



Lower Twin Lake Values Survey and Lake Summary Report

Year Assessed: 2020

Love Your Lake is a program of Watersheds Canada and the Canadian Wildlife Federation



CanadianWildlifeFederation.ca



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Introduction

Thank you for participating in the Love Your Lake program. The state of a shoreline is important to the overall health of a lake and to the people and wildlife that call it home. Maintaining or restoring shorelines to their natural state helps improve water quality by reducing nutrient inputs and preventing soil erosion. Natural shorelines also provide some of the most productive and diverse wildlife habitat. An abundance of wildlife living within an area is a good indicator of a healthy shoreline.

On the other hand, the health of a lake can be negatively impacted if more and more of the shoreline becomes highly developed or if an increasing number of shoreline property owners contribute sediment or nutrients to the lake. Some lakes have already exceeded the amount of development or nutrient input that the lake can sustain and are trying to restore the health of the lake. Others are still within limits and are working to keep it that way.

The Love Your Lake program promotes shoreline stewardship. It helps shoreline property owners protect and restore their shorelines and maintain their property in an environmentally responsible way, thereby improving the health of their lake.

This report summarizes the information collected on your lake from your participation in the Love Your Lake program. The report is meant to provide an overview of the elements that shoreline property owners value about the lake as well as the types of shorelines and development currently on the lake. It also highlights some opportunities for future actions that can be taken by the lake association and shoreline property owners.

The report consists of two parts. The first portion is a summary of the Values Survey information. Values Surveys were distributed to 74 shoreline property owners on Lower Twin Lake in 2020, 4 of whom provided their responses. Values Surveys are conducted to gauge the opinions of shoreline property owners about what is important to them about their lake and what they believe are the biggest issues facing their lake.

The second part of this report is a summary of the observations from the shoreline assessments. This section can be used as a source of information on the current physical conditions of Lower Twin Lake and as a baseline to compare future assessments. It can also be used by the lake association and other partners to determine opportunities for restoration, education, and stewardship on a lake wide level. In 2020, 74 properties were assessed totaling about 3.4 km of shoreline on Lower Twin Lake

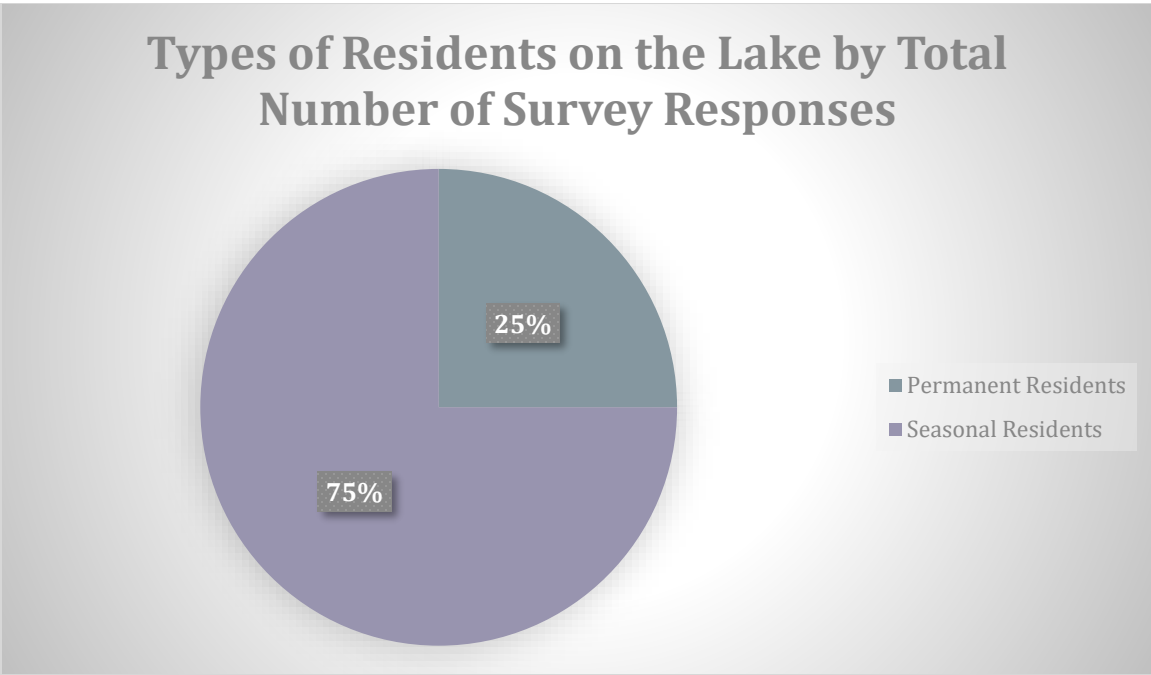


Map of Lower Twin Lake

PART 1: Lower Twin Lake Values Survey Results

Property Ownership

Of the 4 respondents to the Values Survey, 3 (75 per cent) identified themselves as seasonal residents and 1 (25 per cent) identified themselves as permanent residents, as shown below.



Of the seasonal residents that have a two or three season cottage, none said they plan on winterizing their cottage.

The number of years people had been a seasonal or permanent resident on Lower Twin Lake ranged from 1 year to as many as 52 years, with an average of 16.5 years.

Stewardship Recommendations

When thinking about actions to promote environmental stewardship on your lake, seasonal and permanent shoreline property owners may respond to different messages and events. As well, long term versus more recent property owners may have different perspectives, values, and habits in terms of how they manage their property and use the lake.

Recreational Activities

The top recreational activities identified by the survey respondents included swimming, canoeing or kayaking, nature appreciation, fishing and hiking.

In order of popularity from most to least popular, the number and percentage of shoreline property owners on Lower Twin Lake that participate in recreational activities are summarized in the table below.

Top Recreational Activities Enjoyed by Property Owners on the Lake

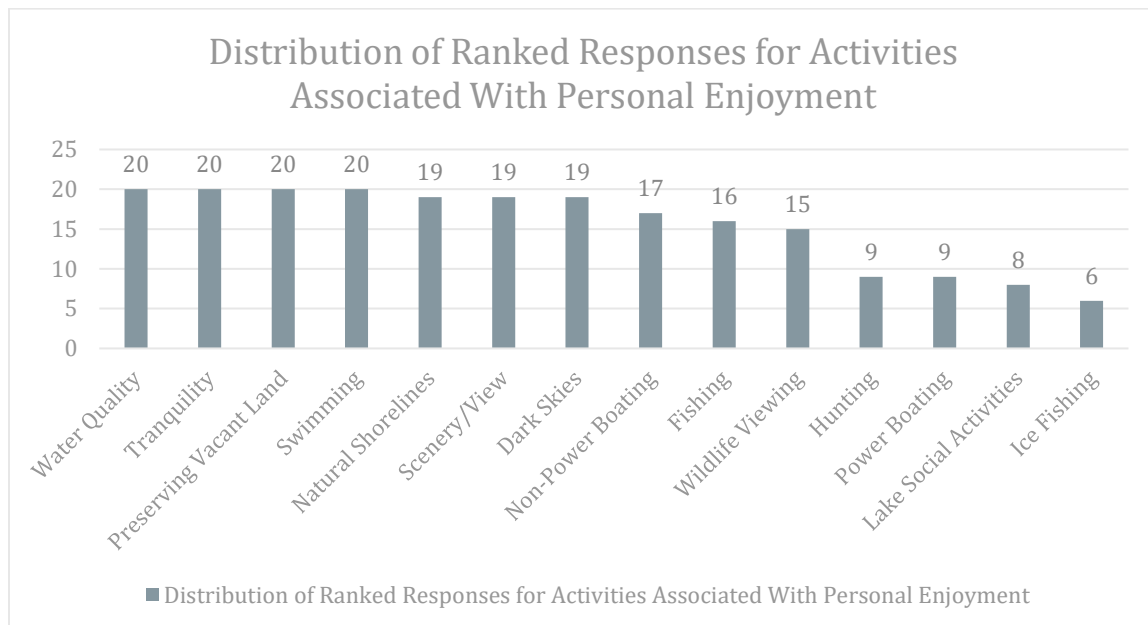
Recreational Activities:	# Respondents	% of Respondents
Swimming	4	100%
Canoeing or Kayaking	4	100%
Nature Appreciation	4	100%
Fishing	4	100%
Hiking	4	100%
Ice Fishing	2	50%
Mountain Biking	2	50%
Snow Shoeing	2	50%
Ice Skating	2	50%
Socializing	2	50%
Socializing	2	50%
Sailing	1	25%
Camping	1	25%
Hunting	1	25%
Scuba Diving	1	25%

Stewardship Recommendations

Recreational activities provide a sense of what people value about their lake. They can be used as entry points for reaching out to people about lake stewardship. For example, if there are a high number of people living on the lake that enjoy fishing, talking to shoreline property owners about actions they can take to help keep the lake healthy for fish could be a good way to get shoreline property owners interested.

Elements that Impact Personal Enjoyment

The most important elements, valued for their impact on personal enjoyment of the lake, included water quality, tranquility, preserving vacant land and swimming. The figure below shows the distribution of ranked values for each element, in order of the most valuable to least valuable element. Surveys asked respondents to rate each element from 1 to 5 with 5 being extremely important and 1 being not important.

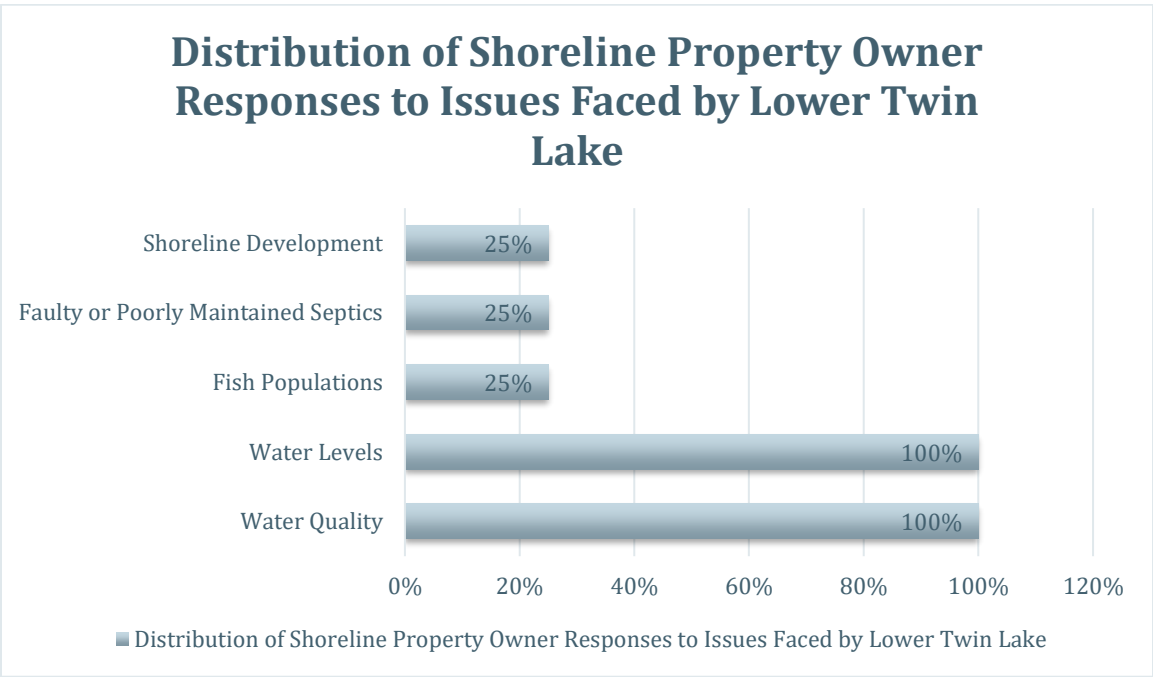


Stewardship Recommendations

When lake groups know the elements that are most important to shoreline property owners, they can use this to tailor their stewardship messages. If swimming is an important element, for instance, messaging can be centered around how implementing a stewardship activity like a water sampling program could improve lake health and improve swimming conditions. Shoreline property owners may be more inclined to support the change if they, and their families, will benefit.

Issues Facing Lower Twin Lake

The most frequently identified issues facing Lower Twin Lake provided by the 4 respondents were water quality and water levels. The figure below shows the distribution of shoreline property owner responses regarding the issues facing Lower Twin Lake.



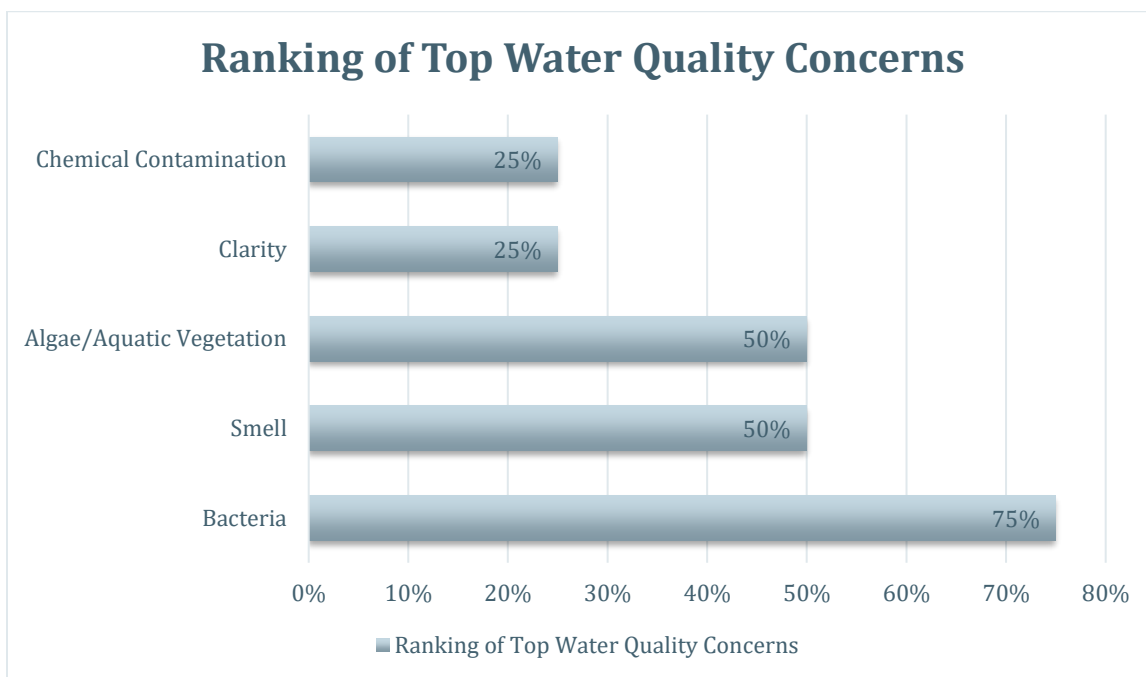
Stewardship Recommendations

When lake groups know the top issues facing the shoreline property owners around the lake, they can focus their efforts on specific actions and create an action plan(s). Providing additional resources to increase knowledge and guide efforts will benefit the health of individual shorelines and the lake as a whole. For instance, if water quality is a top issue, you could implement a lake water quality monitoring program; distribute information on the importance of having eaves trough, vegetative buffers, and proper shoreline access to reduce runoff into the lake; or contact the provincial government for locally funded water quality programs and involvement.

Perceived Water Quality Concerns

Of the 4 survey respondents, 3 (75 per cent) perceive water quality to be good and 0 (0 per cent) perceive water quality to be excellent.

The top concerns expressed about water quality were bacteria, smell, and algae/aquatic vegetation. The figure below shows the distribution of shoreline property owner responses regarding water quality concerns on Lower Twin Lake.



Stewardship Recommendations

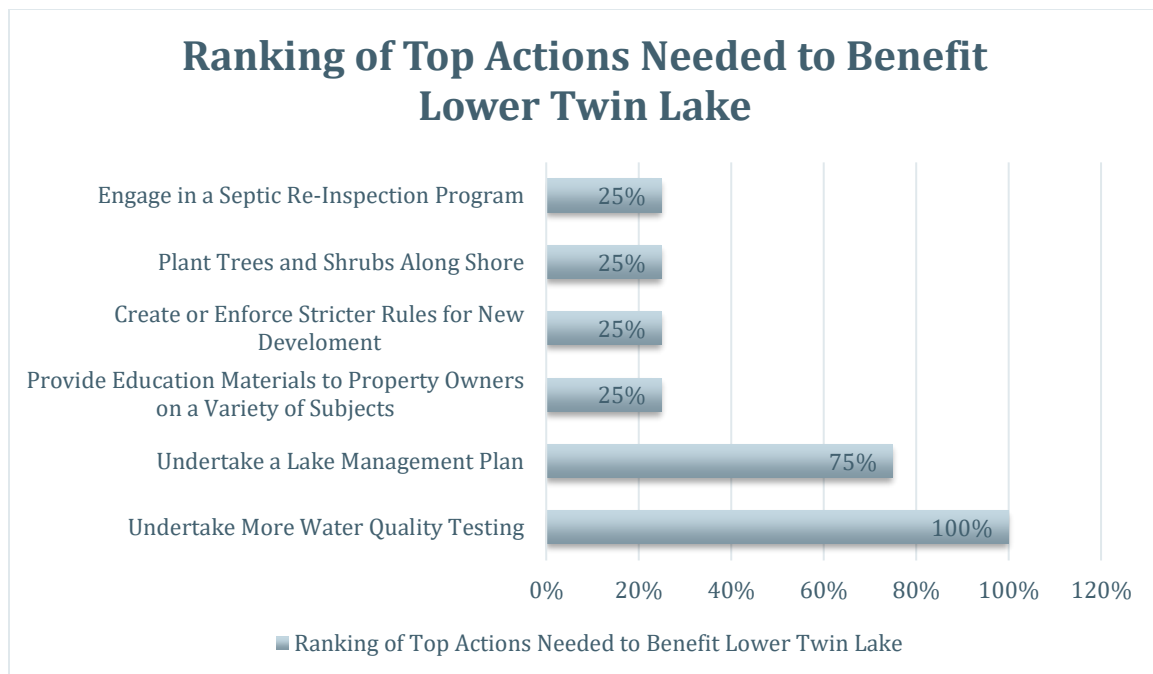
Implement stewardship actions that will target the concerns of shoreline property owners on Lower Twin Lake. Addressing these concerns is a great way to get more people involved! For example, if algae/aquatic vegetation is the top concern, the lake association could host public meetings to advise on ways to reduce personal impact in this area such as reducing fertilizer applications on yards, discouraging bathing in the lake, and creating a shoreline buffer using native plants.

Actions Shoreline Property Owners Believe Should be Undertaken to Benefit Lower Twin Lake and the Community

The most frequently identified actions shoreline property owners on Lower Twin Lake believe would benefit the lake and community include:

- Undertake More Water Quality Testing
- Undertake a Lake Management Plan

The figure below summarizes the percentage of responses that identified each of the actions as beneficial to the lake and community.



Stewardship Recommendations

Knowing which actions will be accepted most by shoreline property owners is valuable information! Start by promoting these actions in your newsletters, at meetings, events, and through social media. Do not forget to explain why the actions are important. Start with one action so people do not feel overwhelmed. Once people realize that it does not have to be hard, time consuming or expensive, it is easier to get them interested in the next stewardship activity.

Shoreline Property Owner Interest in Stewardship Information and Activities

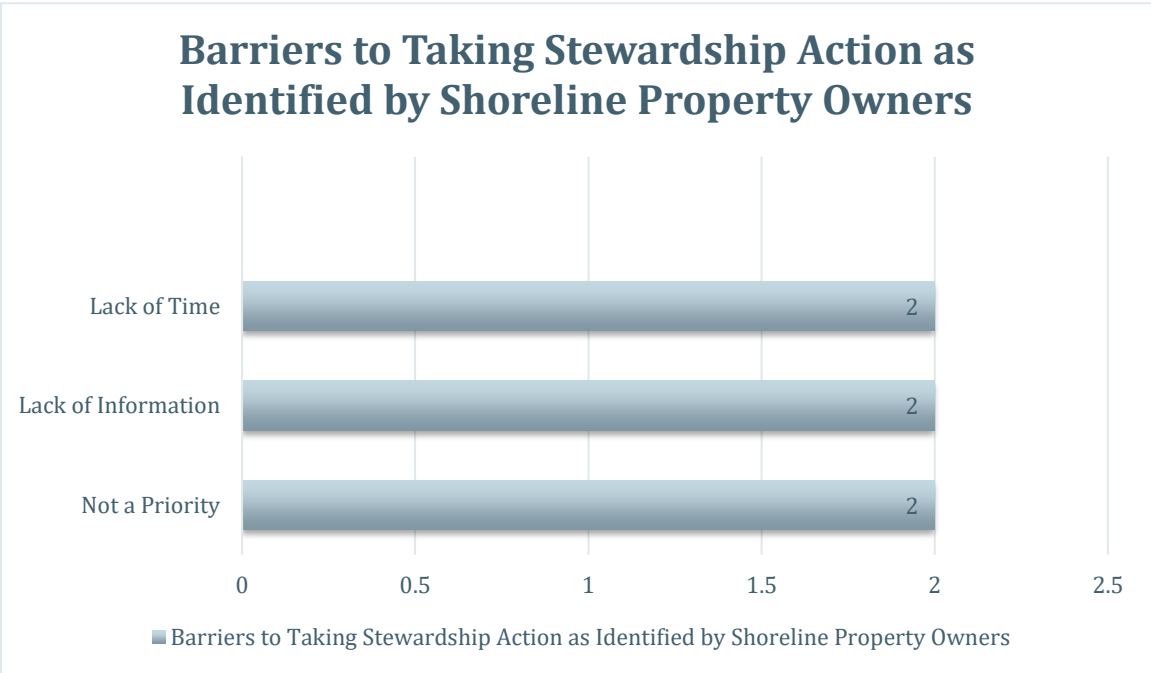
Of the 4 respondents, 2 (50 per cent) said they were interested to learn more about their activities and how they affect water quality, wildlife habitat, and the overall health of the lake. When asked whether they would be interested in participating in stewardship activities around the lake, 2 respondents, (50 per cent) answered “yes”.

Stewardship Recommendations

Typically, there are more shoreline property owners interested in learning about how their actions affect their lake than there are people interested in participating in stewardship activities. But that is ok! Start with the group of people who are interested. Soon others will see how a regenerative or a natural shoreline property can be beautiful and welcoming to beneficial wildlife including birds and pollinators. They will notice that those properties are experiencing less erosion and that people are spending less time and money maintaining them. More people will become convinced of natural shoreline properties simply by seeing the benefits of their neighbour’s natural properties.

Barriers Preventing Shoreline Property Owners from Undertaking Stewardship Activities

The top barriers shoreline property owners encountered when trying to participate in stewardship activities, were lack of time, lack of information and not a priority. The figure below shows the responses for the listed barriers.



Stewardship Recommendations

This could be a great place for the lake group to get involved. For instance, check to see if there are any funding programs that offer native plants for free or at a reduced cost. Information could also be distributed on the importance of healthy shorelines. There are lots of great resources on the Love Your Lake website – loveyourlake.ca. If you notice an important topic that is missing, let us know! We are always looking for additional topics to add.

Conclusion

There is not one standard message that will work for all shoreline property owners. By varying the activity, the message, and how the message is delivered, you will reach more people. Let your shoreline property owners know why the stewardship action or activity is important. Let them know that it does not have to be time consuming or costly. Make it fun. Maybe incorporate a contest – a prize, a feature on your Facebook page or newsletter for the property that has the largest shoreline buffer or for the property that planted the most native plants one summer. Make it family friendly as that is often what people seek from a shoreline property – a place to spend more time with their loved ones.

PART 2: LAKE SUMMARY REPORT FOR LOWER TWIN LAKE

The following information was produced for the entire lake by summarizing the data collected from the shoreline property assessments:

- Riparian & Shoreline Classifications
- Shoreline Restoration
- Building Setbacks
- Runoff
- Property Slope
- Erosion
- Lawns
- Shoreline Structures
- Shoreline Lighting
- Vegetation
- Sediment Distribution
- Invasive Species
- Next Steps

Riparian and Shoreline Classifications

Love Your Lake assessors proportioned the riparian zone (the area that extends upland 30 metres from the shoreline) and the shoreline (the line where the land meets the water at the average water level) of each property into five classifications: natural, regenerative, manicured, developed and degraded. Proportions were based on what could be seen from the water and were rounded to the nearest 10 per cent. For example, a shoreline might be 80 per cent natural and 20 per cent developed while the riparian zone of the same property may be 30 per cent natural, 30 per cent manicured and 40 per cent developed. The table below provides descriptions and example photographs for the five classifications.

Classification & Description	Photograph Example*
Natural – Areas that show no significant human disruption to the natural vegetation or land cover.	
Regenerative – Natural vegetation has been removed in the past but is in the process of growing back towards a natural state.	

Manicured – Areas where the natural vegetation has been removed and replaced with a manicured lawn, artificial turf, ornamental garden, man-made beach and/or agricultural crops.



Developed – Refers to any buildings, structures or impervious surfaces (e.g. paved stones, driveways or pathways).



Degraded – Natural vegetation has been lost; soil erosion, undercutting of the bank and/or exposed roots of shrubs and trees are significant.

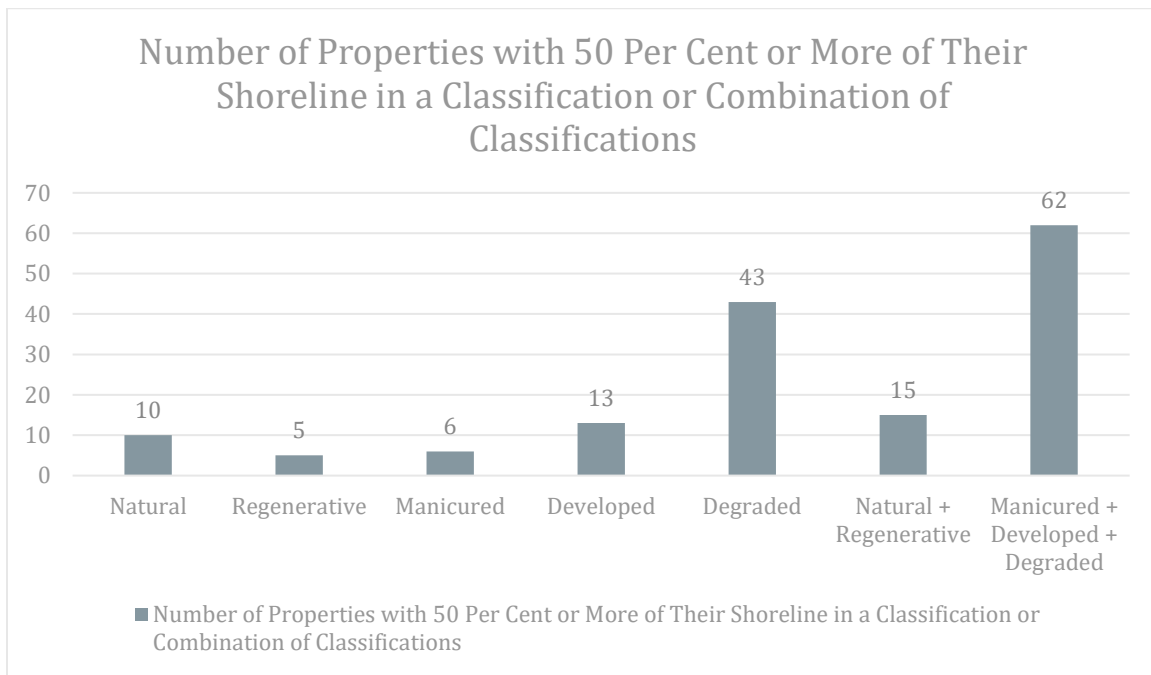


***Note:** These photographs are not representative of any specific shoreline property. There can be a range of variation in the classifications depending on the type of shoreline property.

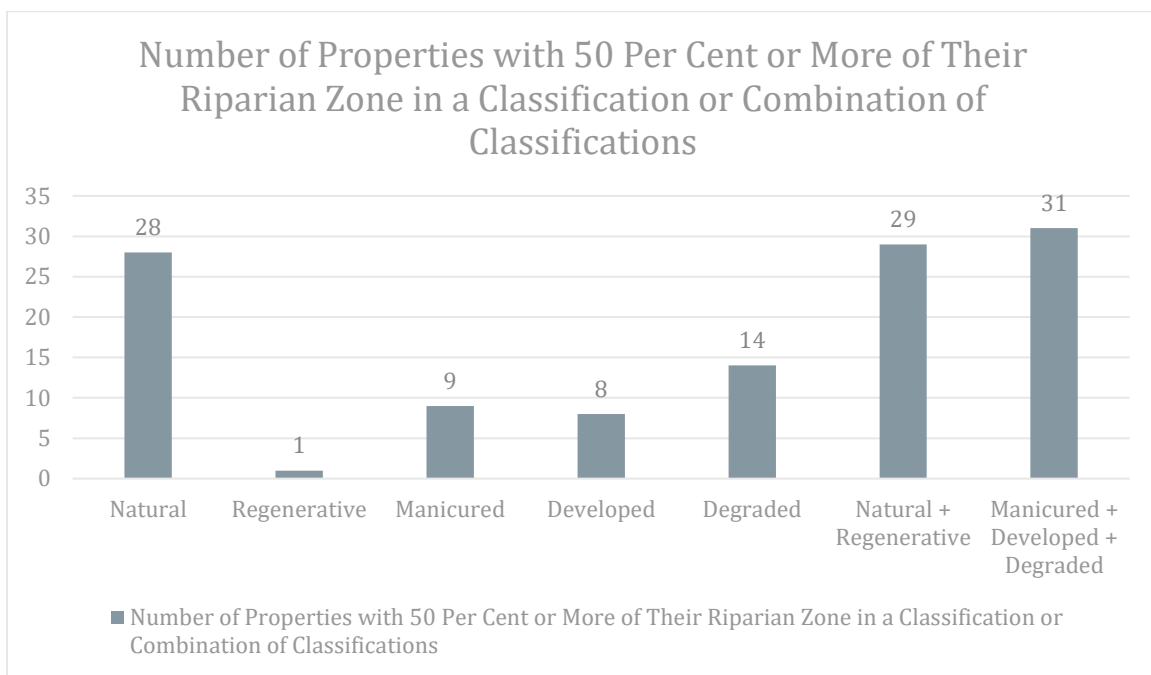
Property Status

This section provides a picture of the shoreline and riparian zone status assessment for properties on the lake. The summary counts up the number of properties that have 50 per cent or more of the shoreline and riparian zone in a specific status classification. Lake stewards can think of this as counts of the number of properties with the majority of their shoreline or riparian zone in one of the classifications. The summary also provides the counts for two combined categories. One counts the number of properties where the combination of natural and regenerative status is 50 per cent or greater. A second counts the number of properties where the combination of manicured, developed and degraded accounts for 50 per cent or greater. The results provide an approximate picture of the types of properties on the lake.

Property Shoreline Types

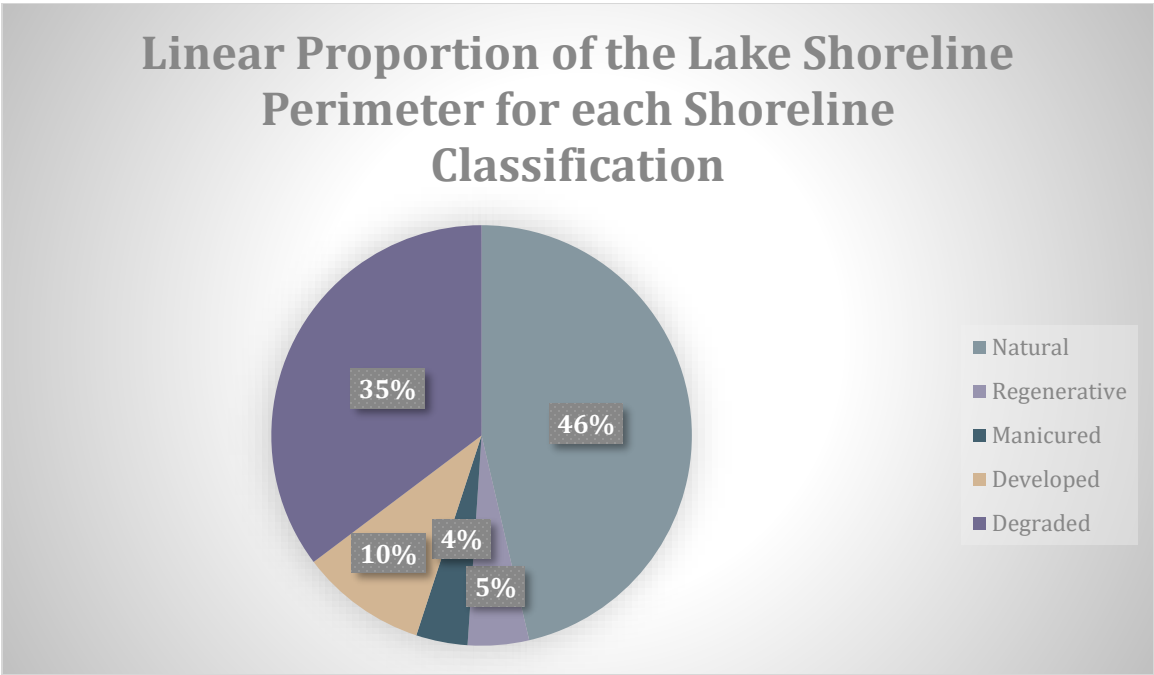


Property Riparian Zone Types



Lake Shoreline Status

This next figure shows the proportion of the lake shoreline in each of the classifications. The calculations are based on the shoreline lengths that were provided for each property.



Stewardship Recommendations

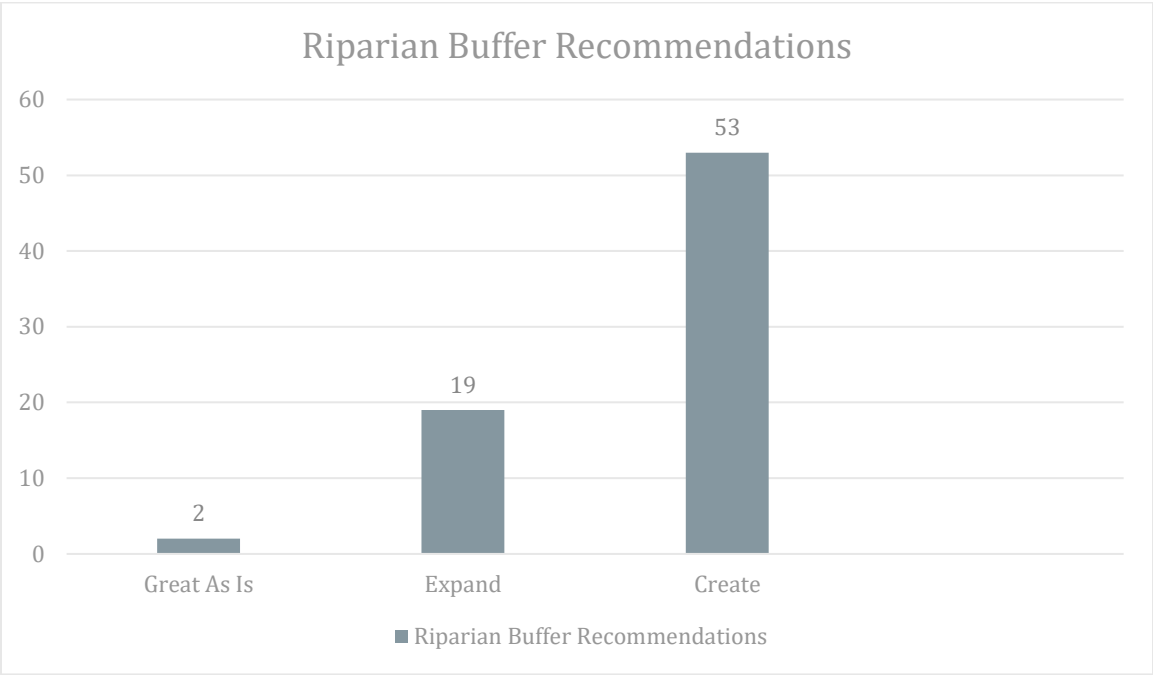
It is recommended that shoreline property owners engage in shoreline naturalization planting projects to further decrease the manicured, developed and degraded percentages and increase the regenerative and natural percentages.

This presents an opportunity for shoreline property owners of Lower Twin Lake to increase the overall quality of the lake by maintaining, protecting and enhancing natural shoreline properties. To restore riparian and shoreline areas to a more natural state, property owners are encouraged to take action. There are plenty of ways lake associations can encourage or get involved, such as hosting naturalization days, native planting workshops or featuring properties on the lake that have naturalized shorelines in emails, newsletters, etc. to inspire other owners. Regenerative properties should also be encouraged to maintain their properties in a natural state by allowing the vegetation on their property to continue to regenerate and grow naturally.

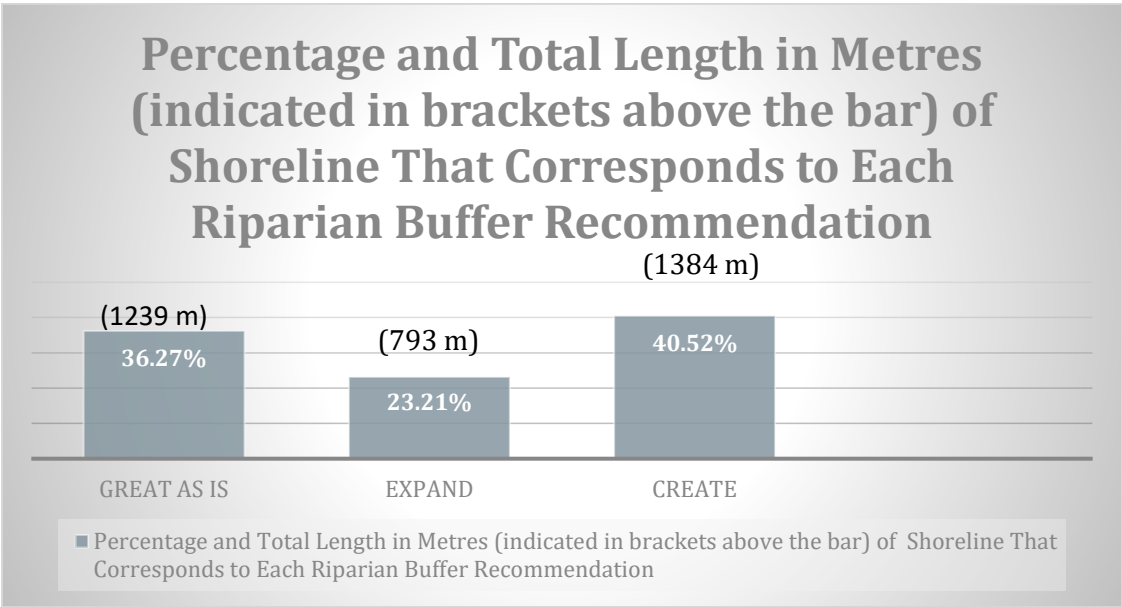
Riparian Buffer Restoration

One important way to improve water quality in lakes and rivers is to ensure that there is a natural buffer of native vegetation along the shoreline. Natural and vegetated buffers are some of the most productive and diverse habitats on the planet. Vegetated areas are also important for filtering contaminants and sediments before they enter the lake. Deep rooted trees and shrubs help to capture nutrients moving from the surrounding landscape. Shallow rooted vegetation, such as grass lawns, are unable to capture these nutrients with the same effectiveness as their natural counterparts. A well vegetated buffer can capture sediment before it is able to enter the lake and potentially affect water quality and lake bottom habitat.

The figure below summarizes the number of properties that were assigned a buffer recommendation during the assessments. Of the 53 properties that had a recommendation to create a shoreline buffer and the 19 properties that had a recommendation to expand their current buffer, it was noted that it would be difficult for 9 of these properties to create a 30 m wide buffer. This may be due to the close proximity of a structure, cliff, rocky terrain or other factors that would make planting a buffer difficult.



This next figure shows the percentage and total length in metres of the shoreline that corresponds to each of the riparian buffer recommendations.



Stewardship Recommendations

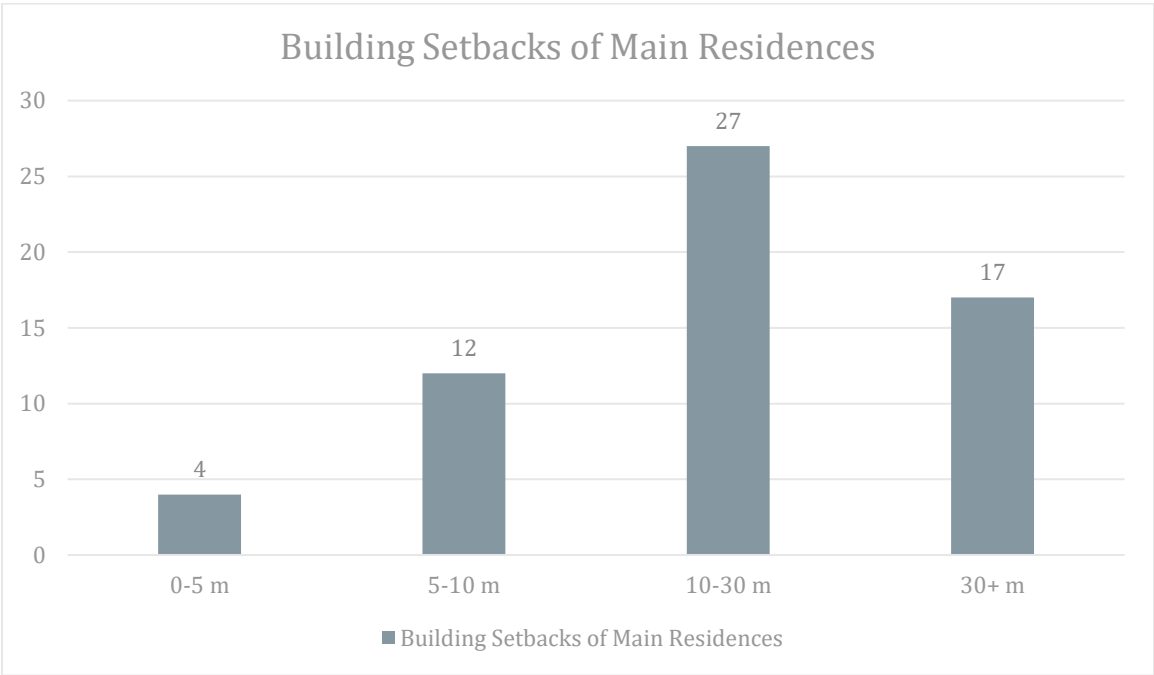
Shoreline naturalization is a voluntary action by shoreline property owners. While naturalization of the more manicured, developed or degraded properties may produce greater benefits, increasing the natural shoreline on any property is a positive stewardship action. It is recommended for the health of a lake that 75 per cent of the shoreline property remains natural, leaving 25 per cent for development opportunity. Working towards keeping 75 per cent of a shoreline property in a natural state will greatly benefit the health of the lake.

Check out some of the before and after photos of property owner shoreline restoration projects for inspiration - loveyourlake.ca/natural-shoreline/

Building Setbacks

The primary issue associated with shoreline building setbacks less than 30 metres is the limited area to buffer or filter contaminated runoff and wastewater from the main dwelling. Buildings can also disrupt the nearshore habitat corridor that many different animals use to move around the lake environment and into upland areas. While moving these buildings further back from the shoreline may not be a feasible or realistic option, naturalizing the shorelines of these properties would help address the issue.

Shown in the figure below is the range of building setbacks of main residences for properties on the lake, not including vacant properties, buildings under construction and unidentifiable properties. Building setbacks for shoreline developments should be at least 30 metres from the high-water mark; however, older buildings were permitted closer to the high-water mark. On Lower Twin Lake 58 per cent of the properties assessed were observed to be closer than 30 metres to the shoreline.



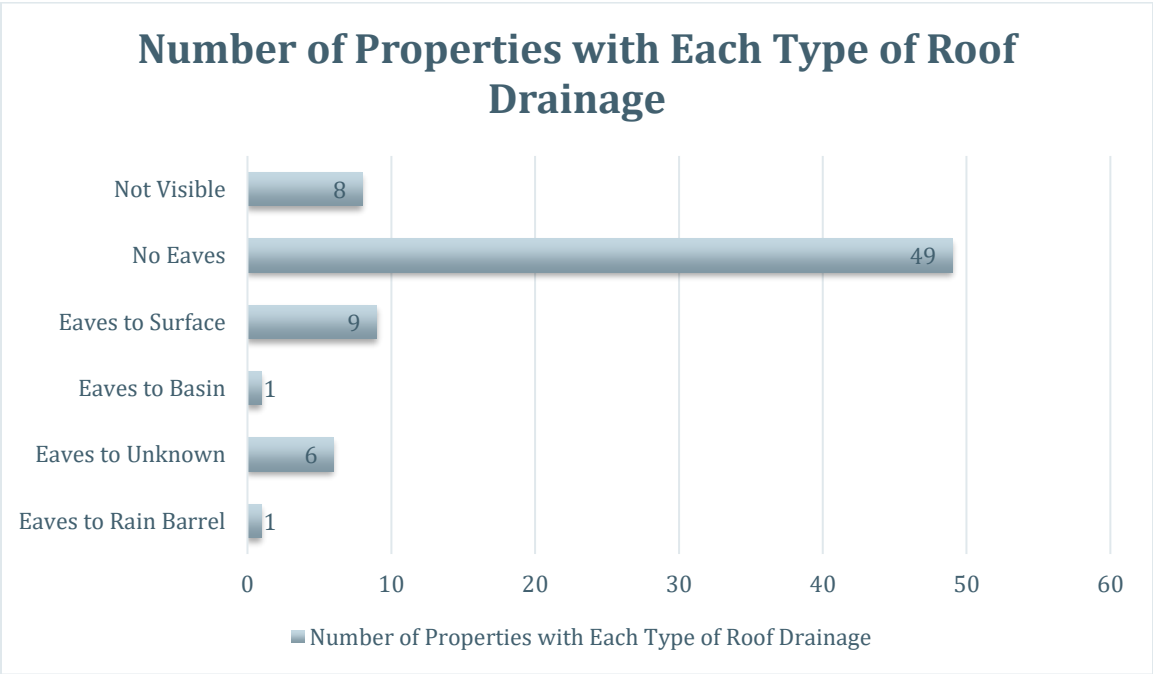
Stewardship Recommendations

A potential area of concern with building setbacks is having septic systems installed close to shore. If properties on Lower Twin Lake have septic systems or holding tanks, regular inspections and maintenance can help prevent excess nutrients from entering the lake. Nutrients entering the lake can contribute to eutrophication (when the lake becomes enriched with nutrients), resulting in increased aquatic vegetation, low oxygen levels, turbid water and algae blooms. Excess nutrient loading is one of the largest threats to water quality in lakes and rivers. When the main building is close to the shoreline, a 30 metre buffer won’t be possible. However, it is important to remember that any size buffer of native plants is better than no buffer at all! It is everyone’s responsibility to help protect the lake.

Runoff

Runoff from precipitation often heads straight into the lake instead of being absorbed by vegetation when there are more manicured lawns and hard, impermeable surfaces rather than permeable ones on a property, or if drainage methods are not working properly. Up to 35 per cent of precipitation can run off lawns and enter a lake, instead of re-entering the water cycle by filtering through the soil. In comparison, with native vegetation, generally less than five per cent becomes runoff. Runoff can contribute to shoreline erosion and excess nutrients entering the lake. Higher rates of ground absorption are preferable because it allows runoff to soak into the soil, filtering many contaminants before entering the lake.

The figure below shows the types of roof drainage that were recorded from the shoreline assessments.



Stewardship Recommendations

Naturalizing shorelines would help reduce runoff from entering into Lower Twin Lake, which could help reduce potential problems such as algae blooms and loss of oxygen in the water. Property owners can also manage this problem by ensuring they have eavestroughs with downspouts directed at natural or stone catch basins, rain gardens or rain barrels, as well as ensuring they have a properly functioning septic to process wastewater before it enters the lake. It is also important to use phosphate free products as phosphate can lead to an increase in weed growth and algae blooms.

Property Slopes

On Lower Twin Lake, 43 per cent of properties had gentle slopes, 49 per cent had moderate slopes and 8 per cent had steep slopes.

Stewardship Recommendations

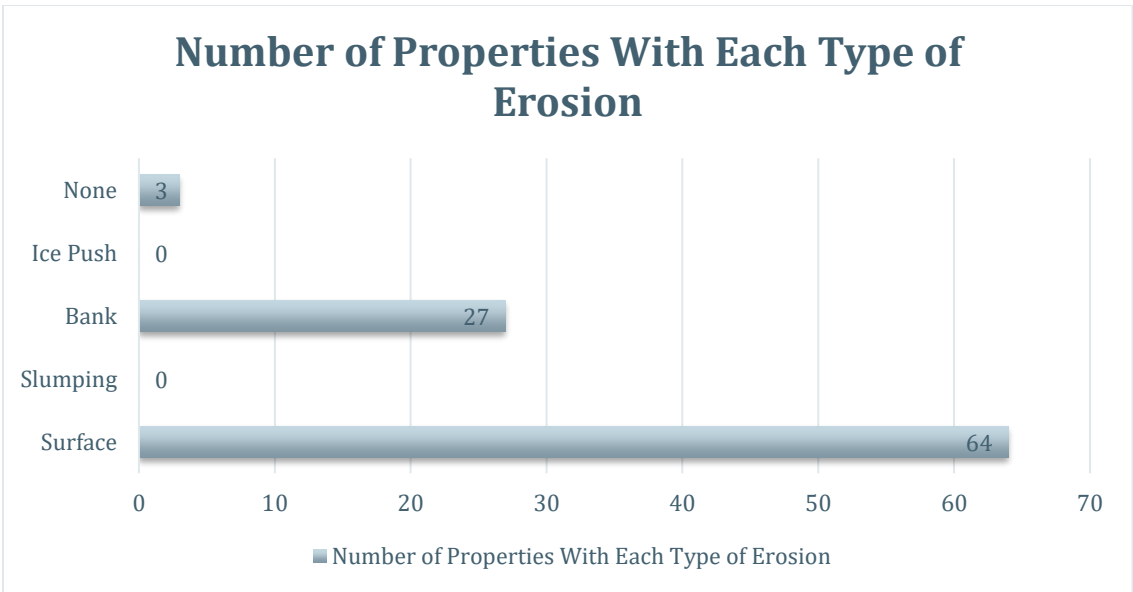
The slope of shorelines can influence the energy of runoff and its ability to transport sediment. Steeper shorelines often suffer greater erosion problems. While shoreline buffers of healthy trees and shrubs are important on all properties, steeper properties yield even greater benefit from well-vegetated slopes to reduce the impacts of erosion from runoff. It is therefore important to maintain as much existing vegetation on steep slopes as possible, trimming trees to improve lake views rather than removing them.

Erosion

Shoreline erosion is a common and natural process that affects many shoreline properties. The process of erosion from ice, wind or water is natural and normally occurs at a very slow rate. However, altering the natural features of properties can accelerate this process and create unsafe conditions.

Sediments deposited as a result of erosion are considered pollutants when excessive levels due to human activities occur. Shoreline erosion affects water quality, wildlife habitat and shoreline stability.

Shown below are the counts for each type of erosion that were observed on Lower Twin Lake.



Stewardship Recommendations

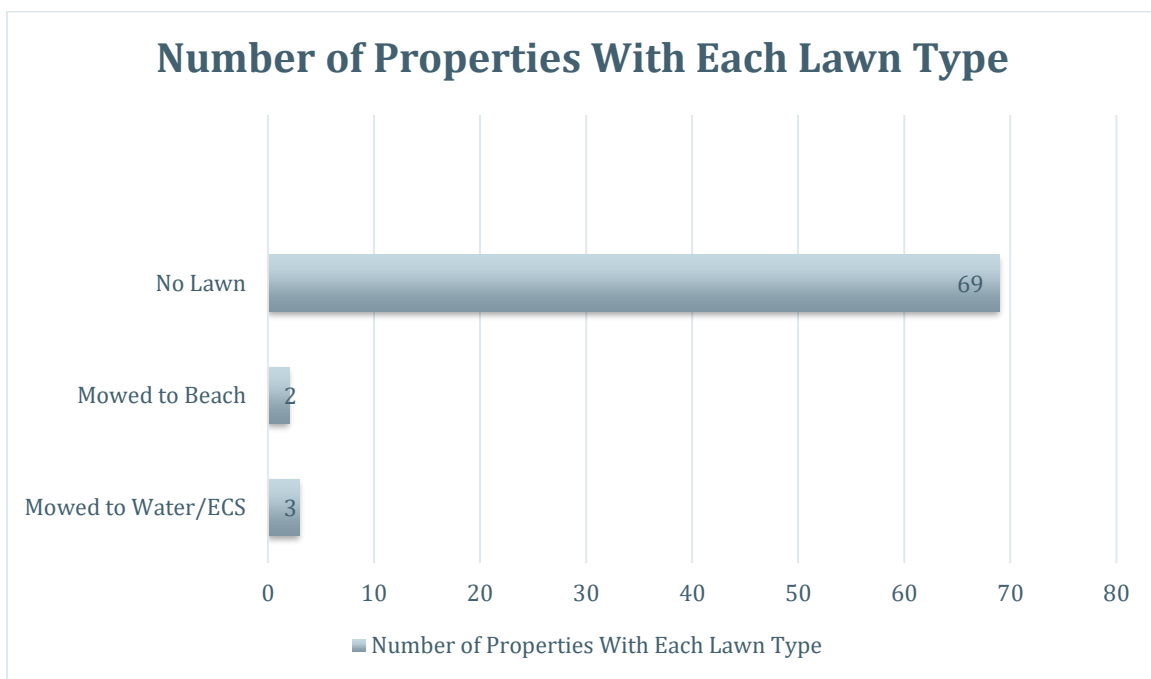
There are a number of steps that can be taken to protect Lower Twin Lake. Protect the natural shoreline from erosion by planting or maintaining native vegetation and leaving in place stones, boulders, snags and dead branches found along the shoreline, when it is safe to do so. If some of these features are in the water, approvals or permits may be required in order to move them. Further reduce runoff by having rain barrels or natural or stone catch basins to collect runoff from roofs. Also, minimize wake from boats, take precautions during construction and contain foot traffic by having a well designed path and/or stairs to the shoreline. Use curved pathways that are covered with the appropriate tread material, see the chart below. Pathways that extend straight to the water can result in soil and runoff being pulled straight towards the lake. If using stairs, construct stairs that are raised with open backs. This will allow sun and rain to reach the ground and promote the growth of vegetation.

Slope	Pathway	Tread Material
Gentle Slope	Curved or Straight	Pine needles/leaves, woodchips & crushed gravel, or erosion control mix
Moderate Slope	Curved	Woodchips & crushed gravel and/or erosion control mix
Steep Slope	Curved	Erosion control mix although stairs that are raised with open backs are better in this situation

*Erosion control mix is a type of mulch made of partially composted bark, sand, gravel, stone and wood fragments.

Lawns

On Lower Twin Lake, the number of properties with lawns, either mowed or regenerative, was observed and is shown below. 4 per cent of properties had lawns that were mowed to the water's edge. When a lawn is maintained to the water's edge, natural ground cover and native vegetation are no longer present to slow runoff and allow nutrient filtration. Nutrients, contaminants, pollutants, and other harmful substances can be easily carried into the lake by runoff and can harm water quality and local ecological integrity. Manicured lawns also have short root systems and do not bind the soil well, which can lead to problems with erosion and increased sediment deposition.



Types of Lawns Around the Lake

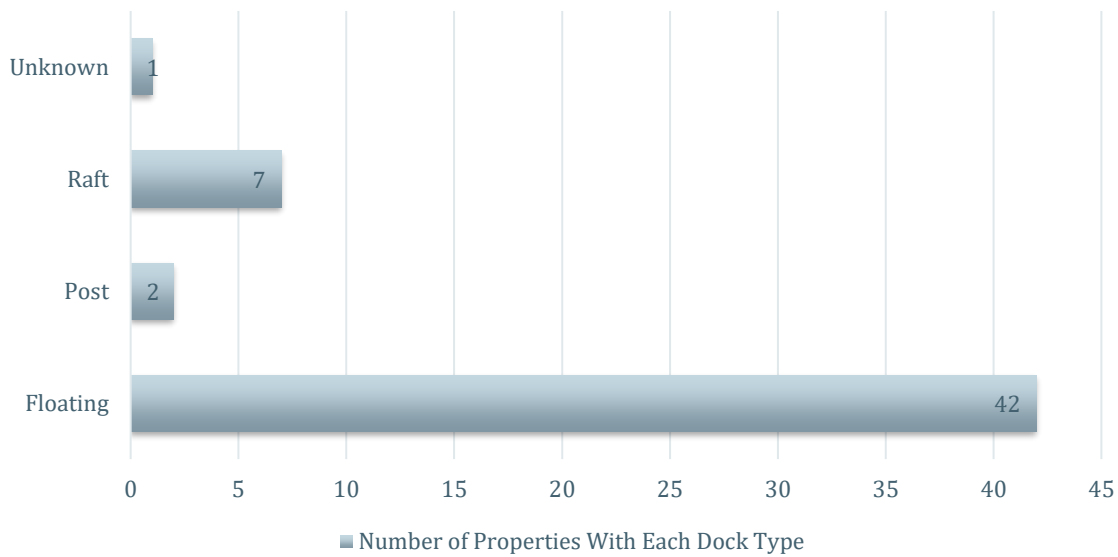
Stewardship Recommendations

In areas close to shore, a lawn is generally not a good choice of ground cover. Up to 35 per cent of precipitation can run off a mowed lawn directly into the lake, instead of returning to a natural groundwater source. When precipitation travels across driveways and lawns to a lake, it carries with it pesticides, fertilizers, sediment and other materials. If shoreline property owners wish to mitigate this runoff, they could consider allowing vegetation to regenerate on its own by creating a “no-mow” zone that can be left natural or by actively planting native trees, shrubs, grasses, or alternative ground cover. The roots of the vegetation will grip the soil which can help prevent erosion. Allowing mowed lawns to regenerate to a more natural state promotes water conservation and protects surface and groundwater resources. Properties with regenerative lawns are encouraged to allow this natural process to continue and to enhance regeneration by planting native trees and shrubs. Check out the list of native plants by province - loveyourlake.ca/project/native-plants/.

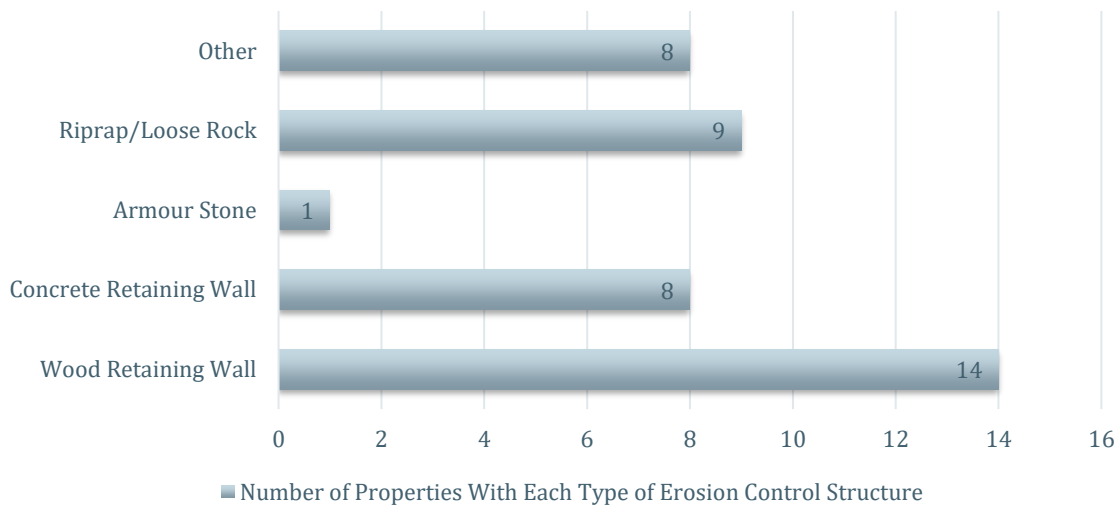
Shoreline Structures

Shoreline structures includes decks, buildings, stairs, pathways, boat launches, boat houses, boat ramps/lifts, man-made beaches, docks, and erosion control structures within three metres of a shoreline. Different types of structures can have negative environmental impacts due to their ability to remove habitat as well as store contaminants and nutrients that can eventually be released into the aquatic environment. However, structures along a shoreline can be done sustainably and in an environmentally sensitive fashion, providing structures are well maintained and kept to a minimal footprint. The figures below illustrate the number of properties that have each type of structure present on Lower Twin Lake.

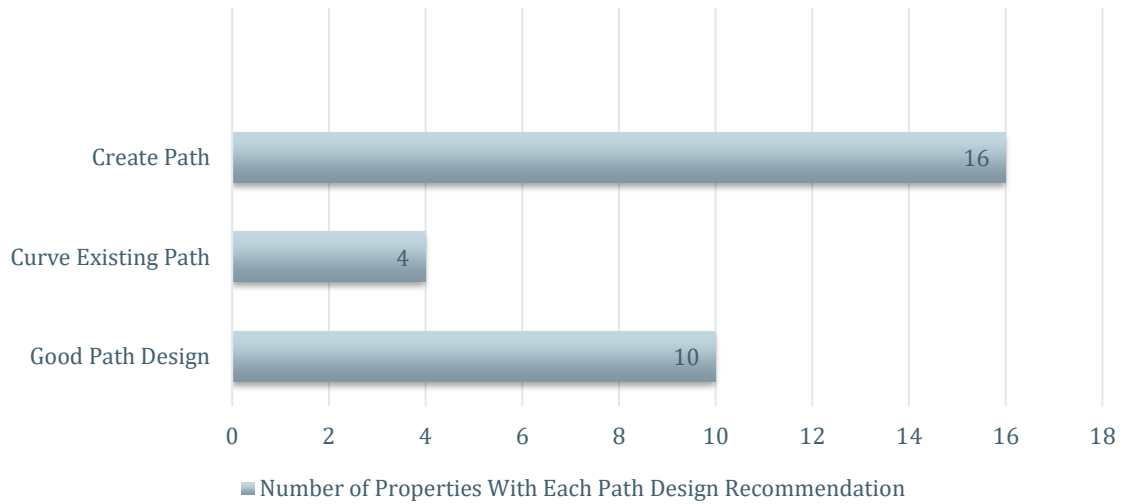
Number of Properties With Each Dock Type



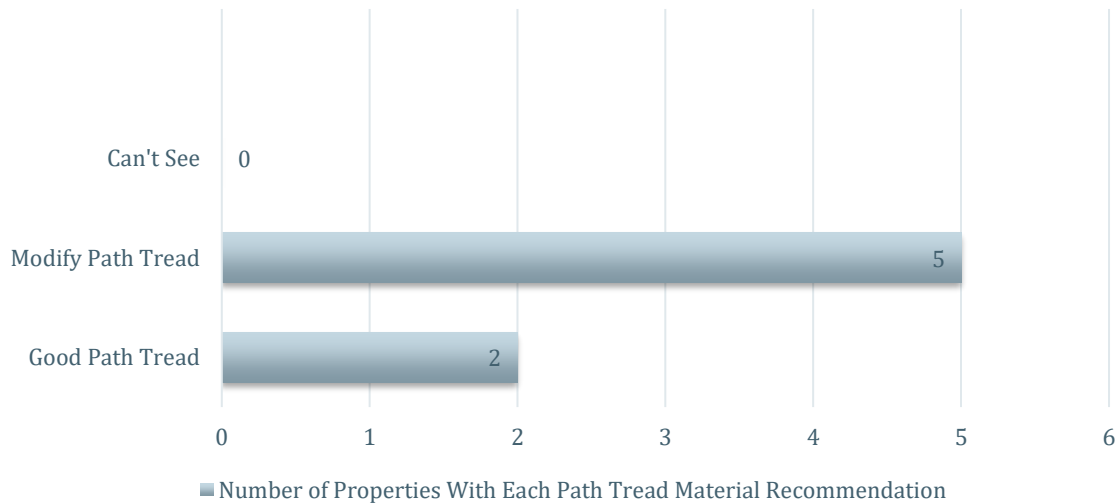
Number of Properties With Each Type of Erosion Control Structure



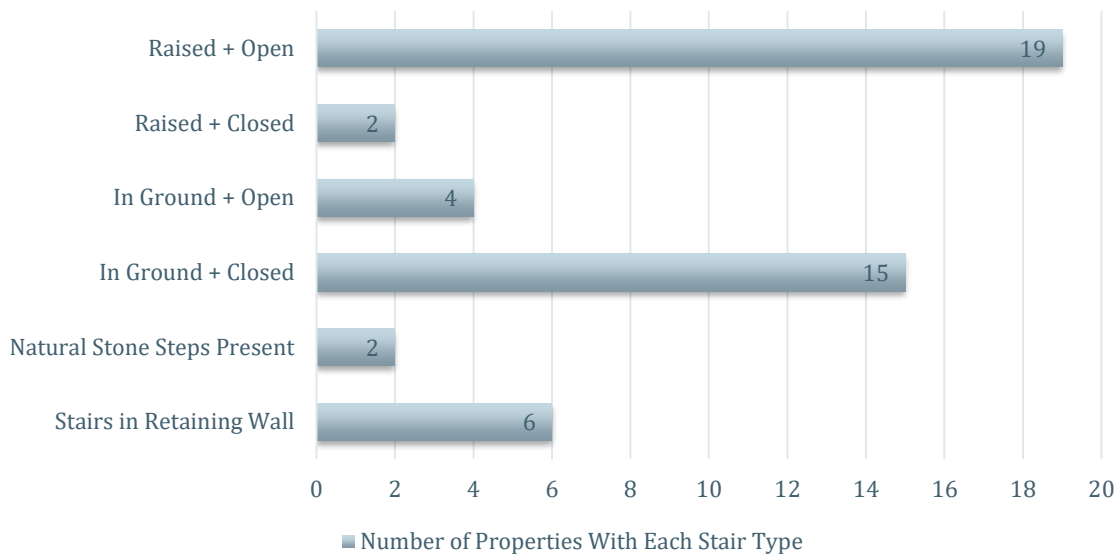
Number of Properties With Each Path Design Recommendation



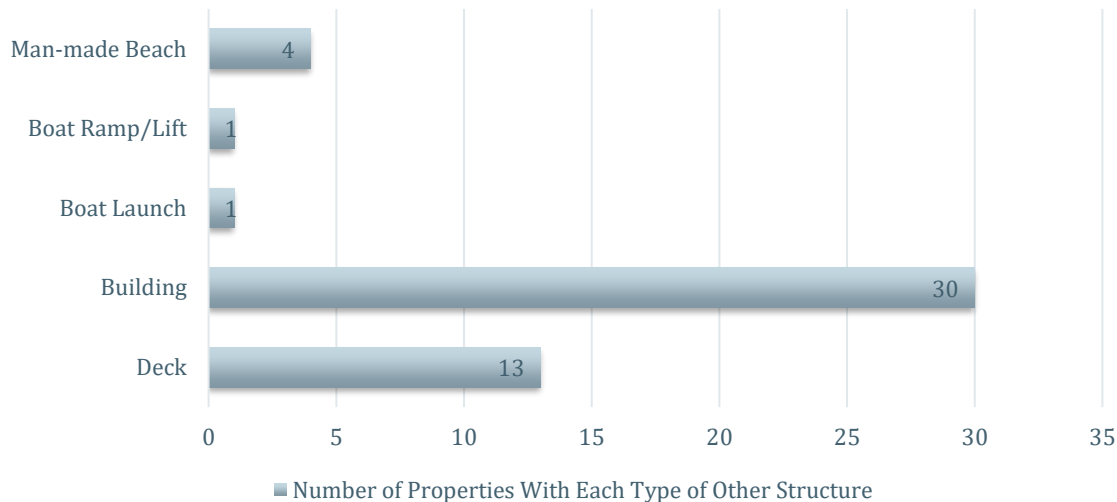
Number of Properties With Each Path Tread Material Recommendation



Number of Properties With Each Stair Type



Number of Properties With Each Type of Other Structure



Stewardship Recommendations

When shoreline development structures are present, keep structures clean and organized to prevent possible soil and water contamination. Consider planting native species to provide additional habitat between man-made structures and the shoreline. If an older structure is present and no longer functioning, consider retiring the building, shed or other man-made structure as this will provide more potential habitat for wildlife.

Docks

Small floating docks, post docks and cantilever docks are the most environmentally friendly dock choices as they allow natural water flow, have limited contact with the lake bottom, and reduce the overall potential for

disturbance to aquatic life. In the future, if shoreline property owners need to replace their old or failing solid or crib docks, they should choose an environmentally friendly dock option. By selecting these types of docks, people can reduce the potential impacts to fish and other aquatic species, which can help protect the overall health of the lake environment.

Erosion Control Structures

Erosion Control Structures made out of rock, concrete, metal and other materials were once commonly used when it was thought that the only way to combat erosion was to take a hard, aggressive approach. Consequently, people began putting in concrete walls and gabion baskets. These structures only work in the short term to prevent erosion, but they ultimately do much more harm than good.

40 properties on Lower Twin Lake, or 54 per cent of the properties assessed had at least one type of erosion control structure. Of the erosion control structures that were present, the most common choice was wood retaining walls. While erosion control structures were an option to combat erosion for property owners in the past, we now know about their negative impact on the natural environment. Wave energy is reflected back from these hard, flat surfaces with the same force at which they strike the wall. This can cause excess turbulence in the water, which scours the sediments from the lake bottom. Solid walls also eliminate shoreline habitat and act as a barrier, preventing wildlife from reaching the water. Although some erosion control structures such as riprap or loose rock have fewer impacts than others, shoreline property owners should consider alternative erosion control methods such as planting native vegetated buffers. In the meantime, maintaining vegetation on the land-ward side of the wall and allowing new vegetation to establish and grow will help reduce runoff and provide habitat for wildlife. For more information contact your provincial and federal government departments regarding erosion control and necessary work permit requirements.

Shoreline Access

When creating shoreline access, there are a few things to consider. Limiting foot traffic to one area of the shoreline can help maintain a healthy buffer for wildlife habitat and reduce runoff and erosion. By creating a well-formed pathway that follows the contours of the slope or constructing raised, open-backed stairs, you can direct foot traffic leading to the shoreline. Covering pathways with wood chips, crushed gravel or an erosion control mix, depending on the slope, will also help reduce soil loss on pathways. Raised, open-backed stairs will allow vegetation to grow underneath, helping to hold soil in place.

Shoreline Lighting

The number of shoreline properties with shoreline lighting was observed. This included lighting along docks, erosion control structures as well as pathways and stairs that lead to the shoreline. On Lower Twin Lake, 2 properties used shoreline lighting. The figure below shows the number of properties that have shoreline lighting in comparison to those properties that do not have shoreline lighting. While shoreline lighting can help property owners maximize the enjoyment of their properties at night, excessive lighting can disturb wildlife by altering foraging, mating, hibernation and migration patterns.

Shoreline Properties With Shoreline Lighting vs Those Without Shoreline Lighting



Stewardship Recommendations

Not all shoreline lighting needs to be removed. However, there are some questions that can be asked to determine the amount of light needed:

- Does the area really need to be lit?
- Does it need to be this bright?
- Is the light transmitted further than it needs to be?

To help reduce the amount of shoreline lighting on Lower Twin Lake in public areas:

- Turn off lights when they are not needed.
- Reduce the use of blue lights and use warm light sources instead. It should have a colour temperature of no more than 3000 Kelvins.
- Use “full cut-off” or “fully shielded” light fixtures (those that point downward).
- Use lighting that is certified as Dark Sky Friendly Outdoor Lighting. This will ensure that it is low colour temperature and is fully shielded.
- Use timers, motion sensors and dimmers.

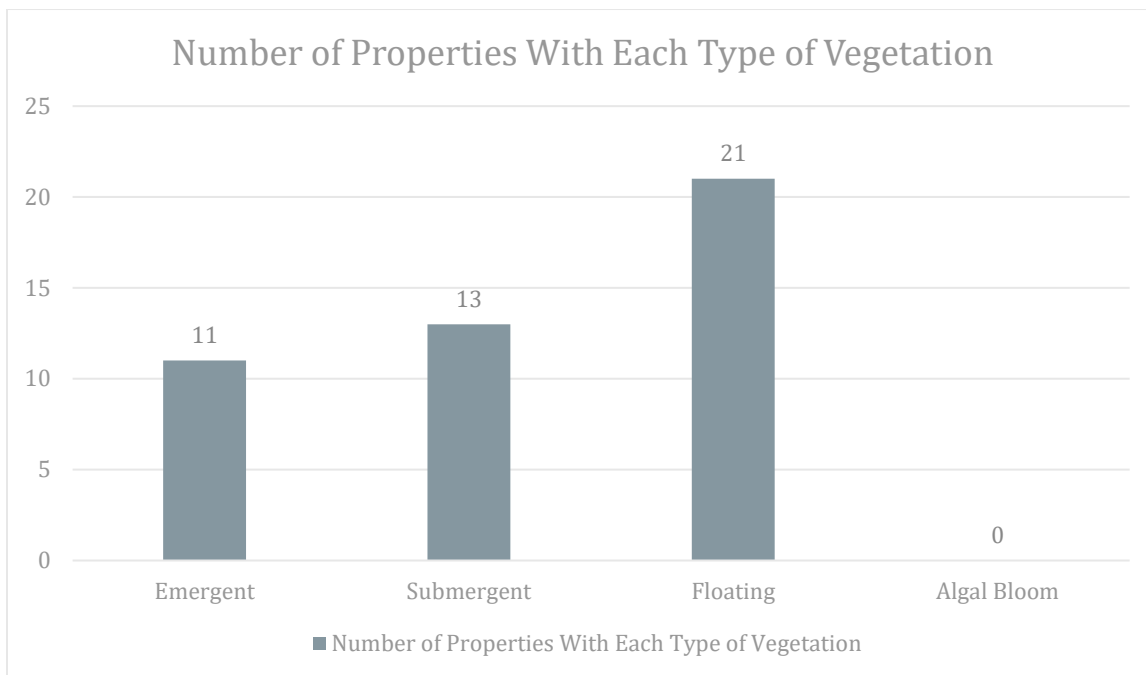
Shoreline property owners on Lower Twin Lake should also be encouraged to reduce their use of shoreline lighting, when possible.

Vegetation

Aquatic Vegetation

On Lower Twin Lake, shorelines were assessed for their presence of aquatic plants. The presence of aquatic plants was further summarized into aquatic vegetation types; emergent, submergent, floating and algal blooms. The figure below shows the number of properties on Lower Twin Lake that had aquatic plants along their

shoreline properties. The majority of aquatic vegetation that was present was floating. Submergent and emergent vegetation were found less frequently on Lower Twin Lake but are still an important part of the aquatic ecosystem, giving habitat to birds, frogs, fish, dragonflies and other wildlife.

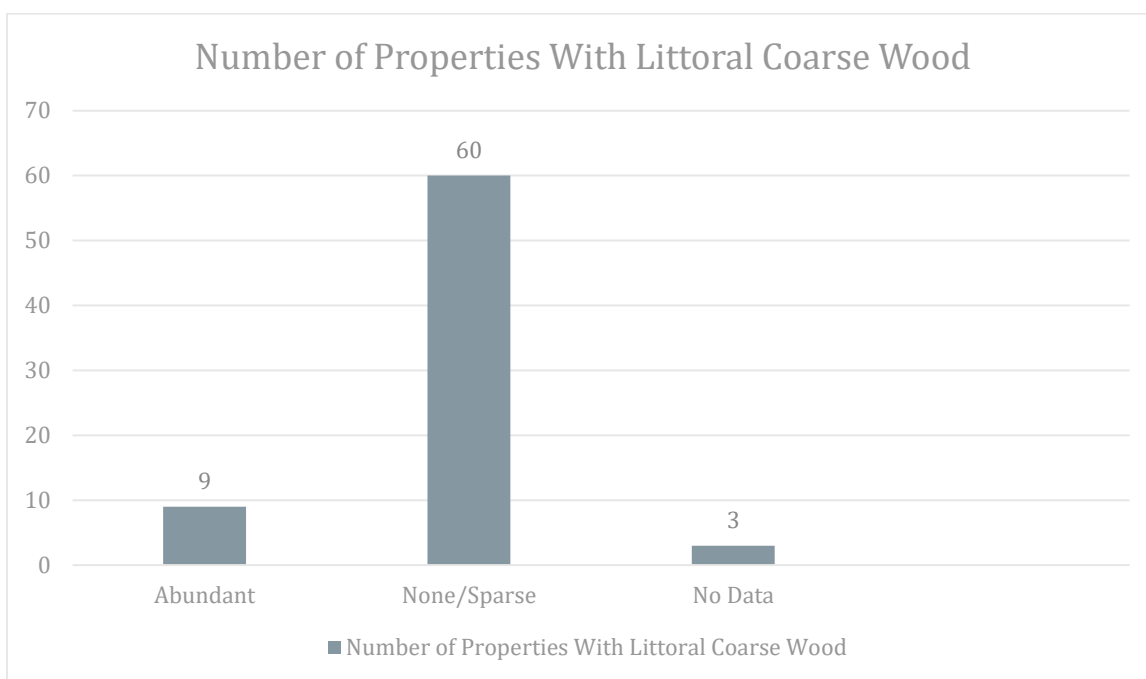


Overhanging Vegetation

The average percent of each shoreline on Lower Twin Lake that had overhanging vegetation was 7.97 per cent. The average width of the overhang was 0.58 m.

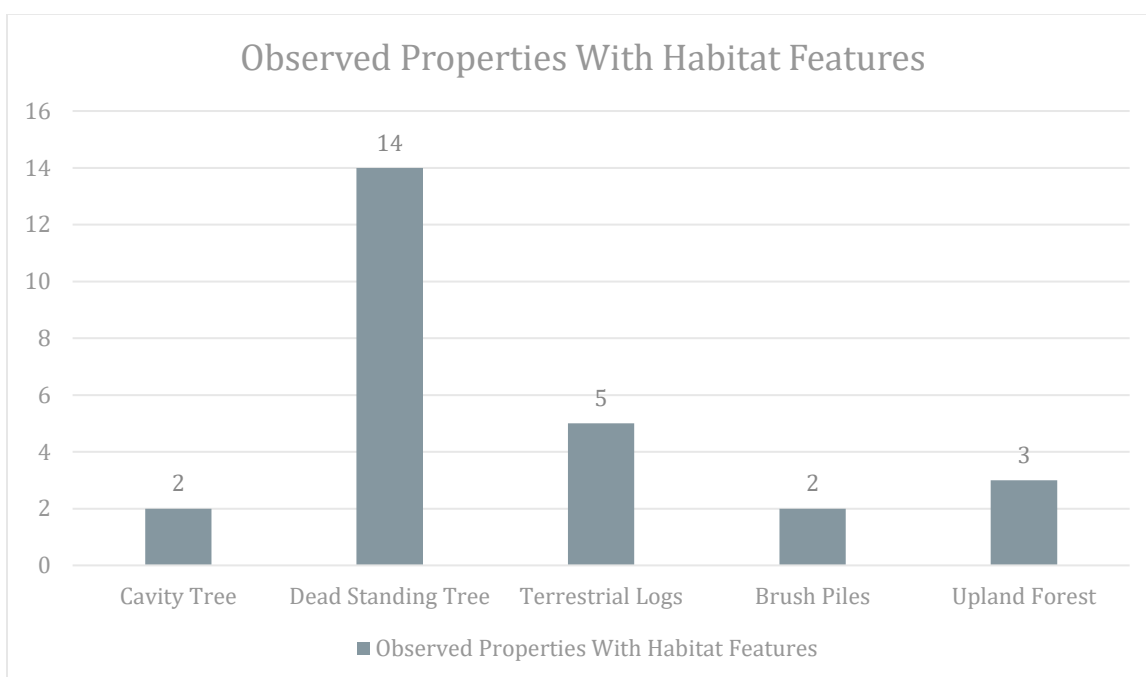
Littoral Coarse Wood

The amount of littoral coarse wood was recorded for Lower Twin Lake as either Abundant, None/Sparse or No Data. Littoral coarse wood includes fallen trees, logs, root wads and large branches that are partially or fully in the water. Abundant was selected if there were more than five pieces of littoral coarse wood per 100 m of shoreline. If there were less than five pieces per 100 m of shoreline, None/Sparse was selected. No data was selected if the presence of littoral coarse wood was unable to be determined. The number of properties that had Abundant Littoral Coarse Wood was 9, 60 properties had None/Sparse and 3 had No Data. The figure below shows the amount of Littoral Coarse Wood for Lower Twin Lake.



Habitat Features

The most common type of nearshore habitat on Lower Twin Lake was identified as dead standing trees, followed by terrestrial logs. Wildlife provides us with many enjoyable and beneficial activities from bird watching and wildlife photography to pest control, seed dispersal, nutrient cycling and pollination, just to name a few. It is important for there to be a rich and diverse range of habitats along the lakeshore in order to ensure a healthy lake environment. The figure below summarizes the nearshore habitat.



Stewardship Recommendations

Aquatic Vegetation

When aquatic vegetation is removed, the integrity of the shoreline is lost. This negatively impacts the health of the waterbody by decreasing the quality of the water and reducing biodiversity. Eventually, a waterbody can become unusable, affecting the hundreds of species that rely on it. If aquatic vegetation needs to be removed for access to the water for swimming and/or recreational activities, pending permit approval, limit the amount of vegetation that is removed to one area of high use. Maintaining aquatic vegetation in other areas will contribute to the health of Lower Twin Lake and will help maintain important habitat.

Overhanging Vegetation

It is important to leave overhanging vegetation. Overhanging vegetation shades and cools the water and provides important habitat for wildlife, including fish, amphibians, and reptiles. Fish and frogs often feed and spawn below overhanging vegetation and the leaves, twigs, fruit, flowers and even insects found on overhanging vegetation provide an important food source for many species. Allow native trees and shrubs to grow!

Littoral Coarse Wood

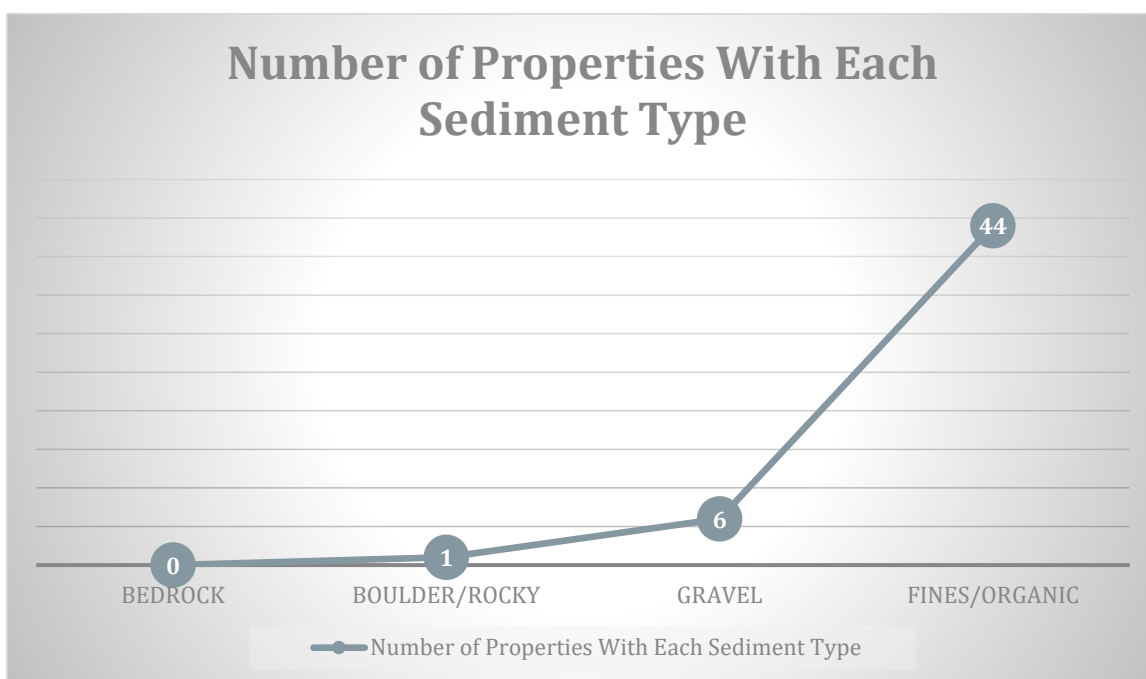
Woody debris is an important component of a healthy shoreline. Fallen trees, logs and large branches that are partially or fully in the water help to reduce erosion, provide insects with resting sites and offer fish and amphibians protective cover and shade. Some fish species use these wood features for spawning and nest protection. By allowing woody debris to remain in place, you are contributing to the health of Lower Twin Lake. Plus, removing these features may require a permit. Planting native trees and shrubs along shorelines will help jumpstart the process. If trees fall or wood accumulates, allow these features to remain in place.

Habitat Features

It is important to leave large trees that are dead and dying in place, when it is safe to do so. They provide important habitat for a number of different wildlife species. Many species of birds and mammals depend on cavity trees for nesting, rearing young, roosting, feeding, storing food, escaping predators and hibernating. Fallen logs on land provide habitat for small mammals such as moles, woodpeckers, toads and insects. As the log decomposes, reptiles and amphibians lay their eggs in the moist wood. A decaying log is also great habitat for beetles and ants that burrow under the bark and lay eggs. By leaving dead and decaying brush and logs in place, you are helping contribute to a healthy and vibrant species community.

Sediment Distribution

On Lower Twin Lake, the type of sediment present on the lake bottom was observed and is shown below. The benthic zone which is located on the lake bottom is classified as the ecological region at the lowest level of a body of water. It starts at the shoreline and continues down until it reaches the floor, encompassing the sediment surface and subsurface layers. Although this zone may appear barren, it plays a vital role in the health of aquatic ecosystems. Tiny, microscopic organisms which cycle nutrients live in this zone and act as a source of food for bottom feeding animals.



Stewardship Recommendations

In a healthy lake system, there is a balance between the erosion of and accumulation of soil. Sedimentation of lakes can coat and abrade the body surfaces of fish, cover fish spawning and resting grounds, smother fish eggs and reduce the amount of sunlight that reaches the lakebed. To maintain this balance, it is important to reduce the amount of erosion taking place. Encourage shoreline property owners to maintain or increase their shoreline buffer. The roots of native plants will help hold soil in place. Artificial beaches should not only be discouraged but it should be made known that their creation is illegal without proper permits. The land below the natural high-water mark, or the shore lands as it is referred to in some provinces, is Crown land - it belongs to the government and therefore cannot be altered without prior approval.

Invasive Species

Eurasian Water-Milfoil is an invasive aquatic perennial plant. It is fast growing, forms dense underwater mats and shades out native species. When large stands begin to die off in the fall, oxygen levels are greatly reduced. Eurasian Water-Milfoil grows under water, has feather-like green leaves and thread-like segments. The plant blooms in late summer and consists of small reddish flowers. If your boat comes into contact with the plant, you should reduce your speed as boat wakes can dislodge plants and enable plant colonization in new areas. Carefully inspect and clean your boats, trailers and other recreational equipment before entering a new waterbody to remove any plants, animals and substrate. Never release unwanted or invasive plants into the wild.

Stewardship Recommendations

You can help prevent the spread of invasive species to and from Lower Twin Lake. These species disrupt the ecosystem and can lead to declines in favourite native species. These species can spread by the dumping of bait buckets, trailering your boat from one lake to another before proper cleaning, and planting non-native species or seed mixtures along your shoreline. If you use live bait, be sure to dispose of unused bait and packaging material including soil in the garbage. Water from minnow buckets, bilges and livewells can contain a variety of tiny invaders and should be dumped on shore. When removing your boat from the water, be sure to dispose of

any weeds or mud. If you are going to use the boat in another waterbody, clean it thoroughly and allow it to dry for two to seven days.

Visit <https://bcinvasives.ca/play-your-part/clean-drain-dry/> for detailed instructions on how to clean, drain and dry your boat.

Next steps

The top actions identified by shoreline property owners on Lower Twin Lake to benefit the lake and lake community were:

- Undertake More Water Quality Testing
- Undertake a Lake Management Plan

These topics would be a great place to begin, or continue, interactions with property owners. 2 said they were interested in learning more about how their activities affect their lake and 2 said they were interested in participating in stewardship activities. Shoreline areas present a unique opportunity for people to help protect the environment and reduce their footprint. It is important to remember that some work in and around water requires permits and approvals. Before beginning any project, make sure to get in touch with all levels of government to determine what is needed for your next project!

The benefits of natural shorelines are immense. Native plants help to stabilize soil, reduce erosion and improve water quality. A good underground root network helps to keep soil in place, while a healthy buffer of vegetation prevents topsoil from being exposed and washed away. Shoreline vegetation, such as aquatic plants, can absorb wave energy. Natural vegetation along shorelines can also provide privacy from neighbouring properties and can reduce the amount of noise generated by boats and other recreational activities. Trees and other native vegetation improve air quality, lower temperatures and minimize energy costs associated with cooling.

Natural buffers also provide critical habitat for wildlife, both aquatic and terrestrial. They improve habitat for fish by shading and cooling water and provide protective cover for birds, mammals and other wildlife that feed, breed and rear their young near water. Allowing a natural buffer to grow can cut down on the time required for yard maintenance and alleviate the financial expense associated with landscaping.

It is important when naturalizing areas to choose native species. Non-native species can be extremely invasive, reproduce rapidly and remove wildlife habitat by choking out large natural areas. It is critical to understand how invasive species can affect the overall health of a lake by threatening our native fish, plants and animals. The lake community must work together to raise public awareness and help promote responsible stewardship. By practicing prevention and continuing education efforts, the community can reduce the spread of additional invasive species.

This report has been created for the lake group and community to utilize as an environmental stewardship guide. Lower Twin Lake property owners are encouraged to continue to use their shoreline property reports as an additional personalized resource to learn more about how to protect their shoreline properties and reduce their environmental footprint. Following the stewardship actions outlined in this report and working to maintain natural shorelines, shoreline property owners can unite and make a positive change for the greater good of their lake.