

St. Marys River Little Rapids
Chippewa County, T47N R01E, Sec. 26
St. Marys River Watershed, Last Surveyed 2023

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Environment

As the only outlet of Lake Superior, the St. Marys River connects Lake Superior to Lake Huron and the lower Great Lakes. The river is approximately 70 miles long and is a truly unique system that provides world-class fishing opportunities year-round for several warm-, cool-, and cold-water fish species. Historically, the river had four main "rapids" areas - the Main Rapids, the Little Rapids, West Neebish Rapids, and East Neebish Rapids (Figure 1). These relatively shallow, rocky areas with faster flowing water were very productive for a variety of different fish species and prey items. Over time, however, alterations to the river for navigation and other uses reduced or eliminated these rapids habitats, until only the Main Rapids remained, and that area now only receives only about 10% of the river's flow (the other 90% goes through hydroelectric power plants and the Locks). This loss of important fish habitat contributed to the St. Marys River being listed in 1987 as an Area of Concern in the Great Lakes Water Quality Agreement.

The Little Rapids is a reach of the St. Marys River between Sugar Island and Island Number 1 near Sault Ste. Marie, Michigan (Figures 2 and 3). It is approximately 70 acres in area and includes several small islands, with varying depths and velocities. Substrate ranges from sand to large cobble.

History

The Little Rapids area originally extended the width of the river from the mainland to Sugar Island. From 1891 to 1895, a total of almost 1.3 million cubic yards of material were dredged for a navigation channel at the Little Rapids. In 1893, a dike of 2,300 linear feet (0.43 mile) in length was built between Sugar Island and Island No. 1 to "compensate [for] the increased cross-sectional area caused by the newly dredged navigation channel, and thus maintain the water level above this point" (MDNR files, unpublished data). This dike, or causeway, essentially blocked all the flow to the remaining portion of the Little Rapids. Only two 6-foot culverts were contained in the 0.43-mile-long causeway. The Chippewa County Historical Society prepared a rendering of what the area may have looked like prior to the excavation of the Little Rapids Cut, or navigation channel and estimated that about 60 acres of land/island were excavated for the creation of the shipping channel, also known as the "Little Rapids Cut" (Figure 4).

In 1996, DNR Fisheries Biologist Jim Waybrant (now retired), suggested restoring flow to the Little Rapids area by putting culverts or bridges in the causeway. Jim suggested this to Bill Gregory, president of Edison Sault Electric Co. at the time (now Cloverland Electric Co.). Edison Sault Electric funded a feasibility study for the Little Rapids Restoration Project in 1997 (Acres International 1997).

Concerns were raised by the Great Lakes Carriers Association (Great Lakes Shipping) that allowing water to flow through the Little Rapids would drop water levels in the shipping channel. Sugar Island residents were also concerned about construction interfering with traffic on the causeway, which is the

only way to get to the Sugar Island Ferry dock. A major concern of Island Residents was the potential impact on ice formation in the shipping channel, which could affect ferry service.

Over the years (and decades), this project remained a priority for MDNR Fisheries Division, and several attempts were made to secure funding. Grant applications were submitted by Fisheries Division and other partners, including Lake Superior State University (LSSU), the Eastern Upper Peninsula Planning and Development Corporation, the Chippewa County Road Commission, Chippewa-Ottawa Resource Authority, the St. Marys River Binational Public Advisory Council, Michigan Department of Environmental Quality (DEQ), and the Great Lakes Commission. Finally, in 2011, a grant was obtained to do planning and engineering for the project, and river flows were modeled to ensure water levels in the shipping channel would not be impacted.

Starting in 2013, the Great Lakes Commission had received Great Lakes Restoration Initiative (GLRI) funding from the National Oceanic and Atmospheric Administration (NOAA) to complete this project, with the Chippewa County Road Commission, DNR, and other partners. The project included construction of a 5-span, 625-foot bridge, as well as physical and biological monitoring of the Little Rapids area. NOAA-GLRI funding for the project was \$9.4 million. Two-way traffic was maintained throughout construction by building a temporary roadway alongside the causeway. Bridge construction, which includes parking and a fishing area separate from traffic, was completed in fall 2016, and the entire project was completed in 2017. Parking includes space for approximately 3 vehicles on each end of the bridge, and the fishing area is a walkway on the downstream side of the bridge.

Prior to the bridge construction, DEQ staff conducted a boat electrofishing survey to document the "pre-construction" fish community. The survey was done on May 7, 2013, and consisted of 10-minute sampling periods at 10 different locations. There were eight locations downstream of the causeway and two locations upstream of the causeway. A total of 10 fish representing 2 species (White Sucker and Atlantic Salmon) were collected during that effort (B. Keiper, DEQ, personal communication).

A follow-up post-construction survey was done in May of 2017 by DNR staff, duplicating efforts and methods of the previous survey. The survey was done May 10, 2017. Water temperature at the time of the survey was 40°F. A total of 33 fish representing seven species were captured during the survey. Although rocky substrate was starting to be uncovered, the cold water temperatures (40°F) likely affected the species richness and numbers of fish observed in the survey.

By Fall 2017, a little more than a year after the bridge was installed, benefits of the bridge and hydrologic restoration were evident. There was an immediate improvement in flows, with the gravel and cobble substrates exposed very soon after bridge installation. LSSU monitoring showed an increase in the use of the area by lotic species, or those that prefer flowing water, and a shift to species that prefer rocky substrates. Anglers were also enjoying the new bridge, with reports of Atlantic Salmon, Steelhead, Pink Salmon, and Chinook Salmon being caught in the area.

In 2018, NLHMU personnel did nighttime boat electrofishing surveys of the rapids in June, July, September, and October. Approximately 3.1 miles of shoreline distance were sampled over three transects downstream of the causeway, and about 2.9 miles over two transects were sampled upstream of the causeway to cover a variety of habitats. Diversity and abundance of the catch improved in 2018, with 12 to 17 species captured during each sampling event, with thousands of fish captured and many

more observed. Salmonids including Atlantic Salmon, Rainbow Trout, and Chinook Salmon were captured, along with Rainbow Smelt, White Suckers, and a variety of other species.

Lake Superior State University also studied the physical and ecological responses to the restoration of the Little Rapids area by surveying the area before restoration (2013 and 2014) and after restoration (2017 and 2018) (Molina-Moctezuma et al. 2021a and 2021b). They found that the restoration project successfully restored flow and habitat through increased flows and a change to coarser substrate (Molina-Moctezuma et al. 2021a) and an increase in age-0 fish catch per unit effort (CPUE), along with a shift in the fish assemblage with more salmonids captured after the restoration (Molina-Moctezuma et al. 2021b). That study recommended future evaluation to determine the long-term response to the change.

Current Status

In 2023, NLHMU personnel again surveyed the Little Rapids area to document the fish community and any changes over the five years since the previous survey. Boat electrofishing surveys were done in July, September, October and November of that year following roughly the same transects that were done in 2018, with some changes due to different water levels. Similar to the previous survey, 2 transects were surveyed upstream of the causeway each time, and 3 transects were surveyed downstream of the causeway. Total effort was 5.87 hours of boomshocking time and approximately 16 miles of shoreline distance, with an average of 1.96 hours of boomshocking time and 4 miles of shoreline distance for each survey period.

A total of 1,388 fish representing 37 species were captured in the Little Rapids in the 2023 surveys (Table 1). Note that the total number of fish observed was much higher, with numbers from visual estimation listed below.

July. A total of 727 fish were captured representing 23 species of fish (Tables 2 and 3) during 1.7 hours and approximately 4 miles of effort. Juvenile Chinook Salmon and Rainbow Smelt were the most abundant species at this time. Atlantic Salmon from 7 to 26 inches in total length were captured, with the juvenile fish being recently stocked fish. A Cisco was captured during this sampling event.

September. A total of 358 fish were captured representing 25 species of fish (Tables 4 and 5) during 2.13 hours and 3.3 miles of effort. Rainbow Smelt were by far the most abundant species captured, with an additional estimate of 1400 smelt observed but not captured. Atlantic Salmon from 8 to 30 inches in total length were captured. The smaller Atlantic Salmon were clipped, indicating they had been stocked in June by Lake Superior State University's Center for Freshwater Research and Education.

October. A total of 277 fish were captured representing 21 species of fish (Tables 6 and 7) during 2.04 hours and 3.9 miles of effort. Emerald Shiners were the most abundant species captured, with an additional estimated 1200 Emerald Shiners observed but not captured. Atlantic Salmon from 2 to 25 inches in total length were captured. The juvenile Atlantic Salmon appear to be from natural reproduction, as they were not clipped and the fins did not display any erosion typical of a hatchery fish.

November. A total of 217 fish were captured representing 17 species of fish (Tables 8 and 9). Small-bodied fish were extremely abundant, with an estimated 25,000 Emerald Shiners, 1500 Bluntnose Minnows, and 500 Common Shiners observed in the transects. Adult Cisco were also captured in the Little Rapids during this sampling event.

Analysis and Discussion

The fish community of the Little Rapids since the restoration project continues to be diverse and abundant. Species richness was high, with 17 to 25 species captured during each survey period in 2023. Fish abundance was also high, with "clouds" of minnows present during some survey periods.

Salmonids. The Little Rapids had diverse representation of salmonids depending on the season. Recreationally important species such as Chinook Salmon adults were present in September, Coho Salmon adults were present in November, and Atlantic Salmon adults were present in July, September, October, and November. Pink Salmon adults were also present during the September survey. Juveniles of most of these species were also present at different times with young Chinook Salmon abundant in July. Of particular note was the presence of wild (naturally-produced) Atlantic Salmon in October and November. There has been very little evidence of natural reproduction of Atlantic Salmon in the Great Lakes (Tucker et al. 2014).

Cisco were also present in the July and November survey periods. Restoration of habitat for this species was an important part of the Little Rapids Restoration project, and it is encouraging to see them in the Little Rapids. In November, the Cisco were in depths of 4-6 feet of water downstream of the causeway and below the islands.

Anglers can fish for these species from a separate fishing area on the bridge. This fishing area/walkway is on the downstream side of the bridge and is separated from traffic by a guardrail. Parking is available for about six vehicles (three at each end of the bridge). It is also a short walk from the Sugar Island ferry, where there is additional parking. This represents one of the few shore/pier fishing opportunities for Great Lakes salmonids in the Northern Lake Huron Management Unit.

Prey fish. The prey population is abundant in the Little Rapids. Indeed, the only way to characterize the "clouds" of minnows we observed on several occasions was to visually estimate the numbers of fish. It was not uncommon to see thousands of small fish in our transects, and in November we visually estimated tens of thousands of minnows, including Emerald Shiners, Bluntnose Minnows, and Common Shiners.

The 2023 survey of the Little Rapids showed that this reach has maintained a diverse community of fish preferring higher velocities with high numbers of prey fish. The preference for fast-moving water by many of these fish species, and the increase in the abundance of those species, was likely a result of the restoration project which restored those flows (Molina-Moctezuma et al. 2021a and 2021b). The shift from a more lotic fish community from pre-restoration to the more lotic fish community we currently see was one of the goals of the Little Rapids Restoration project.

The NOAA Restoration Center and the University of Michigan Cooperative Institute for Great Lakes Research released in spring 2024 a request for proposals for a study to do an in-depth post-restoration monitoring of the Little Rapids looking at target fish species, their use of the rapids for spawning and/or other life stages, the macroinvertebrate community, and any nuisance or invasive aquatic plant species. That study, for which funding has not yet been awarded, is expected to be done by the end of 2025.

Management Direction

1. An electrofishing survey should be repeated again in 2028 pending other more detailed studies, and periodically thereafter, to continue to document the fisheries use of this habitat over time.
2. Electrofishing surveys should continue to be done over multiple time periods to document seasonal use of the habitat by different species such as Lake Sturgeon and Cisco.
3. Although fishing is available from the walkway/fishing area on the bridge and from boat anglers, opportunities for improving public access at this location should be pursued. A kayak/small boat launch and/or fishing platforms on Island No. 1 would facilitate access for anglers and other recreational use.

References

Acres International Corporation. 1997. Little Rapids restoration project feasibility study. Prepared for Edison Sault Electric Company. Sault Ste. Marie, Michigan.

Molina-Moctezuma, A., E. Ellis, K.L. Kapuscinski, E.F. Roseman, T. Heatlie, and A. Moerke. 2021a. Restoration of rapids habitat in a Great Lakes connecting channel, the St. Marys River, Michigan. *Restoration Ecology*, 29:1.

Molina-Moctezuma, A., N. Godby, K.L. Kapuscinski, E.G. Roseman, K. Skubik, and A. Moerke. 2021b. Response of fish assemblages to restoration of rapids habitat in a Great Lakes connecting channel. *Journal of Great Lakes Research*, 47:4, pp. 1182-1191.

Tucker, S., A. Moerke, G. Steinhart, and R. Greil. First record of natural reproduction by Atlantic salmon (*Salmo salar*) in the St. Marys River, Michigan. *Journal of Great Lakes Research* 40, pp. 1022-1026.

Table 1. Overall summary of catch by species in the St. Marys River Little Rapids for each sampling period in 2024.

Species	July catch (No.)	September catch (No.)	October catch (No.)	November catch (No.)
Atlantic Salmon	3	8	11	12
Bluegill		1		
Blacknose Shiner			7	3
Bluntnose Minnow	29	22	22	72
Burbot				1
Chinook Salmon	195	4	16	2
Cisco	1			5
Coho Salmon			1	1
Common Shiner		40	27	17
Creek Chub		3		
White Sucker	70	24	31	24
Freshwater Drum	1	1		
Emerald Shiner	9		72	43
Golden Redhorse	1			
Johnny Darter	11	8		
Lake Chub	5			
Largemouth Bass		1		
Logperch	69	60	13	5
Longnose Gar			1	
Mimic Shiner	6	11		
Mottled Sculpin		1		
Northern Pike		1		
Pink Salmon		1	21	
Rainbow Trout	1	1	2	7
Rock Bass	34	23	29	15
Rosyface Shiner		14	4	
Silver Redhorse	2	1		
Slimy Sculpin	22	2	1	
Smallmouth Bass	1		5	1
Rainbow Smelt	136	102	6	7
Sculpins (family)			3	1
Shothead Redhorse			1	
Spottail Shiner	25	9		
Trout-Perch	73		3	1
Threespine Stickleback	23	1		
Walleye	1	2		
Yellow Perch	9	17	1	

Table 2. Number, weight, and length by species caught in the St. Marys River Little Rapids in July 2024.

Species	Number	Number (Incl. Estimate)	Percent by number	Weight (lb.)	Percent by Weight	Length Range (in.)
Atlantic Salmon	3		0.4	9.5	4.2	7-26
Bluntnose Minnow	29		4	0.2	0.1	2-3
Chinook Salmon	195		26.8	1.7	0.7	2-3
Cisco	1	2	0.1	0.6	0.3	13-13
White Sucker	70		9.6	182.4	79.8	2-22
Freshwater Drum	1		0.1	11.2	4.9	28-28
Emerald Shiner	9		1.2	0.1	0	2-3
Golden Redhorse	1		0.1	3	1.3	20-20
Johnny Darter	11		1.5	0	0	1-2
Lake Chub	5		0.7	0.2	0.1	2-5
Logperch	69		9.5	0.8	0.3	1-4
Mimic Shiner	6		0.8	0	0	1-2
Rainbow Trout	1		0.1	0.1	0	6-6
Rock Bass	34		4.7	2.4	1	2-7
Silver Redhorse	2		0.3	8.6	3.7	23-24
Slimy Sculpin	22		3	0.2	0.1	1-3
Smallmouth Bass	1		0.1	0.1	0	5-5
Rainbow Smelt	136		18.7	1.2	0.5	2-5
Spottail Shiner	25		3.4	0.1	0.1	1-3
Trout-perch	73		10	1.3	0.6	1-4
Threespine Stickleback	23		3.2	0	0	2-3
Walleye	1		0.1	3.7	1.6	22-22
Yellow Perch	9		1.2	1.1	0.5	4-8

Table 4. Number, weight, and length by species caught in the St. Marys River Little Rapids in September 2023.

Species	Number	Number (Incl. Estimate)	Percent by number	Weight (lb.)	Percent by Weight	Length Range (in.)
Atlantic Salmon	8		2.2	27.9	23.5	8-30
Bluegill	1		0.3	0	0	2-2
Bluntnose Minnow	22		6.1	0.2	0.2	1-3
Chinook Salmon	4	11	1.1	29.4	24.7	4-36
Creek Chub	3		0.8	0	0	2-3
Common Shiner	40		11.2	0.3	0.3	2-3
White Sucker	24		6.7	33.9	28.5	2-21
Freshwater Drum	1		0.3	6.1	5.1	23-23
Johnny Darter	8		2.2	0	0	1-2
Largemouth Bass	1		0.3	0	0	4-4
Logperch	60		16.8	0.9	0.7	2-4
Mimic Shiner	11		3.1	0	0	1-3
Mottled Sculpin	1		0.3	0	0	2-2
Northern Pike	1		0.3	6.5	5.4	30-30
Pink Salmon	1		0.3	1.7	1.4	17-17
Rainbow Trout	1		0.3	0.3	0.2	9-9
Rock Bass	23		6.4	1.3	1.1	1-5
Rosyface Shiner	14		3.9	0.1	0.1	2-3
Silver Redhorse	1		0.3	4	3.4	23-23
Slimy Sculpin	2		0.6	0	0	1-2
Rainbow Smelt	102	1,502	28.5	0.4	0.3	2-2
Spottail Shiner	9		2.5	0.1	0	2-3
Threespine Stickleback	1		0.3	0	0	1-1
Walleye	2		0.6	4.1	3.5	18-18
Yellow Perch	17		4.7	1.7	1.4	3-9

Table 5. Length-frequency of select fish species captured during the September 2023 survey of the St. Marys River Little Rapids.

Inch Group	Atlantic Salmon	Chinook Salmon	Large-mouth Bass	Northern Pike	Pink Salmon	Rainbow Trout	Rainbow Smelt	Walleye	Yellow Perch
1									
2							102		
3									1
4		1	1						3
5		1							6
6									4
7									2
8	2								
9						1			1
10									
11									
12									
13									
14									
15									
16									
17					1				
18									
19								2	
20	1								
21	2								
22									
23	1								
24									
25									
26									
27									
28	1								
29									
30	1	1		1					
31									
32									
33									
34									
35									
36		1							

Table 6. Number, weight, and length by species caught in the St. Marys River Little Rapids in October 2023.

Species	Number	Number (Incl. Estimate)	Percent by number	Weight (lb.)	Percent by Weight	Length Range (in.)
Atlantic Salmon	11		4	27.1	13.4	2-25
Bluntnose Minnow	22		7.9	0.2	0.1	2-3
Blacknose Shiner	7		2.5	0.1	0	1-3
Chinook Salmon	16		5.8	80.4	39.7	4-32
Coho Salmon	1		0.4	0	0	3-3
Common Shiner	27		9.7	0.2	0.1	1-3
White Sucker	31		11.2	46.3	22.9	2-21
Emerald Shiner	72	1,272	26	0.3	0.1	1-3
Longnose Gar	1		0.4	1.2	0.6	24-24
Logperch	13		4.7	0.2	0.1	2-3
Pink Salmon	21	45	7.6	38.4	18.9	15-19
Rainbow Trout	2		0.7	2.5	1.2	9-18
Rock Bass	29		10.5	1.9	0.9	1-7
Rosyface Shiner	4		1.4	0.1	0	3-4
Sculpins (family)	3		1.1	0	0	1-2
Shorthead Redhorse	1		0.4	3.4	1.7	20-20
Slimy Sculpin	1		0.4	0	0	3-3
Smallmouth Bass	5		1.8	0.1	0	2-3
Rainbow Smelt	6		2.2	0	0	2-2
Trout-perch	3		1.1	0	0	1-3
Yellow Perch	1		0.4	0.3	0.1	8-8

Table 8. Number, weight, and length by species caught in the St. Marys River Little Rapids in November 2023.

Species	Number	Number (Incl. Estimate)	Percent by number	Weight (lb.)	Percent by Weight	Length Range (in.)
Atlantic Salmon	12		5.5	14.4	30.3	2-27
Bluntnose Minnow	72	1,572	33.2	0.6	1.2	1-3
Blacknose Shiner	3		1.4	0	0	2-3
Burbot	1		0.5	0.4	0.9	11-11
Chinook Salmon	2		0.9	0.1	0.2	4-5
Cisco	5		2.3	3.7	7.8	13-16
Coho Salmon	1		0.5	4.9	10.2	23-23
Common Shiner	17	517	7.8	0.2	0.4	1-4
White Sucker	24		11.1	16.6	34.9	2-20
Emerald Shiner	43	25,043	19.8	0.2	0.3	2-3
Logperch	5		2.3	0.1	0.1	1-3
Rainbow Trout	7		3.2	6	12.6	9-15
Rock Bass	15		6.9	0.4	0.8	1-5
Sculpins (Family)	1		0.5	0	0	1-1
Smallmouth Bass	1		0.5	0	0	3-3
Rainbow Smelt	7		3.2	0.1	0.2	2-5
Trout-perch	1		0.5	0	0	2-2

Table 9. Length-frequency of select fish species captured during the November 2023 survey of the St. Marys River Little Rapids.

Inch Group	Atlantic Salmon	Chinook Salmon	Cisco	Coho Salmon	Rainbow Trout	Rainbow Smelt	Smallmouth Bass
1							
2	2					4	
3	3					1	1
4	1	1				1	
5		1				1	
6							
7							
8							
9	1				1		
10					1		
11							
12	2				2		
13			2				
14			2				
15					3		
16			1				
17							
18							
19							
20							
21	1						
22	1						
23				1			
24							
25							
26							
27	1						
28							

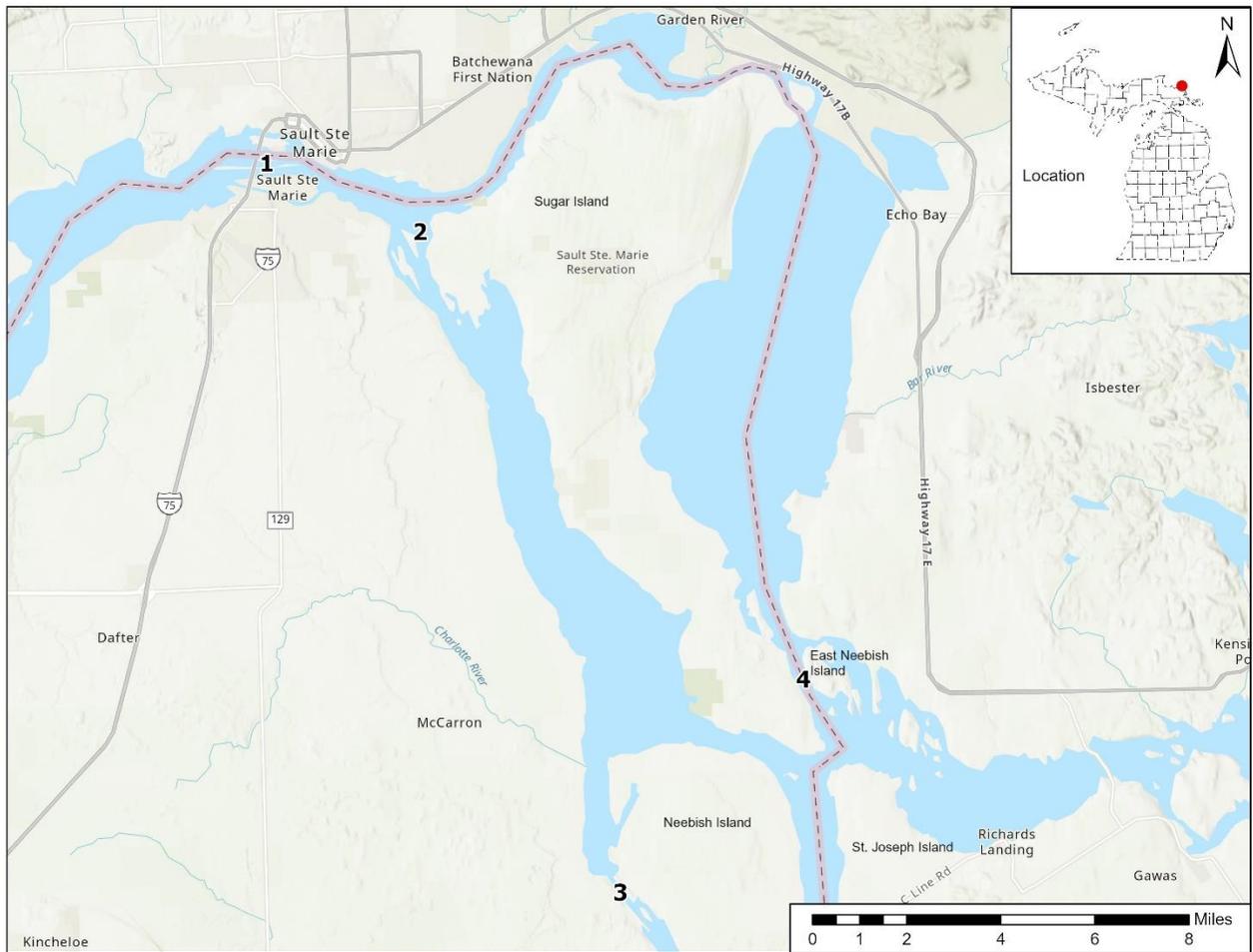


Figure 1. Historic rapids locations in the St. Marys River. 1 = Main Rapids, 2=Little Rapids, 3=West Neebish Rapids, and 4=East Neebish Rapids.

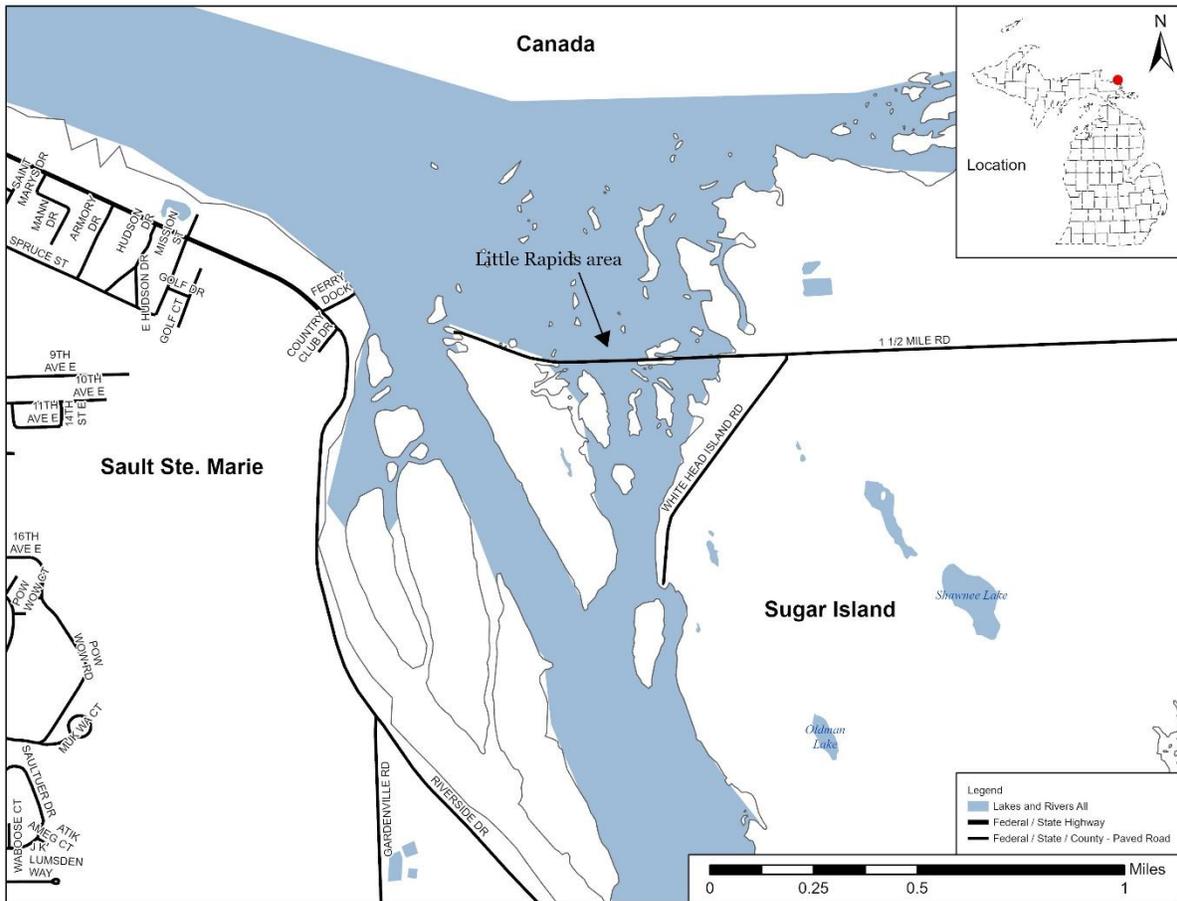


Figure 2. Locator map for the St. Marys River Little Rapids area.

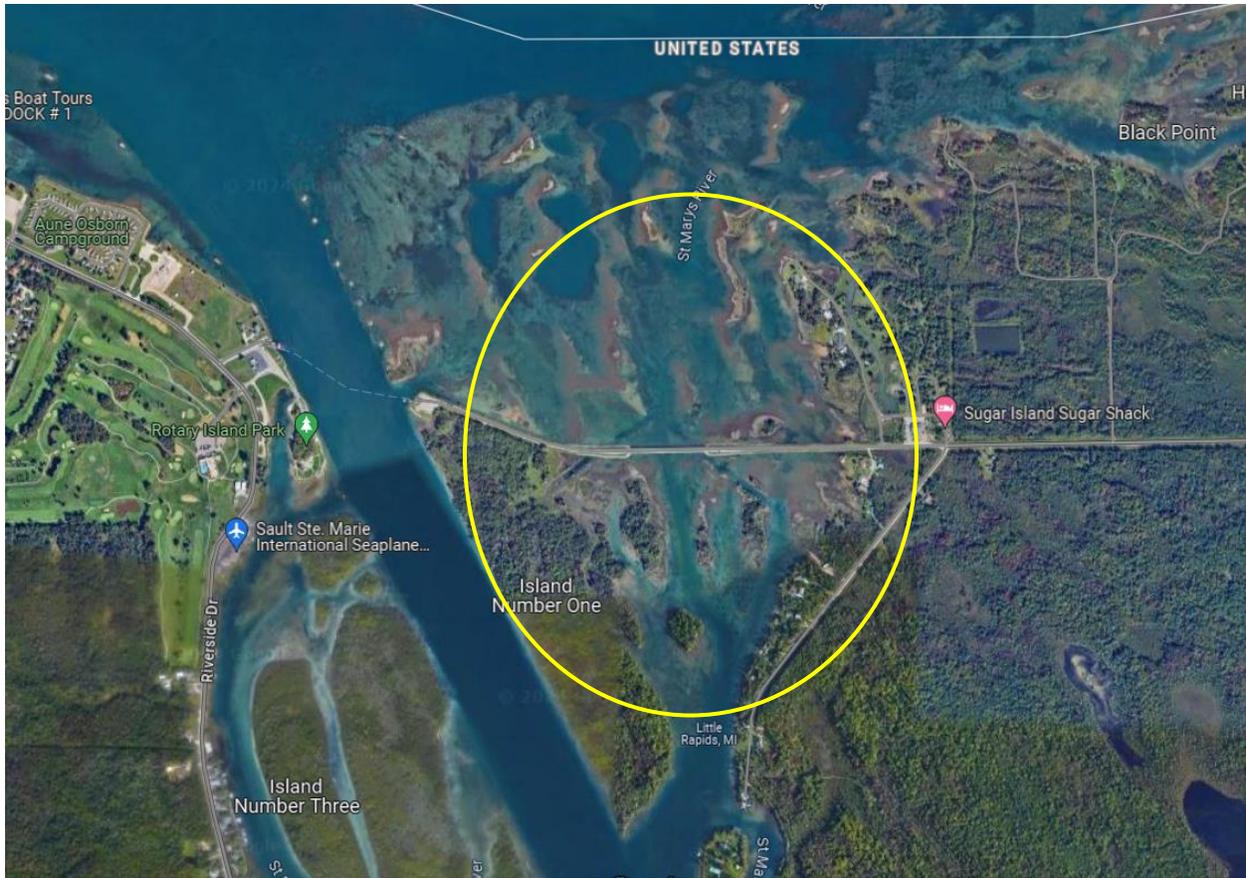
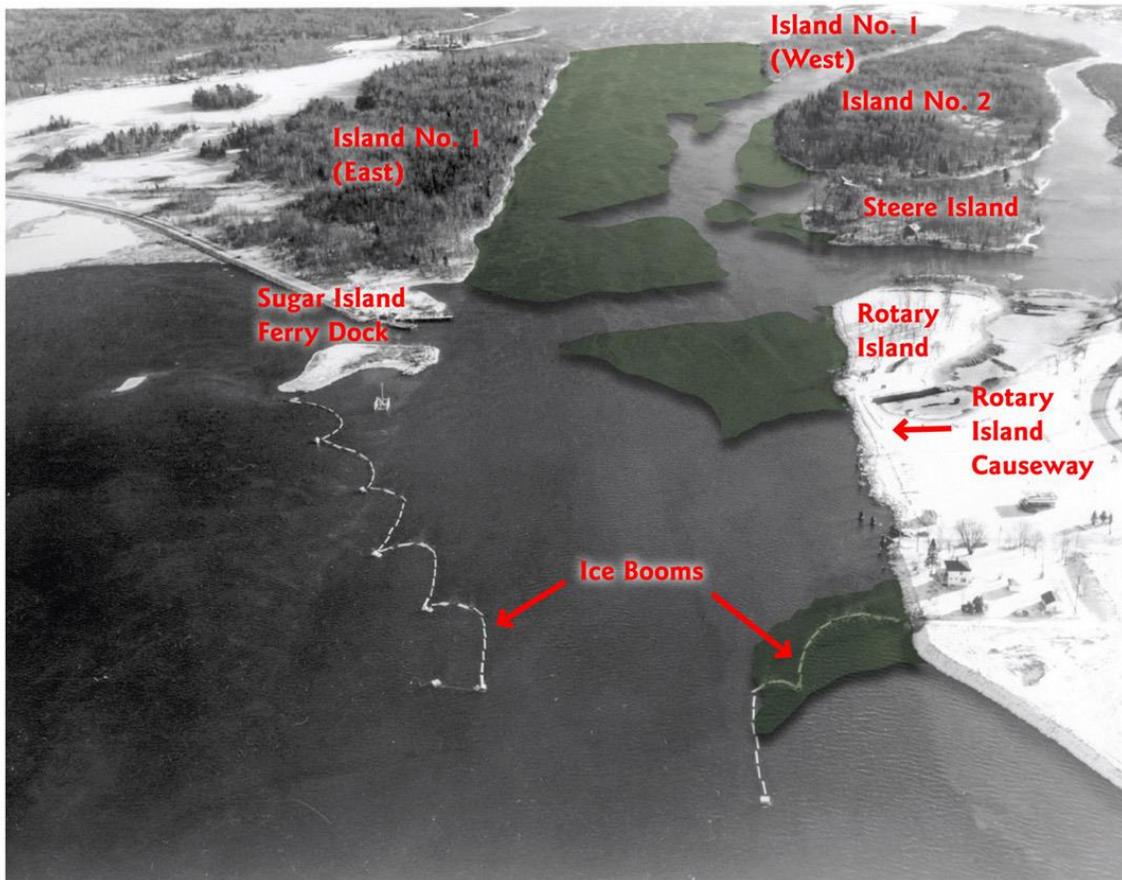


Figure 3. Satellite view of the St. Marys River Little Rapids area. The yellow oval encompasses the approximate Little Rapids project location.

The causeway to the Sugar Island ferry dock appears in the upper left in the photograph below. When Little Rapids Cut was dredged, a dike was built to reduce flow through the eastern part of Little Rapids, to compensate for the increased flow in the channel. This dike became the base for construction of the ferry causeway. The structures in the foreground are “ice booms,” placed to prevent ice from jamming the ferry lane.



Carl Matema, courtesy of the Chippewa County Historical Society

This 1975 photograph helps depict the appearance of this area prior to the dredging of Little Rapids Cut. We added some of the islands back to the picture, to show how much land was excavated. Rotary Island was originally twice as large as it is now. Approximately 60 acres of land were removed to construct the channel.

Figure 4. An aerial photo with artist William Gerrish’s depiction (based on a U.S. Army Corps of Engineers drawing) of the Little Rapids area prior to the excavation of the “Little Rapids Cut.” (Chippewa County Historical Society)

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