



RESTORATION OF
EXTIRPATED LAKE
STURGEON (ACIPENSER
FULVESCENS) IN THE RED
RIVER WATERSHED – PHASE
TWO (2019-2029)

Minnesota Department of Natural Resources
Division of Fish and Wildlife
Section of Fisheries

Jamison Wendel
Red River Fisheries Specialist

BACKGROUND

Historical accounts suggest that Lake Sturgeon were abundant in the Red River basin until the late 1800's. Over exploitation, construction of dams, and declines in water quality decimated Lake Sturgeon populations throughout Minnesota. Lake Sturgeon were effectively extirpated from the Red River basin by the mid-1900's. Although there were occasional, unconfirmed reports of Lake Sturgeon captures in the Red River, there was little chance that the population could recover on its own.

Discussions to restore a Lake Sturgeon population in the Red River basin began in the 1980's. The Minnesota Department of Natural Resources (MNDNR) formally addressed Lake Sturgeon populations in the 1986-1992 Fisheries Long Range Plan (LRP). The LRP objectives for Lake Sturgeon included 1) determine statewide distribution and status, 2) maintain existing natural populations, 3) provide and protect necessary habitat for natural reproduction, and 4) acquire additional knowledge needed to manage and restore Lake Sturgeon populations.

Accomplishments resulting from the 1986-92 LRP set direction for future management of Lake Sturgeon in Minnesota waters. Among the accomplishments was a cooperative telemetry project with the Ontario Ministry of Natural Resources (OMNR). This project determined critical spawning sites, seasonal movements, spawning periodicity, and population dynamics of Lake Sturgeon stocks of Lake of the Woods and the Rainy River.

The 1986-92 LRP also established new regulations to protect and enhance Lake Sturgeon populations in Minnesota and its border waters. Harvest closures were implemented on border waters with North Dakota, South Dakota and on Wisconsin border waters of the St. Croix River above Taylors Falls. Angling regulations were also standardized with Ontario to reflect common opening and closing dates and minimum size limits.

A second generation of the Fisheries Long Range Plan for the period 1994 -1999 revised management direction for Lake Sturgeon in Minnesota. The goal of the 1999 LRP was to enhance current populations and to establish new populations into the species historical range. With the direction given in the 1994-1999 LRP, the Division of Fisheries began discussions on how to best approach restoration of a self-sustaining Lake Sturgeon population in the Red River basin.

Lake Sturgeon restoration efforts are also ongoing in Manitoba. Manitoba Conservation, Fisheries Branch, has been stocking Lake Sturgeon fry and fingerlings in the Assiniboine River, a tributary of the Red River.

COORDINATION, PLANNING, AND PAST MANAGEMENT OF LAKE STURGEON RESTORATION

Along with internal coordination, the MNDNR has worked with North Dakota, South Dakota, and Manitoba in developing comprehensive fisheries management strategies for the Red River. Representatives from these states and province formed the Red River Fisheries Steering Committee (RRFSC) in 1989. The RRFSC provides a forum for coordination and information exchange between management agencies directly responsible for fisheries management in the Red River. Coordination of environmental review input has resulted in a more unified message from fisheries managers on various water development projects in the basin.

Early work of the RRFSC focused on information gathering, primarily directed at the Channel Catfish population. Recent efforts have focused on habitat restoration in the main stem and tributaries of the Red River. Connectivity of the river and its tributaries has become a major focus of the RRFSC and the MNDNR. Members of the RRFSC have catalyzed several dam removal and modification plans that will eventually restore fish passage in the Red River basin.

Barriers to fish passage are a significant obstacle to the restoration of Lake Sturgeon populations. Since 2002, 27 significant barriers have been removed in the Red River basin. With the modifications of the Hickson and Christine dams in 2012, Drayton dam is the last remaining barrier to fish passage on US waters of Red River. Fish passage also has expanded on most major tributaries to Red River such as Red Lake River, Buffalo River, Wild Rice River, Sand Hill River, Otter Tail River, and Pelican River.

Reconnecting river habitat by providing fish passage and reintroduction of Lake Sturgeon has occurred simultaneously in the Red River Basin. Restoring fish movement throughout the system will be a long process. However, with the removal or modification of each dam (Figure 1), more miles of river habitat will be connected. With improved connectivity, the maturing sturgeon population will be able to access historic spawning areas and hopefully, reproduce naturally.

Initial restoration efforts in the late 1990's focused on the capture and relocation of sub-adult Lake Sturgeon from Rainy River to the Red River Basin. During 1997 and 1998, 378 Lake Sturgeon (4-10 year old) were transferred. Seventy-five fish were stocked in Big Detroit Lake and 303 fish were stocked in the Otter Tail River. High water conditions in 1999-2000 hampered the relocation of sub-adults from the Rainy River. High angler harvest of sturgeon from the Rainy River during the early 2000's and local opposition to transfer operations subsequently eliminated the option of relocating sub-adult Lake Sturgeon to the Red River Basin. In 2001, alternative stocking strategies to support restoration efforts were evaluated, relying largely on the initial success from Lake Sturgeon restoration efforts on the St. Louis River.

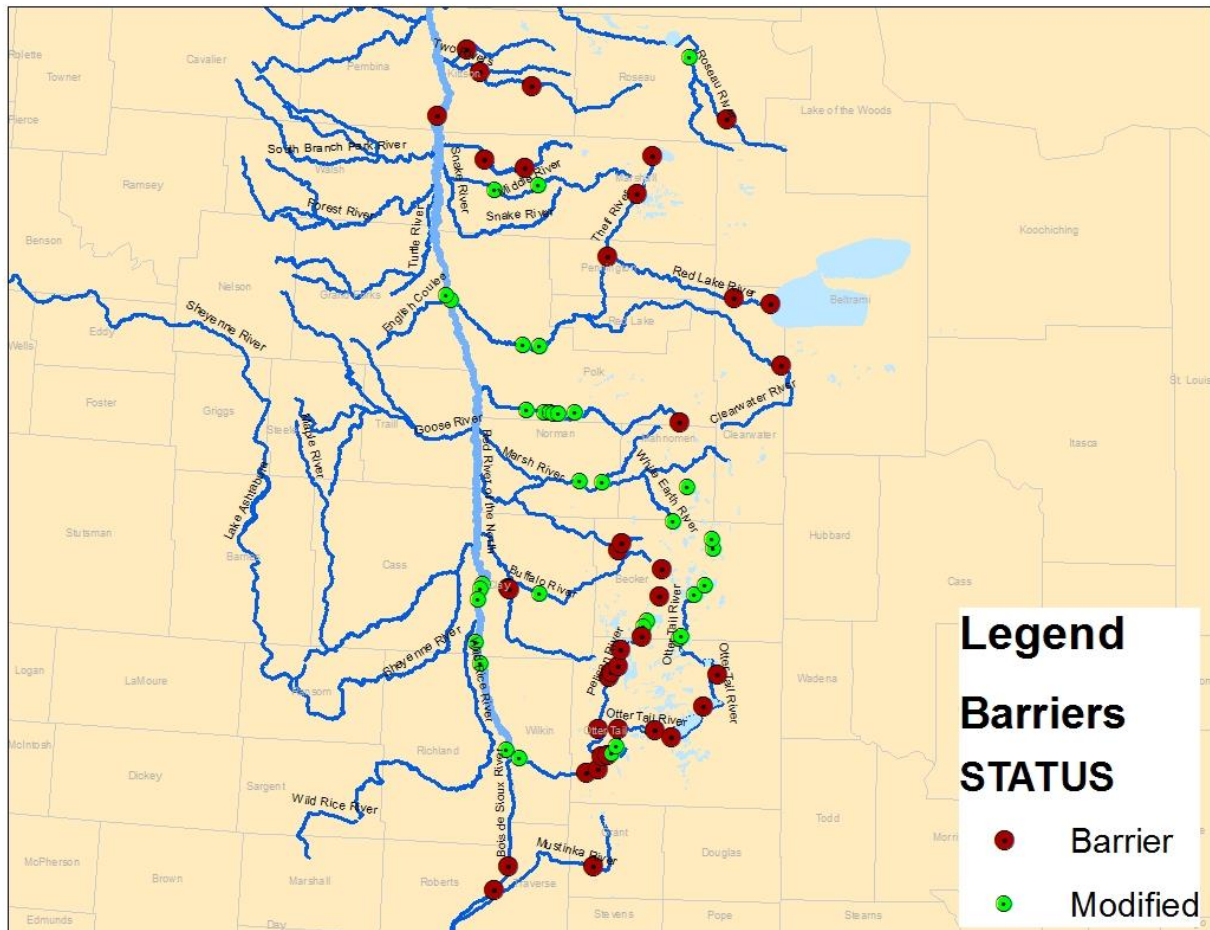


Figure 1. Existing and modified barriers on the Minnesota side of the Red River basin.

In 2002, MDNR developed guidelines for the initial phase to restore Lake Sturgeon in the Red River watershed. This plan utilized recommendations from other successful Lake Sturgeon reintroductions. Efforts to reintroduce Lake Sturgeon in the St. Louis River estuary were very successful following twelve years of fry/fingerling stocking. Successful reintroduction efforts may hinge upon stocking a young enough life stage so that imprinting to the receiving water is maximized. Because Lake Sturgeon grow so slow and mature at such a late age it was recommended to stock a minimum of 20 Lake Sturgeon year classes. The plan recommended that fry and fingerlings not be stocked in the same water each year as this would complicate the evaluation analysis.

The 2002 Red River basin Lake Sturgeon Restoration Plan proposed a 20-year program (2002-2022) that relied on stocking fry and fingerlings originating from Rainy River stock. The USFWS established working relationships with Rainy River First Nations and the White Earth Reservation and demonstrated the ability to produce 6-8 inch fingerlings annually. Several sites in the upper reaches of the Red River basin were identified for reintroduction of Lake Sturgeon (Table 1 + Figure 2). MNDNR revised Lake Sturgeon stocking goals in 2016 based on fish availability and preliminary netting assessment data. Figure 2 and Table 1 summarize historical stocking locations and proposed operational plans for the twenty-year program (2002-2022) and the second phase of Lake Sturgeon restoration.

Table 1. Lake Sturgeon stocking quotas in the Red River basin.

Waterbody	Jurisdiction	Original Annual Quota	Current Annual Quota	Phase 2 Quota (2023)
Otter Tail Lake	MN DNR	15,000 (1.1/acre)	4,000 (0.29/acre)	None
Detroit Lake	MN DNR	4,000 (1.3/acre)	2,000 (0.67/acre)	None
Otter Tail River	MN DNR	1,000	1,000	1,000
Buffalo River	MN DNR	1,000	1,000	1,000
Red Lake	Red Lake Band	10,000	10,000	TBD
Red Lake River	MN DNR	400,000 (Fry)	Surplus	2,500
Roseau River	MN DNR	200,000 (Fry)	Surplus	1,000*
Big and Little Pine Lakes	MN DNR	Surplus	Surplus	None
Round Lake	White Earth Band	5,000	2,000	TBD
White Earth Lake	White Earth Band	8,000	3,000	TBD

Surplus refers to additional fish available for stocking once all other quotas have been met.

*Roseau River pending adequate water level

Coordination of Lake Sturgeon stocking efforts also occurred with the Ontario Ministry of Natural Resources (OMNR) and the White Earth Band (WEB), though most interaction has been related to the Rainy River and Lake of the Woods. In prior meetings between MNDNR, OMNR, and WEB all have indicated that restoration of Lake Sturgeon population is a high priority. The ongoing recovery of Lake Sturgeon in the Rainy River is a clear example of how water quality improvement and river level management can accelerate recovery of a species.

Lake Sturgeon reintroduction has been a collaborative effort between Minnesota Department of Natural Resources, Rainy River First Nations, Red Lake Band, State of North Dakota, US Fish and Wildlife Service, and White Earth Band. Reintroduction efforts in the Red River basin began in 1997 by transplanting juvenile fish from the Rainy River to Detroit Lake and Otter Tail River. The Red River basin Lake Sturgeon stocking program became more consistent beginning in 2001 when the White Earth Band initiated fingerling stocking in Ice Cracking, Round, and White Earth Lakes. In 2003, Minnesota DNR began a stocking program for Lake Sturgeon fingerlings and fry. The Red Lake Band began stocking fingerlings in the Red Lakes in 2009. From 2003 through 2016, Lake Sturgeon fingerlings and fry were produced annually by the US Fish and Wildlife Service National Fish Hatchery in Genoa, WI for Red River basin reintroduction efforts. DNR eliminated fry stocking in 2017 due to budget constraints and there are no plans to start fry stocking again in the future. This specifically affects the Red Lake and Roseau Rivers. Modified stocking strategies for both of those basins have been adjusted to stocking surplus fingerlings when conditions are suitable.

LAKE STURGEON REGULATIONS

Though anglers provided many reports of incidental Lake Sturgeon catches in the Red River basin, no open season existed for the species until 2015. After input from anglers interested in being able to target Lake Sturgeon, and an internal review, an open catch and release was established. However, a spawning season closure exists from April 15 to June 15.

Table 2. Lake Sturgeon stocking history in the Red River basin.

	Life Stage	Buffalo River	Detroit Lake	Ice Cracking Lake	Otter Tail River	Otter Tail Lake	Pine Lake (Big and Little)	Red Lake	Red Lake River	Red River	Round Lake	Roseau River	White Earth Lake	Wild Rice River
1997	Juvenile		50		128									
1998	Juvenile		25		172	2,031								
2001	Fingerling			600							6,195		12,000	
2002	Fingerling										5,250		7,800	
2002	Yearling	350	2,031		350									
2003	Fingerling										1,425		2,275	
2004	Fingerling	2,000			2,000	9,575					5,006		7,972	
2004	Fry								50,000			50,000		
2005	Fingerling	1,980	2,556		2,000	5,372					6,000		8,000	
2005	Fry								88,000			88,000		
2005	Yearling		920											
2006	Fingerling	1,000	2,000		1,000	4,000					5,000		8,000	
2006	Fry								111,550			111,550		
2007	Fingerling	1,100	1,000		1,000	1,000	10,000				4,000		6,000	
2007	Fry								70,000			70,000		
2008	Fingerling	4,098	8,150		4,300	17,080	11,814				6,500		6,500	
2008	Fry								114,000			114,000		
2009	Fingerling	980	1,302		750	1,503	10,000				5,183		8,000	
2009	Fry								75,000			75,000		

	Life Stage	Buffalo River	Detroit Lake	Ice Cracking Lake	Otter Tail River	Otter Tail Lake	Pine Lake (Big and Little)	Red Lake	Red Lake River	Red River	Round Lake	Roseau River	White Earth Lake	Wild Rice River
2010	Fingerling	3,511	4,500		4,020	6,001		10,000			5,000		8,000	
2010	Fry								117,000			120,000		
2011	Fingerling	1,000	2,000		1,000	1,044		4,400			2,000		2,929	
2011	Fry								83,000			83,000		
2012	Fingerling	1,000	2,000		4,801	4,000	7,121	13,500		500	1,978		3,302	12,993
2013	Fingerling	1,000	2,000		1,000	1,000		10,623			1,000		1,512	
2013	Fry								85,000			80,000		
2014	Fingerling	2,100	2,100		2,100	4,100	6,557	10,000			2,500		3,676	8,860
2014	Fry								58,000			50,000		
2015	Fingerling	1,476	3,734		1,719	3,060		11,187			2,020		3,600	6,060
2015	Fry								100,000			100,000		
2016	Fingerling	2,051	4,090		2,398	4,034		31,026			1,900		3,045	10,820
2016	Fry								114,090			112,046		
2017	Fingerling	628	2,020		656	3,057		9,600			1,000		1,000	2,000
2018	Fingerling	1,020	2,020		1,034	3,546		10,150	4,938		1,835		2,059	5,218

RESTORATION SITES

Several sites in the upper reaches of the Red River basin have been chosen for reintroduction of Lake Sturgeon. Location of each site is identified on the map below.

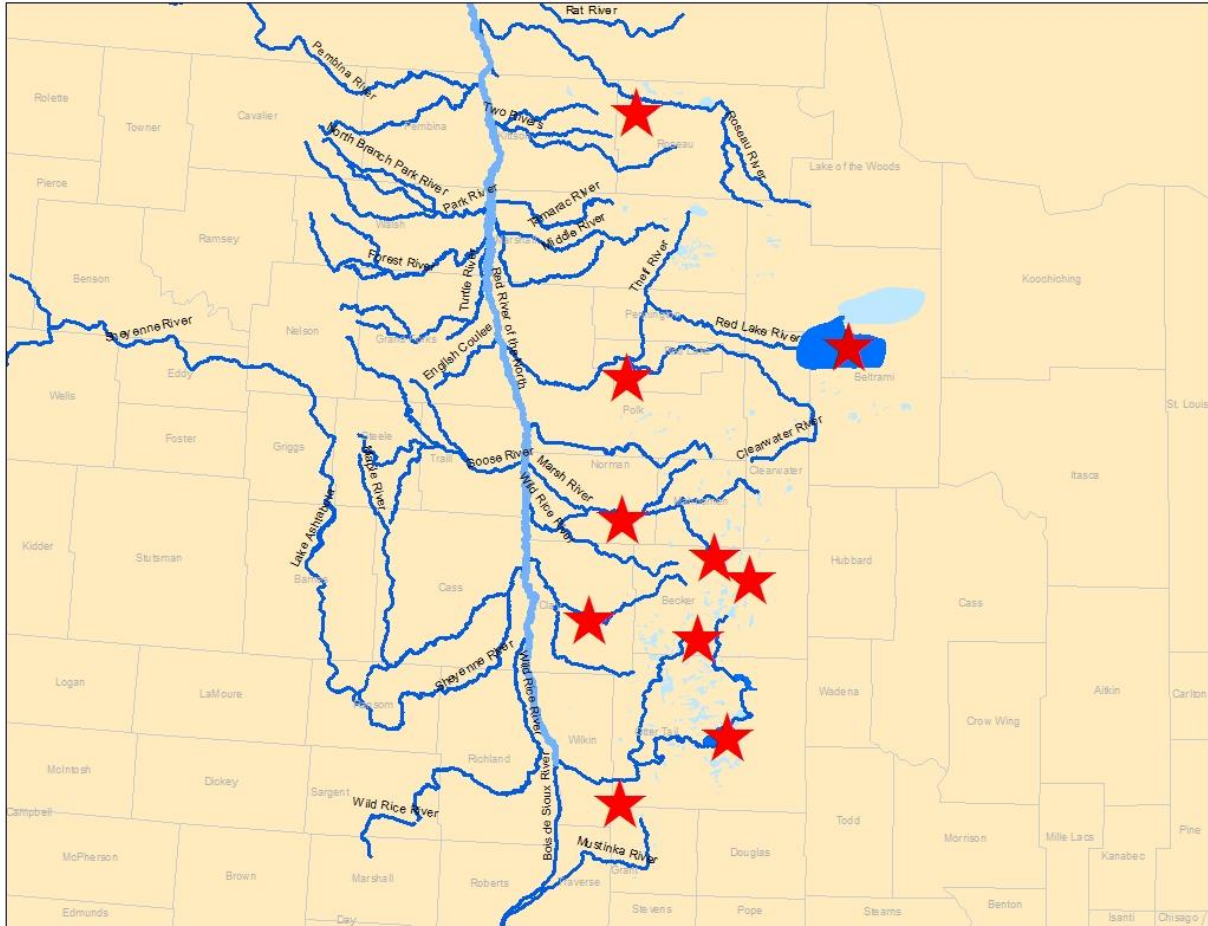


Figure 2. Locations of sites chosen for Lake Sturgeon reintroduction in the Red River basin.

Otter Tail Lake - Otter Tail Lake is a large (13,725 acre) lake located in central Otter Tail County. The Otter Tail River flows through the lake connecting numerous waterbodies both upstream and downstream of the lake. Fish passage is not possible from the Red River because of several dams in and near Fergus Falls. With the removal of the Frazee Dam fish passage is now possible upstream of Otter Tail Lake into the headwaters of the Otter Tail River. However, the Rush and Big Pine Lake outlet dams still restrict upstream movements at many flows.

Lake Sturgeon were found in the Otter Tail River watershed at one time but were extirpated by over-exploitation and construction of dams that blocked their migration routes. By re-introducing Lake Sturgeon to Otter Tail Lake and the upper headwater watershed a population may develop, which over time may augment the lower Otter Tail River and Red River through downstream movement.

Suitable Lake Sturgeon spawning habitat exists in Otter Tail Lake, the Otter Tail River and in several of the upstream lakes. An abundant forage base, consisting of invertebrates and crayfish, exists in the lake and river and will provide adequate food for the various life stages.

The 2002 Lake Sturgeon Restoration Plan for the Red River Basin established stocking goals for an identified group of waters to be stocked by the Minnesota Department of Natural Resources. Beginning in 2004, the stocking goal for Otter Tail Lake called for 15,000 (1.1/acre) fingerlings to be stocked on an annual basis. In 2016, that goal was reduced to 4,000 (0.28/acre) fingerlings stocked annually based on preliminary Lake Sturgeon assessment catch data. The number of actual fish stocked has varied from year to year based on the number of fish produced by hatcheries.

Otter Tail Lake was first stocked with yearling Lake Sturgeon in 2002. Since 2002, 64,826 fingerlings and 2,031 yearling Lake Sturgeon have been stocked into Otter Tail Lake.

Overall, ten gill netting surveys have been conducted on Otter Tail Lake since reintroduction of Lake Sturgeon began in 2002. These surveys were typically completed in the first week of September.

Year	Total Lake Sturgeon Catch	Catch Per Unit Effort (CPUE)
2004	10	0.5
2007	27	1.35
2008	69	3.45
2009	55	2.75
2010	53	2.65
2011	93	4.65
2012	40	2.0
2013	49	2.45
2014	34	1.7
2015	32	1.6
Mean	46.2	2.31

In spring 2017, an electrofishing survey targeting spawning Lake Sturgeon was conducted on the Otter Tail River upstream of Rush Lake. This survey captured 18 mature male Lake Sturgeon ranging from 40.6 to 52.4 inches. Ages ranged from 10-15 years. The highest concentration of fish was just below the Pine Lake dam. Captured fish are reported in the table below.

Date	Length (in)	Sex	Age
5/12/2017	44.8	Male	12
5/12/2017	52.4	Unknown	15
5/12/2017	51.6	Unknown	15
5/15/2017	45.5	Unknown	13
5/15/2017	47.9	Unknown	12
5/15/2017	50.1	Male	13
5/15/2017	52.0	Male	13
5/15/2017	51.7	Male	13
5/15/2017	52.8	Male	13
5/15/2017	49.6	Male	15
5/15/2017	48.6	Male	12
5/15/2017	40.6	Male	12
5/15/2017	50.6	Male	13
5/15/2017	50.0	Male	11
5/15/2017	52.4	Male	15
5/15/2017	50.8	Male	12
5/15/2017	51.0	Male	13
5/15/2017	46.1	Male	10
5/15/2017	45.7	Unknown	12
5/23/2017	51.0	Male	12
5/23/2017	50.2	Male	13
5/23/2017	43.3	Male	12
5/23/2017	47.8	Male	15

More extensive electrofishing was conducted on the Otter Tail River in spring 2018. Mature Lake Sturgeon were captured in high concentrations below the Big Pine Lake Dam, Rush Lake Dam, and Otter Tail Lake Dam, and near the inlet to Deer Lake. Overall, 72 Lake Sturgeon were captured in the Otter Tail River in spring 2018. Sex could not be identified for one fish, the rest were males. Mean length of captured Lake Sturgeon was 47.4 inches, with a range of 39-54.7 inches.

Round Lake – Round Lake (1,094 acres) is located within the White Earth Indian Reservation and is a headwater lake of the Otter Tail River system. Historical accounts indicate Lake Sturgeon were once present in the system. Potential spawning sites are located near Many Point Lake on the Otter Tail River. Much like other Lake Sturgeon populations throughout their historic range, these populations were lost by over-fishing and construction of dams that blocked migration routes to critical habitat.

Since 2001, the White Earth Band of Ojibwe has stocked 61,957 fingerling Lake Sturgeon into White Earth Lake.

Year	Jurisdiction	Total Lake Sturgeon Caught	CPUE	Mean Length (in)
2003	WEBD	4	NA	
2005	MN DNR	19	1.58	13.5
2007	WEBD	4	NA	
2010	MN DNR	145	16.11	20.3
2011	WEBD	114	NA	
2012	WEBD	200	5.7	
2015	MN DNR	47	5.22	24.4
Mean	MN DNR	70.3	7.63	

Three gill netting surveys have been conducted by Minnesota DNR on Round Lake since reintroduction efforts began in 2001. All of these surveys were conducted as part of the standard lake survey assessment and were conducted at five year intervals.



White Earth Lake – White Earth Lake (1,989 acres) is located within the White Earth Indian Reservation. This lake is the headwater lake for the White Earth River that flows into the Wild Rice River near Mahanomen. Historical accounts indicate Lake Sturgeon were once present in this lake. A 176-pound specimen was caught in White Earth Lake on May 12, 1926. Potential spawning sites are located in the Wild Rice and White Earth rivers. In particular, the high gradient beach ridge area of the Wild Rice River (just upstream of Twin Valley) contains good sturgeon spawning habitat. Much like Lake Sturgeon populations throughout their native range, these populations were extirpated by over-exploitation and construction of dams that blocked their migration routes. The Heiberg and White Earth dams blocked fish passage from the Red River to the Wild Rice and White Earth River and Lake. White Earth Lake Dam was modified to allow fish passage in 2003. Heiberg Dam was modified in 2006, restoring fish passage from the upper portions of Wild Rice River to Red River.

Since 2001, the White Earth Band of Ojibwe has stocked 93,611 fingerling Lake Sturgeon into White Earth Lake.

Year	Jurisdiction	Total Lake Sturgeon Caught	CPUE	Mean Length (in)
2002	MN DNR	1	0.11	10.1
2003	WEB	2	0.13	
2005	WEB	15	1.0	

Four gill netting surveys have been conducted by Minnesota DNR on White Earth Lake since reintroduction efforts began in 2001. All of these surveys were conducted as part of the standard lake survey assessment and were conducted at five year intervals.

2007	MN DNR	107	7.13	18.3
2009	WEBD	45	3.75	
2012	MN DNR	90	11.25	21.4
2012	WEBD	140	5.8	
2017	MN DNR	38	4.22	21.0
Mean	MN DNR	59	5.68	
Mean	WEB	50.5	2.67	

White Earth Biology Department (WEBD) conducted four gill netting surveys on White Earth Lake from 2003-2012. These surveys used large mesh gill nets specifically targeted towards Lake Sturgeon and were typically conducted in the fall. In contrast, DNR surveys on other waterbodies typically used experimental gill nets and did not specifically target Lake Sturgeon until 2018.



STURGEON Caught in Detroit Lake April 26th, 1890, by J. Olson, J. Frederick and J. Ellis. Weight, 106 lbs.; length, 6 feet, 4 inches; girth, 2 feet, 10 inches. Photographed by W. D. Myerson in front of Carson's Pharmacy.

Detroit Lake - Detroit Lake (3,067 acres) is located within the city limits of Detroit Lakes and is a popular lake for recreation. The lake is located in the upper Pelican River system. The river connects numerous lakes and eventually flows into the Otter Tail River. Several lakes in the Pelican River systems once had abundant Lake Sturgeon populations. A photo of a 106-pound sturgeon that was caught from Detroit Lake in 1890 was found at the Becker County Historical Museum. The fish measured 76 inches and had a girth of 34 inches. A dam on the Pelican River at the outlet of Muskrat Lake, just downstream of Detroit Lake, was converted into a rock rapids in 2002 and should provide sturgeon spawning habitat and access to the upper reaches of the river and Big Detroit Lake. Numerous other downstream dams on the Pelican and Otter Tail River still need modification or removal.

Detroit Lake was first stocked with juvenile Lake Sturgeon in 1997 and 1998. In 2002, 751 yearlings were stocked into Detroit Lake.

The 2002 Lake Sturgeon Restoration Plan for the Red River Basin established stocking goals for committed waters to be stocked by the Minnesota Department of Natural Resources. Beginning in 2004, the stocking goal for Detroit Lake called for 4,000 (1.3/acre) fingerlings to be stocked on an annual basis. In 2016, that goal was reduced to 2,000 (0.65/acre) fingerlings stocked annually based on preliminary assessment catch data. The number of actual fish stocked has varied from year to year based on the number of fish produced by hatcheries.

Since 1997, 41,744 fingerlings, 75 juveniles, and 920 yearlings have been stocked into Detroit Lake.

Year	Total Lake Sturgeon Caught	CPUE	Mean Length (in)
2003	2	0.13	17.9
2007	4	0.27	19.8
2011	11	0.73	26.5
2015	2	0.17	34.8
Mean	5	0.39	

Four gill netting surveys have been conducted on Detroit Lake since reintroduction efforts began in 2002. All of these surveys were conducted as part of the standard lake survey assessment and were conducted at four year intervals.

In the fall of 2018, large-mesh gill nets were used to evaluate the number and maximum size of adult Lake Sturgeon in Detroit Lake. Almost 3 sturgeon per gill net were captured, the smallest being 21.5 inches

long, the largest approaching 65 inches long, and the average length being 50 inches.

Red Lakes – Combined, Upper and Lower Red Lake comprise the largest inland waterbody within Minnesota at 285,000 acres. The Red Lake Band initiated reintroduction of Lake Sturgeon in 2007. Since that time, over 130,000 Lake Sturgeon fingerlings have been stocked into the Red Lakes.

Other Lakes - Lake Sturgeon have been captured during gill netting surveys on seven additional lakes in the Otter Tail River watershed. These lakes have only been stocked with Lake Sturgeon sporadically when surplus fish have been available or have not been directly stocked at all.

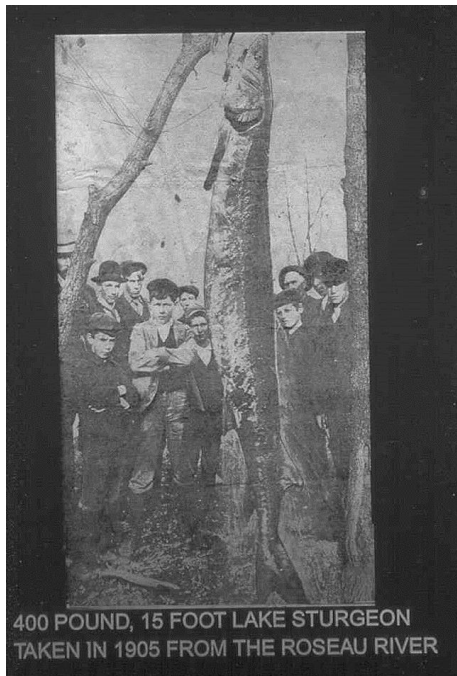
Lake	Year	Total Lake Sturgeon Caught	CPUE	Mean Length (in)
Big Pine Lake	2017	2	0.17	20.2
Deer Lake	2014	2	0.22	34.7
East Lost Lake	2009	10	1.11	26.2
East Lost Lake	2014	10	1.11	24.4
Height of Land Lake	2005	1	0.07	6.5
Height of Land Lake	2015	2	0.17	28.0
Hoot Lake	2011	2	0.33	39.2
Hoot Lake	2016	2	0.33	47.2
Rush Lake	2016	2	0.17	50.6
West Lost Lake	2015	1	0.11	24.6

Otter Tail River

The Otter Tail River, which joins the Bois de Sioux River to form the Red River, has been negatively impacted by channelization, wetland drainage and construction of dams. Fish passage was restored to the lower 40 miles of this river with modifications to the Lake Breckenridge dam and Breckenridge water plant dam. A third dam (Kidder Dam at Wahpeton/Breckenridge) was modified in 2000 further restoring fish passage in the upper reaches of the Red River.

The Otter Tail River, from the mouth to Orwell Dam, provides suitable spawning sites for adults residing in the Red River. Migration of Lake Sturgeon above Orwell Dam and to the headwaters of the river is currently not possible because of several high profile dams in and near Fergus Falls.

Many reports of Lake Sturgeon captures were reported by anglers soon after the initial stocking in Otter Tail River in 1997 and 1998. These fish were marked with external dangler tags. Captures from that stocking effort were soon reported all along the Red River down to Lake Winnipeg. Overall, 85 tagged Lake Sturgeon captures have been reported from the initial Otter Tail River stocking of 300 juveniles in 1997 and 1998. The most recent report of a tagged recapture from the 1997 stocking occurred in 2017 when an angler reported catching a tagged 54 inch Lake Sturgeon. That fish was 28.5 inches when initially stocked in Otter Tail River in 1997.



Roseau River - The Roseau River is Minnesota's most northern tributary to the Red River of the North. The stream reach near Caribou has high quality spawning habitat for Walleye, Sauger and other riverine species. This reach of river was a historic Lake Sturgeon spawning area as reported by early settlers. The largest known Lake Sturgeon, weighing over 400 lbs., was taken from the Roseau River near Dominion City, Manitoba. The Dominion City, Manitoba low head dam was modified with a rock rapid in 1996 to facilitate fish passage. The project reconnected the Roseau River upstream to Roseau, MN. In January 2001, the Roseau City Dam was modified with a rock rapid to reconnect the stream reach from Roseau to Hayes Lake.

Much like Lake Sturgeon populations throughout their native range, these populations were extirpated by over-exploitation and construction of dams that blocked their migration routes. A MN DNR tagged Lake Sturgeon from the 1998 stocking in the Otter Tail River was recaptured and released (2000) near Roseau River, Manitoba.

Red Lake River - The Red Lake River is the largest tributary on the Minnesota side of the Red River of the North. Historical records identified the confluence of the Red Lake and Clearwater Rivers as a significant Lake Sturgeon spawning location. Since 2004, 4,938 fingerlings and 1,065,640 fry have been stocked in Red Lake River.

Modifications to the Crookston and East Grand Forks low head dams now allow fish passage to this historic spawning site. Red Lake River is barrier free from the Red River upstream to the dam in Thief River Falls. Stocked Lake Sturgeon from the 1997 and 1998 Otter Tail River stocking events were captured downstream of the dam at Crookston following high flow events.

Buffalo River - The Buffalo River is another large tributary on the Minnesota side of the Red River. It is 140 miles in length from the confluence of the Red River to the headwaters. At approximately river mile

50, the gradient increases as the stream flows through the beach ridge area. About twenty miles of high quality higher gradient stream habitat exist in the beach ridge area. Modification of the Buffalo River State Park Dam in 2002 restored fish passage to approximately 75 miles of river upstream. Since 2002, 25,294 Lake Sturgeon have been stocked in Buffalo River.

Other Rivers - Angler capture reports have provided valuable information on Lake Sturgeon distribution in the Red River basin. The following map displays all Lake Sturgeon reports in US waters outside of identified restoration sites.

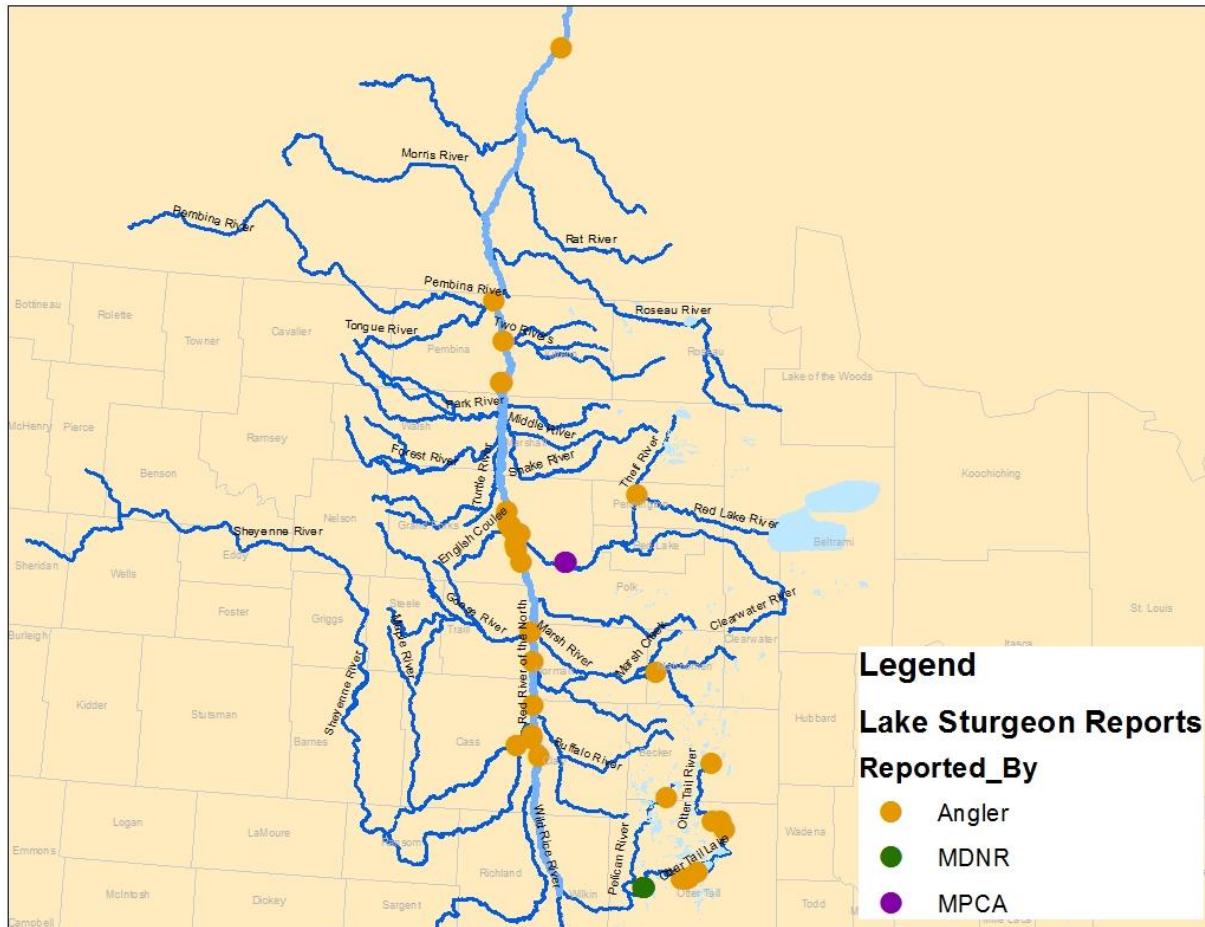


Figure 3. Locations of reported Lake Sturgeon captures in the Red River basin.

STATUS OVERVIEW

Initial survey results and angler reports suggest that Lake Sturgeon populations in the Red River basin are meeting initial recovery goals. Lake Sturgeon now inhabit much of the Red River basin. Anglers have reported catching Lake Sturgeon throughout Red River and all of the major tributaries. Some reports from the Otter Tail River have anglers specifically targeting Lake Sturgeon.

Catch rates in lake restoration sites consistently show broad size ranges of Lake Sturgeon suggesting multiple year classes surviving. Standard lake survey gill nets have been used to monitor the recently reintroduced Lake Sturgeon populations. These fish are now reaching sizes where they would not be vulnerable to this sampling gear. DNR staff will be evaluating alternative strategies such as larger mesh gill nets to monitor these maturing populations.

Detailed information for setting density goals of reintroduced Lake Sturgeon populations is lacking. The Wisconsin Lake Sturgeon Management Plan suggests managing for densities of Age 2+ fish at 1.5 fish/surface acre in lake systems. That plan also recommends populations should ideally be represented by males up to 40 years of age and females up to 70 years of age. Similar long term goals were set for Lake of the Woods and Rainy River. This plan also included a density goal of 250 Age 2+ fish/river mile. Self-sustaining Lake Sturgeon populations were defined in The New York Lake Sturgeon Recovery Plan as having at least an estimated 750 spawning adults and detection of at least three years of wild reproduction in a five-year period. Upon review of these goals, it is currently difficult to discern the applicability to the Red River system.

In addition to the challenge of establishing population-level density targets, correlating gill net catch rates to population densities for reintroduced Lake Sturgeon populations has been difficult. Round Lake and White Earth Lake have been stocked at much higher rates per acre than Otter Tail and Detroit Lake. These two lakes have also had much higher mean catch rates for Lake Sturgeon during standard lake surveys conducted by MNDNR.

Significant advances to remove barriers to fish passage in the Red River basin will improve the likelihood of establishing self-sustaining Lake Sturgeon populations. As Lake Sturgeon become sexually mature, populations should have access to spawning habitat. Efforts to remove additional barriers will continue.

As reintroduced Lake Sturgeon populations mature, adult fish will be able to access potential spawning locations. Some spawning locations have already been located on the Otter Tail River (identified in the map below). Though only males have been captured at these sites, more females should be maturing in the coming years.

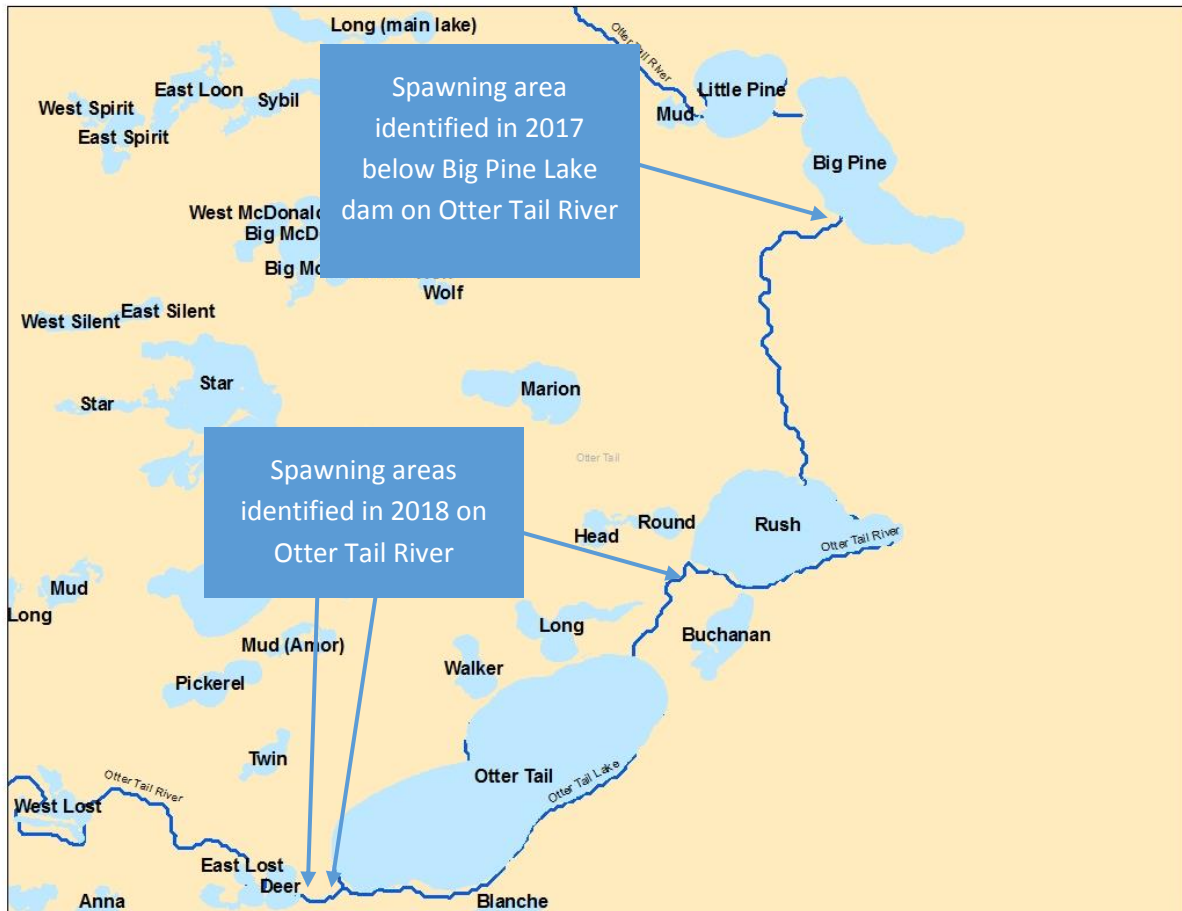


Figure 4. Location of spawning area identified in spring 2017 and 2018.

NEXT STEPS

The perpetuation of self-sustaining Lake Sturgeon populations will require adequate numbers of spawning adults, access to appropriate spawning habitat, and protection from harvest. Though difficult to correlate gill net catch rates to population density, we feel that most populations will be at adequate abundance to support self-sustaining populations in the near future. We have already observed sexually mature males in the Otter Tail and Pelican Rivers. Removal of barriers to fish passage and continuation of catch and release angling for Lake Sturgeon should facilitate Lake Sturgeon recovery.

With the positive signs of the reintroduced Lake Sturgeon populations thus far, we plan to transition management focus away from stocking efforts to monitoring populations in the coming years. During this next phase of Lake Sturgeon restoration, priority will be placed on the following activities:

- Cease Lake Sturgeon stocking after 2022 on Detroit Lake and Otter Tail Lake

- Much time and resources have been committed to reintroducing Lake Sturgeon into the Red River basin. With the positive signs of Lake Sturgeon recovery on these lakes, those resources can be allocated towards other purposes.
- Stock fingerling Lake Sturgeon annually on Buffalo River, Otter Tail River, Red Lake River, and Roseau River
 - Few Lake Sturgeon have been captured on these rivers and no spawning sites have been identified. Continue stocking fingerling Lake Sturgeon and expand sampling efforts.
 - Continue utilizing batch specific coded wire tags by stocking location. The location of implantation has also been utilized to identify year of stocking. However, identifying the specific location on the body of coded wire tag implants has proven difficult on small Lake Sturgeon. Consideration should be given to transitioning to PIT tagging fingerlings.
- Continue monitoring populations
 - Continue documenting Lake Sturgeon captured during standard lake surveys
 - Conduct targeted surveys for Lake Sturgeon using larger mesh gill nets in lakes. Most Lake Sturgeon collected during survey work were captured during lake survey gill netting assessments. As these fish age, standardized methods specifically targeting Lake Sturgeon will need to be developed.
 - Further refine and develop additional methods to sample Lake Sturgeon river populations.
 - Maintain the database documenting angler reported catches of Lake Sturgeon in Red River Basin.
 - PIT tag all Lake Sturgeon encountered during monitoring work.
- Expand efforts to identify spawning areas
 - Likely spawning locations were identified below the Big Pine Lake dam, Rush Lake Dam, and Otter Tail Lake Dam on the Otter Tail River. Continue surveying this area for spawning fish and successful reproduction.
 - Additional areas to target for possible spawning locations include the lower Otter Tail River below Orwell Dam, Red Lake River below Thief River Falls dam and near Red Lake Falls, and Buffalo River.
- Evaluate the ability of populations to self-sustain
 - Successful natural reproduction would be the next step for the population to move towards self-sustaining. Once female Lake Sturgeon start maturing, effort to assess natural reproduction should expand.
- Utilize planned creel surveys on Otter Tail and Detroit Lakes to gather angler effort and catch information on Lake Sturgeon
- Continue efforts to remove fish passage barriers
 - Plans are progressing to remove more barriers in the Red River basin. This work should remain a high priority.

- Restore and enhance habitat in streams that have the hydrologic conditions to support Lake Sturgeon
- Continue to collaborate with federal, state, and tribal partners on Lake Sturgeon restoration efforts

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RESTORATION OF EXTIRPATED LAKE STURGEON
(*Acipenser fulvescens*) IN THE RED RIVER WATERSHED –
PHASE TWO (2019-2029)

Prepared by Jamison Wendel, Red River Fisheries Specialist



Henry Drewes

Minnesota Department of Natural Resources

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Date