

2007 New York Cooperative Trout and Salmon Pen-Rearing Projects

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In 1998, concerns over post-stocking survival and imprinting of steelhead and Chinook salmon to stocking sites led to the formation of several cooperative sportsmen's groups interested in pen rearing (Bishop and Pearsall 1999). Concerns from the eastern basin of Lake Ontario centered on predation of stocked steelhead trout by cormorants. Western basin concerns included the apparent lack of imprinting and subsequent impaired homing of Chinook salmon and steelhead to the stocking streams.

After the successful completion of pen-rearing projects at Oswego Harbor and Oak Orchard Creek in 1998, a number of other sportsmen's groups expressed interest in pen-rearing. New sites were added in 1999, including the Lower Niagara River, Sandy Creek, Genesee River and Sodus Bay. No additional sites were added until 2003, when a new pen project for Skamania steelhead was initiated at Little Salmon River. In 2005, a Chinook pen-rearing project was initiated at Olcott Harbor on Eighteenmile Creek, and steelhead were added there in 2006. Also in

2006, a pen-rearing project was initiated at Wilson Harbor on East Branch Twelvemile Creek to rear steelhead. In that same year, steelhead trout was raised at the Lower Niagara and Sandy Creek pen sites. All project sites have been active each year since their inception, except for Sandy Creek which was inactive in 2004 and 2005. This report summarizes 2007 pen-rearing activities and results.

Methods

Pen rearing was conducted at nine different sites along New York's coastline of Lake Ontario in 2007. The project sites, along with a description of site locations and project sponsors, are listed in Table 1.

All sites, except the Lower Niagara River, used similar pen materials, design and netting as described for the 1998 Oak Orchard Creek Project in Bishop and Pearsall (1999). The Lower Niagara River pen-rearing facility is described in Wilkinson et al (2005).

Standard operating procedures for stocking, maintaining, feeding, and releasing penned salmon were developed and refined by NYSDEC (Wilkinson 1999, Sanderson 2006). Rearing methods have remained very similar at most sites from year to year, except for the Lower Niagara River as mentioned previously. Additional information on methods used at pen sites in 2007 is provided in Table 2.

Observed mortalities for all projects were based on the number of dead fish collected from the pens during captivity and from the bottom of the pens after release. Both sources of mortality were noted by cooperators, except where listed otherwise. Mortality does not include fish lost to cannibalism or from predators that may have gained access to pens.

Results and Discussion

A total of 84,300 steelhead (Washington and Skamania strains) was raised at eight pen sites, comprising 14% of NYSDEC's Lake Ontario rainbow trout/steelhead stocking allotment in 2007. Observed mortalities at the eight steelhead rearing sites ranged from 0.028 to 0.15%. Results for all the pen projects are summarized in Table 3.

Five pen-rearing sites raised a total of 313,100 Chinook salmon, representing 18% of NYSDEC's 2007 Chinook salmon stocking allotment. At the five sites where Chinook were penned, mortality estimates ranged from 0.025 to 0.096%, which is considered low.

Water temperatures at all pen sites generally benefited from cool weather during the pen project period. The water temperature criterion (65°F) established for pen projects was exceeded at only one pen site during 2007. The highest water temperature observed was 66°F at the Sandy Creek pen site.

Little Salmon River

In the fifth year of pen-rearing at Little Salmon River, Skamania steelhead grew from 20 to 10.5 fish per lb after 22 days in the pens (Table 3). Fish were towed in pens and released in the vicinity of the river mouth. Water temperatures ranged from 49 to 64°F during the project.

Oswego Harbor

Steelhead were delivered at 17 fish per lb, and when released on 10 May, weighed 13 fish per lb. However, in one pen where steelhead density was approximately one-half that of the other two pens, the steelhead achieved growth of approximately 7.8 fish per lb.

Chinook grew from 110 fish per lb to 55 fish per lb after 27 days. During the steelhead and Chinook rearing period, the water temperature ranged from 35 to 60°F.

Sodus Bay

Chinook grew from 109 fish per lb to 83 fish per lb after 19 days. The fish had an average (10 fish from each pen) length of 81mm (3.2 in) at release. Water temperatures ranged from 35 to 54°F.

Genesee River

Steelhead were released on 30 April and weighed 12.4 fish per lb, compared to a delivery weight of 17 fish per lb. Steelhead had an average (10 fish from each pen) length of 160mm (6.3 in) at release.

Chinook released from pens on 2 May weighed 70 fish per lb, versus a delivery weight of 113 fish per lb. Chinook had an average (10 fish from each pen) length of 84mm (3.3 in). Water temperatures ranged from 39 to 58°F.

Sandy Creek

Steelhead were delivered at a weight of 23 fish per lb on 23 April. They were held in the

pens for 12 days and released on 5 May. Steelhead weighed 20.3 fish per lb three days prior to release, and had an average (10 fish from each pen) length of 138 mm (5.4 in). Pens were towed a short distance to the river mouth where fish were released. Water temperatures ranged from 54 to 66°F.

Oak Orchard Creek

Steelhead were held in pens from 10 April to 30 April, a total of 20 days. Steelhead weighed 11.9 fish per lb when released, with an average (10 fish from each pen) length of 156mm (6.1 in) at release.

Chinook were also held for 20 days, weighing 64 fish per lb when released. Chinook salmon had an average (10 fish from each pen) length of 87mm (3.4 in) at release. Water temperatures ranged from 40-59°F during the period that both species were in pens.

Olcott Harbor

Steelhead were released on 30 April after 21 days in the pen. Initial weight of steelhead was 17 fish per lb, and final weight was 10.9 fish per lb.

Chinook were released on 1 May after 22 days in pens. Initial weight of Chinooks was 106 fish per lb. Chinook weight, measured at release, was 68 fish per lb in one pen and 69 fish per lb in the other.

Water temperatures on release dates were 58.1 and 56.3°F, respectively, for steelhead and Chinook. Water temperatures for steelhead and Chinook ranged from 39 to 60°F during the project.

Wilson Harbor

Steelhead were released on 14 May, after 26 days in the pens. Initial steelhead weight was 18 fish per lb, and average weight of samples from both pens on the release date was 9.1 fish per lb. Water temperatures at the pen site

ranged from 44 to 63°F.

Lower Niagara River

Steelhead were penned for 25 days and released on 1 June. At release, sample weights of fish taken from both pens averaged 16 fish per lb. Water temperature in the pens was 59°F on the release date. Water temperature ranged from 43 to 59°F during the project.

DO values measured in pens on 17 May ranged from 10.5 to 11.2 ppm. DO values in the Niagara River in close proximity to the pens ranged from 11.7 to 12.1 ppm. DO was slightly higher in the river than in the pens despite the presence of the water circulation/aeration pumping system.

Conclusions

Steelhead target weights (12-15 fish per lb) were reached or exceeded at six of the eight pen sites. Steelhead at the Lower Niagara pen site achieved an average weight of 16 fish per lb, which is very close to the target weight. At Sandy Creek, steelhead were released after only 12 days in pens. This was due to a postponed pen stocking and to accelerated water warming in early May. Final weight of steelhead at Sandy Creek was 20.3 fish per lb.

Chinook target weights (90 fish per lb) were exceeded at all five pen sites where they were raised. It is likely that a large percentage of the penned trout and salmon imprinted to water at their respective pen sites since a large majority of fish exceeded target weights.

The modified water management system used at Salmon River Hatchery during 2006 and 2007 to prepare Chinooks for pen-rearing projects has been associated with healthy, robust, uniform-sized fingerlings that have performed very well in pens. Pen project coordinators and DEC fishery management

staff have been very pleased with Salmon River Hatchery efforts to affect the improvements in water management. The tenth year of pen-rearing steelhead and Chinook salmon along the New York shoreline of Lake Ontario was very successful due to low fish mortality at all sites, a relatively high percentage of fish reaching target weights, and the goodwill generated through partnerships in the projects.

Section 18 *in* 2004 NYSDEC Annual Report Bureau of Fisheries Lake Ontario Unit and St. Lawrence River Unit to the Great Lakes Fishery Commission's Lake Ontario Committee.

Acknowledgments

We wish to express our very sincere appreciation to the many individuals, businesses, municipalities and organizations that made these pen projects possible. Their dedicated efforts demonstrate a deep commitment to the resource and provide a management technique that would not be available without their valuable help.

References

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Table 1. Description of 2007 Lake Ontario pen project sites.

Site	Location	Project Sponsors
Little Salmon River	Salmon Country Marina	Salmon Country Marina
Oswego Harbor	Oswego Marina	Oswego Marina Oswego Harbor Charter Captains
Sodus Bay	Sodus Bay near First Creek	Arney's Marina Lake Ontario Charter Boat Association Prime Time Storage Wayne County Tourism Wayne County Pro-Am
Genesee River	Shumway Marina	Genesee Charter Association Irondequoit Bay Fish and Game Club Shumway Marina Greater Rochester Sportfishery Association
Sandy Creek	Sandy Creek Marina	Sandy Creek Marina S.U.N.Y. at Brockport Boy Scout Troop 99 Charter Captains Brownies Pizza Shack Gander Mountain
Oak Orchard Creek	Lake Breeze Marina	Oak Orchard Business Association Lake Breeze Marina
Olcott Harbor	Town of Newfane Marina and adjacent private docks	Lake Ontario Trout and Salmon Association Town of Newfane (including Town Marina) Niagara County Fisheries Development Board Niagara County "Skip Hartman" Pro Am Tournament Slippery Sinker Bait and Tackle
Wilson Harbor	Sunset Bay Marina	Sunset Bay Marina Town of Wilson Wilson Boatyard Marina
Lower Niagara River	Constitution Park	Niagara River Anglers Association Village of Youngstown Fox Fence Co.

Table 2. Methods used at 2007 Lake Ontario pen project sites.

Site	Pen Stocking Method	Feeding Frequency (times per day)	Temperature Measurement (times per day)	Pen Cleaning Frequency	Fish Release Method
Little Salmon River	Hydraulic transfer	5	1	3 times	Pens towed to river mouth for fish release
Oswego Harbor	Hydraulic transfer	4-5	0-5	2 times	Pens towed past breakwall for fish release
Sodus Bay	Hydraulic transfer	5	5	weekly	Pens towed to lake for fish release
Genesee River	Hydraulic transfer	5	1	weekly	Fish released at pen site
Sandy Creek	Hydraulic transfer	6	6	daily	Pens towed to creek mouth for fish release
Oak Orchard Creek	Hydraulic transfer	5	1	every 3 days	Pens towed to piers near creek mouth for fish release
Olcott Harbor	Hydraulic transfer	5	5	once during first week and every three days thereafter	Fish released at pen site
Wilson Harbor	Hydraulic transfer	5	5	every two days	Fish released at pen site
Lower Niagara River	Hydraulic transfer	5	5	not available	Fish released at pen site

Table 3. Results of 2007 Lake Ontario trout and salmon pen-rearing projects.

Site	Species (Strain)	Number Stocked	Number of pens	Date Stocked	Size at Stocking (#/ Lb)	Date Released (Days Held)	Size at Release (#/ Lb)	Temp. Range (°F)	Mortality (# Fish)	Mortality (%)
Little Salmon	steelhead (Skamania)	4,500	2	19 April	20	11 May (22)	10.5	49-64	4	0.089
Oswego	steelhead	20,000	3	13 April	17	10 May (27)	13	35-60	15	0.075
Oswego	Chinook	40,000	2	13 April	110	10 May (27)	55	35-60	10	0.025
Sodus	Chinook	52,600	2	12 April	109	1 May (19)	83	35-54	25	0.048
Genesee	steelhead	10,000	2	11 April	17	30 April (19)	12.4	39-58	11	0.11
Genesee	Chinook	85,250	4	11 April	113	2 May (21)	70	39-58	52	0.061
Sandy	steelhead	7,300	2	23 April	23	5 May (12)	20.3	54-66	5	0.068
Oak Orchard	steelhead	14,000	3	10 April	17	30 April (20)	11.9	40-59	21	0.15
Oak Orchard	Chinook	85,250	4	10 April	97	30 April (20)	64	40-59	82	0.096
Olcott	steelhead	3,500	1	9 April	17	30 April (21)	10.9	39-60	1	0.028
Olcott	Chinook	50,000	2	9 April	106	1 May (22)	69	39-60	28	0.056
Wilson	steelhead	5,000	2	18 April	18	14 May (26)	9.1	44-63	5	0.10
Niagara	steelhead	20,000	2	7 May	25	1 June (25)	16	43-59	10	0.050