

2004 Evaluation of Barge Stocking Versus Traditional Shore Stocking on the Return of Lake Ontario Brown Trout to the Creel.

M. J. Sanderson
*New York State Department of Environmental Conservation
6274 East Avon-Lima Road
Avon, New York 14414*

T. H. Eckert
*New York State Department of Environmental Conservation
Cape Vincent Fish Research Station
Cape Vincent, New York 13618*

M. A. Wilkinson
*New York State Department of Environmental Conservation
270 Michigan Avenue
Buffalo, New York 14203*

B. F. Lantry
*United States Geological Survey
Lake Ontario Biological Station
Oswego, New York 13126*

Concerns over the possible loss of shore-stocked brown trout to near shore predators in west-central Lake Ontario prompted a comparison study of traditionally shore-stocked versus barge-stocked brown trout.

An earlier study addressing the possible effects of cormorant predation on newly stocked brown trout in south-eastern Lake Ontario revealed that barge-stocked brown trout returned to the creel 3.65 times better than shore stocked brown trout (Eckert 2005).

Methods

In 2001 and 2002, two lots of 20,000 yearling brown trout from the NYSDEC Salmon River Hatchery were fin-clipped for a paired stocking at Sodus Bay and two lots of 20,000 brown trout from the NYSDEC Caledonia Hatchery were fin clipped for a paired stocking at Point Breeze. Table 1 describes the characteristics of brown trout stocked during this study. At each site, one of the uniquely clipped lots of fish was traditionally shore-stocked and the other uniquely clipped lot was barge-stocked.

Analysis of data collected from creel census

surveys in 2002 revealed that nearly nine times more fish returned to the creel from the fish stocked at Point Breeze than Sodus Bay (Pearsall and Eckert 2003, unpublished data). One possible explanation for this observation is that brown trout from the Caledonia Hatchery are larger at stocking than the Salmon River Hatchery brown trout, and therefore survive better. To test this hypothesis, the two lots of Salmon River Hatchery brown trout were stocked at Point Breeze, and the two lots of Caledonia Hatchery brown trout were stocked at Sodus Bay in 2003 and 2004.

Shore-stocking took place at traditional shore-stocking locations. Barge-stocking was accomplished by taking hatchery trucks by landing craft offshore, approximately 1.13 km (0.7 miles) off Sodus and 1.29 km (0.8 miles) off Oak Orchard, where the fish were stocked at the 30 foot (approximate) contour.

Fish from each year class stocked became available to the fishery at age-2. Brown trout returns were monitored from the tributaries through pen rearing evaluation creel censuses on Oak Orchard Creek and the Lower Niagra River (Bishop et al. 2005).

Table 1. Characteristics of brown trout stocked in Lake Ontario as part of the 2001-2004 barge stocking evaluation.

Clip	Age in	Year	Where/How	Hatchery	Size (g) at
LV	1+	2004	Sodus Barge	Caledonia	117.9
	2+	2003	Sodus Barge	Caledonia	151.7
	3+	2002	Sodus Barge	Salmon River	72.7
	4+	2001	Sodus Barge	Salmon River	90.7
LP	1+	2004	Sodus Shore	Caledonia	118.4
	2+	2003	Sodus Shore	Caledonia	144.9
	3+	2002	Sodus Shore	Salmon River	64.8
	4+	2001	Sodus Shore	Salmon River	87.2
LVAD	1+	2004	Point Breeze Barge	Salmon River	98.6
	2+	2003	Point Breeze Barge	Salmon River	78.2
	3+	2002	Point Breeze Barge	Caledonia	157.0
	4+	2001	Point Breeze Barge	Caledonia	154.8
LPAD	1+	2004	Point Breeze Shore	Salmon River	92.6
	2+	2003	Point Breeze Shore	Salmon River	76.9
	3+	2002	Point Breeze Shore	Caledonia	162.5
	4+	2001	Point Breeze Shore	Caledonia	155.9

Returns from the open waters of Lake Ontario were evaluated through the NYSDEC fishing boat census (Eckert 2005) and lake trout assessment programs (Lantry et al. 2005, Lantry and O’Gorman 2005).

Results and Discussion

Returns of clipped fish observed in 2004 tributary and open water surveys are presented in Table 2. Brown trout surveyed during 2004 tributary surveys revealed a 1.65 to 1 advantage of shore-stocking versus barge-stocking. In 2004, fish sampled from the open waters of Lake Ontario showed no significant difference between shore or barge-stocking ($\chi^2 = 0.04, p = 0.85, df=1$). Overall, shore stocked-brown trout returned fish to the creel at a rate of 1.42 to 1 compared to barge-stocked fish in 2004.

Table 2. Fin Clipped brown trout collected from NYSDEC and USGS sampling in 2004.

	Shore	Barge	Shore:Barge
Tributaries	147	89	1.65
Open Water	57	55	1.04
Total	204	144	1.42

A Chi-square test for association revealed that the returns of brown trout in 2004 were distributed differently for the two survey methods ($\chi^2 = 4.07, p = 0.04, df=1$). This suggested that the methods were biased, preventing us from combining the data. A chi-square test for a 1:1 expected return ratio was performed on the 2004 tributary return data. The test revealed that the shore stocked fish returned significantly better than the barge stocked fish ($\chi^2 = 14.3, p < 0.01, df=1$). These results are similar to those observed in 2002 and 2003 (Pearsall et al. 2003, Sanderson et al. 2004).

Cumulative returns of clipped fish observed during the tributaries and open water surveys for all years combined appear in Table 3.

Table 3. Fin Clipped brown trout collected from NYSDEC and USGS sampling in 2002, 2003, and 2004.

	Shore	Barge	Shore:Barge
Tributaries	626	287	2.18
Open Water	153	144	1.06
Total	779	431	1.81

Brown trout surveyed during the three years of

tributary surveys revealed a 2.18 to 1 advantage of shore-stocking versus barge-stocking. Fish sampled from the open waters of Lake Ontario showed no significant difference between shore or barge-stocking ($\chi^2 = 0.28$, $p = 0.60$, $df=1$). Overall, shore-stocked brown trout return fish to the creel at a rate of 1.81 to 1 compared to barge-stocked fish.

A Chi-square test for association revealed that the total returns of brown trout in 2002-2004 were distributed somewhat differently for the two survey methods ($\chi^2 = 8.8$, $p = 0.01$, $df=2$). This suggested that the methods could be biased, preventing us from combining the data. However, a chi-square test for a 1:1 expected return ratio was performed on the return data from all years. The test revealed that the shore stocked fish returned significantly better than the barge stocked fish ($\chi^2 = 100.1$, $p < 0.01$, $df=1$).

Results to date suggest that offshore stocking of brown trout yearlings at Sodus and Point Breeze does not result in any significant improvement in the recruitment of adults to the fishery. Barge stocking at these sites is therefore not cost effective.

Table 4 shows the number of clipped brown trout observed during tributary and open water surveys for all years combined. From these preliminary data, it appears that the larger Caledonia Hatchery brown trout stocked by either method at both sites contribute to the creel better than Salmon River Hatchery brown trout.

The final year of stocking marked fish occurred in 2004, with the two lots of Salmon River Hatchery brown trout stocked at Point Breeze, and the two lots of Caledonia Hatchery brown trout stocked at Sodus Bay as in 2003. Data collection from the open waters of Lake Ontario is planned to continue in 2005. The chinook salmon creel survey at Oak Orchard creek will not be conducted in 2005. However, data from marked brown trout stocked from 2002-2004 will be collected during a proposed Lake Ontario south shore tributary creel survey planned for the fall of 2005.

Table 4. Number of clipped brown trout observed during the tributaries and open water surveys for all years combined. Returns of Caledonia brown trout appear in bold, Salmon River in regular text (PB=Point Breeze, SB=Sodus Bay).

References

- Eckert, T.H. 2005. Lake Ontario fishing boat census 2001. Section 2. *In* 2004 Annual Report. Bureau of Fisheries Lake Ontario Unit and St. Lawrence River Unit to the Great Lakes' Fishery Commission's Lake Ontario Committee. New York State Department of Environmental Conservation. Albany, New York.
- Lantry, B.F. and R. O'Gorman. 2005. Evaluation of offshore stocking to mitigate piscivore predation on newly stocked lake trout in Lake Ontario. Section 11 *In* 2004 Annual Report, Bureau of Fisheries Lake Ontario Unit and St. Lawrence River Unit to the Great Lakes Fishery Commission's Lake Ontario Committee. New York State Department of Environmental Conservation. Albany, New York.
- Lantry, B.F., R. O'Gorman, and S.E. Prindle. 2005. Lake trout rehabilitation in Lake Ontario, 2004. Section 5 *In* 2004 Annual Report, Bureau of Fisheries Lake Ontario Unit and St. Lawrence River Unit to the Great Lakes Fishery Commission's Lake Ontario Committee. New York State Department of Environmental Conservation. Albany, New York.
- Pearsall, W. E., T. H. Eckert, and D. L. Bishop 2003. 2002 Evaluation of barge stocking versus traditional shore stocking on the return of Lake Ontario brown trout to the creel. Section 23 *In* 2002 Annual Report. Bureau of Fisheries Lake Ontario Unit and St. Lawrence River Unit to the Great Lakes' Fishery Commission's Lake Ontario Committee. New York State Department of Environmental Conservation. Albany, New York.
- Sanderson, M. J., T. H. Eckert, and M. A. Wilkinson 2004. 2003 Evaluation of barge stocking versus traditional shore stocking on the return of Lake Ontario brown trout to the creel. Section 23 *In* 2003 Annual Report. Bureau of Fisheries Lake Ontario Unit and St. Lawrence River Unit to the Great Lakes' Fishery Commission's Lake Ontario Committee. New York State Department of Environmental Conservation. Albany, New York

Survey Year	PB Barge		PB Shore		SB Barge		SB Shore	
	Tribs	Lake	Tribs	Lake	Tribs	Lake	Tribs	Lake
2002	80	30	162	46	8	9	12	7
2003	107	43	297	39	3	7	8	4
2004	66	29	125	23	23	26	22	34