Rainbow Trout Management Summary

for the Minnesota Waters of Lake Superior and its Tributaries 2013

Introduction

This document is an annual report on activities related to the management of rainbow trout in the Minnesota waters of Lake Superior and its tributaries. The framework for rainbow trout management is in the Rainbow Trout chapter of the 2006 Lake Superior Management Plan (LSMP) available on the Minnesota Department of Natural Resources (MN DNR)-Lake Superior Area Fisheries website. Creel surveys, trap reports, and weekly angling reports are available at this location: **http://www.dnr.state.mn.us/areas/fisheries/lakesuperior/management.html** Other publications cited in this summary can be obtained by contacting Lake Superior Area Fisheries (see page 22).

Knife River Trap Repair Update

The June 2012 flood caused extensive damage to the Knife River trap and it was not operational for the fall of 2012 or spring of 2013. The trap provides valuable data that cannot be gathered by other means and is a useful tool for evaluation of rainbow trout management strategies. The cost to rebuild the trap qualifies for 75% reimbursement from FEMA and the remaining 25% is covered by state bonding funds dedicated to flood recovery efforts. Complete removal of the trap was an alternative option considered, but the estimated cost was more expensive than repairing the trap and the loss of important information on the Knife River fishery was considered undesirable in the long-term. After both internal discussions and input from constituent groups during the winter months, the decision was made to rebuild the trap.

MN DNR staff worked diligently throughout the spring to prepare a detailed package for the state's formal contract bidding process. In July 2013 Northland Constructors of Duluth was awarded the project (i.e. low bidder) with a bid of $407,738. The work was divided into two main phases: debris removal/"dirt work" and hardware reconstruction. The dirt work began in August and consisted of removal of all flood debris, broken trap components, reconstruction of the road, and refilling voids around the trap with rock.

The Knife River fish trap after the June 2012 flood.

Northland Construction hard at work on the fish trap.

All in-stream work was completed within the MN DNR permitted in-stream work window. The hardware component is the fabrication of new water control gates, walkway grating, and other parts used to operate the trap. This work is scheduled to be completed during the winter months of 2014. Barring any major setbacks, the Knife River trap repair should be completed by March and the trap ready for spring 2014 operations.

Lake Superior Management Plan Revision

The Lake Superior Management Plan (LSMP) is the guiding document for fisheries management in the Minnesota waters of Lake Superior and includes a chapter for rainbow trout management. The plan is revised every 10 years, and the next plan is scheduled to be completed in 2015. Revision of the plan will start in 2014 and involves public input, so anglers will have the opportunity to voice their opinions regarding rainbow trout management during the development of the plan.

French River Coldwater Hatchery Update

The French River Coldwater Hatchery (FRCWH) has been the facility primarily responsible for the rearing of steelhead fry and Kamloops and steelhead yearlings stocked into Lake Superior tributaries. The FRCWH was built in 1974-75 and is in need of significant repairs and upgrades if it is to continue to operate effectively. The MN DNR hired an engineering and consulting firm, HDR, Inc., to fully evaluate the FRCWH. The product of their assessment is the French River Rehabilitation Study, which details the repairs and upgrades necessary for efficient operation of the facility. The projected cost of renovation is $7.6 million and would extend the life of the facility by 25 years. The MN DNR will evaluate the results discussed in the report during the winter/summer and discuss potential options with the public during the LSMP process beginning in fall 2014, before recommending a course of action. The entire French River Rehabilitation Study is available on the Lake Superior Area Fisheries website for public review.

Trout Angler Survey

The MN DNR and the University of Minnesota Cooperative Fish and Wildlife Research Unit recently completed a survey of trout angling in Minnesota. The purpose of the study was to determine how the state's trout fishery resources are utilized by anglers, with an emphasis on rainbow trout in Lake Superior. Key findings include the number of anglers utilizing the resource, a breakdown of species targeted, geographical areas fished, and various funding issues related to the state's cold water fishery. The report is available for public review on the Lake Superior Area website.

Environmental factors

Environmental conditions were somewhat unfavorable for juvenile trout entering the winter of 2012/13. Less than average precipitation fell in the fall, and many streams entered the winter with low flows and the North Shore was classified as being in moderate drought status. Fortunately, air temperatures were moderate and adequate snowfall during the winter months helped insulate streams from excessive ice formation that can decrease overwintering habitat for juvenile trout.

While spring came extremely early in 2012, winter-like conditions prevailed throughout April of 2013. Nearly 51 inches of snow fell during April in Duluth, making it the snowiest month ever recorded in Duluth. Air temperatures were also below average from March through May and streams remained locked in ice until nearly May. Some anglers voiced concern about extensive gravel bars blocking river mouths and preventing rainbow trout from entering rivers to spawn. The formation of gravel bars at river mouths along the North Shore is not uncommon. Gravel bars form more frequently when lake levels are low and limited precipitation causes reduced stream flow. In 2013 the most severe gravel bars formed near Duluth which resulted from very high amounts of material deposited during the 2012 flood.

The mouth of Kadunce Creek, completely blocked by a gravel bar. Many streams along the North Shore were disconnected from Lake Superior, but spring runoff cut through them, allowing rainbow trout to migrate upstream to spawn.

As in most years, significant spring runoff cut through these bars allowing fish to ascend rivers to spawn. Precipitation totals through spring were above average and much better than in 2012, which helped maintain adequate flows in streams during the spawning season (Figure 1).

Conditions for juvenile trout were fair during the summer months. Precipitation totals were lower than average and air temperatures were higher than normal, but the North Shore remained out of significant drought status most of the summer. Low precipitation totals and warm air temperatures can result in low stream flows and water temperatures that stress juvenile trout. Adequate flows and cool water temperatures are key components to retaining juveniles upstream for two years until they are large enough to undergo smoltification. Adequate precipitation fell in October to maintain decent flows heading into winter, and the ample snowfall through early winter will be beneficial for insulating streams from excessive ice formation and also will provide flow during the spring spawning season.

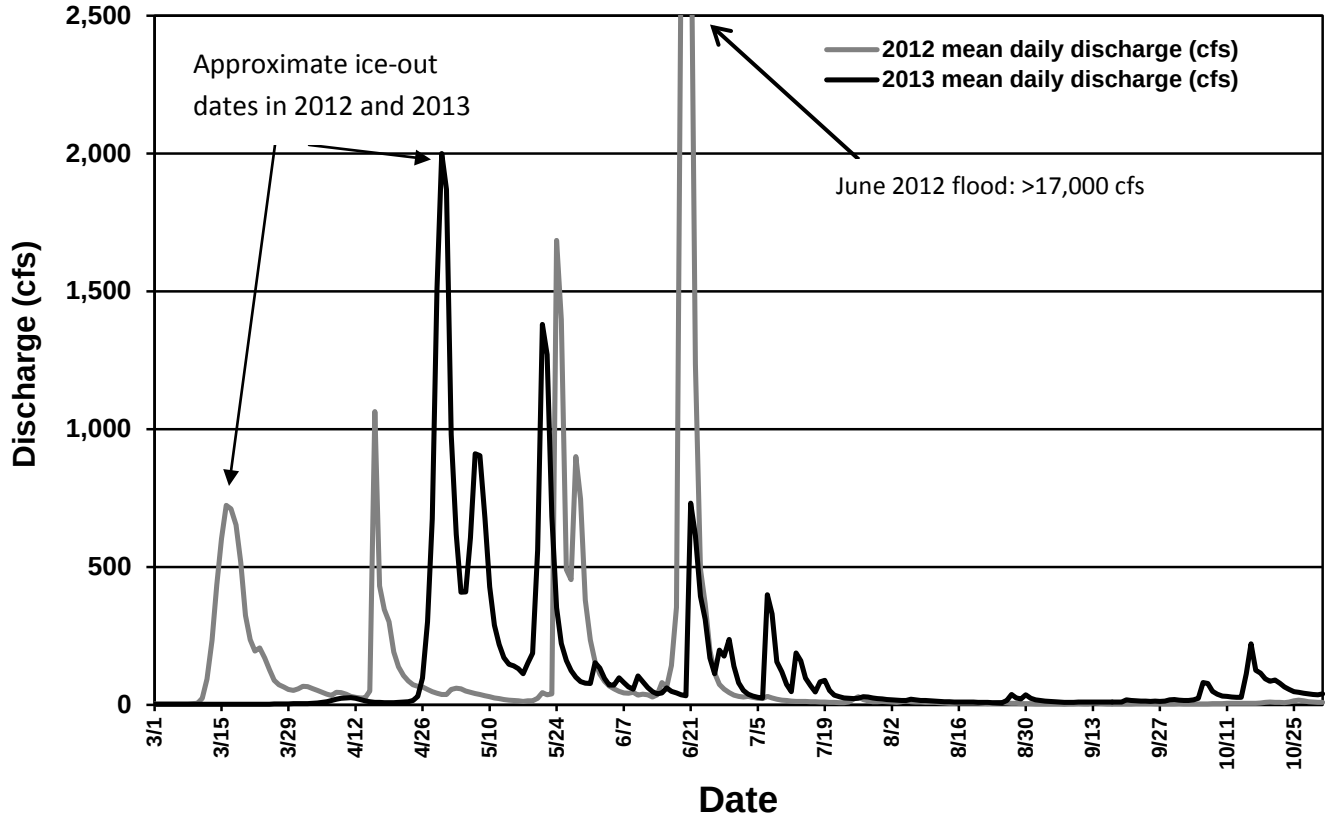

Figure 1. Knife River mean daily discharge (ft^3/sec) in 2012 and 2013. The ice went out over a month later in 2013 compared to 2012.

Juvenile steelhead assessments

Duluth, Finland, and Grand Marais Area offices continued annual juvenile steelhead electrofishing assessments at their respective index stations. Sampling these stations demonstrates if steelhead successfully reproduced during the spring spawning season. Juvenile abundances can also be compared to long-term averages to assess trends over time across the North Shore.

In 2013, Duluth Area sampled 9 stations across 7 rivers including the Blackhoof, French, Knife, Little West Branch Knife, West Branch Knife, Stewart, and Sucker rivers. Finland Area sampled one station on both the Split Rock and Baptism rivers. Grand Marais Area sampled stations on 5 rivers including the Onion, Devil Track, Kimball, Kadunce, and Flute Reed rivers. Shorewide in 2013, age-0 steelhead abundance was below average at 5 stations, average at 9 stations, and above

average at 2 stations (Table 1). Age-1+ steelhead abundance was below average at 8 stations and average at 8 stations. Sampling after the June 2012 flood indicated there were no stations with above average age-0 numbers, so the reduced number of age-1+ juveniles in 2013 continues to reflect the difficult conditions the 2012 year-class endured during the flood.

		2013	
		Age-0 STT	Age-1+ STT
Duluth Area	Below average	3	4
	Average	4	5
	Above average	2	0
Finland Area	Below average	1	2
	Average	1	0
	Above average	0	0
Grand Marais Area	Below average	1	2
	Average	4	3
	Above average	0	0
Shore-wide	Below average	5	8
	Average	9	8
	Above average	2	0

Table 1. The number of index stations above, below, or near the long-term average in 2013.

Creel surveys

Lake Superior Area has continued its annual spring and summer creel surveys. The spring creel begins at ice-out and targets anglers fishing rivers and near river mouths on 18 Lake Superior tributaries and McQuade Harbor, whereas the summer creel focuses on those angling primarily by boat on Lake Superior. Annual completion reports for both creel surveys are available on the Lake Superior web page.

In 2013, the spring creel survey was conducted from May 1st – June 4th. Anglers spent an estimated 24,792 hours fishing for rainbow trout during this time, which was 7,000 less than average and the fewest

since 2003. The extremely late spring was likely the main reason for the reduction in fishing pressure. North Shore streams were covered in ice during April and anglers were unable to fish them until May. Anglers may have opted to forego fishing for rainbow trout and instead focused on walleyes and other gamefish during the month of May.

An angler battles a rainbow trout on a North Shore tributary of Lake Superior. Anglers had good success in the spring of 2013 fishing for rainbow trout.

Despite the reduction in fishing pressure, anglers had good success catching both steelhead and Kamloops. The estimated storewide catch of rainbow trout was 3,603 steelhead and 1,657 Kamloops, both of which were higher than in 2012. The steelhead catch was approximately 1,000 fish above average while the Kamloops catch was approximately 1,000 fish below average. However, there was considerable shore fishing pressure for Kamloops prior to ice-out which was not captured in the spring creel survey and would have certainly increased the Kamloops catch.

The estimated shorewide catch rate for steelhead was 0.145 fish/angler-hour (a-hr) (6.9 hours/fish), the third highest since the creel survey began (Figure 2). It was also the seventh year out the past eight that the catch rate was above 0.10 fish/a-hr. The estimated shorewide catch rate of Kamloops was 0.067 fish/a-hr (14.9 hours/fish), the highest since 2005 but still low compared to high levels reported from 1998-2005.

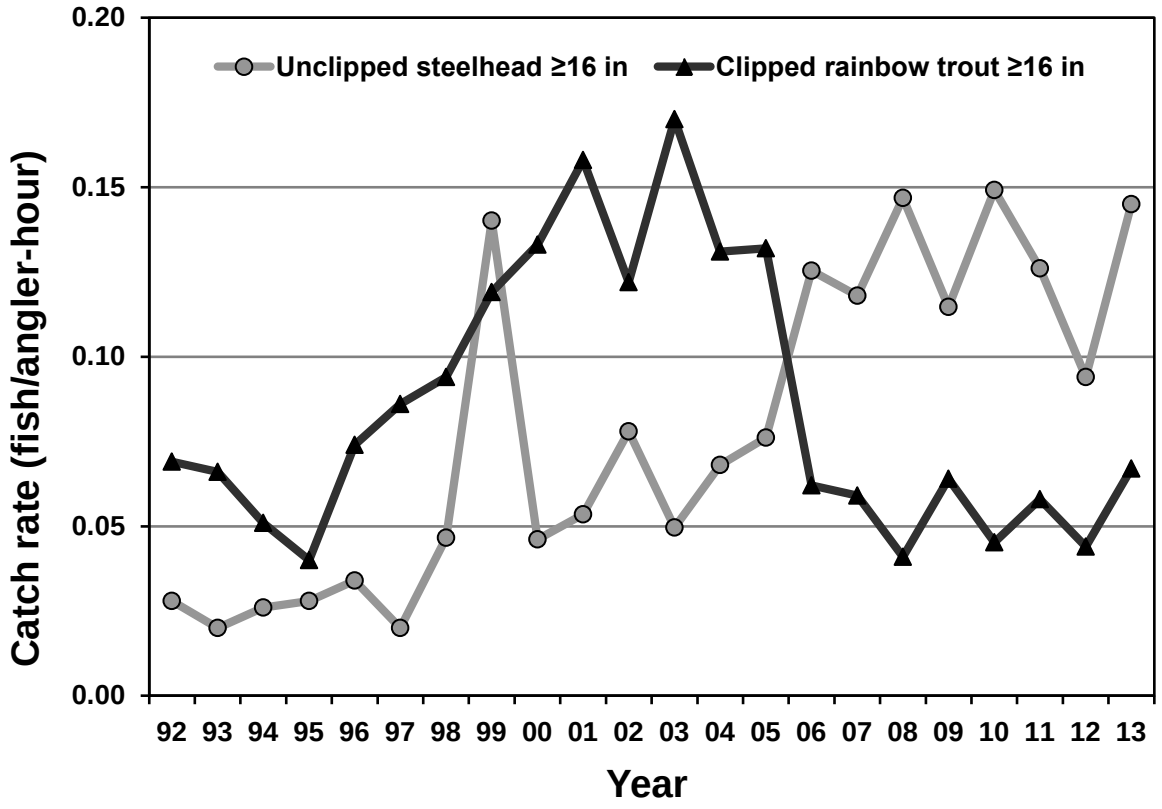

Figure 2. Shorewide catch rate (fish/angler-hour) for unclipped steelhead and clipped rainbow trout ≥16" from the spring creel survey, 1992-2013.

The summer creel survey data have not been analyzed as of this writing. However, the raw data suggests the estimated number of steelhead caught will likely be similar the past several years. Only six Kamloops were reported during the summer creel survey, which is too few to generate a seasonal estimate of catch. Low Kamloops catch is common in the summer creel survey.

Anadromous Fish Traps

Trap numbers reported for 2013 are preliminary, and final numbers will be included in trap reports available on the Lake Superior Area website by June 2014. The Knife River trap was not operational in 2013 due to the flood damage of 2012, so there are no numbers to report for the year. The French River adult and juvenile traps were operated as usual.

French River adult trap

In spring 2013, 138 unclipped steelhead, 3 clipped steelhead (from previous Knife River stockings), and 1,271 Kamloops were sampled (Table 2).

	Unclipped steelhead 2013	Long-term average	Kamloops 2013	Long-term average	Clipped steelhead 2013
French River	138	93	1,271	905	3

Table 2. The number of steelhead and Kamloops captured at the French River trap in the spring of 2013 compared to the long-term average.

The number of unclipped steelhead captured was above the interquartile range (25th to 75th percentiles). A very small number of clipped steelhead were captured at the trap. Few clipped steelhead were expected because no yearling steelhead have been stocked since 2007. The number of Kamloops captured was very similar to 2012 and at the high end of the interquartile range (Figure 3).

The French River adult trap was not operated in the fall. Year-class strength for Kamloops is determined in part by size at stocking, predation, forage availability, lake temperature and a number of other lake factors that combine to cause fluctuations in survival, and not merely the total number of Kamloops that are stocked on an annual basis.

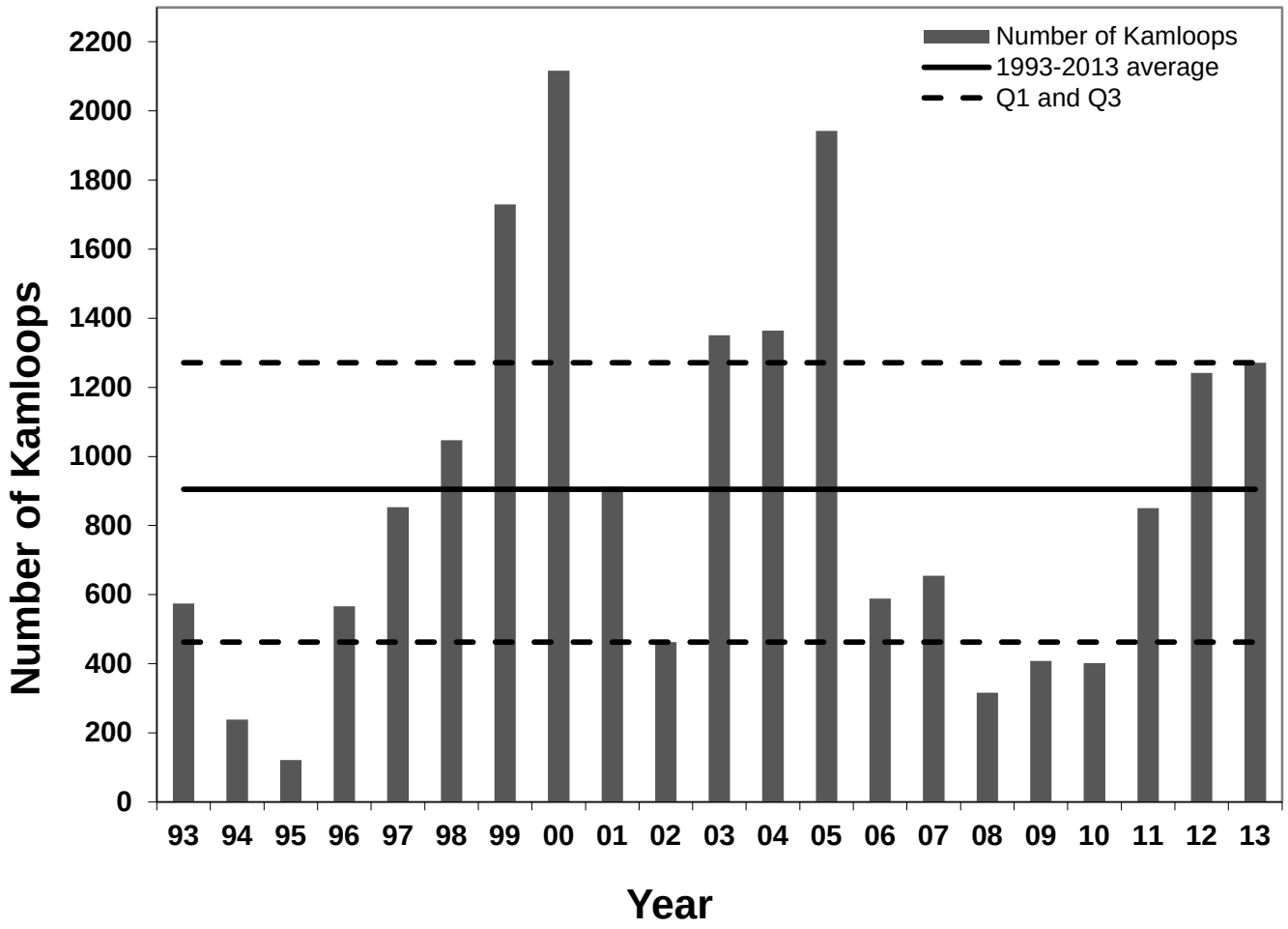

Figure 3. The yearly returns of Kamloops to the French River trap, 1993-2013. The mean, 25th percentile (Q1), and 75th percentile (Q3) are also shown.

French River juvenile trap

The number of juvenile steelhead emigrants sampled at the French River juvenile trap in 2013 was 744. Steelhead fry have not been stocked in the French River since 2008. Instead, steelhead frylings have been stocked as part of a research project to evaluate stocking fish at this life stage, and all emigrants captured were from fryling stocking. The number stocked per year has been approximately half the number compared to fry, so a lower number of juvenile steelhead emigrants is not alarming. Refer to the research section of this report for more information and preliminary results.

Stocking

Steelhead Fry and Frylings

A total of 369,017 steelhead fry and 55,967 frylings were stocked in 2013 (Table 3). Stocked fish originated from either the Knife River captive broodstock or returning French River unclipped feral broodstock. Fry and frylings continue to be reared for short lengths of time at the Spire Valley Hatchery (SVH) to prevent the potential introduction of VHS above the barriers. The fry and frylings are then transported in well water to North Shore tributaries where they are stocked above natural barriers. This was the final year of fryling stocking. Experimental use of frylings is discussed in the research section of this summary. The French River will be stocked with fry in 2014.

Area	River	fry	frylings
Duluth Area	Amity Creek	8,499	55,967
	Lester River	19,179	
	French River		
	Silver Creek	50,375	
	Gooseberry River	51,892	
Finland Area	Split Rock River	101,602	
	Baptism River	137,470	
	Total	**369,017**	**55,967**

Table 3. The number of steelhead fry and frylings stocked in 2013.

A total of 369,017 fry were stocked in seven Lake Superior tributaries in 2013. Unfortunately, extended periods of very warm Lake Superior water caused considerable mortality of steelhead broodstock in the FRCWH in 2012. The number of fry stocked was reduced by approximately 75,000 for the Lester River, 50,000 for the Split Rock River and 15,000 for the Baptism River because of the broodstock losses.

Kamloops Yearlings

In 2013, a total of 97,263 Kamloops yearlings were stocked in the French River (39,712), Lester River (32,507), and McQuade Harbor (25,044), which slightly exceeded the annual quota of 92,500 yearlings. Kamloops eggs continue to be hatched and most yearlings reared for 10 months at SVH before being returned to the FRCWH where they are reared for approximately three months, and then stocked into Lake Superior.

Habitat Work

Beaver management update

Duluth Area staff annually conducts a fall aerial survey of beaver activity within the Knife River watershed. When required, beaver trapping and dam removal is contracted with the US Department of Agriculture. The Blackhoof River is also assessed for beaver activity by canoe. The 2013 flight of the Knife River watershed was conducted on November 6th.

Blackhoof River

After the completion of the 2012 beaver dam survey, 10 beaver and 8 dams were removed from the anadromous portion of the Blackhoof River during the fall/winter months of 2012/13. Information from this fall's survey was not available at the time of this writing.

Knife River Watershed

A total of 43 beaver and 15 dams were removed from the Knife River system in 2013. Tributaries of the Knife River with removals included the West Branch, Little West, Captain Jacobson, Little Knife, Tributary 9, and the main stem of the Knife River.

Eight active dams were located during the 2013 flight. These locations have been prioritized and will be targeted for removal prior to spring to allow spawning steelhead to ascend farther upstream in search of ideal spawning habitat.

Habitat Projects

West Branch Knife River

In 2012 the Lake Superior Steelhead Association (LSSA) secured a $380,000 grant from the Lessard-Sams Outdoor Heritage Council (LSOHC) to restore trout habitat on the West Branch of the Knife River that was degraded by historic clear cutting and decades of beaver activity. In June the club conducted a tree planting project along the West Branch of the Knife River. A follow-up visit in November revealed good growth and survival of these trees. The club began water temperature assessment with placement of 19 temperature monitors spread throughout the watershed, and also walked the entire length of two tributaries, mapping the location of beaver dams, springs, and ash stands.

LSSA will conduct another tree planting effort in 2014, continue temperature monitoring, and utilize the information gathered in 2013 to determine where to focus their efforts during the next year.

LSSA members planting trees along the West Branch Knife River.

Sucker River

Trout Unlimited implemented two habitat projects on the Sucker River in 2013 with $75,000 in funding from the LSOHC and $75,000 from the Great Lakes Restoration Initative. Project locations were 1.0 and 4.8 miles upstream from the river mouth at Old North Shore Road and Ryan Road. Work was conducted on 2,700 feet of stream. The purpose of the projects are to restore and enhance in-stream habitat for trout, primarily through the use of large woody debris (LWD) and rock cross- vanes to increase the amount of pool habitat.

Left: An excavator moves a piece of large woody debris in preparation for placement in the Sucker River at the Ryan Road project site.

Right: A bend in the Sucker River showing large woody debris protecting the bank and providing cover. LWD on the floodplain is also visible.

Adequate pool depths and an abundance of woody cover may increase the number of juvenile steelhead that survive and emigrate to Lake Superior, as well as benefit other resident trout species. LWD was also used to protect stream banks susceptible to erosion and to simulate a mature floodplain forest.

Knife River Second Falls Modification

The second falls of the Knife River is located 2.7 miles upstream from the river mouth. Several previous projects designed to aid the passage of fish over the falls had deteriorated with time and flood events. Although MN DNR data has consistently shown natural reproduction upstream of the falls, some constituents felt that the current state of the falls presented too great of an obstacle for fish migration and that the falls should be altered to allow easier passage during periods of low flow.

After considerable debate, a project design was developed by MN DNR and implemented by the Lake Superior Steelhead Association (LSSA) through a contract with Reuben Johnson and Son. Funding for the project was part of a grant given to the LSSA by the LSOHC. In early September, two carefully selected quarried stones each measuring approximately 6.5'x5'x3.5' and weighing 10 tons were strategically placed below the second falls. The stones were buttressed against the bedrock walls and pinned in place with rebar to prevent movement.

The stones create two smaller steps instead of a single higher one, decreasing the height fish have to jump to ascend the falls. The pool depth below the falls also increased with placement of the stones. The project should extend the window of opportunity fish have to migrate beyond the falls by making it easier to pass during lower flow conditions.

A Reuben Johnson & Son excavator operator carefully lifts one of the quarried stones for placement below the second falls on the Knife River.

The Knife River second falls at approximately 100 ft^3/sec before (l) and after (r) modification in September.

Riparian Easement Acquisition

A riparian easement acquisition program was initiated in 2011 with a $200,000 grant obtained by MN DNR from the National Fish Habitat Initiative-Great Lakes Partnership and approximately one million dollars from the LSOHF. The MN DNR purchases easement rights in the riparian corridors of trout streams in the Lake Superior watershed from private landowners. Trout stream easements ensure the protection of the riparian corridor from detrimental activities, enhance water quality, authorize MN DNR personnel to conduct habitat improvement projects within the easement boundaries, and provide angler access. These are perpetual easements, meaning they never expire. Acquiring and preserving riparian easements helps ensure that future generations of anglers have access to North Shore streams.

Through September 2013, land ownership has been mapped on 60 Lake Superior tributaries spanning 764 miles of stream along the North Shore. Of the 764 river miles, 246 are under private ownership. To date, the program has agreements with 30 landowners to purchase 11.35 river miles that will protect 211 riparian acres at an estimated cost of $810,879. The easements will also connect over 60 miles of currently unconnected public river miles. The program has not received new funding and will be complete on July 1st, 2014.

Undisturbed riparian corridors such as this are essential for stream health.

Research Projects

No new rainbow trout research projects were started during the past year. Several projects were completed in 2012 and were included in last year's Rainbow Trout Management Summary. Currently there is only one ongoing rainbow trout research project, although more may be developed depending upon the needs of management to have specific questions addressed.

Survival, Growth, and Emigration Behavior of Steelhead Frylings

A study to evaluate the use of frylings as suggested by anglers during the development of the 2006 LSMP began in 2008. Frylings are stocked about a month later than fry and therefore have an initial size advantage when stocked. About 55,000 frylings were stocked into the French River in 2009 and 2011-2013 when no fry were stocked into the river. No fry or frylings were stocked in the French River in 2010 because of VHS concerns. Emigrating juveniles have been monitored each open-water season at the French River juvenile trap.

Thus far, fryling-stocked steelhead have maintained their size advantage over fry-stocked steelhead. Age-1 emigrants captured at the trap in 2012 averaged 25 mm (1 inch) greater length than age-1 emigrants from previous fry stockings. Although it takes two years for most naturally-spawned steelhead to achieve smolt size, many of the stocked frylings achieve smolt size by age-1.

Monitoring of the stocked frylings will continue through 2016, when all year-classes will have completely emigrated. Survival and growth rates will be compared to data collected on fish stocked as fry in previous years. Adults produced from frylings should begin returning to the French River in 2014. The percent of adult returns from fryling stocking will be compared to the return rate of adults from fry stocking to determine if the fryling program yields better returns than traditional fry stocking.

Guide to Trout Angling in NE Minnesota

The popular “Trout Angling Opportunities in Northeast Minnesota” regional guide published in 2007 is still available free of charge from the DNR. The guide and individual maps are available at the Duluth Area Fisheries office located on 5351 North Shore Drive, Duluth MN 55804 or online at
http://www.dnr.state.mn.us/fishing/trout_streams/northeast.html

The booklet features maps to help anglers locate trout fishing opportunities in northeast Minnesota. The maps show trout waters and trout species present, special regulation areas, and identify stream segments accessible through fishing easements. This guide covers inland areas as well as Lake Superior tributaries.

CONTACTS AND INFORMATION

Duluth Area (218) 525-0853
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- Lester River to Gooseberry River
- Stream survey, population assessment, and temperature reports
- French River adult and juvenile trap reports 1994-2013

Finland Area (218) 353-7591
Dean Paron-Area Supervisor

- Split Rock River to Cross River
- Stream survey, population assessment, and temperature reports

Grand Marais Area (218) 387-3056
Steve Persons-Area Supervisor

- Temperance River to Grand Portage Reservation
- Stream survey, population assessment, and temperature reports

Lake Superior Area (218) 525-0853
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Listed plans, summaries, surveys, and reports are available at:
http://www.dnr.state.mn.us/areas/fisheries/lakesuperior/management.html

- Lake Superior Fisheries Management Plan 2006
- Spring and Summer Lake Superior Creel Surveys 2008-13
- Rainbow Trout Management Summaries 2006-13
- Rainbow Trout Management Plan for the MN waters of Lake Superior 2003
- Knife River adult and juvenile trap reports 2008-12
- French River adult and juvenile trap reports 2008-13
- Weekly North Shore fishing updates April-October

French River Cold Water Hatchery (218) 525-0867
Mark Gottwald-Hatchery Supervisor

- Production of juvenile steelhead and Kamloops

Duluth Area Research (218) 525-0853
Bethany Bethke-Research Biologist ext-223

Other Recent Publications

- Negus, M.T., and J.C. Hoffman. 2013. *Habitat and diet differentiation by two strains of rainbow trout in Lake Superior based on archival tags, stable isotopes, and bioenergetics*. Journal of Great Lakes Research, 39(578-590).
- Ward, M.C., D.R. Schreiner, and D.F. Staples. 2013. *An evaluation of age-1 steelhead stocking locations on a Minnesota tributary to Lake Superior*. North American Journal of Fisheries Management, 33(1063-1070).
- Negus, M.T., D.R. Schreiner, M.C. Ward, J.E. Blankenheim, D.F. Staples. 2012. *Steelhead return rates and relative costs: a synthesis of three long-term stocking programs in two Minnesota tributaries of Lake Superior*. Journal of Great Lakes Research, 38(653-666).
- Schreiner, D. R. editor. 2006. *Fisheries management plan for the Minnesota waters of Lake Superior*. Minnesota Department of Natural Resources, Section of Fisheries Special Publication 149, St. Paul.
- Schreiner, D. R. editor, 2003. *Rainbow trout management plan for the Minnesota waters of Lake Superior*. Minnesota Department of Natural Resources, Section of Fisheries Special Publication 157, St. Paul.

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