

Binbrook Fishery Study 2002

-Preliminary Findings

by

Glanbrook Conservation Committee, and
Niagara Peninsula Conservation Authority

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Preliminary Binbrook Fishery Resource Study Analysis **2002**

The Binbrook Conservation Area was established in 1970. In 1971 a reservoir of 174 hectares (430 acres) was created. This reservoir was created to enhance summer flow of the Welland River as well as to provide on-site habitat for fish and waterfowl and passive recreational opportunities of hunting, fishing, and canoeing.

The goal for Lake Niapenco fisheries resources is to provide a healthy self-sustaining fishery with enhanced sport fishing opportunities. This fishery study is part of the site's long term monitoring program to assess the fishery resources and its potential, as well as to direct further rehabilitation work. Thanks to the long-term dedicated work of the Glanbrook Conservation Committee (GCC) this site monitoring and rehabilitation have been completed since the early 1990's. Additional thanks to the Ministry of Natural Resources whom has assisted with site monitoring and rehabilitation project funding since the 1970's.

Methodology

This study was conducted in 2002 to determine the success of fish stocking and habitat improvement and confirm the direction of fish management for the site. Trap nets and minnow traps were used July through September 2002 (non-reproducing time) throughout the lower reservoir, in comparison to previous monitoring data and equipment accessibility. A four and six foot trap net, and minnow traps were used. A combination of one trap net with 6 minnow traps were located throughout the reservoir in vegetated, unvegetated, and rock areas. Due to timing, three repetitions of each trap net throughout the season could not be completed. The trap net was set perpendicular to the shore with 3 minnow traps set on each of its sides. Traps were checked and emptied in the morning and evening. The trapped species were fin clipped and the records were taken of individual species, weight, and record of clipping, in addition to scale samples of several fish species (for aging purposes), the time the trap was set, lifted, the weather and water temperature. In addition, anglers reports were reviewed. Habitat in and around the trap net was also recorded and mapped for each trap site. All aquatic shore plantings, and fish cover and spawning restoration work were also mapped, in addition to area substrate, depth. From this information, the population structure (species composition, age and relative abundance) and ability of sport fish to reproduce was assessed. Existing habitat areas and comparisons with past fish populations were also assessed.

Background

In 1978 a weir was installed with Ducks Unlimited and OMNR 1/3 from the head of the reservoir to reduce water fluctuations, help establish vegetation, and provide shallow waters for ducks. In the early 1990's Pinehill Sportsman Club

was involved in sport fish stocking, fish studies and fish derbies (pike and crappie derbies in 1993-1995). Throughout the early 1990's through the present, the Glanbrook Conservation Committee (GCC) has been instrumental in completing fish monitoring and establishing aquatic and shoreline habitat throughout the reservoir (1995 through 2002) and establishing upland habitat at the site, while also being instrumental in determining suitable water level. The GCC and Dofasco Sportsman Club were also involved in joint fish stocking of the reservoir. From 1980 to the present, additional improvements to the site and the surrounding properties were completed by the Authority, including additional plantings, water quality and erosion sedimentation projects of the 'Clean up Rural Beaches (C.U.R.B.) and Welland River Non-Point Source programs. In fall of 1997 the water management was also altered to eliminate the winter draw down.

In 1997 the fisheries management plan was developed for this site with the OMNR, GCC and NPCA. A walleye, bass sport fishery was planned. Walleye and bass were experimentally stocked in the reservoir in 1997-1998, and plantings and habitat areas of the bays, shoreline and shallow island areas were completed to provide habitat for the fish species. Approximately 9000 carp were also removed from the upper weir area to assist in establishing vegetation, controlling sedimentation and balancing the fish population towards more sports fish (1997). Monitoring of the fish populations was also necessary to determine the success and best top sport fish. To ensure the stocked fish can establish a healthy population, a moratorium has been placed on pike, large and smallmouth bass since 1997, where catch and release is only permitted on these species.

Analysis

The chosen method of trap nets and minnow traps provides the most readily accessible equipment and comparison with past monitoring data at the time. This method however is limited to determining the relative abundance of adult fish and moving, shore species. Fish species such as pike, walleye and bass are less likely to be sampled with this method as they tend to favour the cooler deeper waters in the summer time and/or tend to be stationary to ambush their prey. The use of minnow traps assist in capturing the moving juveniles, young of the year.

From July 28 through September 5, 2002 13 sites were sampled in the lower reservoir (please refer to map 1 for locations). A total of 74 netting days resulted in 2499 fish being sampled. The total number of species sampled was 14 species, similar to other trapping years of 1992 through 1994, as well as the electrofishing data of 1997. The fish community and sport fish trend show that the number of walleye and largemouth bass have increased from 1992 to 2002, while the number of crappie has been decreasing from 1993 to 2002 (see Table 1).

Related to habitat, the greatest number of fish per netting day were found at bay mouths near rock weirs and at the west end of the lake (site G, F and E), and the greatest number of fish species per netting day was in unvegetated, open water areas also near the west end (site G and M). There was no appreciable difference noticed between 2 and 10 metre vegetation area and little difference between bay macro habitat areas (chart 1, 2 & 3).

Chart 1

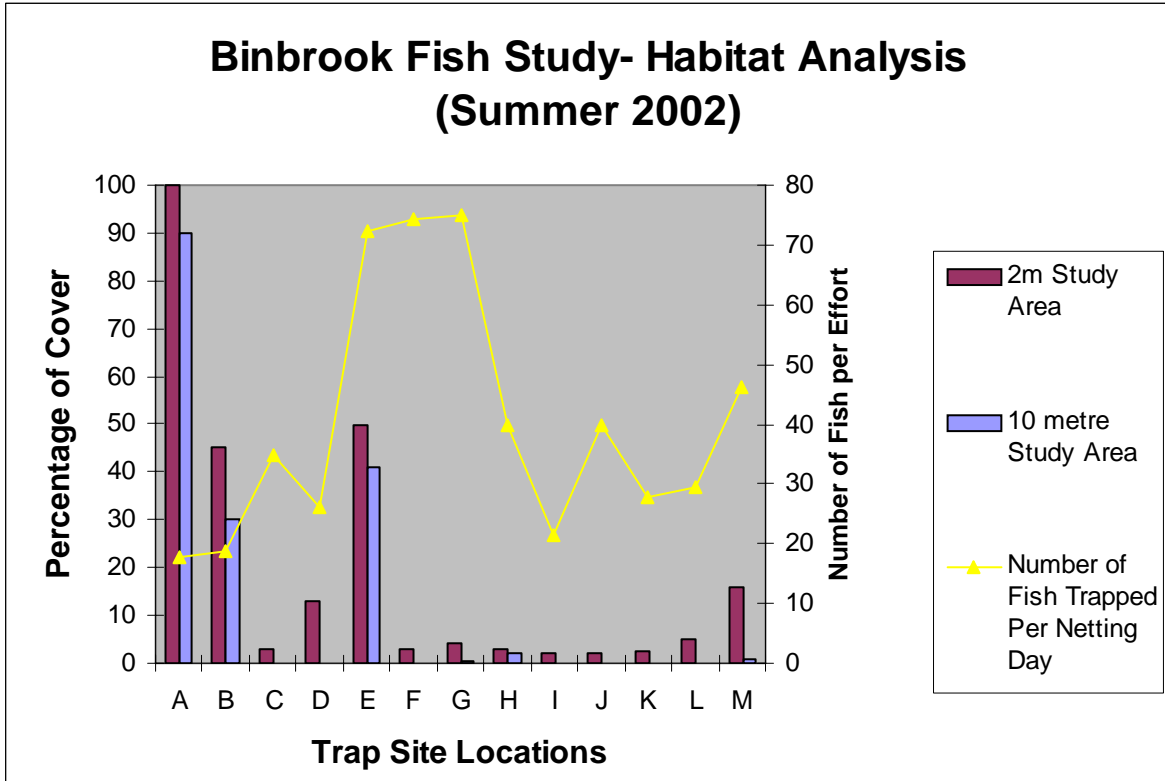


Chart 2

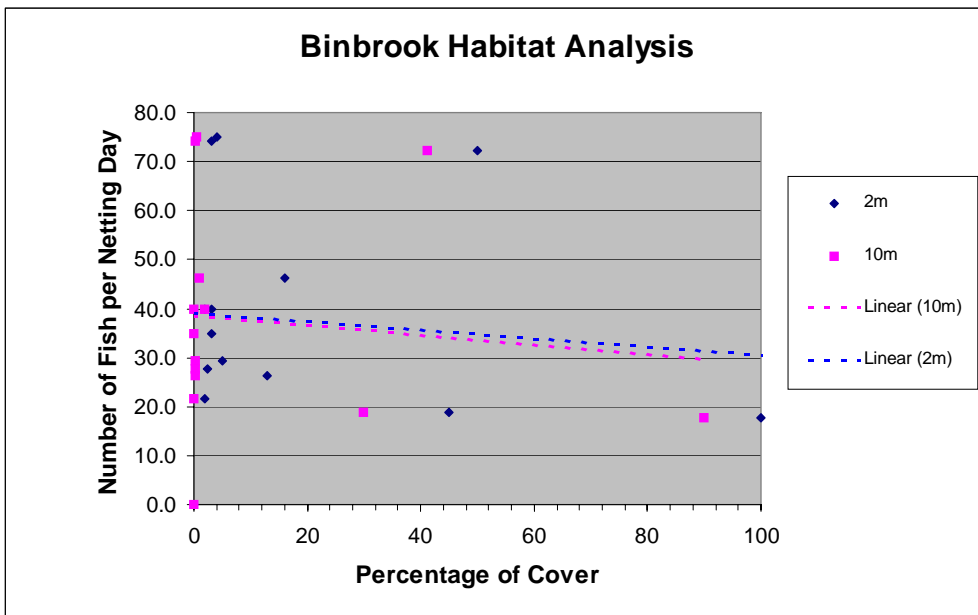
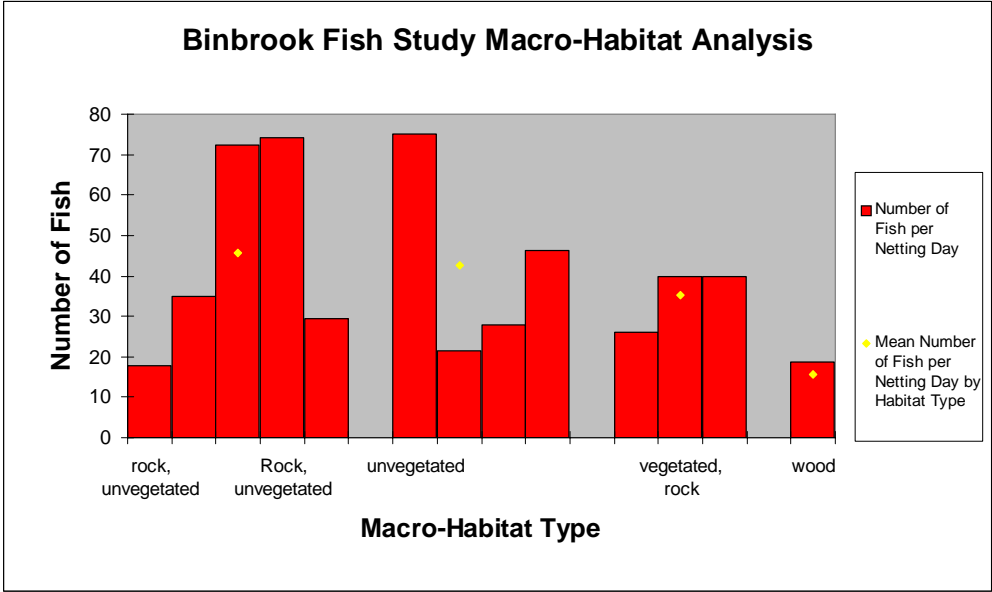
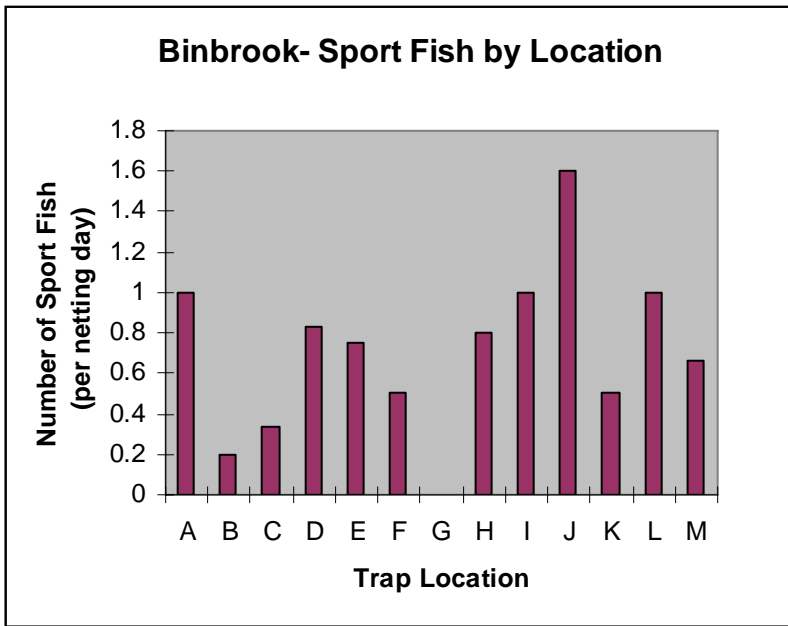


Chart 3



The greatest number of sports fish¹ per netting day were observed at the mouths of vegetated bays with nearby rock (site J) and well as vegetated, rocky and shallower sites (10-14 feet deep) (sites A, L and I) (chart 4 and map 1).

Chart 4

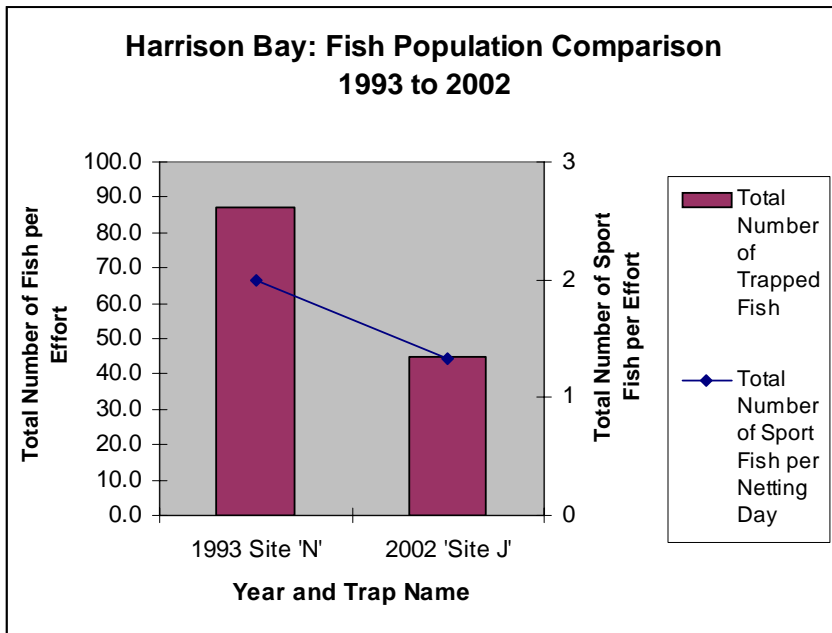


¹ Sports fish included largemouth bass, smallmouth bass, northern pike, walleye, yellow perch and rock bass.

To assess any changes in fish population composition related to new plantings and habitat cover, the same monitoring trap net locations were reviewed over time. Comparatively, they indicated an increase in the proportional population of sport fish to forage fish, as outlined in the followings (Table 2):

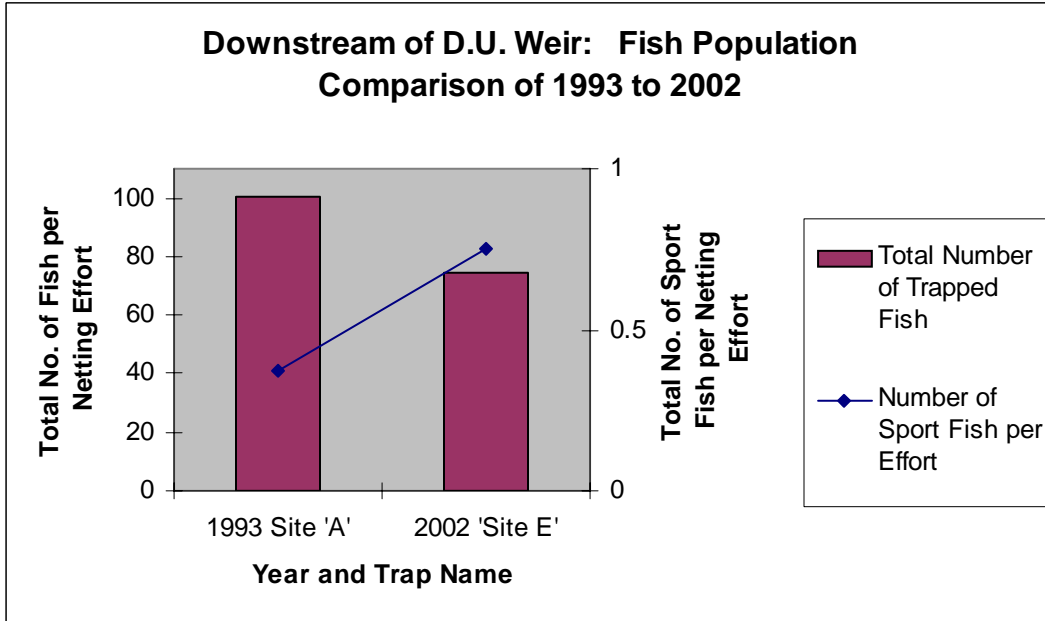
At the mouth of Harrison Bay the proportion of sport fish to other forage/ pan fish ratio has increased from 1993 to 2002. The number of catfish and crappies have also significantly decreased (Table 2, chart 5). Vegetation rehabilitation at this site was in 1997 and 1999 including shore plantings (of waterlily and sago pondweed) and additional in-water cover (of Christmas tree brush piles) (map1).

Chart 5



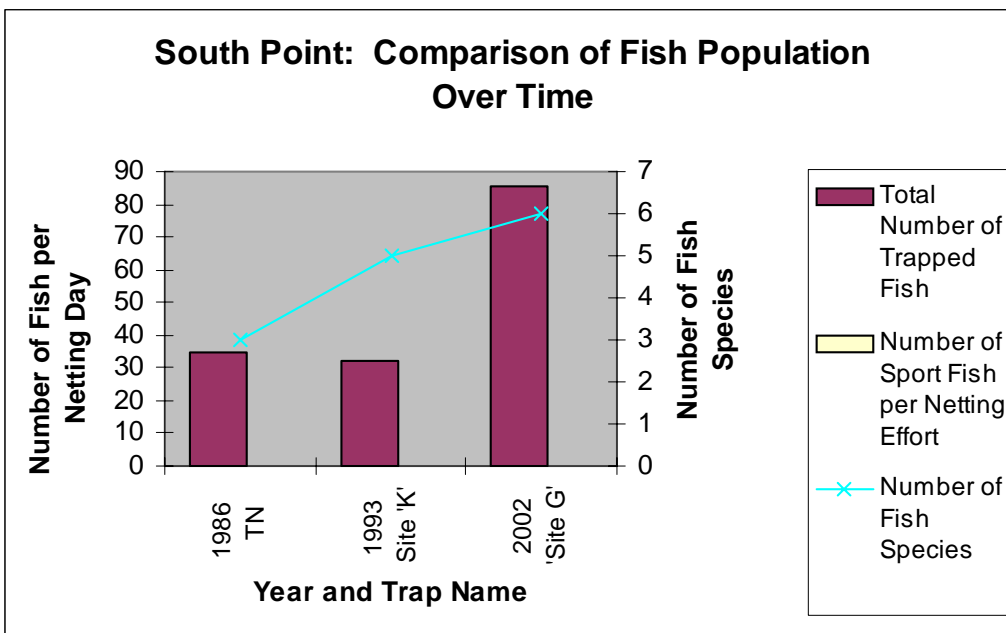
Similarly, on the downstream side of the D.U. weir, the proportion of sport fish to pan fish ratio has increased from 1993 to 2002. The total number of fish per effort decreased while the total number of sport fish per effort increased. Catfish has also significantly decreased (34 to 0.125 fish per netting day from 1993 to 2002). Crappie populations are shown to remain relatively the same 65 and 67 fish per netting day. Noted for this site is a difference in the 1993 sampling time from May through June as a possible inflated amount of crappie (chart 6). Site vegetation changes included 1996 shore vegetation plantings (of soft stem bulrush), and in 1994-5 nearby bank bioengineering (of dogwood) (map 1).

Chart 6



On the south shore point near D.U. weir, in the open water shallow area, the population trend, of total number of fish per netting day, increased from 1993 to 2002. The fish caught were pan fish which has been consistent from 1986 through 2002. The number of crappies has decreased from 1993 being approximately the same as effort caught in 1986, from 85 crappies per effort to 36-33 crappie per effort/netting (table 2, chart 7). Virtually no sport fish (except 0.25 yellow perch per netting day in 1986). Habitat improvements were completed in the surrounding area, with shore plantings of softstem bulrush, to the south in 1996, and shore plantings (of water lilies and softstem bulrush) and in-water cover (of Christmas tree brush piles) on the opposite lake shore in 1997 and 1998.

Chart 7



Fish Community and Age Distribution

For overall fish composition, the trapping survey indicates a high relative abundance of forage fish. The number of species has remained relatively the same over time, and the ratio of sport fish to forage fish is shown as improving but not optimal, increasing from approximately 1:102 to 1:46 sport fish per forage fish, from 1993 to 2002 (Table 1). A decrease in sport fish is also seen from 1994 to 2002. The number of forage fish also shows a significant decrease since 1993 (Table 1, chart 13). During this time carp removal and habitat improvements occurred which appears to have a positive affect on the fish community composition. The optimal proportion of sport fish to forage fish is 1:5 as per Bob Lewis, summer 1992 report based on comparison with Chemung Lake's fish trophic level (of omnivores, herbivores, insectivores, piscivores).

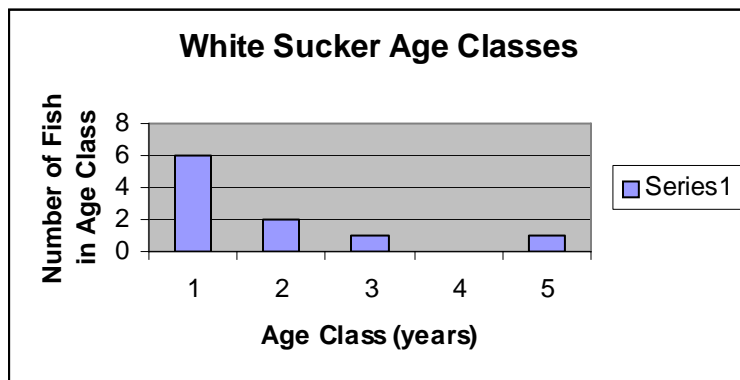
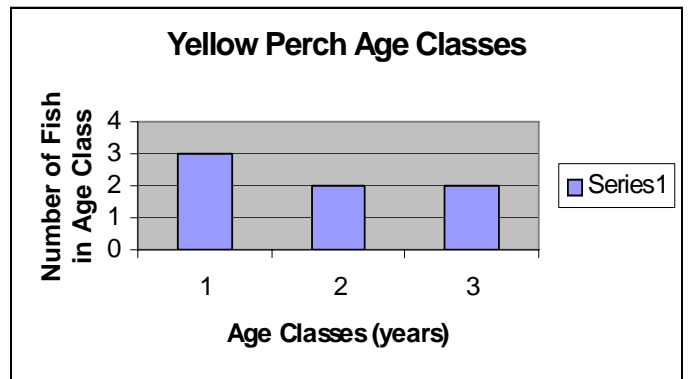
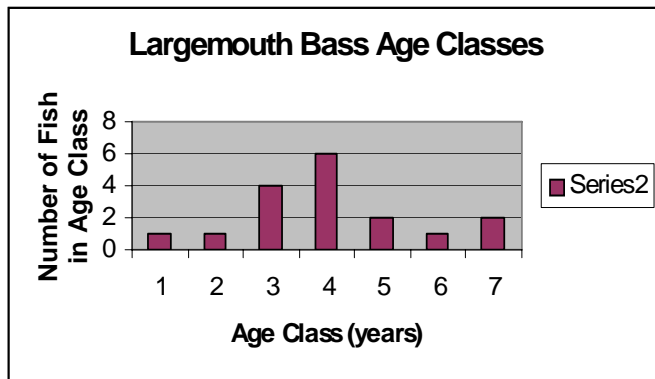
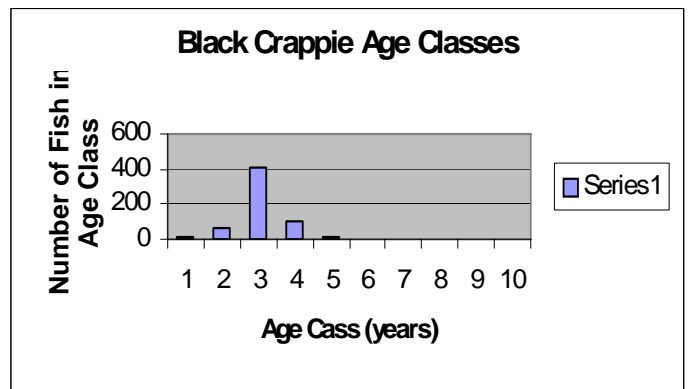
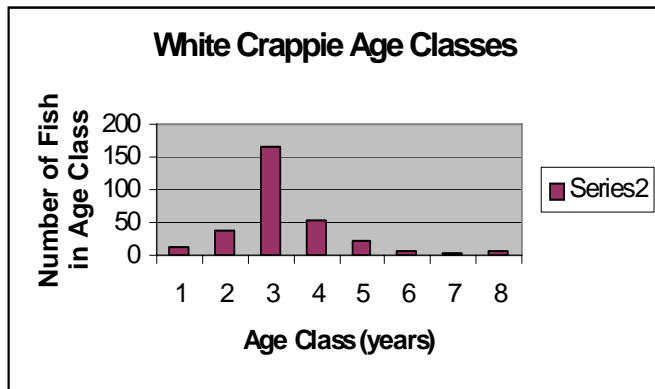
From the fish length measurements and scale samples taken, all ages are represented for crappie, largemouth bass, and white sucker. Capture of fingerlings and juveniles also indicate sunfish, crappies, largemouth bass and catfish are able to reproduce. Young age classes of yellow perch and absence of older adult age classes suggest an establishing population over the last 4 years. For walleye, pike and small mouth bass however, low numbers or absence of smaller age classes were observed indicating low reproduction rates for these species. Their age classes for these species were: walleye 6 to 8 years old, pike 4 through 8 years old and no observed smallmouth bass. Absence of the younger sport fish age classes were also reflected in the three angler reports received from the site² (charts 8 – 12). Habitat analysis of the lower reservoir (based on trap location habitat, and past site information) would also suggest that small amounts of spawning habitat exist for walleye and limited spawning habitat exist for pike in the lower reservoir.

The age distributions also highlight the success of past largemouth and walleye stocking initiatives. Approximately 600 unaged, adult largemouth bass were stocked in 1997 and 1999, in addition to 40 unaged adult Walleye stocked in 1997-1998. The presence of age classes less than 4 years old largemouth bass indicate reproduction and suitable habitat and conditions found for this species. For walleye no fish less than 5 years were caught which may reflect difficulty in reproducing.

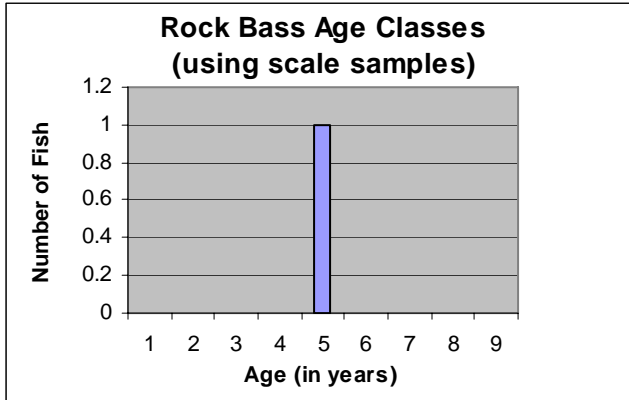
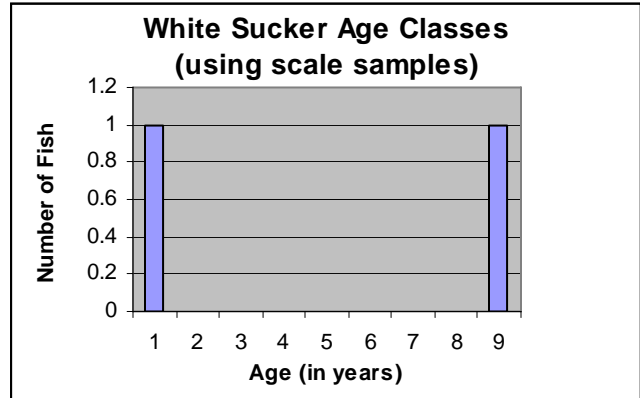
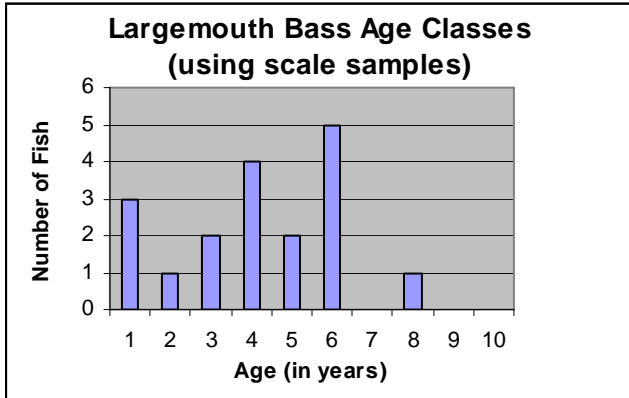
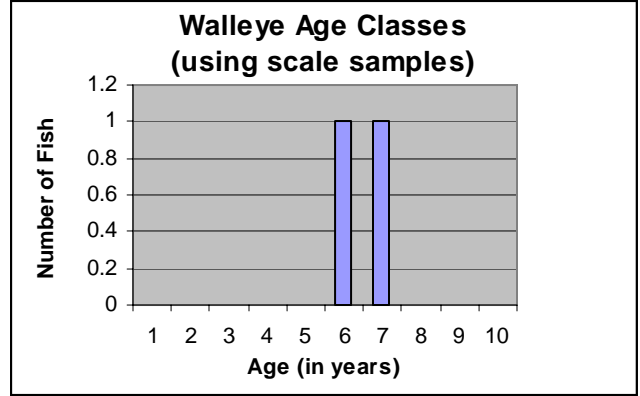
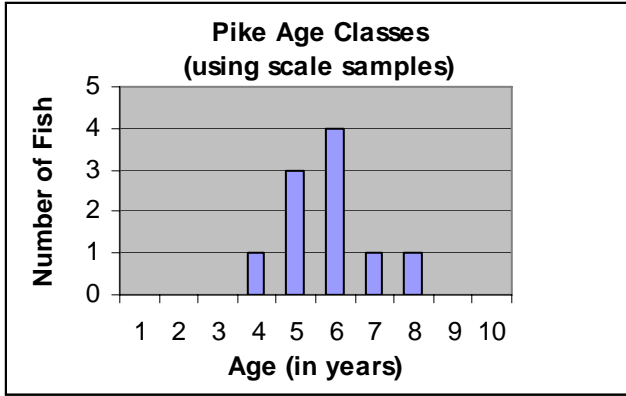
For related fish management policies for the site, it is also noted that a catch and release policy exists for walleye, pike and bass since 1998. A limited number of angler harvest reports for the site² indicate pike, walleye and largemouth bass as the targeted species. Limited signage and only one brochure (produced in 2002) appears to communicate this policy.

² Angler Reports, 2002

Charts 8-12



Pike and walleye ages by length range too large to age



Conclusion

We highlight that these study findings are to assist in determining the fish community health and future rehabilitation activity, and must be considered with the following aspects in mind:

- 1) that deep water non mobile fish species (such as walleye and pike) may not be captured or accurately reflected by this method,
- 2) that unusual findings may be represented by a the small sample size and absence of trap repetition.
- 3) that for annual data comparison, all data methods were considered to be equal will 1992, 1993, and 1994 totals addressing recaptures.

With these limitations in mind, we note the study may be biased, reflecting the adult and young of the year warm water shallow and moving species only (based on the trap netting and minnow trap method). Walleye, pike and smallmouth bass may also be found in deeper waters by other sampling methods, or within the upper reservoir. These limitations can be addressed with electrofishing and upper weir trapping to supplement the fishery findings in other water depths and to obtain a full understanding of the lake fishery.

Fish Community

The fish community of the lower Binbrook reservoir suggest an improving sport fishery. The number of fish has decreased, while the sport fish in proportion to other fish has increased. The proportion (relative abundance) of forage fish to sports fish is high, yet improving, with the optimum ratio of 5 forage fish to 1 sport fish still to be achieved (Bob Lewis, 1992). The fish community appears to remain constant with 14 to 15 species since 1993, with white and black crappies being the dominant fish group. For sport fish, largemouth bass show a self sustaining population with all age classes represented, and an establishing yellow perch population over the last 4 years. Pike and walleye levels suggest low to no reproduction in the past 3-5 years. Existing stocking programs of largemouth bass also appear to be successful.

Habitat

Habitat at Binbrook reservoir has significantly improved with much of the habitat improvements occurring since 1994. Created fish habitat included approximately 5,200 metres of shore were planted, 950 metres of inshore habitat cover (from 1995 through 2002), and 550 metres of rock shore, 300 metres of shore bioengineering, 100 hectares of upland forest and water quality programs on-site in the surrounding area including natural vegetative buffers, CURB and Welland River Non-Point Source Programs (1980-2002). Areas of focus were bays and shallow island areas. The majority of sport fish (2002) were found at the mouths of vegetated bays with rock nearby, reflecting beneficial habitat improvements.

In the lower reservoir, habitat and site conditions appear best suited for the largemouth bass and yellow perch. The findings suggest that for walleye and

pike conditions are not suitable resulting from either a lack of or unsuitable habitat (such as silted rock spawning beds, or unsuitable spring water levels for spawn (too low or drops before eggs can hatch or fry can escape)), overfishing of these species, high predation of fish eggs and/or fry, or study biases where walleye and pike may be existing in deeper waters of the reservoir.

Suggested Fishery Resource Management for the Site

These findings suggest:

- the sport fish populations should focus on largemouth bass, yellow perch and possibly northern pike, in the lower reservoir, with fishery consultation from the Ministry of Natural Resources. This increasing population of fish eater should assist in balancing the high forage fish base
- Electrofishing should also be completed to confirm the potential lack of pike and walleye reproduction (younger age classes), as this method is less biased of fish size, species mobility and water depths
- In addition, the analysis of reservoir water levels (at walleye and pike reproduction time) should be assessed regarding potential affect on these population findings.
- Trapping of the upper reservoir (above the D.U. weir) should also continue to complete the reservoir fish assessment, and determine if pike production does exist here or would be best suited in this part of the reservoir.
- Site 'catch and release' policies should also remain on pike, walleye and bass for a minimum of 3-5 years until the younger age classes can develop. After 3-5 years the 'catch and release' policy and its' effectiveness on the target fish population growth should be reviewed and a determination made on the need to continue the policy. Increased signage and information distribution on the catch and release policy will need to be promoted if the moratorium is to continue. Further promotion of the 2002 Catch and Release policy and species harvest report is also required.

For overall habitat assessment, study above the D.U. weir is also required and is scheduled to be completed in the summer of 2003. The GCC's continued endeavours and energy to monitor and rehabilitate this Conservation Area is well observed and appreciated.

While this study focuses on the fishery resource requirements, it is noted that habitat requirements of all species and site use objectives are jointed addressed. As a result, waterfowl needs for grass, submerged and emergent vegetation and open upland areas, as well as passive recreational water use is also considered in activities at this site.

Acknowledgements

This study is completed with the on-going, energetic work of Andy Fevez and the remainder of the Glanbrook Conservation Committee (GCC).

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Lee-Ann Hamilton, NPCA, and
Kim Frohlich, NPCA

Appendices

Table 2 Fish Trapping Comparison Over Time- same trap net location

Species	1993 Site 'N'	2002 'Site J'		1993 Site 'A'	2002 'Site E'		1986 TN	1993 Site 'K'	2002 'Site G'	
Black Crappie	436	76	78	1566	134	140	132	249	70	72
White Crappie		89			264				9	
Northern Pike		2			3					
Walleye		1								
Largemouth Bass	2	4		1	3					
Smallmouth Bass	2									
Rock Bass	2	1		5						
Yellow Perch	6			3				1		
White Sucker				1	3			4	1	
Pumpkinseed Sunfish	5	15		3	48			1	1	
Bluegill Sunfish										
Common Carp	1			21					1	
Brown Bullhead		2			1		2		17	
Black Bullhead							6			
Channel Catfish	68			811	1			35		
Spottail Shiner	1	1								
Other										
TOTAL	523	269		2411	597		140	290	171	
Total Number of Netting Days	6	6		24	8		4	9	2	
Total fish caught per netting day (success per netting effort)	87.2	44.8		100.5	74.6		35	32.2	85.5	
Number of sport fish per netting day	2	1.3		0.375	0.75		0	0.1	0	

Binbrook Trap Netting Summary Sheet 1992-2002																			
	1986			1992			1993			1994			1995 (above DU weir)		2002				
Species	total number	%	number per netting day	total number	%	number per netting day	total number	%	number per netting day	total number	%	number per netting day	total number	%	total number	%		number per netting day	
Black Crappie		94	33	13711	95	67.88	13655	88	79.39	9257	90	60.11	11500	54.87	1534	61.39	94	31.74	
White Crappie	132														815	32.61			
Northern Pike				8	0.05	0.04	4	0.03	0.02	200		1.30	89	0.42	17	0.68		0.23	
Walleye				2	0.01	0.01			0.00	1	0.01	0.01			2	0.08		0.03	
Largemouth Bass				3	0.02	0.01	7	0.04	0.04	3	0.03	0.02	14	0.07	21	0.84		0.28	
Smallmouth Bass				3	0.02	0.01	4	0.03	0.02	1	0.01	0.01			0	0		0.00	
Rock Bass				11	0.07	0.05	38	0.2	0.22	14	0.1	0.09			1	0.04		0.01	
Yellow Perch				59	0.4	0.29	97	0.6	0.56	70	0.7	0.45			12	0.48		0.16	
White Sucker				3	0.02	0.01	14	0.086	0.08	18	0.17	0.12	45	0.21	12	0.48		0.16	
Pumpkinseed Sunfish				15	0.1	0.07	154	1	0.90	23	0.2	0.15			13	0.52		0.18	
Bluegill Sunfish							14	0.09		3	0.03				2	0.08		0.03	
Common Carp				129	0.9	0.64	99	0.6	0.58	29	0.3	0.19	7434	35.47	1	0.04		0.01	
Brown Bullhead	6	4		439	3	2.17	1332	9	7.74	790	8	5.13	1875	8.96	56	2.24	2.72	0.76	
Channel Catfish															12	0.48		0.16	
Other	2	1		1	0.006	0.00	2	0.01	0.01			0.00			1	0.04		0.01	
TOTAL	140			14391			15445			10226			20957		2499				
Total Number of Netting Days	4			202			172			154			n/a		74				
Number of fish per netting day (success per netting effort)	35			71.2			89.8			66.4					33.8				
Percentage of Sport Fish / Number of Sport Fish per Netting Day	0	/	0	0.6	/	0.4	0.9	/	0.9	0.9	/	1.9	n/a	/			2.1	/	0.7

