



Peninsula Lake - Lake Level Report

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Provided by Muskoka Watershed Council

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Executive Summary

Healthy shorelines are some of the most biologically rich and ecologically productive places on earth, supporting a diverse range of plants and animals. Healthy shorelines are also critical in filtering pollutants and protecting against erosion, two areas of major concern for shoreline property owners. As shorelines become more developed over time, the role of shoreline property owners to be stewards of their land is increasingly important.

The purpose of the Love Your Lake program is to provide shoreline property owners with individualized property reports about the state of their shoreline and recommendations for maintaining a healthy waterfront property. These individualized reports are intended to provide useful information and resources for landowners, raise their awareness and understanding of the importance of shorelines, and encourage them to become engaged lake stewards.

In the summer of 2013, 354 properties, totaling 26,140 meters (100%) of shoreline, were assessed on Peninsula Lake. Trained students from the University of Waterloo assessed each individual property using the Shoreline Survey Datasheet (Appendix A). Land owned by conservation agencies or government, such as the Nature Conservancy of Canada and some Crown Land, were not included in this assessment. Some islands were not assessed because they were not identified on the mapping provided. In addition, some properties were not assessed as per landowner requests to opt-out of the Love Your Lake shoreline assessment program.

This report presents the data collected per property into a lake-wide summary on shoreline classifications, building setbacks, development (including structures and docks), retaining walls, erosion, aquatic cover, aquatic substrate, other shoreline observations, slope, lawns, and buffers. This report is intended to be a resource for the Peninsula Lake Association and community to use as a source of baseline shoreline data to compare future shoreline data to over time.

Each shoreline property included in the program was given percentage classifications in four possible classes (natural, regenerative, ornamental, and degraded), rounded to the nearest ten percent, based on shoreline development, retaining walls, and shoreline vegetation. Table 1 below summarizes these classifications with descriptions and photographs.

- Natural – A healthy buffer of vegetation and/or a natural shoreline of sand or exposed rock that is undisturbed and undeveloped;
- Regenerative – Natural vegetation has been removed in the past, but is in the process of growing back towards a natural state;
- Ornamental – All natural vegetation has been removed and replaced with mowed lawn and other non-native vegetation; structures such as docks, decks, boathouses and boat ramps are predominantly present at the shore; and
- Degraded – Natural vegetation has been lost; soil erosion, undercutting of the bank, and/or exposed roots of shrubs and trees are significant.

The classification results show that of the total shoreline assessed on Peninsula:

- 1,694.11 metres or 6.5% were classified as natural;
- 13,140 metres or 50.3% were classified as regenerative;
- 11,213.53 metres or 42.9% were classified as ornamental; and
- 37.3 metres or 0.1% were classified as degraded.

Of the properties assessed, 149 properties (43%) were setback less than 30 metres from the shoreline and 39 (11%) were setback 30 metres or more from the shoreline. There were 6,360.42 metres (24.3%) of the total shoreline that was developed with structures and/or docks, and 4,340.52 meters (16.6%) with retaining walls. Of the 354 properties assessed, 96 had observable erosion, and 6 had erosion severe enough to require action. Aquatic cover observed on Peninsula Lake included emerging, submerged and floating vegetation. Aquatic substrate observed on Peninsula Lake included exposed bedrock, boulders, cobbles, rubble, gravel, sand, silt, clay, and organic materials.

Other shoreline property observations included development type, buffer landscapes, and invasive species. On Peninsula Lake, 9 properties, or 2.5% of properties assessed, were identified as commercial properties, no properties were identified as farming properties, 10 properties, or 2.8% of properties assessed, were identified as properties for sale, and no properties were identified as island properties. Cliff faces were observed on 2 properties; 2 properties had exposed bedrock shorelines; and 2 properties had thin soils. There were no invasive species observed on Peninsula Lake throughout the course of this study. Average slopes were observed, and 1 property had very steep slopes, 1 property had steep slopes, 151 properties, or 42.65% of properties assessed, had moderately steep slopes, and 195 properties, or 55.08% of properties assessed, had gentle or flat slopes. Mowed lawns were observed on 223 properties, or 63% of properties assessed, and 44 properties, or 12.4% of properties assessed, had regenerative lawns.

Properties were assigned naturalization priorities on a scale of one through six, and calculated from their ornamental classification percentages combined with their buffer recommendations. Of the 354 properties on Peninsula Lake:

- 98 properties, or 28% of properties assessed, were assigned Priority 1;
- 4 properties, or 1% of properties assessed, were assigned Priority 2;
- 68 properties, or 20% of properties assessed, were assigned Priority 3;
- 9 properties, or 3% of properties assessed, were assigned Priority 4;
- 50 properties, or 14% of properties assessed, were assigned Priority 5; and
- 2 properties, or 1% of properties assessed, were assigned Priority 6.

The remaining 117 properties are not a priority for naturalization efforts because they are either less than 25% ornamental or already have great buffers.

Increasing the natural class percentages and decreasing the number of properties that match criteria for the naturalization priority scale would not only serve to further help maintain or improve water quality and prevent soil erosion, but also reduce impacts of flooding, provide wildlife with additional food and habitat, and increase recreational opportunities and property values (which have been tied to water quality in other lakes). Property owners can accomplish this by creating or expanding buffer strips (a permanent strip of trees, shrubs, grasses and groundcover at the water's edge) to protect and stabilize the shoreline. By actively planting a buffer strip, property owners can increase the naturalization process with positive impacts for their shoreline and their lake.

Introduction

A healthy shoreline is important to the overall health of a lake, as well as to individual property owners. A healthy shoreline is defined as one that contains a variety of native vegetation, and different layers of vegetation ranging from groundcover and grasses, to wildflowers, herbaceous plants, aquatic plants, shrubs, and trees. It is also important to have structural complexity, such as fallen logs and different sizes of stones and rocks to provide habitat for wildlife. The functions of a healthy shoreline are numerous. Shoreline vegetation helps maintain good water quality, and prevent soil erosion through root stabilization. Well-vegetated shorelines also reduce impacts of flooding by providing barriers against moving water. A natural shoreline attracts and provides wildlife with food and habitat, which creates recreational opportunities (i.e., fishing). An abundance of wildlife living within an area is a good indicator of a healthy shoreline.

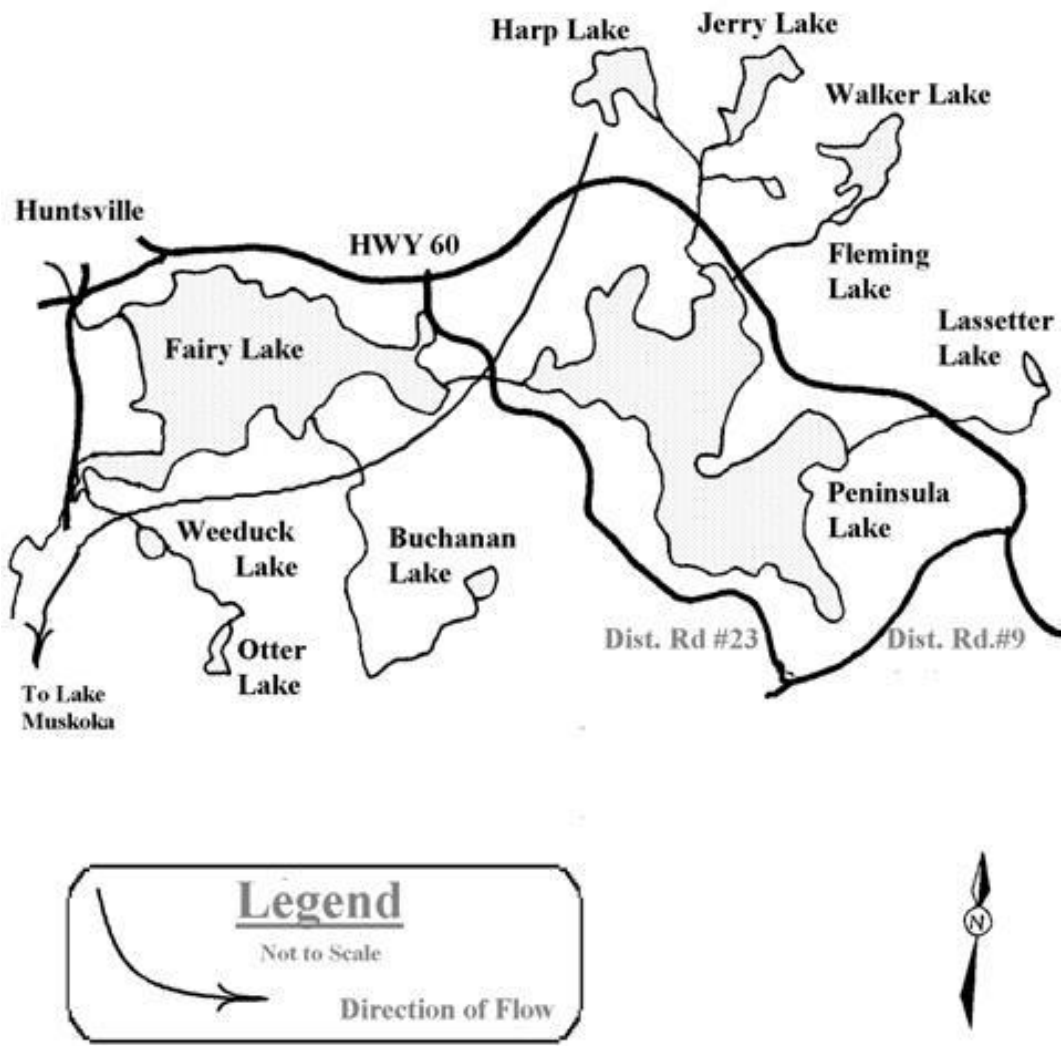
Alternatively, less healthy shorelines experience problems, such as shoreline erosion, and negatively impact the lake by contributing to poor water quality, algae blooms and excessive weed growth. Less healthy shorelines are typically observed to have areas that have been cleared of all or most vegetation, lawns that extend to the water's edge, and hardened structures, such as retaining walls, that have replaced natural vegetation.

Watersheds Canada, the Canadian Wildlife Federation, and regional partners (including Lakeland Alliance, Bonnechere River Watershed Project, Muskoka Watershed Council and City of Greater Sudbury) developed the Love Your Lake program in 2012 to promote shoreline stewardship and help landowners protect and restore their shorelines, thereby improving the health of their lake.

Locally trained staff assess the health of shoreline properties on a lake using the standardized Love Your Lake Shoreline Assessment Protocol and Love Your Lake Shoreline Survey Datasheet. This data is then used to produce a personalized, confidential report for each landowner that accurately describes existing conditions on their shoreline, suggests stewardship actions, and provides additional contacts, resources, and sources of support. This program is non-regulatory and completely voluntary. Landowners generally have a common interest to manage their properties in ways that maintain property values and lake quality and this program provides the information and support to do so.

In the summer of 2013, trained students from the University of Waterloo used the Love Your Lake Shoreline Survey Datasheet (Appendix A) to assess Peninsula Lake, which is located within the Town of Huntsville and the Township of Lake of Bays. Peninsula Lake is east of Huntsville Ontario, with inflow from Harp Lake, Jerry Lake, Walker Lake, Fleming Lake and Lassetter Lake and outflow to Fairy Lake and the north branch of the Muskoka River, as shown in Map 1.

This report is a further effort to provide the Peninsula Lake Association with a summary of the information collected by the Love Your Lake assessment effort. This report presents the data collected per property into a lake-wide summary on shoreline classifications, building setbacks, development (including structures and docks), retaining walls, erosion, aquatic cover, aquatic substrate, other shoreline observations, slope, lawns, and buffers. This report is intended to be a resource for the Peninsula Lake Association and community to use as a source of baseline shoreline data to compare future shoreline data to over time. This report can also be used to encourage stewardship activities for more natural shorelines.







Map 1. Location of Peninsula Lake relative to the Town of Huntsville.

Methodology

A total of 354 shoreline properties were assessed on Peninsula Lake by students trained in the Love Your Lake Shoreline Assessment Protocol. A datasheet was completed for each property assessed. This data was entered into a database to generate an individualized property report for the property landowner. For this lake-wide summary report, the data in the database was exported to a spreadsheet for analysis.

Each shoreline property included in the program was given percentage classifications in four possible classes (natural, regenerative, ornamental, and degraded), rounded to the nearest ten percent, based on shoreline development, retaining walls, and shoreline vegetation. Table 1 below summarizes these classes with descriptions and photographs.

Table 1. Shoreline Class Descriptions and Photographs

Class & Description	Photograph Example*
<p>Natural – A healthy buffer of vegetation and/or a natural shoreline of sand or exposed rock that is undisturbed and undeveloped.</p>	
<p>Regenerative – Natural vegetation has been removed in the past, but is in the process of growing back towards a natural state.</p>	
<p>Ornamental – All natural vegetation has been removed and replaced with mowed lawn and other non-native vegetation; structures such as docks, decks, boathouses and boat ramps are predominantly present at the shore.</p>	
<p>Degraded – Natural vegetation has been lost; soil erosion, undercutting of the bank, and/or exposed roots of shrubs and trees are significant.</p>	
<p>*Note: These photographs are examples of shoreline classes, not representing any specific shoreline property on Peninsula Lake. There can be a range of variation in the classifications depending on the type of shoreline.</p>	

Shoreline lengths for each property were obtained from parcel data provided by the municipality. For properties without this data, lengths were estimated using Global Imaging Systems (GIS) software. Shoreline lengths for each property were multiplied by each of the class percentages to yield an estimated total length of shoreline in each class for each property. These lengths were then summed and divided by the total length of assessed shoreline to yield the total lake-wide length of assessed shoreline in each class. Likewise, shoreline development percentages and shoreline retaining wall percentages were also multiplied by the shoreline lengths to yield an estimated total length of development and retaining walls for each property. These lengths were then summed and divided by the total length of assessed shoreline to yield the total lake-wide length of shoreline development and retaining walls.

The following information was also summarized for the entire lake, by counting the number of properties and calculating the resulting percentages of properties with the presence of each observable shoreline feature:

- Number and percentage of properties assessed with various building setback ranges (including: setback not visible, less than or equal to five metres, five to 10 metres, 10 to 30 metres, and greater than or equal to 30 metres);
- Number and percentage of properties assessed with shoreline development, by each structure type (including: decks, boat launches, boat ramps, boat houses, boat lifts, boat slips, buildings, other structures, stairs and manmade beaches);
- Number and percentage of properties assessed with docks, by each dock type (including: cantilever, floating, post non-permanent, post-permanent, crib-wood, crib-steel, solid, raft, combo - post/floating, combo - post/solid, combo - solid/floating, and/or combo - other);
- Number and percentage of properties assessed with shoreline retaining walls, by each retaining wall type (including: wood, gabion basket, armour stone, concrete, steel, riprap, loose rock, and/or other retaining wall materials) and other retaining wall observations (including: wall failing, railroad ties, treated wood, other structure acting as a retaining wall, and upland retaining wall);
- Number and percentage of properties assessed with presence of erosion, by each erosion type (including: surface, mass movement/slumping, and undercut bank);
- Number and percentage of properties assessed with presence of erosion requiring action, by each erosion type (including: surface, mass movement/slumping, and undercut bank). This erosion is considered significant and could potentially contribute to degradation of the shoreline;
- Number and percentage of properties assessed with presence of aquatic cover along their shoreline (including: emergent, floating, and submergent vegetation, no cover, algal blooms, and evidence of aquatic vegetation removal);
- Number and percentage of properties assessed with presence of observable aquatic substrate, by each substrate type (including: bedrock, boulder, cobble, rubble, gravel, sand, silt, clay, muck/organic, hardpan, pelagic). If no substrate is observable, field staff indicate that no data was recorded;
- Number and percentage of properties assessed with other observations (including development observations [commercial property, farm, for sale, island], landscape observations [cliff, bedrock, thin soil], and presence of invasive species);
- Number and percentage of properties assessed with various average slopes (including, from most steep to least steep: greater than 1:1, 1:1, 2:1, and less than or equal to 3:1);
- Number and percentage of properties assessed with lawn presence, by each lawn type (including: mowed lawn, regenerative lawn, and pine needles); and

- Number and percentage of properties assessed with buffers, by each status/recommended restoration opportunity (including: create a buffer, 30 metre buffer size inland from the water's edge is difficult, expand current buffer, and/or current buffer is great as is).

In addition to the above data being summarized into tables, the ornamental classification percentages and the buffer status/recommended restoration opportunity data has been analyzed to produce a naturalization priority scale with values one through six. Each value on the scale has different criteria and properties that meet the criteria were then summarized into a table. The criteria for each value on the naturalization priority scale are:

- **Priority #1:** Recommendations to create or expand buffers and ornamental classifications greater than or equal to 75%;
 - These properties are the best candidates for naturalization projects because they are mostly ornamental and have at least 30 metres of space available to create or expand buffers.
- **Priority #2:** Recommendations to create or expand buffers and ornamental classifications between 50 and 74%;
 - These properties are the second best candidates for naturalization projects because they are very ornamental and have at least 30 metres of space available to create or expand buffers.
- **Priority #3:** Recommendations to create or expand buffers and ornamental classifications between 25% and 49%;
 - These properties are the third best candidates for naturalization projects because they are partially ornamental and have at least 30 metres of space available to create or expand buffers.
- **Priority #4:** Recommendations to create or expand buffers, ornamental classifications greater than or equal to 75%, but 30 metres of buffer inland from the waters edge is difficult;
 - These properties are the fourth best candidates for naturalization projects because they are mostly ornamental, but do not have at least 30 metres of space available to create or expand buffers.
- **Priority #5:** Recommendations to create or expand buffers, ornamental classifications between 50 and 74%, but 30 metres of buffer inland from the waters edge is difficult;
 - These properties are the fifth best candidates for naturalization projects because they are very ornamental, but do not have at least 30 metres of space available to create or expand buffers.
- **Priority #6:** Recommendations to create or expand buffers, ornamental classifications between 25% and 49%, but 30 metres of buffer inland from the waters edge is difficult;
 - These properties are the sixth best candidates for naturalization projects because they are partially ornamental, but do not have at least 30 metres of space available to create or expand buffers.
- **Non-Priority:** Ornamental classifications less than 25% with any buffer recommendation, including great buffer as is;
 - These properties are not priority candidates for naturalization projects because they are mostly regenerative or natural, and/or currently have great buffers.

Results

Shoreline Classifications

Of the 354 properties assessed on Peninsula Lake, the overall percentages and estimated lengths per shoreline class were:

- 1,694.11 metres or 6.5% natural;
- 13,140.39 metres or 50.3% regenerative;
- 11,213.53 metres or 42.9% ornamental; and
- 37.30 metres or 0.14% degraded.

Figure 1 shows the percentage of the entire assessed shoreline in each classification. Figure 2 shows the percentages of each shoreline class per property. The overall estimated length and percentage of shoreline development on Peninsula Lake is 6,360.42 metres or 24.33%. The overall estimated length and percentage of retaining walls on Peninsula Lake is 4,340.52 metres or 16.6%. Table 2 summarizes these results.

Shoreline Classification Percentages of Total Assessed Shoreline

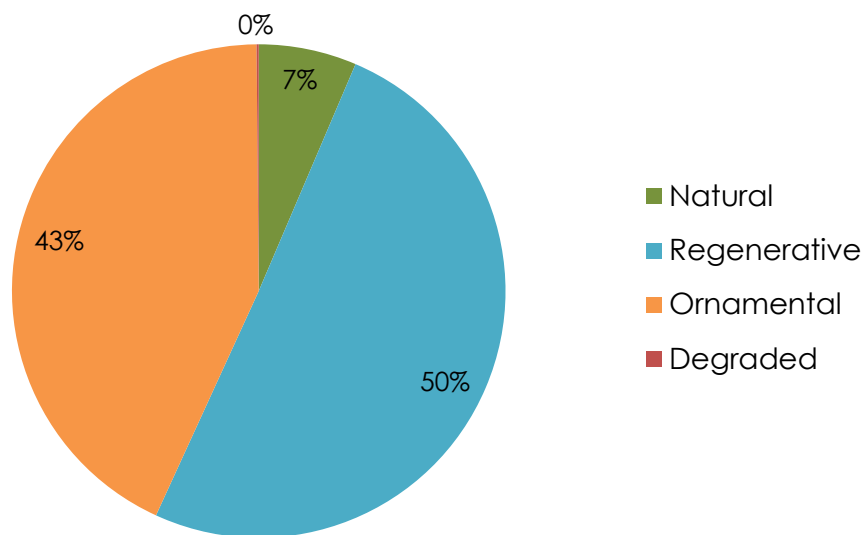


Figure 1. Total classification percentages of all assessed shoreline properties on Peninsula Lake.

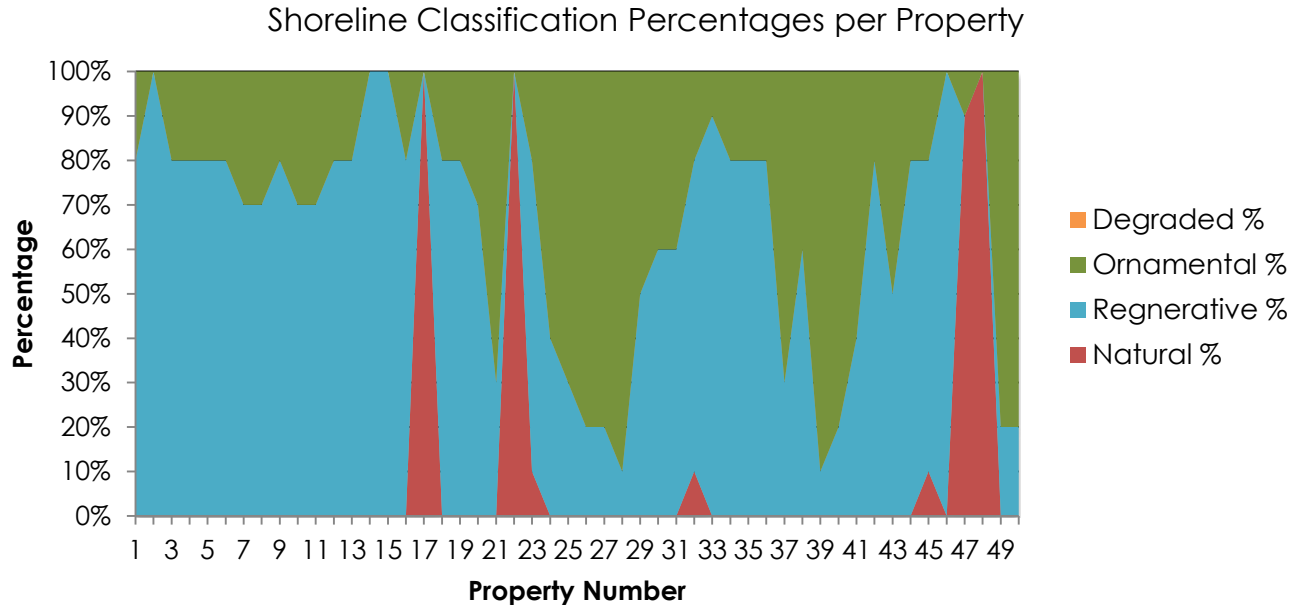


Figure 2. Classification percentages per property of all shoreline properties assessed on Peninsula Lake.

Table 2. Shoreline classification, development, and retaining wall lengths of all shoreline properties assessed on Peninsula Lake.

Assessment Parameter	m	%
Natural Class	1,694.11	6.5
Regenerative Class	13,140.39	50.3
Ornamental Class	11,213.53	42.9
Degradated Class	37.30	0.1
Shoreline Development	6,360.42	24.3
Retaining Walls	4,340.52	16.6
Total Assessed Shoreline	26,140.00	100.0

Stewardship Message

On Peninsula Lake, the majority of the shoreline is classified as Regenerative. However, as shown in Figure 2, 347 properties are less than 75% natural.

Generally, 25% of a property's shoreline can be developed for access to the lake and for recreational space. The remaining 75% should be left in a natural state, or be regenerating back to a natural state to benefit the lake and wildlife. However, depending on the size of a property's waterfront, this percentage may not be appropriate. For example, 25% of a shoreline property with 25 metres of waterfront would mean five metres of the length of the waterfront could be developed for access to the lake or for recreational room. Whereas 25% of a shoreline property with 1,000 meters of waterfront would mean 25 metres could be developed for access to the lake or for recreational room. Therefore, the ultimate suggestion is to manage properties as naturally as possible, whereby development should be considerate of the space required for access to the lake or for recreational room, regardless of the overall length of waterfront.

Building Setbacks

On Peninsula Lake, the number of properties with various building setback ranges were observed and recorded. Building setbacks for new cottage developments in Ontario should be at least 30 metres from the high water mark; however, older cottage buildings may have been constructed closer to the high water mark. As shown in Figure 3, the following numbers and percentages of properties assessed on Peninsula Lake had the following building setbacks:

- 2 properties, or 1% of properties assessed, had building setbacks that were not visible;
- 9 properties, or 3% of properties assessed, were less than or equal to five metres from the shoreline;
- 27 properties, or 8% of properties assessed, were between five and 10 metres from the shoreline;
- 110 properties, or 31% of properties assessed, were between 10 and 30 metres from the shoreline; and
- 39 properties, or 11% of properties assessed, were greater than or equal to 30 metres from the shoreline.

There was 1 property, or 0.28% of properties assessed on Peninsula Lake, without a main building.

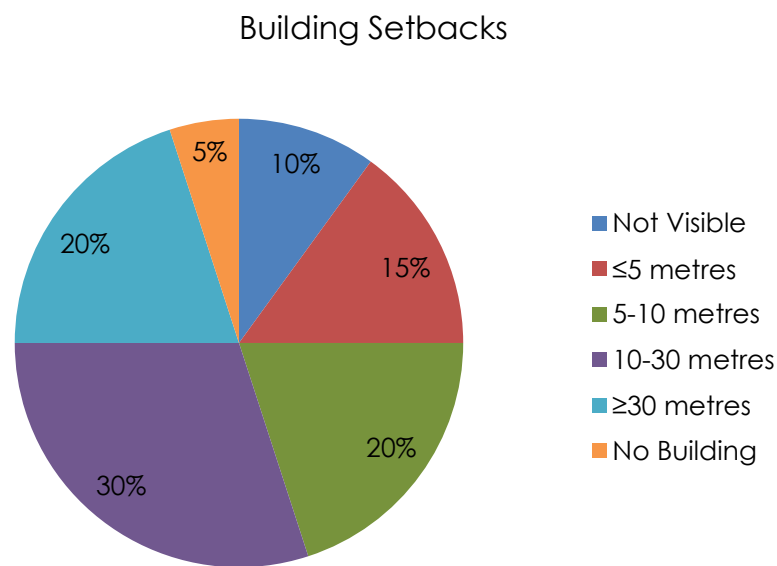


Figure 3. Main building setback ranges of all shoreline properties assessed on Peninsula Lake.

Stewardship Message

Setbacks are important on shoreline properties to help minimize the impact of development on the aquatic environment. Setbacks assist in:

- Maintaining separation from the lake or adjacent properties so that septage from septic systems does not have an easy path to the lake or on to neighbouring properties;
- Allowing spaces for a vegetative buffer zone to exist; and
- Improving the natural visage of the shoreline.

The further away from the water a cottage or other structure is, the more time nature has to absorb, neutralize, or filter out pollutants before they reach Peninsula Lake. A building set back from the water a minimum of 30 metres with a healthy buffer zone between it and the water will have a minimal impact on water quality.

Shoreline Development

On Peninsula Lake, the number of properties with shoreline development features were observed and recorded. Shoreline development includes the presence of man-made structures on the land or in the water within the first three metres of the shoreline. These structures can be harmful to local plants, contribute to erosion, and can restrict wildlife access to and from land and water. Although some of these types of structures can have negative environmental impacts because they cover habitat, this can be mitigated by allowing vegetation to grow around the decks, boathouses, sheds, stairs, or other man-made structures.

Small floating or post docks are the best choice of docks as they have minimal contact with the lake bottom, and sit on or out of the water, which reduces the impact they have on the surrounding environment. In the future, if shoreline property owners need to replace their old or failing permanent post, solid, or crib docks, they could consider a non-permanent post dock or floating dock, thereby limiting impacts to fish habitat and ensuring the natural flow of water remains unrestricted.

The overall estimated length and percentage of shoreline development on Peninsula Lake is 6,360.42 meters or 24.3%. Figure 4 shows the ranges of shoreline development of the properties assessed on Peninsula Lake. As shown in Figures 5 and 6, the following numbers and percentages of properties assessed on Peninsula Lake had shoreline development by each structure type and each dock type:

- Structures:
 - 75 properties, or 21.19% of properties assessed, had decks;
 - 5 properties, or 1.41% of properties assessed, had boat launches;
 - 20 properties, or 5.65% of properties assessed, had boat ramps;
 - 72 properties, or 20.34% of properties assessed, had boat houses;
 - 30 properties, or 8.47% of properties assessed, had boat lifts;
 - 22 properties, or 6.21% of properties assessed, had boat slips;
 - 15 properties, or 4.24% of properties assessed, had building(s) that were not the main dwelling;
 - 5 properties, or 1.41% of properties assessed, had stairs;
 - 20 properties, or 5.56% of properties assessed, had manmade beaches;
- Docks:
 - 53 properties, or 14.97% of properties assessed, had floating docks;
 - 74 properties, or 20.9% of properties assessed, had post non-permanent docks;
 - 9 properties, or 2.54% of properties assessed, had post permanent docks;
 - 97 properties, or 27.4% of properties assessed, had crib-wood docks;
 - 1 property, or 0.28% of properties assessed, had a solid dock;
 - 42 properties, or 11.86% of properties assessed, had rafts;
 - 6 properties, or 1.69% of properties assessed, had combo - post/floating docks;
 - 2 properties, or 0.56% of properties assessed, had combo - other docks
 - 6 properties, or 1.69% of properties assessed, had permanent dock systems; and
 - 3 properties, or 0.85% of properties assessed, had non-permanent dock systems.

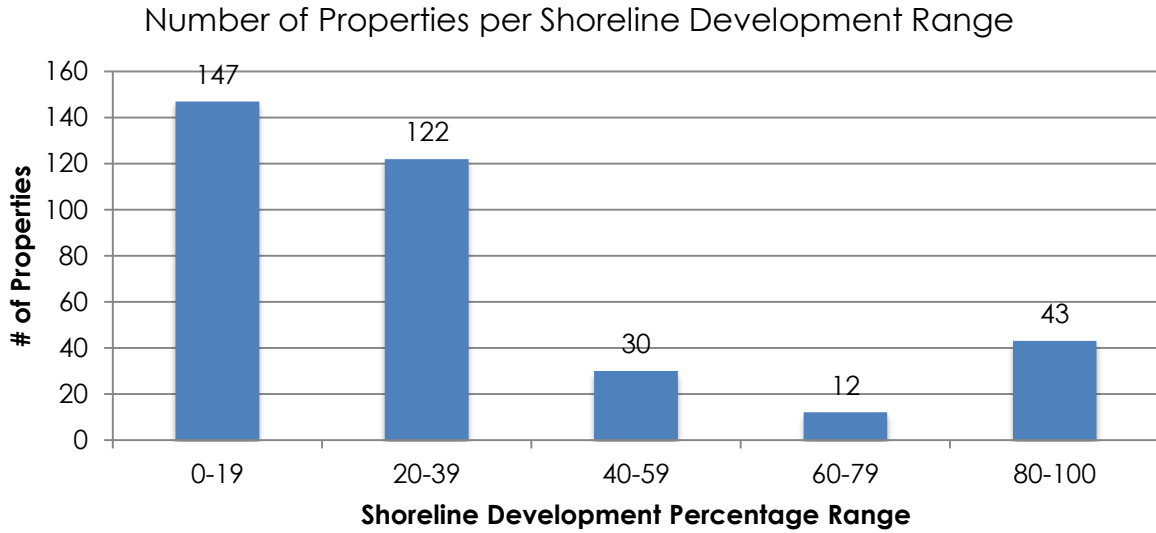


Figure 4. Shoreline development ranges per property of all shoreline properties assessed on Peninsula Lake.

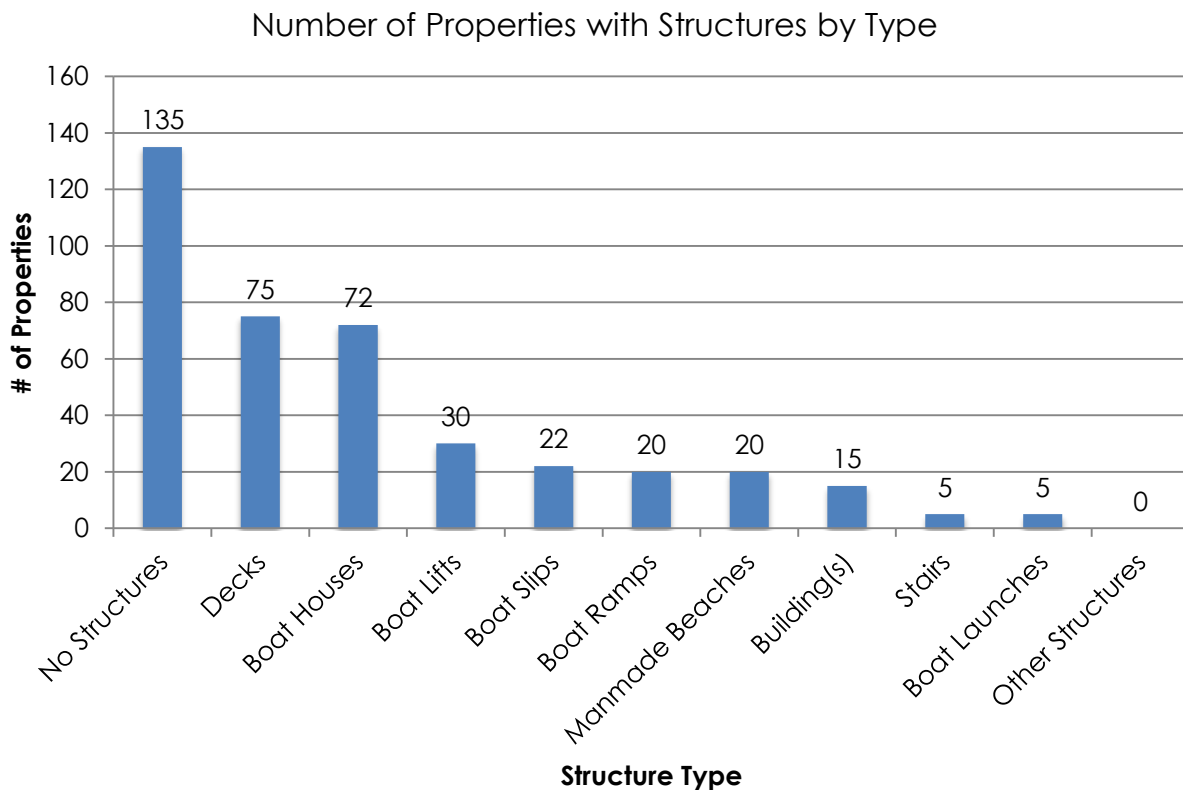


Figure 5. Shoreline development by structure type of all shoreline properties assessed on Peninsula Lake.

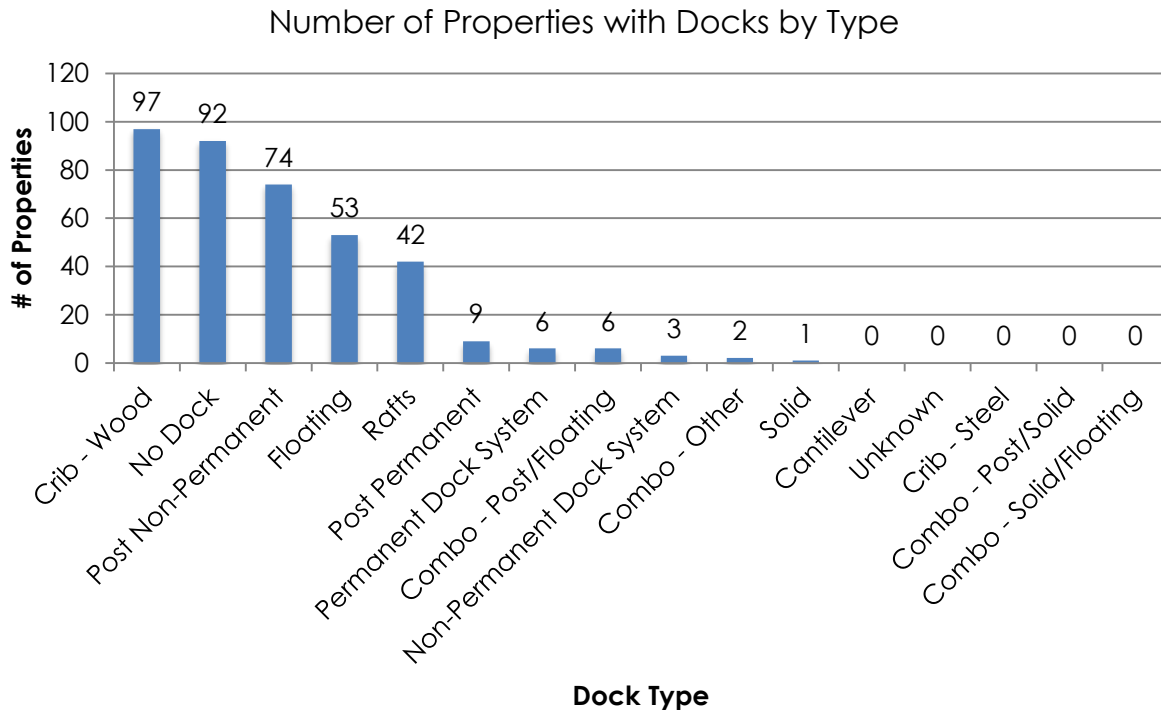


Figure 6. Types of docks of all shoreline properties assessed on Peninsula Lake.

Retaining Walls

On Peninsula Lake, the number of properties with retaining walls were counted and summarized. Retaining walls are a common feature on many lakes to protect against erosion. While retaining walls were a common choice in the past, we now know about their impact to the natural environment. Waves and wakes are reflected back from flat, hard surfaces with the same vigour as they strike the wall. This causes 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 local wildlife from reaching the water. Although some retaining walls (like riprap) have fewer impacts than other retaining walls (like armour stone), shoreline property owners could consider alternative erosion control methods (like planting vegetated buffers or shoreline bioengineering) if they ever wish to replace their current, old, or failing retaining wall. In the meantime, maintaining vegetation around the wall and allowing new vegetation to establish and grow will help reduce runoff and erosion.

The overall estimated length and percentage of retaining walls on Peninsula Lake is 4,340.52 metres or 16.6%. As shown in Figure 7, the following numbers and percentages of properties on Peninsula Lake had retaining walls, by each retaining wall type:

- 13 properties, or 3.67% of properties assessed, had wood retaining walls;
- 14 properties, or 3.95% of properties assessed, had armour stone retaining walls;
- 2 properties, or 0.56% of properties assessed, had concrete retaining walls;
- 1 property, or 0.28% of properties assessed, had a riprap retaining wall;
- 64 properties, or 18% of properties assessed, had loose rock retaining walls;
- 7 properties, or 1.97% of properties assessed, had other types of retaining walls; and
- 120 properties, or 66.1% of properties assessed, did not have retaining walls.

As shown in Figure 7 as well, the following numbers and percentages of properties on Peninsula Lake had retaining walls with additional observations:

- 1 property, or 0.28% of properties assessed, had railroad ties used as a wood retaining wall; and
- 16 properties, or 4.51% of properties assessed, had an upland retaining wall not on the immediate shoreline.

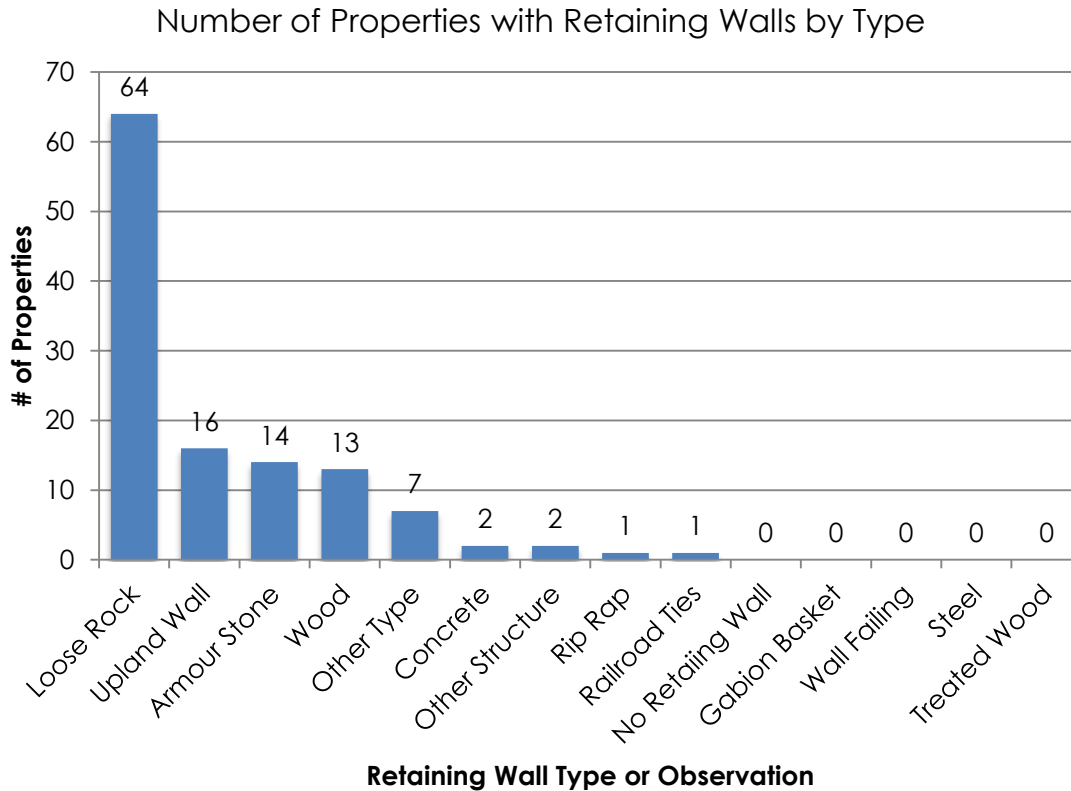


Figure 7. Retaining wall types and observations of all assessed properties on Peninsula Lake.

Stewardship Message

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 and aggressive approach. People began putting in concrete break walls, gabion baskets and rip-rap (loose stones along the shore). These structures do work well in the short term to prevent erosion, but they ultimately do much more harm than good.

Hardened shorelines deflect wave energy instead of absorbing it – the energy is deflected to the sides, passing the erosion problem on to neighbouring sites, and down, scouring away any sediment or plant life near the base of the wall. These structures completely obliterate the natural shoreline environment, eliminating food and habitat for creatures in and out of the water. Installing these structures requires heavy machinery, which is both costly and environmentally damaging. Worst of all, these structures eventually fail.

Erosion

On Peninsula Lake, the number of properties with observed erosion were counted and summarized into Table 3 below. Erosion can contribute to shoreline destabilization, reduce the water quality of the lake, and therefore indirectly reduce property value and recreation opportunities. To mitigate this, shoreline property owners could consider naturalizing these areas by establishing native vegetation by simply allowing vegetation to regenerate on its own, or by actively planting native trees, shrubs, grasses, or groundcover. The roots of the vegetation will grip the soil, while the leaves will reduce the velocity of surface water flow and rain fall, thereby reducing further erosion.

As shown in Table 3, 96 properties, or 27.1% of properties assessed on Peninsula Lake, had some form of observable erosion (including surface, mass movement/slumping, or undercut bank); and 6 properties, or 1.69% of properties assessed, had significant erosion with recommended action. Each property can have more than one type of erosion. Figure 8 shows the percentage of each type of erosion present on assessed shoreline properties on Peninsula Lake.

Table 3. Erosion observed by type on shoreline properties assessed on Peninsula Lake.

Category	# Properties	% of Properties
Erosion presence		
Surface	32	74.00
Mass movement/slumping	7	1.98
Undercut bank	57	16.10
Erosion requiring action		
Surface	1	0.28
Mass movement/slumping	1	0.28
Undercut bank	4	1.13
No erosion	264	74.58

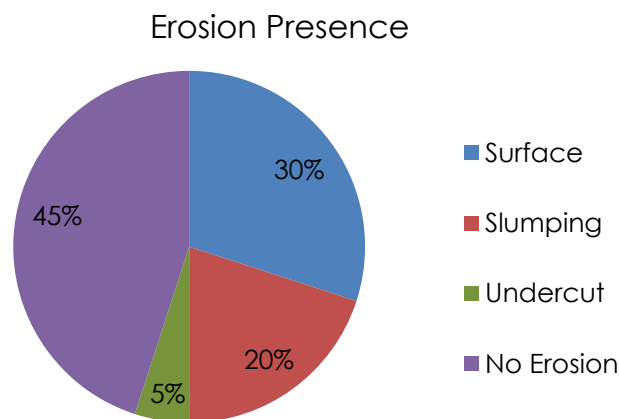


Figure 8. Presence of erosion observed on shoreline properties assessed on Peninsula Lake.

Stewardship Message

The best insurance policy against erosion is to retain the natural characteristics of the shoreline; this means keeping lots of vegetation, maintaining a good buffer strip (no mowing up to the water's edge) and leaving in place all of the stones, boulders, snags, and dead branches found along the shoreline. These materials absorb the energy from erosive forces like waves and keep the shoreline "glued" together.

Aquatic Cover

On Peninsula Lake, the number of properties with aquatic cover were counted and summarized. Aquatic cover includes emergent, floating, and submergent aquatic vegetation, and can provide important habitat for fish and other aquatic wildlife. However, an overabundance of it may be an indicator of high nutrient levels entering the lake. By having a well-vegetated shoreline to intercept and filter excess nutrients and fertilizers from runoff before entering the lake, landowners may be able to influence the amount of excess aquatic cover growing along their shorelines.

The presence and abundance of aquatic cover can vary throughout the year. Each assessed property could have one or more types of aquatic cover. The following numbers and percentages of properties on Peninsula Lake had aquatic cover by aquatic cover type observed along their shoreline during the time of the assessments:

- 82 properties, or 23.2% of properties assessed, had emergent aquatic cover;
- 76 properties, or 21.5% of properties assessed, had floating aquatic cover;
- 232 properties, or 65.5% of properties assessed, had submergent aquatic cover;
- 22 properties, or 6.2% of properties assessed, had no aquatic cover;
- No properties assessed had algal blooms; and
- No properties assessed had evidence of aquatic cover removal.

Aquatic Substrate

On Peninsula Lake, the number of properties with aquatic substrate types were counted and summarized. Aquatic substrate can be important habitat for fish and other aquatic wildlife, and it is useful to document this feature to better inform future restoration projects on the lake. Each property can have a combination of aquatic substrate types at their shorelines.

The following numbers and percentages of properties on Peninsula Lake had aquatic substrate by aquatic substrate type:

- 4 properties, or 1.1% of properties assessed, had exposed bedrock;
- 81 properties, or 22.9% of properties assessed, had boulders (rocks greater than 25 cm in diameter);
- 111 properties, or 31.4% of properties assessed, had cobble (rocks 17-25 cm in diameter);
- 142 properties, or 40.1% of properties assessed, had rubble (rocks 6.4 to 16.9 cm in diameter);
- 165 properties, or 46.6% of properties assessed, had gravel (rocks or pebbles 0.2 to 6.39 cm in diameter);
- 337 properties, or 95.2% of properties assessed, had sand (small, gritty rock particles 0.05 to 0.19 cm in diameter);
- 262 properties, or 74% of properties assessed, had silt (fine, powdery rock particles less than 0.05 cm in diameter);
- 47 properties, or 13.3% of properties assessed, had clay (fine, greasy rock particles about 0.01 cm in diameter);

- 1 property, or 0.3% of properties assessed, had muck/organic (black earth or mud and/or decaying organic material);
- No properties assessed had hardpan (clay-rich soil cemented or compacted into impervious, hardened layer);
- 3 properties, or 0.8% of properties assessed, had no visible substrate due to pelagic zone (sudden drop in depth); and
- 1 property, or 0.3% of properties assessed, had no visible data recorded.

Other Observations

On Peninsula Lake, additional property observations were recorded and summarized. These observations may have changed since the time of the survey. Additional observations were recorded about land development, including commercial properties, farming properties, properties for sale, and island properties; landscape types for buffers, including cliffs, bedrock, and thin soils; and invasive species.

The lake community usually already knows about the presence of invasive species in their lake before the property assessments take place. Invasive species travel and will spread throughout a waterway. They are difficult to control once already present. It is important to help prevent the spread of invasive species to other waterbodies by properly washing and drying your boat and trailer before travelling to another waterbody.

The following numbers and percentages of properties on Peninsula Lake had additional shoreline property observations:

- Development:
 - 9 properties, or 2.5% of properties assessed, were identified as commercial properties;
 - 10 properties, or 2.8% of properties assessed, were identified as for sale;
- Landscape Types for Buffers:
 - 2 properties, or 0.6% of properties assessed, had cliff faces;
 - 2 properties, or 0.6% of properties assessed, had bedrock;
 - 2 properties, or 0.6% of properties assessed, had thin soils;
- Invasive Species:
 - No invasive species were observed during the assessment on Peninsula Lake.

Slopes

On Peninsula Lake, each shoreline property was observed for its average slope and summarized. The steepest slope is greater than or equal to 1:1, meaning the steepness of the land for every metre inland from the shoreline equals every metre upland from the surface of the water; or, the minimum incline of the slope is at least 45 degrees. The least steep slope is less than or equal to 3:1, meaning the steepness of the land for every three metres inland from the shoreline is equal to one metre upland from the surface of the water. Slopes indicated as greater than or equal to 3:1 include "flat" properties.

The slope of shorelines influences the gravitational pull of runoff downslope into the water. Steeper shorelines often suffer with more erosion problems. While shoreline buffers of healthy trees and shrubs are important on all properties, steeper properties would yield even greater benefit from well-vegetated slopes to reduce the impacts of erosion from runoff.

The following numbers and percentages of properties on Peninsula Lake had various average slopes:

- 1 property, or 0.28% of properties assessed, had a very steep slope, $\geq 1:1$;
- 1 property, or 0.28% of properties assessed, had a steep slope, 1:1;
- 151 properties, or 42.66% of properties assessed, had moderately steep slopes, 2:1; and
- 195 properties, or 55.08% of properties assessed, had gentle to flat slopes, $\leq 3:1$.

Lawns

On Peninsula Lake, the number of properties with lawns, either mowed or regenerative, were counted and summarized. In areas close to the shoreline, a lawn is generally not a good choice of ground cover because over 55% of precipitation runs off mowed grass directly into the lake, instead of returning to the underground water cycle by filtering through the soil. Natural ground cover and native vegetation, in comparison, slow the runoff and allow filtration, removing many contaminants, pollutants, nutrients, fertilizers and other substances. These substances can be carried into the lake by runoff and can harm water quality and upset the natural ecosystem. Lawn grasses also have short root systems and therefore do not bind the soil well, which can lead to problems with erosion. If shoreline property owners wish to mitigate this, they could consider naturalizing this area by simply allowing vegetation to regenerate on its own or by actively planting native trees, shrubs, grasses, or alternative groundcover. The roots of the vegetation will grip the soil, which can help prevent further 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 landowners are encouraged to enhance regeneration by planting native shrubs and trees.

As shown in Figure 9, the following numbers and percentages of properties on Peninsula Lake had lawns, by lawn type:

- 223 properties, or 63% of properties assessed, had mowed lawns;
- 44 properties, or 12.4% of properties assessed, had regenerative lawns;
- 11 properties, or 3.1% of properties assessed, had pine needles; and
- 87 properties, or 24.6% of properties assessed, had no lawn.

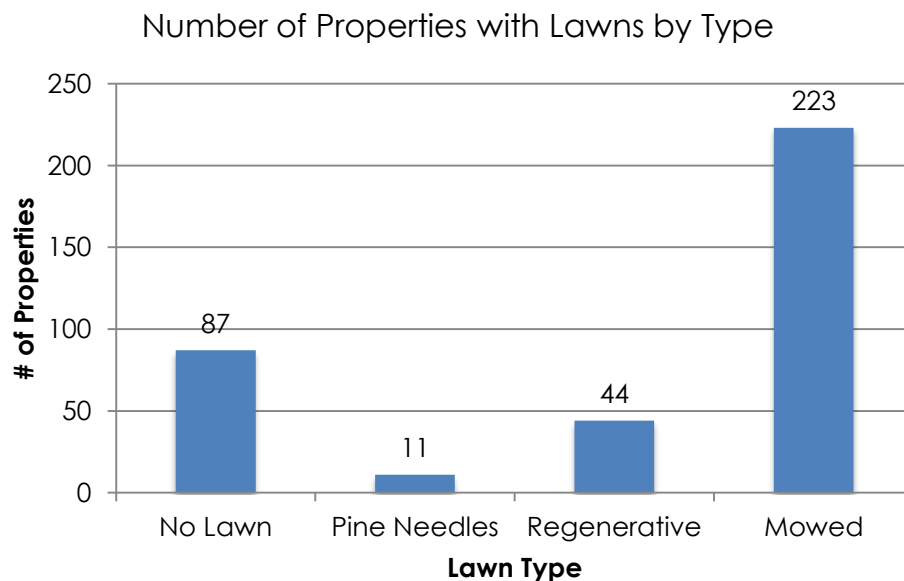


Figure 9. Presence of lawns observed on shoreline properties assessed on Peninsula Lake.

Stewardship Message

In North America, lawns now account for more than eight million hectares of land use. Often chemical or organic fertilizers are applied to these lawns, and it is not uncommon for a typical manicured lawn to have between five and ten times the concentrations of chemical fertilizers and pesticides as areas the same size in an agricultural setting. One of the main problems with the overuse of chemical or organic fertilizers on shoreline properties, especially lawns, is that 55% of precipitation leaves as runoff. On a shoreline property, the runoff is allowed to flow directly into the adjacent waterbody, where it can upset the natural ecosystem.

Naturalization Priorities

The ornamental classification percentages and the buffer status/recommended restoration opportunity data was analyzed to produce a naturalization priority scale with values of one through six. Each value on the scale has different criteria and properties that meet the criteria were then summarized into a table. Properties can decrease their priority ranking by increasing the amount of natural vegetation along their shoreline. This will both decrease their ornamental classification percentage and contribute to a healthier buffer.

Buffers are a vital area of the shoreline, for plenty of reasons, as already discussed. Buffer zones are the ribbon of life, providing over 90% of aquatic and terrestrial wildlife with essential habitat needed at some point throughout their various life stages, to mate, rear young, find food, or take shelter. Property owners who do not have 30 metres of space inland from the water's edge are encouraged to plant where they can.

The criteria for each value on the naturalization priority scale are:

- **Priority #1:** Recommendations to create or expand buffers and ornamental classifications greater than or equal to 75%;
 - These properties are the best candidates for naturalization projects because they are mostly ornamental and have at least 30 metres of space available to create or expand buffers.
- **Priority #2:** Recommendations to create or expand buffers and ornamental classifications between 50 and 74%;
 - These properties are the second best candidates for naturalization projects because they are very ornamental and have at least 30 metres of space available to create or expand buffers.
- **Priority #3:** Recommendations to create or expand buffers and ornamental classifications between 25% and 49%;
 - These properties are the third best candidates for naturalization projects because they are partially ornamental and have at least 30 metres of space available to create or expand buffers.
- **Priority #4:** Recommendations to create or expand buffers, ornamental classifications greater than or equal to 75%, but 30 metres of buffer inland from the water's edge is difficult;
 - These properties are the fourth best candidates for naturalization projects because they are mostly ornamental, but do not have at least 30 metres of space available to create or expand buffers.
- **Priority #5:** Recommendations to create or expand buffers, ornamental classifications between 50 and 74%, but 30 metres of buffer inland from the water's edge is difficult;

- These properties are the fifth best candidates for naturalization projects because they are very ornamental, but do not have at least 30 metres of space available to create or expand buffers.
- **Priority #6:** Recommendations to create or expand buffers, ornamental classifications between 25% and 49%, but 30 metres of buffer inland from the water's edge is difficult;
 - These properties are the sixth best candidates for naturalization projects because they are partially ornamental, but do not have at least 30 metres of space available to create or expand buffers.
- **Non-Priority:** Ornamental classifications less than 25% with any buffer recommendation, including great buffer as is;
 - These properties are not priority candidates for naturalization projects because they are mostly regenerative or natural, and/or currently have great buffers.

Of the 354 properties on Peninsula Lake, 98 properties, or 28% of properties assessed, were assigned Priority 1, 4 properties, or 1% of properties assessed, were assigned Priority 2, 68 properties, or 20% of properties assessed, were assigned Priority 3, 9 properties, or 3% of properties assessed, were assigned Priority 4, 50 properties, or 14% of properties assessed, were assigned Priority 5, and 2 properties, or 1% of properties assessed, were assigned Priority 6. The remaining 117 properties, or 34% of properties assessed, are not a priority for naturalization efforts because they are either less than 25% ornamental or already have great buffers. Table 4 below summarizes the number and percentage of properties per priority ranking. Figure 10 shows the percentages of properties in each priority ranking.

Table 4. Priority Naturalization Rankings of Properties Assessed on Peninsula Lake.

Category		# Properties	% of Properties
Naturalization Priority	Priority Criteria		
Priority #1	Create or Expand and Orn Class >=75%	98	28
Priority #2	Create or Expand and Orn Class = 50-74%	4	1
Priority #3	Create or Expand and Orn Class = 25-49%	68	20
Priority #4	Create or Expand and Orn Class >=75% and 30m Difficult	9	3
Priority #5	Create or Expand and Orn Class = 50-74% and 30m Difficult	50	14
Priority #6	Create or Expand and Orn Class = 25-49% and 30m Difficult	2	1
No Priority	Orn Class <25% and Create or Expand and/or Great Buffer as Is and/or 30m Difficult	117	34

Percentage of Properties per Naturalization Priority

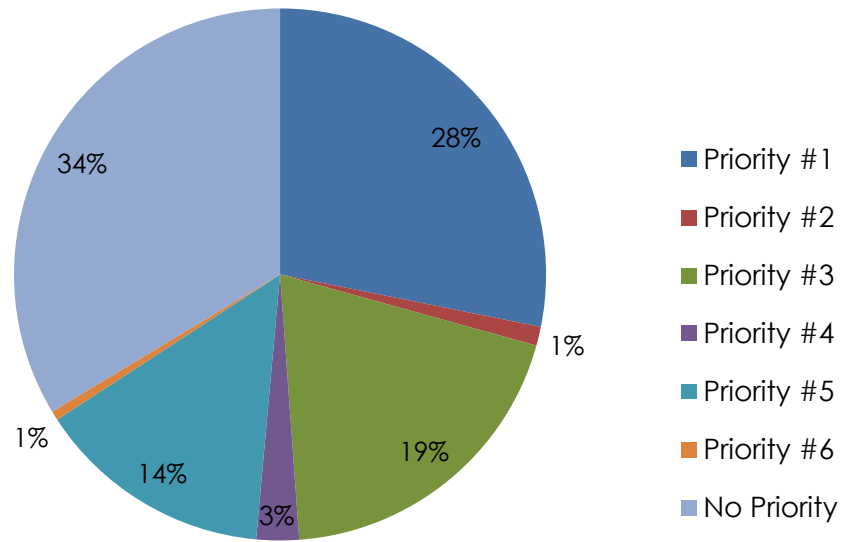


Figure 10. Naturalization priorities of all assessed properties on Peninsula Lake.

Conclusions


This report summarized the shoreline assessment data that was collected in the summer of 2013 as part of the Love Your Lake program on Peninsula Lake, providing an overview of the state of the total shoreline.

This report is intended to be a resource for the Peninsula Lake Association and community to use as a source of baseline shoreline data to compare future shoreline data to over time. It further serves to encourage the Peninsula Lake Association to continue their efforts to engage shoreline property owners in naturalization projects, with hopes of increasing the percentage of regenerative and natural shorelines, and decreasing the percentage of ornamental shorelines, as well as decreasing the number of properties in the first three ranks of the priority naturalization scale. Natural shorelines are shown to contribute positively to water quality, wildlife habitat, recreational opportunities, and property values. With positive individual and community actions to protect shoreline health, all lake users, cottagers, and residents will benefit by enjoying a healthier lake.

This report can also be used by property owners to see how their property measures up against others on the lake while maintaining individual property privacy as to the specific contents of each report. Each individual property owners' shoreline reports are written largely based on the majority classification of their shoreline. For ornamental properties, the reports encourage the introduction of native shoreline vegetation. For regenerative properties, the reports encourage the continued growth of existing shoreline vegetation and/or recommend increasing buffer size. For natural properties, the reports recommend to maintain the existing shoreline buffer. And for degraded properties, the reports recommend to create any type of buffer or allow native groundcover to establish itself in order to decrease overland runoff.

Ultimately, in Ontario, the more native shoreline vegetation a lake has, the healthier the lake system. Natural shorelines in some other areas may include exposed bedrock, cliff faces, sand, or other landscape features that is not suitable for native vegetation to thrive, or is difficult or dangerous to establish vegetation; in these locations, keeping the shorelines in their natural state is recommended. While shoreline vegetation aids in soil stabilization, pollutant filtration, and overall lake health, it is also the best defense against most erosion problems. A good underground root network keeps soil in place, while a healthy buffer of shrubbery prevents topsoil from being exposed and washed away. Shoreline vegetation nearest to and even in the water, such as aquatic and wetland plants, absorbs wave energy before it reaches the shoreline, further reducing the impact of erosion through wave action, undercutting and washing away the bank. Natural buffers also provide habitat for wildlife, both aquatic and terrestrial, and they improve habitat for fish by shading and cooling the water. They provide protective cover for birds, mammals and other wildlife that feed, breed and rear young near water. Local wildlife has also been known to aid natural buffer creation by spreading native plant seeds from neighboring forests (via their fur, feathers, or excrement), which also adds genetic diversity and strengthens these natural buffers. By maintaining the natural shoreline, and with a few simple improvements, residents of Peninsula Lake can enjoy the benefits of the lake for years to come.

Appendix A: Love Your Lake Shoreline Classification Protocol Datasheet



Shoreline Survey Datasheet

Lake Name: _____		Address: _____			
Datasheet #:	GPS UTM (NAD83)			Digital Photo Ref #s:	
Property #/ Pin Number:					
Property Assessment #:	Start of Property	End of Property			
	N	N			
	E	E			
Classification (%)				Erosion check all that apply <input checked="" type="checkbox"/>	
Degraded	Ornamental	Regenerative	Natural	Surface (rill, gully, rain, exposed soil)	Mass Mvmt/ Slumping (angled veg)
%	%	%	%		Undercut Bk (scouring, wave/boat/ice)
Building Setback check the field that applies <input checked="" type="checkbox"/>				<input type="checkbox"/>	<input type="checkbox"/>
Can't see	≤ 5 meters	5-10 meters	10-30 meters	≥30 meters	Erosion control (if required)
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Shoreline Development: (%)				Aquatic Cover check if present <input checked="" type="checkbox"/>	
%				Emergent	Floating
Structures enter # of each applicable				Submergent	No cover
Deck	Boat Launch	Boat Ramp	Boat house	Boat Lift	Boat Slip
#	#	#	#	#	#
Build ing(s)	Other	Man-made Beach	Stairs	Aquatic Substrate check if present <input checked="" type="checkbox"/>	
#	#	#	#	Bedrock (exposed)	Silt (<0.05 cm)
Dock enter # of each applicable				Boulder (>25cm)	Clay (0.01 cm)
Cantilever	Floating	Post Non Perm	Post Perm	Crib Wood	Crib Steel
#	#	#	#	#	#
Solid	Raft	Cobble (17-25cm)		Muck or organic	
#	#	Rubble (6.4-17cm)		Hardpan	
Combo Post & Filing	Combo Post & Solid	Combo Solid & Filing	Combo Other	Dock System	# Sections
#	#	#	#	#	#
Permanent	Non-Perm	Gravel (0.2 - 6.4cm)		Pelagic	
#	#	Sand (0.05 - 0.10 cm)		No Data Recorded (not visible)	
Shoreline Retaining Wall				Other Observations	
Length of all walls (% of shoreline) %				Development	Commercial <input type="checkbox"/>
Wood	Gbn Basket	Armour stone	Concrete	Steel	Riprap
#	#	#	#	#	#
**If other please specify: _____				Landscape for buffer	Cliff <input type="checkbox"/>
Wall failing <input type="checkbox"/>				Railroad ties <input type="checkbox"/>	Treated wood <input type="checkbox"/>
Other structure (deck/dock) acting like ret wall <input type="checkbox"/>				Invasives:	Wildlife:
				Eur. Milfoil	Purpl Looset rife
				Spiny water flea	Zebra Mussel
				Eur. Frog-Bit	Water soldier
				Fernwort	Phragmites
				<input type="checkbox"/>	<input type="checkbox"/>
Upland Retaining Wall check if present <input checked="" type="checkbox"/>				Slope: >1:1 <input type="checkbox"/> ≤3:1 <input type="checkbox"/>	
Recommendations/ Restoration Opportunities					
Buffer	Rec create <input type="checkbox"/>	30m size difficult here <input type="checkbox"/>	Rec expand <input type="checkbox"/>	Great buffer as is <input type="checkbox"/>	
Lawn	Mowed lawn <input type="checkbox"/>	Pine Needles <input type="checkbox"/>	Lawn is regenerative <input type="checkbox"/>		
Land use	Stop raking organic <input type="checkbox"/>	Garden <input type="checkbox"/>	Rec young trees <input type="checkbox"/>	Rec boat racks <input type="checkbox"/>	Using boat racks <input type="checkbox"/>
Pathway	Rec create on slope <input type="checkbox"/>	Rec create no slope <input type="checkbox"/>	Rec S & Rec cover <input type="checkbox"/>	Rec S & is covered <input type="checkbox"/>	
	Good S & Rec cover <input type="checkbox"/>	Good S & good covered <input type="checkbox"/>	X S & rec cover <input type="checkbox"/>	X S & Good cover <input type="checkbox"/>	
Stairs	Rec install stairs <input type="checkbox"/>	In retaining wall <input type="checkbox"/>			Stone steps <input type="checkbox"/>
	In ground, closed <input type="checkbox"/>	In ground, open <input type="checkbox"/>	Raised, closed <input type="checkbox"/>	Good - raised, open <input type="checkbox"/>	
Drainage	Can't see <input type="checkbox"/>	No eaves <input type="checkbox"/>	Eaves to surface <input type="checkbox"/>	Eaves to ? <input type="checkbox"/>	Eaves to nat area <input type="checkbox"/>
Habitat	Cavity tree <input type="checkbox"/>	Dead standing tree <input type="checkbox"/>	Terr logs <input type="checkbox"/>	Aq logs <input type="checkbox"/>	Overhanging <input type="checkbox"/>
				Upland forest <input type="checkbox"/>	Wetland <input type="checkbox"/>
				Other <input type="checkbox"/>	Brush Piles <input type="checkbox"/>
Surveyed By:				Entered By:	
Survey Date:	MM/DD/YYYY			Date Data Entered: MM/DD/YYYY	

Version 8, May 2013, Canadian Wildlife Federation, Muskoka Watershed Council, Lakeland Alliance, City of Greater Sudbury and Centre for Sustainable Watersheds