

# **Distribution and Abundance of Pitch Pine in Ontario**

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## Foreword

The objective of this report is to document the present day abundance and distribution of pitch pine in Leeds County. Population occurrence and size were derived from 1991 aerial photographs and should be field verified. Field verification should be completed for populations showing dramatic change in size from previous assessments and for newly documented populations. The information in this report forms a foundation that will aid in the formation of a conservation strategy.

## Acknowledgements

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# Introduction

The Southern Ontario Forest Genetics Group, Science & Technology Transfer Unit, of the Ontario Ministry of Natural Resources (MNR), Southern Region, contracted with Dendron Resource Surveys Inc. to provide a report on the distribution and abundance of pitch pine (*Pinus rigida* Mill.) in Leeds County. The main objective of the project was to validate previously identified pitch pine locations, from two previous surveys conducted in 1966 and 1982, on 1991 aerial photography. The project team included Dave Coleman of the Southern Ontario Forest Genetics Group, and Andy Welch (project leader), Elaine Read (photo interpreter), Harold Dirschl (project manager), and Jacques Leblanc (cartographic technician) of Dendron.

The project involved three components: aerial photography interpretation, mapping, and a written report. Interpretation was conducted on 1:10,000 aerial photos taken in the summer of 1991. Pitch pine locations from the previous surveys focussed the interpretation of the 1991 photos.

An initial survey was conducted in the spring of 1966 by the Conservation Authorities Branch of the MNR after a number of pitch pine sites were identified in the previous year's general survey of the Cataraqui Region Conservation Authority's watershed (Adlam 1973). The 1966 survey consisted of an aerial 'fly-by' where observers identified pitch pine from a low-flying aircraft and immediately marked its location on 1:30,000 topographic maps (Adlam 1973). Some aerial photography was taken of the Hill Island site but was not available for the current study. The 1966 survey information was subsequently transferred onto 1:50,000 National Topographic Series (NTS) maps using a 'highlighter' pen, but it is not known when and by whom. It is the latter maps which were made available for this project. No associated database or report for the 1966 survey was provided aside from a newspaper article (Adlam 1973). Although population sizes or distributions can be inferred by the size of the area 'highlighted' on the maps, such estimates would be too crude to be used in this study. The positional accuracy of the mapping is unknown.

The 1982 survey, conducted by Craig Witzke (1982) on contract to the MNR, involved field surveys of known pitch pine locations and potential sites. Each verified site was assigned a unique identification number and closely related sites were designated as sub-sites. Each site was indicated on the 1:50,000 NTS maps with uniformly sized circles or 'dots', representing small and large populations (presumably contained within or around the actual dot). Sub-sites were indicated with an 'x'. Site information (number of stems, name of nearest geographical feature, UTM co-ordinates, and methodology used to determine population size) was entered into a tabular database and referenced by their identification codes.

The final products delivered to the client included two 1:50,000 maps of pitch pine location from all three surveys and one 1:250,000 map of site location interpreted from the 1991 photography. Additional deliverables included this report, a digital database of site information for the 1982 and 1991 surveys, and digital files of the above maps.

# Methodology

The following steps were undertaken to complete the project:

- 1) Pitch pine areas identified on the 1966 and 1982 survey maps were located and interpreted on the 1991 photographs. The interpreter also checked areas in the vicinity of the previous surveys and was able to identify several new areas. Visible single, small clumps, and large groups of pitch pine, were delineated on the 1991 photographs with a polygon in red ink.
- 2) Where numerous 1991 locations (polygons) were found in the vicinity of one or more 1982 locations, the 1991 polygons were aggregated by drawing a dotted line around them. These aggregate polygons were selected to approximate the 1982 areas and were assigned the 1982 identification number to allow comparisons between the two time periods. Individual polygons within an aggregate were assigned a suffix to retain their individual identity. For example, three 1991 polygons within the vicinity of the 1982 'dot' No. 201 would be assigned the codes 20101, 20102, and 20103. Interpreted 1991 polygons which were not in close proximity to 1982 sites were assigned a new identification number.
- 3) For each of the 1991 aggregate polygons, the interpreter estimated the number of trees and assigned a population class. The seven population classes used, as requested by the client, were: 1, < 15, 15-34, 35-84, 85-200, 201-500, > 500. Similarly, one density class was assigned to each aggregate polygon. The codes A, B, or C were used for tightly spaced, scattered, and widely scattered trees, respectively. Population and density classes were marked on the photos in red ink.
- 4) Selected base map features (township and municipal boundaries; primary, secondary, and tertiary roads; lakes and streams; and the UTM grid) were digitized from the four 1:50,000 NTS sheets which covered the project area. The selected features and their format was confirmed with the client ahead of time. The pitch pine polygons from the interpreted (1991) photographs were transferred onto the base maps, using an optical transfer device.
- 5) Pitch pine areas from the 1966, 1982, and 1991 maps were digitized as either points or polygons, as appropriate, and stored as separate layers in the GIS. The aggregate polygon boundaries for the 1991 interpretation (i.e., dashed lines in Fig. 1) were also digitized onto a separate layer. Two draft 1:50,000 maps were plotted for the client's inspection: one showing points and polygons from the 1966, 1982, and 1991 surveys, and one showing aggregates of 1991 polygons with site numbers corresponding to the 1982 Witzke survey. These maps were subsequently modified as per the client's comments and produced in final form.

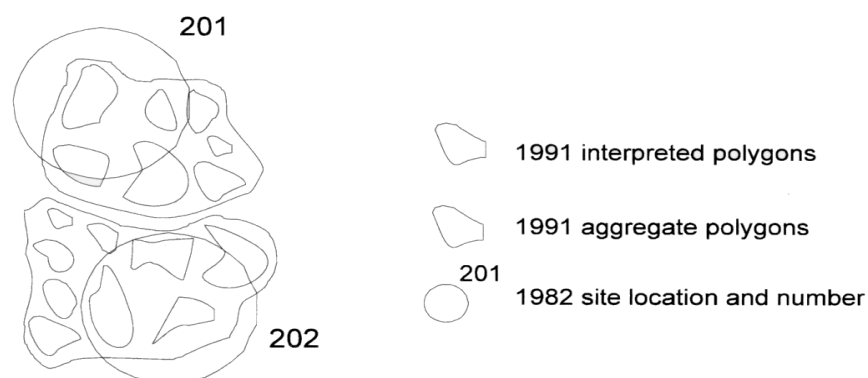


FIG. 1. Aggregation of 1991 pitch pine areas in relation to 1982 site location and number.

6) Selected features from the above maps (i.e., township boundaries, major roads, bodies of water, and centroids of 1991 aggregate polygons) were exported in HPGL format from the GIS and imported into Corel Draw<sup>®</sup> in order to produce the smaller scale map to be included in the report. The process included the removal of a number of small lakes and islands which appeared as specks at the smaller scale. A draft of this 1:250,000 map was forwarded to the client for inspection, and modifications were implemented for the final product. The 1:250,000 map was produced in colour and is presented in Figure 2.

7) A database was created to contain data from the 1982 survey and the 1991 survey and to facilitate subsequent comparisons between the surveys. The Witzke (1982) report identified the following information which was included in the database (the database field name is indicated in brackets):

- a. site number (SITE-NO)
- b. name of a nearby geographical area (SITE-NAME)
- c. UTM co-ordinate (UTM)
- d. data collection method; i.e., estimated or counted (METHOD)
- e. for counted sites, the number of live trees (LIVE\_82)
- f. for counted sites, the number of dead trees (DEAD\_82)
- g. for all sites, the number or population class of trees, including live and dead trees for counted sites (TOTAL\_82).

To these field, the following fields were added for the 1991 data:

- h. population class for each aggregate polygon (PCLAS-91)
- i. density class for each aggregate polygon (DENS\_91)
- j. area for each aggregate polygon (AREA\_91)

To compare the 1982 and 1991 surveys, a number of modifications had to be made to the records in the database to make it consistent, these included:

- a. The Grenadier Islands (1 -8) were combined into a single record in the database because only a single population estimate was provided for them all in 1982; the 1991 survey included population estimates for each island although a number of the islands were not observed to have pitch pine in 1991.
- b. Several sites which were identified in 1982 but were given no population estimate, and which were not identified in 1991, were omitted from the analysis.
- c. To enable comparison between the two surveys, an additional field was added (PCLAS\_82). In this field, the counts and estimated data from the 1982 survey were assigned to the same population classes as used for the 1991 data (see Step 3). Note that only the number of 'live' trees (indicated in the 1982 survey) were used to determine population class.
- d. The 1982 records identified whether the population counts were estimates (E) or actual field counts (C). Two records indicated the survey method as 'sampled' (S). Estimates and samples were typically

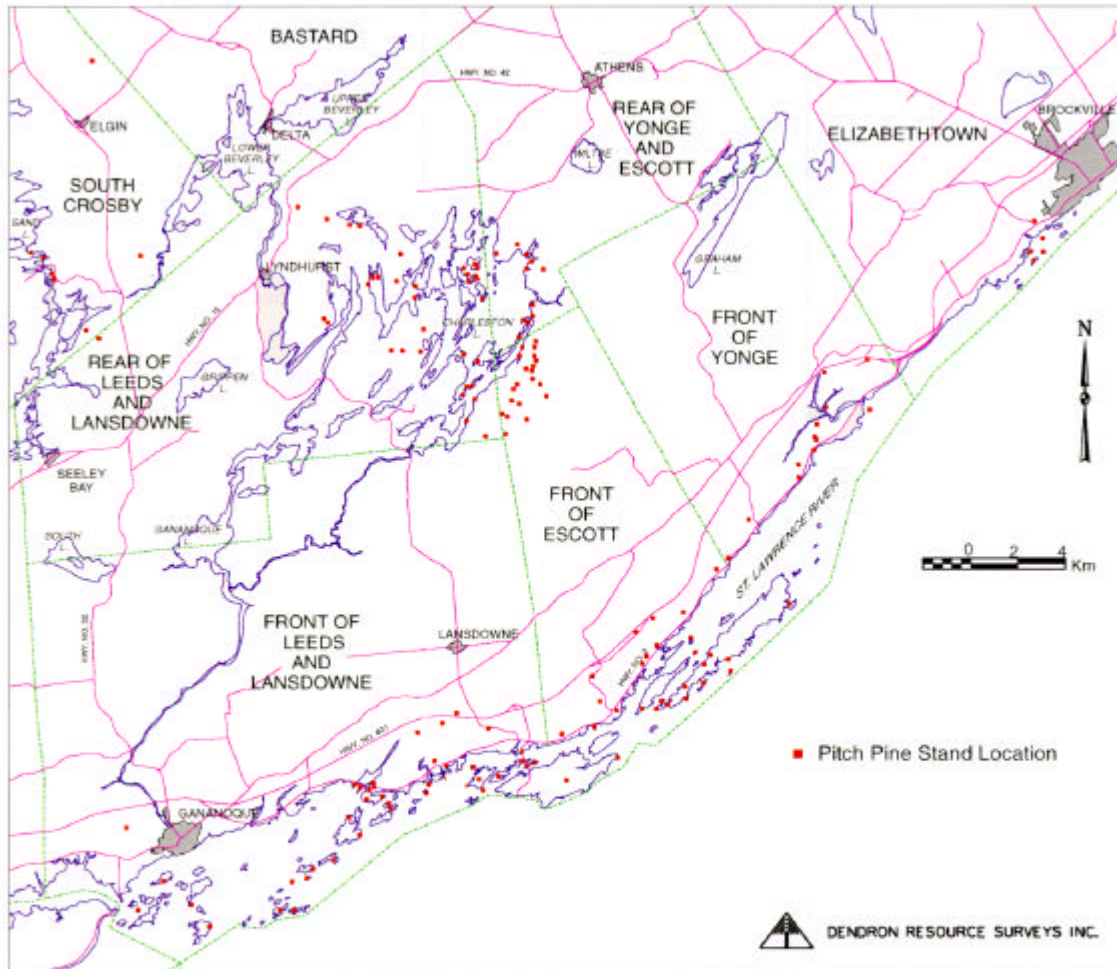


FIG. 2. Location of pitch pine (*Pinus rigida* Mill.) sites in Leeds County from 1991 aerial photography interpretation.

shown as 100+, 500+, 50+, etc. Therefore, for subsequent analysis, the 'samples' were lumped in with the 'estimates' group.

The fact that the population classes used in this study were not continuous presented a number of problems; specifically where to assign 1982 estimates or counts that fell outside any of the classes.

The rule used was to assign the 1982 to the nearest 1991 population class. For example, a count of '15' trees would be assigned to the '20-30' class; '14' or '10+' trees to the '< 10' class.

8) Observations and discussions were written up as per the next section and this report was produced in draft and, following client review, final versions.

9) The digital maps were exported in DXF format onto 3.5 in diskettes. The maps, report, and database were delivered to the client in digital and hard copy formats.

## Discussion

Different formats of information available for the three surveys made quantitative comparisons between the surveys difficult. Only the 1982 and 1991 surveys provided information of sufficient quality to attempt a meaningful comparison. Nothing in the following discussion should be considered as rigorous statistical analysis. This was neither called for nor possible with the information provided.

### Validation of 1966 Survey

Visual inspection of maps produced for this project indicates that the location of pitch pine from the 1966 survey does not appear to correspond well with the other surveys. Large areas of pitch pine indicated in 1966 were not observed during either of the subsequent surveys; for example, two large areas midway between Highways No. 401 and No. 2, northwest of the Tar Island Narrows. Furthermore, a large number of small areas on the 1966 survey map (primarily on small islands in the St. Lawrence River) were not indicated in 1982 and could not be validated in the 1991 survey. Several possible reasons why sites identified in the 1966 survey were not identified in the interpretation of 1991 aerial photos include:

- a. pitch pine may have been overtopped by white pine or other species, obscuring the pitch pine in the 1991 photography,
- b. interpreters may have mistaken white pine, or other species, for pitch pine,
- c. the pitch pine sites experienced 100% mortality in the period between the surveys.

For the 1966 sites which did not appear in the 1982 and 1991 surveys, it is more likely that the pitch pine was either misinterpreted and/or poorly located on the survey maps, and less likely that the sites experienced 100% mortality in the 16 years between 1966 and 1982. This is possible given the 'fly-by' survey approach used for the 1966 survey. For the above reasons, the 1966 survey data was omitted from any further analysis.

### Validation of 1982 Survey



Visual inspection of the produced maps indicates that the location of pitch pine corresponds fairly well between the 1982 and 1991 surveys, although several areas identified in 1982 were not observed in 1991, and vice versa. In other words, where a site was indicated (by a dot) in the 1982 survey, 1991 polygons were frequently found in close proximity. It is important to note, however, that 1991 aggregate polygons were delineated to correspond to 1982 sites, and this delineation was entirely at the discretion of the interpreter. This was required because the 1982 survey only provided a point location (a dot) for the 1982 sites. Therefore, in areas where 1991 polygons were in close proximity to several 1982 'dots' (for example, the east side of Charleston Lake), the interpreter had to decide to which 1982 site number each 1991 polygon should be assigned. Therefore, the population comparisons between the 1982 and 1991 surveys for such areas are speculative.

After the data was modified as discussed in Step 7 of the Methodology section, a total of 131 and 152 discrete pitch pine sites could be identified for the 1982 and 1991 surveys, respectively. In other words, 41 sites were newly identified in 1991, whereas, of the 131 sites identified in 1982, 20 were not observed in 1991 (a listing of database records for each of these sites is provided in Appendices A, B, and C). Possible reasons for the discrepancy between the surveys, as discussed previously, include:

- a. pitch pine may have been obscured by other species in the 1991 photography,
- b. interpreters may have mistaken white pine, or other species, for pitch pine,
- c. pitch pine sites experienced 100% mortality in the period between the surveys.

As discussed in the Methodology section, each of the sites identified in the 1982 and 1991 surveys were assigned a population class. The number of sites in each population class for both surveys is provided in Table 1.

An additional summary table was prepared which shows the change in population class for sites common to both the 1982 and 1991 surveys. A distinction was made between sites where the population was derived from an estimate or a field count. Tables 2 and 3 show the number and percentage of 1982 sites, which had a higher, lower, or the same population class in 1991.

TABLE 1. Number of sites observed of each population class for 1982 and 1991 surveys.

<b>Population Class</b>	<b>1982</b>	<b>1991</b>
1	3	2
< 15	40	41

<b>Population Class</b>	<b>1982</b>	<b>1991</b>
15-34	14	44
35-84	24	20
85-200	27	25
201-500	1	1
> 500	22	19
<b>TOTAL</b>	<b>131</b>	<b>152</b>

TABLE 2. Number of 1982 pitch pine sites whose population class was higher, lower, or the same in the 1991 survey (by method used for determining population in 1982).

	Higher	Same	Lower	Total
Counted	5	26	15	46
Estimated	7	41	17	65
<b>TOTAL</b>	<b>12</b>	<b>67</b>	<b>32</b>	<b>111</b>

TABLE 3. Percentage of 1982 pitch pine areas whose population class was determined to be higher, lower, or the same in the 1991 survey (by method used for determining population in 1982).

	Higher	Same	Lower	Total
Counted	10.9	56.5	32.6	100.0
Estimated	10.8	63.1	26.1	100.0
<b>AVERAGE</b>	<b>10.8</b>	<b>60.4</b>	<b>28.8</b>	<b>100.0</b>

From Table 3, the following observations can be made for sites which were observed both in 1982 and 1991:

- a. 60.4% were assigned to the same population class in 1991
- b. 10.8% were assigned to a higher population class in 1991
- c. 28.8% were assigned to a lower population class in 1991

The breakdown was similar between sites estimated and counted in 1982. Thus, it appears that population class tended to be underestimated in the 1991 survey, as compared to the 1982 survey. A 10% error in population estimates was desired, but Dendron's interpreter estimates that the error could be as much as 30% for the 1991 survey. Reasons for this include:

- a. the interpreter's inexperience at estimating pitch pine population sizes,

- b. pitch pine being obscured by other species,
- c. Witzke's 1982 estimates appeared high to Dendron's interpreter including those in which an actual field count had to be done in 1982; this is why Dendron was not confident in their ability to be within the 10% error.

The objective of this project was to validate previous studies of pitch pine locations based solely on aerial photography interpretation. A normal part of the photo interpretation process is the calibration of the interpretation with field sampling. However, as field sampling was not part of this study, the population estimates made cannot be considered as statistically rigorous and no estimate of error can be made. It would still be worthwhile to provide new field counts for several pitch pine sites identified in the 1991 survey, to validate the population estimates made in the 1991 photo interpretation. The present study provides direction and a baseline for future work.

## References

Adlam, W.D. 1973. Pitch pine in Ontario. The 1000 Islander and Rideau Voyageur, Gananoque, Ontario. July 21.

Witzke, C. 1982. Appearances can deceive. Ontario Ministry of Natural Resources. Unpublished.

## Appendix 1

List of 1991 Sites Not Identified in 1982

No.	Location Name	UTM	PClas91	Dens91	Area
70	Bass Lake	148355	15-34	C	0.24
71	The Quarters	014341	15-34	C	3.60
72	Greens Cove	163332	> 500	B	21.00
73	Rock Dunder	039306	15-34	C	9.88
74	La Rose Bay	160305	> 500	B	10.72
75	White Hills	165298	85-200	C	10.08
76	Slim Bay	174299	35-84	C	5.96
77	Sand Bay	215348	15-34	A	0.32
78	Boy Scout Camp	225335	> 500	B	33.84
79	Crawford Point	222320	15-34	B	4.40
80	Wolf Island	215307	15-34	B	1.00
81	Mud Lake	218292	15-34	B	0.68
82	Basin Lake	222289	> 500	B	9.24
83	Basin Lake	224287	85-200	B	2.52
84	SE of Basin Lake	226279	15-34	C	8.44
104	Cockburn Is.	437344	< 15	C	3.64
113	Old River Road	332249	< 15	C	1.36
189	Grenadier Island	297169	15-34	B	6.72

190	NW of Rockport	245158	85-200	B	24.12
192	Grenadier Island	285155	15-34	C	0.00
193	N. of Ivy Lea	190144	15-34	A	3.12
194	NW of Champagne Island	152110	15-34	A	3.08
195	Collier Island	157107	15-34	B	3.72
196	W. of Gananoque	050094	85-200	B	9.76
197	Marsh Creek	345275	15-34	B	2.24
198	Princess Island	363275	< 15	C	3.00
199	401 SW of Sherwood Sp.	363296	< 15	B	3.16
200	Knight's Creek	177122	35-84	C	9.12
201	S. of Green Lake	165342	< 15	C	1.20
202	Jones Creek	270217	35-84	B	16.16
203	Harvey Island	436349	15-34	B	1.40
204	Long Mountain	209265	< 15	A	0.08
205	Hill Island	249122	15-34	C	6.80
206	Ash Island	198114	< 15	A	0.04
207	Knight's Creek	183139	< 15	B	1.00
208	Sugar Island	128077	35-84	B	5.04
209	N. of Ivy Lea	190144	15-34	A	2.20
210	Buckhorn Point	192299	< 15	A	0.08
211	Axeman Island	127072	< 15	A	0.04
212	Psyche Island	120070	< 15	A	0.04
213	Island 6	055058	< 15	A	0.04

**Note:** Descriptions of column headings are provided in Step 7 of the Methodology section.

## Appendix 2

List of 1982 Sites Not identified in 1991

<u>No.</u>	<u>Location Name</u>	<u>UTM</u>	<u>Method</u>	<u>Live Dead</u>		<u>Total</u>	<u>Pclas82</u>
				<u>82</u>	<u>82</u>	<u>82</u>	
18	Portage	146326	E			50+	35-84
24	Tallow Rock Bay	171323	C	7	3	10	< 15
32	Leeders Creek	223322	E			1000+	> 500
46	Grouse Island	171324	E			10+	< 15
51	Wolf Island	200296	C	19	1	20	15-34
52	Crow Island	207295	C	475	82	557	> 500
54	Hemlock Island	199289	C	2		2	< 15
60	Round Island	154334	E			10+	< 15
62	Eastern Waters 3	219310	E			100+	85-200
118	Narrows 1	266159	c			1	1
122	Narrows 5	278178	E			10	< 15
144	Club	256134	E			100+	85-200
146	Spilsbury Island	169100	E			40+	35-84
156	Lyndock Island	200110	C			34	15-34
167	Garrett Point	190118	E			10+	< 15
174	Ivy Lea Inn	180114	E			10+	< 15
181		265143	E			25+	15-34

182	Doctor Island	272145	E		50+	35-84
183	Hooper Island	287153	E		25+	15-34
184	Shanty Island	291154	E		50+	35-84

## Appendix 3

List of Pitch Pine Sites Identified in 1982 and/or 1991

No.	Location Name	UTM	Method	Live82		Total82		PClas91		Area	
					Dead82	PClas82			Dens91		
1	Elgin	035425	E			4000	> 500	> 500	B	38.52	
2	Sand Bay	010343	C	32	26	58	15-34	35-84	C	6.32	
3	Jones Fall 1	017334	C	2	1	3	< 15	< 15	A	0.04	
4	Jones Fall 2	019332	C	4		4	< 15	1		0.08	
6	Morton	057346	C	731	68	799	> 500	> 500	B	26.76	
7	Rock Dunder	032309	C	17		17	15-34	15-34	C	11.76	
8	Oakleaf	121364	C	75	8	83	35-84	35-84	C	15.32	
9	Kirkby	135358	C			1000+	> 500	> 500	B	6.32	
10	Bass Lake	143355	C	2		2	< 15	15-34	C	0.44	
16	Red Horse Narrows 1	134312	C	59	7	66	35-84	< 15	C	0.16	
17	Red Horse Narrows 2	132313	E			2500	> 500	> 500	B	13.12	
18	Portage	146326	E			50+	35-84	0		0.00	
19	Donaldson Bay	151329	E			100+	85-200	85-200	B	12.16	
20	Bill Island	153333	E			100+	85-200	85-200	A	1.08	
21	Grindstone Island	155332	E			50+	35-84	35-84	A	0.24	
22	Partridge Island	171325	C	53	3	56	35-84	15-34	B	4.12	
23	Deer Island	172328	C	39	3	42	35-84	35-84	B	1.92	
24	Tallow Rock Bay	171323	C	7	3	10	< 15	0		0.00	
25	White Hills	175310	C	502	70	572	> 500	201-500	C	10.04	
26	Tar Island	197332	E			100+	85-200	85-200	A	0.84	
27	Derbyshire Point	205341	C			22	15-34	85-200	C	14.96	
28	Browns Island	219342	E			50	35-84	15-34	B	5.16	
29	Watch Hill Point	218334	E			1000+	> 500	85-200	B	7.76	
30	Eastern Waters 1	215298	C			3	< 15	< 15	A	0.04	
31	Little Bluff Island	216315	E			100	85-200	35-84	A	3.32	
32	Leeders Creek	223322	E			1000+	> 500	0		0.00	
33	Big Bluff Island	219313	C			100+	85-200	35-84	A	4.60	
34	Sugahoaf Point	221316	E			100+	85-200	35-84	B	6.04	
35		220340	C	1		1	1	< 15	B	1.88	
36	Mud Lake	220292	E			1000+	> 500	> 500	A	1.60	
37	Mud Lake North 1	222294	E			5000+	> 500	> 500	A	2.92	
38	Mud Lake North 2	222298	E			100+	85-200	85-200	B	2.28	
39	Mud Lake North 3	222300	E			10+	< 15	85-200	B	9.48	
40	Mud Lake North 4	222302	E			400+	> 500	85-200	B	7.44	
41	Mud Lake North 5	222305	E			100+	85-200	15-34	B	0.40	
42	Basin Lake	217284	E			500+	> 500	> 500	A	13.04	
43	Basin Lake Trail	213283	E			700+	> 500	85-200	C	21.72	
44	Concession	214287	E			100+	85-200	15-34	B	1.04	
45	Huckleberry Trail	216279	C	74	12	86	35-84	> 500	A	7.16	
46	Grouse Island	171324	E			10+	<15	0		0.00	

47	Blue Mountain	207272	E			2800	> 500	> 500	B	17.60
48	Blue Ridge	209269	C	32	1	33	15-34	35-84	C	13.16
49	Long Mountain	200263	E			3000	> 500	> 500	B	13.12
51	Wolf Island	200296	C	19	1	20	15-34	0		0.00
52	Crow island	207295	C	475	82	557	> 500	0		0.00
53	Croziars Island	197296	E			4000	> 500	> 500	A	9.88
54	Hemlock Island	199289	C	2		2	< 15	0		0.00
55	Narrows Island	196287	C	85	11	96	85-200	15-34	C	3.48
56	Huckleberry Island	193285	C	51	7	58	35-84	15-34	C	0.24
57	Pine Island	191281	C	10		10	< 15	< 15	B	0.32
58	Sunset Rocks	196280	C	29	1	30	15-34	15-34	C	6.04
59	Outlet Reach	193269	C	74	6	80	35-84	35-84	B	1.12
60	Round Island	154334	E			10+	< 15	0		0.00
61	Eastern Waters 2	216304	E			10+	< 15	< 15	B	0.36
62	Eastern Waters 3	219310	E			100+	85-200	0		0.00
63	Bertha Island	197333	E			10+	< 15	15-34	A	0.20
64	Sheep Island	196337	E			100+	85-200	35-84	C	10.96
65	Beechers Island	197337	E			5+	< 15	< 15	C	1.48
66	Picnic Island	192337	E			4+	< 15	< 15	C	0.52
67	May's Island	193334	C			3	< 15	< 15	C	0.04
68	Fisher Island	195330	C			3	< 15	< 15	C	3.64
69	Hogsback Island	199322	C			2	< 15	< 15	A	0.40
70	Bass Lake	148355					0	15-34	C	0.24
71	The Quarters	014341					0	15-34	C	3.60
72	Greens Cove	163332					0	> 500	B	21.00
73	Rock Dunder	039306					0	15-34	C	9.88
74	La Rose Bay	160305					0	> 500	B	10.72
75	White Hills	165298					0	85-200	C	10.08
76	Slim Bay	174299					0	35-84	C	5.96
77	Sand Bay	215348					0	15-34	A	0.32
78	Boy Scout Camp	225335					0	> 500	B	33.84
79	Crawford Point	222320					0	15-34	B	4.40
80	Wolf Island	215307					0	15-34	B	1.00
81	Mud Lake	218292					0	15-34	B	0.68
82	Basin Lake	222289					0	> 500	B	9.24
83	Basin Lake	224287					0	85-200	B	2.52
84	SE of Basin Lake	226279					0	15-34	C	8.44
101	Brockville	434356	E			20+	15-34	15-34	C	5.84
102	Stovin Island	433340	C	238	81	319	201-500	35-84	B	5.00
103	Fernbank	430342	E			10+	< 15	15-34	C	2.68
104	Cockburn Is.	437344					0	< 15	C	3.64
105	Jones Creek 3	343292	E			5+	< 15	< 15	B	1.40
106	Jones Creek 2	340267	E			100+	85-200	85-200	B	1.72
107	Jones Creek 1	340263	C	996	13	1129	500	85-200	A	0.56
108	Browns Bay 1	342260	C	171	8	179	85-200	85-200	A	0.44
109	Browns Bay 2	339255	E			10+	< 15	< 15	C	0.72
111	Parkway 1	332245	E			100+	85-200	35-84	C	5.24
112	Mallorytown Landing	310227	E			2581	500	> 500	B	5.68
113	Old River Road	332249					0	< 15	C	1.36
114	La Rue Mills 1	298205	E			25+	15-34	15-34	B	0.64
115	La Rue Mills 2	303210	C			2	< 15	< 15	C	0.76
118	Narrows 1	266159	C				1	1	0	0.00
119	Narrows 2	267165	E			10+	< 15	< 15	B	0.56

120	Narrows 3	271169	E			10+	< 15	< 15	B	0.48
121	Narrows 4	273172	E			10+	< 15	1		0.00
122	Narrows 5	278178	E			10	< 15	0		0.00
123	Narrows 6	287187	E			10	< 15	< 15	B	7.48
124	Berry Island	287176	E			5	< 15	< 15	C	0.40
125	401(1)	265178	E			100+	85-200	85-200	B	6.08
126	401(2)	271184	E			100+	85-200	85-200	B	11.04
130	Grenadier Islands	278146	C	2394	901	3295	500	> 500		1.48
138	Little Grenadier	274145	E			35+	35-84	15-34	C	5.64
139	Tar Island	264143	E			200+	85-200	85-200	B	18.44
140	Rockport	254143	E			50+	35-84	35-84	B	5.64
141	Rockport Road	250151	E			100+	85-200	85-200	A	7.48
142	Redstone Isle	246138	E			10+	< 15	15-34	C	3.20
143	Darlingside	233133	E			1000+	> 500	85-200	B	8.28
144	Club	256134	E			100+	85-200	0		0.00
145	Hill Island	235114	C			6075	> 500	> 500	A	4.96
146	Spilsbury Island	169100	E			40+	35-84	0		0.00
147	Ninette Island	157103	E			25+	15-34	15-34	A	3.76
148	Bucks Bay	221130	E			100+	85-200	85-200	C	10.04
149	Shipmans Point	177113	E			10	< 15	15-34	A	0.20
150	Constance Island	219121	C	12	4	16	15-34	15-34	B	3.56
151	Georgina Island	215120	C	925	42	1351	> 500	> 500	C	13.56
152	Davis Island	176109	E			10	< 15	< 15	C	2.36
153	Ash Island	198112	E			50	35-84	< 15	B	1.16
154	Wallace Island	207115	E			100+	85-200	85-200	C	11.28
155	Reynolds Road	202936	C	65	6	71	35-84	15-34	A	1.80
156	Lyndock Island	200110	C			34	15-34	0		1.32
157	Ivy Island	196120	E			50	35-84	15-34	C	2.00
158	Huckleberry	222122	E			100	85-200	85-200	B	4.24
159	Fitzsimmons Mountain	173135	C	132	19	151	85-200	85-200	C	22.64
160	Champagne Point	184120	E			10	< 15	15-34	A	0.16
161	Mulcaster Island	162101	C	47	19	66	35-84	15-34	A	0.32
162	Landons Bay	154112	C	14	1	15	< 15	< 15	A	0.04
163	Waller's Island	153110	C	32	3	35	15-34	15-34	C	2.04
164	Mainshore Point	145112	C	6	1	7	< 15	< 15	A	0.04
165	Snake Island	147110	C	13	1	14	< 15	< 15	B	0.64
166	Horseblock Point	149106	E			50	35-84	15-34	B	3.76
167	Garrett Point	190118	E			10+	< 15	0		0.00
168	SIA	148090	C	3		3	< 15	< 15	A	0.04
169	Prince Regent Is.	137080	E			100	85-200	35-84	A	6.76
170	Stave Island	143096	E			10	< 15	15-34	B	15.52
172	Endymion Island	123058	C	69	14	83	35-84	35-84	C	12.96
173	Camelot Island	113056	C	157	76	133	85-200	15-34	C	11.16
174	Ivy Lea Inn	180114	E			10+	< 15	0		0.00
176	Thwartway (leek) Is.	085051	C	39	20	59	35-84	15-34	B	7.32
179	McDonald Island	064071	C	1		1	1	< 15	C	6.80
180	Vanburen Island	289169	E			50+	35-84	35-84	C	3.04
181		265143	E			25+	15-34	0		0.00
182	Doctor Island	272145	E			50+	35-84	0		0.00
183	Hooper Island	287153	E			25+	15-34	0		0.00
184	Shanty Island	291154	E			50+	35-84	0		0.00
185	Bloomfield Island	294157	E			10+	< 15	< 15	C	2.40
186	Buck Island	275148	E			5+	< 15	< 15	B	0.04

187	Pitch Pine Island	304165	E	10	< 15	< 15	B	5.64
188	Champagne Island	185115	E	10	< 15	< 15	B	1.72
189	Grenadier Island	297169			0	15-34	B	6.72
190	NW of Rockport	245158			0	85-200	B	24.12
192	Grenadier Island	285155			0	15-34	C	0.00
193	N. of Ivy Lea	190144			0	15-34	A	3.12
194	NW of Champagne Island	152110			0	15-34	A	3.08
195	Collier Island	157107			0	15-34	B	3.72
196	W. of Gananoque	050094			0	85-200	B	9.76
197	Marsh Creek	345275			0	15-34	B	2.24
198	Princess Island	363275			0	< 15	c	3.00
199	401 SW of Sherwood Sp.	363296			0	< 15	B	3.16
200	Knight's Creek	177122			0	35-84	C	9.12
201	S. of Green Lake	165342			0	< 15	c	1.20
202	Jones Creek	270217			0	35-84	B	16.16
203	Harvey Island	436349			0	15-34	B	1.40
204	Long Mountain	209265			0	< 15	A	0.08
205	Hill Island	249122			0	15-34	C	6.80
206	Ash Island	198114			0	< 15	A	0.04
207	Knight's Creek	183139			0	< 15	B	1.00
208	Sugar Island	128077			0	35-84	B	5.04
209	N. Of Ivy Lea	190144			0	15-34	A	2.20
210	Buckhorn Point	192299			0	< 15	A	0.08
211	Axeman Island	127072			0	< 15	A	0.04
212	Psyche Island	120070			0	< 15	A	0.04
213	Island 6	055058			0	< 15	A	0.04