

## **2008 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 salmon 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 were raised at the Lower Niagara River 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, and for the Lower Niagara River which was inactive in 2008. This report summarizes 2008 pen-rearing activities and results.

### **Methods**

Pen rearing was scheduled to be conducted at eight different sites along New York's coastline of Lake Ontario in 2008; however projects were not conducted at two of the sites due to excessive water temperatures (Sandy Creek and Little Salmon River). The Lower Niagara River pen project volunteers decided not to raise steelhead in pens in 2008. The active project sites, along with a description of site locations and project sponsors, are listed in Table 1.

All sites used similar pen materials, design and netting as described for the 1998 Oak Orchard Creek Project in Bishop and Pearsall (1999). 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. Additional information on methods used at pen sites in 2008 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 35,000 Washington strain steelhead were raised at four pen sites, comprising 7% of NYSDEC's Lake Ontario rainbow trout/steelhead stocking allotment in 2008. Observed mortalities at the four steelhead rearing sites ranged from 0 to 0.20%. Results for all the pen projects are summarized in Table 3.

Four pen-rearing sites raised a total of 191,190 Chinook salmon, representing 23% of NYSDEC's 2008 Chinook stocking allotment. A combination of low flows and high temperatures in the fall of 2007 reduced Chinook returns to the Salmon River hatchery and resulted in poorer than normal eye-up of eggs for both Chinook and coho salmon. The Chinook total egg take was well short of the target (3.5 million). Likely due to temperature stress on female salmon during egg development, egg survival to the eyed stage was reduced to 64% for Chinook eggs. As a result about 800,000 Chinook salmon spring fingerlings were produced, only 45% of the normal annual production of 1.76 million (Bishop and Prindle 2008). The four pen sites reared all of the Chinook salmon

designated for those respective tributaries in 2008 (i.e., no Chinook salmon were stocked directly into Eighteenmile creek, Oak Orchard Creek, the Genesee River, or Lake Ontario at Sodus Point). At the four sites where Chinooks were penned, mortality estimates ranged from 0 to 0.19%, which is considered low.

Water temperatures at all pen sites were generally affected by warmer than average weather during the pen project period in 2008. The water temperature criterion (65°F) established for pen projects was exceeded at three pen sites during 2008. The highest water temperatures observed were 65°F at the Sandy Creek pen site and 60°F at the Little Salmon River pen site on the day that steelhead were scheduled to be stocked. Because continued warm weather was forecasted, decisions were made to stock all of the steelhead, including those scheduled to be stocked in the pens, directly into the mouths of Sandy Creek and Little Salmon River near Lake Ontario. Five days after being stocked into pens, the water temperature at the Oswego Harbor pen site reached 63°F. All of the fish in pens (steelhead and Chinook salmon) were released.

#### *Sodus Bay*

Chinook salmon grew from 150 fish per lb to 59 fish per lb after 21 days. The fish had an average (10 fish from each pen) length of 93mm (3.7 in) at release. Water temperatures ranged from 47 to 59°F.

#### *Genesee River*

Steelhead were released on 5 May and weighed 12.5 fish per lb, compared to a delivery weight of 16.8 fish per lb. Steelhead had an average (10 fish from each pen) length of 160mm (6.3 in) at release.

Chinook salmon released from pens on 7 May weighed 66 fish per lb, versus a delivery weight of 127 fish per lb. Chinook had an average (10 fish from each pen) length of 87mm (3.4 in). Water temperatures ranged from 47 to 61°F.

#### *Oak Orchard Creek*

Steelhead were held in pens from 15 April to 27 April, a total of 12 days. They were released earlier than planned despite a pen site temperature of 61°F because the pen project coordinator noticed that the steelhead were nipping at each other and some appeared to have a white layer on the dorsal fin. Rather than chance further infection and potential mortality, the pen project coordinator decided to release the steelhead. It is unknown what the steelhead weight or lengths were when released. The fish were released at the pen site because the lake temperature was 43°F.

Chinook salmon were held for 22 days (until 7 May), weighing 85 fish per lb, when released. The Chinook salmon were not measured for total length at release. Water temperatures ranged from 51-61°F during the period that both species were in pens.

#### *Olcott Harbor*

Steelhead were released on 12 May after 18 days in the pen. Initial weight of steelhead was 17.6 fish per lb, and final weight, measured five days prior to release, was 13.1 fish per lb. Water temperature at the pen site ranged from 51.2 to 61.7 °F.

Chinook salmon were released on 13 May after 19 days in pens. Initial weight of Chinooks was 155 fish per lb. Final weights of Chinooks in the three pens were 61.5, 69.8 and 79.5 fish per lb.

Water temperatures on release dates were 56.3 and 59.4°F, respectively, for steelhead and Chinook salmon. Water temperatures for

steelhead and Chinook ranged from 51.2 to 61.7°F during the project.

#### *Wilson Harbor*

Steelhead were released on 12 May, after 21 days in the two pens. Initial steelhead weight was 17 fish per lb, and mean weight of samples from both pens on the release date was 9.2 fish per lb. Water temperatures at the pen site ranged from 48.9 to 58.6°F.

The pen site was moved to a new location at Wilson Boatyard Marina in Wilson Harbor in 2008, so dissolved oxygen (DO) measurements were made on 24 April and 5 May to monitor water quality. On 24 April, DO values measured at 2 and 4 ft. depths in and outside of pens ranged from 10.6 to 11.2 ppm. Dissolved oxygen values were lower on 5 May when measurements at 2, 4 and 6 ft. depths outside of pens ranged from 7.9 to 8.1 ppm. However, these values were considered more than sufficient for steelhead survival and growth.

### **Conclusions**

Steelhead target weights (12-15 fish per lb) were reached or exceeded at three of the four pen sites. At Oak Orchard, steelhead were released after only 12 days in the pens. This was due to a potential disease outbreak and to accelerated water warming in early May. Final weight of steelhead at Oak Orchard is unknown.

Chinook salmon target weights (90 fish per lb) were exceeded at all four 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 reached target weights. Growth rate of Chinook salmon reared in pens was higher in 2008 relative to other years, possibly because fish were held in the pens at lower densities than usual due

to the reduced numbers of Chinook stocked at sites.

The modified water management system used at Salmon River Hatchery from 2006 to 2008 to prepare Chinook salmon 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 eleventh year of pen-rearing steelhead and Chinook salmon along the New York shoreline of Lake Ontario was very successful for those projects that were able to rear fish. The pen projects were considered 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.

### **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 2008 Lake Ontario pen project sites.

<b>Site</b>	<b>Location</b>	<b>Project Sponsors</b>
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
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	Wilson Boatyard Marina	Central Niagara County Rotary Niagara Cerebral Palsy Association Town of Wilson Wilson Boatyard Marina

**Table 2.** Methods used at 2008 Lake Ontario pen project sites.

<b>Site</b>	<b>Pen Stocking Method</b>	<b>Feeding Frequency (times per day)</b>	<b>Temperature Measurement (times per day)</b>	<b>Pen Cleaning Frequency</b>	<b>Fish Release Method</b>
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
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	every three days	Fish released at pen site
Wilson Harbor	Hydraulic transfer	5	5	every two days	Fish released at pen site

\* Fish released from pens 5 days after stocking because threshold temperatures reached

**Table 3.** Results of 2008 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 (%)
Oswego	steelhead	20,000	2	18 April	17	23 April (5)	unk	60-63	unk	---
Oswego	Chinook	41,890	2	18 April	140	23 April (5)	unk	60-63	unk	---
Sodus	Chinook	30,230	2	17 April	150	8 May (21)	59 <sup>a</sup>	47-59	25	0.083
Genesee	steelhead	10,000	2	16 April	17	5 May (19)	12.5	47-61	18	0.180
Genesee	Chinook	46,930	3	16 April	127	7 May (21)	66 <sup>b</sup>	47-61	unk	---
Oak Orchard	steelhead	14,000	3	15 April	16.8	27 April (12)	Unk	46-64	28	0.200
Oak Orchard	Chinook	46,930	2	15 April	135	7 May (22)	85	46-64	89	0.190
Olcott	steelhead	3,500	1	24 April	18	12 May (18)	13.1 <sup>c</sup>	51.2-61.7	2	0.057
Olcott	Chinook	67,100	3	24 April	155	13 May (19)	70.3	51.2-61.7	58	0.086
Wilson	steelhead	7,500	2	21 April	17	12 May (21)	9.2	48.9-58.6	7	0.093

<sup>a</sup> Chinook salmon were weighed 1 day prior to release

<sup>b</sup> Chinook salmon were weighed 2 days prior to release

<sup>c</sup> Steelhead were weighed 5 days prior to release