflet pairs**
- leaves generally **do not collapse** against stem when removed from water
- flowers on emergent spikes with tiny leaves (<1mm) below each flower
- has **turions** (overwintering buds)



Other milfoils

Native or noxious

- *M. hippuroides*, northern milfoil, is **native** and **rare**
- *M. heterophyllum*, variable-leaf milfoil, is **noxious** and not currently known in King County
- both have flower spikes with **emergent leaves** that become entire as they get further from the water
- submerged leaves are feathery with 6-20 leaflet pairs

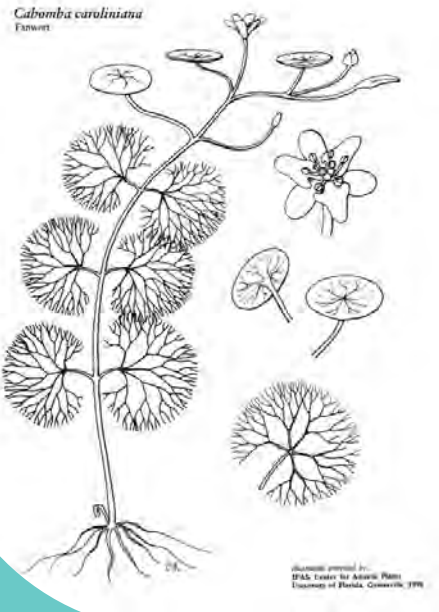


Fanwort

Cabomba caroliniana

noxious

- leaves **opposite**, branched, on long stalks
- plant often looks cylindrical underwater
- occasionally present floating leaves 2cm long, stalk attached in center of leaf
- flowers 1-2cm across, white to pink with yellow center
- uncommon natives with similar submerged leaves have **alternate** leaves



Coontail

Ceratophyllum demersum

native

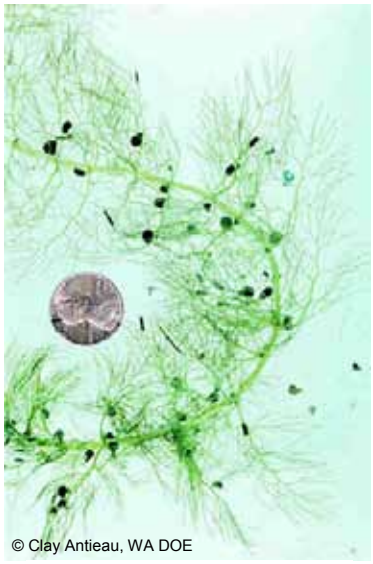
- leaves **whorled**, leaflets forked, toothed along one edge
- plant remains very stiff out of water
- plant often looks cylindrical underwater
- flowers tiny, green, inconspicuous, at leaf bases
- has no roots, but can be attached to sediment

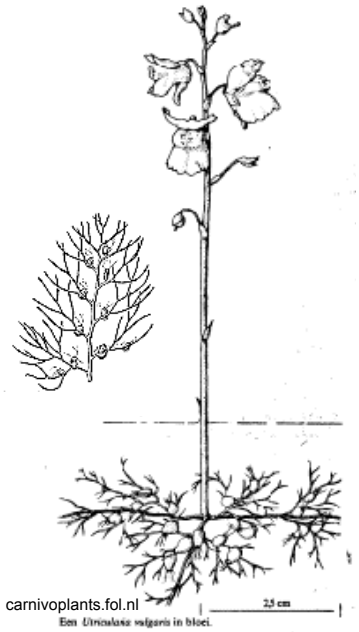
Common bladderwort

Utricularia vulgaris

native

- has **bladders** on leaves
- leaves highly divided
- plant often looks cylindrical underwater
- yellow snap-dragon-like flowers on stalks above water
- has no roots, but can be attached to sediment
- carnivorous plant





Potamogeton species: pondweeds

All pondweeds:

- have **alternate** leaves
- are monocots with **at least one midvein**
- have **tiny flowers in spikes** held on stalks above the water

Curly-leaf pondweed *Potamogeton crispus* – noxious (class C)

- only pondweed with **wavy leaf margins**
- leaves olive green, rather stiff
- submerged leaves only (no floating leaves)

Native pondweeds with submerged leaves only *Potamogeton spp.*

Sago pondweed	*Potamogeton pectinatus*
small pondweed	*Potamogeton pusillus*
fern-leaf pondweed	*Potamogeton robbinsii*
Richardson's pondweed	*Potamogeton richardsonii*
flat-stem pondweed	*Potamogeton zosteriformis*

- small pondweed most common, has short, thin grass-like leaves
- Sago and flat-stem pondweed also have thin leaves
- Richardson's pondweed is the only common submerged pondweed with wide (3cm) leaves
- fern-leaf pondweed has dark, stiff leaves in a 2-dimentional plane

Native pondweeds with submerged *and* floating leaves *Potamogeton spp.*

big-leaf pondweed	*Potamogeton amplifolius*
ribbon-leaf pondweed	*Potamogeton epihydrus*
Illinois pondweed	*Potamogeton illinoensis*
floating-leaved pondweed	*Potamogeton natans*

- big-leaf and Illinois pondweeds have wide (5cm) submerged leaves, big-leaf pondweed is most common
- ribbon-leaf and floating-leaved pondweeds have narrow, grass-like submerged leaves
- submerged leaves appear first; floating leaves form later
- submerged leaves generally decay after floating leaves appear

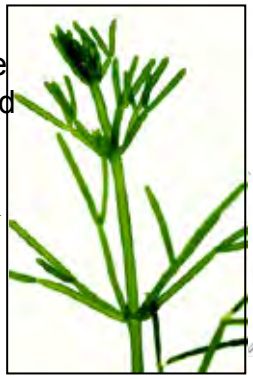
Other common submerged natives

Slender water-nymph *Najas flexilis*

- branched stem, up to 2m long, fragments easily
- slender pointed leaves <3cm long **cluster near top of stem**
- leaf base clasps stem and is much broader than leaf blade
- flowers inconspicuous

Plant-like algae

- algae has no leaves; leaf-like branchlets form whorls around stem
- ***Nitella* spp.** (brittleworts), branches are evenly forked
- ***Chara* spp.** (muskgrasses), branchlets are undivided. *Chara* spp. have a strong, musky, garlic-like odor, especially when crushed
- can be up to 2m long or as short as a few centimeters



Two less common submerged natives

quillwort *Isoetes spp.*

• clumping evergreen plant with bulbous base

• leaves stiff, grass-like, hollow, generally less than 24cm long and taper to a point

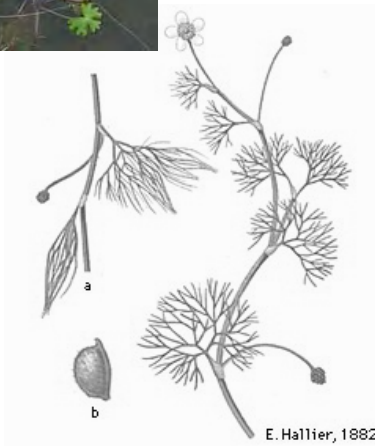
•no flowers; reproduces by spores

water buttercup *ranunculus aquatilis*

•submerged leaves **alternate**, short stalked, highly branched

• occasionally present floating leaves are scalloped, <2cm wide

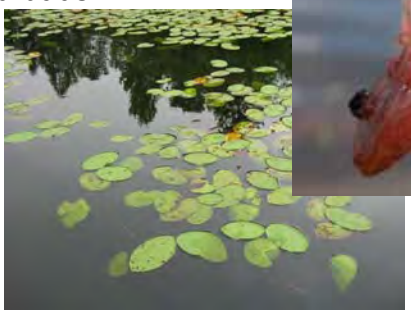
• white buttercup flowers with yellow centers are either held above water or submerged

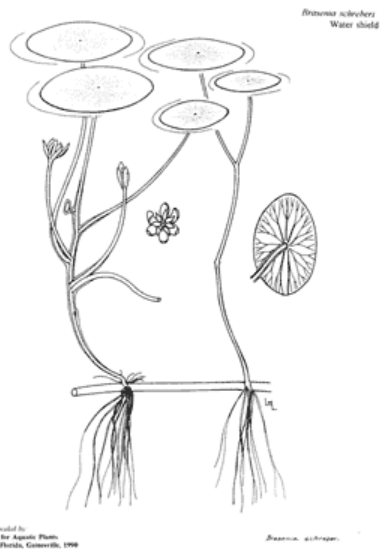


Other floating-leaved plants

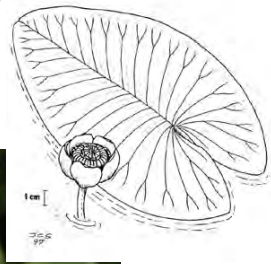
Watershield *Brasenia schreberi*

- stem attaches in **center of leaf**
- leaf oval, entire, 4-12cm long
- underside of leaf, stem and buds covered with a **slippery gelatinous substance**
- flowers small, purplish

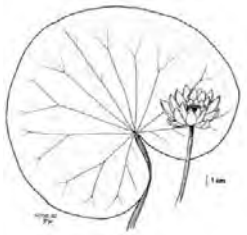




Water lilies



- stem attaches at slit in leaf, single flowers on separate stalk



- **Fragrant waterlily** *Nymphaea odorata* – class C non-designate leaf round, up to 30cm wide, on flexible stalk. Flowers white to pink, showy.

- **Spatterdock or yellow waterlily** *Nuphar lutea*: leaf large, heart-shaped, on stiff stalk. Flower yellow, ball-shaped.

Yellow floating-heart *Nymphoides peltata* – class B noxious weed

- stem attaches at slit in leaf
- leaves small (to 10cm), **leaf edges wavy**
- underside of leaf can be purplish
- flowers small (4cm), yellow, 2-5 per flower stalk, have **5 petals with ruffled edges**
- **Found on Vashon Island 2008**

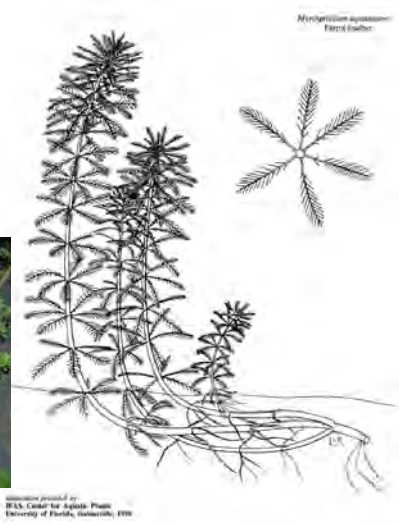
© S. G. Kazanovsky

Floating mat plants

Parrotfeather *Myriophyllum aquaticum* – class B noxious weed

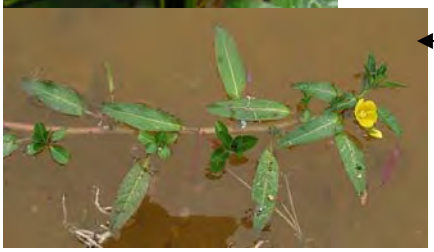
- **leaves feather-like**, whorled around stem (like milfoil)
- stems prostrate or floating, can **rise up to 30cm above the water** (this is the only emergent milfoil)
- mat looks like a **stand of tiny fir trees**
- flowers inconspicuous



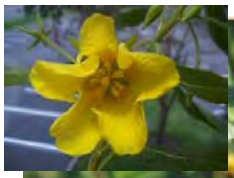



Floating primrose-willow *Ludwigia peploides* – class A noxious weed

Water primrose *Ludwigia hexapetala* – class B noxious weed

- difficult to tell apart
- both have **alternate leaves** (oval to lance-shaped) and **showy 5-petalled yellow flowers**, and both can form dense mats of vegetation
- **floating primrose-willow** is generally prostrate
- **water primrose** can extend up to 3 feet from the water

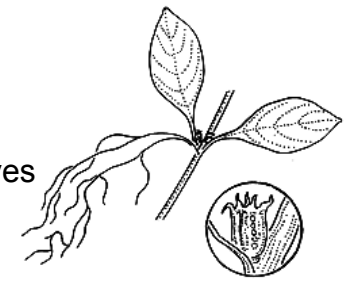



Water purslane *Ludwigia palustris* – native



Photos © Ben Legler

- **leaves opposite**, elliptical, on long stalks
- **flowers inconspicuous**, greenish, in leaf axils
- stem prostrate to erect or floating, fleshy
- can form floating mats
- leaves can be reddish, especially submerged leaves



Emergent noxious weeds and native look-alikes

Purple loosestrife *Lythrum salicaria* – Class B noxious weed

Hardhack *Spiraea douglasii* – native

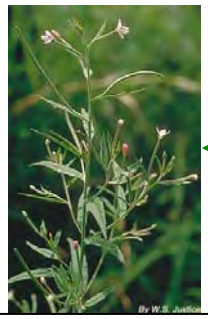
- woody deciduous shrub
- leaves **alternate**, toothed at the tip
- tiny pink flowers in spikes, appear fuzzy
- can be mistaken for purple loosestrife in flower

Hairy willow-herb *Epilobium hirsutum* – Class C designate

- tall (to 6 feet) rhizomatous herb
- whole plant distinctly **fuzzy**
- leaves **mostly opposite**, **toothed**
- wind-dispersed seeds like fireweed
- flowers July and August

Native Epilobiums

Fireweed →
Epilobium angustifolium
- tall (to 9 feet) rhizomatous herb
- leaves **alternate**, **smooth-edged**



← **purple-leaved willow-herb**
Epilobium ciliatum
- **short** (to 3 feet)**, small-flowered**
- annual, usually lacks rhizomes
- leaves mostly **opposite, toothed**

Yellow-flag iris *Iris pseudacorus* – Class C non-designate

- perennial monocot to 5 feet tall
- **leaves fold around stem** at base
- thick rhizomes form solid mats
- **showy yellow flowers** (the only yellow aquatic iris)
- green seed pods with flattened seeds
- when not in bloom can be confused with cattails (cattail leaves not folded)

Garden loosestrife *Lysimachia vulgaris* – Class B noxious weed

- perennial emergent to 8 feet tall
- red rhizomes up to 15 feet long
- **showy yellow flowers** clustered at top of plant
- leaves smooth-edged, opposite or **whorled** (usually in threes)
- stems round
- flowers July and August

Top TEN DOs for Lake Marcel

10 **DO** attend neighborhood meetings to become an active member of the Lake Marcel Community Club and the community.

9 **DO** plan your landscape to catch rainwater in rain gardens and encourage infiltration into the soil instead of running off directly into the stormwater system.

8 **DO** wash your car at a carwash, or use only hot water if you wash it on your property.

7 **DO** keep your septic system functioning with regular check-ups and maintenance.

6 **DO** shrink your lawn by planting native plants both to cut down on garden maintenance and to provide natural habitat for area wildlife. Make sure the non-native plants in your garden are not on the noxious weed list.

5 **DO** scoop pet poop and dispose of it in the trash, rather than leaving it to wash into the lake.

4 **DO** use low or no phosphorus fertilizers for your lawn and clean up spills of garden products before rain or irrigation moves them into the lake.

3 **DO** dispose of aquarium plants and animals in the trash so they cannot get into our waterways and cause environmental damage.

2 **DO** dispose of hazardous chemicals and waste safely to keep dangerous and harmful materials out of the lake.

And NUMBER 1 **DO** enjoy the natural beauty and peacefulness of where you live. It makes the other nine DO's worthwhile!