

## **Salerno (Devil's) Lake Shoreline Inventory Project**

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For: The Salerno (Devil's) Lake Cottagers' Association



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## **1. INTRODUCTION/BACKGROUND**

### 1.1 Salerno (Devil's) Lake Cottagers' Association

The SDLCA has determined that with increased development of shoreline properties the lake itself is starting to show indicators of a deteriorating ecosystem. In hopes to grasp a better understanding of these elevated disturbances the SDLCA has commissioned a shoreline inventory to aid in their continued efforts supporting shoreline preservation and management. Human habitation has been intended as having cumulative effects on the habitat, water quality and biota of lake ecosystems (Engel & Pederson, 1998)

### 1.2 Shoreline Inventory Project: Salerno (Devil's ) Lake

The Salerno (Devil's) Lake Cottages' Association commissioned through U-Links a request for a Shoreline Assessment compiled by a Trent University student. The Shoreline Inventory Project was originally developed by Trent student Matthew Birada in March 2011. A Shoreline Assessment was finalized on Kennisis Lake by former Trent student Amy Tenbult the following year. The success of this project has interested the SDLCA and they wish to have a similar assessment done on their lake to be used in future rehabilitation and naturalization projects.

Additionally a new By-law to “conserve, prohibit, protect, restrict and regulate the protection, preservation and removal of trees on shoreline properties in the county of Halliburton” (2012, no. 3505, County of Halliburton) has recently been passed restricting any further removal of trees within 30 meters of the shoreline. It is because of this that the SDLCA decided to catalog the current state of their shoreline for future reference. As well, the SDLCA hopes to gain access to a database with individual property scores for any interested residents of the lake who are involved in shoreline restoration. This shoreline assessment would be a good starting point in furthering lake management techniques and creating awareness of maintaining a healthy lake ecosystem.

## **2. PURPOSE**

The purpose of this is to perform an inventory of the shoreline on Salerno Lake using the previously developed “Shoreline Classification Scorecard” (Birada, 2011). This will offer a base-line to assess and monitor developmental impacts on lake quality as well as the impact of boat traffic on shoreline erosion (SDLCA, 2012). Using the shoreline classification system, the Salerno Lake shoreline can be monitored going forward for any negative changes that may impact the lake's water quality. For example, if blue green algae is spotted in the lake, the shoreline area within the vicinity of the algae could be assessed to determine if there were any changes to the shoreline that could have contributed to the development of the algae (SDLCA, 2012).

It is important that water management be initiated on a local scale in order to accurately assess and manage a lake system. This is, in essence, the broad view of the SDLCA's approach to commissioning the shoreline inventory. Adaptive management of a lake is the continuous changing of management techniques, and even the alteration of goals, to adjust to changes in the lake as a monitoring and/or restoration process progresses (Williams & Kelly 2003).

### **3. SHORELINE CLASSIFICATION SCORECARD**

#### **3.1 History and Development of the SCS**

The “Shoreline Classification Scorecard” (Appendix B) was revised by Tenbult (2012) from the previously titled “Riparian Heath Scorecard” created by Birada (2011). It was adapted accordingly for the shoreline to be accessed by boat. Primarily changes were made to categories within the classification process. Tenbult (2012) combined them into four simple and easy to evaluate parameters: structures, littoral zone, buffer zone and site vegetation cover. Consequently there was very little to refine, in the end, and the methods were followed exactly. There were slight changes to the data collection sheets (i.e. more space, different orientation) and fire numbers were added to the collection sheet so that there could be a relevant ID for each cottage that could be paired with the picture number.

#### **3.2 Classification Introduction**

Using the “Shoreline Classification Scorecard” the individual shoreline of each property was evaluated. The scores were determined visually from the water in a boat approximately 10 meters from the shoreline. The scorecard was referenced for every property in order to remain constant and reduce bias with single scores. As mentioned above, the scorecard is broken down into four categories: Structures, Littoral Zone, Buffer Zone, and Site and Vegetation Cover. These classification scores have been developed to “represent the level of impact the shoreline has on the health” (Birada, 2012) of a given lake. These are the main characterizations of the shoreline as indicated by Fisheries and Oceans Canada (DFO 2010).

### 3.3 Shoreline Classification Scorecard

Structures:									
Shoreline is natural, absence of break-walls, piers or docks.		Shoreline has a temporary floating dock or a dock on stilts, which can be removed.		Crib dock filled with rocks or break-wall that compromises a small fraction of shoreline (10% of site length).		Concrete or rock pier, or extensive rock wall.		Combination of human constructions (rock wall with dock, concrete pier, etc.) in littoral zone, major loss of habitat.	
10	9	8	7	6	5	4	3	2	1

Littoral Zone:									
Majority of littoral zone contains a good amount of rocks, vegetation and woody debris. Rocky shores have left the water's edge natural.		A large portion of littoral zone contains rocks and woody debris, but there is evidence of tree removal. Sand benches have left rocks along water's edge.		Contains intermittent patches of woody debris and vegetation. Evidence of rock, wood or vegetation removal.		Contains little woody debris other than leaves or needles. Evidence of rock vegetation and woody debris removal. Sand benches have removed most of the habitat.		No evidence of rocks or woody debris and no mature trees along littoral zone.	
10	9	8	7	6	5	4	3	2	1

Buffer Zone:									
Dense mature trees and understory extending 3-5m or more from water's edge.		Dense mature trees or understory extending 3m from water's edge.		Mature trees or understory extend 3 m from water's edge but patchy. Or vegetation is scarce but there have been attempts to rehabilitate.		Vegetation is patchy, mostly grass or understory.		Nearly no buffer zone, lack of trees and understory along water's edge and extending upland.	
10	9	8	7	6	5	4	3	2	1

Site and Vegetation Cover:									
Small cottage and no landscaping. Site is approx. 90% natural. Little tree removal, canopy cover is nearly 100%. Only impact is a small walking path.		Small cottage and minimum landscaping. 80% of site is natural. Little tree removal, about 75% canopy cover.		Medium sized cottages and minimum landscaping (or small cottage with significant landscaping). Approx. 70% of site is natural. Some tree removal, about 60% canopy cover.		Medium sized cottage with major landscaping (or large cottage with only some landscaping). Approx. 50-70% of site is natural. Some tree removal, about 60% canopy cover.		Large cottage with major landscaping 50% or more deforested and replaced with lawns, gardens, paths, etc. Many non-native species.	
10	9	8	7	6	5	4	3	2	1

### 3.4 Examples of Shoreline Classification

This section provides examples of how the “Shoreline Classification Scorecard” works and how it is used to evaluate shorelines. Images used below are representative of genetic shoreline types seen along Salerno Lake.

#### **Photo 1: Represents a shoreline with a classification score of (10/10)**

Site and Vegetation Cover: Approx. 90% natural, canopy cover nearly 100%. (10/10)

Structures: Shoreline has no breakwalls, piers or dock. (10/10)



Buffer Zone: Contains dense mature trees and understory. (10/10).

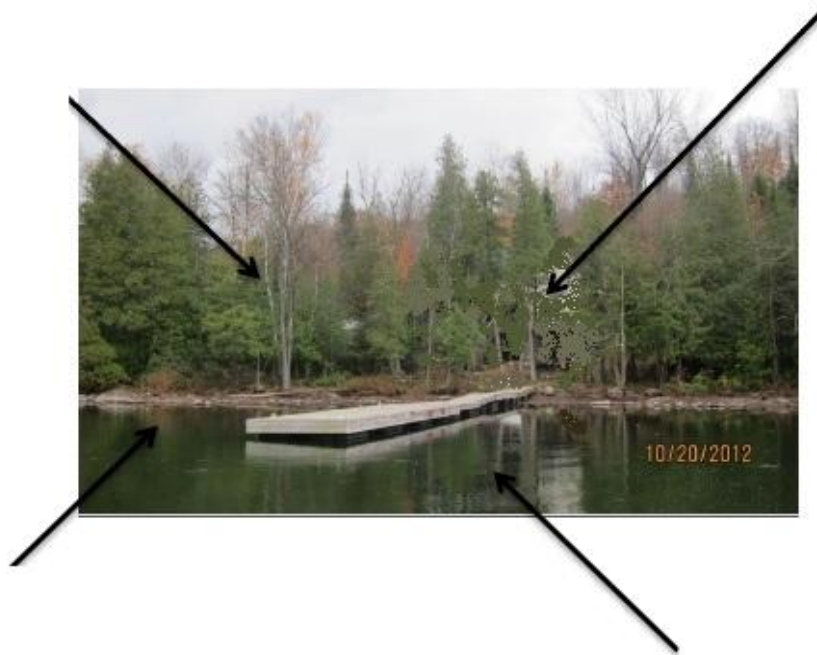
Littoral Zone: Contains a good amount of rocks, vegetation and woody debris. (10/10)

**Photo 2: Represents a shoreline with a classification score of (7.5/10)**

Site and Vegetation Cover:

Little tree removal, canopy cover about 75%, minimum landscaping. (7.5/10)

Buffer Zone: Contains dense mature trees 3m from water's edge. (7/10)



Littoral Zone: Contains rocks and woody debris with minimum removal. (7/10)

Structures: Shoreline has temporary floating dock. (7/10)

**Photo 3: Represents a shoreline with a classification score of (3/10)**

Site and Vegetation

Cover: Large cottage with some landscaping, 50-70% deforested. (3/10)

Buffer Zone:

Vegetation is patchy but there have been attempts to rehabilitate. (5/10)

Littoral Zone:

Contains little woody debris evidence of rock, vegetation and woody debris removal. (3/10)



Structures:

Combination of human constructions rockwall with docks. (1/10)

### 3.5. Difficulties with Shoreline Classification

Tenbult (2012) outlines some difficulties that were similar in the Salerno Lake inventory that may create bias and/or inconsistencies. Some of these include visually scoring shoreline from the boat, differences in natural shoreline attributes and time of year. The boat is the least invasive way to conduct this assessment; very little disturbance to the residence is a result. The natural shoreline of Salerno Lake tends to have a high gradient and a naturally rock/ boulder shoreline. This made it difficult to evaluate the littoral zone and actual size of the property; however it was taken into consideration and accurately is represented in the scores. It should be noted that this factor makes it even more imperative that a natural shoreline be maintained to avoid the already high nutrient loading that happens from high elevation precipitation. Due to the senescence of vegetation during the fall time of year, the canopy coverage and floor plant community are more difficult to determine. Plus many residents remove seasonal structures (i.e. docks, piers) before winter. It is important to take pictures that represent many angles of a property so a proper representation can be later referenced for re-evaluation of scores.

## **4. INVENTORY METHODS**

### **4.1 Field Work**

The inventory of the shoreline of Salerno (Devil's) Lake was complete in late October 2012 with the assistance of the Salerno Lake Cottagers' Association. Using the SCS individual scores will be given to each shoreline property. Additional information such as coordinates of each property, fire number, picture ID number, and additional comments were recorded in the classification process. There are four facets to the classification card: littoral zone, buffer zone, structures, and site vegetation coverage. This required approximately two minutes per site to evaluate and record. One person drove the boat, one took pictures of the properties/recorded additional comments, and one person was responsible for filling out all the requirements on the data sheet as well as taking a waypoint of each property on the GPS.

### 4.2 Resources Used

Assessment was done visually from the boat and records were made by hand to the Field Record Shoreline Classification Table (Appendix A). GPS was used to record coordinates of each property. All additional information was recorded on a separate piece of paper by the photographer. A camera with a long battery life is needed, along with water proof paper for note taking. A laminated version of the "Shoreline Classification Score Card" for rapid referencing in order to remain consistent is helpful. The Haliburton County GIS maps were printed off and used to reference fire numbers and property locations. Some lot numbers were not included in the GIS map, so it is important to create some form of labeling for both vacant lots and "unmarked" lots.



### 4.3 Timing of Inventory

Due to the time of year the inventory took place there were a few observational differences with the scoring. Obviously in the summer months the lake is at full capacity and the amount of disturbance to the shoreline is elevated. However, in the fall the lake is comparatively uninhibited and thus more easily documented with less interaction with cottagers.

### 4.4 Difficulties with Inventory

Even though there are many positives of running the inventory in the fall, the summer would ultimately give a better representation of how the shoreline is being used and the frequency at which this use happens. This would be more of a complete representation and more recommendations for future use could be given. It took longer to inventory some of the larger properties, and it was difficult to fully represent the length of the shoreline in a fair and consistent manner. Identification of unknown and vacant lots was difficult to record and to organize later in the database, especially if these properties went on for exaggerated lengths. However, it is essential to include these properties in the final score of the lake because they are significant enough in size to have an effect on the overall health of the shoreline. The main difficulties were linking the pictures up with their fire number. One picture per property shoreline is essential for maintaining organization during data compilation.

## **5. DATA COMPILATION**

### 5.1 Inputting Data and Photos

Data was transferred into a digital format, and linked up with the photos taken during the field assessment. Data was divided up by inventory dates to help with matching up lot numbers and photos with shoreline scores. Vegetative sites were labeled as vacant and went in sequence with the photos. Margaret Clayton of the SDLCA helped identify fire numbers; with her vast knowledge of the lake and its surrounding land, she was able to confirm the unidentified lots from the road and provide lot numbers. The Haliburton County GIS map of Salerno Lake was used to match fire numbers and their sequences as well as street names. An ID number and street name were placed on each photo to identify them.

### 5.3 Difficulties with Data Compilation

It was very difficult to compile the information for input into the spreadsheet; attaching the correct picture ID with the corresponding fire number, GPS coordinates, and classification score. Not all of the fire numbers that were provided on the Haliburton County GIS map and had to be determined from the road by Margaret Clayton which was quite time consuming. The photos initially were not consistent with the properties fire number, so many of the properties had to be

rescored using photos. Once the fire numbers were lined up with the photos, each one was re-evaluated to maintain consistency and uniformity within the database. This delayed the data analysis section of this report. There were also time constraints on accessing development times on the shoreline zones that were created to help with location and used for correlation with the average shoreline scores.

## 6. SHORELINE ZONES

### 6.1 Background to Shoreline Zones

The Shoreline Zones were identified according to the year of development so that correlations could be made between developmental trends and the age of the property. Developmental era is important to catalog so that any trends associated with the property age can be seen. This may refer to the size of properties, distance of structures from the shoreline, and the size and abundance of structures on the property (i.e. Boathouses, saunas). Identifying shoreline zones will also assist in maintaining confidentiality of specific properties by publicizing only zone area shoreline scores and not individual shoreline scores. This can help track areas of concern without pointing out specific properties. It allows for a general score which cottagers can relate to their neighbors. The opportunity will be given for individual scores to be given upon request, and the shoreline zone will assist in narrowing down property fire numbers.

### 6.2 Identification of Shoreline Zones

Macro Zone Discription	Mid Zone ID	Macro Zone Description	Property Count	Picture ID	Development
North West Shore	NWS-1	Hancock, Rachelles, Procter, Chapman, Miners Cliff, Tree Feller	35	1568-1610 (1716-1738)	1920-1950
South West Shore	SWS-1	Eldanori, Heart's Content, Supple, Hand, Pickerel, Firefly, South End Channel	54	1809-1887 (6-8 )	Unknown
North West Shore	NWS-2	Tumble Down, Miners Cliff, Lightning, Star, Chimo, Forbees, Grampa's	40	1679-1715, 1981-2001	Unknown

South West Shore	SWS-2	Twist, Spencer, Bowbek, Eldanori	49	1734-1808 (1674-1677; 1739-1808)	Unknown
South South Shore	SSS-1	Lucky Copper, Apollo	37	1610-1673	Unknown
South East Shore	SES-1	Nickleodeon, Andek, Papas, Dreamscape, Beatrice, Mineral, Joseph, Grampa's	56	1888-1980 (Photos 1-2)	Unknown

**Table 1: Shows Shoreline Zones Dividing Portions of the Shoreline on Salerno Lake**

*Table 1* summarizes all the zones identified along Salerno Lake. It demonstrates the breakdown as to how zones were identified from a larger section to a smaller portion of the shoreline.

**Figure 1: Map Showing the Shoreline Zones on Salerno Lake**



## 7. RESULTS/ANALYSIS

### 7.1 Overall Shoreline Inventory Scores

Category:	Structures	Littoral	Buffer Zone	Site and Vegetation Cover	Overall Lake Score
<b>Overall Score (/10):</b>	7.5	7.1	7.5	7.6	7.4

**Table 2:** Overall Lake Scores - shows the overall score for each category of the scorecard along with the overall lake score. Littoral had the lowest score, followed by Structures and Buffer Zone coming in at a tie, and site and vegetation cover with the highest scoring. The overall score of the lake was 7.4/10. It should be noted that the average scores are higher than to be expected due

to the amount of vacant lots and undisturbed wetlands found in Salerno Lake, these brought up the averages considerably.

#### Structures:

Structure had an overall average score of 7.5/10 due to the fact that a high percentage of cottagers had floating docks and/ or docks on stilts. There may be a bit of a discrepancy with the time of year this study took place as many had already removed most seasonal structures for the winter season. There were several rock walls and crib docks in some of the older properties due to erosion of the shoreline. Some shorelines had small man made beaches usually no more than a couple meters long, which heavily affected the final average. However, the lake score was increased by the protected wetland properties around the lake that had little to no disturbance to the shoreline

#### Littoral Zone:

In certain zones of the lake the score for the Littoral Zone was found to be quite low as shown in Table 3. Most noticeably in SES-1, SWS-1 and SSS-1 which all had the largest property count. Out of the four classification categories, the Littoral Zone in Salerno Lake scored the lowest. Salerno Lake already has a compromised littoral zone due to its geographic location (high aspect valley) and is prone to shoreline erosion. The natural rocky shoreline should be maintained in order to reduce erosion and nutrient loading into this already very shallow lake.

#### Buffer Zone:

The Buffer Zone scored quite high (7.6/10), which is important because it is the main factor in maintaining a healthy water quality. On average many of the properties preserved many of the trees on their lot, and many seemed to be making efforts to rehabilitate their buffer zone (i.e. replanting, restoring natural rocky shoreline). However, there are some old and new properties that showcased urban landscaping, building too close to the lake, and the clear-cutting of entire lots.

#### Site and Vegetation Cover:

The category of Site and Vegetation Cover received the highest score (7.6/10). This category was very easy to score as there were more properties that maintained <70% of their trees, and as I have mentioned above, were many of the more long term cottages exhibited signs of rehabilitation towards a more natural landscape. With the newly implemented Shoreline Tree Preservation By-Law, the score should not change and may even increase in the future.

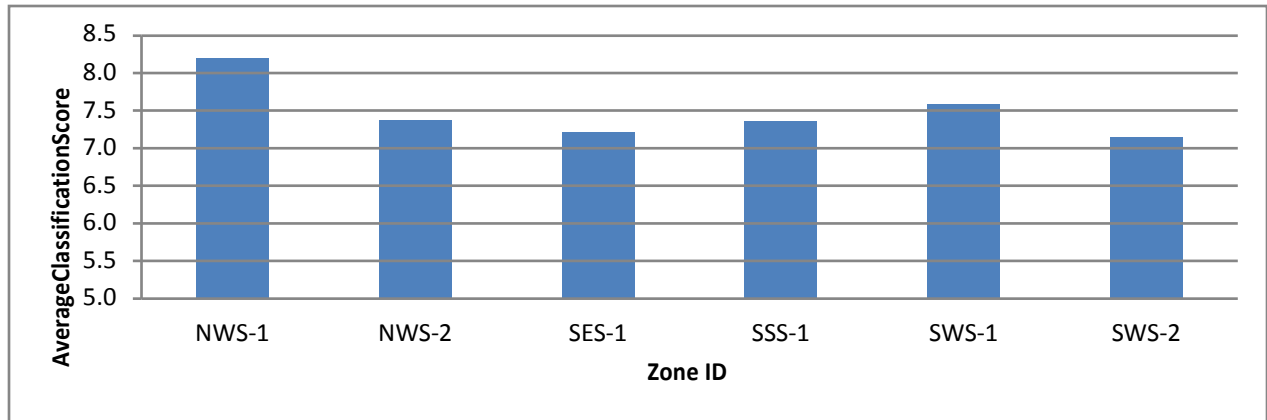
## 7.2 Shoreline Zones Classification Scores

Zone ID	Zone Description	Structures	Littoral	Buffer Zone	Site & Vegetation Cover	Property Count	Overall Zone Score
NWS-1	Hancock, Rachelles, Procter, Chapman, Miners Cliff, Tree Feller	8.2	8.4	7.8	8.1	20	8.1
NWS-2	Eldanori, Heart's Content, Supple, Hand, Pickerel, Firefly, South End Channel	7.4	7.0	7.6	7.7	46	7.4
SES-1	Tumble Down, Miners Cliff, Lightning, Star, Chimo, Forbeses, Grampa's	7.2	6.7	8.3	7.4	51	7.4
SSS-1	Twist, Spencer, Bowbek, Eldanori	7.4	6.9	6.9	7.5	47	7.2
SWS-1	Lucky Copper, Apollo	7.6	6.3	7.9	7.8	54	7.4
SWS-2	Nickleodeon, Andek, Papas, Dreamscape, Beatrice, Mineral, Joseph, Grampa's	7.2	7.1	6.7	7.4	52	7.1

**Table 3: Summary Table Showing the Average Scores According to Shoreline Zone**

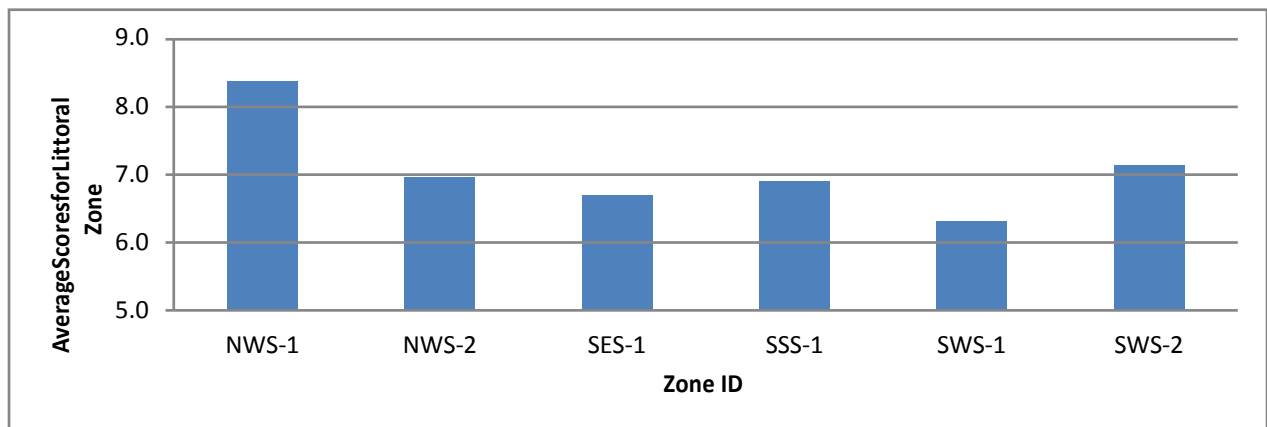
Table 3 shows results of the average scores for each shoreline zone according to the SCS system. Overall the scores were relatively similar to one another with NWS-1 scoring the highest (8.1/10) possibly due to the amount of vacant lots found in that area, which tend to be associated with fairly high scores. Also it is the area that was first developed, so the properties tended towards smaller structures and more naturalist landscapes. The lowest score was found in SWS-2 with a score of 7.1/10. The scores are very ambiguous; it seems no significant area of the lake stands out in negative development.

**Figure 2: Overall Average Classification Scores by Shoreline Zone**



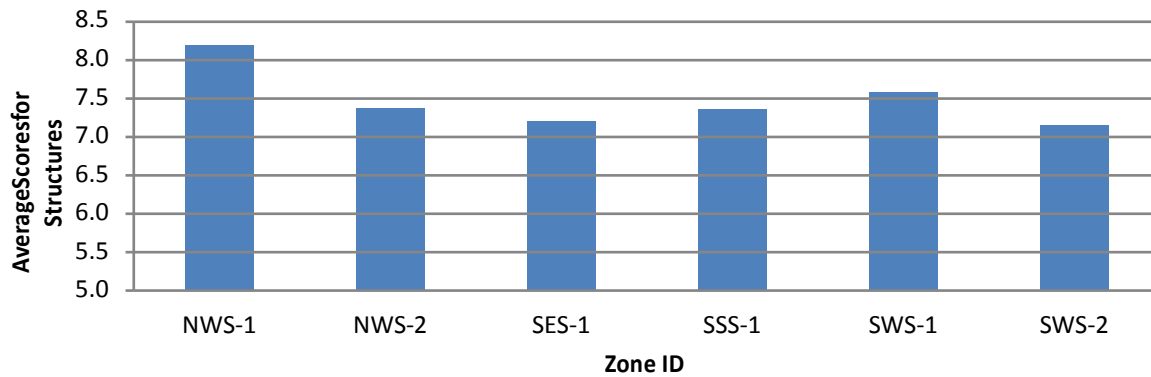
The lowest average scores were for SES-1 with 7.2/10 and SWS-2 with 7.2/10. NSW-1 had the highest score at 8.1/10 most likely due to the very low number of populated properties; many of the properties are vacant or so large that only a small percentage of them are being used.

**Figure 3: Average Classification Scores for the Littoral Zone by Shoreline Zone**



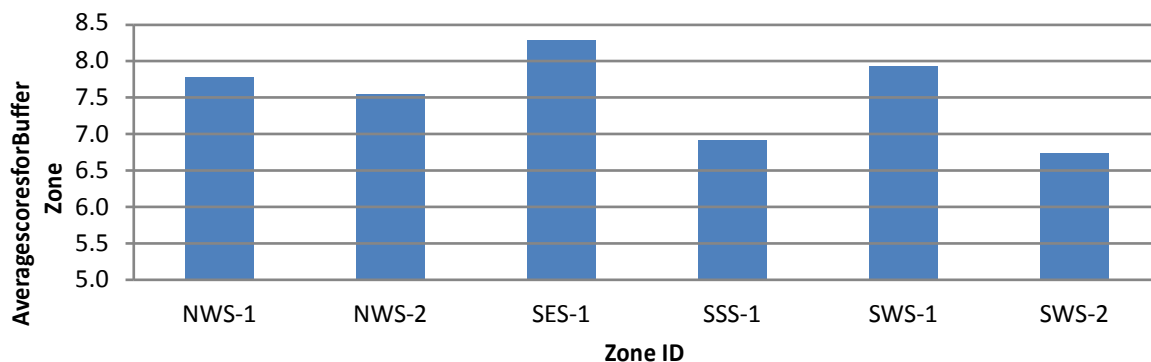
There really is no significant difference in the shoreline scores when it comes to the littoral zone and the scores are all relatively high. The one exception being in the Zone of NWS-1(8.4/10), which due to the high number of vacant lots had a fairly natural shoreline.

**Figure 4: Average Classification Scores for Structures by Shoreline Zone**



Many, with the exception of a few, of the cottages were moderately sized with floating docks or structures on stilts. Most docks were not excessively large, however as mentioned above this may be a misrepresentation due to the time of year of the inventory. The score for the shoreline correlate with the littoral zone in that scores were high and consistent across zones.

**Figure 5: Average Classification Scores for Buffer Zone by Shoreline Zone**



Buffer Zone scores were highest in the SES-1 region, and alternatively they were lowest in the SWS-2 region. Observations indicate that SWS-2 has, on average; the most developed and cleared buffer zones. There are some properties with man-made beaches which can deteriorate the buffer zone of a landscape rater rapidly. Also a grass lawn does not provide much in the way of buffering excess run of into the lake water, which may decline the surrounding water quality.



**Figure 6: Average Score for Site and Vegetation Cover by Shoreline Zone**

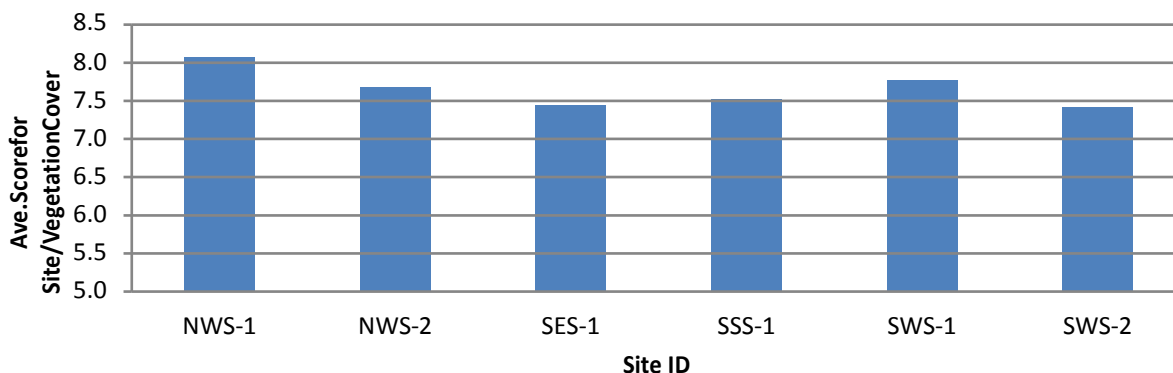


Figure 6- shows consistency in trends to many of the other figures. Again NWS-1 had the higher scores for reason consistent with what was mentioned above. Lowest scoring for site vegetation cover was in the SWS-2 zone which is consistent with the overall averaged lake scores; the lowest in almost every category.

## **8. CONCLUSIONS AND RECOMMENDATIONS**

### **8.1 Conclusions**

According to the “Shoreline Classification System” used in the project, Salerno Lake had an overall score of 7.4 for 271 properties that were inventoried. Structures including rockwalls, docks and boat houses had the greatest impact on overall shoreline health. This was followed by littoral zone of the shoreline and then the buffer zone. Site vegetation cover had the lowest impact on the shoreline health of Salerno Lake.

According to the shoreline zones data, conclusions were made about sections of the shoreline with less or more impact on the shoreline. The zones that had the least impact were the ones that had a high number of vacant lots, an island and a number of wetlands. NWS-1 had the highest score overall primarily due to the large and older lots found along Procter Lane. The portion of the lake with the most impact was SES-1 (roads listed in Table 1). Common traits of these shoreline properties are contemporary development, high tree removal and urban landscaping.

Shoreline development eras were not provided before this project came to a conclusion, however through close observation; it seems that with many of the newly built cottages urban landscaping seems more popular than ever. That being said many of the cottages that had a 1960-1970 architectural build seemed to have large expanses of grass turf lawns.

## 8.2 Recommendations

Salerno Lake is considered a Mesotrophic (MOE, 1999), which means that the natural level of productivity of living beings in the lake is neutral. It also means that this lake system could be pushed into an unnatural eutrophic state (high productivity, leading to algae blooms) with only minor manipulations to the shoreline and inputs as a result of development. In most Mesotrophic lake systems the phytoplankton and algae blooms are triggered by nutrient loading from the erosion of the surrounding landscape, septic nutrient loading and contaminates from recreational vehicles. Increasing the amount of phosphorus in a system will change the entire nutrient cycle in the lake and will eventually reduce the water quality (Arms and Camp, 1991). “However these things do not look at the root problem which is shoreline disturbance due to excessive development, not just along the shoreline but in the surrounding watershed” (Radomski & Goeman 2001).

The removal of trees within 30 meter of the shoreline eliminates the root systems that absorb excess nutrients and support the soil from erosion (Haliburton By-law No. 3505). The lands around Salerno Lake have rolling drumlins surrounding the lake; these hills have low soil content, shallow bedrock and are ideal landscapes for high velocity runoff from precipitation (MOE, 1999). With high nutrient loading come high plant production and algae/ plankton blooms. This reduces the oxygen in a lake and can eventually kill off fish stocks (Wetzel, 1983). When the lake water quality is reduced, swimming will become limited, motorboats will not be able to run and the aesthetic appeal of a shoreline cottage will degrade. Thus the property will no longer have value and property prices will be lowered. This is the natural progress of nutrient loading. This is not to imply that this land cannot be enjoyed by seasonal and long-term residents; however it creates initiative for more sustainable management practices that will promote a healthy thriving lake system.

The shorelines of a lake can be attributed to many functions that are not readily seen at first glance. It provides:

- Food and shelter for wildlife
  - Stabilizes the riverbank
  - Acts as a filter improving water quality
  - Buffers against shoreline erosion from turbulent lake water as well as precipitation.
- (Kawartha Conservation, 2004)

Sustainable development is all about minimizing your impact on your surrounding environment, “working with nature and not against it” (Walters, 2007). This is where some shoreline naturalization techniques will be very useful in increasing a shoreline score. Many cottage owners buy a property from previous owners and had no control over the manipulations of the shoreline and the development that occurred on their newly acquired land. There are some very basic yet effective naturalization techniques that can help one improve their surrounding environment. Removing lawns that provide no buffer, can improve a shoreline immensely, not to mention the water quality in the lake. The first step to decreasing the high nutrient load is to stop any kind of fertilization (Walters 2007). Planting native vegetation thus creating a root system can slow down excess nutrients, found in runoff rainwater, from entering the water body (Walter 2007). This will also help with erosion and deterring any unwanted wild life (i.e. Canadian geese). Walters (2007) suggests planting white pine, which after a couple years will provide you with a nice open area between the cottage and the lake, while maintaining an intricate root system and a health buffer zone. These will also, in years down the road increase your property value as the trees mature.

When replacing or building structures on your property; floating docks have the least amount of impact (Lakeland Alliance). The Lakeland Alliance in their “Shoreline owners guide to Lakeland living” state that floating docks are easy to build, cause very little disruption of the lake bed, minimal shading of aquatic plants and offer a free flow of water underneath.

The maintenance of septic systems is integral to controlling the health of a shoreline. It should be checked regularly and kept in good condition at all times (Walters 2007). Spending the money to ensure that it is in good working order will save money in the long term. In the building stages of a property be sure to place the septic system as far away from the shoreline as possible.

Also, instead of building rock-walls or piers to prevent erosion create a simulation of the natural shoreline by placing rocks along the slope of the littoral zone.

With these simple recommendations, along with creating open communication with fellow residents of the lake, the integrity of the ecosystem services that are integral to a property’s value will be safeguarded. For more published information on what can be done to improve a shoreline property’s score, please reference the sources provided below:

<http://www.kawarthaconservation.com/shoreline/>

[http://www.kawarthaconservation.com/pdf/Lakeland\\_Living\\_Guide.pdf](http://www.kawarthaconservation.com/pdf/Lakeland_Living_Guide.pdf)

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## APPENDIX A

Structures:									
Shoreline is natural, absence of break-walls, piers or docks.		Shoreline has a temporary floating dock or a dock on stilts, which can be removed.		Crib dock filled with rocks or break-wall that compromises a small fraction of shoreline (10% of site length).		Concrete or rock pier, or extensive rock wall.		Combination of human constructions (rock wall with dock, concrete pier, etc.) in littoral zone, major loss of habitat.	
10	9	8	7	6	5	4	3	2	1

Littoral Zone:									
Majority of littoral zone contains a good amount of rocks, vegetation and woody debris. Rocky shores have left the water's edge natural.		A large portion of littoral zone contains rocks and woody debris, but there is evidence of tree removal. Sand benches have left rocks along water's edge.		Contains intermittent patches of woody debris and vegetation. Evidence of rock, wood or vegetation removal.		Contains little woody debris other than leaves or needles. Evidence of rock vegetation and woody debris removal. Sand benches have removed most of the habitat.		No evidence of rocks or woody debris and no mature trees along littoral zone.	
10	9	8	7	6	5	4	3	2	1

Buffer Zone:									
Dense mature trees and understory extending 3-5m or more from water's edge.		Dense mature trees or understory extending 3m from water's edge.		Mature trees or understory extend 3 m from water's edge but patchy. Or vegetation is scarce but there have been attempts to rehabilitate.		Vegetation is patchy, mostly grass or understory.		Nearly no buffer zone, lack of trees and understory along water's edge and extending upland.	
10	9	8	7	6	5	4	3	2	1

Site and Vegetation Cover:									
Small cottage and no landscaping. Site is approx. 90% natural. Little tree removal, canopy cover is nearly 100%. Only impact is a small walking path.		Small cottage and minimum landscaping. 80% of site is natural. Little tree removal, about 75% canopy cover.		Medium sized cottages and minimum landscaping (or small cottage with significant landscaping). Approx. 70% of site is natural. Some tree removal, about 60% canopy cover.		Medium sized cottage with major landscaping (or large cottage with only some landscaping). Approx. 50-70% of site is natural. Some tree removal, about 60% canopy cover.		Large cottage with major landscaping. 50% or more deforested and replaced with lawns, gardens, paths, etc. Many non-native species.	
10	9	8	7	6	5	4	3	2	1

## APPENDIX B

Buffer Zone:										
Site Description	Continuous, dense stands of a mix of mature trees and understory species extend 30m or more from water's edge into upland areas. Strong root systems that hold soil in place are evident. Strong ability to filter runoff is obvious. Trees and shrubs overhang the water's surface. Minimal slope.		Buffer zone consists of dense mature forest or understory stands that are highly continuous. Extends 20m-30m from water's edge towards upland areas. Strong root systems that minimize erosion are evident.		Stands of mature trees or understory species extend 15m-30m from water's edge but density is patchy with obvious gaps between stands. Some evidence of erosion – exposed roots, uprooted trees, ruts from runoff, bare soil with no plants.		Vegetation is sparse at all distances from shoreline. Major gaps lacking vegetation, but patchy stands exist. Mostly grass or understory species with an inability to prevent major erosion during high precipitation events. Ability to filter runoff is compromised.		Buffer zone is nearly non-existent: lack of trees and understory plants at water's edge leaves soil prone to severe erosion. Plant density is also low extending into upland area. Inability to filter runoff. Issue may be compounded by steep slope.	
Score	10	9	8	7	6	5	4	3	2	1

Lawns, Landscaping, Buildings and Other Impermeable Surfaces:										
Site Description	There are no permanent buildings, driveways, lawns, artificial gardens, or other impermeable surfaces on the site. At least 90% of the site's terrestrial system remains natural and permeable. A small walking path may exist but must be permeable.	A very small percentage of the site's terrestrial system has been altered and is now impermeable. Site may have 1 small permanent building with a small driveway (unpaved) and minimal landscaping. 80% or more of the site's terrestrial ecosystem remains natural.	Site has a medium-sized cottage (or a small cottage with a boathouse) with little landscaping. At least 70% of the natural terrestrial environment is in excellent condition. Conversely, the site may have a small cottage with significant amounts of landscaping (medium-sized lawn / garden).	Site has a medium-sized cottage with major landscaping. Or a large cottage with some lawn or landscaping. A large portion of the property has been converted to impermeable surfaces. 50-70% of the property remains in 'fair' ecological condition.	Site's terrestrial environment has been irrevocably altered by unnatural structures. 50% or more of the land-base has been deforested and replaced with impermeable surfaces: buildings, gravel/ concrete driveways, walkways, or semi-permeable surfaces such as lawns, gravel paths or unnatural gardens.					
Score	10	9	8	7	6	5	4	3	2	1

Vegetation Cover and Plant Community Structure:										
<u>Site Description</u>	Stands consist of mature trees or naturally occurring understory species. Little or no evidence of tree removal or clear-cutting. Property owners have left terrestrial ecosystem as natural as possible. Species reflect potential natural community (PNC). Canopy cover is nearly 100%.	Little evidence of tree removal, although small openings exist. At least 75% of property has canopy cover. Community structure may show slight differences from PNC, but current structure does not indicate major clear-cutting in the past. Species composition does not indicate major human disturbance.	Some tree removal has taken place. At least 60% of the property still has canopy cover. Current plant community is headed towards PNC and has therefore suffered slightly from some form of disturbance in the past.	Significant tree removal has taken place and is obvious. 40%-60% of the property has been deforested at some point. Major openings in the canopy are apparent, making other forest stands on the site susceptible to severe edge effects (wind, temperature, precipitation, drought etc.)	60% or more of the property has been severely altered by clear-cutting. Strong evidence of damage to remaining trees because of weathering or de-limbing. -OR- Current community differs substantially from PNC. Many species are non-native or are early successional species indicative of deforestation.					
<u>Score</u>	10	9	8	7	6	5	4	3	2	1

