

Ken Lake

Comprehensive Lake Management Plan

2023

Introduction

Ken Lake is the most valued community asset providing residents with opportunities to experience nature up close and provides abundant recreational opportunities for those who are members of the Lakemoor Community Club. For over 50 years, the lake has had many studies conducted and documentation gathered but a Comprehensive Lake Management Plan was never developed. On February 8, 2021 the LCC Board approved the development of a Lake Management Plan for Ken Lake as both the Board and the Community at large desired a plan which would provide a strategy to enhance this asset. The Board and the Lake Management Committee adopted a nine step planning process which was used in the development of this plan and each step is detailed in this plan.

Step 1: Identify Problems and Opportunities

The first step of the nine step planning process adopted by the LCC Board and the Lake Management Committee was to Identify Problems and Opportunities. At the request of the Lake Management Committee, the LCC Board solicited input from residents regarding problems and opportunities residents had identified and this data was collected by the Chair of the Lake Management Committee. The following are the problems and opportunities identified by our community:

Lake Bottom Muck
Aquatic and Shoreline Plants
Algae
Lake Level
Recreational and Community Access
Shoreline Management Responsibilities
Canal Sediment Buildup
Flood Hazard Reduction
Quality Fish and Wildlife Habitat

Step 2: Determine Objectives

The Objectives of the Lake Management Plan are:

1. Maintain a healthy viable ecosystem for recreation, fishing, and wildlife.
2. Ensure the LLC and its residents have input in the process and their concerns are addressed.
3. Develop a planning document that is reviewed no less than triennially.

Step 3: Inventory Resources

An exhaustive analysis of existing records of work done previously by others on the lake was conducted prior to conducting a Natural Resource Inventory of Ken Lake to avoid duplicating work previously done by others and to identify data gaps that needed to be filled. Upon completion of this analysis, a comprehensive Natural Resource Inventory of Ken Lake was conducted targeting the soil, water, plants, animals, air, and people to fill the identified data gaps.

Step 4: Analyze Resource Data

Upon completion of the analysis of the existing data and the completion of the Natural Resource Inventory, the Lake Management Committee reviewed each of the problems and opportunities identified by the community to determine if the data in previous and on-going studies and/or monitoring and the Natural Resource Inventory identified a similar problem or not and what are the findings.

Lake Bottom Muck

Lake bottom muck is typically comprised of organic and inorganic material of varying proportions and is a natural occurrence in a healthy functioning ecosystem. “Excessive amounts of muck in the wrong places certainly can cause problems, but just enough muck in the right places is essential for a healthy lake that supports diverse wildlife and fishing. That’s because, in addition to midge and mayfly larvae, muck provides habitat for numerous other aquatic organisms called macroinvertebrates (Pennak 1953; e.g., other insect larvae, leeches, worms, snails, mussels). These organisms provide food for a variety of fish, insects, amphibians, and water birds. Thus, the goal for resource managers is not to eliminate muck entirely, but to keep the right amount of muck in the lake for proper ecosystem function and human uses of the water body.” (Hoyer, Canfield, Brenner 2017, UF; A Beginners Guide to Water Management). The Natural Resource Inventory focused on identifying areas of excessive muck and then determine the potential sources of the material and composition of the material present that have created these excessive deposits. The Natural Resource Inventory findings concluded that unlike Capitol Lake in Olympia, Washington, Ken Lake does not have a surface waterbody which transports large amounts of sediment (inorganic particles such as sand, silt, and clay) to Ken Lake. Where these inorganic deposits have occurred in Ken Lake these deposits were observed close to the source such as eroding shoreline along the east canal. Ken Lake is a low gradient system and lacks the flow and the velocity needed to transport inorganic materials far from the source but rather acts like a settling basin with the west canal outlet being the exception. On the other hand, excessive amounts of muck were comprised primarily of organic material conveyed to Ken Lake through the stormwater system that serves the many streets in our community was identified and these deposits varied in magnitude due to several characteristics of the drainage area each stormwater outlet serves. These excessive deposits are a problem that needs to be addressed but is closely associated with the community’s stormwater system. The excessive lake bottom muck is a point source “localized” problem confined to the locations where stormwater pipe outlets in to the lake and not a problem associated with the entire lake. The stormwater system is very efficient at conveying pollutants from our streets and yards to the lake but this system also is very efficient at conveying vast amounts of organic matter from our streets in to the lake that would have not been deposited in the lake otherwise. Over time these deposits vary in length, width, and depth depending upon the drainage area of each pipe and degrade near shore resident fish habitat as well as recreational uses near each of the outlets. In addition, during the inventory other structures were located on the lake bottom such as tires, barrels, and railroad ties. It was also noted during the inventory that many shoreline property owners regularly rake their beachfront as they desired a clean gravelly bottom for their shoreline. The Lake Management Committee will develop alternatives and make recommendations to the LCC Board to address this concern.

Aquatic and Shoreline Plants

The Natural Resource Inventory identified that State and County listed noxious weeds are present on the shoreline of various parcels around the lake. Plants such as the Yellow Flag Iris, Fragrant Waterlily, and Reed Canary grass are present and are considered noxious weeds and are not native to the Pacific Northwest. The Lake Management Committee will develop alternatives and make recommendations to the LCC Board to address this problem. Watershield, an aquatic plant which is not considered a noxious weed, is present and can become problematic for recreational uses of the lake. Ongoing monitoring of this species is recommended. There is ongoing aquatic weed control focused on introduced invasive noxious weed species through the targeted application of aquatic herbicide by a licensed professional applicator. This highly targeted effort has occurred for many years and has been successful at managing these species. Additional education on preventative measures such as cleaning and inspection of watercraft used elsewhere by residents was identified as needed to prevent future noxious weed infestations. Technical assistance is also needed to assist homeowners on controlling existing noxious weeds.

Algae

Monitoring of the lake has been conducted by Al Hatten, Chairman of the Lake Management Committee and the data has been peer reviewed by the Washington State Department of Ecology and Thurston County Health Department and data has been collected since April 2017 to present. The five years of data collected indicates that there are normal and predictable seasonal fluctuations in algae levels and species present and at this time algae is not a concern that needs to be addressed because the water quality data indicates that the water quality is very good and support intended uses. The Lake Management Committee will not develop alternatives for this concern but does recommend an ongoing monitoring program for the lake to detect changes water quality and clarity trends.

Lake Level

Monitoring of the lake has been conducted by Al Hatten, Chairman of the Lake Management Committee and the data has been peer reviewed by the Washington State Department of Ecology and Thurston County Health Department and data has been collected since April 2017 to present. The five years of data collected indicates that there are seasonal fluctuations of the lake level and at present this is not a concern that needs to be addressed because the data indicates that the lake level follows seasonal predictable patterns. The Lake Management Committee will not develop alternatives for this concern but does recommend an ongoing monitoring program for the lake to detect changes in the lake level that are statistically different from established patterns that may be the result of impact of development in the Ken Lake watershed, Climate Change, or other factors.

Recreational and Community Access

The Lake Management Committee reviewed past and present information on Recreational and Community Access and concluded that Recreational and Community Access continues to be improved to make our facilities better accessible to all including residents with disabilities. (This would be the place to highlight improvements such as new docks, dog park, scheduled lake access for dogs, tennis court

sidewalk, drinking fountains, new trail in the Ken Lake Urban Forest, new playground equipment, handicap accessible toilet facility at the Main Recreation Area, and a road to the pump station in the park. The Lake Management Committee will not develop alternatives for this concern but does recommend ongoing improvements to community facilities to all residents and encourages residents to submit ideas for improvements for recreational and community access to the LCC Board.

Ongoing water quality monitoring has occurred since 2017 and data collected “in house” includes lake level, temperature, dissolved oxygen expressed both as a percentage and in mg/l, pH, conductivity, salinity, ORP (Oxidation Reduction Potential), Total Dissolved Solids (TDS), and Secchi disk readings. Additional data is gathered from laboratory samples includes Fecal Coliform Bacteria, E Coli Bacteria, Nitrate, Nitrite, Total Nitrogen and Phosphorus. This data has been a valuable baseline of information for the overall health of the lake both now and in to the future.

Periodic nonlethal management of geese is conducted on an as needed basis when E Coli bacteria levels are trending upwards towards from given baseline. A committee is activated periodically as needed triggered by the data collected by the Lake Management Committee.

Shoreline Management Responsibilities

The Lake Management Committee reviewed past and present information on Shoreline Management Responsibilities and concluded that further clarity is needed as to where the Lakemoor Community Club responsibilities begin and end and individual homeowner’s responsibilities begin and end all with respect to the shoreline as it is a shared property boundary. The Lake Management Committee will develop alternatives and/or recommendations for this concern.

Canal Sediment Buildup

The Lake Management Committee reviewed archived information and studies on this concern, archived data, and information collected during the Natural Resource Inventory and concluded that Canal Sediment Buildup is a concern and the Lake Management Committee determined that the East and West Canals should be discussed independently in the plan as follows.

East Canal

The East Canal is a shallow portion of the lake surrounded by homes in our community and thus does not exhibit any velocity and/or scour potential. There are two stormwater outlets terminating in to the East Canal conveying organic material collected on the streets to the East Canal. Samples of the material on the bottom of the East Canal were taken to the Oregon State University for testing and the results of the testing indicated that 85% of the material is of **inorganic** rather than of **organic** origin. Ken Lake, with exception of its outlet, acts like a settling basin and does not have sufficient velocities to transport gravel, sand, silt and clay particles of any sufficient quantity and over any distance in the lake and for this reason, deposits of material whether organic or inorganic in nature typically are deposited close to the source. The vast majority of the material deposited in the East Canal is of an **inorganic** source which has determined to be erosion of the shoreline areas of the East Canal and other data and observations support this conclusion.

West Canal

The West Canal is the current outlet for Ken Lake and is surrounded on both sides with homes within this community. There is one stormwater outlet in to this canal. Unlike the East Canal, the West Canal does exhibit surface and subsurface water velocities that vary depending upon the storm event(s) which generate the ever fluctuating water elevation above the outlet control. The outlet control elevation plays role in scour depth potential. Scour potential does exist at this time to varying degrees in this canal but the scope and extent depends upon the water elevation above the outlet control generated a particular storm event or events. Similar shoreline erosion occurs on the West Canal as does occur in the East Canal although there is the ability to transport some of the material due to surface and subsurface water velocities and scour discussed above in the West Canal. An ongoing search for engineering designs showing benchmarks, a profile, and cross-sections of this canal have not been successfully located but is ongoing. In lieu of this information, and based upon the data gathered and observations made, the Lake Management Committee determined that unlike the East Canal, the West Canal has not been as adversely impacted by shoreline erosion as the East Canal. This difference is because the effects of the shoreline erosion are mitigated in part due to the factors mention previously and it was noted that the outlet control has been functioning as designed. A request for information has been made to the City of Olympia for any detailed engineering survey data they might have on the West Canal. To date the City of Olympia has not processed our request for information and our request is pending.

Flood Hazard Reduction

The costly and damaging flooding of waterfront households during the 2007 and 2008 severe weather events were extensively studied by the City of Olympia in conjunction with the Ken Lake Stormwater Committee. Two major causes of sudden lake level rise resulting in flooding. One was occlusion of the outflow culverts in the West Canal by trapped debris and an escaped boat that was trapped at the culvert entrance. The second was a backup of water caused by occluded canals in the Ken Lake Tot Lot and the drainage creek in Westbrook Park both before and after the culvert under Parkmont Lane, plus the partial infilling of the Westbrook culvert, reducing total water volume capacity. Subsequent to the flooding, trash racks were installed on the side of the Ken Lake Culverts to deflect debris, the Tot Lot ditch and fence dividing this water system from Westbrook Park, the Westbrook Park culvert and stream systems were all cleared out, resulting in significantly better movement of water out of the lake in high level situations. Regular maintenance by Ken Lake and the City of Olympia Stormwater department is needed to maintain this protection against the increasing number of severe weather events. The Lake Management Committee determined that this concern needs to be addressed and will formulate alternatives to address this concern.

Quality Fish and Wildlife Habitat

We recognize that our lake is a home for wildlife and that it not only provides valuable habitat for animals of many types but that this enriches the lives of Ken Lake residents. Maintaining high quality habitat will make it possible for healthy populations of fish, invertebrates, waterfowl, and other species that utilize the lake.

Maintenance of high quality aquatic, shoreline and upland habitat is very important for the species which also inhabit our community and is essential for healthy populations of these species. Native plants provide food and nesting habitats and should be encouraged through technical assistance and educational programs for residents. Additional technical assistance and educational programs could also focus on ways to enhance habitat for raptor and other avian species as well as amphibians and small mammals greatly enhancing the food, shelter, and nesting habitat available.

In addition to invasive plant species mentioned earlier in this document, Invasive plant species such as Invasive animal species such as bull frogs can also be managed. The management of geese numbers to control fecal coliform bacteria levels is ongoing and is also discussed earlier in the Recreation and Community Access portion of this document. Ongoing monitoring of wildlife species along with educational and technical assistance programs will greatly improve this community asset as well as enhance how we live in harmony together. The Lake Management Committee recognized that this concern is related to many portions of other concerns identified and will formulate alternatives and recommendations for this concern.

Step 5: Formulate Alternatives

Lake Bottom Muck

- No Action Alternative
- Street Hygiene – City of Olympia and Residents of Ken Lake: Annual resident education; Remove objects found on lake bottom by Lakemoor Community Club
- Stormwater Retrofit – Lakemoor Community Club
- System Maintenance and Organic Deposit Removal near stormwater outlets – Lakemoor Community Club

Aquatic and Shoreline Plants

- No Action Alternative and ongoing monitoring
- Eradicate some of the State and County noxious weeds present.
- Eradicate all of the State and County noxious weeds present.
- Provide voluntary education and technical assistance to control and prevent infestations
- Provide notice to all lakeside residents of plants causing concern, or other issues, as was done with docks.

Shoreline Management Responsibilities

- No Action Alternative
- Establish and clarify responsibilities for waterfront property owners and Lakemoor Community Club including facilitate clarifying management guidelines for shorelines between Dept of Ecology, City of Olympia, and Lakemoor Community as relates to restoring shoreline.

Canal Sediment Buildup

East Canal

- No Action Alternative and conduct Ongoing Monitoring
- Organic material near the stormwater outlets is removed - City of Olympia in partnership with the Lakemoor Community Club
- Property owners restore shoreline areas and remove sediment (inorganic material). Organic material from the canal bottom is removed near the stormwater outlets - Lakemoor Community Club

- Lakemoor Community Club restores shoreline areas and removes sediment (inorganic material). Organic material from the canal bottom is removed near the stormwater outlets - Lakemoor Community Club

West Canal

- No Action Alternative and conduct ongoing monitoring.
- Organic material near the stormwater outlets is removed -Lakemoor Community Club

Flood Hazard Reduction

- No Action Alternative and ongoing monitoring.
- Collaborate with City of Olympia Stormwater and Ken Lake Grounds Manager to ensure that outflow of Ken Lake is maintained to ensure optimal outflow in high water events and that flow is not impeded by maintaining drainage through the Tot Lot and Westbrook park streambed and culverts.

Quality Fish and Wildlife Habitat

- No Action Alternative and ongoing monitoring.
- Develop technical assistance and educational programs for homeowners to provide tools to enhance fish and wildlife habitat on their property.

Step: Evaluate Alternatives

Lake Bottom Muck

- No Action Alternative and ongoing monitoring
- Street Hygiene – City of Olympia and Residents of Ken Lake; Annual resident education; Remove objects found on lake bottom by Lakemoor Community Club
- Stormwater Retrofit – Lakemoor Community Club
- Stormwater System Maintenance and Organic Deposit Removal near stormwater outlets – Lakemoor Community Club

Discussion: The Natural Resource Inventory of Ken Lake by the Lake Management Committee clearly documented excessive point source deposits of organic material which is being deposited in well-defined areas around stormwater pipe outlets and the Gruen Swale and **not** the entire lake bottom as previously thought. The stormwater systems is very efficient in transporting organic material as well as pollutants to the lake from areas within the Ken Lake subdivision that would not have occurred prior to development. A healthy lake ecosystem, such as Ken Lake, contains aquatic plants on the bed and the shores of the lake and data peer reviewed by the Washington State Department of Ecology supports this finding. Key to solving the problem with the stormwater system contribution of organic matter to nearshore areas where outlets occur, will require dialogue and partnership with the City of Olympia who owns, maintains, and is otherwise responsible for the stormwater system. Lakemoor Community Club should prioritize removal of items identified on the lake bottom such as tires, drums, and railroad ties that could be completed by volunteers during periods of low water.

Recommendations: The Lake Management Committee recommends a combination of several of the alternatives listed to address this problem.

- Ongoing monitoring
- Street Hygiene which includes annual resident education to reduce organic matter and chemicals flowing from streets into lake – City of Olympia and Residents of Ken Lake
- Remove objects found on lake bottom by Lakemoor Community Club
- Stormwater Retrofit to reduce the discharge of organic material and contaminants to the lake – Lakemoor Community Club
- Stormwater System Maintenance and Organic Deposit Removal near stormwater outlets – Lakemoor Community Club.

Aquatic and Shoreline Plants

- No Action Alternative and ongoing monitoring
- Eradicate some of the State and County noxious weeds present.
- Eradicate all of the State and County noxious weeds present.
- Provide voluntary education and technical assistance to control and prevent infestations

Discussion: The Lake Management Committee recognizes that noxious weeds can inhibit recreational uses such as swimming, boating, fishing and adversely impact the aquatic and nearshore habitat for native species as well as adversely impact the function of the outlet of the lake. Other aquatic and shoreline plants provide valuable habitat and forage areas for the wildlife of Ken Lake, including small mammals, amphibians, fish, and birds. Maintaining areas of native vegetation for wildlife should be a part of our lake management plan, as discussed below.

Recommendations: The Lake Management Committee recommends a combination of several of the alternatives listed to address this problem.

- Ongoing monitoring
- Eradicate all of the State and County noxious weeds present.
- Provide voluntary education and technical assistance to control and prevent infestations

Shoreline Management Responsibilities

- No Action Alternative
- Establish and clarify responsibilities for waterfront property owners and Lakemoor Community Club including facilitate clarifying management guidelines for shorelines between Dept of Ecology, City of Olympia, and Lakemoor Community as relates to restoring shoreline.

Discussion: The Lake Management Committee recognizes there is a need to determine, define, and document where Lakemoor Community Club and Lakefront Resident’s responsibilities begin and end with respect to shoreline area of Ken Lake. Action was taken years ago to determine, define, and document responsibilities in our covenants but failed to include the shoreline areas of Ken Lake. The Lake Management Committee feels this is key to the long term management of lake and will make addressing problems identified in this Lake Management Plan easier and insure consistency as to how problems are addressed in the future.

Recommendations: The Lake Management Committee recommends the following alternative to address this problem.

- Establish and clarify responsibilities for waterfront property owners and Lakemoor Community Club including facilitate clarifying management guidelines for shorelines between Dept of Ecology, City of Olympia, and Lakemoor Community as relates to restoring shoreline.

Canal Sediment Buildup

East Canal

- No Action Alternative and conduct Ongoing Monitoring
- Organic material near the stormwater outlets is removed – City of Olympia in partnership with the Lakemoor Community Club
- Property owners restore shoreline areas and remove sediment. Organic material from the canal bottom is removed near the stormwater outlets – City of Olympia in partnership with the Lakemoor Community Club
- Lakemoor Community Club restores shoreline areas and removes sediment. Organic material from the canal bottom is removed near the stormwater outlets – City of Olympia in partnership with the Lakemoor Community Club

Discussion: The Lake Management Committee had a very healthy discussion regarding the problems of the East Canal and the solutions as well as where the responsibility of the problem(s) rests. The Lake Management Committee selected alternatives that address what the Committee feels should be in line with the responsibilities of the Lakemoor Community Club as well as the responsibilities of the City of Olympia who owns, operates and maintains the stormwater system. These recommendations were derived given the data collected during the Natural Resource Inventory and the source of the problem(s) identified. The Lake Management Committee felt strongly that the Board needs to determine, define, and document where Lakemoor Community Club and Lakefront Resident’s responsibilities begin and end with respect to shoreline area of Ken Lake and it will be an important tool in managing expectations both now and in to the future.

Recommendations: The Lake Management Committee recommends a combination of several of the alternatives listed to address this problem.

- No Action Alternative and conduct ongoing monitoring.
- Organic material near the stormwater outlets is removed – Lakemoor Community Club.

West Canal

- Conduct ongoing monitoring.
- Organic material near the stormwater outlets is removed – Lakemoor Community Club

Discussion: The Lake Management Committee evaluated the resource inventory data and concluded that unlike the East Canal, the West Canal is not experiencing the changes in base elevation of the canal bottom primarily due to the velocity and subsequent scour generated by the outlet. This system has been effective for many years and the base elevation of the invert of the pipe is either higher than the

bottom of the canal which demonstrates the ability of the canal and the stream to transport any sediment and/or organic matter deposited from nearshore areas and move it downstream. There is no evidence of a decrease in channel capacity and the outlet functions as designed. It was noted that the stream that conveys water from Ken Lake off the community should be monitored for changes in elevation, invasive plant growth, obstructions and beaver dams that may impact the stream and perhaps the outlet of Ken Lake in the future.

Recommendations: The Lake Management Committee recommends a combination of several of the alternatives listed to address this problem.

- Conduct ongoing monitoring.
- Organic material near the stormwater outlets is removed – Lakemoor Community Club

Flood Hazard Reduction

- No Action Alternative and ongoing monitoring.
- Collaborate with City of Olympia Stormwater and Ken Lake Grounds Manager to ensure that outflow of Ken Lake is maintained to ensure optimal outflow in high water events and that flow is not impeded by maintaining drainage through the Tot Lot and Westbrook park streambed and culverts.

Discussion: The Lake Management Committee received resident input that flooding should have been a concern that was addressed in the plan and provided historical accounts of flooding in Ken Lake which was the result of occlusion of the outflow culverts in the West Canal by trapped debris and a boat blocked the culvert entrance. The second was a backup of water caused by occluded canals in the Ken Lake Tot Lot and the drainage creek in Westbrook Park both before and after the culvert under Parkmont Lane as well as the partial infilling of the Westbrook culvert, reducing total water volume capacity.

Recommendations: The Lake Management Committee recommends a combination of two alternatives to address this problem.

- Ongoing monitoring.
- Collaborate with City of Olympia Stormwater and Ken Lake Grounds Manager to ensure that outflow of Ken Lake is maintained to ensure optimal outflow in high water events and that flow is not impeded by maintaining drainage through the Tot Lot and Westbrook park streambed and culverts.

Quality Fish and Wildlife Habitat

- No Action Alternative and ongoing monitoring.
- Develop technical assistance and educational programs for homeowners to provide tools to enhance fish and wildlife habitat on their property.

Discussion: Neighbors benefit from understanding the rich resource we have in our wildlife and how lake management can enhance this. Combining education and technical assistance to enhance fish and

wildlife habitat as well as around optimal strategies to limit negative wildlife interactions and increase good ones can include: education about wildlife that lives in Ken Lake, optimal plantings to encourage desirable wildlife, how to manage geese, how to clean floats and minimize water quality impact from bird feces, keeping pets safe from predators, etc. Voluntary committees such as the goose and noxious weed committees could be expanded to include a native plant and other committees.

Recommendations: The Lake Management Committee recommends a combination of two alternatives to address this problem.

- Ongoing monitoring.
- Develop technical assistance and educational programs for homeowners to provide tools to enhance fish and wildlife habitat on their property.

Step 7: Make Decisions

Document the Boards decision in a table that will show what alternative(s) were selected, the alternative is scheduled to be implemented as well as space on this table for when the alternative selected is actually implemented.

Project	Date Planned	Date Implemented
Lake Bottom Muck Selected Alternative:		
Aquatic and Shoreline Plants Selected Alternative:		
Shoreline Management Responsibilities Selected Alternative:		
Canal Sediment Buildup Selected Alternative:		
Flood Hazard Reduction Selected Alternative:		
Quality Fish and Wildlife Habitat Selected Alternative:		

Step 8: Implement the Plan

Document the implementation date for when the alternative is actually implemented in the space provided in the record of decisions and compile information on the alternative implemented.

Step 9: Evaluate the Plan

The Lake Management Committee acknowledges that the Lake Management Plan needs to be a flexible and living document that evolves through time and recommends that the plan be revisited at least every three years during a regular session of the Board. The plan can be modified as new resource concerns are identified and/or new data is collected that identifies new or emerging resource concerns.