

Over Threshold Classification

The District Municipality of Muskoka classifies lakes based on their sensitivity to phosphorus inputs as an indicator of lake health. Lakes in Muskoka are some of the cleanest and best recreational lakes in Canada. In order to preserve our good water quality, Muskoka has taken a very conservative approach to development around our lakes.

An acceptable threshold for phosphorus has been determined for each lake in Muskoka, as detailed in the report entitled *Recreational Water Quality Management in Muskoka – Technical Review of the Water Quality Model, 2005* prepared by Gartner Lee Limited. The threshold level of a lake is 50% above the predicted background or undeveloped value. This threshold is restrictive because Muskoka believes that action taken when small changes have been identified will protect our good water quality in the future. This threshold value, when compared to measurements of current water quality, serves as an indicator of lake enrichment and the sensitivity of the lake to phosphorus loading.

There are two criteria that must be examined to determine if a lake has exceeded its acceptable threshold for phosphorus. If a lake meets both of these criteria, then it is considered to be Over Threshold:

1. Total phosphorus concentration, as estimated by the Muskoka Water Quality Model, exceeds the “Background + 50%” threshold; and
2. Long-term measured total phosphorus concentration, as determined by Muskoka’s Lake System Health monitoring program, also exceeds the “Background + 50%” threshold value.

Where a lake is considered over threshold, restrictive planning policy will be implemented as detailed in the *Official Plan of the Muskoka District Area* and Muskoka District will work with the Area Municipality, Lake Ratepayer associations and other interested parties to prepare and implement a Remedial Action Program (RAP) for the lake. The District Municipality of Muskoka will provide technical support and data when a RAP is initiated.

A lake that is Over Threshold will be de-listed only after the 10-year long-term average of total phosphorus is less than the threshold established for the lake and there have been three consecutive phosphorus measurements below its threshold value. In the event that a 10-year review of the model is underway, lakes will not be listed as being Over Threshold nor delisted as no longer being Over Threshold until the model review is complete.

Lakes may approach or exceed their threshold value for phosphorus loading for a variety of reasons, both from human sources and from changes in the natural system. Human sources of phosphorus are attributed to such activities as:

- Nutrient loading from septic systems;
- Use of phosphorus-based cleaning supplies; and
- Loss of native shoreline vegetation, especially the diverse forest environment that has traditionally ringed many of our lakes. As lawns replace trees, fertilizer runoff, stormwater and soil erosion wash higher loads of phosphorus into our lakes.

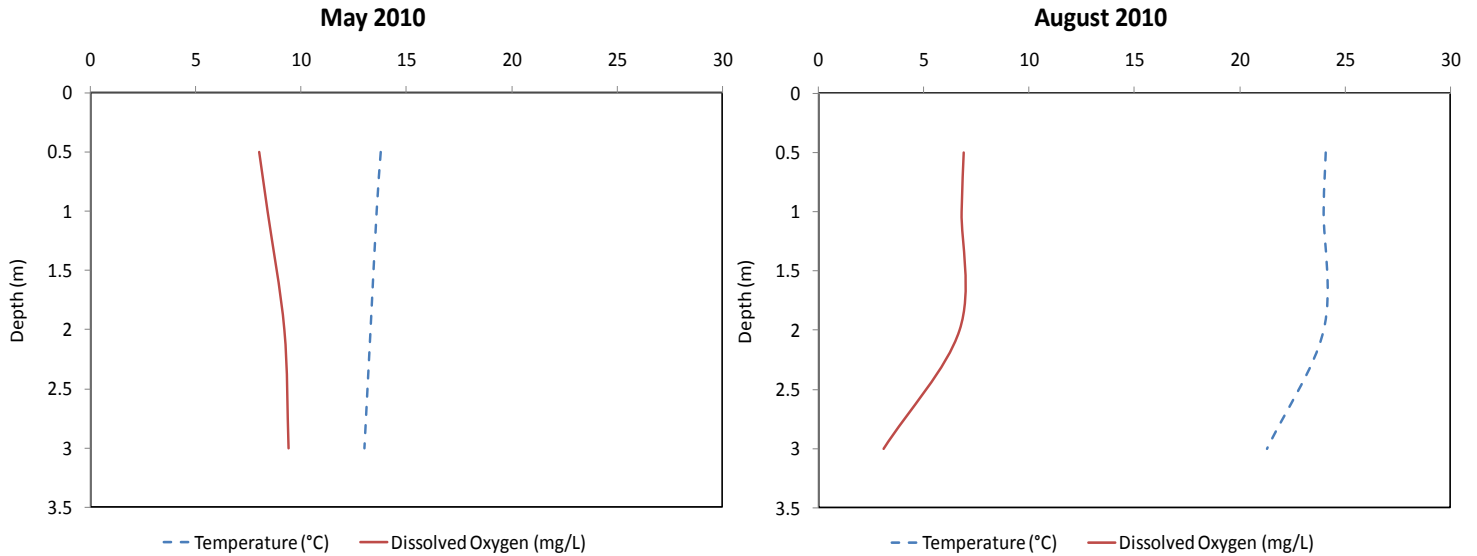
Appendix 3

Sensitivity Assessment and Threshold Calculation

Sheet	Lake	Surface Area, Ao (km^2) Response #Lots @1/1.62 ha		Lake Responsiveness					Phosphorus Mobility	Code	Existing Status	Old Capacity	Threshold Calculation							
													Natural	Developed	Spring	BG + 50%	Triggered Now	Watch These !	Measure These	
				Response									via Peat	via Peat	TP					
		[TP] Background	TP KG	[TP] Total	TP % Increase	Responsiveness Rank	Phosphorus Mobility	Code	Existing Dev. Background + %	via Peat [TP] (ug/L)	via Peat [TP] (ug/L)		TP (ug/L) n=	[TP] (ug/L)	n=1 or 2	n = 0				
LOB	South Muskoka River Bay	1.10	67.90	5.26	33.41	5.36	1.84	L	H	H3	33.34	751	5.26	7.01	5.05	2	7.89	No	No	No
Vernon	McCraney	4.10	253.09	4.74	124.52	6.65	40.31	M	H	H2	0.00	n/a	4.74	4.74	0.00	0	7.11	No	No	No
Vernon	Marion	0.83	51.23	5.49	25.21	6.72	22.44	L	H	H3	0.47	n/a	5.49	5.51	0.00	0	8.23	No	No	No
Vernon	Doughnut	0.13	8.02	3.29	3.95	5.47	66.37	M	H	H2	0.00	n/a	3.29	3.29	0.00	0	4.93	No	No	No
Vernon	Sly	0.10	6.17	4.87	3.04	6.54	34.32	L	H	H3	0.00	n/a	4.87	4.87	0.00	0	7.31	No	No	No
Vernon	Westfrog	0.06	3.70	4.71	1.82	5.87	24.62	L	H	H3	0.00	n/a	4.71	4.71	0.00	0	7.06	No	No	No
Vernon	Skunk	0.06	3.70	3.69	1.82	5.79	57.21	M	H	H2	0.00	n/a	3.69	3.69	0.00	0	5.53	No	No	No
Vernon	Dot	0.05	3.09	3.96	1.52	6.02	51.99	M	H	H2	0.00	n/a	3.96	3.96	0.00	0	5.94	No	No	No
Vernon	Flossie	0.25	15.43	6.11	7.59	7.36	20.59	L	H	H3	0.00	n/a	6.11	6.11	0.00	0	9.16	No	No	No
Vernon	Camp	2.00	123.46	5.67	60.74	8.63	52.30	M	L	L2	26.72	63	5.67	7.18	4.90	5	8.50	No	No	No
Vernon	South Tasso	0.20	12.35	2.32	6.07	4.58	97.71	H	H	H1	0.00	n/a	2.32	2.32	0.00	0	3.48	No	No	No
Vernon	Toad	0.35	21.60	3.42	10.63	5.61	63.79	M	H	H2	0.00	n/a	3.42	3.42	0.00	0	5.13	No	No	No
Vernon	Little Hardy	1.90	117.28	2.74	57.70	5.11	86.64	H	H	H1	0.00	n/a	2.74	2.74	0.00	0	4.10	No	No	No
Vernon	Slim	0.90	55.56	2.96	27.33	4.91	65.75	M	H	H2	0.00	n/a	2.96	2.96	0.00	0	4.45	No	No	No
Vernon	Tasso	1.83	112.96	4.32	55.58	5.79	34.13	L	H	H3	36.29	36	4.32	5.88	5.50	5	6.47	No	No	No
Vernon	Maggie	1.30	80.25	2.36	39.48	4.71	100.00	H	H	H1	0.00	n/a	2.36	2.36	0.00	0	3.54	No	No	No
Vernon	Nelson	0.35	21.60	3.70	10.63	5.81	56.92	M	H	H2	2.82	n/a	3.70	3.80	0.00	0	5.55	No	No	No
Vernon	Greenish	0.10	6.17	17.02	3.04	17.72	4.07	L	H	H3	0.00	n/a	17.02	17.02	0.00	0	25.54	No	No	No
Vernon	Heck	0.30	18.52	5.71	9.11	7.68	34.49	L	H	H3	0.00	n/a	5.71	5.71	0.00	0	8.56	No	No	No
Vernon	Upper Raft	0.30	18.52	9.78	9.11	11.33	15.76	L	H	H3	0.00	n/a	9.78	9.78	0.00	0	14.68	No	No	No
Vernon	Verner	0.20	12.35	3.00	6.07	5.24	74.62	M	H	H2	6.46	n/a	3.00	3.19	0.00	0	4.50	No	No	No
Vernon	Lower Raft	0.20	12.35	7.01	6.07	8.00	14.11	L	H	H3	0.15	n/a	7.01	7.02	0.00	0	10.52	No	No	No
Vernon	Loon	0.32	19.75	8.30	9.72	11.38	37.06	L	H	H3	2.01	n/a	8.30	8.47	10.00	10	12.45	No	No	No
Vernon	Bella	3.45	212.96	6.87	104.78	9.52	38.50	L	H	H3	20.66	0	6.87	8.29	6.60	7	10.31	No	No	No
Vernon	Solitaire	1.22	75.31	5.48	37.05	9.25	68.59	M	L	L2	16.55	n/a	5.48	6.39	5.00	5	8.23	No	No	No
Vernon	Little Clear	0.10	6.17	5.74	3.04	6.90	20.04	L	H	H3	8.70	n/a	5.74	6.24	0.00	0	8.62	No	No	No
Vernon	Seventeen Mile	0.10	6.17	4.66	3.04	5.55	19.16	L	H	H3	6.15	n/a	4.66	4.94	0.00	0	6.99	No	No	No
Vernon	Mansell	0.13	8.02	2.64	3.95	4.94	87.35	H	H	H1	0.00	n/a	2.64	2.64	0.00	0	3.96	No	No	No
Vernon	Rebecca	2.15	132.72	7.98	65.30	10.47	31.22	L	L	L3	25.24	69	7.98	9.99	4.84	5	11.97	No	No	No
Vernon	Benson	0.35	21.60	6.09	10.63	8.12	33.33	L	H	H3	0.00	n/a	6.09	6.09	0.00	0	9.13	No	No	No
Vernon	Foote	1.25	77.16	8.02	37.96	11.02	37.33	L	H	H3	25.86	0	8.02	10.10	8.80	1	12.03	No	No	No
Vernon	Surprise	0.25	15.43	3.09	7.59	5.22	69.17	M	H	H2	14.38	n/a	3.09	3.53	0.00	0	4.63	No	No	No
Vernon	Mirage	0.50	30.86	4.68	15.19	6.60	41.12	M	H	H2	0.00	n/a	4.68	4.68	0.00	0	7.01	No	No	No
Vernon	Oudaze	1.25	77.16	7.48	37.96	10.13	35.51	L	H	H3	18.70	41	7.48	8.87	10.02	5	11.21	No	No	No
Vernon	Emsdale	0.70	43.21	2.78	21.26	5.06	82.02	H	H	H1	58.85	n/a	2.78	4.41	0.00	0	4.17	No	No	No
Vernon	Spry	0.20	12.35	5.46	6.07	6.74	23.48	L	H	H3	6.53	n/a	5.46	5.81	0.00	0	8.18	No	No	No
Vernon	Bay	1.20	74.07	3.50	36.44	5.42	54.93	M	H	H2	106.71	n/a	3.50	7.23	0.00	0	5.25	No	No	No
Vernon	Langford	0.50	30.86	2.94	15.19	5.23	77.90	M	H	H2	0.00	n/a	2.94	2.94	0.00	0	4.41	No	No	No
Vernon	Perch	1.10	67.90	19.03	33.41	20.11	5.69	L	H	H3	6.87	32	19.03	20.33	15.80	5	28.54	No	No	No
Vernon	Bing	0.20	12.35	7.42	6.07	10.88	46.51	M	H	H2	20.14	6	7.42	8.92	7.76	5	11.14	No	No	No
Vernon	Jessop	0.30	18.52	9.60	9.11	11.56	20.38	L	H	H3	18.82	6	9.60	11.41	15.00	5	14.40	No	No	No
Vernon	Clark	0.27	16.67	18.08	8.20	20.36	12.56	L	L	L3	17.97	0	18.08	21.34	16.20	4	27.13	No	No	No
Vernon	Waseosa	1.65	101.85	7.65	50.11	10.77	40.80	M	H	H2	54.33	0	7.65	11.81	12.52	6	11.48	Yes	No	No
Vernon	Ripple	0.15	9.26	9.78	4.56	11.03	12.78	L	H	H3	34.14	n/a	9.78	13.12	0.00	0	14.67	No	No	No
Vernon	Palette	0.10	6.17	3.48	3.04	5.63	61.63	M	H	H2	0.00	n/a	3.48	3.48	0.00	0	5.22	No	No	No
Vernon	Little Arrowhead	0.22	13.58	4.71	6.68	6.79	44.05	M	H	H2	0.00	n/a	4.71	4.71	0.00	0	7.07	No	No	No
Vernon	Arrowhead	0.60	37.04	14.88	18.22	15.34	3.07	L	L	L3	30.59	n/a	14.88	19.44	13.10	2	22.33	No	No	No
Vernon	Compass	0.55	33.95	3.67	16.70	5.84	59.14	M	H	H2	0.00	n/a	3.67	3.67	0.00	0	5.51	No	No	No
Vernon	Round	2.00	123.46	9.84	60.74	10.76	9.36	L	H	H3	27.47	n/a	9.84	12.54	0.00	0	14.76	No	No	No
Vernon	Fawn	0.15	9.26	11.07	4.56	13.26	19.72	L	H	H3	13.66	n/a	11.07	12.59	0.00	0	16.61	No	No	No
Vernon	Axe	2.50	154.32	22.78	75.93	24.49	7.49	L	H	H3	0.00	n/a	22.78	22.78	0.00	0	34.17	No	No	No
Vernon	Buck	2.50	154.32	9.03	75.93	9.90	9.66	L	H	H3	20.53	404	9.03	10.88	11.50	1	13.55	No	No	No
Vernon	Bittern	0.56	34.57	6.47	17.01	8.58	32.60	L	H	H3	0.00	n/a	6.47	6.47	0.00	0	9.71	No	No	No

Jessop (Jingo) Lake

Municipality:	Huntsville	Watershed:	Lake Vernon
Surface Area:	0.3 km ²	Watershed Area (excluding lake):	2.0 km ²
Maximum Depth:	3 m	Lake Trout Lake?	No
Wetland Area:	30 %	Secchi Depth (10-year average):	2.0 m
Phosphorus (10-year average):	15.0 µg/L	Sensitivity:	Moderate



Jessop Lake Long Term Monitoring Data

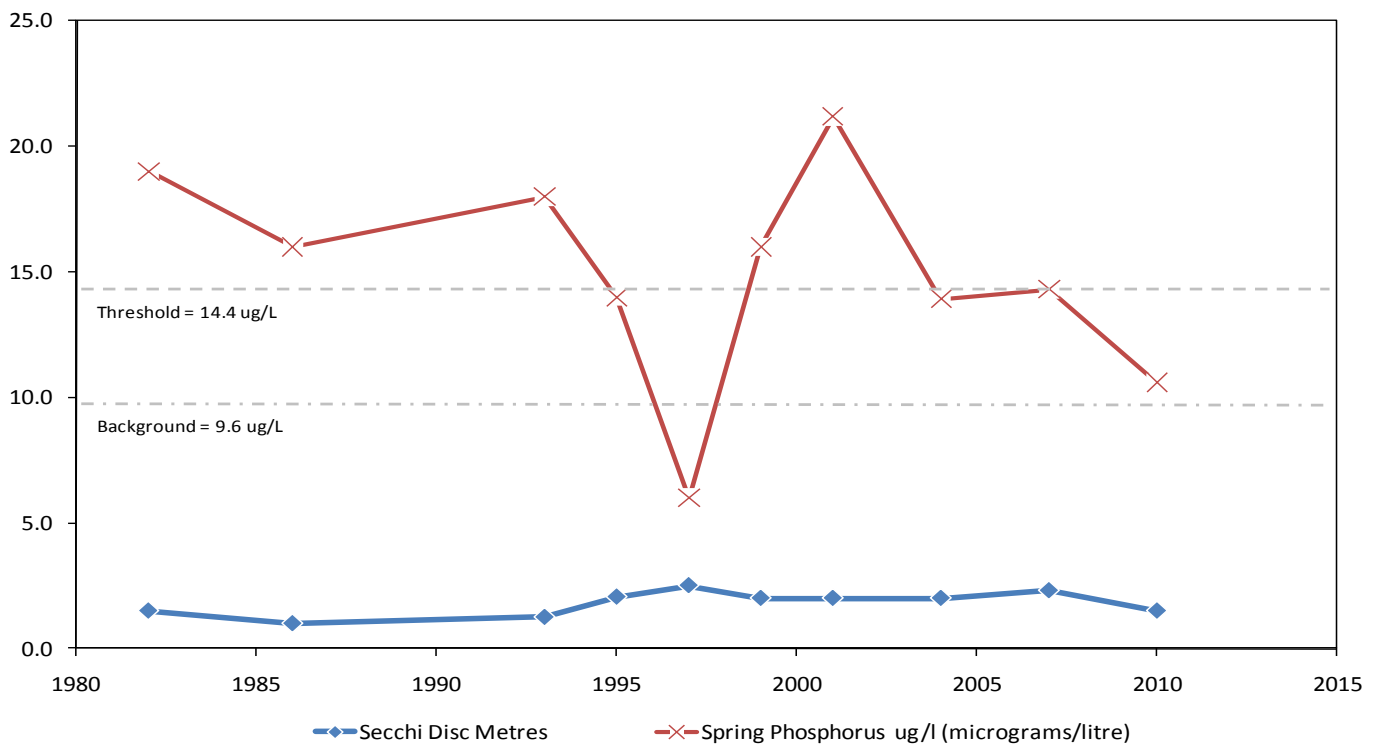


Table 1: 2007 Total Phosphorus Data

Lake Name	TP1 (µg/L)	TP2 (µg/L)	Ave TP (µg/L)	Lake Name	TP1 (µg/L)	TP2 (µg/L)	Ave TP (µg/L)
Ada	18.2	18.8	18.5	Leonard	7.0	7.8	7.4
Bass	7.6	7.4	7.5	Little Go-Home Bay	9.6	12.2	10.9
Ben	9.0	9.6	9.3	Longline	8.2	8.0	8.1
Bigwind	5.4	6.0	5.7	Mary	9.2	-	9.2
Bonnie	3.8	5.2	4.5	McRey	12.8	10.4	11.6
Brooks	12.0	15.6	13.8	Menominee	8.0	8.0	8.0
Bruce	13.4	11.6	12.5	Morrison	8.2	7.4	7.8
Butterfly	15.8	17.2	16.5	Myers	8.2	8.4	8.3
Camp	4.0	5.8	4.9	Nine Mile	8.4	9.2	8.8
Cardwell	8.2	9.6	8.9	Nutt	12.6	9.6	11.1
Clark	13.0	10.4	11.7	Otter	9.2	7.2	8.2
Cooper	11.2	11.4	11.3	Oudaze	9.4	9.4	9.4
Dark	8.2	8.0	8.1	Oxbow	6.0	4.4	5.2
Deer	5.4	5.0	5.2	Paint	8.0	8.6	8.3
Devine	10.6	10.6	10.6	Pell	11.4	11.4	11.4
Dickie	9.0	8.4	8.7	Pine	8.6	10.4	9.5
Doe	14.2	14.0	14.1	Prospect	8.6	7.6	8.1
Dotty	6.8	7.8	7.3	Ricketts	11.8	14.4	13.1
Echo	7.8	6.2	7.0	Rosseau - Brackenrig Bay	6.8	7.6	7.2
Fawn	13.8	18.0	15.9	Rosseau - Main	4.8	5.4	5.1
Flatrock	5.6	5.6	5.6	Rosseau - E. Portage Bay	6.4	5.6	6.0
Fox	13.8	13.2	13.5	Rosseau - Skeleton Bay	11.2	8.2	9.7
Gartersnake	12.4	13.2	12.8	Ryde	17.2	17.0	17.1
Gilleach	8.8	-	8.8	Silver (GR)	11.0	13.2	12.1
Golden City	12.8	12.4	12.6	Silver (ML)	7.2	8.8	8.0
Haggart	10.6	10.0	10.3	Silversands	10.8	10.0	10.4
Healey	10.0	9.0	9.5	Six Mile - Cedar Nook Bay	8.0	8.0	8.0
Henshaw	6.8	6.8	6.8	Six Mile - Main	11.4	7.8	9.6
Jessop	13.0	15.6	14.3	Six Mile - Prov. Park Bay	9.8	7.8	8.8
Jevins	12.2	11.8	12.0	Solitaire	6.8	5.8	6.3
Joseph - Cox Bay	5.6	5.4	5.5	Spence - North	11.0	11.0	11.0
Joseph - Joseph River	9.2	9.4	9.3	Spence - South	5.2	5.2	5.2
Joseph - Little Lake Joseph	5.6	7.6	6.6	Tasso	5.4	4.8	5.1
Joseph - Main	10.6	7.6	9.1	Toronto	7.2	7.6	7.4
LOB - Dwight Bay	6.2	6.6	6.4	Tucker	7.2	4.2	5.7
LOB - Haystack Bay	4.2	3.8	4.0	Turtle	6.2	8.0	7.1
LOB - Rat Bay	5.6	6.4	6.0	Waseosa	9.6	12.4	11.0
LOB - S. Muskoka River Bay	4.2	4.2	4.2	Webster	14.6	16.6	15.6
LOB - S. Portage Bay	4.6	5.0	4.8	Weismuller	25.0	21.2	23.1
LOB - Ten Mile Bay	3.8	3.6	3.7	Wood	6.4	8.2	7.3
LOB - Trading Bay	3.2	3.8	3.5				

Recreational Water Quality Management in Muskoka

Table 6.1 Classification of Recreational Water Quality in Lakes in Muskoka by Major Determinant Factors

Tea Coloured Lakes (DOC > 5 mg/L)	Small, Shallow Non-stratified	Multi-Basin Lakes	Anoxic (<1 ppm)	Anoxic (<1 ppm)	Anoxic (<1 ppm)	High Nutrient Lakes (>15 µg/L:)
<ul style="list-style-type: none"> ♦ Ada ♦ Barron's ♦ Bass, GR ♦ Bass, ML ♦ Bearpaw ♦ Brandy ♦ Camel ♦ Devine ♦ Doeskin ♦ Echo ♦ Fawn ♦ Fox ♦ Galla ♦ Gibson ♦ Gullwing ♦ Halfway ♦ Healey ♦ Henshaw ♦ Hesner's ♦ Long's ♦ McKay ♦ Morrison ♦ Nine Mile ♦ Nutt ♦ Oudaze ♦ Perch ♦ Ricketts ♦ Ryde ♦ South Bay ♦ Sparrow ♦ Spence ♦ Stewart ♦ Stoneleigh ♦ Three Mile, Main 	<ul style="list-style-type: none"> ♦ Ada ♦ Ben ♦ Black ♦ Brackenrig Bay ♦ Butterfly ♦ Doeskin ♦ Halfway ♦ Heeney ♦ Jessop ♦ Jevins ♦ Loon ♦ Myers ♦ Penhold ♦ Perch ♦ Rat Bay (LOB) ♦ Ricketts ♦ Siding ♦ Stoneleigh ♦ Three Mile (Main) ♦ Tooke ♦ Toronto ♦ Wildcat 	<ul style="list-style-type: none"> ♦ Lake Muskoka ♦ Lake Rosseau ♦ Lake Joseph ♦ Lake of Bays Urbanized ♦ Cox Bay , Lake Joseph ♦ Fairy Lake ♦ Gravenhurst Bay ♦ Indian River ♦ Muskoka River – Bracebridge to Lake Muskoka ♦ Peninsula Lake High Quality (< 6 ug/L) ♦ Lake of Bays ♦ Lake Muskoka ♦ Lake Joseph ♦ Lake Rosseau ♦ Grindstone ♦ High ♦ Leonard ♦ Little ♦ Longline ♦ Margaret ♦ Oxbow ♦ Skeleton ♦ Solitaire ♦ Spence ♦ Spring ♦ Tasso ♦ Tadenac ♦ Twelve Mile 	<ul style="list-style-type: none"> ♦ Ada ♦ Atkins ♦ Axle ♦ Bass GR ♦ Bass ML ♦ Bastedo ♦ Bearpaw ♦ Ben ♦ Bing ♦ Bonnie ♦ Brandy ♦ Buckshoof ♦ Butterfly ♦ Camel ♦ Chub ♦ Clark ♦ Cooper ♦ Crosson ♦ Crotch ♦ Devine ♦ Dickie ♦ Echo LoB ♦ Fawn ♦ Foote ♦ Fox ♦ Galla ♦ Gartersnake ♦ Gibson, N&S ♦ Gilleach ♦ Golden City ♦ Grandview ♦ Grindstone ♦ Gull ♦ Gullfeather 	<ul style="list-style-type: none"> ♦ Gullwing ♦ Haggart ♦ Halfway ♦ Healey ♦ Henshaw ♦ Hesner's ♦ Kahshe, Main ♦ Little Leech ♦ Leonard ♦ 10 Mile Bay LoB ♦ Long ♦ Longline ♦ Loon, LoB ♦ Mainhood ♦ Margaret ♦ McKay ♦ McRey ♦ Medora ♦ Menominee ♦ Moot ♦ Morrison ♦ Muskoka Bay ♦ North Bay ♦ North Muldrew ♦ Otter ♦ Oudaze ♦ Paint ♦ Pine, GR ♦ Prospect ♦ Ricketts ♦ Ril ♦ Riley ♦ Rose ♦ Rutter 	<ul style="list-style-type: none"> ♦ Ryde ♦ Shoe ♦ Silver, GR ♦ Silver Sands ♦ Spence, N ♦ Spring ♦ South bay ♦ South Muldrew ♦ Stewart ♦ Sunny ♦ Tackaberry ♦ Tadenac Lake ♦ Tasso ♦ Thinn ♦ Three Mile, GR ♦ Three Mile, Hammel's ♦ Walker ♦ Waseosa ♦ Wolfkin ♦ Wood ♦ 	<ul style="list-style-type: none"> ♦ Ada ♦ Barron's ♦ Bass, GR. ♦ Black ♦ Brandy ♦ Buck ♦ Butterfly ♦ Clark ♦ Doeskin ♦ Fawn ♦ Golden City ♦ Haggart ♦ North Bay ♦ Penhold ♦ Perch ♦ Ricketts ♦ Riley ♦ Rose ♦ Siding ♦ Three Mile, Hammel's Bay ♦ Three Mile, Main ♦ Wiesmuller

Many of the lakes in Muskoka are small and shallow enough (<10 m) that they do not stratify thermally and are subject to mixing by wind throughout the summer. Non-stratified lakes do not model well by either the Muskoka recreational water quality model or the Dillon-Rigler/Lakeshore Capacity Study model, as they were both calibrated for stratified lakes. The major difference in modelling small shallow lakes is related to estimates of phosphorus settling velocity and hence phosphorus retention. Constant resuspension by mixing in shallow lakes means that they must be modelled with lower retention values. The shallow lakes in the Muskoka model were calibrated individually. In-lake phosphorus retention was modified to achieve a best fit between measured and predicted estimates of total phosphorus concentration.

Table 5. Site and Year of TP Measurements that Were Identified as Potential Outliers.

Site	Year
Bearpaw	2006
Cornall (Duplicate)	2002
Butterfly	2007
Fairy-North	2008
Fairy-Rogers Cove	2006
Galla	2000
Gilleach	2001
Grindstone	2000
Halfway	2006
Healey	2001
Jessop	2001
Jevins	2001
Kahshe - Grant's Bay	2000
Longline	2002
Oudaze	2000
Riley	2000
Rosseau - Skeleton Bay	2007
Silver ML	2002
Vernon - Hunter's Bay	2000

7.4 Possible Sources of Outliers in DMM dataset

Most outliers (14 out of 18) and many potential outliers identified in the DMM dataset (see Appendix 1) are from sampling dates before 2003. This lends to the conclusion that the outlier samples were likely contaminated by the presence of large zooplankton that were not removed by sample filtration. The remaining outliers were observed in 2004, 2005 (2) and in 2007, and thus are probably due to other sources of contamination or analysis errors. Overall it appears that the quality of data has improved over the past ten years. The procedure of filtering the samples and the analysis of duplicates are likely the main reasons.

8. Summary

A review and statistical analysis of TP monitoring data of the District Municipality of Muskoka was carried out in order to identify invalid data points. Based on the review of available statistical methods for outlier identification, a procedure for the DMM dataset was developed and applied to the data collected from 2000 to 2008. The major conclusions of the data analysis are as follows:

1. Sample collection methods and analysis varied over the years, with increasing reliability of data from 2000 on (duplicate sampling started, sample precision increased) and 2003 on (filtering of zooplankton started).
2. The DMM dataset is characterized by low numbers of observations, with many sites that have been measured only three times during the past ten years. As statistical tests are least reliable with small data sets, a series of appropriate tests were carried out in order to solidify decisions regarding outlier identification.
3. Using the procedure described in this report, statistically significant outliers were identified for 18 out of 194 lakes or sites within lakes.
4. Based on the updated long-term means (calculated without the outliers), the status of Gull Lake, Long's Lake (Utterson), McKay and Waseosa Lakes was modified from "Over Threshold" to "Under Threshold". All other sites where outliers were removed remained in the same category.
5. A list of TP measurements that may potentially be outliers was provided. We recommend the yearly re-evaluation of these measurements as more data become available.
6. We recommend evaluating all future extreme values and split duplicates using the procedure described in this report.

Report Prepared By:



Dörte Köster, Ph.D.
Aquatic Scientist

Report Reviewed By:



Neil Hutchinson, Ph.D.
Lead Consultant, Aquatic Science

Report Prepared By:



Bev Clark
Senior Aquatic Scientist

INTRODUCTION

Muskoka has many lakes and provides a high quality recreation environment. It is comprised of interconnecting lakes, rivers, streams and wetlands inhabited by an attractive variety of plants and animals. There is a mosaic of rural and forested landscapes and a natural resource base that has traditionally contributed resource products to the people of Muskoka and Ontario. In this natural setting, second homes and resorts have developed along with attractive communities of varying size, character and function.

C.1 Growth, by way of development and redevelopment, in all major segments of the economy will be encouraged and accommodated in the context of the goal, objectives and principles of this Plan.

*Encourage
Growth*

C.2 Growth necessary to continue to rejuvenate and take forward the economy of Muskoka must have respect for the environmental constraints, physical influences and ultimately the character of Muskoka.

*Growth will Re-
spect the Natu-
ral Environment*

C.3 The growth permitted by the Plan will be monitored and reviewed on a regular basis to ensure that the carrying capacity of the natural environment is not significantly affected in the adverse and the development pattern as identified in the Plan is achieved in a fiscally and socially sound manner.

*Monitor devel-
opment*

Muskoka is 381,619 ha in area and ranges from Georgian Bay in the west to Algonquin Park in the east and from the Severn River in the south to north of Huntsville and Mactier. It is comprised of 31% Crown land (excluding lake beds) and 69% patent land. Muskoka is located two hours north of the large population in southern Ontario, which significantly influences the economic, social and cultural development of the District. Strategic policy must recognize the value of this market and channel investment in a positive and sound manner.

Policy must also recognize that the land base of Muskoka is owned and used by many people for many different purposes; yet the land resources entrusted to the people of Muskoka must serve individual purposes and function within a broader system. In the end, we must keep in mind the proverb that we have not inherited this land from our parents but borrowed it from our children.

How we plan the growth and development of Muskoka will determine what resources we leave our children.

In 1996 the permanent population of Muskoka was 50,305 and projected to increase to 75,040 by the year 2016¹. In addition, there were approximately

¹Marshall Macklin Monaghan The District Municipality of Muskoka 1996-2016 Population Projections, December 1997

Site Evaluation

- 8.11.8 A Site Evaluation Report will be required by the Town, prior to consideration of a development application related to a narrow waterbody. The Report will evaluate environmental issues and the safety, compatibility and the suitability of the development and identify any mitigating measures which should be implemented.

8.12 WATERFRONT SPECIAL POLICY AREAS

8.12.1 Waterfront Special Policy area – One (Peacock Bay Resort)

- 8.12.1.1 The subject lands to these policies consist of Part of Lot 30, Concession 7, Geographic Township of Stisted, Town of Huntsville, and are identified on Schedule D-1.
- 8.12.1.2 A tourist resort with Tourist Accommodation Units and a Marina may be permitted on the lands subject to Council approval of an appropriate implementing zoning by-law amendment. A “Tourist Accommodation Unit” shall mean an accommodation unit which is used for the vacationing and/or travelling public only. A “Marina” shall be restricted to those limited marine uses as defined in the implementing zoning by-law amendment.
- 8.12.1.3 The implementing zoning by-law amendment shall include a Holding Symbol pursuant to Section 36 of the Planning Act, R.S.O. 1990. Council may consider an application to remove the Holding Symbol upon the owner demonstrating that the environmental site conditions are suitable or have been made suitable for the intended uses and are in compliance with all Provincial statutes and regulations respecting the redevelopment of brownfield sites.

8.13 LAKE PLANS

Lake Plans

- 8.13.1 Lake Plans provide more detailed land use policy direction for specific lakes in the Town, and are intended to go beyond the more general policy framework of both the Town of Huntsville Official Plan and District Municipality of Muskoka Official Plan. Such plans are intended to identify, reflect and respond to the character and physical capabilities of particular lakes.

Individual Character

- 8.13.2 Each lake possesses its own character that is a result of its location, size, physical attributes, access and historic development. The mix of uses, extent of natural features and constraints, and individual historic lot standards all combine to generate the uniqueness of a given lake. Lake Plans may be developed for specific lakes in Huntsville that address different minimum lot standards for new lot creation, regulate redevelopment activities, support improved public access to the lake, or recognize special needs (e.g. for waterfront landings where there are extensive “water access only areas”).

Land Use
Policies

8.13.3 Lake Plans prepared for individual lakes often go beyond land use planning considerations. The land use planning components of a Lake Plan are intended to be implemented through policies in this Plan. Other features of a Lake Plan will be implemented through the efforts of individual ratepayer organizations.

Development
Limits

8.13.4 It is recognized that environmental, physical and social factors other than recreational water quality may also present limits to the amount of development that would be desirable for a particular lake. Therefore, the preparation of specific Lake Plans in consultation with waterfront communities is strongly encouraged to address these matters on an individual lake basis.

Contents of a
Lake Plan

8.13.5 The following matters should be addressed where appropriate through a specific Lake Plan:

- a) definition of the characteristics and character of the Lake;
- b) place in the watershed, drainage basin and related waterways;
- c) topography, landscape, shoreline features and hazards;
- d) areas of constraint to development such as steep slopes, narrow waterbodies and wetlands;
- e) allocation of water quality capacity;
- f) cultural heritage and historic development;
- g) identification of current land use on lake with distinct areas and neighbourhoods shown and type of vegetation cover around lake;
- h) sensitive boating issues/areas;
- i) public and private open space, recreation areas or trails;
- j) public access points;
- k) development potential and capacity;
- l) natural areas or landscape features to be preserved; and
- m) specific policies and standards for development.

Have regard to
the Lake Plans

8.13.6 Development will be encouraged to have regard for the values, principles and stewardship features of individual Lake Plans.

Specific
Policies

8.13.7 Those provisions of the lake plan that are related to municipal planning policy and that may vary from the general provisions of the Huntsville Official Plan are carried forward as specific policies applicable to the Lake.

Carrying Capacity

Lake Density

The District of Muskoka Official Plan requires that:

“C.3 The growth permitted by the Plan will be monitored and reviewed on a regular basis to ensure that the carrying capacity of the natural environment is not significantly affected in the adverse and the development pattern as identified in the Plan is achieved in a fiscally and socially sound manner.”

The Official Plan of the Town of Huntsville has historically approached limits to lake development in the form of minimum frontage requirements and minimum lot size to control the effect of development on the recreational water quality. These are important, but it needs to be remembered that these deal with lot size, not the overall density of the lake, and therefore only approximate the actual carrying capacity for a “typical” lake. Unfortunately, this approximation is inadequate in the face of highly irregular or long, narrow lakes which have a very small surface area in comparison to their available shoreline length.

The current Official plan recognizes this shortfall.

“8.13.4 It is recognized that environmental, physical and social factors other than recreational water quality may also present limits to the amount of development that would be desirable for a particular lake. Therefore, the preparation of specific Lake Plans in consultation with waterfront communities is strongly encouraged to address these matters on an individual lake basis.”

The size of the lake itself as a public area – in particular its surface area – is relevant for various recreational uses of the lake, just as the combination of the size of the lake and its depth (and hence the volume of the lake) is relevant for understanding the ability of the lake to absorb nutrients such as phosphorus from development on the shore.³ A model developed by Ministry of Natural Resources called the “Lake Alert System” sets limits on lake development by considering, among other things, the surface area of the lake (or more accurately the net *usable* surface area⁴ of the lake) in relation to the amount of development

³ It should be noted that Town officials and its consultants and District officials and its consultants have, from time to time, stated that it is advisable to move beyond using phosphorus runoff as a planning limit since it is possible that some time in the future reliable phosphorus containing septic systems will be developed.

⁴ “Usable” surface area would exclude the surface within 30 metres of the shore where, for example, boating could not take place. Hence two lakes with the same total surface area, but different shapes, could have very different usable surface areas. For example, two 100 hectare lakes – one a perfect circle and the other a long narrow lake – would differ in usable surface area since the long narrow lake would have a substantial portion of its surface area in

on the lake. The underlying principle is that during the summer residents are likely to use the lake for various purposes. Hence there is a need to consider the volume of use that the lake as a whole can sustain (e.g., for canoeing, sailing, water-skiing, swimming, etc.). Locally, this recreational carrying capacity model has been adopted in the Official Plans of Magnetawan, Perry Township, Highlands East (Haliburton), and Sequin. It is referenced (without specific densities) in the Official Plans of Gravenhurst and Kearney.

This model takes the total surface area of the lake and subtracts from it the surface area that is within 30 metres of the shore. For a small lake, 4 hectares per dwelling would be required, for a medium sized lake 2.4 hectares would be needed, and for a large lake, the proposal would set 1.6 hectares per dwelling as the minimum amount of usable surface area of the lake. Obviously these limits are somewhat arbitrary "rules of thumb." At the same time, it is easy to see that at some point any lake could become too crowded to sustain safe and pleasant recreation.

As shown in the next table, by this criterion, the four lakes covered by this lake plan are all over-developed. These figures do not take into account the actual amount of *usable* surface area for boating purposes. Lake Waseosa, for example, contains three islands each of which, because of the added shoreline, reduces the amount of usable surface area for boating.

These calculations also do not take into account the fact that one developed lot on Waseosa contains Camp Huronda. Camp Huronda counts as only one property but has hundreds of residents during the crucial summer months and is planning on increasing this number considerably over the next few years because of the number of diabetic children who want to attend the camp has increased over the years and the camp is the only permanent camp for diabetic children in Ontario. Furthermore, Camp Huronda provides an important opportunity for the personal development of these children by providing an environment where they can participate in the normal outdoor activities enjoyed by other children under the supervision of professionals trained to accommodate their needs. A key factor in the success of this camp is the pastoral setting of Lake Waseosa. As these children learn to sail and canoe on this relatively small lake, it is crucial to ensure that there is sufficient "space" on the lake for them.

close proximity to the shore and therefore unavailable for boating activities such as waterskiing.

Table: Surface area per residence (including approved building lots)
on Lake Waseosa and associated lakes

Lake	Total surface area in hectares	Number of Properties	Number of Residential Buildings	Current <i>total</i> Surface area per property (in hectares)	Conclusion
Waseosa	156.3	137 (Not including island properties. Includes Camp Huronda and Factor's lodgings as one property)	135 (including Bear Island cottage and Factor's lodging but not including sleeping cabins in Camp Huronda.)	1.14	Over-developed
Palette	15.3	53*	45	0.29	Over-developed
Ripple	18.1	32		0.56	Over-developed
Jessop	28.9	25	17	1.15	Over-developed
Clark**	26.7	25	Unknown	1.07	Over-developed

* Includes two cluster developments of 12 lots that share a common access point

** Included solely because it is in the immediate watershed of Lake Waseosa

It should be noted that we have been extremely conservative and have used *total* surface area of each lake, not the *total usable* surface area (i.e., only the surface area beyond 30 metres from the lake. Had we calculated the *usable* surface area, the amount of usable surface area per dwelling would be even lower than it is and even further from what is seen as the appropriate limit for development.

The conclusion that one should draw from this table is a simple one: The creating of additional dwellings on any of the lakes for which we have data would put each of these lakes even further from the minimum standard that has been proposed. These lakes already have too much development on them in terms of the use of the surface of the lake.

Boat Density Study

The District of Muskoka Official Plan makes reference to the issue of boat density:

“D.21 Increased boating density on many lakes is a significant issue. Discussions with senior levels of government should be undertaken to address issues of congestion, speed and use.

F.4 To maintain and enhance the quality of Muskoka's other resources by, among other matters:

...

b) maintaining and improving public access to and opportunities for public enjoyment and use of the lakes and rivers of Muskoka in a manner which is compatible with established uses and the recreational carrying capacity of these waterways.”

A common method of determining the recreational carrying capacity is by measuring the boat density – ie: the surface area of water per boat. While some authorities use an area per boat regardless of use, this study utilized a sliding scale approach that allocates less surface area for certain activities and more for others. For example, a powerboat towing a water-skier requires more space than a powerboat alone. This approach is particularly suitable for small to medium sized lakes and narrow lakes where the available space for maneuvering when towing or tacking is limited.

Methodology

In 2006, the LWRA conducted a survey of lake residents on Ripple, Pallet, Jessop and Waseosa lakes with a response rate of 38%. Of the respondents, 47 property owners indicated that they own and operate at least one power craft and 18 residents indicated that they own and operate at least one sail craft. Using our respondents' boat ownership a representative sample those on the lake indicates a total of at least 124 power and 47 sail craft distributed among current owners of developed lake front lots on the four lakes. Of the power craft, 66% of respondents indicated that they use their boats for water-skiing.

There are two assumptions made for the purpose of this study: First, that an owner will only be operating one boat of any class at any given time. It seems unlikely that a household with two power craft will have two being operated simultaneously. Second, it is assumed that no more than 10% of available craft in any given class will be operating on the lake even during peak periods. These assumptions represent typical use according to studies previously conducted for the MNR.

Canoes, kayaks, peddle boats and row boats have been ignored as they generally operate within the 30 meter shore zone from which power boats are excluded. Obviously, this is a conservative assumption, since they are often seen in the middle of the lake. Similarly, there has been no allowance made for craft not owned by lake residents being operated on the lakes. As there are no public launch facilities available for craft larger than a canoe or kayak it is very unusual for outside boats to be operated on these waters.

In order to account for future load from previously approved building lots, a direct ratio of approved, undeveloped lots to existing lots was applied to the total for each lake. This calculation has been updated in 2011 to reflect additional lot severances approved in the intervening years. Lake Waseosa presents a special case as home to Camp Huronda, a camp for diabetic children. The camp's 7 sail craft were added to the projected load.

The surface area and perimeter of each lake was extracted from Ministry of Natural Resource records and the Land Information Ontario mapping system. Since powerboats are restricted to a minimum distance of 30 meters from shore and since sail boat keels are similarly restricted by depth, the average usable area was calculated using the formula $[(2 \times (\text{Area}/\text{Perimeter}) - 30)^2] / [4 \times (\text{Area}/\text{Perimeter}) - 60] \times \text{Perimeter}$. Lake Waseosa is also home to 3 islands. The largest, 'Treasure Island', comprises a land area of 9.26ha. The 30-meter exclusion zone was calculated and subtracted from the usable surface area. The two smaller islands were not subtracted from the area as they lie in part within 30 meters of either the mainland or 'Treasure Island'. Similarly, boating hazards (rocks and shoals) have not been taken into account in the calculations. Those portions lying outside the 30-meter zone would have the effect of reducing net available space still further (See map – Appendix A3). The resulting area is shown as "Usable Area (EST.)" in the tables below.

Results

Determining the required space is not an exact science. While there are several well-respected studies on the subject, their conclusions differ slightly as to the exact numbers. Four such studies are by Kusler (1972)⁵, Jaakson (1989)⁶, Wagner (1991)⁷ and Warbach (1994)⁸. An average of their findings was calculated as follows:

	Power boating	Water-skiing	Sailing
Kusler		16.18ha	
Jaakson	8.09ha	8.09ha	4.05ha
Wagner	10.12ha	10.12ha	10.12ha
Warbach	12.14ha	12.14ha	12.14ha
Average	10.12ha	11.63ha	8.77ha

⁵ Kusler, Jon A. 1972. Carrying Capacity Controls for Recreation Water Uses. Upper Great Lakes Regional Commission.

⁶ Jaakson, R., M.D. Buszynski and D. Botting. 1990. Carrying capacity and lake recreation planning. The Michigan Riparian, November 1989

⁷ Wagner, Kenneth J. 1991. Assessing Impacts of Motorized Watercraft on Lakes: Issues and Perceptions. Proceedings of a National Conference on Enhancing States' Lake Management Programs. Northeastern Illinois Planning Commission.

⁸ Warbach, J.D., M.A. Wyckoff, G.E. Fisher, P. Johnson and G. Gruenwald. 1994. Regulating keyhole development: Carrying capacity analysis and ordinances providing lake access regulations. Planning and Zoning Center, Inc.

The calculations indicated a total potential load of 25 power and 10 sail craft on Palette Lake; 16 power and 6 sail craft on Ripple Lake; 15 power and 5 sail craft on Jessop Lake and 84 power and 39 sail craft on Waseosa.

Lake Name	Area (ha)	# Vacant Lots	# Developed Lots	Total Perimeter (m)	Usable Area (EST.)	# of Power Craft	# of Sail Craft
Palette Lake	15.314	3	39	1738	12.7	25	10
Ripple Lake	18.124	4	23	2317	14.6	16	6
Waseosa Lake	156.245	15	124	14800	122.6	84	39
Jessop Lake	28.879	8	16	2510	25.1	15	5

Based on the survey results, power craft use was weighted between cruising and water-skiing to determine the totals. As stated, a peak loading of only 10% of these totals was multiplied by the average requirement determined above to determine a total requirement for each lake in the study.

Lake Name	Usable Area (EST.)	ha for Powerboat	ha for Water-skiing	ha for Sailing	Total Required	Surplus/ Shortfall
Palette Lake	12.7	12.428	19.261	8.432	40.1	-27.4
Ripple Lake	14.6	8.078	12.520	5.141	25.7	-11.1
Waseosa Lake	122.6	41.638	64.530	34.108	140.3	-17.7
Jessop Lake	25.1	5.965	11.561	4.730	22.3	2.8

Conclusions

Palette, Ripple and Waseosa are far above the carrying capacity for boating. In fact, Palette already has twice as many boats as can safely be accommodated. The situation on Waseosa may be equally dangerous, since the children from Camp Huronda are just learning to sail and cannot be expected to have developed any great degree of proficiency during their two-week session. Of all the lakes, only Jessop appears to have some room left but it should be recognized that even one additional craft on the lake at peak times would put it over the threshold.

These findings confirm the density calculations derived from the guidelines of the Ministry of Natural Resources: Three of these four lakes are over-developed and Jessop is at capacity.

- b) Lands which do not physically or functionally relate to the Waterfront designation, although within 150 metres (500 feet) of the waterbody will be deemed not to be within the Waterfront designation.

Lands, which form the bed of any waterbody defined above, will generally be considered as part of the Waterfront designation. The Waterfront designation will not extend within any limit of any other designation.

Permitted Uses

D.17 The Waterfront is a sensitive area and as such permitted uses are limited to:

- a) Single unit residential dwellings;
- b) Tourist Commercial and other commercial uses that relate to the waterfront area (ie. resorts, camps, restaurants and attractions);
- c) Industrial development that services the waterfront community (ie. contractors yards, boat repair and accessories);
- d) Open space uses; and
- e) Waterfront landings.

Accessible to Public

D.18 The Waterfront is a major recreation resource area that should be made accessible to both public and private users.

Lot sizes

D.19 The Area Municipalities will establish a variety of lot sizes and frontages reflective of environmental constraints. In particular, waterfront lots should be of sufficient size to accommodate the use proposed, related structural requirements and private individual services. In addition, waterfront lots should be sized and designed to recognize environmental, man-made or other influences including soil, terrain, water quality, fish habitat and waterbody constraints among others.

Maintain Shoreline Vegetation

D.20 The maintenance of the shoreline of lakes and rivers is key to preserving the quality of the natural and cultural heritage of Muskoka within the Waterfront designation. Tree cover, vegetation and other natural features are encouraged to be retained to uphold the visual and environmental integrity of the Waterfront. Where development is proposed, a natural, substantially undisturbed buffer is recommended at the water's edge to generally meet a target of 8 metres (26 feet) in width for three-quarters of the water frontage.

Boating

D.21 Increased boating density on many lakes is a significant issue. Discussions with senior levels of government should be undertaken to address issues of congestion, speed and use.

Floating Residences

D.22 Although municipalities do not presently have jurisdiction over surface water usage, this is an issue directly related to land use planning. Therefore, as a statement of policy, floating dwellings or similar structures, supported by a barge type hull capable of remaining in the water year round and are substantially unpowered and which are used for either residential or commercial purposes, will not be permitted on waterbodies within Muskoka.

INTRODUCTION

- F.1** This section outlines resource management policies and environmental constraints or influences to development within the District.
- F.2** In addition to general policies, certain specific policies have been provided in the following two categories:
- a) Environmental Limitations:**

Environmental limitations are defined as characteristics of the land, water or air that may render an area unsuitable for active use without careful consideration of the impact the development may have on the natural environment and in some cases adjacent properties. Environmental limitations include: water quality, acidic deposition, lands prone to flooding, optimum water levels, natural constraints, and biological constraints.
 - b) Significant Heritage Areas:**

Significant Heritage Areas are natural or man-made features that should be protected and maintained in their current state as they enhance the character and beauty of Muskoka. Significant Heritage Areas include: historical, geological, archaeological, and scenic features.

*Environmental Limitations**Significant Heritage Areas***OBJECTIVES**

- F.3** To maintain and enhance the quality of Muskoka's natural resources by, among other matters:
- a)** minimizing and reducing, where possible, the pollution of water, air and land.
 - b)** protecting significant fish and wildlife habitat.
 - c)** encouraging and participating in the identification, preservation, management and formal study of Muskoka's distinctive biophysical features and areas in cooperation with responsible public authorities and interested private individuals and organizations.
- F.4** To maintain and enhance the quality of Muskoka's other resources by, among other matters:
- a)** identifying lands subject to environmental hazards in an effort to protect life and property by permitting development only in suitable areas as contained in this Section of the Plan (specifically as detailed in those sections on lands prone to flooding and building hazard areas) and in some cases subject to more stringent controls.
 - b)** maintaining and improving public access to and opportunities for public enjoyment and use of the lakes and rivers of Muskoka in a manner which is compatible with established uses and the recreational carrying capacity of these waterways.

*Natural Resources**Pollution**Habitat**Biophysical Features**Other Resources**Hazards**Public Access*

<i>Scenic Views</i>	c)	preserving and encouraging public use of scenic views and of scenic land and water routes in the District from or on public lands.
<i>Upgrade Facilities</i>	d)	encouraging the establishment and upgrading of a variety of appropriate recreation, open space and cultural facilities throughout the District.
<i>Heritage Resources</i>	e)	encouraging the protection, maintenance, conservation and interpretation of heritage resources including archaeological sites; buildings and structures of historic and architectural value; and those waterfront, rural and community landscapes which reflect special traditional aspects of Muskoka as contained in this Section of the Plan (specifically as detailed in those sections on wetlands, narrow waterbodies, biological constraints and significant heritage areas).
<u>GENERAL POLICY</u>		
<i>Mitigate Pollution</i>	F.5	The District will continue to investigate, maintain and develop programs or initiatives designed to protect and improve the environmental resources of Muskoka. Not limiting the generality of the foregoing, the District shall initiate, maintain or support programs or other initiatives necessary to mitigate point and nonpoint sources of pollution.
<i>Management of Resources</i>	F.6	The wise and proper management of renewable and non-renewable resources shall be encouraged within any development or redevelopment proposal.
<i>Protect Natural Areas</i>	F.7	Special provisions may be established in documents implementing this Plan to prevent and restrict the construction of buildings, structures or other facilities permitted on adjacent lands from causing a destruction of habitat, or other significant heritage areas, as a result of erosion, surface water runoff, structural development or fill, or the migration of chemical or other elements.
<i>Discourage Use of Chemicals</i>	F.8	The use of chemicals or compounds for the treatment or maintenance of the land or ground cover shall be discouraged particularly where cost effective alternatives are available.
<i>Maintain Vegetation</i>	F.9	The general maintenance of ground or vegetative cover and the natural landscape of Muskoka shall be encouraged where possible in an effort to maintain the natural appearance and aesthetics of the District and provide a natural buffer particularly in the Rural and Waterfront designations. Without limiting the generality of the foregoing, in the Waterfront designation where shorelines have been artificially altered by man in a manner that is not environmentally sound, encouragement shall be given to undertakings that would restore and preserve natural habitat.

phosphorus load, the lake or river is considered as being "Over Threshold" for phosphorus loading. "Over Threshold" lakes require a higher level of development control as a precautionary action to protect the long-term health of the lake.

General Development Policies

- F.18** The District of Muskoka will maintain a recreational water quality model and monitoring program and will review it on an ongoing basis. This model has been designed to address recreational water quality only and does not include factors to address fisheries values.
- F.19** Lake and river classifications are identified in Schedule F. Any lake or river not listed is assumed to be of moderate sensitivity unless otherwise identified by Muskoka.
- F.20** Through the review of the Muskoka recreational water quality program, it has been determined that the overall health of lakes and rivers in Muskoka is very good to excellent and that the cautious approach to development taken in Muskoka has been beneficial. This cautious approach will be continued. In this regard, new lot creation, development or redevelopment will only be permitted where it is determined that phosphorus impacts on water quality can be effectively eliminated.
- F.21** The role of natural vegetated shorelines in buffering waterbodies from erosion, siltation and nutrient migration adjacent to the sensitive littoral zone is critical to the protection of water quality. Preservation and restoration, where appropriate, of shoreline buffers is therefore required. At a minimum, a target of 75% of the linear shoreline frontage of a lot will be maintained in a natural state to a target depth of 15 metres from the shoreline where new lots are being created and where vacant lots are being developed. Where lots are already developed and further development or redevelopment is proposed, or where the lot is located within an urban centre or community, these targets should be achieved to the extent feasible. Where these targets cannot be met, a net improvement over the existing situation is required.
- F.22** A minimum 30 metre setback from any shoreline will be required for leaching beds. Where this is not feasible, on-site phosphorus management, as outlined in section F.26, will be required.
- F.23** A minimum 20 metre setback from any shoreline will be required for all development, excluding shoreline structures. Where this setback cannot be achieved, a lesser setback may be considered where on-site phosphorus management is implemented and in the following circumstances:
- a) Sufficient lot depth is not available;
 - b) Terrain or soil conditions exist which make other locations on the lot more suitable;
 - c) The proposal is for an addition to an existing building or replacement of a leaching bed where the setback is not further reduced;

Recreational Water Quality Management in Muskoka

ensure that the benefits from soil adsorption are maintained as development proceeds and minimize the potential mobility of phosphorus from septic systems and impervious surfaces. In addition, naturalization policies reduce the visual impact of development and provide social benefits.

Table 10.2 Phosphorus Management Techniques for Lakes in Muskoka

Recommended Management Actions	Lake Sensitivity Classification			
	<i>Low</i>	<i>Moderate</i>	<i>High</i>	<i>Over Threshold</i>
• Vegetated buffers	X	X	X	X
• Shoreline Naturalization	X	X	X	X
• Soil Protection	X	X	X	X
• On-site stormwater control	X	X	X	X
• Limit impervious surfaces		X	X	X
• Septic phosphorus abatement technologies		X	X	X
• Site specific soil chemistry, flowpath and soil volume investigation			X	X (moderate and high sensitivity)
• Limit development (lot sizing, lot creation)			X	X
• Planning Controls (development agreements)		X	X	X
• Securities				X
• Monitoring (lake water quality)	X	X	X	X
• Monitoring (site compliance)				X

10.6.4.4 Moderate Sensitivity to Development

Where a lake is classified as having a moderate sensitivity to development, the lake has some ability to receive phosphorus without a significant decrease in water quality. There are 458 lakes in Muskoka that are classified as “Moderate Sensitivity”. Of these, 332 are lakes for which no measurements of phosphorus exist and are classified as moderate because phosphorus mobility is assumed to be high.

It should be noted that of the thirty-seven (37) lakes that are over the threshold value, thirty four (34) lakes are moderately sensitive. This suggests that development policy should address methods to control phosphorus loading on moderately sensitive lakes as well as on those that are highly sensitive.

In order to ensure that water quality is maintained over time it is important that development in these situations incorporates vegetative buffers, increased building setbacks, on-site stormwater management and limits the number of impervious surfaces adjacent to the waterbody. Where appropriate, the use of phosphorus abatement septic system technology or imported soils should be encouraged as a condition of development. The use of development agreements such as subdivision agreements, site plan or a development permit approval should be required to ensure long-term compliance (Table 10.2).

5.3.4 Lot Requirements:

Row	Table 5.3.4						
i	Lot Standards		SR1	SR2	SR3	SR4	SR5
ii			Shoreline Residential One	Shoreline Residential Two	Shoreline Residential Three	Shoreline Residential Four	Shoreline Residential Five
iii	Lot Frontage		60 m (200 ft.)	60 m (200 ft.)	120 m (400 ft.)	(a)	(a)
iv	Lot Area		4,000 sq. m (1 ac.)	1 ha (2.5 ac)	1 ha (2.5 ac)	(a)	(a)
v	Lot Coverage (Maximum)		10%	5%	5%	5% (b)	5% (b)
vi	Yard Requirements	Front Yard	20 m (66 ft.)	20 m (66 ft.)	30 m (100 ft.)	20 m (66 ft.)	30 m (100 ft.)
vii		Interior Side Yard	6 m (19.7 ft.)	6 m (19.7 ft.)	6 m (19.7 ft.)	6 m (19.7 ft.)	6 m (19.7 ft.)
viii		Exterior Side Yard	7 m (23 ft.)	7 m (23 ft.)	7 m (23 ft.)	7 m (23 ft.)	7 m (23 ft.)
ix		Rear Yard	10 m (33 ft.)	10 m (33 ft.)	10 m (33 ft.)	10 m (33 ft.)	10 m (33 ft.)
x	Setback from streams (on site) – Cold water		30 m (100 ft.)	30 m (100 ft.)	30 m (100 ft.)	30 m (100 ft.)	30 m (100 ft.)
xi	Setback from streams (on site) – Warm water		20 m (66 ft.)	20 m (66 ft.)	20 m (66 ft.)	20 m (66 ft.)	20 m (66 ft.)
xii	Building Height (maximum)		9 m (30 ft.)	9 m (30 ft.)	9 m (30 ft.)	9 m (30 ft.)	9 m (30 ft.)
xiii	Maximum Number of enclosed or roofed accessory buildings or structures on a lot		3	3	3	3	3
xiv	NOTES: (a) As exists on the date of passing of this By-law, but not less than the requirements of Section 3.3. (b) The lot coverage shall be calculated on the portion of the lot that is located within 90 metres (300 ft.) of the shoreline.						

NOTICE of Public Meeting The LWRA will host a public meeting on Sept. 3, @ 3pm (rain date: Sept. 4) at 1346 S. Waseosa Lk. Rd. regarding the Lake Plan. All waterfront owners on Palette, Ripple, Jessop and Waseosa lakes can attend or submit written comments. The 2011 draft is at www.lwra.net/2011_draft_lake_plan. Copies will be available from noon prior to the meeting. secretary@lwra.net



Annual LWRA CORN ROAST!

Saturday, September 3rd 12pm to 4pm (that's the Saturday of Labour Day Weekend)
(Rain Date: Sunday, September 4th)

Where: The West Residence. **1346 South Waseosa Lake Road**. That's on the west shore in the southern half of Lake Waseosa (see map on reverse).

Featuring:

- Corn (Free) Hot dogs (\$1.00)
- Soft drinks or water (\$1.00)
- Hamburgers (\$2.00)
- Chicken or Veggie burgers (\$3.00)
- Sausage on a Bun (\$3.00)
- Dessert table (Pot luck -- donations of deserts requested)
- Raffle – tickets \$1.00 for 1 or \$5.00 for an arm's length (donations to the prize table are requested)

ALL* ARE INVITED TO ATTEND

**Fine Print: "All" Means Everybody. Members, non-Members, Family, Guests, Friends and Relatives. Backlot Residents, People from Palette, Ripple, Jessop or Waseosa. Even Clark. Old or Young, ANYBODY can come! But no pets, please.*

NOTICE of PUBLIC MEETING: The 2011 edition Draft Lake Plan for Jessop, Palette, Ripple and Waseosa will be available for review all afternoon and we will have a Public Meeting at 3pm to solicit input from ALL property owners on or near these lakes and approve final changes.

For more information, see www.lwra.net

borderline at best. Spring phosphorous results are often at or near the threshold. This may be due to the extremely low flushing rate that traps and holds sediments. The only outlet is a small stream into Waseosa, which is often dammed by beavers.

8.19.3.4.2 Jessop has a high proportion of wetlands, at 30%, restricting the developable area.

8.19.3.4.3 Available usable surface area of Jessop Lake is at current forecast needs. Total surface area per dwelling unit is 2.85ha less than the recommended minimum in Ontario.

8.19.3.4.4 Jessop is almost exclusively developed as seasonal use residences which tend to be single story and less than 1,500 square feet. Most shoreline structures are small docks.

8.19.3.5 This area was settled and developed primarily by those who could not afford stately homes on the more desirable large lakes of the area. Many properties are still held by the descendants of the original owners. As families grew, it was common to subdivide or build small additional dwellings for the extended family. Consequently, accessible properties are often deep but with narrow frontages along the water. In general, residences on all four lakes tend to be compact.

8.19.4 Policies

8.19.4.1 The four lakes covered by this section (Waseosa, Palette, Ripple and Jessop) are all over-developed, as measured by all objective methods. Therefore there shall be no further lot creation on these lakes. Future development is limited to existing vacant lots of record and redevelopment of existing properties.

8.19.4.2 In the case of redevelopment or development of an existing waterfront lot that was legally approved prior to adoption of this section, the nature, location, size and architectural style of any structures or land use, including shoreline activity areas, shall be consistent with the character of these lakes, as described in the current edition of the Lake Plan as filed by the Lake Waseosa Ratepayers' Association on behalf of the local residents with the Town of Huntsville at the time of adoption. To more fully realize these principles, the Lake Waseosa Ratepayers' Association shall be consulted prior to approval of any such development or redevelopment.

8.19.4.3 The continued institutional camp use by Camp Huronda should be encouraged and protected. Notwithstanding 5.5.2 (iv), and 8.19.4.4, subject to MOE approval and monitoring of the required septic system, this expansion should be allowed to continue including the construction of new buildings where required to accommodate the target of 136 campers plus associated support staff.