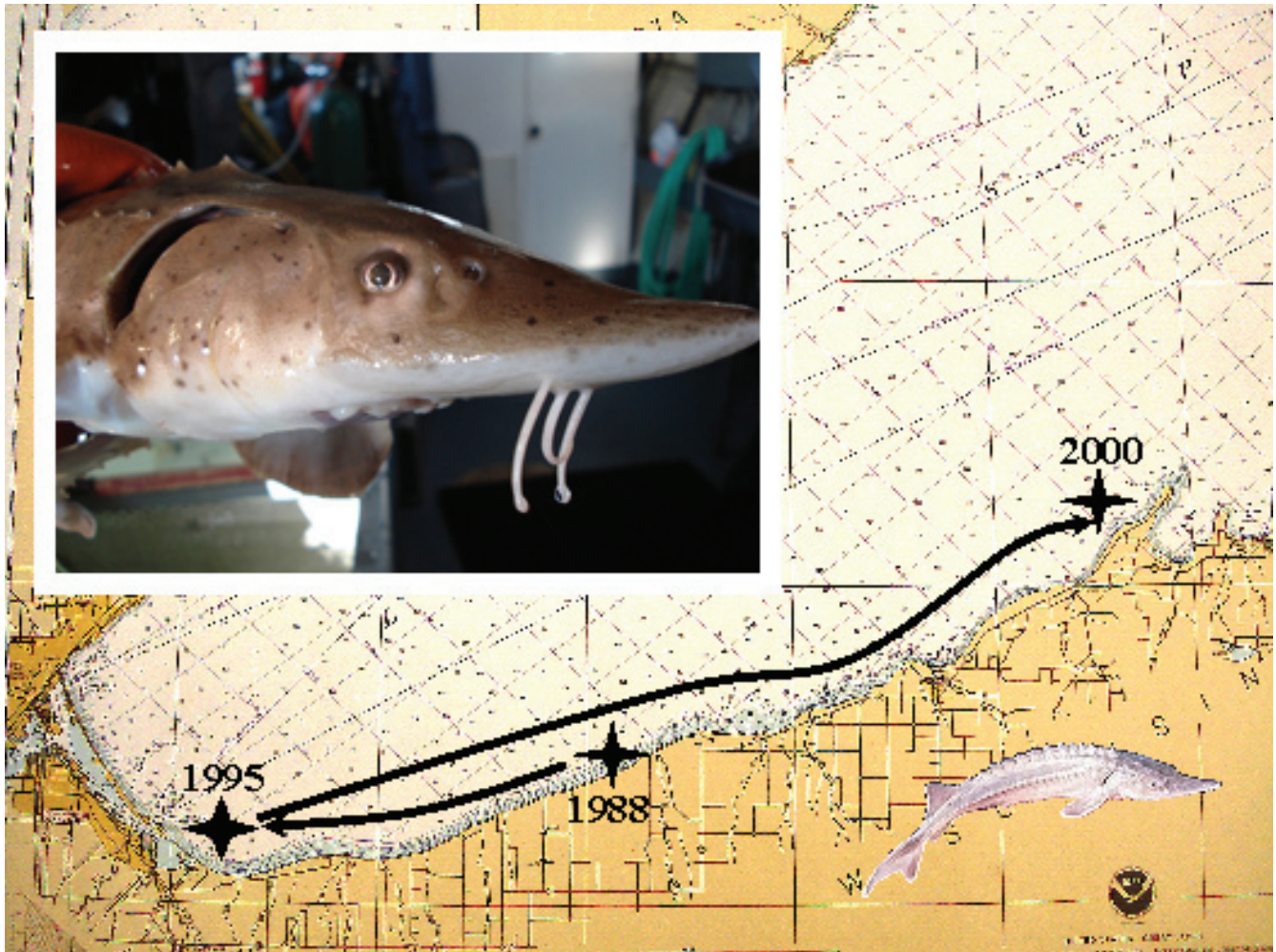


Dispersal of Stocked Lake Sturgeon in Wisconsin Waters of Lake Superior



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Abstract. - Lake sturgeon, *Acipenser fulvescens*, are the subject of a lake wide rehabilitation effort in Lake Superior. Hatchery-reared fry and fingerling lake sturgeon were released in the St. Louis River as part of a reintroduction project. Between 1985 and 2007, stocked lake sturgeon dispersal was monitored by capturing and tagging fish during routine gill net assessments in Wisconsin waters of Lake Superior. The capture location of 1,219 lake sturgeon averaged 26 km from the mouth of the St. Louis River. Fifty-three tagged lake sturgeon were recaptured in the western arm of the lake, nine were recaptured in the Apostle Islands and four fish were recaptured in Ontario. Eighty percent of the tagged recaptures came from an area between Duluth, MN and Bark Point, WI. The distribution of lake sturgeon caught in assessment nets in Wisconsin waters and the movement patterns of tagged recaptures indicated lake sturgeon stocked in the St. Louis River generally remained within the extreme western arm of Lake Superior.

Lake sturgeon, *Acipenser fulvescens*, were once common in Lake Superior, declined in abundance during the late 1800's and are now the subject of a lake wide rehabilitation effort (Auer 2003). A stocking program to reestablish a spawning lake sturgeon population in the St. Louis River was undertaken by the Wisconsin Department of Natural Resources (WDNR) and Minnesota Department of Natural Resources (MDNR) in 1983 (Schram et al. 1999). Determining movement and dispersal patterns of all life stages and the impact of stocked lake sturgeon on remnant populations were identified as research and management needs in the Lake Sturgeon Rehabilitation Plan for Lake Superior (Auer 2003). Movement patterns, home ranges and habitat requirements of lake sturgeon were identified as knowledge gaps to successful rehabilitation in the Great Lakes (Holey et al. 2000). Auer (1999) studied movement of wild lake sturgeon from the Sturgeon River, MI, and Schram et al. (1999) reported on bathymetric distribution and movement of stocked lake sturgeon in western Lake Superior. Other lakewide agency rehabilitation efforts have initially focused on studying the population dynamics of remnant populations in tributaries. Movement and spatial distribution of lake sturgeon in Lake Superior has received little attention yet remains an important knowledge gap for agencies managing lake sturgeon or for those considering stocking as a rehabilitation tool. The

objective of this study was to further describe juvenile dispersal of stocked lake sturgeon in Wisconsin waters of Lake Superior by incorporating additional mark and recapture data collected since Schram et al. (1999).

METHODS

Detailed descriptions of the study area and capture methods are described in Schram et al. (1999). Briefly, lake sturgeon originally had been released as fry or fingerlings in the St. Louis River. Lake Winnebago, WI, strain fish were used from 1983-1994 and Sturgeon River, MI, strain fish were used from 1998-2000. After leaving the St. Louis River estuary, lake sturgeon were captured between 1985 and 2007 during routine



Floy tags were used to determine movement patterns. Multiple recaptures were marked with an additional tag.

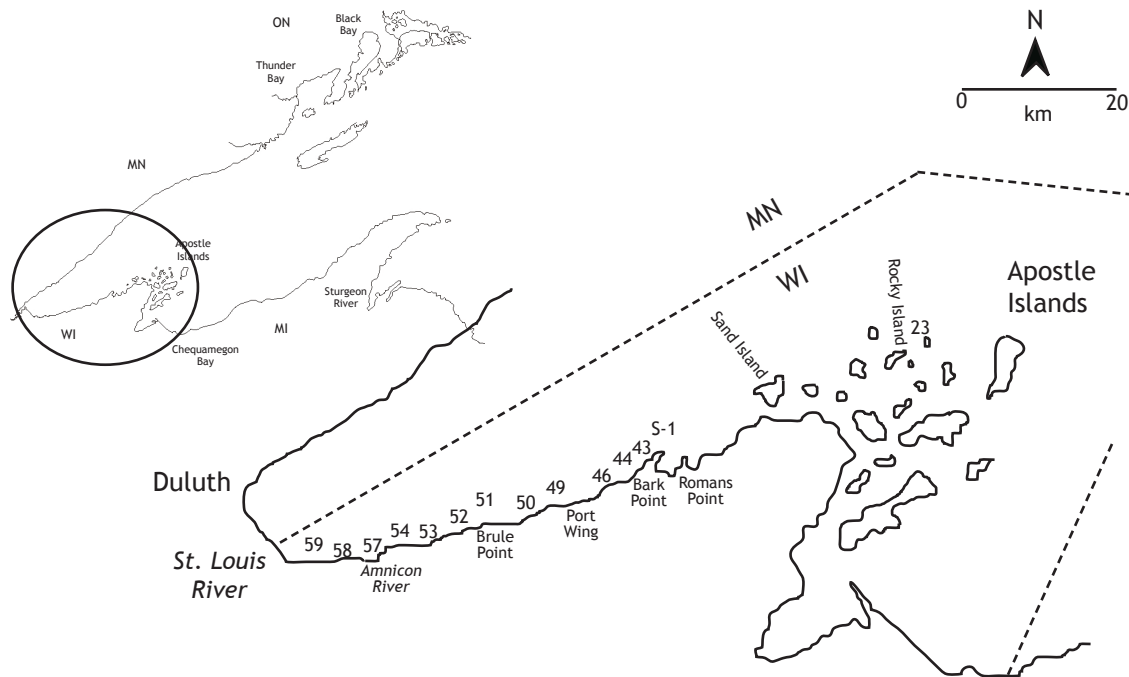


Figure 1. Spring (numbers) and siscowet (S-1) assessment stations where lake sturgeon were captured in western Lake Superior.

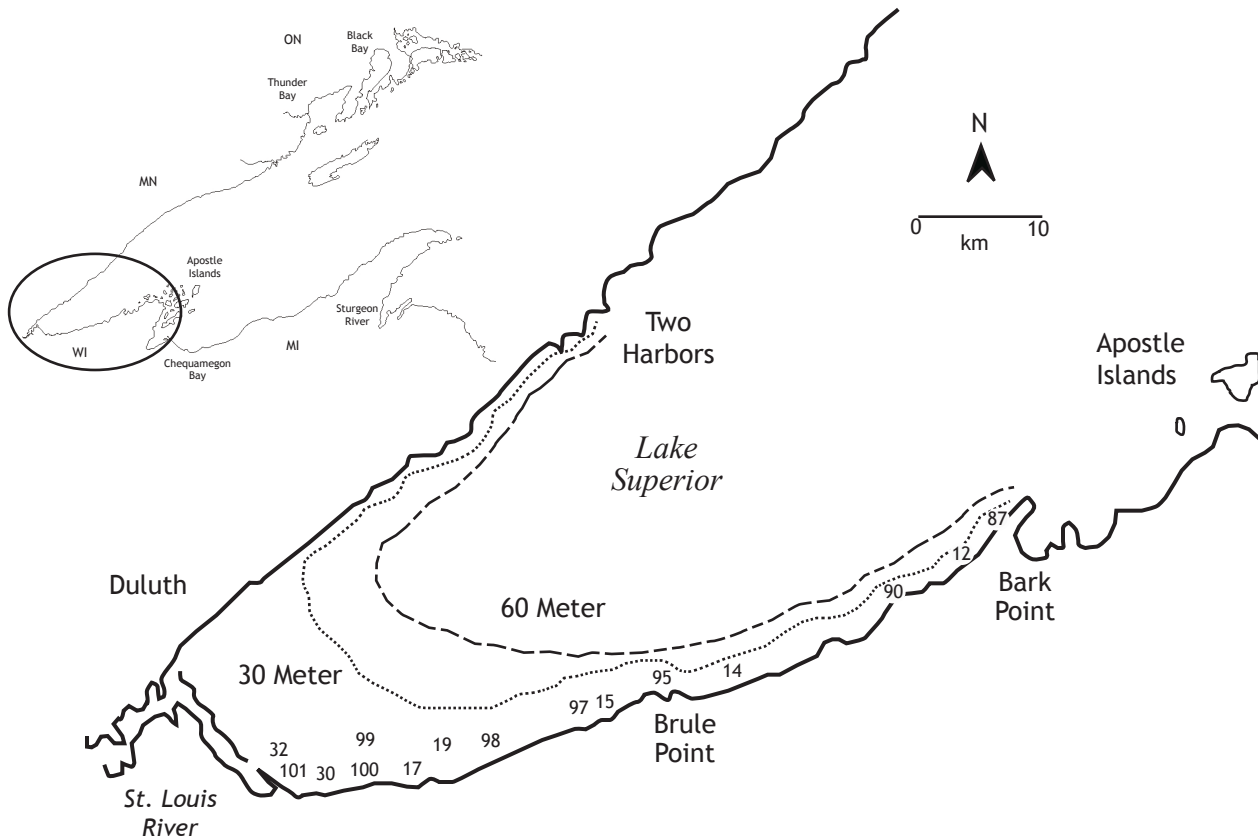


Figure 2. Summer assessment stations where lake sturgeon were captured in western Lake Superior. The 30 and 60 meter depth contours are represented by dashed lines.

WDNR gill net assessments in all Wisconsin waters of Lake Superior (Figures 1 & 2). All lake sturgeon originally captured west of the Apostle Islands were assumed to be stocked fish from the St. Louis River (Schram et al. 1999). These captured fish were marked with individually numbered anchor tags (Floy tag FD-68BC or FD-94) adjacent to the dorsal fin. Beginning in 2003, each fish also received a passive integrated transponder (PIT) tag, which was inserted under the skin behind the top of the head or under the third dorsal scute. Dispersal was determined by (1) measuring the distance from the mouth of the St. Louis River to the capture location and (2) from movement patterns of tagged recaptured fish.

RESULTS

From 1985 through 2007, 1,219 lake sturgeon were captured during spring and summer assessments between the St. Louis River mouth and the western Apostle Islands and a targeted siscowet lake trout, *Salvelinus namaycush*, assessment near Bark Point. These fish were captured a mean distance of 26 km (SD 19.06,



Author releasing tagged lake sturgeon on board the research vessel *Hack Noyes*.

range 1-110 km) from the mouth of the St. Louis River. From 1988 through 2007, 66 lake sturgeon were recaptured. Twenty-five were recaptured during the spring assessment, 28 were recaptured during the summer assessment, 12 were recaptured by commercial fishers, and one was found dead on a beach at Duluth (Tables 1 & 2).

Eighteen fish recaptured in an area between Duluth, MN and Bark Point, WI, were caught a mean distance 16 km (S.D. 10.15, range 2-34 km) east of their original tagging location, 21 were recaptured a mean distance 23 km (S.D. 13.68, range 2-50 km) west of their original tagging location and four were recaptured at the same tagging location. Nine fish were recaptured in the Apostle Islands (approximately 93 km from the tagging location). Two fish were recaptured in Thunder Bay, ON (approximately 279 km from the tagging location) and two fish were recaptured at the southern end of Black Bay, ON (approximately 300 km from the tagging location). Four lake sturgeon were recaptured twice (Tables 1 & 2). One lake sturgeon recaptured twice was originally tagged in 1988 near Brule Point, recaptured 18 km to the west near the St. Louis River mouth in 1995, and recaptured 54 km to the east near Bark Point in 2000. Another lake sturgeon recaptured twice was also originally tagged in 1999 near Brule Point, recaptured 20 km to the west near the St. Louis River mouth in 2002 and recaptured 15 km east near Port Wing in 2007. The third lake sturgeon recaptured twice was also originally tagged in 1999 near Brule Point, recaptured 3 km to the west in 2000 and recaptured 90 km to the east in the Apostle Islands in 2007. The fourth lake sturgeon recaptured twice was originally tagged in 2001 near the Amnicon River, recaptured 28 km to the east in 2003 and recaptured 121 km to the east in the Apostle Islands in 2007. Two lake sturgeon were recaptured three times (Table 1). One lake sturgeon recaptured three times was originally tagged near Brule Point in 1999, recaptured 11 km to the east in 2000, and recaptured at Brule Point again in 2002 and 2003. The other lake sturgeon recaptured three times was also originally tagged near Brule Point in 1999, recaptured 11 km to the east in 2000, recaptured at the original tagging location 11 km to the west in 2003, and was recaptured 7 km to the east in 2006.

DISCUSSION

Two decades after the rehabilitation program began the majority of stocked lake sturgeon sampled in Wisconsin waters of Lake Superior remained between Duluth, MN and Bark Point, WI. Eighty percent of the tagged recaptures were from this area while the other tagged recaptures were reported from the Apostle Islands and Ontario, CA. The lake sturgeon recaptured in Ontario moved approximately the same distance as lake sturgeon tagged in the Sturgeon River, MI, that

Table 1. Tagging and recapture locations of lake sturgeon originally captured during spring (Sp) and siscowet (S-1) assessments. Sum = summer

Date Tagged	Tagging Location	Total Length at Tagging (mm)	Date Recaptured	Recapture Location	Recapture Length (mm)	Distance from Initial Capture Location (km)	Days at Liberty
05/08/1988	53	500	05/21/1995	Sp-57	843	18	2568
2nd Recapture			05/05/2000	Sp-43	1003	54	4377
05/17/1989	52	617	10/26/1994	Romans Pt	953	43	1984
05/23/1989	44	533	05/31/1991	Sp-52	686	42	738
05/14/1990	57	577	07/31/1991	Sum-95	696	24	442
05/22/1991	58	737	08/01/1991	Sp-17	754	6	70
05/31/1991	52	686	08/08/1995	Sp-17	859	16	1528
05/13/1992	52	533	07/30/1993	Sum-19	602	13	442
05/13/1992	51	unknown	08/03/1995	Sum-97	673	10	1175
05/13/1992	49	953	06/22/1999	Black Bay	unknown	300	2574
05/30/1997	57	566	05/13/1999	Sp-52	706	19	713
05/11/1998	53	417	07/30/1999	Sum-99	457	16	444
05/11/1998	52	475	07/19/2001	Sum-30	660	26	1163
05/09/1998	44	599	07/19/2001	Sum-17	782	48	1165
05/11/1998	52	467	07/19/2001	Sum-17	678	20	1163
05/13/1999	50	747	05/09/2000	Sp-52	765	6	360
05/13/1999	50	678	05/09/2000	Sp-51	709	3	360
2nd Recapture			06/29/2007	Apostle Is.	993	90	2967
05/13/1999	51	460	05/09/2000	Sp-51	511	0	360
05/13/1999	51	556	05/09/2000	Sp-51	632	0	360
05/13/1999	52	457	05/09/2000	Sp-49	518	11	360
2nd Recapture			05/15/2002	Sp-52	711	12	731
3rd Recapture			05/15/2003	Sp-52	711	0	1096
05/13/1999	52	572	07/12/2000	Rocky Is	577	83	424
05/13/1999	52	584	05/07/2001	Sand Is.	691	53	724
05/13/1999	52	483	07/10/2001	Sum-87	630	34	787
05/13/1999	52	630	09/09/2002	Thunder Bay	unknown	264	1211
05/13/1999	52	485	Jan. 2007	Apostle Is.	unknown	90	2787
05/13/1999	52	516	05/14/2002	Sp-57	650	20	1096
2nd Recapture			05/05/2007	Port Wing	unknown	15	3642
05/13/1999	52	457	05/09/2000	Sp-49	518	12	361
2nd Recapture			05/15/2003	Sp-52	711	12	1462
3rd Recapture			04/23/2006	Sp-50	843	7	2535
05/19/1999	59	605	07/20/2005	Sum-15	856	27	2252
05/13/1999	50	635	07/21/2005	Sum-17	884	27	2257
05/13/1999	52	569	09/10/2006	Thunder Bay	unknown	294	2674
05/05/2000	43	561	07/19/2001	Sum-17	660	50	439
05/09/2000	51	607	07/19/2001	Sum-17	681	23	1165
05/09/2000	52	777	07/19/2003	Duluth	unknown	27	1165
05/09/2000	53	843	07/21/2005	Sum-17	1011	14	1898
06/29/2000	S-1	655	07/16/2003	Sum-87	765	2	1112
04/30/2005	51	726	07/20/2005	Sum-15	747	5	81

Range	70-4377
Mean	1324
S.D.	1013

Table 2. Tagging and recapture locations of lake sturgeon originally captured during summer assessments. Sp = spring and Sum = summer

Date Tagged	Tagging Location	Total Length at Tagging (mm)	Date Recaptured	Recapture Location	Recapture Length (mm)	Distance from Initial Capture Location (km)	Days at Liberty
07/26/1989	90	597	05/14/1994	Sp-54	782	30	1753
07/31/1989	14	605	08/03/1989	Sum-17	610	17	4
08/03/1989	98	521	05/13/1993	Sand Is.	699	72	1379
08/07/1989	100	615	08/01/1991	Sum-97	721	14	724
08/07/1989	100	559	08/01/1991	Sum-17	704	3	724
08/07/1989	100	554	08/03/1993	Sum-100	747	0	1456
08/07/1989	100	686	08/06/1991	Sum-100	810	0	729
08/08/1989	101	605	08/08/1995	Sum-17	810	8	2190
07/30/1991	15	483	05/17/1992	Sp-46	516	24	292
08/01/1991	97	752	08/02/1995	Sum-15	902	6	1461
08/06/1991	100	742	08/04/1995	Sum-98	864	10	1458
08/06/1991	100	635	05/08/1995	Sp-23	721	112	1372
07/29/1997	90	762	08/08/1997	Sum-100	762	42	10
08/08/1997	100	630	05/29/2000	Black Bay	unknown	300	1025
08/12/1997	32	554	05/13/1999	Sp-53	681	22	641
08/12/1997	101	607	07/19/2001	Sum-30	813	2	1423
08/12/1997	101	653	07/19/2001	Sum-17	815	8	1423
07/19/2001	17	772	05/14/2003	Sp-49	823	30	665
07/19/2001	17	673	07/18/2003	Sum-14	744	28	729
2nd Recapture			08/03/2007	Apostle Is.	unknown	121	2205
07/19/2001	30	584	05/04/2004	Sp-50	706	15	1020
07/17/2003	12	721	05/04/2004	Sp-51	739	19	292
07/19/2001	30	597	07/21/2005	Sum-17	780	7	1462
07/10/2001	87	554	04/30/2005	Sp-50	681	27	1389
						Range	4-2190
						Mean	1027
						S.D.	569

were subsequently caught in Chequamegon Bay, WI (Auer 1999). One lake sturgeon originally tagged while spawning in the Sturgeon River, MI, was recaptured twice in Chequamegon Bay, WI, (approximately 280 km) during non-spawning years (WDNR unpublished data), and then returned to spawn in the Sturgeon River in subsequent years suggesting lake sturgeon recaptured in Ontario and the Apostle Islands could potentially return to the St. Louis River to spawn. Walleye, *Sander vitreus*, from the St. Louis River migrate to the Apostle Islands each year during late summer and return to spawn the following spring (Schram et al. 1992). Stocked lake sturgeon generally inhabited waters less than 30 m deep but were captured in waters as deep as 60 m (Schram et al. 1999). Hay-Chmielewski (1987)

felt food distribution was the most important factor for habitat selection by lake sturgeon. Along the Wisconsin shore at the extreme western end of Lake Superior the bottom slopes gradually and is frequently turbid due to red clay and sand runoff from adjacent tributaries. The shallow productive water may influence habitat selection and ultimately keep lake sturgeon within the extreme western end of the lake. Chiasson et al. (1997), found the largest concentration of juvenile lake sturgeon in northern Ontario rivers adjacent to substrate dominated by sand and clay. Close proximity of the 30 m depth contour to the shore near Duluth and Bark Point restricts movement out of this area to a narrow 1 km corridor along each shore (Figure 2). Lake sturgeon were captured

110 km northeast in Minnesota waters (Schram et al. 1999), however, movement along the deep, rocky Minnesota shore appears limited based on occasional catches in Minnesota DNR assessment nets north of Two Harbors (Steve Geving, MN DNR per. com.) Stocked lake sturgeon from this study generally exhibited shorter lake movements than those reported by Auer (1999) who found mature native lake sturgeon from the Sturgeon River, MI, moving up to 230 km to the east and 280 km to the west from the spawning site. The shorter recapture distances for the majority of lake sturgeon recaptured in this study may indicate suitable foraging areas are closer to the St. Louis River and/or these predominately immature fish still have the potential to migrate further after they become fully mature. Wild lake sturgeon exhibit spawning site fidelity (Priegel and Wirth 1978; Folz and Meyers 1985; Auer 1999) but it was unknown if stocked lake sturgeon would return to spawn in the St. Louis River or migrate to other tributaries in Lake Superior. Twenty-four years after the stocking program was initiated, the distribution of juvenile lake sturgeon caught in assessment nets and the movement patterns of tagged recaptures indicates the majority of St. Louis River stocked lake sturgeon do not migrate to other areas of the lake but generally remain within extreme western Lake Superior.

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LITERATURE CITED

Auer, N.A. 1999. Population characteristics and movements of lake sturgeon in the Sturgeon River and Lake Superior. *Journal of Great Lakes Research* 25(2): 282-293.

Auer, N.A., editor. 2003. A lake sturgeon rehabilitation plan for Lake Superior. Great Lakes Fishery Commission, Misc. Publ. 2003-02.

Chiasson, W.B., D.L.G. Noakes and F.W.H. Beamish. 1997. Habitat, benthic prey, and distribution of juvenile lake sturgeon, *Acipenser fulvescens*, in northern Ontario rivers. *Canadian Journal of Fisheries and Aquatic Sciences*. 54:2866-2871.

Folz, D.J., and L.S. Meyers. 1985. Management of the lake sturgeon, *Acipenser fulvescens*, population in the Lake Winnebago system, Wisconsin. pp.135-46 in F.P. Binkowski and S.I. Doroshov, eds. *North American Sturgeons*. Junk Publishers, Netherlands. 163 pp.

Hay-Chmielewski, E.M. 1987. Habitat preferences and movement patterns of the lake sturgeon, *Acipenser fulvescens*, in Black Lake, Michigan. Michigan Department of Natural Resources, Fisheries Research Report 1949, Ann Arbor.

Holey, M.E., E.A. Baker, T.F. Thuemler, and R.F. Elliot. 2000. Research and assessment needs to restore lake sturgeon in the Great Lakes. Great Lakes Fishery Trust, Muskegon, Michigan.

Priegel, G.R. and T.L. Wirth. 1978. Lake sturgeon populations, growth, and exploitation in Lakes Poygan, Winneconne, and Butte Des Morts, Wisconsin. Wisconsin Department of Natural Resources, Technical Bulletin 107, Madison.

Schram, S.T., T.L. Margenau, and W.H. Blust. 1992. Population biology and management of the walleye in western Lake Superior. Wisconsin Department of Natural Resources. Technical Bulletin 177, Madison.

Schram, S.T., J. Lindgren, and L.M. Evrard. 1999. Reintroduction of lake sturgeon in the St. Louis River, western Lake Superior, *North American Journal of Fisheries Management* 19:815-823.