Pakeshkag Lake

Mowat Township

Synoptic Trapnet Survey Report
Summer, 2001

Eric McIntyre
Fisheries Biologist
OMNR Parry Sound Area

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Executive Summary:

During the summer of 2001 a synoptic trapnet survey was conducted on Pakeshkag Lake. The primary purpose of the survey was to assess the status of walleye and smallmouth bass populations and secondarily that of other species in the near-shore fish community.

Fish productivity was exceptionally low with only 7.03 kg. of fish being caught on average in 12 overnight 8' trapnet sets. This index of productivity rates Pakeshkag Lake last in the Parry Sound Area for similarly surveyed lakes, and well below the average of 17.74 kg. per net set. Only 1 walleye was captured for a meagre Catch-Per-Unit-Effort by number (*CPUE-no*) of 0.1 walleye per net set, well below the Parry Sound Average of 4.1 for similarly surveyed lakes. Conversely, northern pike abundance was relatively high with a *CPUE-no* of 2.0 pike per net set, well above the Parry Sound average of 1.1.

Anecdotal reports of smallmouth bass and black crappie being present in the lake appear to be unfounded as neither of these species was captured during our survey. This conclusion is also supported by an independent *Fall Walleye Index Netting* (FWIN) Survey conducted on the lake during the fall of 2001.

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1.0 Introduction:

Pakeshkag Lake is located in Grundy Lake Provincial Park in the Township of Mowat in Parry Sound District. Crown Land surrounds the lake and there is no development along the shoreline with the exception of a park access point at its south end. The CPR railway does pass over the Pakeshkag River outlet near the north end of the lake. The lake is somewhat peculiar in that it is at the top of a small watershed with two inlets that drains the surrounding land and one outlet, the Pakeshkag River that flows north into the Pickerel River (OMNR, 1972).

The lake is best described as long and narrow with a very irregular shoreline (Figure 1). It is 53.7 hectares (133 acres) in size with a maximum depth of 22.9 metres (75') and a mean depth of 3.4 metres (11') (OMNR, 1972). The water is darkly coloured yellow-brown with a low light transparency (secchi reading 1.2 metres; OMNR, 1972.) Typical of Canadian Shield lakes, the water is slightly acidic (pH 6.5), with low alkalinity (13 – 20 mg/l) and low Total Dissolved Solids (TDS approx. 28.3 μmhos / cm) (OMNR, 1972). The above description makes it very suitable as a walleye lake.

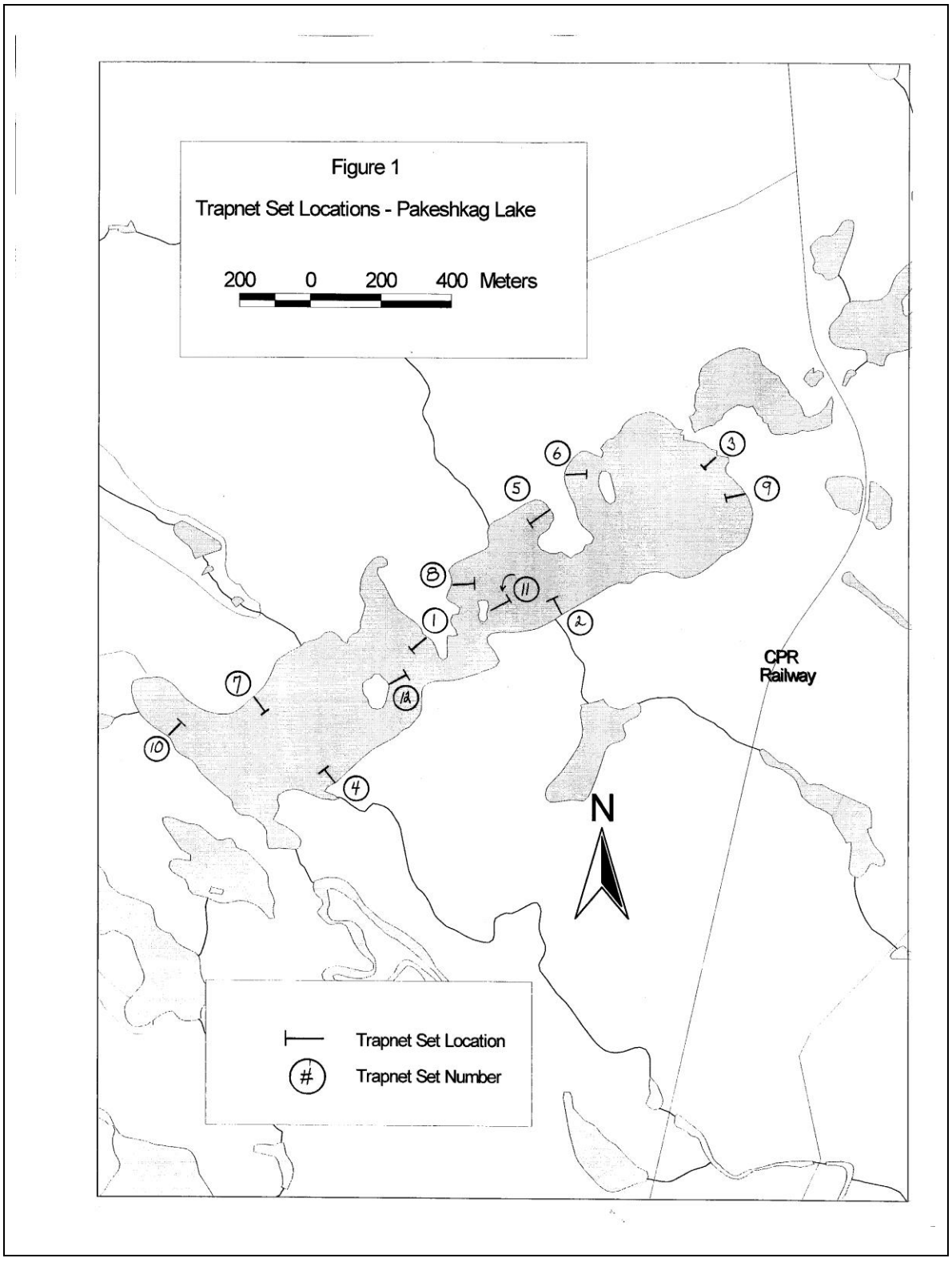
The first data collection on the lake was a "Biological Survey", conducted in 1961. This survey described the lake as being surrounded by low marshy country with 'swamp' comprising 60% of the shoreline. It listed species present as: northern pike, smallmouth bass, yellow pickerel (walleye), sunfish (pumpkinseed), rock bass, yellow perch and brown bullhead (OMNR, 1961). The listing of these species must have from anecdotal accounts as no netting was conducted during the survey. It further states that fishing was "poor to fair" with "moderate" fishing pressure, also adding that fishing deteriorated once the road was put through to the lake in 1959.

Two years later in 1963, another "Biological Survey" was conducted (OMNR, 1963). This survey included three gill net sets that added common white sucker to the list of inhabiting species, but failed to catch any smallmouth bass.

A standardized *Aquatic Habitat Inventory* Survey (lake survey) was conducted on the lake in 1972 (OMNR, 1972). In addition to the above mentioned species, they also captured golden shiner, bluntnose minnow, brook stickleback, central mudminnow, johnny darter and finescale dace, all small fish species that support the forage base. Interestingly, they did not capture any smallmouth bass, hence there is no confirmed documentation of this species being present in the lake.

A map on file at the Parry Sound MNR office indicates that black crappie were introduced to the lake in 1990. We saw no evidence of this in our survey and doubt the likelihood of this species being present in the lake.

The primary purpose of this survey was to evaluate the status of the walleye population in the lake, and secondarily the status of other fish species present in the near-shore fish community.


Figure 1
Trapnet Set Locations - Pakeshkag Lake
200 0 200 400 Meters
CPR Railway
N
Trapnet Set Location
Trapnet Set Number

2.0 Methods:

2.1 Field Procedures:

Synoptic surveys are intended to provide a 'snapshot in time' of the status of the fish community and individual populations that comprise it. We used 8' trapnets due to the non-lethal nature of the gear and it's proven effectiveness at capturing walleye and smallmouth bass that were particular species of interest in this survey. Results must be viewed in light *of 'species selectivity*' of the gear. This is further discussed in the *Results* section of the report.

Due to severe limitations that the gear imposes on set location, netting sites were not pre-determined. Site selection was at the discretion of the field crew. However, site selection was based on the following guidelines:

- The site had to be suitable for the net to fish effectively. (Consequently – factors such as: contours of the lake bottom, absence of obstructions, depth, sufficient lead length, etc. were to be considered.)
- Nets were to fish all habitat types in approximate proportion to their abundance on the lake in order that the catch would reflect the 'whole lake' as accurately as possible.
- Nets were to be set far enough apart such that they were not competing with each other.
- Nets were to be approximately randomly distributed throughout the study area.

We completed 12 over-night, trapnet sets that met the above guidelines. Nets set locations and orientation are indicated in Figure 1.

Field operations were conducted from August 27th – 31st, 2001.

In this report the unit of effort is recorded as a "net set" – and approximates a set of 24 hours duration. Nets were relocated daily.

Complete catch enumeration was conducted for all sets (Appendix A).

For all walleye and northern pike (Appendix B) captured, biosampling data including total length, fork length and round weight was collected. Scale samples were also collected for age determination of walleye. For non-game fish, round weights were recorded in order that *total weight captured* and *mean weight* for non-game fish species could be determined (Appendix A).

2.2 Relative Abundance Analysis and Comparison with other Surveys:

Since 1982, the Ministry of Natural Resources has conducted over 30 synoptic trapnet surveys on various lakes throughout the Parry Sound Area. The primary focus of these investigations has been to assess the status of walleye and smallmouth bass populations and secondarily those of other species in the near-shore fish community.

We use the catch rate or *Catch-Per-Unit-Effort by number (CPUE-no)* as an index of abundance of a particular fish species in the lake community. We also use the *Catch-Per-Unit Effort by weight (CPUE-wt)* as an index of fish productivity. We discuss both statistics in conjunction with one another because independently they can be misleading. (For instance: A high *CPUE-wt*

could be the result of a small number of very large fish being caught or a large number of very small fish being caught. This is clarified when we consider the *CUE-no.)*

We call *CPUE-no* an "*index of relative abundance*" because it does not specifically tell us the actual size of a population. Rather the *CPUE-no* statistics for a particular species generated on one lake is compared "relative" to that generated on a number of other lakes. Hence the abundance of a fish species on one lake is based on its position relative to a host of other lakes similarly surveyed.

We use size and age distribution data of various game fish species to help give us some insight regarding reproductive, recruitment and mortality rates. We acknowledge that we do not know actual reproductive, recruitment or mortality rates. We simply draw inferences about these rates based on the abundance of size classes.

The reader will note that when we make species specific comparisons with previous surveys, the number of reference surveys vary. This is because we only make comparisons with previous surveys that caught the same species. Also, surveys conducted prior to 1994 did not calculate Catch-Per-Unit-Effort by weight (*CPUE-wt*), and we therefor did not make any comparisons with these surveys when talking about this statistic.

3.0 Results and Discussion

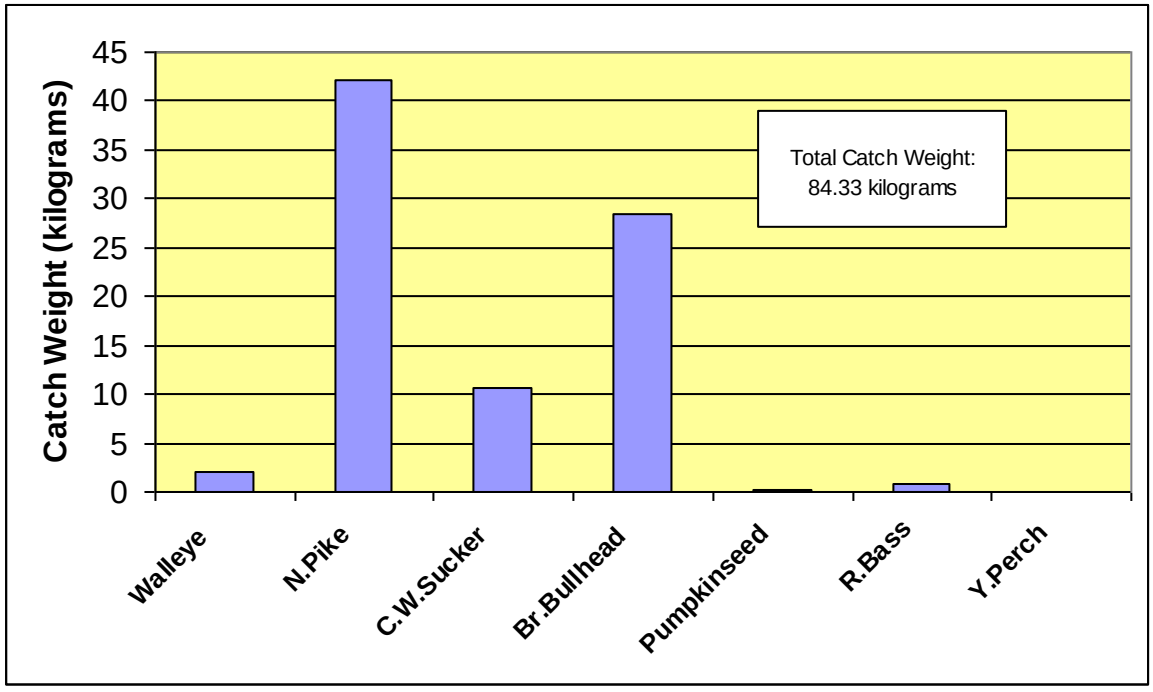
3.1 Catch Composition and Productivity:

The catch from 12 overnight trapnet sets consisted of: 1 walleye, 24 northern pike, 21 common white sucker, 162 brown bullhead, 3 pumpkinseed, 9 rock bass and 1 yellow perch (Appendix A).

Cumulatively, these fish weighted a grand total of 84.33 kilograms (Appendix A and Figure 2). The Catch-Per-Unit-Effort by weight (*CPUE-wt*) was 7.03 kg. / net set (Appendix A). Relative to 16 similar surveys conducted since 1994 on Parry Sound Area walleye lakes, this index of productivity ranks last and far below the average of 17.74 kg. / net set.

Game fish (walleye and northern pike) comprised 52.3% of the total catch weight, but almost all of this (49.9%) was attributable to northern pike alone. Coarse fish (sucker and brown bullhead) comprised 46.5% of the total catch weight and most of this was attributable to brown bullhead (33.8%). Pan fish (pumpkinseed, rock bass and yellow perch) comprised 2.4% of the total catch weight.

Figure 2. Catch Composition (by weight) for the Pakeshkag Synoptic Trapnet Survey, Summer 2001.



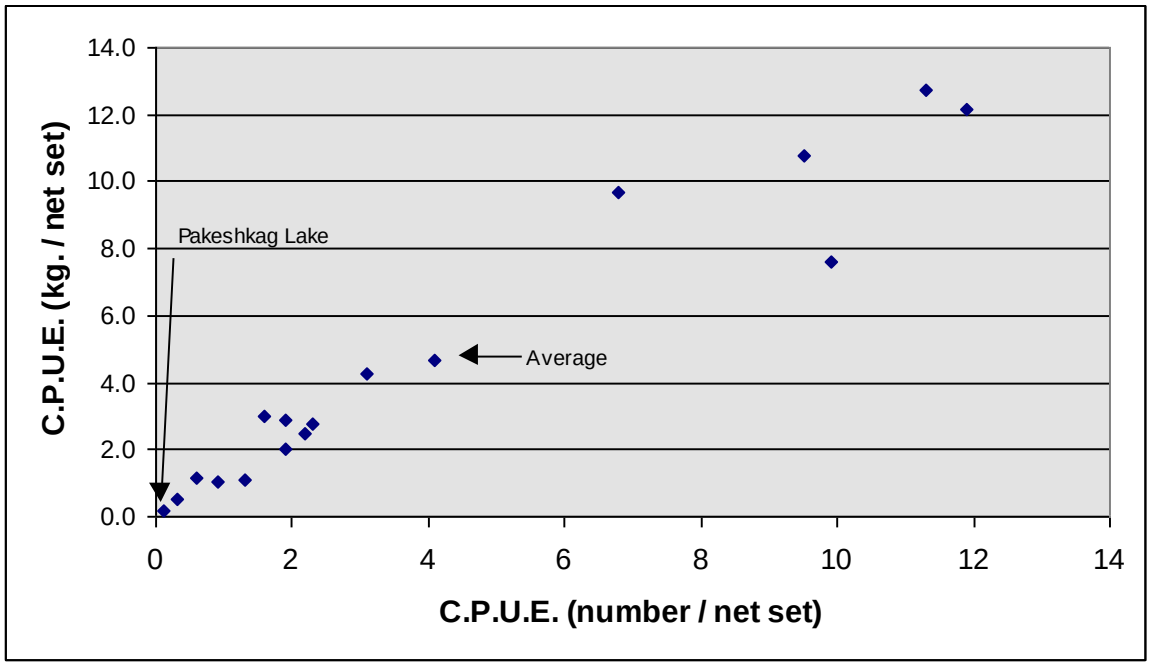
(For specific values – See Appendix A.)

3.2 Walleye:

From 12 over-night trapnet sets, our CPUE-no was a meagre 0.1 walleye / net set (standard error 0.083) (Appendix A). Relative to 16 recently completed trapnet surveys in the Parry Sound Area, this value ranks last and well below the average of 4.1 walleye / net set (Figure 3).

Our walleye CPUE-wt was also a meagre 0.167-kg. / net set (Appendix A), also last relative to similar Parry Sound Area surveys (Figure 3).

Figure 3. Walleye CPUE-no versus walleye CPUE-wt for 16 synoptic trapnet surveys recently conducted (since 1994) in the Parry Sound Area.



The single walleye captured had a total length of 57.7 cm., fork length 55.0 cm. and round weight was 2000 grams. It was assessed to be age 8, according to the scale reading method.

We conclude that walleye abundance is exceptionally low on Pakeshkag Lake, perhaps at the point where the populations is facing extinction.

3.3 Northern Pike:

Indices of abundance for northern pike must be viewed in light of the fact that this species is typically under represented in the catch relative to its abundance in the lake. Northern pike are "ambush feeders" that wait for their prey to come to them. Because trapnets rely on fish to actively swim into them, more sedentary fish such as pike are not as vulnerable to the gear. Also,

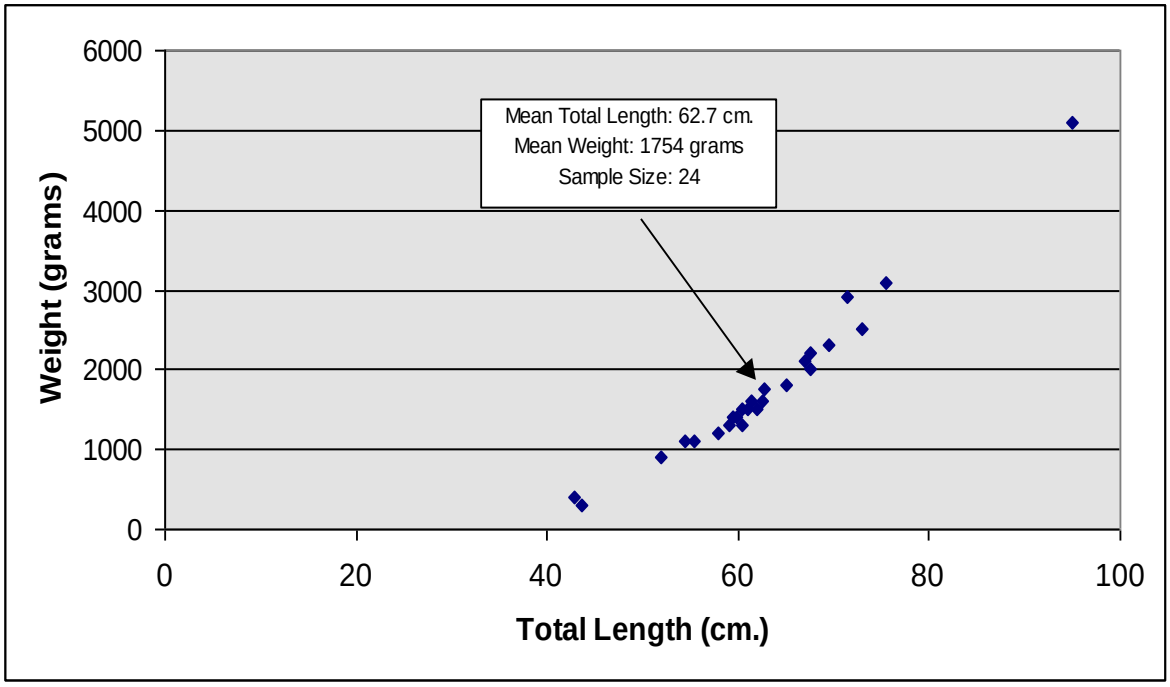
due to the inherently low catch rate for this species it is more difficult to ascertain what constitutes a low or high abundance.

A total of 24 northern pike were captured in 12 overnight trapnet sets for a CPUE-no of 2.0 pike per net set (standard error 0.564) (Appendix A). Relative to 22 recently conducted surveys (since 1986) conducted on Parry Sound Area lakes containing both pike and walleye in the fish community, this index of pike abundance ranks 4th and well above the average of 1.1 pike per net set. We consequently consider the abundance of pike to be relatively high on Pakeshkag Lake.

Likewise, our northern pike CPUE-wt was 3.508 kilograms per net set (Appendix A), which is well above the average for Parry Sound Area synoptic surveys of 1.736 kg. / net set.

We sampled all 24 pike captured during the survey. Mean total length was 62.7 cm. and mean weight 1754 grams (Appendix B and Figure 4).

Figure 4. Size distribution of northern pike captured in Pakeshkag Lake from a synoptic trapnet survey conducted during the summer of 2001.



The size distribution of pike in our sample appeared healthy with a good representation of large adult fish suggesting sustainable levels of mortality and a fair abundance of juvenile fish suggesting satisfactory recruitment. Very small and young pike are seldom caught as these fish tend to inhabit shallow near-shore waters that are not effectively fished by 8' trapnets.

3.4 Other Species:

Our CPUE-no for common white sucker (1.8 / net set) (Appendix A), brown bullhead (13.5 / net set) and yellow perch (0.1 / net set) were approximately average for similar synoptic trapnet surveys conducted on Parry Sound Area lakes since 1986 (sample size: 25 surveys). That for rock bass (0.8 / net set) and pumpkinseed (0.3) were below average.

3.5 Results Summary and Fishery Status Report Card:

We present a hypothetical report card for the Pakeshkag Lake fishery in which the give lake two ratings depending on its management goal. If the goal is pike production, we rate it highly with a B+. If the goal is walleye production, we rate it with an "F".

Pakeshkag Lake Fisheries Report Card

Index / Parameter	2001 Survey	Reference Value (Average)	Grade	Comments / Interpretation
Overall Productivity (All Species CPUE-wt)	7.07 kg. / net set	17.741 kg. / net set	D	Low Productivity
Game Fish - % of total catch biomass	52.3 %	62.3%	C-	Slightly below average
Walleye CPUE-no (no. / net set)	0.1	4.0	F	Extremely low walleye abundance
Northern Pike CPUE-no (no. / net set)	2.0	1.1	B+	Well above average pike abundance
N. Pike Size Distribution (Mean Length)	62.7 cm.	-		Sustainable mortality and recruitment rates

It is rather difficult to assign an over-all grade to the fishery of this lake. Certainly it has exceptionally low over-all fish productivity. Walleye production is extremely low and perhaps approaching extinction. The one 'bright spot' in our survey is the relatively high abundance of northern pike and its dominance as the top predator in the lake. Although productivity is low, a large portion is going towards pike production. Rating the lake is dependent on the goal one is trying to achieve. In terms of pike production, the lake rates a B+. In terms of walleye production, it rates an F.

We caution readers that the grading in this report card is somewhat arbitrary in that we have no specified criteria for any individual grade. We do use 'reference values' to indicate average conditions where this is available for specific parameters.

4.0 Discussion:

The precipitously low abundance of walleye in our survey results suggests that this remnant population may be on the brink of extinction. As part of an MNR Southcentral Region initiative, the status of walleye populations on forty lakes throughout the region were assessed by using the Ministry's *Fall Walleye Index Netting* (FWIN) survey methodology during the fall of 2001. Fortuitously, Pakeshkag Lake happened to be one of the lakes assessed. The results from the FWIN survey closely mirrored our survey results. From 12 overnight gill net sets, they captured a single walleye and 15 northern pike (unreported raw data – MNR, 2001). Both surveys point to an exceptionally low abundance of walleye and a good abundance of northern pike.

Unfortunately, we have no reliable or comparable base-line data to indicate historical levels of walleye abundance in the lake. Ministry file records for Pakeshkag Lake indicate a single entry from a 1963 summer creel interview in which 17 walleye and 5 pike were caught in 28 angler hours of fishing effort, suggesting 'pretty good walleye fishing' at that time (MNR, 1963). The 1972 lake survey caught 6 pickerel and no pike in two standard, over-night gill net sets (MNR, 1972). Although this information represents a paltry amount of historical data, it does suggest that walleye may have been much more abundant in the past than presently on the lake. It may also suggest that pike were historically less abundant. We emphasize the speculative nature of these statements and caution readers that they are not 'factually based'.

We are unsure of the cause(s) of the seeming imbalance in top predators on this lake today. Habitat on the lake appears to be quite suitable for walleye. Due to lack of development and habitat protection afforded by being in Grundy Lake Provincial Park, we have no reason to suspect habitat degradation or significant change in habitat is responsible for the low abundance of walleye. It is possible that walleye access to spawning sites may be blocked or impeded by the presence of beaver dams – but this has not been investigated.

Although walleye and northern pike co-exist in many Ontario lakes, there is evidence that the two species compete for food and pike predate young walleye (Kerr & Grant, 2000). Based on the 1961 Biological Survey Report (Johnson, 1961) we consider pike and walleye to be indigenous species to Pakeshkag Lake and have co-existed in this lake since the last ice age, 10 – 15,000 years ago. It would appear that the harmonious balance that evolved between these two species has recently been disrupted such that pike is now the dominant top predator in the lake and walleye have been relegated to a remnant population in the fish community. There is reference on a 1961 Biological Survey Report (Johnson, 1961) that fishing was "*once reported to be good but deteriorated rapidly in the last few years since new road [1959] made the lake accessible to heavy fishing*." We speculate that perhaps intense fishing pressure directed primarily at walleye may account for the current imbalance in top predators. We readily admit however that we have little substantive basis on which to draw such a conclusion and emphasize that it is an untested hypothesis.

Notwithstanding our lack of understanding of the factor(s) that contributed to the current state of a remnant walleye population in Pakeshkag Lake, we strongly recommend rehabilitative action before this population is pushed over the brink of extinction. A moratorium has been placed on walleye regulation changes in the Southcentral region pending recommendations of the *Southcentral Region Walleye Committee* expected in 2003. When those recommendations are

made, it is intended that Pakeshkag Lake will be place in a "rehabilitation" category and new walleye fishing regulations will greatly diminish or eliminate walleye harvest from this lake.

It is perhaps significant that smallmouth bass and black crappie are both absent in the catch. These species were also absent in the FWIN survey conducted on the lake during the fall of 2001. The above-mentioned 1961 Biological Survey (Johnson, 1961) indicated that smallmouth bass were present in the lake, although this was not confirmed by netting. There is also reference on a Ministry map on file that black crappie were introduced to the lake in 1990. Although we cannot account for the authenticity of these reports, it would appear that these species have been extirpated from the lake or are in extremely low abundance. Certainly, the very low secchi readings (1.2 metres) and highly dystrophic nature of the lake are not conducive to these species.

5.0 Acknowledgements:

Field operations were well supervised by Jim Palmer. Ministry staff providing able assistance included Andrew Johnson, Janet Feduszczak and Ken Molyneaux.

6.0 Literature Cited:

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OMNR, 1963. Biological Survey Report. Parry Sound District Office fisheries file report. 8 p.

OMNR, 1972. Aquatic Habitat Inventory (lake survey) Report. Parry Sound District Office fisheries file report. 2 p.

OMNR, 2001. Unreported, raw data for Fall Walleye Index Netting (FWIN) survey conducted on Pakeshkag Lake, fall 2001. Parry Sound District Office fisheries files.

Appendix A

Catch Summary for Pakeshkag Lake Synoptic Trapnet Survey, Summer 2001

Net Set Number	Effort (Net Nights)	Net Depth (meters)	Catch							
			Walleye	N.Pike	C.W. Sucker	Brown Bullhead	Pumpkin-seed	Rock Bass	Yellow Perch	
1	1	3.0	0	5	2	44	1	0	0	
2	1	3.5	0	1	0	0	0	0	0	
3	1	3.7	0	2	4	1	0	0	1	
4	1	3.7	0	0	0	9	0	0	0	
5	1	2.7	0	5	0	33	0	2	0	
6	1	3.8	0	0	0	0	0	0	0	
7	1	5.3	1	5	0	6	0	0	0	
8	1	3.9	0	2	4	17	1	3	0	
9	1	2.7	0	1	0	11	1	2	0	
10	1	4.9	0	2	0	1	0	0	0	
11	1	4.6	0	0	8	36	0	1	0	
12	1	4.6	0	1	3	4	0	1	0	Grand Totals
Total			1	24	21	162	3	9	1	221
CUE (number / net set)			0.1	2	1.8	13.5	0.3	0.8	0.1	
Standard Error			0.083	0.564	0.740	4.505	0.131	0.305	0.083	
Median			0	1.5	0	7.5	0	0	0	
Standard Deviation			0.29	1.954	2.56	15.61	0.45	1.06	0.29	
Sample Variance			0.08	3.818	6.57	243.55	0.20	1.11	0.08	
Confidence Level(95.0%)			0.18	1.242	1.63	9.92	0.29	0.67	0.18	
Count			12	12	12	12	12	12	12	
Total Weight (kg.)			2.000	42.100	10.700	28.530	0.170	0.730	0.100	84.330
% of Total Catch Weight			2.4%	49.9%	12.7%	33.8%	0.2%	0.8%	0.1%	99.9%
CUE (wt) (kg./net set)			0.167	3.508	0.892	2.375	0.014	0.061	0.008	7.027
Mean Weight (grams)			2000	1754	509	176	57	81	100	
Sample Size			1	24	21	162	3	9	1	

Appendix B

Northern Pike Biosampling Data – Pakeshkag Lake Synoptic Trapnet Survey, Summer 2001

	Set No.	Total Lg. (cm.)	Fork Lg. (cm.)	Weight (grams)
	1	61.9	57.9	1500
	1	95.0	91.0	5100
	1	54.5	52.0	1100
	1	59.0	56.0	1300
	1	65.0	61.2	1800
	2	62.5	59.0	1600
	3	42.9	40.0	400
	3	43.6	40.5	300
	5	59.5	56.5	1400
	5	59.8	56.5	1400
	5	61.3	58.0	1600
	5	60.5	57.0	1500
	5	67.5	64.5	2000
	7	67.0	63.5	2100
	7	67.5	64.0	2200
	7	61.0	57.5	1500
	7	71.5	68.0	2900
	7	75.5	72.5	3100
	8	73.0	69.3	2500
	8	58.0	54.4	1200
	9	52.0	48.6	900
	10	69.5	65.5	2300
	10	60.5	56.9	1300
	12	55.5	52.0	1100
Mean		62.7	59.3	1754
Standard Error		2.156	2.119	200.992
Median		61.2	57.7	1500
Standard Deviation		10.564	10.382	984.656
Sample Variance		111.600	107.792	969547.101
Confidence Level(95.0%)		4.461	4.384	415.783
Sum				42100
Count		24	24	24