Au Train River 2012 Survey Report

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Introduction: A Status and Trends fisheries survey was conducted on the Au Train River, Alger County on August 13, 2012. The purpose of this survey was to evaluate the fish community and river habitat for comparisons within the Status and Trends program. The section of the Au Train River being evaluated in this survey is located between Au Train Basin and Au Train Lake.

- **History:** The Au Train River brown trout fishery is located between the Au Train Basin and Au Train Lake. This section has been managed primarily for brown trout since being first stocked in 1989 (Table 1). Brown trout were stocked in the lower river below Au Train Lake to provide a brown trout fishery in Lake Superior, but stocking was ceased due to lack of return to the recreational creel. The Au Train River brown trout population is a popular fishery yielding many fish greater than 15 inches. Local and non-local anglers frequent this destination because of these "trophy" brown trout. Estimates for the Au Train River from the 2007 creel survey revealed relatively few fish caught (.0987 fish per hour), all occurring between April and June. This stretch of river has seen negative effects from the hydro-electric dam on Au Train Basin. Varying flow-regimes and early spring and late fall drawdowns have resulted in limited trout habitat during the summertime months.
  Rainbow trout, Coho and chinook salmon all access the Au Train River from Lake Superior and have some reproductive success. Their catches are limited in both the recreational creel and fisheries surveys, but have shown limited success for many years. Brook trout are native to the river, but their numbers remain low mostly due to the thermal regime of the river. Cold groundwater enters the river just below the spillway from the hydro-electric dam. This cools the warmer reservoir water to create tolerable temperatures, but under extreme drought and low flow conditions the brook trout struggle to find suitable water. Brown trout are more tolerant of warmer temperatures than brook trout, which is why they have done well in the Au Train River. Au Train River has a Type-4 trout regulation (minimum size limits for brook trout and brown trout of 8" and 10", respectively).
- **Physical features:** The stretch of river between the Au Train Basin (M-94) downstream to Au Train Lake is approximately 5 miles long. Two roads cross the river, USFS Road 2276 just above Au Train Lake and Powerhouse Road about .5 miles downstream of M-94. The rest of the river has excellent canopy cover on both banks. The topography of the area closest to the Au Train Basin is steep while the area nearest the Au Train Lake is relatively flat (old Lake Superior lake bed). Substrates down the entire river are comprised primarily of sand with some mixed areas of gravel. Some bedrock is present, but is limited to the area where the Au Train Falls are located. Good amounts of large woody debris and undercut banks are present throughout this stretch of river.
- **Biological features:** Aquatic vegetation in the river is sparse with most of the densities occurring near the mouth at Au Train Lake. Aquatic insects are abundant throughout the river as a function of the large amount of woody debris. Forage fish species are limited and consist of bluntnose minnow, sculpin (sp.), and white sucker. Thermal conditions of the Au Train River are dictated by the discharge from the hydro-electric dam on Au Train Basin, which is affected by drought conditions and periodic maintenance operations. In 2006 and 2007 mean July temperatures in the river were 66.2 and 68.9, respectively.

Methods and Materials: The survey was conducted by staff from the Eastern Lake Superior Management Unit using Status and Trends protocol (random site). A stream shocker electrofisher (500 V DC, 4A, two probes) was used to capture all game and non-game species in a 1,000 feet survey station (1,200 Status and Trends protocol). This survey was shortened to 1,000 feet due to a large log jam near the end of the station. A single pass electrofishing run was completed while moving in an upstream direction. Total length was recorded for all game species. Scale samples of game species were collected from 10 fish per inch group for age determination. For non-game fish species, all fish were counted and total lengths were recorded. Fish habitat and riparian bank conditions within the sampling station were assessed using methods outlined by Wills et al. (2006). An Onset® Hobo® Temp Pro V2 temperature logger was not deployed in 2012, but will be deployed in spring of 2013.

Results: A total of 92 fish were captured during the survey effort comprised of 8 species. A total of 19 brown trout were captured with a total length range of 2-17 inches (Figure 1). Thirty-seven percent of the brown trout captured were of legal size (≥10 inches; Figure 2). Brook trout and rainbow trout captured totaled 6 and 1, respectively. Other species captured were smallmouth bass (n=2), yellow perch (n=16), white sucker (n=14), and sculpin (sp.) (n=29).

Analyses of scale samples for brown trout revealed the presence of five year classes (ages 1-6, Figure 3). Age determination from scale samples revealed all age-4 and age-6 fish from the 2012 sample were wild fish (no fish stocked in 2007 or 2009). Mean growth indices were not made due to small sample sizes (<5) in each inch group, but an overview of mean-lengths-at-age found all year classes to be growing below state average (Figure 4). No estimates could be made for brook trout or rainbow trout due to their small sample sizes.

Sand covered 86% of the sampling station and pebble sized gravel (<2.5 inches) covered 10%. Large cobble (<3%) was present, but did not provide much habitat for trout species. Large woody debris was present in good amounts providing excellent cover for trout species. The habitat type through the entire station was a run lacking deep pools and riffles. Bank stability was rated as good (<25% of streambank = bare soil) at 100% of the measurement locations along the sampling station. The estimated discharge at the time of the survey was 69.14 cfs. Water temperature at the time of the survey was 66.6°F and pH was 8.56.

Discussion: In 2012, about 3 times as many legal brown trout were captured in the survey as in the 2006 survey (Table 2). This could be attributed to the reduction in the stocking plan for 2010. The previous management prescription for stocking brown trout in 2006 called for 2,000 yearlings. Results from the 2006 survey revealed brown trout to have poor survival and slow growth and was thought to be due to the stocking rates. Fish were not stocked from 2007-2009 and a new management prescription in 2010 called for 1,100 yearlings. The main purpose of the modification was to increase brown trout abundance with a reduced stocking plan allowing more available habitat and forage. In addition, the stocking rate was reduced with the thought that natural reproduction is significantly contributing to the population. Today, the contribution of naturally reproduced fish is unknown because the stocked fish have never been marked for identification purposes.

Trout population dynamics can be affected by various abiotic factors in a riverine setting. These factors include, but are not limited to high and low flows, high summer water temperatures, and limited habitat. Drought conditions in the area have severely affected the conditions in Au Train Basin, challenging the power company's ability to regulate flows appropriately for the fishery downstream. The established

FERC license requires a minimum flow of 50 cfs to be maintained throughout the year. In 2012, minimum flows reached ~35 cfs due to the power company's attempt to meet both minimum pool elevation (773.7 feet above mean sea level) and minimum flow requirements.

Low flows typically coincide with higher average water temperatures, resulting in lower quantity of available habitat for brown trout. Mean July water temperatures in 2007 were found to be 66.2°F. The incipient lethal temperature for brown trout is 76.5°F (Elliot 1981). This is the temperature brown trout can tolerate for a 7 day period. In 2007, temperatures in the Au Train River reached a maximum of 74.9°F which is below the incipient lethal temperature. The river has a significant groundwater input about 500 feet below the powerhouse on M-94 that cools the water through the summer time months yielding more available habitat for brown trout and other trout species.

Water temperatures also affect growth in brown trout when outside the range of 39°F and 67°F (Elliot 1993). Brown trout growth in the 2012 survey appeared to be slow (Figure 4). Every year class displayed lower mean-lengths-at-age compared with state average growth suggesting that in recent years including 2012 (drought conditions), water temperatures may have exceeded the preferred range of growth in brown trout. Without recent temperature data only speculation can be made to whether or not this was a contributing factor.

Overall, the brown trout fishery seems to have improved with the establishment of a reduced stocking plan. Anglers continue to be satisfied with this fishery and maintain that "trophy" brown trout could still be caught in this stretch of river.

Management Recommendations: The Au Train River brown trout fishery has been established through stocking since 1989. A popular fishing destination for many, the Au Train River offers a unique opportunity to catch that "trophy" brown trout on an aesthetically beautiful stream. Three management goals have been developed for the Au Train River. Goal 1: Increase the number of legal brown trout. Goal 2: Collect additional water temperature data to monitor the thermal regimes being released from the Au Train Basin Dam. Goal 3: Continue to monitor habitat through the Michigan Department of Natural Resources Status and Trends Program.

To accomplish Goal 1, Fisheries Division will work to improve the growth rates and survival of brown trout. The current Type-4 regulation allows harvest of fish ≥10 inches. Catch and release is a common practice on this river and this method is increasing in popularity today which will help to improve survival of the brown trout. Growth rates for brown trout in the Au Train River appear to be density dependent so if the contribution of naturally reproduced fish can be determined, then stocking rates could be adjusted accordingly. Fisheries Division will work with the Fish Production section to possibly use clipped fish to help identify stocked fish. Being able to understand the contribution of wild fish should allow managers to determine the correct amount and frequency of stocking to maximize the number of legal fish in the Au Train River.

Goal 2 can be accomplished by simply installing Onset® Hobo® Temp Pro V2 temperature loggers periodically throughout the next few years. Assuming these temperature loggers are available for use and

not deployed to other area streams, collecting thermal data will help to understand the tolerance of brown trout in this segment of river. Additional data will also help us to understand the effects of the drought on other area rivers and streams that rely on groundwater for cooling.

To accomplish Goal 3 Fisheries Division's Status and Trends Program habitat evaluation protocol should be able to identify changes over time to the conditions in this river segment as well as the effects on the fish community. Currently, the habitat in the Au Train River is excellent to support brown trout and other salmonids. However, with erosion and sedimentation issues in particular areas along the river, habitat degradation could increase being detrimental to the critical habitat for brown trout.

References:

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Elliot, J. M. 1993. Quantitative ecology and the brown trout. Oxford University Press, Oxford, UK.

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Wills, T. C., T. G. Zorn, and A. J. Nuhfer. 2006. Stream Status and Trends Program sampling protocols. Chapter 26 *in* Schneider, J. C. (editor) 2000. Manual of fisheries survey methods II: with periodic updates. Michigan Department of Natural Resources, Fisheries Special Report 25, Ann Arbor.

Table 1.-Stocking history for Au Train River, Alger County.

Site	Year	Species	Number	Stage	Average Length (inches)
USFS Road 2276	1993	Brown Trout	3,000	Yearling	8.0
	2000	Brown Trout	1,250	Yearling	4.7
	2001	Brown Trout	1,040	Yearling	4.8
	2002	Brown Trout	1,190	Yearling	5.0
	2003	Brown Trout	1,250	Yearling	5.1
	2005	Brown Trout	1,800	Yearling	7.1
	2006	Brown Trout	1,250	Yearling	7.6
	2010	Brown Trout	740	Yearling	7.0
	2011	Brown Trout	700	Yearling	7.5
	2012	Brown Trout	770	Yearling	5.5
Au Train Falls	1979	Brook Trout	16,000	Spring Fingerling	4.0
	1980	Brook Trout	8,000	Spring Fingerling	2.1
	1983	Brook Trout	3,800	Fall Fingerling	3.2
	1984	Brook Trout	1,500	Yearling	5.3
	1985	Brook Trout	3,000	Yearling	5.4
	1986	Brook Trout	2,580	Yearling	6.6
	1987	Brook Trout	3,000	Yearling	5.7
	1988	Brook Trout	3,000	Yearling	6.7
	1989	Brown Trout	4,098	Yearling	7.2
	1990	Brown Trout	3,000	Yearling	7.2
	1991	Brown Trout	3,000	Yearling	6.7
	1992	Brown Trout	2,900	Yearling	6.7
	1993	Brown Trout	3,000	Yearling	7.8
	1994	Brown Trout	3,000	Yearling	7.1
	1995	Brown Trout	3,000	Yearling	6.9
	1996	Brown Trout	2,500	Yearling	8.0
	1997	Brown Trout	3,000	Yearling	7.0
	1998	Brown Trout	3,000	Yearling	5.8
	1999	Brown Trout	3,000	Yearling	7.2
	2000	Brown Trout	1,250	Yearling	4.7
	2001	Brown Trout	1,040	Yearling	4.8
	2002	Brown Trout	1,190	Yearling	5.0
	2003	Brown Trout	1,250	Yearling	5.1
	2004	Brown Trout	1,000	Yearling	5.2
	2006	Brown Trout	1,250	Yearling	7.6
	2010	Brown Trout	320	Yearling	7.0

Table 1.-Continued.

Site	Year	Species	Number	Stage	Average Length (inches)
Au Train Falls	2011	Brown Trout	300	Yearling	7.5
	2012	Brown Trout	330	Yearling	5.5
	1988	Brown Trout	12,400	Yearling	6.9
Old M-28	1988	Brown Trout	12,400	Yearling	8.2
	1989	Brown Trout	12,635	Yearling	6.7
	1989	Brown Trout	12,635	Yearling	6.7
	1990	Brown Trout	11,875	Yearling	7.2
	1990	Brown Trout	14,250	Yearling	7.2
	1991	Brown Trout	8,700	Yearling	5.8
	1991	Brown Trout	13,000	Yearling	6.4
	1991	Brown Trout	5,125	Yearling	6.4
	1992	Brown Trout	12,400	Yearling	6.4
	1992	Brown Trout	12,400	Yearling	6.3
	1992	Brown Trout	12,600	Yearling	6.9
	1992	Brown Trout	4,483	Yearling	6.9
	1993	Brown Trout	10,000	Yearling	7.1
	1993	Brown Trout	14,700	Yearling	7.1
	1993	Brown Trout	6,000	Yearling	7.8
	1994	Brown Trout	20,885	Yearling	6.6
	1994	Brown Trout	14,435	Yearling	6.8
	1994	Brown Trout	15,000	Yearling	7.4
	1995	Brown Trout	10,926	Yearling	7.4
	1995	Brown Trout	10,000	Yearling	6.2
	1995	Brown Trout	12,500	Yearling	6.5
	1995	Brown Trout	3,400	Yearling	7.2
	1996	Brown Trout	21,642	Yearling	7.7
	1996	Brown Trout	11,312	Yearling	7.7
	1997	Brown Trout	11,630	Yearling	7.5
	1997	Brown Trout	10,000	Yearling	8.2
	1997	Brown Trout	10,000	Yearling	8.2
	1998	Brown Trout	15,360	Yearling	6.6
	1998	Brown Trout	4,800	Yearling	8.5
	1998	Brown Trout	3,220	Yearling	6.8
	1998	Brown Trout	9,000	Yearling	8.5
	1999	Brown Trout	8,000	Yearling	7.2
	1999	Brown Trout	5,040	Yearling	8.0

Table 1.-Continued.

Site	Year	Species	Number	Stage	Average Length (inches)
Old M-28	1999	Brown Trout	18,000	Yearling	6.9
	1999	Brown Trout	8,000	Yearling	7.5
	2000	Brown Trout	18,400	Yearling	6.0
	2000	Brown Trout	15,000	Yearling	5.7
	2000	Brown Trout	7,008	Yearling	5.7
	2000	Brown Trout	95,145	Fall Fingerling	2.4
	2001	Brown Trout	30,750	Yearling	5.8
	2001	Brown Trout	4,250	Yearling	5.4
	2002	Brown Trout	11,800	Yearling	7.0
	2002	Brown Trout	23,700	Yearling	5.6
	2004	Brown Trout	25,000	Yearling	6.7
	2004	Brown Trout	10,000	Yearling	6.7
	2009	Lake Sturgeon	1	Adult	39.5
M-28	1987	Lake Trout	94,200	Yearling	5.1
	1993	Lake Trout	45,000	Yearling	5.1
	1995	Lake Trout	46,600	Yearling	5.6
	2003	Brown Trout	23,000	Yearling	5.4
	2003	Brown Trout	12,037	Yearling	6.1

Table 2.-Electrofishing survey results and stocking for brown trout in the Au Train River, Alger County for 1999, 2006, and 2012. Catch per unit effort is represented by CPUE.

Year	Number of Fish Stocked	Sample Effort (feet)	Number of Fish Captured	CPUE (# fish/100 feet)	CPUE fish ≥10 inches (# fish/100 feet)
1999	3,000	1,000	47	4.7	0.2
2006	2,500	1,000	6	0.6	0.1
2012	1,100	1,000	19	1.9	0.7

Figure 1.-Length frequency distribution for brown trout captured in the electrofishing survey conducted on the Au Train River, Alger County on August 13, 2012.

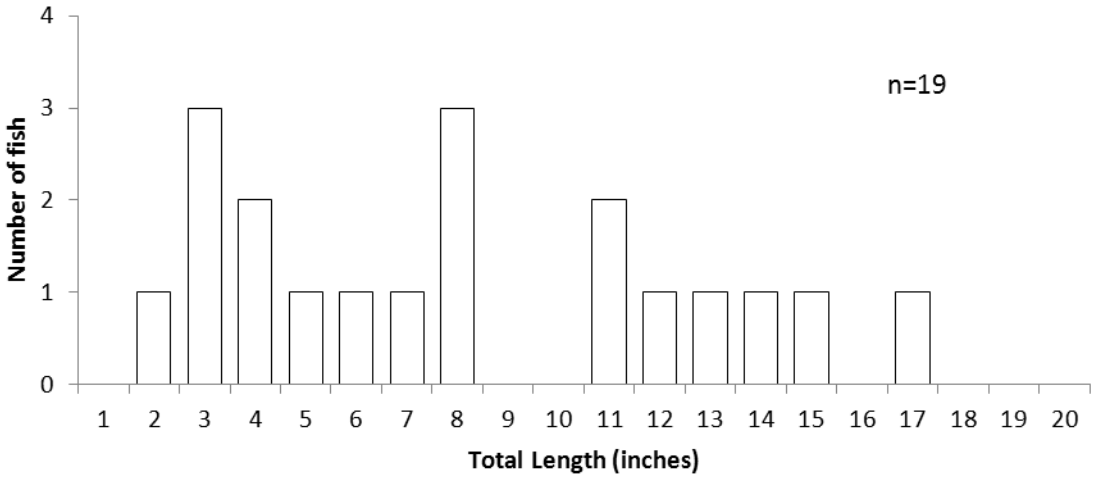

Figure 2.-Length frequency distribution by percent for brown trout captured in the electrofishing survey conducted on the Au Train River, Alger County on August 13, 2012.

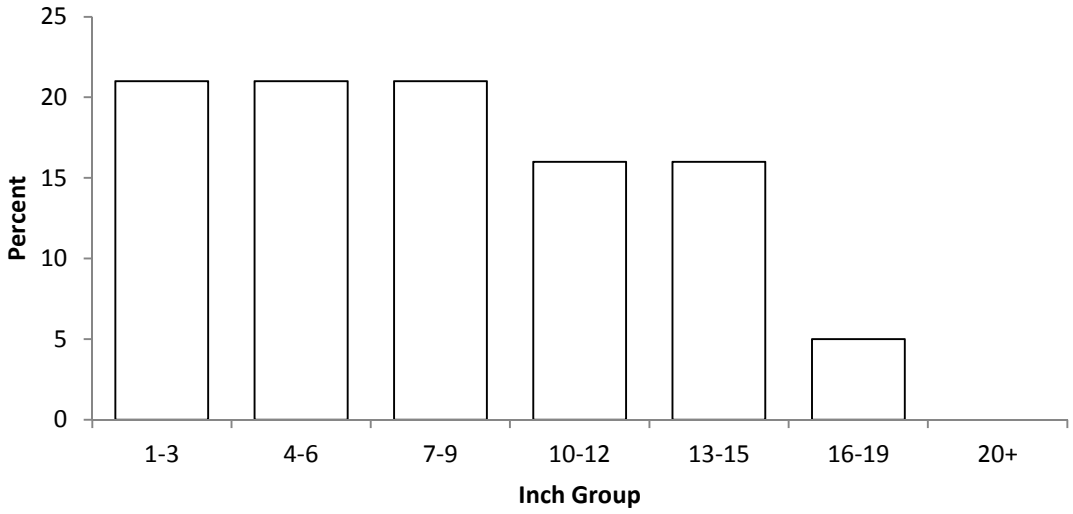

Figure 3.-Age frequency distribution for brown trout captured in the electrofishing survey conducted on the Au Train River, Alger County on August 13, 2012.

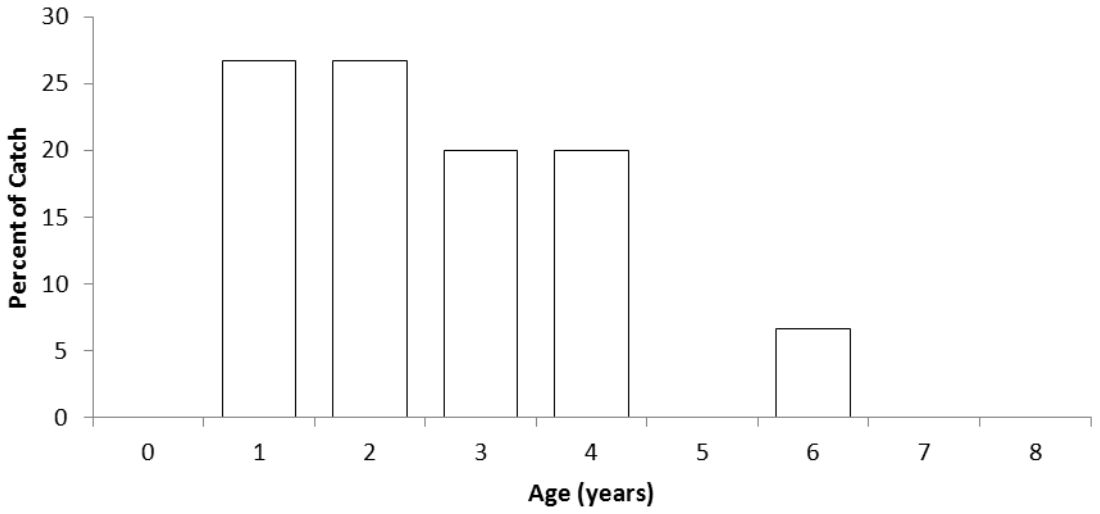

Figure 4.-Growth of brown trout in the Au Train River, Alger County, as determined from scale samples collected during the electrofishing survey conducted on August 13, 2012.