CROWLEY LAKE

URBAN LAKES FISHERIES STUDY 2014

Fisheries Assessment by:
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INTRODUCTION

Crowley Lake (46°23’07” N, 80°59’06” W) is a 43.5 ha lake locat

Dorset, and analyzed for pH, conductivity, total inflection point alkalinity, dissolved organic carbon, metals and major ions.

The sampling location for water quality can be seen in Figure 2

RESULTS AND DISCUSSION

Fisheries Community Assessment

During the July 2 to 5, 2014 netting survey, a total of 16 nets were set, catching only two species: smallmouth bass and yellow perch. Total catch, total weight (g) and catch-per-unit effort (CPUE) from the Nordic survey are presented in Table 2.

Table 2 Catch summary and CPUE for all species captured in Crowley Lake July 2 - 5, 2014. *Fish were not individually weighed. Total biomass for yellow perch from two nets not recorded in field notes.

Fish Species	Total Catch	Sample Size	Total Weight (g)	CPUE (fish/net)	CPUE (g/net)
Smallmouth Bass	74	73	36369.3	4.625	2273.0813
Yellow Perch*	86	82	-	5.375	-
Total	160	155	-	10	-

A total of 74 smallmouth bass were captured during the 2014 survey with total lengths ranging from 98 mm to 465 mm. A complete summary of morphological data for smallmouth bass from the 2014 Nordic survey is provided in Appendix I.

Yellow perch was still the most numerically abundant fish species found in Crowley Lake (Table 2) with total lengths ranging from 57 mm to 177 mm. A length frequency histogram for yellow perch can be seen in Figure 3.

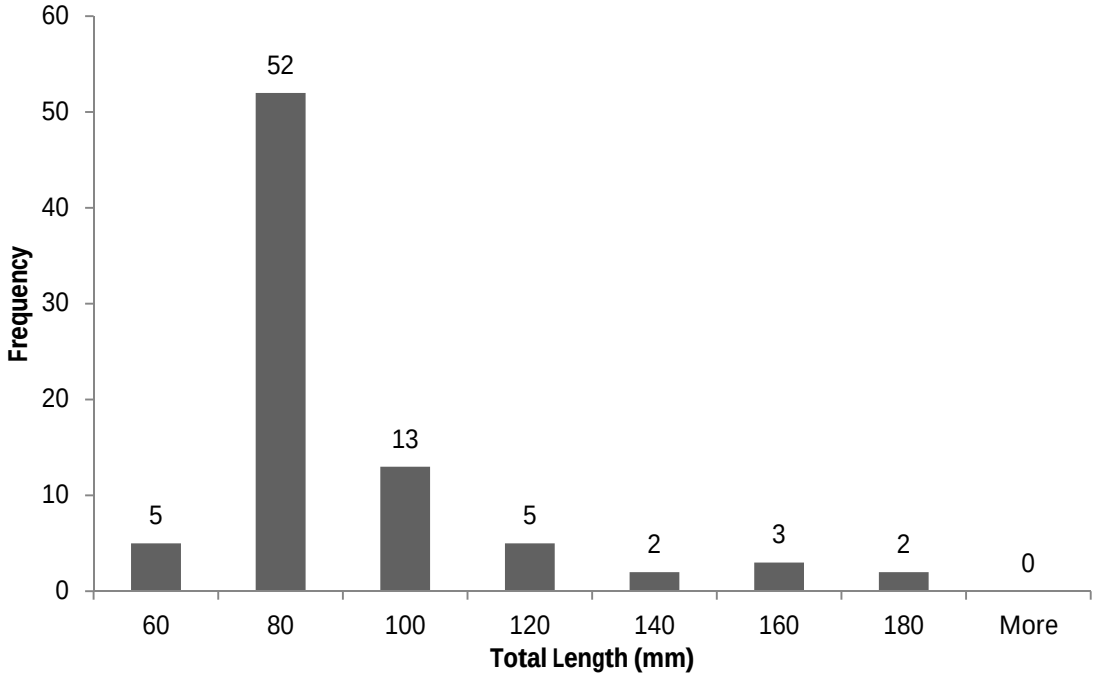

Figure 3 Length frequency histogram for yellow perch (n=86) captured in Crowley Lake July 2 - 5, 2014.

During the original 1991 urban lakes survey only yellow perch were caught in Crowley Lake with a total catch of 829 fish (Poulin *et al*., 1991). Yellow perch remained the only species in Crowley Lake when the first Nordic survey was conducted in 2005 with a total catch of 1479 fish (Cooperative Freshwater Ecology Unit, 2014). The 2008 Nordic survey caught a total of 32 smallmouth bass which were a result of stocking initiatives earlier that year (Luek, unpublished data; Cooperative Freshwater Ecology Unit, 2008). A total of 32 bass were captured in 2009. In 2014, the smallmouth bass population had more than doubled, now accounting for 46% of the total catch but the vast majority of the biomass. The Species richness and proportion of total catch can be seen in Table 3.

Table 3
Species richness and proportion of total catch for Crowley Lake (1. Poulin *et al*., 1991; 2. Cooperative Freshwater Ecology Unit, 2014).

Survey Type	**Multi-Gear Survey**		**Nordic**		**Nordic**		**Nordic**		**Nordic**	
Year	**1991**[1]		**2005**[2]		**2008**[2]		**2009**[2]		**2014**	
Species	***n***	**%**	***n***	**%**	***n***	**%**	***n***	**%**	***n***	**%**
Smallmouth Bass	-	-	-	-	32	4.82	21	2.99	74	46.25
Yellow Perch	829	100	1479	100	631	95.03	681	97	86	53.75

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concentrations of Nickel (37.8 µg/L) and Copper (7.9 µg/L) remain high (Ontario Ministry of Environment and Energy, 1994).

Table 4 Water chemistry from Crowley Lake (1. Ontario Ministry of Environment and Energy, 1994; 2. Keller *et al*., 2004).

Parameter	PWQO[1]	Year		
		1990[2]	2003[2]	2014
pH	6.5-8.5	5.88	6.31	6.67
TIA Alkalinity (mg/L $CaCO_3$)	-	1.69	2.10	3.03
Conductivity (µS/cm)	-	35.2	27.6	24.4
DOC (mg/L)	-	2.9	3.3	3.2
SO4 (mg/L)	-	11.94	7.85	5.5
Total Cu (µg/L)	5	14	11	7.9
Total Ni (µg/L)	25	89	55	38
Total Zn (µg/L)	30	9	6	3
Total Fe (µg/L)	300	110	49	20
Total Mn (µg/L)	-	71	32	8
Total Al (µg/L)	75	<50	26	19

CONCLUSIONS

Although water quality appears to have improved over the past 24 years, concentrations of Ni and Cu remain above the PWQO criteria for the protection of aquatic life. However, pH has improved to a circumneutral value of 6.67 and metal concentrations have declined by 58% for Ni and 43% for Cu. Clams and snails were not observed in the lake, however acid-sensitive mayflies appear to be common. Crowley Lake supports populations of two species of fish, including a growing population of smallmouth bass that appears to be rapidly reducing the population of the once abundant yellow perch.

ACKNOWLEDGEMENTS

The urban lakes fisheries monitoring program in Sudbury is conducted by staff and students of the Cooperative Freshwater Ecology Unit with support from OMNRF, OMOECC, City of Greater Sudbury, Vale and Glencore. Over the past 25 years the program has been led by Rod Sein, Rob Kirk, George Morgan, Ed S

APPENDIX I

Morphological data for smallmouth bass (*Micropterus dolomieu*) from Crowley Lake, July 2 - 5, 2014.

Species	Fish #	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex 1-Male 2-Female 9-Unknown	Maturity 1-Immature 2-Mature 9-Unknown	Ageing Structure 0-None 2-Scales 4-Pectoral Ray 7-Dorsal Spine A-Otolith B-Operculum D-Cleithrum	Tissue 0-None 1-Flesh 8-Stomach 9-Gonads A-Whole Fish X-Genetic
Smallmouth Bass	16	251	264	250	2	2	A	1
Smallmouth Bass	17	254	269	243	1	2	A	1
Smallmouth Bass	18	198	209	110.8	1	1	A	1
Smallmouth Bass	19	238	252	200.3	2	9	A	1
Smallmouth Bass	20	293	310	342	1	2	A	1
Smallmouth Bass	21	300	317	416.8	2	2	A	1
Smallmouth Bass	22	192	199	96.5	2	1	A	1
Smallmouth Bass	23	416	433	1038.3	9	2	A	1
Smallmouth Bass	24	211	220	135.7	9	1	A	1
Smallmouth Bass	25	191	196	95.8	2	1	A	0
Smallmouth Bass	26	171	178	66.9	2	1	A	0
Smallmouth Bass	27	101	104	11.1	9	1	A	0
Smallmouth Bass	35	175	184	75.6	2	1	A	0
Smallmouth Bass	36	409	430	1092.7	1	2	A	1
Smallmouth Bass	37	355	375	689.6	2	2	A	0
Smallmouth Bass	38	421	437	1097.5	2	2	A	0
Smallmouth Bass	39	265	280	284.4	1	9	A	0
Smallmouth Bass	40	419	440	1137.7	1	2	A	0
Smallmouth Bass	41	422	444	969.6	2	2	A	0
Smallmouth Bass	42	321	337	475.5	2	2	A	0
Smallmouth Bass	43	334	353	638.5	1	2	A	0
Smallmouth Bass	44	326	344	484.3	1	2	A	0
Smallmouth Bass	45	342	360	578	2	2	A	0
Smallmouth Bass	46	335	353	575.1	2	2	A	0
Smallmouth Bass	47	247	261	234.3	1	2	A	0
Smallmouth Bass	48	250	261	222.5	2	2	A	0
Smallmouth Bass	49	100	105	13.7	9	1	A	0
Smallmouth Bass	50	111	115	19	2	1	A	0
Smallmouth Bass	77	339	356	559.6	1	2	A	1
Smallmouth Bass	78	425	445	1194.3	2	2	A	1
Smallmouth Bass	79	415	437	1048.1	2	2	A	1
Smallmouth Bass	80	357	369	714	2	2	A	1

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Smallmouth Bass	81	342	361	563.5	1	2	A	1
Smallmouth Bass	82	364	386	720.8	2	2	A	1
Smallmouth Bass	83	200	211	126.9	2	1	A	0
Smallmouth Bass	89	445	465	1241.3	2	2	A	1
Smallmouth Bass	90	372	390	675.4	2	2	A	1
Smallmouth Bass	91	293	310	428	2	2	A	0
Smallmouth Bass	92	340	357	622.6	1	2	A	1
Smallmouth Bass	93	285	291	361.3	2	2	A	1
Smallmouth Bass	94	312	329	492.9	2	2	A	0
Smallmouth Bass	95	282	298	378.7	1	2	A	0
Smallmouth Bass	96	280	295	365.5	2	2	A	0
Smallmouth Bass	97	185	194	87.9	2	1	A	0
Smallmouth Bass	98	445	465	1349.9	2	2	A	0
Smallmouth Bass	99	191	202	118.4	9	9	A	0
Smallmouth Bass	100	332	350	552.7	1	2	A	0
Smallmouth Bass	101	96	98	11.7	2	1	A	1
Smallmouth Bass	102	113	116	23.8	9	1	A	0
Smallmouth Bass	103	304	320	448.8	2	2	A	0
Smallmouth Bass	111	440	465	1287.4	1	2	A	0
Smallmouth Bass	112	304	317	450.6	2	2	A	0
Smallmouth Bass	113	335	354	596.3	1	2	A	0
Smallmouth Bass	114	318	335	487.5	2	2	A	0
Smallmouth Bass	115	332	354	576.4	1	2	A	0
Smallmouth Bass	116	325	345	563.2	2	2	A	0
Smallmouth Bass	117	297	314	379.4	1	2	A	0
Smallmouth Bass	118	181	202	118.5	1	2	A	0
Smallmouth Bass	121	320	335	508.2	1	2	A	0
Smallmouth Bass	122	132	137	31.8	9	1	A	0
Smallmouth Bass	123	124	129	25.5	2	1	A	0
Smallmouth Bass	124	230	244	174.4	2	2	A	0
Smallmouth Bass	125	280	297	320.7	2	2	A	0
Smallmouth Bass	126	434	455	1195.5	2	2	A	0
Smallmouth Bass	127	428	450	1172.9	2	2	A	0
Smallmouth Bass	128	406	429	1011	1	2	A	0
Smallmouth Bass	129	200	201	106.2	1	1	A	0
Smallmouth Bass	130	368	387	746.1	1	2	A	0
Smallmouth Bass	131	421	439	1133.5	2	2	A	0

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Smallmouth Bass	132	435	456	1164.2	1	2	A	0
Smallmouth Bass	133	304	319	449.2	1	2	A	0
Smallmouth Bass	134	166	175	72.9	2	1	A	0
Smallmouth Bass	135	200	211	116.6	2	1	A	0