

Shoreline Restoration Plan

SHORELINE MASTER PROGRAM CITY OF MAPLE VALLEY

Prepared on behalf of:



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City of Maple Valley
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1 Introduction

1.1 Guidelines

An ecological system is made up of many interacting and interdependent chemical and biological components that, as they exist at any given time, produce habitats and shoreline landscapes. Ecological functions are the roles these systems play or the work they do (either alone or together) within the ecosystems. The Department of Ecology guidelines as established in the WAC are designed to assure no net loss of the ecological functions needed to sustain a shoreline's natural resources and to restore impaired functions. (WAC 173-26-201(2) (c) and WAC 173-26-186(8))

According to the WAC, methods to manage shorelines to sustain ecological functions include:

- Ecosystem-wide processes such as those associated with the flow and movement of water; sediment and organic materials; the presence and movement of fish and wildlife; and the maintenance of water quality.
- Individual components and localized processes such as those associated with shoreline vegetation, soils, water movement through the soil and across the land surface, and the composition and configuration of the beds and banks of water bodies.

The Department of Ecology's *Report on Restoration Planning* describes the components local governments should include in a restoration plan. They are:

- Gather information about existing land use patterns, critical areas, the degraded areas with restoration potential, special interest areas, public access areas, and channel migration zones.
- Conduct an inventory to characterize the shorelines and analyze the information to determine that is healthy, what is degraded or impaired, and what may be restored.
- Consider use of all existing analyses conducted by other governmental agencies that contribute to the characterization.
- Design policies, regulations, and restoration plans based on data collected in the inventory and as described in the characterization using "environment designations" as a tool for determining acceptable uses in particular locations:
- Regulate shoreline uses so that no net loss results, and coordinate restoration plans with other local policies and regulations.
- Focus restoration plans on tools such as economic incentives, broad funding sources, volunteer programs, and other strategies.

1.2 Shorelines in City Jurisdiction

Maple Valley is home to three popular, well-used lakes: Lake Wilderness, Lake Lucerne and Pipe Lake. Lake Wilderness, once a popular weekend and vacation destination, is a 67-acre lake with a mean depth of 21 feet and a maximum depth of 38 feet and drains into Jenkins Creek. The watershed is 318 acres in size and ultimately drains into Soos Creek. Lake Wilderness Park was transferred from King County to the City of Maple Valley in 2001. The lodge and park are now managed by the City's Parks Department. The 108-acre park includes the lodge (now used as a conference and banquet facility), tennis courts, a ball field, a swimming beach, a dock, and a boat launch. About 65,000 people visit the lake and public park each year. There also is a five-acre private park on Lake Wilderness owned and operated by the Lake Forest Estates Homeowner's Association.

Lake Lucerne and Pipe Lake are almost entirely developed as single-family parcels along their shores. The portion of the waterbody considered Lake Lucerne is 16 acres in size with a mean depth of 18 feet and a maximum depth of 37 feet. Pipe Lake is 52 acres in size with a mean depth of 27 feet and a maximum depth of 65 feet. The two lakes are connected to one another at ordinary high water levels and therefore considered one waterbody for the purposes of shoreline management. In the 1920s, Lake Lucerne and Pipe Lake were considered beautiful wooded retreats. By the 1950s, most of the properties around both lakes had been platted and sold. Today, surrounded by privately owned residential lots, there is limited public access to Lake Lucerne and Pipe Lake for recreation and boating. However, both lakes have private beach clubs for the use of property owners: Cherokee Bay Beach Club on Lake Lucerne and the Cedar Downs Homeowner's Beach on Pipe Lake.

Most of the homes on the lakes have piers, docks, or floats to provide recreational access to the water. Many of these structures are aged and some pre-date shoreline regulations. Most properties are protected from erosion with bulkheads and many have lawns extending to the water's edge.

Maple Valley's lakes are not stream fed but rather receive their water from underground springs, rainfall, and surface water runoff.

Fish stock in the lakes consists of warm water species. According to data collected to determine the existing conditions, the water is too warm for salmonid spawning and, for the most part, the shorelines have not retained enough woody debris for adequate habitat. The exception may be the shoreline along the King County Trail and isolated parcels designated as Urban Conservancy.

The shorelines around the Maple Valley lakes are fragmented due to private ownership. Nevertheless, they are under the care of a number of governmental, non-profit, and volunteer efforts. The volunteer water quality monitoring programs, the volunteer milfoil patrol, and the aquatic management plans approved by DOE have been in place for many years. The City implements these programs through an interlocal agreement with the King County Department of Natural Resources.

Other efforts, such as the approved Lake Wilderness Park Master Plan with an annual budget of \$50,000 and nearly \$575,000 over a ten-year period to fund the Lake Management District's aquatic management program, demonstrate the City's financial commitment to shoreline management and restoration.

The theme of the restoration plan "context and collaboration" supports the goals and policies throughout the Shoreline Master Plan and makes every attempt to meet the Department of Ecology's SMP guidelines:

- Prepare a shoreline inventory to determine how the policies and regulations of the local SMP will protect ecological functions
- Identify where to focus restoration programs.

2 Existing Conditions

Restoration efforts rely on the detailed *Inventory and Characterization Report* that includes, among other data, an inventory of existing ecosystems and their ecological functions, specifically those located on portions of the lakes that the City of Maple Valley manages and regulates. The *Inventory and Characterization Report* also references other local, regional, and statewide management plans that provide insight, data, and methodology to guide restoration efforts.

This restoration plan is based on the types of degradation on the shorelines and the recommendations for mitigation, enhancement, and restoration in the body of the SMP.

The following discussions summarize the existing conditions, areas of concern, and ways to improve the ecological condition of areas within shoreline jurisdiction of Maple Valley's lakes through ongoing and/or new restoration efforts. All waterbodies within Maple Valley's jurisdiction are considered in conjunction as they face very similar challenges, with each discussion focusing on a specific shoreline designation.

2.1 Aquatic Environment

Much of the shoreline habitat along Maple Valley's lakes has been altered from a naturally forested state and is now developed for private or public recreational use and access. These changes include the installment of bulkheads, landscaped lawn areas, docks, boat launches, and artificial beaches. The City currently prohibits aquaculture practices, the use of combustion engines on the water except for emergencies and necessary maintenance, and any uses that cause significant ecological impacts to critical freshwater habitats. To improve the aquatic environment the City will limit over-water structures to water-dependent uses, encourage the decrease in over-water structure size, minimize uses that may obstruct the passage of fish and wildlife, discourage underwater utilities including pipelines and cables, and remove abandoned or neglected structures.

2.2 Shoreline Residential Environment

Most of the watersheds surrounding Maple Valley's lakes is developed as low density residential or parks and recreation space. This has drastically changed the native forested landscape that formally surrounded the lakes. As a result, urban runoff from lawns, homes, driveways, and roads enter the lakes via stormwater runoff. Till, gravel, and sand form many sediment layers created to drain private lawns and public spaces for recreational use. The changes to the landscape have increased impervious surfaces and decreased tree and shrub cover, allowing runoff to enter the lakes with more pollutants and less filtration resulting in high growth rates of introduced aquatic plants (Eurasian milfoil, hydrilla, etc.), higher bacteria levels, and possible algal blooms. Measures to address these issues include the encouragement of native plantings along shoreline, encourage soft armoring alternatives to bulkheads, discourage new bulkhead creation, remove invasive vegetation both aquatic and terrestrial, educate shoreline residents of the effects of treating lawns with fertilizers and other chemicals, and possible improvements to stormwater management systems to address pollutant loads entering the lakes.

2.3 Urban Conservancy Environment

Shoreline designated as urban conservancy have much of the same issues as shoreline residential areas but tend to have less impervious surface, larger lawn areas, and at least some trees. The development in these areas is generally intended to increase public access to the shoreline and the lake itself with some infrastructure present. Because of the less developed and publicly owned nature of urban conservancy areas, they are generally the most suitable areas for restoration efforts. Improvement considerations include removing abandoned and neglected structures, assessing the possibility of restoring portions of public use areas and concentrating use in other areas, improve native plant communities, and require mitigation for new development and expansion of existing infrastructure.

2.4 Natural Environment

There is little natural environment remaining on Maple Valley's lakes with Lake Wilderness being the only lake to have two small narrow sections of natural environment designated along its eastern shoreline. These areas tend to provide similar ecological functions to the natural shoreline present prior to development. Although areas are designated as natural environment, the narrow nature of the areas and surrounding development inhibits them from providing full ecological functionality in relation to fish and wildlife habitat and water quality, for example. Areas designated as natural environment can be enhanced and maintained by removing introduced/invasive species and replacing them with native understory plantings, restoring areas on habitat edges or filling in gaps in habitat, preventing development both within and from encroaching on these areas, and provide information/education for the public to appreciate and enjoy these increasingly rare shoreline environments.

2.5 The Lake Matrix of Pathways and Indicators

The *Lake Matrix of Pathways and Indicators* system was developed by the National Marine Fisheries Service in conjunction with The Watershed Company. The Watershed Company was part of the consulting team contracted by the City in 2005 to describe and analyze the existing conditions on the City’s shorelines. Although the applicability of the matrix system for the Maple Valley lakes may not be absolutely direct, it is a general tool than can be applied at any spatial or temporal scale to evaluate the impact of regulations and restoration projects.

The Pathways and Indicators Matrices contains the scientific analysis of the degraded areas on the shorelines of Lake Wilderness, Lake Lucerne, and Pipe Lake. The matrices as shown in *Table 1: Lake Lucerne and Pipe Lake* and *Table 2: Lake Wilderness* list indicators such as water quality and habitat and then describe the “conditions/implications” of each indicator. The matrix concludes with a series of recommendations for correcting, improving, or restoring the degraded circumstances. The rating system measures environmental baseline conditions as: Properly Functioning (PF); At Risk (AR); and Not Properly Functioning (NPF).

Table 1. Lake Lucerne and Pipe Lake

Lake Lucerne and Pipe Lake		
<i>Pathways and Indicators</i>	<i>Conditions/Implications</i>	<i>Recommendations</i>
Water Quality		
Temperature/ Dissolved Oxygen (D.O.)	AR/NPF/PF- Summer surface temperatures are above the thermal preferences of salmonids. An observed thermocline between 20 and 30 feet could provide thermal refuge. Pipe Lake may be too shallow to provide sufficient thermal refuge. However, there may be submerged springs that provide thermal refuge. D. O. concentrations are unknown for both lakes.	Increase shade along the near shore area for temperature management—will have only a minor impact on lake surface temperatures overall. Reduce phosphorus input to protect against algae blooms that deplete oxygen.
pH	The pH factor is unknown.	Monitor pH; may not affect regulations.
Chemical Contamination	Unknown.	Regulate use of treated wood, finishing of over-water structures, and pesticide/herbicide application.
Nutrients/Total P	AR—total phosphorus	Control phosphorus input by discouraging excessive fertilizing. Mandate vegetated filter strips at shoreline.
Habitat Access		
Physical Barriers	Unknown- No apparent barriers within 200 feet of the lakes. Downstream issue.	Don’t allow fish-passage barriers within shoreline jurisdiction. Regulated by WDFW and USACE.

Lake Lucerne and Pipe Lake		
<i>Pathways and Indicators</i>	<i>Conditions/Implications</i>	<i>Recommendations</i>
Habitat Elements		
Exotic Species (in water)	NPF- Eradication efforts are controlling exotic species of submergent vegetation. Bullfrogs will continue to modify fish, invertebrate, and amphibian community structure. Bass, sunfish, and perch (all exotic warm water species), dominate the fish community.	Maintain physical eradication as necessary. Bullfrogs are difficult-to-impossible to eliminate- encourage resident to destroy bullfrogs when encountered. Exotic warm water fish species may be desirable- depending upon objectives. Docks, piers, and floats provide refuge habitat to large bass. Restoration efforts targeting invasive exotic vegetation.
Shoreline Upwelling/ Downwelling	Unknown, possibly AR. Bulkheads can interfere with upwelling zones.	This indicator is probably not critical for Maple Valley's lakes unless their objective is to establish salmonids spawning. There is no evidence that upwelling/downwelling has been affected by bulkheads in Lake Lucerne and Pipe Lake.
Structural Complexity (LWD/emergent/ submergent vegetation)	NPF. The submergent plant community has been almost completely eliminated by the Hydrilla eradication efforts, and it is likely that the scarcity of emergent species has also resulted from those efforts. Woody debris is absent or scarce around much of the shoreline.	Encourage re-establishment of emergent vegetation and discourage the removal of woody debris. Woody debris and emergent vegetation are often eliminated during bulkhead and dock construction. Forbid the placement of vegetation-control mats (i.e. plastic or other material) placed on the substrate to prevent emergent/submergent vegetation growth. Docks, floats, and piers affect submergent and emergent vegetation communities- consider regulating, and notify residents of the permitting requirements. (WDFW, USACE)
Substrate Composition	AR- Substrate modification in the form of beach nourishment and shoreline armoring.	Regulate filling-one needs a permit from WDFW and the USACE; add a city permit.
Shoreline Conditions		
Shoreline Vegetation and Riparian Structure	NPF- Essentially all of the shoreline of both lakes lacks the defined appropriate riparian structure.	Require/encourage planting of shoreline vegetation and limit impervious surfaces.

Lake Lucerne and Pipe Lake		
<i>Pathways and Indicators</i>	<i>Conditions/Implications</i>	<i>Recommendations</i>
Shoreline Gradient	NPF-Greater than half of the shoreline is bulkheaded. Erosion is not a pervasive problem.	Regulate bulkhead construction and repair. No new bulkheads at or below OHWM. Encourage removal or relocation of bulkheads that are presently at or below OHWM.

Table 2. Lake Wilderness

Lake Wilderness		
<i>Pathways and Indicators</i>	<i>Condition</i>	<i>Recommendations</i>
Water Quality		
Temperature/Dissolved Oxygen	AR/NPF Summer surface temperatures are above the thermal preferences of salmonids. An observed thermocline around 25 feet could provide thermal refuge. Lake Wilderness is relatively shallow. There is not a lot of room under the 25-foot contour. There may be submerged springs that provide thermal refuge. D.O. concentrations are unknown.	Increase shade in the near shore for temperature management. This will have only a minor impact on lake surface temperatures overall. Reduce phosphorus input to protect against algae blooms that deplete oxygen.
pH	The pH factor is unknown.	Monitor pH; may not affect regulations.
Chem. Contamination	Unknown	Regulate use of treated wood, finishing of over the water structures, and pesticide/herbicide application.
Nutrients/Total P	AR Total phosphorus	Control phosphorus input by discouraging excessive fertilizing. Mandate vegetated filter strips at shoreline.
Habitat Access		
Physical Barriers	Unknown. No apparent barriers within 200 feet of the lakes. This is a downstream issue for Jenkins Creek.	Don't allow fish-passage barriers within shoreline jurisdiction. Regulated by WDFW and USACE.
Habitat Elements		
Exotic Species (in water)	NPF-Eradication efforts are controlling exotic species of submergent vegetation. Bullfrogs will continue to modify fish, invertebrate, and amphibian community structure. Bass, sunfish, and perch (all exotic warm water species) dominate the fish community. Exotic invasive emergent and shoreline vegetation is present.	Maintain physical eradication efforts as necessary. Bullfrogs are difficult-to-impossible to eliminate –encourage resident to destroy bullfrogs when encountered . Exotic warm water fish species may be desirable depending upon objectives. Docks, piers, and floats provide refuge habitat to large bass.

Lake Wilderness		
<i>Pathways and Indicators</i>	<i>Condition</i>	<i>Recommendations</i>
Shoreline Upwelling/ Downwelling	Unknown, possibly AR. Bulkheads can interfere with upwelling zones.	This indicator is probably not critical for Maple Valley's lakes unless their objective is to establish salmonids spawning. There is no evidence that upwelling/downwelling has been affected by bulkheads in Lake Wilderness.
Structural Complexity (LWD/emergent/ submergent vegetation)	There are distinct sections of the lake where conditions differ substantially. Woody debris is absent or scarce around much of the residential shoreline. NPF. However, woody debris is less abundant along the northwestern shoreline; still PFC for wood. NPF for submergent and emergent vegetation. The submergent plant community has been almost completely eliminated by the milfoil eradication efforts, and it is likely that the scarcity of emergent species has also resulted from those efforts.	Encourage re-establishment of emergent vegetation and discourage the removal of woody debris. Woody debris and emergent vegetation are often eliminated during bulkhead and dock construction, Forbid the placement of vegetation-control mats (i.e., plastic or other material placed on the substrate to prevent emergent/submergent vegetation growth). Enforcement can be via WDVW, who would have to permit mat placement under the State Hydraulic Code. Docks, floats, and piers affect submergent and emergent vegetation communities- consider regulating, and notify residents of the permitting requirements (WDFW, USACE)
Substrate Composition	AR-Substrate modification in the form of beach nourishment and shoreline armoring in the residential section.	Regulate filling-one needs a permit from WDFW and the USACE; add a City permit. Regulate bulkhead construction and repair; WDFW and USACE permits are required.
Shoreline Conditions		
Shoreline Vegetation and Riparian Structure	There are distinct sections of the lake where conditions differ substantially. The eastern shoreline from the private beach north to the County park is PFC; from the private beach south there is a section that is near PFC; the residential section is NPF; and the park section is AR	Require/encourage planting of shoreline vegetation and limit impervious surfaces. Restore shoreline vegetation within the park. Remove invasive exotic vegetation from natural areas. Limit impervious surfaces.
Shoreline Gradient	NPF The majority of the residential shoreline is bulkheaded. Natural areas along the Park and eastern shore are PFC. Erosion is not a pervasive problem; there is evidence of erosion at locations with unmanaged human access where vegetation has been cleared.	Regulate bulkhead construction and repair. No new bulkheads at or below OHWM. Encourage removal or relocation of bulkheads that are presently at or below OHWM. Restrict water access to designated areas.

3 Restoration: A Collaborative Process

According to the Department of Ecology, “no net loss” requires sustaining habitat functions such as: 1) the flow and movement of water, sediment, and organic materials; and, 2) the presence and movement of fish and wildlife and maintenance of water quality. This includes attention to shoreline vegetation and soils as well as water movement through soils, and particularly water movement across land surface and the composition of beds and banks next to water bodies.

As indicated in *Tables 1 and 2 Lake Pathways and Indicators*, many obstacles prevent restoration of the three lakes. However, tools do exist to enable a local government to work toward achieving restored ecological functions. Everything from stringent local development regulations that impose authority to lively public education programs that elicit participation, these tools work together to improve shorelines.

Fragmentation along the Maple Valley shorelines due to private property ownership makes it difficult, if not impossible, to comprehensively restore upland shoreline functions. Only a small portion of the total shorelines area is in the public domain. That stated, in addition to a permitting process that will require parcel-by- parcel mitigation and restoration, the best chances for functional restoration are collaborative lake management programs that combine education and non-regulatory controls.

To that end, a number of ongoing collaborative efforts are at work. The following list describes the complex and continuous activities involving state, county, and local government; homeowner associations; and, individual participation—all determined to improve the water quality, shoreline habitat, and overall enjoyment of the lakes.

3.1 Government Agencies

City of Maple Valley

Department of Community Development

The Department of Community Development reviews permit applications for development and redevelopment on the shorelines. The Department administers the Maple Valley Municipal Code, Chapter 18, Development Regulations, and issues permits based on compliance with the SMP. The Department requires mitigation of development impacts and restoration of ecological functions when required by regulation.

Comprehensive Plan Updates

The City Council adopted the updated Comprehensive Plan in January 2016.

Critical Area Ordinance Updates

The City Council adopted the updated Critical Areas Ordinance in March 2012.

Parks and Recreation Department

The Parks and Recreation Department manages the Lake Wilderness Park and Lodge, including a park, a public beach, a playground, and a conference facility. The City of Maple Valley acquired the Lake Wilderness Park and Lodge in 2003 through a transfer of ownership from King County

Adjacent to the park is the Lake Wilderness Boat Access, a public boat ramp that until recently was under the authority of the Washington Department of Fish and Wildlife (WDFW). In 2005 the City entered an agreement with the WDFW to assume ownership and operation of the boat launch in exchange for a permanent easement for access to the lake. The WDFW received a permit to remove the existing deteriorating boat launch and replace it with a smaller launch. As a condition of the permit, approximately 5,200 square feet of the existing developed area was restored to its natural state with native vegetation.

Lake Wilderness Park Master Plan

The City's approved the master plan in 2007. Through 2018 multiple projects have been complete including improvements to trails, shoreline recreation infrastructure, and the Lake Wilderness Lodge, as the City continues to fulfill its vision for the park.

The Parks Department will continue to work in collaboration with other city departments and with the Lake Wilderness Management District, the LWMD Citizen Advisory Committee, and the Lake Wilderness Arboretum Foundation to fulfill the goals of the master plan and maintain the City's overall vision.

Parks and Recreation Element for the Comprehensive Plan

In February 2014 an updated version of the Parks, Recreation, Cultural, and Human Services Plan was adopted. The plan includes a vision and goals for the City's park and recreation system, a list of priority improvement projects for the next six years, and implementation strategies for parks, natural areas, trails, and recreation programming.

Public Works Department

The City's Public Works Department administers the *Integrated Aquatic Vegetation Management Plan for Lake Wilderness*. The plan is an ongoing effort begun in 1994 under the direction of King County Surface Water Management Division for the long-term management of aquatic plants and lake stewardship activities.

The Lake Wilderness Lake Management District was created in 1998 for the purpose of assessing private property owners to raise funds to finance the ongoing efforts. In 2006, the City of Maple Valley assumed the financial responsibility for continuing the aquatic management.

An objective of the plan is to eradicate Eurasian water milfoil. Volunteer monitors who participate in the King County Lake Stewardship Program keep track of the milfoil populations and the efforts to recover native plants that are beneficial to the aquatic life of the lake.

Funds for ongoing efforts will be used to help control and monitor plant (Eurasian water milfoil, native, and non-native species) activities and to reach out to educate the population of all lake users rather than just focus primarily on lake property owners.

Public education and stewardship are important features of the management plan and will include such efforts as brochures about non-toxic dock preservative products, the importance of cleaning boats after use, and the detrimental aspects of milfoil. The education program would also include seminars on stewardship and field trips for youths to learn about ecological systems along Lake Wilderness shorelines.

The cost estimates of a 10 year Lake Management Program is about \$575,000 with annual expenditures averaging \$57,480.

City of Covington

A portion of Pipe Lake is within jurisdiction of the City of Covington. Maple Valley and Covington share financial responsibility for stewardship programs on Pipe Lake. Most of the shoreline within Covington's jurisdiction remains in a "natural" state and is a priority for long-term protection and preservation of shoreline ecological function.

King County

King County Lake Wilderness Trail

A leg of the 15-mile Cedar River Trail runs along Lake Wilderness and bisects the Lake Wilderness Arboretum. The trail is owned and managed by King County Parks Department.

King County Lake Stewardship Program

Through an interlocal agreement with the City of Maple Valley, King County manages a Lake Stewardship program that includes volunteer monitors on Lake Wilderness, Lake Lucerne and Pipe Lake. The tracking contributed to a longitudinal study of growth and the effectiveness of control measures to reduce impacts.

The Stewardship Program staff authored the Lake Lucerne and Pipe Lake Integrated Aquatic Vegetation Management Plan and co-authored the Lake Wilderness Integrated Aquatic Vegetation Management Plan.

The Stewardship Program has worked closely with the City of Maple Valley Public Works Department to administer the Lake Wilderness Lake Management District (LWLMD) and to staff the LWLMD Citizen Advisory Committee (CAC). The CAC is comprised of five private property owners on Lake Wilderness, a staff representative from King County, and one from the City of Maple Valley. The purpose of the committee is to work with the staff to identify water quality issues and to guide the activities of the Lake Management District.

Water Resource Inventory Area (WRIA) 8 and 9

WRIA 9 Green/Duwamish and Central Puget Sound Watershed Chinook salmon Plan

The City of Maple Valley participates in the interlocal agreement with other cities and King County to provide financial support for the preparation and implementation of a federally mandated plan to restore Chinook salmon. Most of Maple Valley lies within the boundary of the WRIA 9.

WRIA 8: Lake Washington/Cedar/Sammamish Watershed: Chinook salmon Plan

The City of Maple Valley participates in the interlocal agreement with other cities and King County to provide financial support for the preparation and implementation of a federally mandated plan to restore Chinook salmon. A small portion of Most of Maple Valley lies within the boundary of the WRIA 8.

Washington State

Washington State Department of Fish and Wildlife (WDFW)

For many years the WDFW has operated a public boat launch adjacent to the Lake Wilderness Park. The boat launch has been transferred to the City of Maple Valley but the WDFW retains an easement for access to the launch.

Washington State Departments of Agriculture and Ecology

The Departments of Agriculture (DOA) and Ecology (DOE) collaborated to publish the *Integrated Pest Management Plan for Freshwater Emergent Noxious and Quarantine Listed Weeds*. The purpose of the plan is to advise contractors/cooperators who seek to treat noxious emergent freshwater weeds under the Noxious Weed NPDES permit. The plan provides a detailed description of the classes of noxious weeds found in fresh water, the harm they cause, how to detect them and methods of bio-control.

The plan has particular application to Maple Valley regarding the removal of yellow flag iris.

Washington State Department of Ecology, Maple Valley and Covington

The cities of Maple Valley and Covington share jurisdiction of Pipe Lake. Since 1995 the state DOE and the two cities have joined efforts to eradicate milfoil and Hydrilla in Pipe Lake.

3.2 Non-Profit Organizations

Lake Wilderness Preservation Association (LWPA)

The LWPA formed to initiate the eradication of Eurasian milfoil and to improve and promote the safety of Lake Wilderness and its watershed. Members are involved in the aquatic management program, the volunteer water monitoring programs, and they also conduct cleanup efforts around the lake. The LWPA offers educational opportunities to learn about lake

management including milfoil re-infestation prevention, aquatic plant identification, native shoreline plants, and noxious weeds and wildlife.

Lake Wilderness Arboretum Association/South King County Arboretum Foundation (LWA)

The Lake Wilderness Arboretum Association (LWA) maintains a 40-acre arboretum adjacent to Lake Wilderness Park. The Foundation works closely with the City of Maple Valley to provide a setting where people can study native and cultivated ecosystems. The focus of the LWA is on native plants. The Foundation provides educational programs, collects and propagates native plants, and has plans to establish an interpretive center. The Foundation offers numerous volunteer opportunities to nurture and protect the 40-acre arboretum and sponsors plant sales to raise funds for ongoing programs.

Lake Forest Estates Homeowners' Association (Lake Wilderness)

The Lake Forest Estates Homeowner's Association manages the private waterfront open space and recreation area on Lake Wilderness for the benefit of the property owners.

Cherokee Bay Community Club (Lake Lucerne)

The Cherokee Bay Community Club operates a private waterfront center for residents of Cherokee Bay. Club members participate in the volunteer monitoring programs offered by King County to supply data regarding Hydrilla.

Cedar Downs Homeowner's Association (Pipe Lake)

The Cedar Downs Homeowner's Association owns and operates a private beach club for property owners on Pipe Lake. Club members participate in the volunteer monitoring programs offered by King County.

3.3 Additional Restoration Tools

The Department of Ecology also recommends considering other tools that have found success in neighboring jurisdictions.

Conservation Easements

Conservation easements place restrictions on deeds that run with the land and can be enforced for the life of the easement (preferably in perpetuity). A governmental agency or a 501(c)(3) non-profit land-holding organization may "hold" a conservation easement.

The holder of a conservation easement is responsible for annual monitoring and enforcing the terms of the easement. Conservation easements may be donated or purchased and many accrue tax benefits. The terms of the easement must meet the needs of both the landowner and the holder. Conservation easements may be used as a method to preserve and restore riparian corridors. In the case of Maple Valley lakes, such an easement may help create shade along the shorelines and provide areas of large woody debris.

Low impact detention, surface water, and storm water collection systems.

In combination with the adoption and utilization of new storm water management regulations and programs associated with federal and state National Pollutant Discharge Elimination System Permitting (NPDES), low impact systems will be utilized to mitigate new alterations and enhance existing systems when and where feasible. Surface and storm water systems can be implemented and upgraded to better restore water quality by reducing runoff, improve groundwater recharge and reduce pollutants when opportunities present themselves.

Shoreline Enhancement

Replace yellow flag iris

Use the map of the existing location of the yellow flag iris populations to judge success of future enhancement and restoration activities and to establish a shoreline enhancement program to replant both existing areas of yellow flag iris and other “open” shoreline areas that are potential sites for colonization by the iris.

Replace woody debris

Woody species provide a greater number of habitat niches above water and below water from woody debris (i.e. egg laying sites for invertebrates and amphibians, predator perching sites for invertebrates and escape habitat for invertebrates, amphibians, and fish). In general a variety of woody species will increase the species richness of the base of the food chain, thereby supporting more species higher in the food chain and increasing the overall resiliency and productivity of the regional ecosystems.

Reduce water temperature

Reduce temperature of shoreline waters or provide refuge for a variety of waterfowl (e.g. reducing predation of ducklings from eagles) and invertebrates.

Replace Plantings

Away from the shoreline but still in wet soil conditions, consider Pacific Ninebark (attractive flowering shrub which is used as an ornamental). On the outer wet edge of the shoreline, we suggest black twinberry (*Lonicera involucreata*) and black cottonwood (*Populus balsamifera*) and Western Red Cedar (*Thuja plicata*).

Specific to Pipe Lake

- Replant to restore shoreline’s edge; slope of edge is gradual and allows for replanting
- Map pockets of yellow flag iris slated for enhancement. The planting recommendations for Lake Wilderness also apply to Pipe Lake.

Reduce Lawn Area

Lawns contribute an elevated level (relative to natural conditions) of nutrients and other chemicals due to a combination of heavy grazing by Canada geese and application of artificial fertilizers and other lawn care chemicals. Based on soil type, soils have a specific capacity for retaining phosphorous and nitrogen ions originating from sediment, goose droppings and lawn fertilizers. As the soil capacity is exceeded, soils eventually begin exporting phosphorous and nitrogen in increasingly larger quantities. This can trigger the rapid growth of nuisance aquatic plants and the eventual collapse of the lake ecosystem. Once this eutrophic state is attained, lakeside homeowners tend to resort to chemical control of nuisance aquatic life and that action further destabilizes the lake ecosystem by altering the aquatic planktonic community.

In General

These conditions help to restore the ecological function of shoreline:

- Flows that are slowed sufficiently to allow particles to settle out
- Physical filtering of vegetation and roots mechanically to remove sediments from the water column
- The slope of the buffer is of a low enough gradient to preclude formation of rills and scouring (i.e. less than 5% - Norman 1996)
- There is large woody debris on the ground surface to create roughness*

*The best strategy to accomplish this is to require a buffer of sufficient width around the lake to intercept surface borne sediment. A buffer perpendicular to the lake along the side property line does very little to reduce this type of surface borne nutrient loading.

4 Conclusion

The Maple Valley Shoreline Master Program (SMP) demonstrates the City's commitment to conscientious protection and restoration of the shorelines along Lake Wilderness, Lake Lucerne, and Pipe Lake. The policy direction in the SMP makes it clear that the City intends to use its development regulations and the State's regulatory authority to restore ecological functions wherever possible. With regard to private property, the City is limited to imposing stronger regulations when permit applications are submitted for redevelopment. This will occur as docks, bulkheads, and other in-water structures deteriorate or when structural additions are permitted. The City will make use of its Conditional Use Permit process to assure that necessary improvements meet local and state standards.

The SMP contains numerous recommendations that contribute to the restoration of the shorelines including:

- Remove degraded vegetation

- Minimize the removal of natural vegetation; replant native species
- Limit lawn and pervious surfaces (decks) to 20% lot coverage
- Locate patios 50 feet away from OHWM
- Employ soil bioengineering
- Manage aquatic weeds
- Locate parking away from water; share spaces when appropriate
- Restore water quality by controlling setbacks, buffers, and storm water storage basins to lessen negative impacts
- Require construction practices that minimize effect on water quality
- Control surface runoff through treatment, release of surface water
- Use fragile or unique areas for non-intensive recreation
- Require setbacks for accessory uses
- Limit use of pesticides, fertilizer, toxic materials and prevent them from entering water
- Use bio-filtration systems to screen out pollutants; use grassy swales, retention ponds, and other vegetative features
- Disallow the walking surface elevation of a residential dock or pier from being greater than 3 feet tall over the water
- Use Conditional Use Permit to permit docks, etc
- Prohibit residential development in critical areas
- Limit lot coverage

5 Source Materials

City of Maple Valley, 2004. Lake Wilderness Integrated Aquatic Vegetation Management Plan, presented by Aquatechnix, LLC.

King County, 2004. Pipe and Lucerne Lakes Integrated Aquatic Vegetation Management Plan. King County Department of Natural Resources and Parks, Water and Land Resources Division.

King County, 2013. The Lakes of Maple Valley and Covington: A Report on Monitoring Results for the 2012 Water Year at Lake Lucerne, Pipe Lake, and Lake Wilderness. King County Lakes and Streams Monitoring Group, Science and Technical Support Section, Water and Land Resources Division, King County Department of Natural Resources and Parks.

The Watershed Company, 2019. Inventory and Characterization Report. Shoreline Master Program Update for the City of Maple Valley.