



HORSESHOE LAKE

Lake Plan

1st Edition – June 2016

Photograph on Front Cover:
Sunrise by Donald Heaven, 1960



HORSESHOE LAKE

A plan for our lake

Our Vision – To promote the cultural, social and environmental interests of residents and property owners on and in the vicinity of Horseshoe Lake.

Thank you to everyone who contributed to the development of this Lake Plan. Your hard work and dedication to Horseshoe Lake made the publication of this document possible.

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INTRODUCTION

Horseshoe Lake is located north of Minden, east of Highway 35 in the beautiful Haliburton Highlands. The lake, shaped somewhat like a horseshoe, covers 63 acres of land and has a three mile perimeter of lush green forest. With an average depth of 26 feet (maximum depth of 75 feet at the north end) many species of fish, amphibians, birds and other animals inhabit the lake or its surroundings. This is especially so in the marsh area located by the causeway to Shuyler's Island. Horseshoe Lake is fed by water from the Twelve Mile, Mountain, and Mirror lake system on the west and from Duck Lake on the north-east. Water at the south end of the lake flows into the rapids of the White Water Preserve and then on to the Gull River.

Horseshoe is primarily a residential area with many of the permanent and seasonal residents having vacationed or lived on Horseshoe since they were young. Summer days are filled with boating, swimming, fishing or relaxing on shore with friends and family. The starry nights are usually quiet except for the occasional call of one of our three mated pairs of loons. Winters are also a time of family fun and outdoor activity. Some enjoy snowmobiling, others cross country skiing and a few shovel the frozen lake to fish or skate. Horseshoe has always been an area suited for both young and old every season of the year.

Reason for developing the Lake Plan

In 2008, residents of Horseshoe Lake were experiencing many of the changes cited as threats to area lakes and were seen as issues affecting the special character of our lake. These issues included fluctuating water levels, pollution, diminishing fish populations, unregulated development, invasive species, and excessive boat traffic. Mountain Lake had produced a Lake Plan and the Executive of the Horseshoe Lake Property Owners decided they should do the same.

Early Initiatives

Jim Ross and Mike Hunter took the initiative to present a plan of action at the 2008 HLPOA Annual General Meeting and it was approved. A survey was developed and distributed to property owners whose addresses were available to the Lake Association. Nearly two-thirds of surveys were completed and returned by the end of the summer and Don Heaven with Mike Hunter compiled a summary report.

In addition to this, requests were sent to members of the Executive to prepare reports for inclusion in the plan. Paul Heaven of Glenside Ecological Services Limited took on the task of analyzing and recording the fauna and wildlife of Horseshoe Lake and submitted a report. When this work was completed personal issues delayed further development of the plan and it was not until 2014 that the Horseshoe Lake Executive made arrangements for its completion.

Later Activity

During the summer of 2014 survey results and completed reports were reviewed. It was determined that issues expressed in 2008 were those that had been and were currently being addressed by members of the Executive group. A Summary of Recommendations was developed, reviewed, and presented at the 2015 AGM. Members approved the summary and documents were prepared for publication in June, 2016.

What is a Lake Plan?

A Lake Plan is a strategic document that summarizes the vision of property owners and the surrounding community of the lake. It identifies the unique characteristics of the environment of the lake that are important to residents and sets out principal features that characterize the lake and its surroundings. It also presents guidelines for achieving the vision stated including priorities and agreed to actions.

Lake planning is a community-based process involving input from residents and all interested parties. It is a “living” document that is continually revised with new input for future generations.

SURVEY RESULTS

In May 2008, the Lake Plan Committee mailed 275 Lake Plan surveys to property owners for whom addresses were available. By September 3, 2008 the committee had received 169 completed surveys for a response rate of 61%. The following is a summary of the survey results.

As of September, 2008 residency status of respondents was 86% seasonal and 14% permanent. Of the seasonal residents, 18% indicated they planned to make their property a permanent residence in the future.

ACTIVITIES:

There are diverse types of recreational activities on Horseshoe Lake enjoyed by residents year round as the listing below indicates.

- Boating - 83%
- Canoeing/kayaking - 81%
- Fishing - 52%
- Golfing - 50%
- Sailing - 22%
- Cross Country Skiing - 21%
- Snowshoeing - 18%
- Jet Skiing - 17%
- Snowmobiling - 14%
- ATV's - 13%
- Hunting - 5%

In 2008, property owners had 635 boats, including 31 Jet Skis. Two thirds of the total number of water craft owned were non-motorized.

Qualities that add to respondents' personal enjoyment of the lake varied. Many indicated the importance of their recreational activities but they also noted the integral qualities of the area that bring people to Horseshoe. These include water quality, scenery/view, peace and quiet, dark night skies, natural shorelines and wildlife viewing.

WATER:

Overall respondents' opinion of water quality was that 22% rated it as excellent and 76% as good. There were some concerns about water quality regarding invading species - 66%, algae - 54% and bacteria - 53%.

The problem of changing water levels was a concern and this affected residents in many ways.

- Navigation problems when levels are low - 64%
- Docks not useable when levels are low - 57%
- Poor swimming conditions when levels are low - 50%
- Shore erosion when levels are high - 45%

There were other issues that impacted negatively on lake enjoyment:

- Changing water levels - 85%
- The presence of jet skis - 73%
- Boat wakes - 63%
- Noise - 56%

WATER: (continued)

There had been discussion on whether the 20 metre (66ft) building setback from the water's edge was adequate. Respondents indicated that it was adequate – 85% concurred.

ISSUES REQUIRING MORE STEWARDSHIP INVOLVEMENT:

Respondents were asked to indicate the areas where stewardship action was required in order to educate, monitor or enforce good development practices. A majority of respondents agreed that more controls are needed regarding septic inspections, excessive night lighting and the installation of communication towers.

Respondents noted the following activities are strongly favoured to protect the natural environment of the lake.

- Discourage fertilizer use near the shore - 83%
- Improve water quality - 75%
- Identify and protect wetlands - 70%
- Enforce mandatory septic inspections - 67%
- Protect/improve fish and wildlife habitats - 64%
- Enforce safe boating laws - 58%
- Protect natural shoreline - 54%
- Enforce bylaws to ensure quietness and privacy - 48%

DEVELOPMENT CONCERNS:

The issue of commercial development is one that elicits continuing controversy. Questions were asked to determine the level of concern on Horseshoe Lake. Most respondents would like a ban on the building of marinas, condominiums, and retail stores. Two thirds were against garbage and recycling pickup. Only 51% were against improving internet services using line of sight towers.

If a moratorium on development is not possible, owners would like limits set in the following areas to preserve the natural state of our wetlands.

- The building of condominiums - 93%
- The establishment of trailer parks - 92%
- Mining and quarrying rights – 87%
- Commercial stores, marinas, and restaurants – 86%
- Logging rights – 85%
- The number and size of buildings on a lot - 74%
- Back lot development – 73%
- The construction of cell towers – 69%
- The installation of docks and ramps – 61%
- The types of buildings on a lot – 54%

92% of respondents are in favour of preserving our wetlands.

There were many worthwhile comments submitted with the surveys that were returned. Most were related to jet ski problems, water level concerns, and boat wake shore erosion issues. The HLPOA Lake Plan Committee has used these results to develop a lake plan that addresses the concerns of residents.

HABITATS AND WILDLIFE

1. CATCHMENT BASIN

The Horseshoe Lake Catchment Basin (HLCB) is relatively large with 3921.57 hectares (9690.38 acres) of surface area (See Figure 1). Of interest is the large contribution of the Duck Lake inflow, with Duck Lake and its sub-basin covering over one half of the Horseshoe Lake catchment basin. The surface area of this sub-basin is 2017.56 ha (4985.48 acres) and all surface water flowing in this sub-basin enters into Horseshoe Lake on the eastern side of the large wetland located in the bay created by Schuyler's Island and the causeway. This inflow directly affects the water quality and water levels of Horseshoe Lake and therefore is considered a component of the Horseshoe Lake Catchment Basin.

2. BEDROCK

The Horseshoe Lake catchment basin is dominated by carbonate metasedimentary rocks consisting of marble, calc-silicate rocks, skarn, and tectonic breccias (See Figure 2). These rock types can be found in the north western half of the catchment basin as well as along the south eastern edge. This type of bedrock is limited in the County of Haliburton and is found primarily in the southern portion where the northern Precambrian Bedrock meets the southern limestone and dolostone. Fingers of this calcium rich bedrock extend up into Haliburton, and the Horseshoe Lake catchment basin is found on one of these fingers that extends up to Maple Lake and across to the bottom of Haliburton Lake.

A large pocket of mafic to ultramafic plutonic rocks consisting of diorite, gabbro, peridotite, pyroxenite, anorthosite and derived metamorphic rocks, dominates the south eastern half of the catchment basin.

3. LAND COVER

The land cover of the Horseshoe Lake Catchment Basin is predominately forest cover (66%), with open aquatic habitat representing another 14%, open terrestrial 11% and developed areas (i.e. residential or commercial) 9% (See Table 1 and Figure 3). It should be noted that all wetlands and lakes are not represented by open aquatic habitat as alder thicket swamps and treed swamps are considered forested.

A relatively high component of the Horseshoe Lake Catchment Basin is defined as open terrestrial habitat (11%), which is comprised primarily of fallow fields and agricultural land (9%). This high percentage would be directly related to the rich soils that are derived from the underlying calcareous bedrock as historically much of this land would have been cleared for agriculture. Agriculture is still occurring in the catchment basin.

Two hydro corridors also pass through the Horseshoe Lake Catchment Basin and are considered open terrestrial habitat.



Table 1: General land cover of Horseshoe Lake Catchment Basin

Cover	Acres	Hectares	Percent
Tree or Shrub Cover	6375.34	2579.98	66%
Open Aquatic	1390.4	562.69	14%
Open Terrestrial	1030.98	417.24	11%
Developed	893.68	361.62	9%

Of the forested landscape the principal forest type (ecosite) found in the Horseshoe Lake Catchment Basin is a Sugar Maple - American Basswood ecosite covering over 15% of our catchment basin and 27% of our forested landscape. This is relatively high for the County of Haliburton; where this forest type represents only 5% of the land cover. Again, this uniqueness would be related to the calcareous soils derived from the underlying bedrock. Table 2 details the representation of the various ecosites, wetlands and open habitat.

Table 2: Detailed land cover of Horseshoe Lake Catchment Basin

Land Cover	FEC Ecosite	Description	Acres	Hectares	Percent
Forest	26	Sugar Maple - Basswood	1520.65	615.36	15.69
	25	Sugar Maple - Beech - Red Oak	1464.07	592.51	15.11
	34	White Cedar - Lowland Hardwood	543.98	220.13	5.61
	29	Sugar Maple - Yellow Birch	456.4	184.68	4.71
	35	Lowland Hardwood	437.46	177.01	4.51
	22	White Cedar - Other Conifer	309.16	125.11	3.19
	27	Sugar Maple - White birch - Poplar - White Pine	223.72	90.56	2.31
	18	Poplar - White Birch - White Spruce - Balsam Fir	213.96	86.58	2.21
	17	Poplar - White Birch	160.72	65.04	1.66
	33	White Cedar - Other Conifer	139.73	56.54	1.44
	12	Red Pine	46.58	18.86	0.48
	24	Sugar Maple - Red Oak - Basswood	46.44	18.79	0.48
	16	Black Spruce - Pine	39.26	15.89	0.41
	20	White Pine - Red Pine - White Spruce - White Birch - Trembling Aspen	20.7	8.38	0.21
	23	Red Oak - Hardwood	18.98	7.68	0.20
	21	White Cedar - White Pine - White Birch - White Spruce	18.55	7.51	0.19
	28	Sugar Maple - Hemlock - Yellow Birch	15.78	6.39	0.16
			Total	5676.14	2297.02
Aquatic		Lake	895.22	362.29	9.24
		Wetland - Treed Swamp	609.37	246.6	6.29
		Wetland - Marsh	495.18	200.4	5.11
		Wetland - Alder Thicket	89.83	36.36	0.93
		Total	2089.6	845.65	21.56
Open		Grass - Meadow	904.2	365.92	9.33
		Hydro Corridor	126.78	51.32	1.31
		Total	1030.98	417.24	10.64
Other					



Land Cover	FEC Code	Description	Acres	Hectares	Percent
		Road - Road Buffer	345.63	139.87	3.57
		Commercial - Residential	548.05	221.75	5.66
		Total	893.68	361.62	9.22

WETLANDS

The Horseshoe Lake Catchment Basin is also highly influenced by wetlands with approximately 12% of the landscape comprised of swamps, marshes and alder thickets (See Table 2). Wetlands provide numerous natural functions and features and this high percentage contributes significantly to the ecological health of the basin. Some of the natural functions and features typically associated with wetlands include the following:

Hydrology

Wetlands represent areas of groundwater recharge, where water can naturally seep into and replenish the groundwater table. This is an important function to residents of the Horseshoe Lake Catchment Basin that obtain their drinking water from drilled wells.

Wetlands can also represent areas of groundwater discharge, where waters from the groundwater table seep to the surface and then flow into Horseshoe Lake. This flow of water directly from the groundwater table can increase the water quality of Horseshoe Lake and provide unique habitats in the form of coldwater streams.

Water quality is also highly influenced by wetlands as the aquatic vegetation filters out sediments and contaminants and captures nutrients such as phosphates and nitrates, from surface water prior to the water entering into Horseshoe Lake. This function can greatly reduce the potential for algae blooms and resulting fish die off, as well as deter the spread of aquatic vegetation.

Water levels in Horseshoe Lake have been a voiced concern over the last few years. Wetlands, specifically those with high sphagnum moss content (such as black spruce swamps) can capture water runoff during the spring melt and slowly release the water as the landscape dries. As flow from wetlands in the Horseshoe Lake Catchment Basin is not directly controlled by Trent Severn Waterway (as compared to the waters flowing in from Mountain Lake) the high component of wetlands in the Horseshoe Lake Catchment Basin is an asset in capturing spring runoff and maintaining late summer water levels.

Biology

The wetlands found within the Horseshoe Lake Catchment Basin are currently identified as marsh, treed swamp and alder thicket swamp. These wetland types add to the diversity of habitats in the landscape thereby contributing to the overall biodiversity of the catchment basin with each wetland type supporting a unique community of wildlife. Further, marsh habitats are typically rich in diversity supporting a wide range of submergent, floating and emergent vegetation as well as aquatic, semi aquatic and terrestrial wildlife.

No fens or bogs have been identified however the categorization of these wetland types is difficult when based solely on desktop analysis. A number of wetlands display fen/bog characteristics but without further field work these cannot be identified as such. Fens and bogs do not support highly diversified ecological communities due to their lack of oxygen and nutrients and high acidity. However, because of these harsh conditions fens/bogs do support unique ecological communities thereby adding to the overall biodiversity.



Social

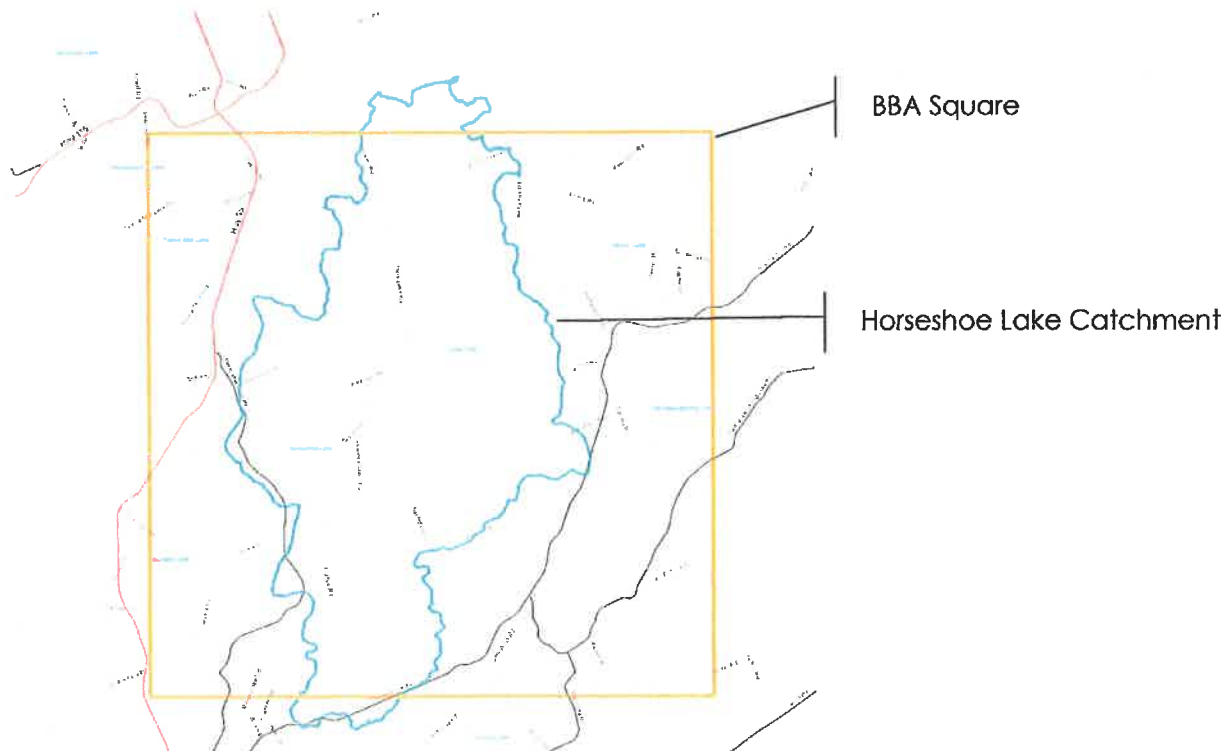
The wetlands in the Horseshoe Lake Catchment Basin also provide a recreational value, specifically the lacustrine wetland found within Horseshoe Lake and located in the bay created by Schuyler's Island and the causeway. This wetland represents approximately 16% of the lake itself with an area of 50.42 ha (124.56 acres). Whether this wetland is part of a larger wetland complex extending up into the catchment basin has yet to be determined. As a lacustrine wetland directly attached to Horseshoe Lake with a high component of open water and relatively low development along the shoreline, boaters and fishermen regularly enjoy this area for the fishing opportunities, natural environment and solitude. Similar opportunities can be found on Duck Lake, Blotter Lake and some of the other larger open water marshes.

Swamps dominated by merchantable timber such as eastern white cedar are also considered a sustainable natural resource. Numerous swamps dominated by eastern white cedar can be found throughout the Horseshoe Lake Catchment Basin.

4. WILDLIFE

The Horseshoe Lake Catchment Basin has a diverse array of forested, open and aquatic habitats and supports ecological communities associated with both the Limestone Plains to the south and the Canadian Shield to the north. Poised on this transition zone (or ecotone) the Horseshoe Lake Catchment Basin would represent an area with high biodiversity and be able to support much of the County of Haliburton's flora and fauna, including large terrestrial mammals such as black bear, moose, deer, wolves and coyotes.

The Breeding Bird Atlas data collected by Bird Studies Canada maintains a database of avifauna observed within each 10km square. Square 17PK88 covers much of the catchment basin and contains 27 point stations from which observation data is compiled during breeding season.



A query of this database revealed a list of 119 avifaunal species that have been observed within this square and categorized as possible, probable or confirmed breeders (See Table 3). As the Horseshoe Lake Catchment Basin represents approximately ½ of this square based on surface area, this list would be representative of the avifaunal community found in the Horseshoe Lake Catchment Basin.

Table 3: Avifaunal species list for BBA square 17PK88

Scientific Name	Common Name
<i>Empidonax alnorum</i>	Alder Flycatcher
<i>Botaurus lentiginosus</i>	American Bittern
<i>Corvus brachyrhynchos</i>	American Crow
<i>Carduelis tristis</i>	American Goldfinch
<i>Falco sparverius</i>	American Kestrel
<i>Setophaga ruticilla</i>	American Redstart
<i>Turdus migratorius</i>	American Robin
<i>Scolopax minor</i>	American Woodcock
<i>Hirundo rustica</i>	Barn Swallow
<i>Ceryle alcyon</i>	Belted Kingfisher
<i>Mniotilta varia</i>	Black-and-white Warbler
<i>Coccyzus erythrophthalmus</i>	Black-billed Cuckoo
<i>Dendroica fusca</i>	Blackburnian Warbler
<i>Poecite atricapillus</i>	Black-capped Chickadee
<i>Dendroica caerulescens</i>	Black-throated Blue Warbler
<i>Dendroica virens</i>	Black-throated Green Warbler
<i>Cyanocitta cristata</i>	Blue Jay
<i>Vireo solitarius</i>	Blue-headed Vireo
<i>Dolichonyx oryzivorus</i>	Bobolink
<i>Buteo platypterus</i>	Broad-winged Hawk
<i>Certhia americana</i>	Brown Creeper
<i>Toxostoma rufum</i>	Brown Thrasher
<i>Molothrus ater</i>	Brown-headed Cowbird
<i>Branta canadensis</i>	Canada Goose
<i>Wilsonia canadensis</i>	Canada Warbler
<i>Bombycilla cedrorum</i>	Cedar Waxwing
<i>Dendroica pensylvanica</i>	Chestnut-sided Warbler
<i>Chaetura pelagica</i>	Chimney Swift
<i>Spizella passerina</i>	Chipping Sparrow
<i>Petrochelidon pyrrhonota</i>	Cliff Swallow
<i>Quiscalus quiscula</i>	Common Grackle
<i>Gavia immer</i>	Common Loon
<i>Mergus merganser</i>	Common Merganser
<i>Corvus corax</i>	Common Raven
<i>Geothlypis trichas</i>	Common Yellowthroat
<i>Accipiter cooperii</i>	Cooper's Hawk
<i>Picoides pubescens</i>	Downy Woodpecker
<i>Sialia sialis</i>	Eastern Bluebird
<i>Tyrannus tyrannus</i>	Eastern Kingbird
<i>Sturnella magna</i>	Eastern Meadowlark

Scientific Name	Common Name
<i>Sayornis phoebe</i>	Eastern Phoebe
<i>Pipilo erythrophthalmus</i>	Eastern Towhee
<i>Contopus virens</i>	Eastern Wood-pewee
<i>Sturnus vulgaris</i>	European Starling
<i>Coccothraustes vespertinus</i>	Evening Grosbeak
<i>Spizella pusilla</i>	Field Sparrow
<i>Regulus satrapa</i>	Golden-crowned Kinglet
<i>Vermivora chrysoptera</i>	Golden-winged Warbler
<i>Dumetella carolinensis</i>	Gray Catbird
<i>Ardea herodias</i>	Great Blue Heron
<i>Myiarchus crinitus</i>	Great Crested Flycatcher
<i>Bubo virginianus</i>	Great Horned Owl
<i>Picoides villosus</i>	Hairy Woodpecker
<i>Catharus guttatus</i>	Hermit Thrush
<i>Larus argentatus</i>	Herring Gull
<i>Lophodytes cucullatus</i>	Hooded Merganser
<i>Passer domesticus</i>	House Sparrow
<i>Troglodytes aedon</i>	House Wren
<i>Passerina cyanea</i>	Indigo Bunting
<i>Charadrius vociferus</i>	Killdeer
<i>Empidonax minimus</i>	Least Flycatcher
<i>Melospiza lincolnii</i>	Lincoln's Sparrow
<i>Asio otus</i>	Long-eared Owl
<i>Dendroica magnolia</i>	Magnolia Warbler
<i>Anas platyrhynchos</i>	Mallard
<i>Falco columbarius</i>	Merlin
<i>Zenaidura macroura</i>	Mourning Dove
<i>Oporornis philadelphia</i>	Mourning Warbler
<i>Vermivora ruficapilla</i>	Nashville Warbler
<i>Cardinalis cardinalis</i>	Northern Cardinal
<i>Colaptes auratus</i>	Northern Flicker
<i>Circus cyaneus</i>	Northern Harrier
<i>Aegolius acadicus</i>	Northern Saw-whet Owl
<i>Seiurus noveboracensis</i>	Northern Waterthrush
<i>Contopus cooperi</i>	Olive-sided Flycatcher
<i>Pandion haliaetus</i>	Osprey
<i>Seiurus aurocapilla</i>	Ovenbird
<i>Dryocopus pileatus</i>	Pileated Woodpecker
<i>Carduelis pinus</i>	Pine Siskin
<i>Dendroica pinus</i>	Pine Warbler
<i>Carpodacus purpureus</i>	Purple Finch



Scientific Name	Common Name
<i>Sitta canadensis</i>	Red-breasted Nuthatch
<i>Vireo olivaceus</i>	Red-eyed Vireo
<i>Buteo lineatus</i>	Red-shouldered Hawk
<i>Buteo jamaicensis</i>	Red-tailed Hawk
<i>Agelaius phoeniceus</i>	Red-winged Blackbird
<i>Columba livia</i>	Rock Pigeon
<i>Pheucticus ludovicianus</i>	Rose-breasted Grosbeak
<i>Regulus calendula</i>	Ruby-crowned Kinglet
<i>Archilochus colubris</i>	Ruby-throated Hummingbird
<i>Bonasa umbellus</i>	Ruffed Grouse
<i>Euphagus carolinus</i>	Rusty Blackbird
<i>Passerculus sandwichensis</i>	Savannah Sparrow
<i>Piranga olivacea</i>	Scarlet Tanager
<i>Cistothorus platensis</i>	Sedge Wren
<i>Accipiter striatus</i>	Sharp-shinned Hawk
<i>Melospiza melodia</i>	Song Sparrow
<i>Porzana carolina</i>	Sora
<i>Actitis macularius</i>	Spotted Sandpiper
<i>Catharus ustulatus</i>	Swainson's Thrush
<i>Melospiza georgiana</i>	Swamp Sparrow

Scientific Name	Common Name
<i>Tachycineta bicolor</i>	Tree Swallow
<i>Cathartes aura</i>	Turkey Vulture
<i>Catharus fuscescens</i>	Veery
<i>Poocetes gramineus</i>	Vesper Sparrow
<i>Rallus limicola</i>	Virginia Rail
<i>Vireo gilvus</i>	Warbling Vireo
<i>Sitta carolinensis</i>	White-breasted Nuthatch
<i>Zonotrichia albicollis</i>	White-throated Sparrow
<i>Loxia leucoptera</i>	White-winged Crossbill
<i>Meleagris gallopavo</i>	Wild Turkey
<i>Troglodytes troglodytes</i>	Winter Wren
<i>Aix sponsa</i>	Wood Duck
<i>Hylocichla mustelina</i>	Wood Thrush
<i>Dendroica petechia</i>	Yellow Warbler
<i>Empidonax flaviventris</i>	Yellow-bellied Flycatcher
<i>Sphyrapicus varius</i>	Yellow-bellied Sapsucker
<i>Coccyzus americanus</i>	Yellow-billed Cuckoo
<i>Dendroica coronata</i>	Yellow-rumped Warbler

SPECIES AT RISK

Numerous Species at Risk have been documented in the Horseshoe Lake Catchment Basin (See Table 4).

The eastern milksnake is known to occur in the HLCB and is a slender medium sized snake that can be identified by brown or reddish brown blotches on a gray or tan background with a Y or V light marking on the head. Feeding primarily on small mammals (mice, voles and shrews) the eastern milksnake has a habitat preference for fields and rocky outcrops and may be found foraging around barns and old buildings. This type of habitat would most likely be associated with the open terrestrial habitat identified in the detailed landcover of the Horseshoe Lake Catchment Basin. Road mortality is one of the primary causes for this species' population decline although human persecution is another contributing factor. In regard to the latter, the eastern milksnake is harmless yet acts aggressive when frightened thereby resulting in people misinterpreting this species as a venomous snake. The eastern milksnake is provincially categorized as a species of Special Concern (SC).



The western chorus frog may not often be seen, but can be heard in the HLCB. This frog is identified in the spring by its unique call which has been likened to running a fingernail along the small teeth of a pocket comb. The western chorus frog (Great Lakes - St Lawrence Canadian Shield population) favours shallow ponds, ditches and flooded swales as breeding habitat. This habitat, although defined as wetland, would not be depicted on the wetland map as the size of wetland that supports western chorus frog breeding can be too small to delineate



on a map of the full basin. The western chorus frog (Great Lakes- St Lawrence Canadian Shield population) is federally categorized as Threatened (THR) and provincially as Not at Risk (NAR)

Although the bald eagle is not known to breed or nest in the Horseshoe Lake Catchment Basin, the bald eagle is observed frequently in the late winter near the Horseshoe Lake inflow from Mountain Lake. These observations may be related to the permanent open water in this area and the associated foraging opportunities. The bald eagle is provincially categorized as a species of Special Concern

Although currently common to our area, the snapping turtle is provincially and federally categorized as a species of Special Concern, as it is vulnerable to the same threats faced by other turtles. Road mortality is high and these turtles also face mortality from fishing and persecution. The snapping turtle prefers shallow weedy inlets and bays as well as quiet, mud-bottomed ponds, lakes, sloughs and slow streams with dense aquatic vegetation. The snapping turtle eats a wide range of food consisting of both plant and animal food and scavenged dead animals. Open, sunny locations with moist but well drained soil are preferred nesting sites. The snapping turtle has been documented in the wetland behind Schuyler's Island and as a species of Special Concern, its presence further defines this wetland as ecologically important.



The stinkpot is categorized as Threatened provincially and federally and the only documented occurrence of the stinkpot in the County of Haliburton is found in the wetland behind Schuyler's Island. However the occurrence dates back to the 1970's and no further observations have occurred. This turtle is extremely cryptic and therefore may still be present but undetected. Motorboat traffic, fishing and habitat destruction through shoreline development (loss of nest sites), wetland drainage and pollution are the primary causes of population decline. The HLPOA is encouraged to be vigilant for this species and its confirmed presence would support the classification of the wetland behind Schuyler's Island as ecologically important.



The Blanding's turtle is also categorized as Threatened provincially and federally. This turtle is highly mobile and utilizes a wide variety of wetland habitats. The Blanding's turtle is known to occur in the northern area of the HLCB and is easily identifiable by its high domed shell and yellow throat. Although not yet documented within the marsh located behind Schuyler's island, this wetland would represent preferred habitat. The HLPOA is encouraged to be vigilant for this species and its confirmed presence would support the classification of the wetland behind Schuyler's Island as ecologically important.



Although not directly documented in the Horseshoe Lake Catchment Basin, the Horseshoe Lake Catchment Basin contains habitat for numerous other Species at Risk that are known to occur in the County of Haliburton. Further, inventories conducted by the Breeding Bird Atlas identify a number of Birds at Risk that are either within the Horseshoe Lake Catchment Basin or are in close proximity.



Table 4 lists the Species at Risk that are in close proximity, have suitable habitat, or are confirmed to be within the Horseshoe Lake Catchment Basin.

Table 4: Species at Risk observed or with suitable habitat in the Horseshoe Lake Catchment Basin

Class	Scientific Name	Common Name	MNR	COSEWIC
Amphibia	<i>Pseudacris triseriata</i> pop. 2	Western Chorus Frog - Great Lakes / St. Lawrence - Canadian Shield Population	NAR	THR
Aves	<i>Haliaeetus leucocephalus</i>	Bald Eagle	SC	NAR
Aves	<i>Dolichonyx oryzivorus</i>	Bobolink	THR	THR
Aves	<i>Wilsonia canadensis</i>	Canada Warbler	SC	THR
Aves	<i>Chordeiles minor</i>	Common Nighthawk	SC	THR
Aves	<i>Vermivora chrysoptera</i>	Golden-winged Warbler	SC	THR
Aves	<i>Contopus cooperi</i>	Olive-sided Flycatcher	SC	THR
Aves	<i>Caprimulgus vociferus</i>	Whip-poor-will	THR	THR
Aves	<i>Euphagus carolinus</i>	Rusty Blackbird	NAR	SC
Aves	<i>Chaetura pelagica</i>	Chimney Swift	THR	THR
Chelonia	<i>Emydoidea blandingii</i>	Blanding's Turtle	THR	THR
Chelonia	<i>Sternotherus odoratus</i>	Eastern Musk Turtle/Stinkpot	THR	THR
Chelonia	<i>Chelydra serpentina</i>	Snapping Turtle	SC	SC
Chelonia	<i>Clemmys guttata</i>	Spotted Turtle	END	END
Chelonia	<i>Glyptemys insculpta</i>	Wood Turtle	END	THR
Dicotyledoneae	<i>Juglans cinerea</i>	Butternut	END	END
Reptilia	<i>Plestiodon fasciatus</i> pop. 2	Common Five-lined Skink (Southern Shield population)	SC	SC
Reptilia	<i>Heterodon platirhinos</i>	Eastern Hog-nosed Snake	THR	THR
Reptilia	<i>Thamnophis sauritus</i>	Eastern Ribbonsnake	SC	SC
Reptilia	<i>Lampropeltis triangulum</i>	Milksnake	SC	SC



FISHERIES STEWARDSHIP

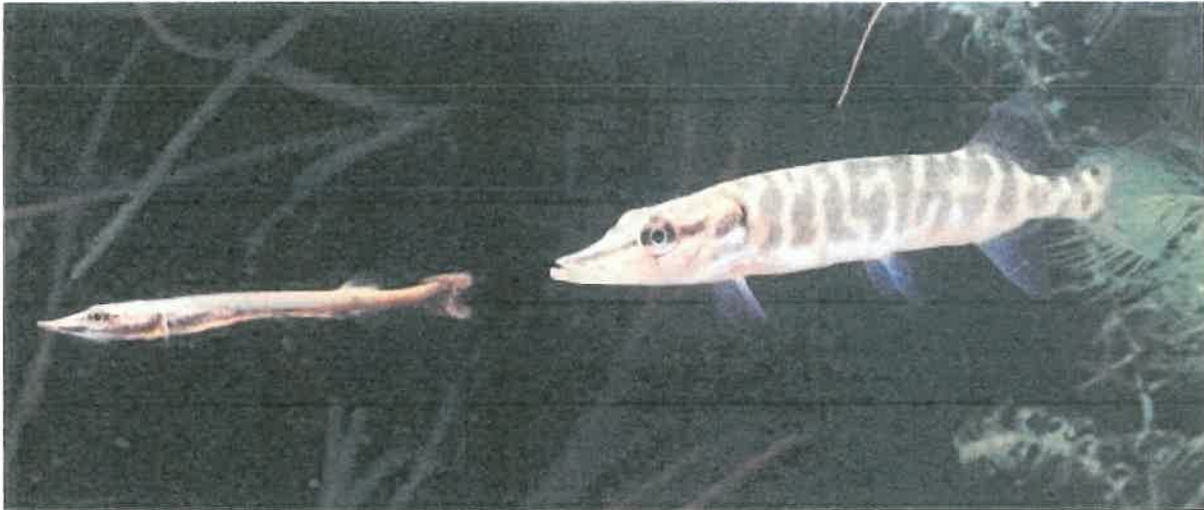
1.0 Fishery Dynamics and Trends

Horseshoe Lake is a small yet productive fishery, boasting an impressive array of baitfish and gamefish species. Species which have been confirmed present in the lake include; largemouth bass, smallmouth bass, northern pike, tiger muskellunge, muskellunge, lake trout, yellow perch, rock bass, pumpkinseed (sunfish), lake whitefish, ling, white sucker, ciscoe (lake herring), smelt, and golden shiner. This diversity of fish species inhabiting Horseshoe Lake can be largely attributable to the variety of habitat niches available within the lake. Preservation of these habitat niches is crucial for maintaining the strength of the fishery and overall aquatic ecosystem (including, for example, loon populations) on a densely populated and heavily fished system such as Horseshoe Lake.

Historically, the most sought after species of fish in Horseshoe Lake have been largemouth and smallmouth bass. The strength of the largemouth bass fishery can be largely attributed to the extensive weedy area located behind Shuyler's Island. This area offers exceptional spawning and feeding opportunities for these fish, and has allowed the fishery to stay strong despite the relatively high fishing pressure. The smallmouth bass fishery has also been strong due to the numerous rocky reefs, shoals, and points found throughout the lake. Smallmouths have been able to grow to relatively large sizes by feeding on crayfish in the more rocky areas of the lake, schools of ciscoes present in open water, and yellow perch in more vegetated areas.

In recent years, northern pike and muskellunge (muskie) have become established in Horseshoe Lake. First reported in Horseshoe Lake in 2004, these fish arrived via connections to upstream lakes where they are prevalent (Boshkung, Beech and Maple lakes) The populations of northern pike and muskie have been increasing in numbers and size since that time, with simultaneous appearance of "tiger muskies" (a cross breed between northern pike and muskie) in the lake. The features which allow for strong bass fisheries – shallow water spawning habitat and ample forage – also allow for strong populations of these top predators. Not coincidentally, northern pike, tiger muskies, and muskies are often found in similar habitats to that of largemouth and smallmouth bass.

These new top predators will likely put pressure on existing largemouth and smallmouth bass populations through added competition for a relatively fixed amount of food (yellow perch, pumpkinseed, ciscoe, smelt, golden shiner, crayfish, etc.). Muskies are an extremely rare and prized fish, and are less aggressive than pike meaning they can likely become incorporated into the existing fishery without causing significant changes. Northern pike, however, represent a greater threat to the existing fishery than muskies as they are much more common, prolific, and aggressive – a difference which can be traced back to species spawning dynamics. Hatch rates of northern pike are inherently higher than muskies (Sternberg, 1996); higher number of pike fry leads to greater within-breed competition for food and therefore increased species aggressiveness. Additionally, northern pike spawn immediately following ice-out which is approximately a month before muskies and 1-2 months before bass. This timing offset means pike fry will readily prey on muskie and bass fry come May, June, and July (Sternberg, 1996).



Northern pike fry (right) will prey on newly hatched muskie fry (left) and bass fry

The introduction of these new species will likely result in an evolution in the structure and function of Horseshoe Lake's existing fishery and aquatic ecosystem over the next several years. The establishment of this new equilibrium is an especially sensitive process for Horseshoe Lake, owing to the relatively high cottage density and fishing pressure present. The "Maintaining the Fishery" section provides information on how HLPOA members can help ensure a strong and productive fishery continues in Horseshoe Lake.

Horseshoe Lake has also held an annual rock bass derby on the Civic Holiday long weekend since 1988. Rock bass affect the largemouth and smallmouth bass population as they aggressively prey on similar forage items (crayfish, baitfish, nymphs, etc.), yet do not grow to a significant size. They also prey directly on largemouth and smallmouth bass nests and fry. Large populations of rock bass can overwhelm male largemouth/smallmouth bass trying to guard their offspring, resulting in complete/partial loss of nests/fry (see "Observe Open and Closed Seasons" for more information). Recently, the rock bass derby has expanded to include northern pike and has been turned into a fish fry ("Rock Bass and Pike Derby and Fish Fry"), aiming to promote thoughtful and sustainable harvest practices of fish species in Horseshoe Lake (see "Selective Harvest" for further discussion).

While lake trout have been caught on Horseshoe Lake, especially during the winter months, lake surveys performed by the MNR indicate insufficient oxygen levels at depths suitable for lake trout for large portions of the year, and it is unlikely that these fish are permanent residents of the lake. However, the healthy population of lake whitefish suggests Horseshoe Lake has the capacity to support a limited cold water trout fishery, leading to stocking initiatives of brook trout, splake, and rainbow trout.

2.0 Stocking History

Horseshoe Lake has been stocked with various sport fish since 1931, including lake trout (most recently in 1992), smallmouth bass (1958), largemouth bass (1978), brook trout (1956), splake

(1986), and in recent years, rainbow trout. Table 1 summarizes the recent MNR rainbow trout stocking.

Table 1: Rainbow Trout Stocking in Horseshoe Lake

Year	Number of Fingerlings
2002	2500
2004	2500
2005	5000
2006	5100
2008	5000
2010	5000

Despite the above 6 years of stocking, no significant catches of rainbow trout have been reported to the HLPOA or the MNR to date. This suggests that a Rainbow Trout fishery is not plausible in Horseshoe Lake, and accordingly, stocking of this fish has not continued past 2010. If you are aware of catches of rainbow trout which have been caught, please forward this information to David Flowers, Fisheries Biologist at the Ministry of Natural Resources (Minden office) or Jeff Muirhead, Lake Steward with the HLPOA (jeffreymuirhead@gmail.com).

3.0 *Maintaining the Fishery*

As discussed above, the recent establishment of new fish species in Horseshoe Lake means an adjustment in the aquatic ecosystem is occurring, tending towards an eventual new equilibrium state. This process is a sensitive one for Horseshoe Lake due to its relatively small size, dense human population, and intense fishing pressure. Recognizing the delicate nature of this evolution, adoption of a few simple management strategies by the anglers and cottagers of Horseshoe Lake can go a long way to ensuring the fishery reaches a stable, sustainable state and is productive for many years to come.

3.1 Catch and Release

One of the most important and basic strategies for maintaining a strong, sustainable fishery is through the practice of proper catch and release angling. Harvesting and/or poor release of quality fish has a ripple effect on the fishery, as these fish often produce the largest number of offspring. Decade-long studies of trophy muskies (Casselman et al., 1996) have shown that a 2% increase in annual mortality of adult muskies (i.e., a harvest of 1 in every 50 fish living in the lake) is equivalent to a *70% decrease* in lake-wide first year hatchling survival! Releasing quality and prized fish allows them to continue to reproduce, year after year, and keep the fish populations healthy.

As Horseshoe Lake is a relatively small, highly pressured lake, the fishery simply cannot handle numbers of quality fish continually being taken out of the system. Repeated removal of large numbers of quality fish is, by far, the largest threat presently facing Horseshoe Lake's fish populations.

When practicing catch and release, anglers can minimize stress and potential injury to fish by employing some basic techniques:

- Do not allow the fish to thrash around on the ground/boat floor – this removes its protective slime making it susceptible to disease
- Never tear the hook out of a fish. If the fish has swallowed the hook, cut the hook shank or line
- To release a fish, gently place the fish back in the water, moving it back and forth slowly until it can swim away under its own power



Practicing catch and release allows quality fish to be caught for years to come

More tips on effective catch and release can be found through Fishing Ontario:

http://www.mnr.gov.on.ca/en/Business/LetsFish/2ColumnSubPage/STEL02_166032.html

3.2 Selective Harvest

If you choose to keep a fish (within the size and number limits put forth by the MNR in the most current sportfishing regulations), doing so *selectively* can go a long way to maintaining healthy populations of large fish for years to come.

Some ways to practice selective harvest include:

- Consider harvesting some of the *more prolific species* present in Horseshoe Lake (such as rock bass, pumpkinseed, yellow perch, and northern pike). Not only are these species typically readily caught, they are often surprisingly tasty table fare (something those who attend the annual Rock Bass and Pike Derby and Fish Fry can attest to!). As a small, highly pressured fishery, the Horseshoe Lake system is more able to withstand removal of these fish. With a little knowledge on filleting techniques (YouTube is a great source!), these “alternative” species are every bit as delicious and filling as conventional “keeper” fish!
- Consider harvesting fish *lower on the food chain* (rock bass, yellow perch, pumpkinseed). Not only are these fish more plentiful and prolific, they have less contaminant bioaccumulation than large fish, making them safer for regular human consumption.
- Consider harvesting the *medium sized members* of a sportfish species, rather than the largest individuals. Fish are no different than humans – some are genetically predisposed to grow larger, and as a byproduct, have larger offspring. By releasing the large fish, and keeping medium sized fish, the genes for large fish can be kept in the breeding pool of the fish population in Horseshoe Lake, and large fish can continue to be caught for years to come!



Rock bass, pumpkinseed, yellow perch, and northern pike are great table fare

3.3 Observe Open and Closed Seasons

The MNR has assigned open and closed seasons for all sportfish species. It is illegal to fish for a sportfish out of season. Table 2 summarizes open and closed seasons for the gamefish species in Horseshoe Lake. Fishing out of season not only damages the fishery, but can mean significant fines and license suspensions.

Table 2: Open and Closed Seasons for Fish Species in Horseshoe Lake

Species	Open Season(s)
lake trout	January 1 - September 30
lake whitefish	open all year
largemouth bass	4th Saturday in June - November 30
muskellunge	1st Saturday in June - December 15
northern pike	January 1 - March 31; 3rd Saturday in May - December 31
pumpkinseed	open all year
rock bass	open all year
smallmouth bass	4th Saturday in June - November 30
tiger muskellunge*	1st Saturday in June - December 15
yellow perch	open all year

**open and closed seasons not published for tiger muskellunge – consider seasons identical to muskellunge*

It should be noted that season dates in Table 2 are for Fisheries Management Zone 15, which Horseshoe Lake is found in. Seasons may differ in different areas of the province; please consult the “2014 Fishing Ontario Recreational Fishing Regulations Summary” for details on open and closed seasons across Ontario:

<https://www.ontario.ca/travel-and-recreation/ontario-fishing-regulations-summary>



Bass guarding a nest will attack out of defense, making them susceptible to being caught and having their nest destroyed

Smallmouth and largemouth bass begin spawning when the water warms to approximately 64°F. The male bass guards the shallow water nest for 2+ weeks, then guards the cloud of newly-hatched fry for another 2+ weeks. During this time, bass are very vulnerable to being caught, as lures or other bait are aggressively attacked out of defense for the offspring. In one fisheries study, two anglers in a single boat hooked and landed 54% of the spawning largemouth bass and 70% of the spawning smallmouth bass in a single pass of a shoreline (Suski and Philipp, 2011). Even if the bass is reeled in and released as quickly as possible, lurking predators such as rock bass, pumpkinseed, yellow perch, and crayfish will devour an entire nest of eggs or school of fry in a matter of minutes (Steinhart et al., 2004). Studies have also shown that bass guarding nests/offspring take longer to recover (up to 24 hours) as compared to when they are not guarding offspring (2 hours), impairing their ability and/or desire to defend

eggs or fry remaining after they return to the water (if there are any left!) (Cooke et al. 2000; Suski et al., 2003). As tempting (and easy) as it may be in June and early July to catch that lunker sitting on a nest off the end of the dock, or the giant cruising the shallows with a school of fry in June and early July – leave it be! Aside from being illegal (if before the 4th Saturday in June), refraining from catching these vulnerable fish gives new generations of bass the best chances for survival – and helps populations stay strong for years to come.

3.4 Habitat Maintenance and Water Quality



Maintaining a natural shoreline protects aquatic habitat and filters contaminants from entering the lake

Removal of rocks, weeds, and woody debris from the lake can be devastating to fish populations. Underwater structures such as logs and rocks not only allow fish to have a place to rest, feed, and spawn, but also provide protection from predators. Removal of these from shorelines will also promote shoreline erosion. Natural shorelines are *crucial* to supporting healthy fish populations.

Eventually, what goes on your lawn and down your drain makes its way into the lake. Having your septic system checked and pumped out regularly maximizes its effectiveness and is *critical* in water quality and ecosystem health in Horseshoe Lake. Nutrients such as phosphorus and nitrogen promote excessive aquatic plant and algae growth in a process called eutrophication, and are not adequately removed by full, damaged, or out-of-date septics. Nutrient inflows from fertilizers applied to yards also causes excessive aquatic vegetation growth and degradation of water quality. Pesticides and other chemicals further decrease water quality when they enter the lake. Remember – what you put in the lake is what you, and the fish, are swimming in!

3.5 Invading Species Prevention

The Ontario Federation of Anglers and Hunters (OFAH) offer a voluntary monitoring program, the Invasive Species Watch, to track and document presence or absence of invading species in Ontario lakes. Horseshoe Lake currently participates in this program, run in conjunction with the Lake Partner Program which focuses on water quality testing. Thus far the only type of exotic invading species found in Horseshoe Lake is the spiny water flea. These organisms feed heavily on native zooplankton, which are a primary first feed for juvenile sportfish and baitfish species. The spiny water flea are difficult to digest for small fish < 10 centimetres due to its long spine, and in large numbers may disrupt the native food web.

Of primary interest in protection of the existing aquatic ecosystem is the prevention of zebra mussel invasion. Zebra mussels filter both nutrients and pollutants from lake water, increasing water clarity and altering existing lake dynamics. Invasion of this species would cause major changes in the overall lake ecology and present hazards to swimmers as the edges of their shells are very sharp. Other invasive species with negative impacts on ecosystems dynamics include:

- round goby – These bottom-dwelling fish have are major predators of sportfish eggs and fry. They have also been shown to accumulate contaminants due to their diet preferences, which therefore accumulates in larger sportfish who prey on them.

- rusty crayfish – These crayfish are quite aggressive and consume significantly more than native crayfish who they quickly outcompete once introduced. They can quickly degrade aquatic plant beds, and aggressive predation of various aquatic invertebrates puts stress on the baitfish and juvenile sportfish which also depend on these invertebrates for food.

The following actions should be taken to prevent the spread of these aquatic invasive species:

- Never empty bait buckets into, or in close vicinity to, the lake
- Never transport aquatic species from one waterbody to another
- When transporting boats between waterbodies:
 - Drain all water from the motor, livewells, bilge, and transom wells before leaving the launch
 - Wash boat and motor with hot soapy water or with a high pressure washer, or alternatively let the boat dry out in the sun for five days

More information on aquatic invasive species can be found through the MNR at the following link:

http://www.mnr.gov.on.ca/en/Business/Biodiversity/2ColumnSubPage/STEL02_167267.html

The OFAH Invading Species Hotline can be reached at 1-800-563-7711. More information on the OFAH Invasive Species Watch can be found at the following link:

<http://www.invadingspecies.com/Programs.cfm?A=Page&PID=19>

3.6 Horseshoe Lake Fish Log – Partnership with the Ministry of Natural Resources (MNR)

A simple-to-use fish log (Horseshoe Lake Fish Log – HLFL) has been handed out to HLPOA members in newsletter packages and various lake events (e.g., Rock Bass and Pike Derby and Fish Fry). The HLPOA is asking anglers and cottagers on Horseshoe Lake to record some basic information about the fish they catch on the lake. Completed HLFL forms can be submitted at any time either to David Flowers, Fisheries Biologist at the MNR in Minden, or to any member of the HLPOA executive at any of the lake events (sailing race, Rock Bass and Pike Derby and Fish Fry, etc.). Any questions regarding the HLFL can be directed to Jeff Muirhead, Lake Steward with the HLPOA (jeffreymuirhead@gmail.com).

Information recorded on the HLFL is very basic in nature (fish species, size, kept/released, etc.), yet provides MNR fisheries biologists with invaluable insights into the current condition of the fishery on Horseshoe Lake. This is especially important and pertinent for Horseshoe Lake given the sensitive re-balancing of the fishery currently occurring due to the aforementioned recent establishment of northern pike, tiger muskies, and muskies. The data gleaned from HLFL submissions allows for the development of lake-specific fisheries management strategies by the MNR, which will help support a healthy, productive, and stable fishery for years to come.

3.7 Renting Your Cottage

It is not only HLPOA members who can help maintain a sustainable fishery; non-property owners can also play a role in preserving our resource. If you rent your cottage or share it with friends or family, discussing the conservation concepts presented in Sections 3.1 through Section 3.6 with them can go a long way in ensuring the aquatic ecosystem remains productive and healthy for years to come!

4.0 Potential Future HLPOA Initiatives

4.1 Provincially Significant Wetland

As previously discussed, the shallow weedy area behind Shuyler's Island provides exceptional spawning and foraging opportunities for largemouth bass, northern pike, and muskie, let alone the other semi-aquatic birds, mammals, and amphibians. The baitfish and other aquatic species these animals depend on for food are able to maintain healthy populations due to the undisturbed conditions offered in this section of the lake. The excellent fishing found in Horseshoe Lake can be largely attributed to the unique advantages provided by this protected backwater area. Presently much of the riparian zone and adjacent land has been kept undeveloped, enhancing ecosystem function by maintaining natural shoreline conditions.

Should the HLPOA decide that the protection of this area be a priority, attempting to designate it as a Provincially Significant Wetland (PSW) may be a worthwhile use of resources. This would require a thorough biological assessment by a wildlife biologist, as well as concerted effort by HLPOA members to document Species at Risk (SAR) sightings. However, having this area designated as a PSW would offer serious resistance to any land development efforts. By undertaking this initiative, the members of the HLPOA would significantly increase the chances that the land surrounding it remains undeveloped, keeping this area of Horseshoe Lake pristine and untouched.

Recommendations for Fisheries Stewardship

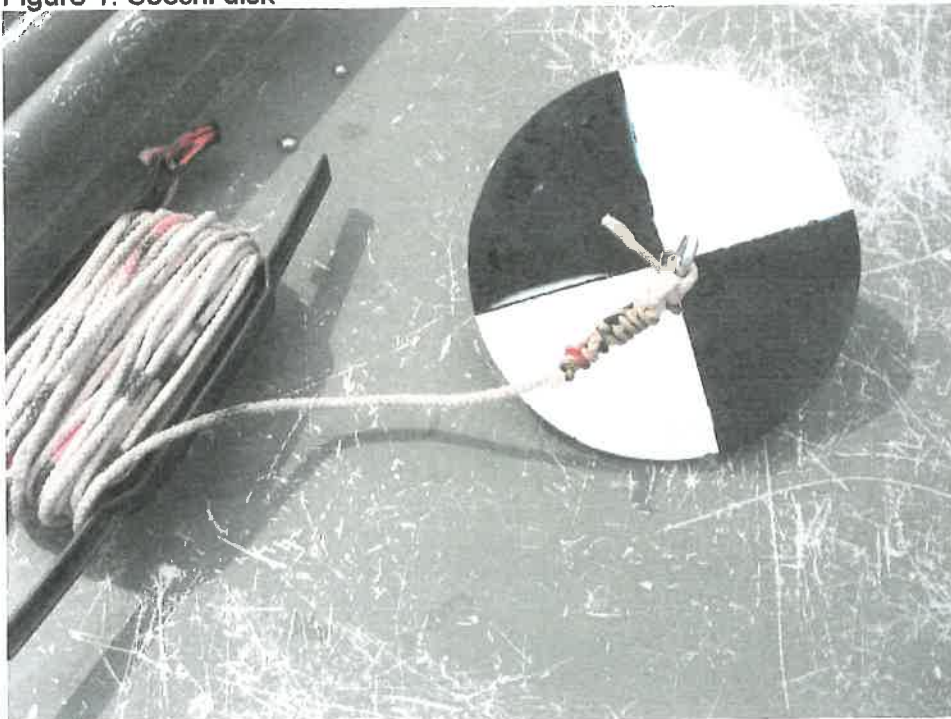
1. Recognize that there is intense pressure on the delicate aquatic ecosystem of Horseshoe Lake due to the introduction of new fish species. Therefore we should adopt management strategies to ensure the fishery is in an optimum state. These strategies are:
 - a. catch and release,
 - b. selective harvest,
 - c. the observation of open and closed seasons,
 - d. the awareness of habitat maintenance and water quality,
 - e. education on invading species prevention, and
 - f. the use of the MNR Fish Log.
2. Investigate whether the HLPOA will undertake the initiative to determine the feasibility of our lake being designated a Provincially Significant Wetland.

WATER QUALITY

Each year the HLPOA participates in the Ministry of the Environment's Lake Partner Program (LPP). The LPP is run by the Ontario Ministry of the Environment and Climate Change (MOECC) out of the Dorset Environmental Science Centre (DESC). The purpose of the LPP is to gather baseline water quality data to track long term trends in water quality and lake health. Data is used by government, universities, and environmental consulting groups.

Participating in the LPP consists of two tests: measuring water clarity using a Secchi disk, and submitting one (or more) water sample(s) for analysis of total phosphorus content. The tests are performed in the spring of each year, allowing the MOECC and HLPOA to flag any large changes in the water quality using these readily-obtained indicators. Clarity is measured using a Secchi Disc (see below) at the deepest point in the lake, which is lowered down the water column and the depth at which it disappears noted. In Horseshoe Lake, the water samples have been taken at the deepest point in the lake, however additional locations will be sampled in future years (i.e., behind Shuyler's Island). Horseshoe Lake water clarity has generally shown to be good and is classified as a clear central Ontario oligotrophic lake.

Figure 1: Secchi disk



The HLPOA has recently partnered up with the Mountain Lake Property Owners Association (MLPOA) and MOECC to perform dissolved oxygen (DO) and temperature profiles. This consists of lowering a probe which measures DO and temperature, down

the water column, and noting the DO and temperature values at 1 m intervals. The testing is completed in the deepest portion of the lake, and provides information on aquatic habitat for fish and overall eutrophication (algae growth) dynamics in the lake. DO is important for living organisms, from the zooplankton which form the base of the food chain to the cold-water lake trout sometimes inhabiting our water. DO is depleted as the water warms (warmer water can not hold as much DO as cold water), and also as decomposition of organic matter occurs. When increased nutrients (i.e., phosphorus and nitrogen) enter the lake, plants and algae flourish – however, excessive growth eventually leads to plant matter dying off and decomposing, which consumes oxygen. Lakes are usually at the highest risk of going “anoxic” (without sufficient oxygen for) in the late summer/early fall, when water is the warmest and decomposition is at a maximum. Horseshoe Lake typically experiences lower DO as the summer progresses than neighbouring Mountain lake, owing to its shallower water, softer sediment, and increased vegetation growth. Currently, low DO levels are not harming the aquatic habitat of the lake, however residents are advised not to use fertilizer on their properties, keep shoreline vegetation buffers, and to ensure septic systems are operating properly and pumped out regularly.

Recommendations for Water Quality

1. Continue to monitor water quality through LPP and DO/temperature profiles, and keep residents informed of results at the AGM and through regular newsletters.
2. Continue to source and distribute guidelines of good practice for:
 - the use of chemicals,
 - the protection of shoreline plants,
 - controlling nutrients and growth of algae, and
 - septic systems.
3. Continue to be part of the Ontario Ministry of the Environment and Climate Change (MOECC) Lake Partnership Program and will stay involved with the Coalition of Haliburton Property Owners Association (CHA) that provides educational activities and materials to Lake Stewards.

LAKE LEVELS

Horseshoe Lake is part of the Trent-Severn Waterway managed by Parks Canada. Our lake is one of the many reservoir lakes that supply water to the Trent Canal in Peterborough. Because of this, Horseshoe has always been subject to extreme fluctuating water levels. Low water levels reached a crisis point in the summer of 2005 when many areas of our lake became unnavigable to motorized boats. At that time Bonnie Fleischaker, a resident and HLPOA member, took the initiative to challenge the federal government into reviewing the drawdown procedures that affect our lake and other waterways in the area. Through these initial activities, the Coalition for Equitable Water Flow (CEWF) was established in 2006 and it has been effective in giving a voice to area lakes and communities regarding water level control.

Now the top priority of the CEWF is to continue to advocate for an Integrated Approach to Water Management at the Watershed level. To accomplish this, the CEWF Executive Committee continues to work closely with the TSW management with a focus on:

- Greater understanding of Reservoir and Flow Through (RaFT) lake issues including preferred water levels, fisheries, and other environmental constraints, winter set levels, and flood and low water management issues and constraints.
- Encouraging the TSW to act on the AECOM Study recommendations with specific reference to the acquisition of improved water management decision support models.
- Encouraging the TSW to work with municipalities and Ontario to provide a greater information base for effective water management in flood situations with the objective of improving public safety and minimizing damage costs.
- Encouraging the TSW to reactivate the TSW Water Management Advisory Council.
- Urging the public release of the results of the numerous dam safety reviews.
- Encouraging opportunities for public and municipal input on TSW capital project planning.

The CEWF Executive Committee will attempt to engage the Province of Ontario to work with the TSW and take action under the Memorandum of Understanding on Integrated Water Management signed by both Parks Canada and Ontario several years ago.

The CEWF will meet when invited and work with member lake associations to raise the understanding of water management issues of the TSW System and to develop Preferred Water Levels documents for each RaFT lake in the TSW Haliburton Sector.

Recommendations for Lake Levels

1. Be an active member of the CEWF to advocate for an integrated approach to water management and water level control.
2. Keep members informed on developments and new ideas regarding water level control.

HISTORY of HORSESHOE LAKE

In the fall of 1857, Provincial Land Surveyor James W. Fitzgerald was assigned the task of surveying the Crown Lands in Minden Township.¹ Fitzgerald reported that 60% of Minden Township was suitable for agriculture. He also produced an accurate Map of the area, dated 1860, which clearly shows the location and name of Horse Shoe Lake.²

Shortly after Fitzgerald's report was received, the Crown appointed Richard Hughes to act as Land Agent responsible for selling Crown Land in Minden Township.³ Not all of the individuals who petitioned for a Crown Patent along the shores of Horseshoe Lake stayed, but we do know that many farm families did clear and work the land including the Reynolds, Harrison, Davis, McCracken and Dennison families.

By the time Fitzgerald surveyed Horseshoe Lake, the First Nations people who had travelled through and used the rivers and lakes of the area were seldom seen by local residents.⁴ The lake was being used by loggers as a passageway for log booms coming from the northern sections of Haliburton County to the Gull River sawmill in Coboconk.⁵ The rapids at the end of Horseshoe Lake, now home to the White Water Preserve, was one of the longest and most treacherous rapids faced by the loggers each spring. Some of the local farmers, such as William Reynolds, worked during the winter and early spring in logging camps to bring in extra income for their families.

When Ontario roads were improved and automobile travel increased, people from southern Ontario came north to escape the city. The farmers divided their acreages and sold plots for cottages to be built. They also supplemented their income by selling eggs, milk and produce to their new neighbours.



The Davis Farm ca. 1942
Photo courtesy Warren & Cathy
Whelen

The northwest end of the lake seems to be where the first cottage development began. The largest of the Three Sisters Islands, Nephawin, was first purchased by Lieutenant-Colonel John Samuel Campbell in 1908.⁶ Cecil A. Heaven, purchased land between Mountain and Horseshoe Lake for a summer retreat in 1915,⁷ while the Cockburn and Winch families arrived sometime during the 1920's.⁸

Life in the first half of the 1900's was quite rugged. Early cottages had no hydro until the mid 1950's so cottages were warmed by a wood stove. The wood stove was used for cooking also – even in the extreme heat of the summer. Lighting was provided by coal oil and Aladdin lamps. Some families had icehouses that were filled each winter with ice blocks cut from the lake and covered with sawdust to keep them cool during the summer.⁹ In spite of the hardships, families continued to build their summer homes on the lake and a community was established.

The reason for the name Horseshoe Lake and the person responsible for giving our lake its name has been lost in time. We do know that the name was in common usage throughout the 19th century as it is used in legal document and in a traveller's account written for the Toronto based newspaper *The Globe* in 1865.¹⁰

For about 35 years, Horseshoe Lake was often referred to as Elsie Lake on maps and in legal documents,¹¹ a name acquired from the opening and running of the local post office (1909-1946). The Elsie Post Office was first operated on Twelve Mile Lake by the Gilbert family. The Gilberts farmed along the east side of Twelve Mile Lake, near the present day Red Umbrella Inn. The Gilberts had three children – Sam, Isabel and Elsie. Each new post office had to have a unique name. When Mr. Gilbert became the first postmaster for the area, he named the post office after his daughter, Elsie.¹²

Shortly after, Sam Gilbert resigned and James Reynolds became postmaster of the Elsie Post Office. The post office facility was moved to the Reynolds farmhouse along the north shore of Horseshoe Lake.¹³ The lake, the community surrounding it and the post office were all called Elsie in local newspaper accounts. In 1946, rural mail delivery took over mail service for the area and the Elsie Post Office was closed. In the early 1970's, a post office was opened in The Cupboard, a store located on Reynolds Road. It took until the mid-1970's before the name Elsie no longer appeared on local and provincial maps.

The lake is larger and deeper than it was originally. During the flooding of the feeder lakes for logging operations and for the Trent-Severn system, Horseshoe Lake became substantially larger. By comparing the map of Horse Shoe Lake (1860) to a present-day map, it appears that when the lake levels were elevated by the construction of a dam at the rapids, Angus Island, Shuyler's Island, and the marsh at the north end of the lake were created. Little Horseshoe was also increased in width.

The Horseshoe Lake Property Owners Association became incorporated in 1987¹⁴ and has been a presence on the lake since the 1950's.¹⁵ Its focus has been to protect the land, waters and wildlife of the lake. The Association conducts annual water testing. It has provided education and information to members on topics as diverse as maintaining a functioning septic system to understanding the life cycle of loons. It has been a political voice on many local issues and continues to be actively involved with the CEWF to establish consistent water levels. It also encourages fellowship among its members with annual social events and gives support to local organizations enhancing the lives of people in the county.

The lake was officially numbered in 1989. Copies of the new lot numbers and a map of the lake were sent to the police, fire department, ambulance and local merchants for easy access to Horseshoe Lake properties in case of emergency. The cost of the project was \$1,850 for signs and steel posts that identify areas of the lake. Since the amount was the entire budget of the Association, each cottage owner was charged \$10. Individual cottage signs were an additional cost to the cottager.¹⁶ The HLPOA system was replaced by 911 numbering in 2005.¹⁷

With the coming of the 21st Century, life on Horseshoe Lake has drastically improved with new and efficient systems that modern technology has provided. The scarcity of lakeshore property within driving distance of southern Ontario has caused land values to soar and a more affluent property owner is buying on the lake. At the same time, many individuals who summered on the lake are now retiring and becoming permanent residents. In today's society there is increased public awareness of the need to conserve earth's natural resources. All of these changes promise to ensure that Horseshoe Lake will have the leadership required to protect and maintain its health and unspoiled beauty in the years to come.

Recommendations for Lake History

1. A comprehensive document on the history of the lake is being compiled.
2. Lake archives are to be organized and maintained for future generations.
3. The feasibility of transferring historical material to an on-line format is to be investigated.

LOONS ON HORSESHOE LAKE

Our lake became involved with Bird Studies Canada in 1997. Bird Studies Canada www.bsc-eoc.org a non-profit organization that in 1981 began a study to determine loon activity on lakes across Canada. This was done through the Canada Lakes Loon Survey (CLLS) and in 2012 produced a study of 30 years of loon breeding success. Some 4500 lakes have been monitored which translates into 19,000 attempts by breeding loons. This study assesses the long term health and productivity of Common Loon and the lakes on which they depend. Loons are top predators and their survival reflects lake health. They fulfill the same role as canaries in the coal mines—acting as an indicator of environmental conditions.

Horseshoe Lake joined the survey as a result of an untoward incident causing the death of a six-week old loon chick - healthy to all appearances but had died and was washed ashore. The CLLS advised us to send the chick for necropsy to the Guelph Ontario Veterinary College. They determined that it had died from a bacterial infection of necrotic enteritis not the result of human interference. The CLLS provided us with information and education regarding the Common Loon and the type of human interaction that has negative effects on loon nesting and breeding. Harassment was emphasized as being problematic from people who wish to get close to loon families to observe or photograph them. Through the following years with yearly articles in our HLPOA newsletters and with the assistance of CLLS that has provided us with LOON ALERT and LOON NESTING signs, more respect has been shown to loon families both while nesting and when parents with downy chicks are unable to dive to escape.

Our lake supports three loon pairs—one in the north bay, the second in the main lake near the Gull River exit and the third near the Three Sisters Islands. The first two pairs have had successful nestings for many years (both nest in the marsh). Pair number three near the Three Sisters Islands has been unsuccessful in nesting each year. This is a busy boating corridor so, perhaps, in future a nesting platform in a sheltered spot may be required.

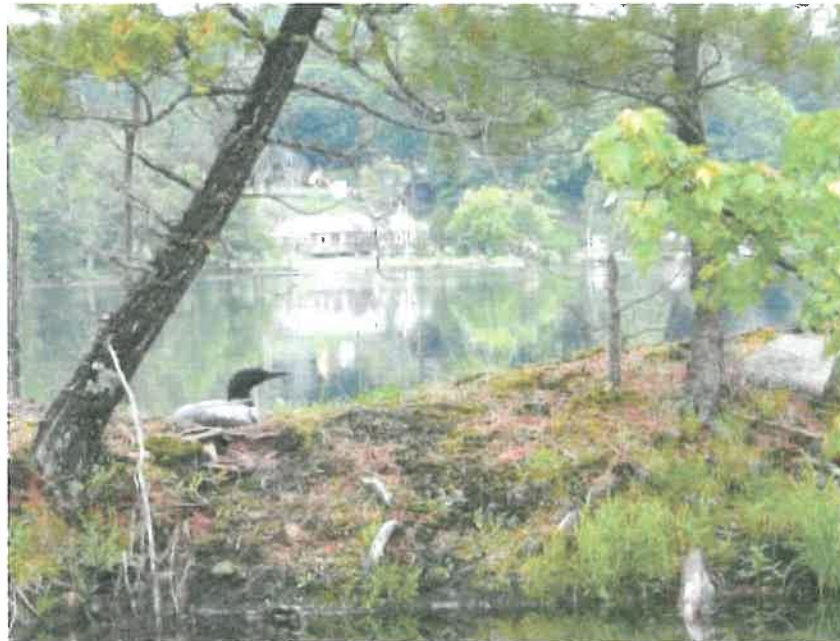
The loon lays only two spotted brown eggs in late May that take 29 days to hatch. Eggs are never without a parent loon covering them to prevent predators from raiding the nest. The parents are devoted and usually feed the young till the early fall months when the chick is able to feed itself.

Because Horseshoe is a feeder lake for the Trent Water System with fluctuating lake levels, some years have seen the nests flooded and abandoned because they are always found at the water's edge. In 2002 a loon platform was built to assist and it has been used successfully by the pair in the north bay. However in summer of 2014, it sank so now needs to be replaced.

Among Common Loons found in good body condition, causes of mortality include trauma, possibly from impact of motor boats, drowning, and/or starvation from fishing line being wrapped around the loon's body. This has occurred twice recently in Horseshoe lake—one rescued successfully in 2014, the other loon perished. As well as the loon chick that was sent for necropsy, two loon eggs from an abandoned nest were sent in 2004 to the Canada Wildlife

Research Centre in Ottawa for analysis. These reports when received did not determine why the nest was abandoned but did reflect the health of our lake.

In summary, although called the Common Loon, they are far less common than 100 years ago. They are suffering from severe population decline as their breeding range has been reduced and acid rain, E-botulism, and mercury poisoning (from lead sinkers) take their toll. **Can you imagine a warm summer night at Horseshoe Lake without those wild loon voices echoing across the lake?**



One of our loons nesting, June 2015. Photo courtesy Dave Heaven

(N.B. Photo taken with a telephoto lens.)

Recommendations for Loons on Horseshoe Lake

1. Continue our monitoring of loon pairs to ensure their continued habitation of Horseshoe Lake.
2. Take all action required to assist loons in their protection and habitation.
3. Continue to educate residents to help them provide and protect the environment loons require for their existence.

SAFE BOATING

Everyone loves the water! It's why we all keep coming back to Horseshoe Lake.

We all seem to love boating on the water too. According to our survey, a large number of us own boats. Most of our residents have more than one. Kayaks, canoes, rowboats, sailboats, pontoon boats, large and small power boats and an increasing number of jet skis can all be seen on the lake.

The Horseshoe Lake Property Owner's Association is concerned with keeping our lake safe and pleasant for those on the water and on the shore.

Our Annual General Meetings have featured guest speakers from the Ontario Provincial Police to talk about safety and the importance of abiding by the laws which protect us from danger on the lake. The OPP visits our lake as well as many other each season checking for pleasure craft operators' licences, safety equipment and alcohol and drug impairment. But their resources are limited. In the past the Association has paid for extra patrols to help provide a safe boating environment on Horseshoe Lake.

In order to protect boats as well as the riders in them, our Association places buoys where there are dangerous rock which, if hit, could do serious damage to boats and their passengers. These markers are located at the entry to Mountain Lake, off the Three Sisters Islands and at the south end of the lake where the narrows begin. While every attempt is made to be accurate with their locations, boaters are advised to stay clear of the entire area where these buoys are placed.

Also, at the narrows entrance and at other locations on the lake are signs advising of the speed limit and "no wake" zones. Not only is high speed dangerous for other boats and swimmers in the area but also for the shoreline. Large wakes can damage moored boats and floating docks. They accelerate erosion on the shore which can lead to problems for cottage owners and for the environment. They can disturb loon and duck nesting sites. While not a particular safety concern, large wakes may also make it unpleasant for the quiet enjoyment of cottage life.

As well as signs on the lake, there are notices posted on some private cottage roads advising of speed limits near the shore. They are designed more for guests and renters to alert them before they go out on the water. These signs and the "no wake" signs are available free of charge to our members.

Recommendations for Safe Boating

1. The HLPOA is dedicated to boating safety and will continue to monitor lake activity and explore new ways of making boating safe as well as fun for all.
2. The Association will stay current regarding boating regulations and ensure members are notified of changes.

SUMMARY of RECOMMENDATIONS

The Horseshoe Lake Property Owners Association takes an active role in organizing social activities for members and providing support for worthy causes in the Haliburton Highlands community. The Association is dedicated to the maintenance of the pristine environment of the lake and protection of its wildlife. To this end the following recommendations are presented.

1. Continue the roles assumed by members to maintain or develop activities in the following areas.

- a. Continue to monitor water quality and lake health and keep residents informed of results. Continue to be part of the Ontario Ministry of the Environment and Climate Change (MOECC) Lake Partnership Program and the Coalition of Haliburton Property Owners Association (CHA).
- b. Be an active member of the CEWF to advocate for an integrated approach to water management and water level control.
- c. Continue our monitoring of loon pairs to ensure the continued protection of individuals and of their habitats on Horseshoe Lake and take all action as required.
- d. The HLPOA is dedicated to boating safety and will continue to monitor lake activity and explore new ways of making boating safe as well as fun for all.

2. Provide education or information to members to assist in maintaining the natural and social environment of our lake.

- a. Continue to source and distribute guidelines of good practice of lake health for:
 - the use of chemicals,
 - the protection of shoreline plants,
 - controlling nutrients and growth of algae, and
 - septic systems.
- b. Keep members informed on developments and new ideas regarding water level control.
- c. Provide management strategies to ensure the fishery is in an optimum state. These strategies are:
 - catch and release,
 - selective harvest,
 - the observation of open and closed seasons,
 - the awareness of habitat maintenance and water quality,
 - education on invading species prevention, and
 - the use of the MNR Fish Log.

- d. Continue to educate residents to help them protect the environment loons require for their existence.
- e. The HLPOA will stay current regarding boating regulations and ensure members are notified of changes.
- f. Lake archives are to be organized and maintained for future generations and a comprehensive document on the history of the lake will be compiled.

3. Investigate the feasibility of the following issues.

- a. HLPOA will undertake the initiative to determine the possibility of our lake being designated a Provincially Significant Wetland.
- b. The transfer of HLPOA historical material to an on-line format is to be reviewed.

CONCLUSION

This document represents an accurate view of residents' values and concerns and presents a workable action plan outlined in the Summary of Recommendations that has been approved. The primary value of residents of Horseshoe Lake is the preservation of its unique fauna and wildlife. Their principal concerns are that of fluctuating water levels, water quality and the protection of wildlife both in the water and on the land. The HLPOA is dedicated to actively monitoring environmental challenges plus all internal and external events to ensure the continuation of the special character of Horseshoe Lake.

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1. J.W. Fitzgerald's "Survey of Township Boundaries" [Ontario, Department of Lands and Forests, Field Notes, no. 1904]. Dated St. Mary's, June 1st. 1858, reprinted in Florence C. Murray, Muskoka and Haliburton 1615-1875. A Collection of Documents. Toronto: University of Toronto Press, 1963, pp. 165-167.

2. The original 1858 survey map showing the boundary lines between the eight townships in Southern Haliburton clearly shows the lake as Horse Shoe Lake. Kim Emmerson, Alexander Niven. Victoria, B.C.: Friesen Press, 2015, p. 37. This map was done before Fitzgerald had completed his survey of the land around Horseshoe Lake and is quite inaccurate.
3. "Up the Muskoka and Down the Trent," Toronto, Globe, October 4, 1865, reprinted in Florence C. Murray, Muskoka and Haliburton 1615-1875. A Collection of Documents. Toronto: University of Toronto Press, 1963, pp. 235-236.
4. Under the terms of Treaty No. 20, signed on November 5, 1818, all rights to much of Muskoka and all of Haliburton had been signed away by the Chippewa Indians. See Erin Kernohan, Triumphs, Tragedies and Changes. A Celebration of Minden's 150 Years, p. 15. Further details can be found in Canadian Indian Treaties and Surrenders, Volume 1, 1971, pp. 48-49.
5. There are numerous references to logging operations in the area, including the problems experienced by the Gull River Lumber Company transporting logs through Mountain and Horseshoe Lake in the 1920's. According to the Minden Echo, the company purchased the Coboconk sawmill in 1906. See Nila Reynolds, In Quest of Yesterday. pp. 63, 65 and 66.
6. Andy Campbell, in conversation with Carol (nee Jamieson) Hewitt and Marilyn Armstrong-Reynolds, August 9, 2014.
7. Ted Heaven, "*Away Up Here: A Century of Cottaging on Horseshoe, Mirror and Mountain Lakes*," pp 4-5.
8. Haliburton County Land Registry Office documents, Lots 11 and 12, Concession 8, Minden Township.
9. Written memories of Carol (nee Jamieson) Hewitt, 2010.
10. "Up the Muskoka and Down the Trent," in Florence B. Murray, Muskoka and Haliburton 1615 -1875. A Collection of Documents. Toronto: University of Toronto Press, 1963, p. 393.
11. Many legal documents for summer properties along Horseshoe Lake, especially along Little Horseshoe, refer to the lake as Elsie Lake and the nearby road as Elsie Lake Road. Haliburton County Land Registry Office.
12. Nila Reynolds, In Quest of Yesterday. Lindsay: John Deyell Company, 1968, pp. 280-281.
13. Nila Reynolds, In Quest of Yesterday. Lindsay: John Deyell Company, 1968, pp. 279-280.

14. "President's Comments," HLPOA Newsletter, June 1987, p. 1.
15. The actual year the HLPOA was formed is unknown at this time, although HLPOA President Jim Ross has records dating back to the late 1950's.
16. HLPOA Newsletters, May and August 1989; and Vern Gilbert, written memories, February 14, 2014.
16. HLPOA Newsletters, Spring and Autumn 2004.

ACKNOWLEDGEMENTS

Thank you to the following people who assisted in developing the Lake Plan and bringing it to completion.

Survey and Survey Results: Don Heaven and Mike Hunter

Habitats and Wildlife: Paul Heaven of Glenside Ecological Services Limited

Fisheries Stewardship: Jeff Muirhead

Water Quality: Jeff Muirhead

Lake Levels: Bill Cornfield

History of Horseshoe Lake: HLPOA Research Committee:

Marilyn Armstrong-Reynolds

Carol Hewitt

Vivien Mann

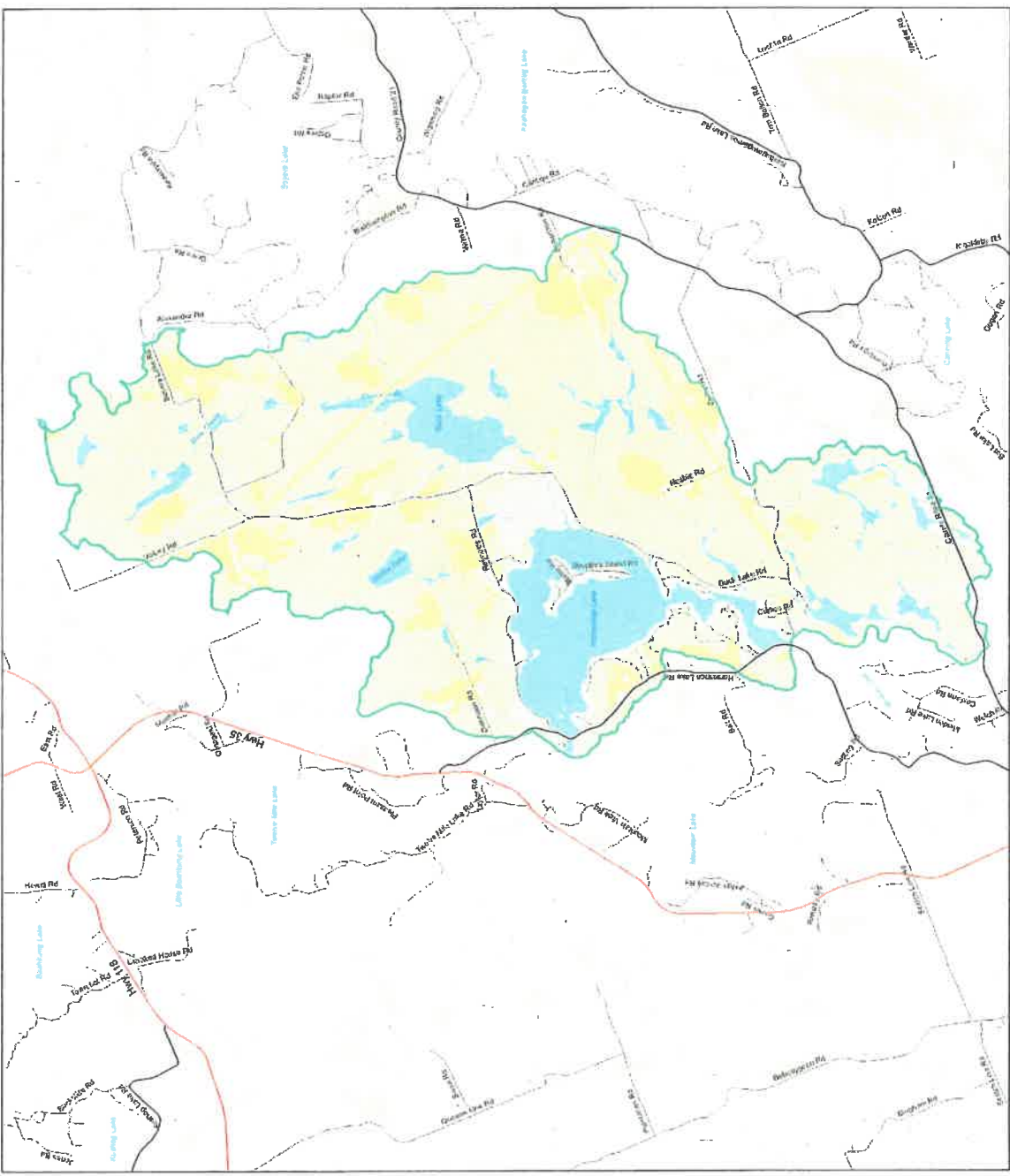
Loons on Horseshoe Lake: Carol Hewitt

Safe Boating: Randy Ward

Editor: Vivien Mann

SECOND DRAFT

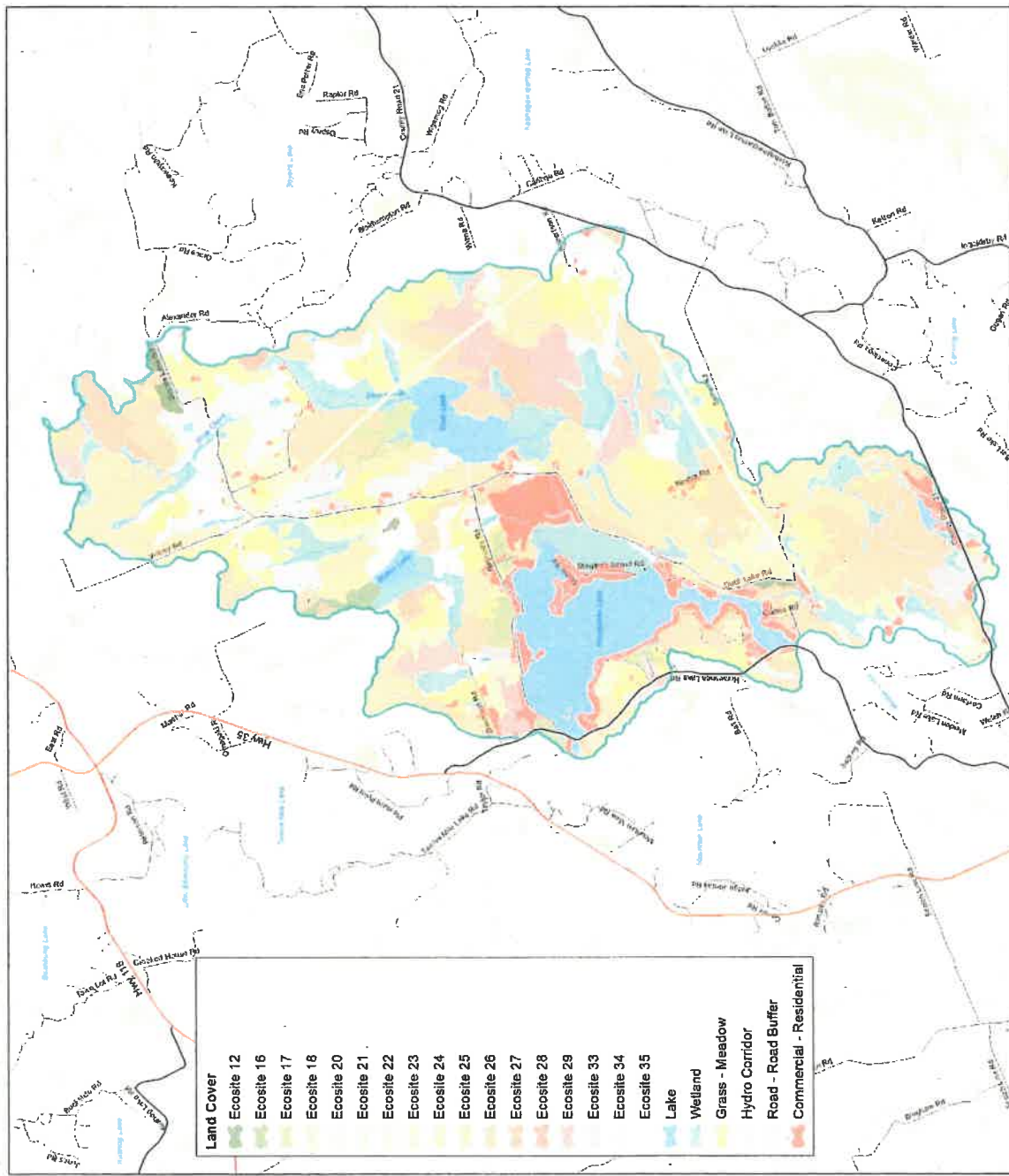
Figure 1: Horseshoe Lake Catchment Basin and General Land Cover



<p>Title</p> <p>Horseshoe Lake Catchment Basin Land Cover</p>	
<p>Legend</p> <p>Roads</p> <ul style="list-style-type: none"> Provincial Highway County Road Township Road Private Road Forest Access Road <p>Horseshoe Lake Catchment Basin</p> <ul style="list-style-type: none"> Rivers Lakes Wetlands <p>Landcover</p> <ul style="list-style-type: none"> Tree or Shrub Cover Open Aquatic Open Terrestrial Developed 	
<p>0 420 850 1,720 2,580 3,440 Meters</p>	
<p>Property Description</p> <p>Horseshoe Lake Township of Minden Hills County of Haliburton</p>	
<p>Client</p> <p>Horseshoe Lake Property Owners Association</p>	
<p>Date: August 2012 Project: 10022</p>	
<p>Data Information:</p> <p>Data Sources:</p> <ul style="list-style-type: none"> Conservation Authorities Data - Nature Conservancy Conservation Authorities Data - Ontario Ministry of Natural Resources Base Data - Ontario Ministry of Natural Resources FRM and Wildlife Data - Ontario Ministry of Natural Resources Enhanced Wetland Mapping - Ontario Ministry of Natural Resources and Parks Unlimited Canada <p>Projection: UTM Zone 17N (North American Datum 1983)</p>	
<p>Produced by:</p> <p>Glenside Ecological Services Limited 2400 Horseshoe Lake Rd, RR#1 Minden, ON K0M 2K0</p>	

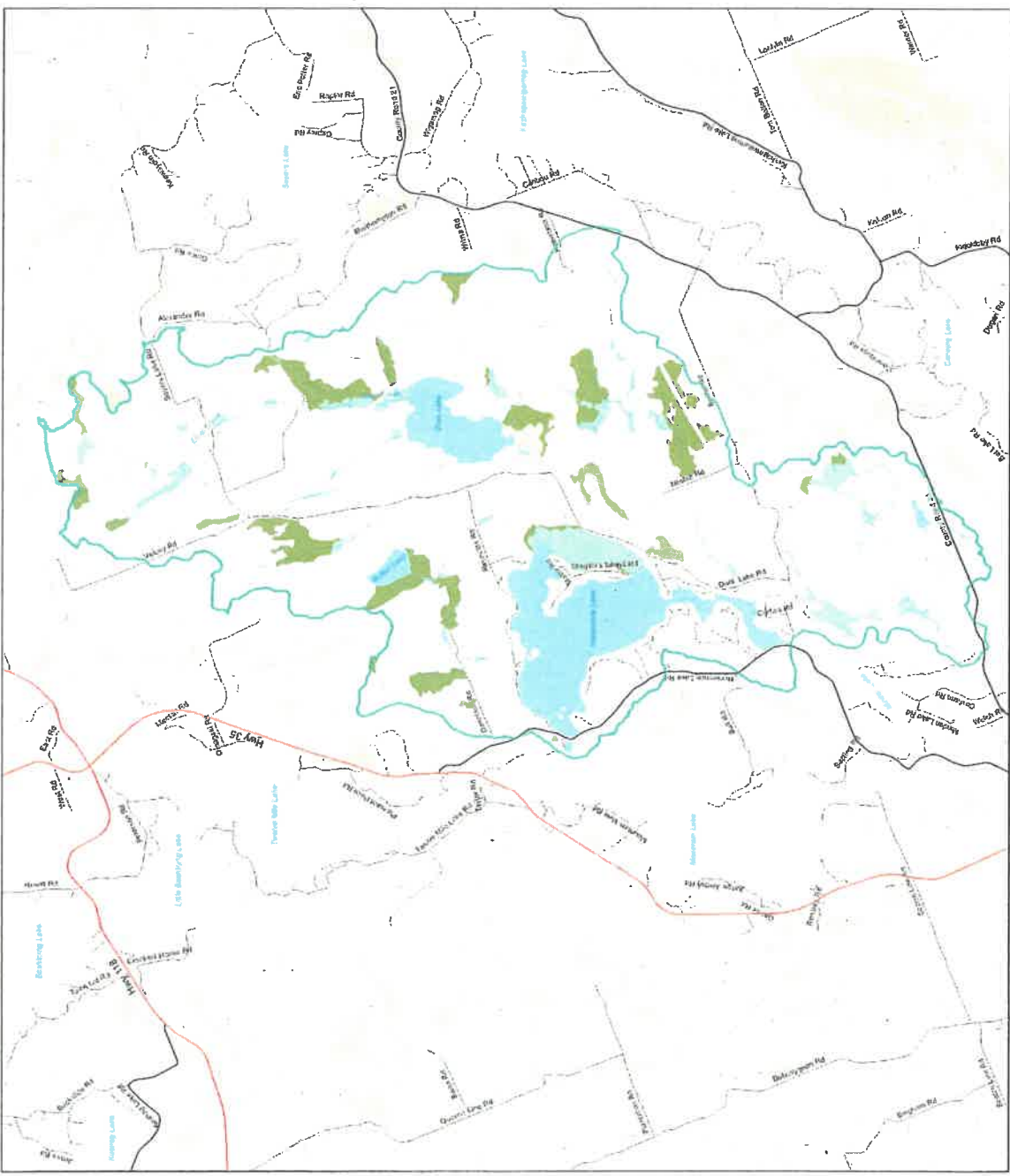
Appendix - 2

<p>Title</p> <p>Horseshoe Lake Catchment Basin Land Cover Detail</p>	<p>Legend</p> <ul style="list-style-type: none"> Horseshoe Lake Catchment Basin Lakes Wetlands Rivers <p>Roads</p> <ul style="list-style-type: none"> Provincial Highway County Road Township Road Private Road Forest Access Road <p>0 430 860 1,720 2,580 3,440 Meters</p>	<p>Property Description</p> <p>Horseshoe Lake Township of Minden Hills County of Haliburton</p>	<p>Client</p> <p>Horseshoe Lake Property Owners Association</p> <p>Date: August 2010</p> <p>Project: 1002</p>	<p>Data Information:</p> <p>Data Sources: Conservation Blueprint Data - Nature Conservancy of Canada and the National Heritage Information Centre Wetland Data - Ontario Ministry of Natural Resources Enhanced Wetland Mapping - Ontario Ministry of Natural Resources and Ducks Unlimited Canada</p> <p>Projection: UTM Zone 17N (North American Datum 1983)</p> <p>Produced by:</p> <p>GREENING ECOLOGICAL SERVICES LIMITED 2490 Horseshoe Lake Rd Minden, ON R0M 2K0</p>
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








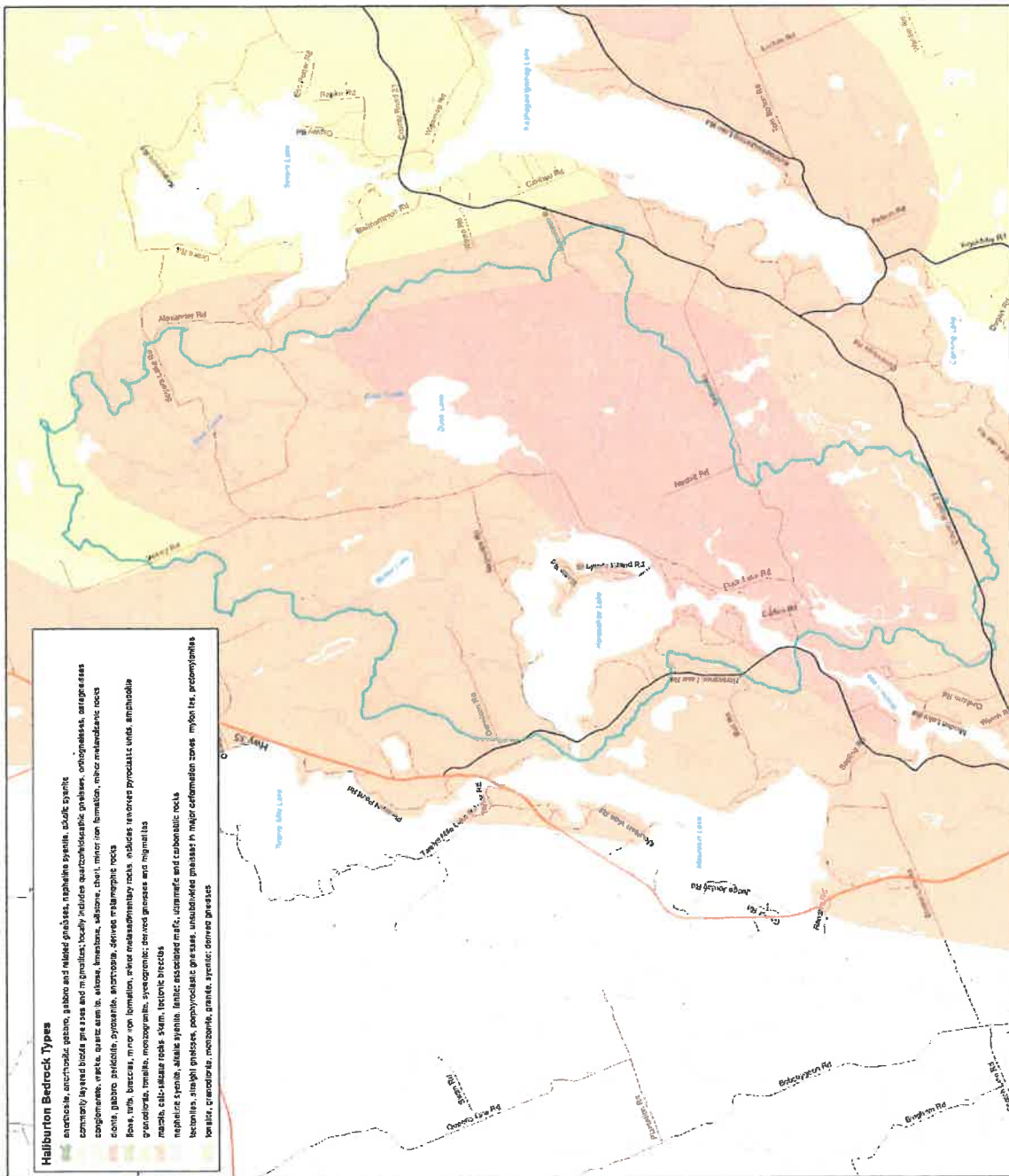
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Figure 3: Horseshoe Lake Catchment Basin Wetlands



<p>Title</p> <p>Horseshoe Lake Catchment Basin Wetlands</p>	
<p>Legend</p> <ul style="list-style-type: none"> Horseshoe Lake Catchment Basin Lakes Wetlands Rivers <p>Roads</p> <ul style="list-style-type: none"> Provincial Highway County Road Township Road Private Road Forest Access Road <p>Horseshoe Lake Catchment Basin Wetlands & Lakes</p> <ul style="list-style-type: none"> Lake Marsh Alder Thicket Swamp 	
<p>0 430 860 1,720 2,580 3,440 Metres</p>	
<p>Property Description</p> <p>Horseshoe Lake Township of Minden Hills County of Haliburton</p>	
<p>Client</p> <p>Horseshoe Lake Property Owners Association</p>	
<p>Date: August 2010 Pages: 10/27</p> <p>Data Information:</p> <p>Data Sources: Conservation Blueprint Data - Nature Conservancy of Canada and the Natural Heritage Information Centre Base Data - Ontario Ministry of Natural Resources Wetland Data - Ontario Ministry of Natural Resources Enhanced Wetland Mapping - Ontario Ministry of Natural Resources and Ducks Unlimited Canada Projection: UTM Zone 17N (North American Datum 1983)</p>	
<p>Produced by:</p> <p>Glenside Ecological Services Limited 2460 Horseshoe Lake Rd, RR#1 Minden, ON N0M 2K0</p>	

<p>Title</p> <p>Horseshoe Lake Catchment Basin and Bedrock</p>	<p>Legend</p> <ul style="list-style-type: none">  Horseshoe Lake Catchment Basin  Lakes  Rivers Roads <ul style="list-style-type: none">  Provincial Highway  County Road  Township Road  Private Road  Forest Access Road <p></p> <p></p>	<p>Property Description</p> <p>Horseshoe Lake Township of Minden Hills County of Haliburton</p>	<p>Client</p> <p>Horseshoe Lake Property Owners Association</p>	<p>Date: August 2000</p> <p>Project: 10022</p> <p>Data Information:</p> <p>Date Sources: Conservation Blueprint Data - Nature Conservancy Ontario and the Natural Heritage Inventory SRTM Data - National Hydrographic Institute FRI and Wildlife Data - Ontario Ministry of Natural Resources Enhanced Wetland Mapping - Ontario Ministry of Natural Resources and Ducks Unlimited Canada</p> <p>Projection: UTM Zone 17N (North American Datum 1983)</p>	<p>Produced by:</p>  <p>Glenside Ecological Services Limited 2490 Horseshoe Lake Rd., RR#1 Minden, ON K0M 2K0</p>
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SECOND DRAFT

Figure 2: Horseshoe Lake Catchment Basin and Bedrock

SECOND DRAFT

Figure 3: Horseshoe Lake Catchment Basin and Topography



<p>Title</p> <p>Horseshoe Lake Catchment Basin and Topography</p>	
<p>Legend</p> <p>Horseshoe Lake Catchment Basin</p> <p>Lakes</p> <p>Rivers</p> <p>Roads</p> <p>Provincial Highway</p> <p>County Road</p> <p>Township Road</p> <p>Private Road</p> <p>Forest Access Road</p>	
<p>0 450 900 1,800 2,700 3,600</p> <p>Meters</p>	
<p>Property Description</p> <p>Horseshoe Lake Township of Minden Hills County of Haliburton</p>	
<p>Client</p> <p>Horseshoe Lake Property Owners Association</p>	
<p>Date: August 2009</p> <p>Project: 10022</p>	
<p>Data Sources:</p> <p>Ontario Open Data - Nature Conservancy</p> <p>Ontario Open Data - Ontario Ministry of Natural Resources</p> <p>Base Data - Ontario Ministry of Natural Resources</p> <p>FRI and Wildlife Data - Ontario Ministry of Natural Resources</p> <p>Enhanced Wetland Mapping - Ontario Ministry of Natural Resources and Ontario Landmatters Canada</p> <p>Projection: UTM Zone 17N (North American Datum 1983)</p>	
<p>Produced by:</p> <p></p> <p>Glenside Ecological Services Limited 2480 Horseshoe Lake Rd, RR01 Minden, ON K0M 2G0</p>	

HORSESHOE LAKE PLAN SURVEY 2008

Background Information

05-Sep-2008

We will use the following information as an aid to grouping and sorting data.

- Please check the box next to each statement.

- Check only one box in each section except sections "H" & "I" (check all that apply)

- A** Our property is located:
- "E" - east side Horseshoe Lake
 - "I" - Shuyler's Island
 - "M" - Mirror Lake
 - "N" - north end Horseshoe Lake
 - "W" - west side Horseshoe Lake
 - "ELH" - east side Little Horseshoe
 - "WLH" - west side Little Horseshoe

- E** We plan to make our property a 4 season permanent residence in the future.
- | | |
|------------------------------|-----|
| Yes | 18% |
| No | 70% |
| It is my permanent residence | 13% |

- F** We dispose of black water (toilet sewage) by:
- | | |
|------------------------|-----|
| Septic tank & tile bed | 85% |
| Holding tank | 13% |
| Outhouse | 0% |
| Chemical toilet | 1% |
| Biodegradable toilet | 1% |
| Propane Toilet | 1% |
| Other | |

- B** Our property is waterfront property.
- | | |
|-----|-----|
| Yes | 96% |
| No | 4% |

- C** Our residency status is:
- | | |
|-----------|-----|
| Seasonal | 86% |
| Permanent | 14% |

- D** We access our property via:
- | | |
|----------------------|-----|
| Public road | 38% |
| Private road or lane | 60% |
| Water access by boat | 1% |

- G** We dispose of household grey water (effluent from sinks and tubs) by:
- | | |
|------------------------|-----|
| Septic tank & tile bed | 85% |
| Holding tank | 11% |
| Other | 5% |

- H** Our recreational activities include: (Check all that apply)

1	13%	ATV
2	83%	Boating
3	81%	Canoeing/kayaking
4	22%	Sailing
5	17%	Jet Skiing
6	52%	Fishing
7	5%	Hunting
8	50%	Golf
9	18%	Snowshoeing
10	21%	Cross country skiing
11	14%	Snowmobiling

- I** We own and/or use the following:

1	243	Canoeing/kayaking
2	122	Sailboats/Paddleboats
3	27	Other non motorized
4	86	Fishing boats < 15hp
5	65	Power boats 15 -90hp
6	54	Power boats >90hp
7	31	Jet Skis
8	6	Other motorized boats
	634	Total boats

169	Number of surveys tallied
100%	entered

275	Number of surveys Distributed (estimated)
169	Number of surveys Returned (to Sep 3rd 2008)
61%	Response Ratio

HORSESHOE LAKE PLAN SURVEY 2008

05-Sep-2008

Lake Quality Values

1. Please rate how the following qualities add to your personal enjoyment of Horseshoe Lake. (Check only one box for each value)

	How Important? (How Good?)				
	Very	Some-What	Important	Not very	No Opinion
a Water Quality	94%	3%	3%	0%	0%
b Natural Shorelines	54%	22%	18%	7%	0%
c Scenery & View	79%	8%	11%	1%	0%
d Peace & Quiet	69%	16%	14%	1%	0%
e Swimming	80%	10%	9%	1%	0%
f Fishing	21%	29%	23%	25%	2%
g Power Boating	23%	18%	24%	31%	3%
h Canoe/kayak/sailing	53%	20%	17%	8%	2%
i Hunting	5%	1%	8%	70%	16%
j Wildlife Viewing	51%	20%	21%	8%	0%
k Dark Night Skies	57%	20%	12%	6%	2%
l Golf	16%	17%	15%	46%	5%
m Other (describe)					

Water Quality

3a. In your opinion, is the lake water quality:

Excellent	22%	Good	76%	Poor	1%	No Opinion	1%
							100%

3b. What are your particular concerns regarding water quality?

100%	Bacteria	53%	Algae	54%	Smell	25%	Clarity	41%	Invading Species	66%	No Concerns	5%
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Water Levels

4. Bearing in mind that the water levels on Horseshoe lake are controlled by the Federal Government, often for the benefits of the Trent-Severn Waterway and their response to our concerns is often limited, What issues do you have with the current practices:

100%	a.	8%	None
97%	b.	45%	Shore erosion when water levels are high
99%	c.	64%	Navigation problems when water levels are low
	d.	50%	Poor swimming conditions when water levels are low
	e.	57%	Docks not usable when water levels are low
	f.		Other (describe)

2. During the past 5 years, what negative impact have the following had on your enjoyment of your Horseshoe lake property? (check only one box for each impact)

	How Significant? (How Bad?)		
	Significant	Moderate	Light
a Water Pollution	11%	18%	32%
b Boat Traffic	31%	35%	16%
c Water Levels	71%	14%	13%
d Jet Skis	43%	30%	14%
e Boat Wakes	34%	29%	22%
f Noise	25%	31%	29%
g Outdoor Lighting	13%	21%	29%
h Tree/Plant Removal	12%	17%	19%
i Automobile Traffic	8%	15%	32%
j Snowmobiles	6%	10%	17%
k ATV's	18%	22%	24%
l Added Bldgs/docks	3%	14%	22%
m Other (describe)			

Development

5. During the past 5 years, how do you feel that the shoreline appearance has changed with respect to the following?

	More Evident			No Change			Less Evident			No Opinion
	Evident	Change	Opinion	Evident	Change	Opinion	Evident	Change	Opinion	
a Lawns	38%	48%	3%	3%	11%	11%				
b Residential development	70%	21%	3%	3%	6%	6%				
c Commercial development	1%	71%	10%	10%	18%	18%				
d Shoreline Structures	28%	50%	11%	11%	11%	11%				
e Shoreline rehabilitation	10%	56%	21%	21%	12%	12%				
f Wetlands	8%	63%	16%	16%	12%	12%				
g Removal of trees	39%	43%	9%	9%	9%	9%				
h Other (describe)										

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Shoreline Structures

6. Shoreline structures

- a Limited to cover no more than 30% of lot width
 79% Yes 10% No 11% No Opinion 100%
- b Should there be a limit on how extensive dock structures are if Yes, total boat spaces per lot
 60% Yes 21% No 19% No Opinion 100%

7. Shoreline residences

- a Is the 20 metres (66ft) setback from the high water mark for main structures (not boathouses) adequate?
 85% Yes 7% No 8% No Opinion 100%
- b Should an existing cottage that is close to the water be permitted to be rebuilt or expanded on the same footprint?
 Rebuilt only 76% Yes 20% No 4% No Opinion 100%
 Expanded 39% Yes 50% No 12% No Opinion 101%
- c Is the proposed minimum building lot width of 60 metres (200ft):
 54% OK 4% Too Small 33% Too Large 8% No Opinion 99%

8. Shoreline Buffer Zone

- a Other municipalities are considering a shoreline buffer strip of natural vegetation of 8 to 15 metres to be excluded from new development. Do you agree?
 53% Yes 36% No 11% No Opinion 100%
- b Should the Twp of Minden Hills regulate shoreline alterations? (ie such as restricting the removal of native trees or vegetation).
 40% Yes 50% No 10% No Opinion 100%

9. What are your views regarding the following stewardship actions to educate, monitor, and enforce good development practices?

	More Controls	No Change	Fewer Controls	No Opinion
a Lawns	38%	55%	1%	6%
b Septic Inspections	68%	31%	0%	1%
c Building Setbacks From the Lake	27%	64%	4%	5%
d Excessive Night Lighting	51%	40%	2%	7%
e Communication Towers	54%	32%	3%	10%
f Other (describe)				

10. The Natural Environment

	Strongly Favour	Somewhat Favour	Nice to Have	No Opinion
a Protect/Improve Natural Shoreline	54%	27%	12%	7%
b Discourage Fertilizer use near shore	83%	9%	5%	3%
c Develop/Enforce bylaws to ensure Quietness and Privacy	48%	28%	14%	10%
d Improve Water Quality	75%	20%	4%	1%
e Reinforce Safe Boating Laws	58%	22%	14%	5%
f Protect/Improve Fish/Wildlife Habitat	64%	23%	10%	3%
g Identify and Protect Wetlands	70%	19%	10%	1%
h Mandatory Septic System Inspection	67%	18%	8%	7%
i Other (describe)				

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11. Do you favour commercial development on Horseshoe Lake such as:

	Yes	No	No Opinion
a Marina facilities	19%	75%	5%
b Condominiums (full ownership or time share)	2%	96%	2%
c Retail Stores	12%	84%	4%
d Garbage and Recycling Pickup	31%	60%	8%
e Internet Services using Line of Sight Towers	35%	51%	14%
f Other (describe)			

	72	73	74
12. The Physical Environment: Do you Favour Setting Limits to Preserve the Natural State of Our Wetlands:			
a Number of buildings/structures on a Lot	74%	17%	9%
b Size of buildings	74%	18%	8%
c Types of Buildings (cabins, gazbos, sheds)	54%	36%	10%
d Condominiums (multiple dwelling townhouse)	93%	6%	1%
e Trailer parks	92%	7%	1%
f Backlot Development	73%	15%	12%
g Cell towers	69%	22%	8%
h Logging rights	85%	9%	6%
i Mining & Quarrying Rights	87%	6%	7%
j Docks & Ramps	61%	28%	10%
k Commercial stores, marinas, restaurants	86%	11%	2%
k Preserving Wetlands	92%	4%	5%
m Other (describe)			

13. Would you be prepared to support priority actions arising from this survey?

	Yes	No	Possibly
a With a financial contribution	35%	16%	49%
b By volunteering to assist in these actions	22%	32%	46%