UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

SEP - 8 2017

REPLY TO THE ATTENTION OF:

Mr. Jon W. Allan, Director
Office of the Great Lakes
Michigan Department of Environmental Quality
525 West Allegan Street
P.O. Box 30473
Lansing, Michigan 48909-7973

Dear Mr. Allan:

Thank you for the July 21, 2017, request to remove the *"Loss of Fish and Wildlife Habitat"* Beneficial Use Impairment (BUI) at the St. Clair River Area of Concern (AOC), MI. As you know, we share your desire to restore all of the Great Lakes AOCs and to formally delist them.

Based upon a review of your submittal and the supporting data, the U.S. Environmental Protection Agency hereby approves your BUI removal request at the St. Clair River AOC. In addition, EPA will notify the International Joint Commission of this significant positive environmental change at this AOC.

We congratulate you and your staff, as well as the many federal, state, and local partners who have worked so hard and been instrumental in achieving this important environmental improvement. This progress will benefit not only the people who live and work in the St. Clair River AOC, but all the residents of the Great Lakes basin as well.

We look forward to the continuation of this important and productive relationship with your agency and the Binational Public Advisory Committee as we work together to delist this AOC in the years to come. If you have any further questions, please contact me at (312) 886-9296, or your staff may contact John Perrecone, at (312) 353-1149.

Sincerely,

for

Tinka G. Hyde, Director
Great Lakes National Program Office

cc: Melanie Foose, MDEQ
Rick Hobrla, MDEQ
Rajesh Bejankiwar, IJC
Dale Meyer, EPA, GLNPO
Rose Ellison, EPA, GLNPO

STATE OF MICHIGAN
OFFICE OF THE GREAT LAKES
LANSING

RICK SNYDER
GOVERNOR

JON W. ALLAN
DIRECTOR

July 21, 2017

Ms. Tinka Hyde, Director
Great Lakes National Program Office
United States Environmental Protection Agency
Region 5
77 West Jackson Boulevard (G-17J)
Chicago, Illinois 60604-3507

Dear Ms. Hyde:

The purpose of this letter is to request the United States Environmental Protection Agency (U.S. EPA), Great Lakes National Program Office's (GLNPO) concurrence with the removal of the Loss of Fish and Wildlife Habitat Beneficial Use Impairment (BUI) from the St. Clair River Area of Concern (AOC). The Michigan Department of Environmental Quality (MDEQ), Office of the Great Lakes (OGL) has assessed the status of this BUI in accordance with the state's *Guidance for Delisting Michigan's Great Lakes Areas of Concern*, and recommends that the BUI be removed from the list of impairments in the St. Clair River AOC.

Enclosed please find documentation to support this recommendation, including the BUI removal Briefing Paper prepared by the OGL's technical staff. The St. Clair River Binational Public Advisory Council provided a letter supporting this recommendation, dated April 27, 2017. A public comment period was held between May 15 and June 14, 2017. One comment was received. Also, the document was provided to Environment and Climate Change Canada (ECCC) and the Ontario Ministry of the Environment and Climate Change (OMOECC) per the Four Agency Letter of Commitment. ECCC and OMOECC did not have any objections to the removal of the BUI.

We value our continuing partnership in the AOC Program and look forward to working with the GLNPO in the removal of BUIs and the delisting of AOCs. If you need further information concerning this request, please contact Ms. Melanie Foose, OGL at 517-897-3244, or you may contact me.

Sincerely,

Jon Allan, Director
Office of the Great Lakes
517-284-5035

Enclosures
cc/enc: Ms. Rose Ellison, U.S. EPA
Mr. John Perrecone, U.S. EPA
Mr. Marc Tuchman, U.S. EPA
Ms. Melanie Foose, MDEQ
Mr. Rick Hobrla, MDEQ

Removal Recommendation
Loss of Fish and Wildlife Habitat Beneficial Use Impairment
St. Clair River Area of Concern

Michigan Department of Environmental Quality
Office of the Great Lakes
Great Lakes Management Unit
June 21, 2017
www.michigan.gov/aocprogram

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ST. CLAIR RIVER AREA OF CONCERN

Issue

Michigan Department of Environmental Quality (MDEQ), Office of the Great Lakes (OGL), Areas of Concern (AOC) Program staff recommend the removal of the Loss of Fish and Wildlife Habitat Beneficial Use Impairment (BUI) from the St. Clair River AOC, based on a review of relevant documentation pursuant to the process and criteria set forth in the *Guidance for Delisting Michigan's Great Lakes Areas of Concern* (*Guidance*) (MDEQ 2015). This recommendation is made with the support of staff from the United States Environmental Protection Agency (USEPA) Great Lakes National Program Office, the MDEQ Water Resources Division, and the St. Clair River AOC Binational Public Advisory Council (BPAC).

Background

The St. Clair River AOC is a binational AOC, sharing a boundary with Canada (Figure 1). The boundary of the AOC includes the entire river from the Blue Water Bridge (connecting Sarnia and Port Huron) to the southern tip of Seaway Island, west to St. John's Marsh, and east to include the north shore of Mitchell's Bay on Lake St. Clair (Ontario Ministry of the Environment [OMOE] and Michigan Department of Natural Resources [MDNR] 1991).

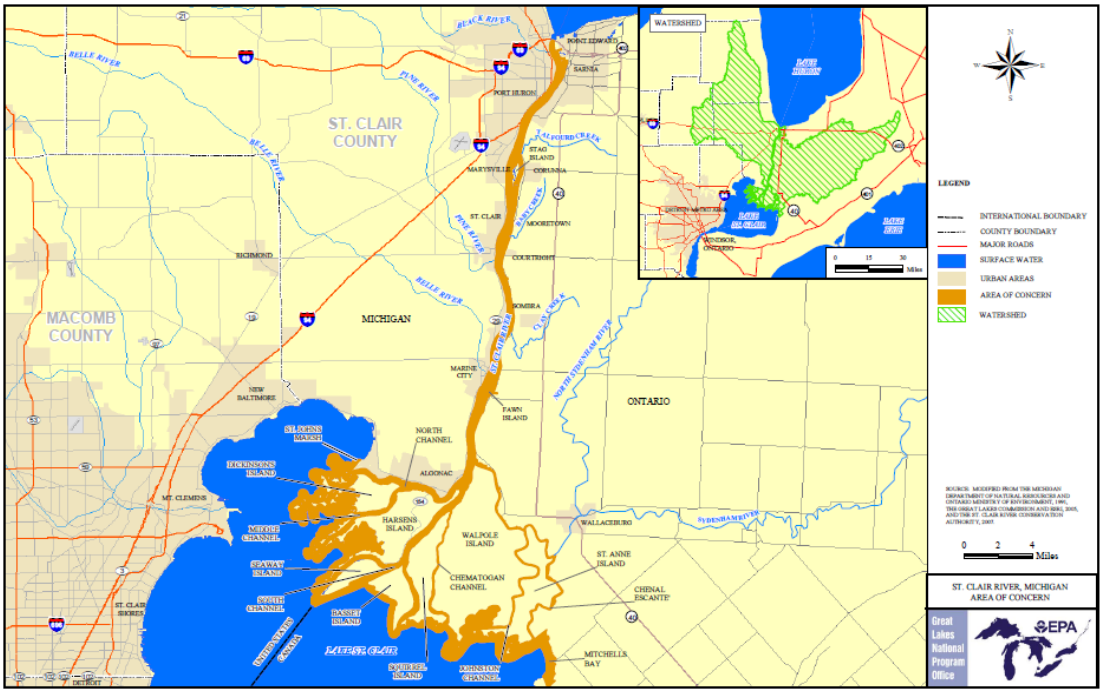

Figure 1: Geographic boundary of the binational St. Clair River AOC.

"The St. Clair River was identified as an AOC due to the following types of problems: conventional pollutants (i.e., bacteria), heavy metals, toxic organics, contaminated sediments, fish consumption advisories, impacted biota and beach closings" (OMOE and MDNR 1991).

According to the Stage 1 Remedial Action Plan (RAP), the reasons for the Loss of Fish and Wildlife Habitat BUI in the St. Clair River were general "losses of the aquatic plant community due to industrial, agricultural, recreational, and urban developments" (OMOE and MDNR 1991) and that significant impact to the natural resources had occurred, including shoreline, tributary, nearshore, wetland, and in-river habitat "due to filling, draining, dredging, and bulkheading for industrial, urban, agricultural, and navigational uses" (OMOE and MDNR 1991).

On the United States (U.S.) side of the St. Clair River AOC, ten of the possible fourteen BUIs were found to be impaired. Following the removal of the Loss of Fish and Wildlife Habitat BUI, only two BUIs will remain impaired: Restrictions on Fish and Wildlife Consumption and Restrictions on Drinking Water Consumption or Taste and Odor Problems.

Removal Criteria

In the State of Michigan's *Guidance for Delisting Michigan's Great Lakes Areas of Concern*, the criterion for removal of the Loss of Fish and Wildlife Habitat requires the development and implementation of a habitat restoration plan.

The removal criteria for the Loss of Fish and Wildlife Habitat BUI states:

Restoration of this BUI requires that a local aquatic habitat or population restoration plan be developed and implemented. The plan must contain at least the following components:

A. A short narrative on historical fish and wildlife habitat or population issues in the AOC, including how habitat or populations have been impaired by water quality.

B. A description of the impairment(s) and location for each aquatic habitat or population site, or for multiple sites where determined appropriate at the local level to address all habitat or population issues identified in the RAP and RAP updates.

C. A locally derived restoration target for each impacted habitat or population site. Sources of information for targets may include data from social science surveys, if appropriate. Habitat restoration targets may be based on restoration of fish and wildlife populations, if appropriate.

D. A list of all other ongoing habitat or population planning processes in the AOC, and a description of their relationship to the restoration projects proposed in the plan.

E. A scope of work for restoring each impacted aquatic habitat or population site. The scope of work should describe specific habitat or population restoration action(s) to be completed, including:

1. *Timetable*
2. *Funding*
3. *Responsible entities*
4. *Indicators and monitoring*
5. *Evaluation process based on indicators*
6. *Public involvement*

F. A component for reporting on habitat or population restoration implementation action(s) to the MDEQ.

Removal of this BUI will be based on achievement of full implementation of actions in the steps above, including monitoring conducted according to site plans and showing consistent improvement in quantity or quality of habitat or populations addressed in the criteria. Habitat values and populations need not be fully restored prior to delisting, as some may take many years to recover after actions are complete. Actions already implemented in AOCs may be reported and evaluated as long as the reports contain all the elements above. The final plans are part of the AOC program files maintained by MDEQ AOC Coordinators.

The attached excerpt from the *Guidance* (pages 47-51) also includes the rationale for the delisting criteria (Appendix A).

Habitat Plan

As stated above, the removal of the Loss of Fish and Wildlife Habitat BUI requires the development and implementation of a habitat restoration plan, a plan that is essentially a list of habitat restoration and enhancement projects that must be constructed. The St. Clair River AOC's habitat plan, titled *Delisting Targets for Loss of Fish/Wildlife Habitat Beneficial Use Impairment of the St. Clair River Area of Concern,* was finalized on June 5, 2013, and included a list of ten habitat projects in 13 locations, spanning the U.S. side of the St. Clair River from its most upstream portions down to the St. Clair River delta (Figure 2). The plan included details on the project location, the purpose of the project, the impaired habitat to be addressed, and the targeted species to be evaluated.

Figure 2. Location of all restoration projects identified in the St. Clair River AOC habitat plan.

Of these ten projects, nine of them were fully funded, designed and constructed. The exception was the Bunce Creek Fish Passage Restoration project. Bunce Creek is a small tributary to the St. Clair River, and approximately 700 feet of the stream is enclosed at the outlet to the St. Clair River where a coal fired power generating facility had stood for nearly a century. The power plant ceased operations in 2001 and was decommissioned in 2011. As of 2013, when the habitat plan was finalized, the property on which the enclosed Bunce Creek drain flowed and the power plant stood was owned by DTE Energy. However, shortly after finalization of the habitat plan, the property was sold. Even though the power plant was demolished in 2015, there are still no plans for the site that include restoration or "daylighting" of the stream. As plans for the property are unknown at this time, the BPAC, the MDEQ and the USEPA agreed that this project would not be necessary to remove the Loss of Fish and Wildlife Habitat BUI. The BPAC provided a letter to the MDEQ dated February 17, 2017, indicating that they understand "the project will not be feasible during the agreed-upon time frame for BUI removal" and that the BPAC recognizes the limitation of the property being "privately owned" with "plans and partnerships for development and restoration not established" (Troy, personal communication, February 17, 2017). It is anticipated that the BPAC and other local and state environmental organizations and agencies will continue to advocate for completion of a restoration project on Bunce Creek.

The BPAC's habitat plan, *Delisting Targets for Loss of Fish/Wildlife Habitat Beneficial Use Impairment of the St. Clair River Area of Concern*, is available on the Friends of the St. Clair River website at: http://scriver.org/area-of-concern.

Analysis

With the exception of the Bunce Creek Fish Passage Restoration Project, all remaining projects have been fully implemented and include:

1. Port Huron St. Clair River Shoreline Restoration – North
2. Port Huron St. Clair River Shoreline Restoration – South
3. Upper St. Clair River Shoreline Restoration
    a. Blue Water River Walk
    b. Blue Water River Walk Wetland
4. Marysville Living Shoreline
5. Cuttle Creek Restoration
6. Cottrellville Township Shoreline Preservation and Restoration
7. Marine City Drain Habitat Improvements
8. Harsens Island Habitat Restoration
9. Restoration of In-River Habitat of the St. Clair River
    a. Middle Channel Reef
    b. Harts Light Reef
    c. Pointe aux Chenes Reef

1. <u>Port Huron St. Clair River Shoreline Restoration – North</u>

The Port Huron St. Clair River Shoreline Restoration – North project (Port Huron North) is located in the Upper St. Clair River south of the Blue Water Bridge in the City of Port Huron. This was one of the first

habitat restoration projects funded through the Great Lakes Restoration Initiative (GLRI) and was implemented in 2011 by the City of Port Huron through a $944,500 grant from the USEPA.

Habitat related improvements at the site included the stabilization of the bank with native plantings and riprap in addition to approximately 8,800 square feet of cobble that was added to the river bottom to provide fish spawning habitat (City of Port Huron Final Grant Report, undated).

While no pre-monitoring assessments were conducted prior to the implementation of the Port Huron North project, the United States Geologic Survey (USGS) conducted post-construction monitoring at several sites throughout the river, both restoration and control sites, including Port Huron North.

At Port Huron North, the USGS used minnow trapping and electrofishing to determine which species of fish may be utilizing the cobble placed at the shallow river shelf at the site. Table 1 provides a list of species encountered for years 2015 and 2016 and shows that several native fish species inhabit the shoreline where the cobble was placed.

Table 1. Catch summary for fishes collected with minnow traps and electrofishing at the Port Huron North site in 2015 and 2016 (USGS 2017).

SPECIES	ELECTROFISHING		MINNOW TRAPS	
	2015	2016	2015	2016
Crayfish spp.	0	0	2	2
Bluegill	0	1	0	0
Emerald shiner	0	295	42	2
Hornyhead chub	0	0	4	0
Iowa darter	0	3	0	1
Largemouth bass	0	1	0	0
Logperch	1	188	2	4
Mottled sculpin	3	27	1	4
Rainbow darter	4	1	0	0
Rock bass	1	6	19	4
Round goby	1	7	30	18
Smallmouth bass	0	6	0	0
Spottail shiner	0	3	1	0
White sucker	0	3	0	0
Yellow perch	0	4	4	25
TOTAL NUMBER OF SPECIES	**5**	**13**	**9**	**8**

2. Port Huron St. Clair River Shoreline Restoration – South

The Port Huron St. Clair River Shoreline Restoration – South (Port Huron South) project is located at Kiefer Park along 480 feet of the Upper St. Clair River just south of the Port Huron North project and is "situated on the fastest flowing portion of the river with fluctuating water levels and intense wave action from commercial shipping" (EA Engineering, Science, and Technology [EA] 2013).

The goals at this site according to the BPAC's habitat plan were to "improve nearshore habitat above and below the water line" (St. Clair River BPAC 2013). During the design and pre-construction monitoring phase of the project, many habitat deficiencies were noted at the site, including the lack of woody structure in the form of dead, fallen whole trees. As stated in the basis of design report, "woody debris is an important substrate for benthic macroinvertebrates, as well as an important refuge and

foraging habitat for fish," and it was expected that adding woody structure to the site would have a "positive impact on the habitats as a whole" (EA 2013).

Although existing infrastructure, such as utility lines and a sidewalk limited the design, many habitat improvements were implemented. Construction occurred in 2014 using $500,000 in GLRI funding and resulted in the establishment of native vegetation, control of invasive species, removal of concrete riprap, and placement of large woody structure and cobble substrate.

The fish species utilizing the habitat constructed at Port Huron South were assessed by the USGS using minnow traps. The minnow traps were set once per month from September to December in 2015 and April to October in 2016. Twelve species were found in 2015 and nine species were found in 2016. All species encountered are listed in Table 2.

Table 2. Catch summary for fishes collected with minnow traps at the Port Huron South site in 2015 and 2016 (USGS 2017).

SPECIES	2015	2016
Crayfish spp.	12	6
Emerald shiner	32	64
Iowa darter	0	2
Green sunfish	3	0
Hornyhead chub	5	0
Logperch	11	20
Mottled sculpin	4	5
Mudpuppy	1	0
Rock bass	6	4
Round goby	85	111
Sculpin spp.	0	1
Spottail shiner	1	0
White sucker	1	0
Yellow perch	9	11
TOTAL NUMBER OF SPECIES	**12**	**9**

3. Upper St. Clair River Shoreline Restoration

Within the City of Port Huron, just south of the outlet of the Black River, is the location of the Upper St. Clair River Shoreline Restoration project. In the BPAC's habitat plan, the overall goal was stabilizing erosion, softening the shoreline, and constructing shallow water habitat (St. Clair River BPAC 2013). To accomplish these goals, restoration of the former train yard was done through two primary phases. The first phase, implemented by the Community Foundation of St. Clair County (Community Foundation) through grant funding from the National Oceanic and Atmospheric Administration (NOAA) and the United States Fish and Wildlife Service (USFWS), included multiple shoreline enhancements along 0.8 miles of the St. Clair River. The shoreline is now commonly referred to as the Blue Water River Walk. The second phase included the creation of wetland on 2.75 acres of a brownfield at the south end of the Blue Water River Walk and will be referred to as the Blue Water River Walk Wetland for the purposes of this report. Figure 3 shows the locations of the two phases of the Upper St. Clair River Shoreline Restoration project.

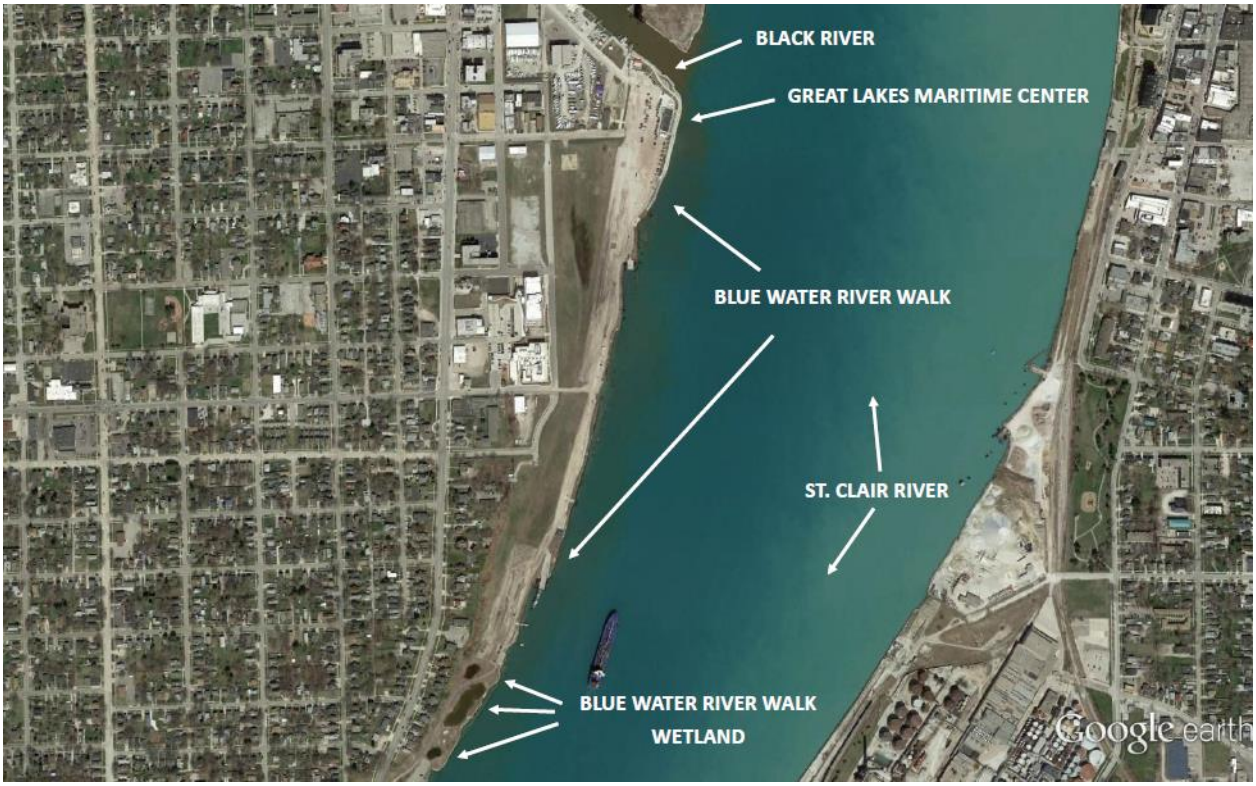

Figure 3. Location of the Upper St. Clair River Shoreline Restoration Project in Port Huron, Michigan.

Blue Water River Walk

The primary goal of the Blue Water River Walk restoration project was to "restore and improve fish and wildlife habitat within the Upper St. Clair River, which will enhance reproductive success and productivity of native species" (Community Foundation project summary, undated).

In 2012, the work to restore the shoreline began using funding provided by both NOAA and the USFWS which amounted to $2,250,000. In addition to the grant funding received from these federal agencies, a significant amount of local match was also used for habitat enhancements in addition to non-habitat elements such as a walking path that spans the entire project area.

At the end of the project, following the removal of 3,250 tons of debris, 4,300 feet of shoreline was restored using rock and native vegetation, 0.75 acres of fish spawning habitat was installed, 2.25 acres of riparian and shallow water nursery habitat was created, and 14 mussel and mudpuppy structures were installed (Community Foundation final grant report, 2014).

Pre-construction monitoring began in 2011, and post-construction monitoring was performed from 2012 through 2016.

Prior to restoration, pre-construction herpetofauna surveys resulted in the observation five species, Eastern snapping turtle (*Chelydra serpentina serpentina*), Eastern spiny softshell (*Apalone spinifera spinifera*), mudpuppy (*Necturus maculosus maculosus*), Midland painted turtle (*Chrysemys picta marinata*), and Eastern American toad (*Bufo americanus americanus*) (Mifsud 2012). During the 2014 post-construction survey, mudpuppy was the only species encountered; however, "numerous age classes and increased spatial distribution was observed." Further, "during 2014 post-restoration monitoring, mudpuppies were detected with a biologically significant increase in abundance and spatial distribution compared to the previous years" (Mifsud 2014). Sampling continued in 2015 and 2016. In 2015, no herpetofauna were encountered along the shoreline; however in 2016, five species were observed including green frog (*Rana clamitans melanota*), mudpuppy, Northern leopard frog (*Rana pipiens*), Northern map turtle (*Graptemys geographica*), and Midland painted turtle (Herpetological Resource Management [HRM] 2016).

Bird surveys were also conducted pre- and post-restoration. Five survey points were utilized for the surveys, and surveys were conducted between 2011 and 2014. In all, 83 species of birds have been observed at the Blue Water River Walk, and overall between 2011 and 2014, "there has been an increase of 140% in observed species richness" (Mifsud 2014). Six listed bird species have been observed at the Blue Water River Walk, including the trumpeter swan (*Cygnus buccinators*), common tern (*Sterna hirundo*), Forster's tern (*Sterna forsteri*), Caspian tern (*Hydroprogne caspia*), Merlin (*Falco columbarius*), and common loon (*Gavia immer*) (Mifsud 2014). The full results from the bird species surveys are available in Appendices E and F.

Monitoring for aquatic macroinvertebrates was also conducted from 2011 to 2014, before and after restoration. Although the invasive zebra mussel and rusty crayfish have been observed at the site, no rusty crayfish were found during post-restoration monitoring in 2013 and 2014. In addition, "post-restoration monitoring in 2014 resulted in the observation of five families that had not been observed prior to restoration: Dystiscidae (predaceous diving beetle), Chironomidae (nonbiting midges), Asellidae (freshwater isopods), Corixidae (water boatmen), and Physidae (bladder snails)" (HRM 2014). "Overall the aquatic macroinvertebrate community has directly benefitted and improved as a result of the restoration measures taken along the St. Clair River with biologically significant results… and it is expected that aquatic macroinvertebrate richness will continue to grow" (Mifsud 2014).

The USGS performed an assessment of the fish community in 2015 and 2016. To assess larval fish using the shoreline, light traps were used at three locations (Figure 4).

Figure 4. Light trap locations at the Blue Water River Walk (USGS 2016).

Most individual larval fish captured were only able to be identified to the family level, although some individuals, such as round goby, were identifiable to species level. Table 3 provides a list of family groups and species caught for each of the sampling locations.

Table 3. Summary of catch data collected from light trap sites at the Blue Water River Walk in 2015 and 2016 (USGS 2017).

SAMPLING LOCATION	LARVAL FISH CAUGHT	SPECIES CAUGHT
LT-003	29	*Catostomidae, Cyprinidae, Gobiidae*
LT-004	15	*Catostomidae, Cyprinidae, Gobiidae*
LT - 005	37	*Cyprinidae, Gobiidae, Percideae*, Round Goby

While most species found were of the non-native *Gobiidae* family (round and tubenose goby), it also shows that “restored habitats are being used as nursery habitat for some native species” (USGS 2017).

To assess juvenile and adult fish use of the Blue Water River Walk, the USGS sampled using electrofishing, gillnetting and minnow trapping techniques. The results of this sampling effort are available in Table 4 and show that the Blue Water River Walk is "supporting a high diversity of fish species" including rare species such as the mudpuppy, an aquatic amphibian of state special concern, and the state threatened river redhorse (USGS 2017).

Table 4. Catch summary for fishes collected with minnow traps, gill-nets, and electrofishing at the Blue Water River Walk in 2015 and 2016 (USGS 2017).

SPECIES	ELECTROFISHING		GILL-NET		MINNOW TRAP	
	2015	2016	2015	2016	2015	2016
Bluegill	0	2	0	0	0	0
Bluntnose minnow	2	1	0	0	0	0
Brown trout	7	1	0	0	1	0
Burbot	0	1	0	0	0	1
Crayfish spp.	0	1	0	0	7	11
Emerald shiner	3	395	0	0	1	40
Fathead minnow	0	1	0	0	0	0
Gizzard shad	0	1	0	8	1	0
Golden redhorse	0	1	0	2	0	0
Green sunfish	5	0	0	0	1	0
Hornyhead chub	0	0	0	0	12	5
Largemouth bass	1	1	0	0	0	0
Logperch	1	13	0	0	1	27
Longnose gar	0	0	1	2	0	0
Minnows/Shiners	1	2	0	2	0	0
Mottled sculpin	2	45	0	0	0	2
Mudpuppy	1	0	0	0	5	3
Northern pike	0	0	0	4	0	0
Rainbow darter	2	0	0	0	0	1
Rainbow smelt	0	1	0	1	0	0
Rainbow trout	0	0	2	1	0	0
River redhorse	0	0	2	3	0	0
Rock bass	10	58	5	11	43	42
Round goby	10	98	0	3	247	230
Sand shiner	0	6	0	0	0	0
Shorthead redhorse	3	5	0	2	0	0
Silver redhorse	0	0	0	3	0	0
Smallmouth bass	1	44	2	1	0	1
Spottail shiner	0	10	0	3	3	1
Spotted sucker	0	0	0	1	0	0
Stonecat	1	0	0	0	0	0
Sucker spp.	0	0	0	3	0	0
Tubenose goby	0	6	0	0	3	2
Walleye	0	0	0	6	0	0
White perch	0	0	0	3	0	0
White sucker	0	3	1	0	0	1
Yellow perch	1	4	6	21	11	16
TOTAL NUMBER OF SPECIES	**15**	**22**	**7**	**17**	**13**	**15**

Blue Water River Walk Wetland

In 2015, construction began to create wetland, in the form of three ponds, out of a brownfield just south of the Blue Water River Walk (Figure 3). The project, implemented by St. Clair County Parks through $1,039,500 in GLRI funding from the National Fish and Wildlife Foundation (NFWF), was designed to maintain a hydrological disconnect between the new wetland and the St. Clair River "due to the contaminated site, soil hydraulics and elevations" (St. Clair County Parks 2015). However, each of the three pools constructed on the 2.75 acre parcel are hydrologically connected to each other via culverts. In all, a total of 2.44 acres of wetland was created with the depths of the three pools varying from a maximum of twelve feet deep to a minimum of four feet deep. Within each pool, additional enhancements were added in the form of whole logs providing basking areas for reptiles, sandy turtle nesting areas, and woody structure designed to provide surfaces for amphibians to attach their eggs. Adjacent to the pools and within the same project area, additional habitat structures specific to mudpuppies were placed in the shallow water areas of the St. Clair River.

Following completion of the project, two seasons of post-construction ecological monitoring was conducted assessing the use of the new wetlands by herpetofauna, birds, and macroinvertebrates. While no specific pre-monitoring assessments were conducted to compare to the post-construction results, it can be safely assumed that the area as it existed prior to restoration, as a gravel parking lot, provided little to no habitat for native wildlife and plant species.

In 2015, upon immediate completion of the project, monitoring was conducted and two species of herpetofauna were encountered including an Eastern American toad (*Bufo americanus americanus*) and a mudpuppy (*Necturus maculosus maculosus*). During the 2016 monitoring season, three additional species were encountered, including green frog (*Rana clamitans melanota*), Northern leopard frog (*Rana pipiens*) and Midland painted turtle (*Chrysemys picta marginata*) (HRM 2016).

A bird survey was also conducted, as this area is an "important flyway for waterfowl and many other bird species which utilize the coastline in large numbers, often seeking adjacent wetlands" (HRM 2016). During the multiple survey days in which "observations were recorded for birds on the water, in air and on land," a total of forty-four bird species were observed, thirty-six species in 2015 and thirty-one species in 2016 (HRM 2016). Appendix E provides a list of all bird species observed at the Blue Water River Walk Wetland area.

Lastly, sampling for aquatic macroinvertebrates also occurred within the created wetland pools. In 2015, "six orders of aquatic arthropods and one class of mollusk were identified," and in 2016, "ten orders of aquatic arthropods, one class of mollusk, and one class of flatworms" were found (HRM 2016). As stated in the post-monitoring report, "the presence of aquatic macroinvertebrates within the created wetlands demonstrates an initial level of project success" and "as the sites develop and native communities begin to establish, higher richness and abundance of sensitive invertebrate species will follow" (HRM 2016).

4. Marysville St. Clair River Living Shoreline Restoration

In 2012, work began to restore the shoreline of the St. Clair River in the City of Marysville, just south of Chrysler Park Beach and just north of the outlet of Cuttle Creek (Figure 5). The shoreline, prior to restoration, included a vertical steel seawall and a sidewalk with a mowed lawn edge.

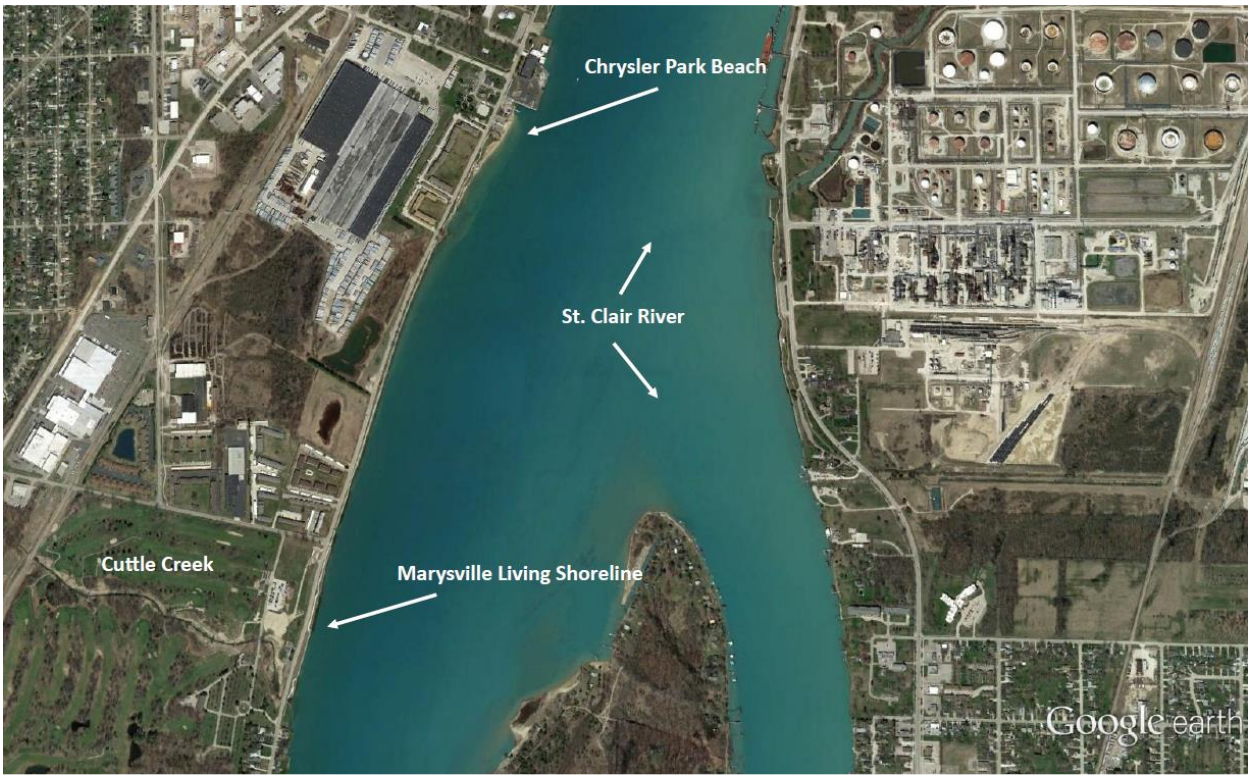

Figure 5. Location of the Marysville Living Shoreline project.

The goal of the project was to "create a mixture of emergent shelves, submergent planting areas, large woody debris structures, stabilized riprap toe with live stake plantings and gravel/cobble bed areas" (Smithgroup JJR 2013).

In 2010, the City of Marysville received GLRI funding from the EPA in the amount of $1,500,000 and provided an additional $289,903 in match funds for construction of the Marysville Living Shoreline project. The project to enhance the shoreline began with the removal of 1,600 feet of steel seawall. Following the removal of the seawall, the shoreline was graded to create a gradual interface between the land and the water. At the toe of the new shoreline, rock riprap was installed to create habitat and provide shoreline stabilization. In other areas, an additional area of rock was placed in the river on the shallow river shelf to provide an area protected by the high flows and freighter wakes. This protected area was then planted with native emergent and submergent wetland vegetation providing another layer of habitat diversity (Figure 6).

Figure 6. Photograph of the Marysville Living Shoreline from 2013 showing the upland, wetland, and river habitat created.

In 2013, following construction, an "underwater habitat review" was conducted by a diving and filmmaking team based out of the Port Huron area. During the filming, which occurred during daylight and evening hours, several species were encountered and are listed in Table 5. One notable observation included "over a dozen northern madtom" a state endangered fish, "found in holes and out foraging (Gregory A.D. 2013).

Table 5. Fish species observed at the Marysville Living Shoreline during underwater filming (Gregory A.D. 2013).

COMMON NAME
Crayfish
Freshwater Drum
Logperch
Northern Hog Sucker
Northern Madtom
Red Horse Sucker
Rock Bass
Round Goby
Smallmouth Bass
Sunfish
Yellow Perch
Walleye

USGS also conducted fish community sampling in 2015 and 2016 to assess the juvenile and adult fish community using electrofishing and minnow trapping and in 2016 added gillnetting. The results of the sampling effort are available in Table 6, and two additional rare species were found including the mudpuppy, an amphibian of special concern status in Michigan, and the pugnose minnow, a state endangered fish.

Table 6. Catch summary for fishes collected with minnow traps, gill-nets, and electrofishing at the Marysville Living Shoreline in 2015 and 2016 (USGS 2017).

SPECIES	ELECTROFISHING		MINNOW TRAP		GILL-NET
	2015	2016	2015	2016	2016
Bluegill	8	12	1	10	0
Bluntnose minnow	0	1	0	2	0
Brook stickleback	0	0	0	2	0
Brown trout	2	0	0	0	0
Burbot	0	1	0	0	0
Central mudminnow	0	0	0	1	0
Common carp	0	0	0	0	1
Crayfish spp.	0	0	8	33	1
Emerald shiner	0	682	3	218	0
Green sunfish	3	3	3	16	0
Hornyhead chub	0	9	3	19	0
Largemouth bass	6	0	0	0	0
Logperch	0	27	0	1	0
Mottled sculpin	10	77	0	13	0
Mudpuppy	0	0	0	3	0
Muskellunge	0	0	0	0	1
Northern pike	1	0	0	0	1
Pugnose minnow	11	0	0	0	0
Rainbow darter	1	3	0	0	0
Rainbow smelt	0	0	0	0	1
Rainbow trout	1	2	0	0	1
Rock bass	33	91	14	35	10
Round goby	35	97	54	263	5
Smallmouth bass	1	84	0	2	1
Spottail shiner	0	1	0	0	0
Striped shiner	0	2	0	0	0
Trout perch	0	1	0	0	0
Tubenose goby	3	12	0	12	0
Unknown	0	0	0	2	0
Walleye	0	0	0	0	2
White bass	0	0	0	0	2
White perch	0	0	0	0	1
White sucker	0	13	0	1	0
Yellow perch	12	51	3	48	8
TOTAL NUMBER OF SPECIES	14	19	8	17	13

5. Cuttle Creek Restoration

The Cuttle Creek is a tributary to the St. Clair River, flowing through a golf course owned and managed by the City of Marysville. The boundary of the restoration project completed on the Cuttle Creek included approximately 3,000 feet of the stream from the railroad culvert at the upstream end, to the culvert under River Road adjacent to the St. Clair River (Figure 7). Within this project area, the creek included a pond in-line with the stream, pond outfall, 36-inch culvert, a perched concrete box culvert, and two open span bridges in the form of blue train cars, typically referred to at the site as the "blue box car bridges."

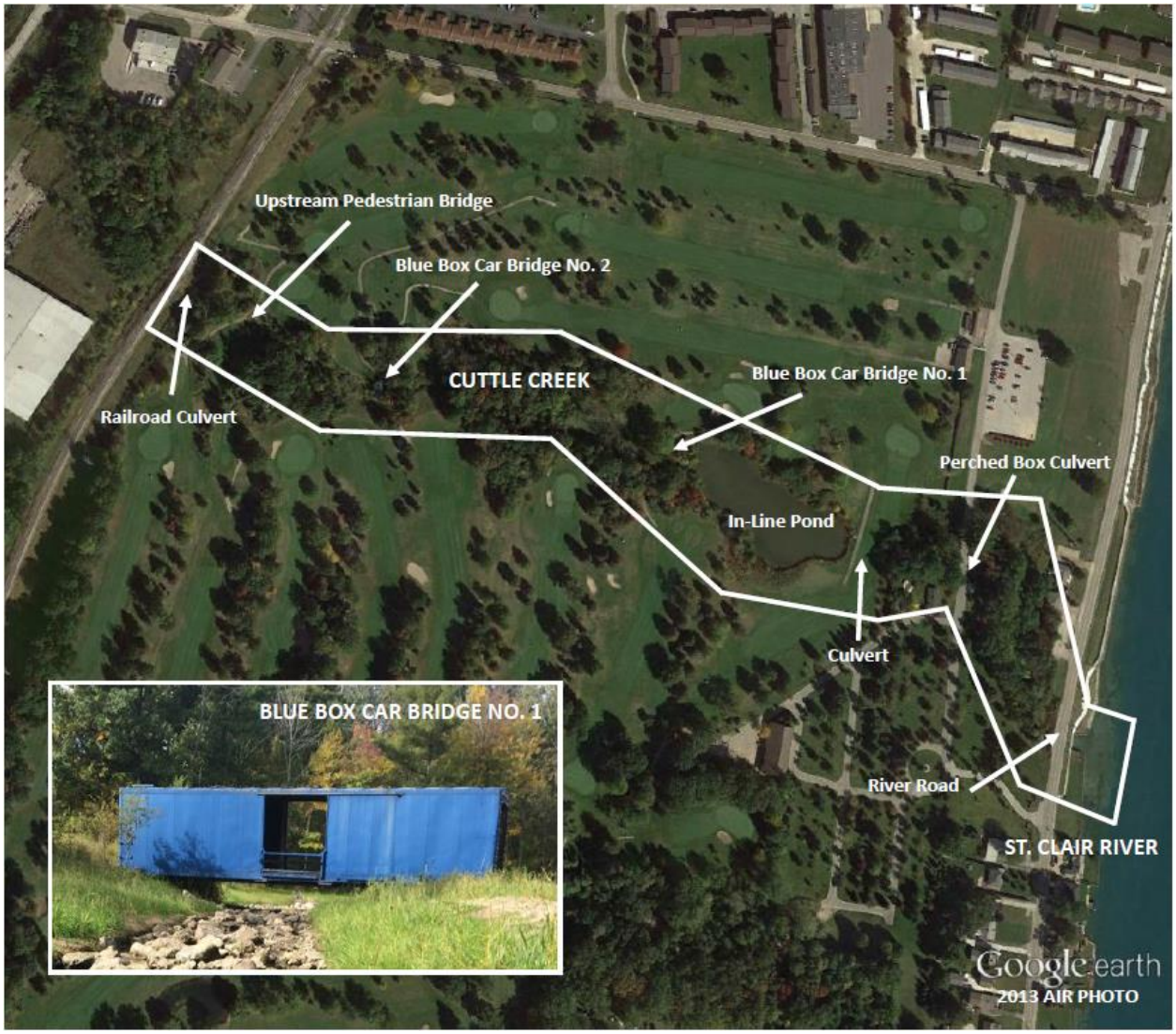

Figure 7. Cuttle Creek Restoration project boundary before construction (2013 aerial photo).

In 2015, the City of Marysville began construction to restore this stretch of Cuttle Creek using USEPA GLRI funding in the amount of $2,753,855 via a subgrant from the MDEQ, OGL. The goals for restoring this portion of Cuttle Creek included "the ecological uplift and restoration of tributary habitat to the St. Clair River, including the connection of aquatic, floodplain, riparian and upland restored habitats through the [3,000 foot] reach" (EA 2014).

To accomplish these goals, the techniques of natural channel design were used to transform the stream (Figure 8). A series of ponds and riffles were constructed providing fish passage through the entire project area. The in-line pond was restored back to a stream system. The 36-inch culvert was removed, and the land bridge that covered it was also restored to an open stream system with a clear span bridge constructed over it for pedestrian and golf cart access. Habitat was added through the placement of random boulders, large whole trees with fine root structure, and gravel and cobble substrate. Ecological uplift of the stream bed was accomplished by adding soils, gravel, and cobble to reconnect the streambed to the floodplain and to the perched culvert. In addition to the improvements to the stream, 1.1 acres of wetland, 6.5 acres of forest, 0.3 acres of open water, and 6.1 acres of riparian habitat were enhanced.

Figure 8. Cuttle Creek Restoration project boundary after construction (2016 aerial photo).

In 2009, the Michigan Department of Natural Resources (MDNR) surveyed the stream for fish. Subsequently, additional pre-construction monitoring was performed in 2013 during the design phase and included a stream assessment as well as assessments for benthic macroinvertebrates and herpetofauna. In 2016, post-construction monitoring occurred for these same parameters.

The herpetofauna pre-construction survey was conducted on two separate occasions, July 2013 up to the in-line pond, and then October 2013 from the in-line pond upstream to the railroad tracks. During the July 2013 survey, eleven individuals were observed of three amphibian species. No herpetofauna were encountered during the survey in October 2013, likely due to the time of year, although suitable habitat was found.

Following construction, the stream was again monitored for reptiles and amphibians in May and June 2016. Totaling observations over both survey days, a total of 83 individuals were encountered of four amphibian species and one reptile species. Table 7 provides a list of all reptile and amphibian species observed during the post-construction monitoring period.

Table 7. Herpetofauna species observed during the post-construction ecological monitoring period at Cuttle Creek.

COMMON NAME	SCIENTIFIC NAME
Eastern American Toad	*Bufo americanus*
Common Snapping Turtle	*Chelydra serpentine*
Green Frog	*Rana clamitans*
Northern Leopard Frog	*Rana pipiens*
Unknown Frog	
Wood Frog	*Rana sylvatica*

Although it is difficult to garner any conclusions from this limited data set, at a minimum, it can be ascertained that “when compared with the EA pre-construction data, more herpetofauna species and individuals were observed” after the restoration of the stream (ECT 2016).

Aquatic macroinvertebrate monitoring was also conducted before and after the restoration in addition to a stream habitat assessment. Both the stream habitat assessment and the aquatic macroinvertebrate surveys were conducted on the same four segments of Cuttle Creek (Figure 9).

The stream habitat assessment utilized the MDEQ Qualitative Biological and Habitat Survey Protocols for Wadeable Streams and Rivers assessment forms (Procedure 51), the same protocol used for pre-construction monitoring. Two of the stream segments were downstream of the previously perched box culvert, and two of the segments were upstream of the former in-line pond. One segment (DS-1) was evaluated using the Glide/Pool assessment form and the other three segments (US-1, US-2 and MID-1) were evaluated using the Riffle/Run assessment form.

Figure 9. Locations of Cuttle Creek stream segments assessed for benthic macroinvertebrates and a stream assessment.

The segment furthest downstream, DS-1, received a score of Good during the pre-construction assessment; however, only received a score of Marginal during the post-construction assessment. Conversely, the remaining three sites scored higher during post-construction assessments than during pre-construction assessments. The sites MID-1, US-1 and US-2 all scored Marginal in 2013 but received a score of Good during post-construction assessments in 2016. Environmental Consulting and Technology (ECT), who performed the post-construction monitoring, characterized the results as follows:

"Based on the improved scores seen at MID-1, US-1, and US-2, which were directly impacted by restoration efforts, it would appear that the ecological benefit of the stream has improved. While there are still issues with sufficient flow and water levels throughout the year (aspects of the flow regime affected by weather and watershed conditions upstream of the project), there were noticeable improvements in scoring metrics between the pre- and post-restoration efforts" (ECT 2016). The full scores from both 2013 and 2016, for the four stream segments, are presented in Table 8 (DS-1) and Table 9 (MID-1, US-1 and US-2).

Table 8. Habitat metric values and total scores for DS-1 in the Cuttle Creek Restoration project area using the MDEQ Glide/Pool assessment. Both pre-restoration (2013) and post-restoration (2016) scores are reported (ECT 2016).

METRIC	RANGE	2013	2016
		DS-1	
Epifaunal Substrate/Available Cover	0-20	9	7
Pool Substrate Characterization	0-20	15	14
Pool Variability	0-20	6	7
Sediment Deposition	0-20	12	11
Channel Flow Status – Maintained Flow Volume	0-10	10	10
Channel Flow Status – Flashiness	0-10	9	9
Channel Alteration	0-20	16	17
Channel Sinuosity	0-20	2	1
Bank Stability	0-20	20	10
Vegetative Protection	0-20	20	10
Riparian Vegetative Zone Width	0-20	8	6
TOTAL SCORE		**127**	**102**
CHARACTERIZATION		**Good**	**Marginal**

Table 9. Habitat metric values and total scores for MID-1, US-1, and US-2 at the Cuttle Creek Restoration project area using the MDEQ Riffle/Run assessment. Both pre-restoration (2013) and post-restoration (2016) scores are reported (ECT 2016).

METRIC	Range	MID-1		US-1		US-2	
		2013	2016	2013	2016	2013	2016
Epifaunal Substrate/Available Cover	0-20	11	12	3	11	9	15
Embeddedness	0-20	11	10	7	15	7	15
Velocity/Depth Regime	0-20	6	5	2	2	6	6
Sediment Deposition	0-20	12	15	5	16	6	15
Channel Flow Status – Maintained Flow Volume	0-10	6	3	4	3	5	3
Channel Flow Status – Flashiness	0-10	2	2	1	8	1	9
Channel Alteration	0-20	16	16	20	20	15	18
Frequency or Riffles (or Bends)	0-20	11	16	0	17	6	19
Bank Stability	0-20	8	10	6	18	6	18
Vegetative Protection	0-20	10	11	10	18	10	12
Riparian Vegetative Zone Width	0-20	8	8	14	16	10	10
TOTAL SCORE		**101**	**108**	**72**	**144**	**81**	**140**
CHARACTERIZATION		**Marginal**	**Good**	**Marginal**	**Good**	**Marginal**	**Good**

The aquatic macroinvertebrates were evaluated using the same segments shown in Figure 9. The scoring for the macroinvertebrate evaluation ranges on a scale from +9 to -9. Excellent scores are +4 or greater, Acceptable scores are between +4 and -4, and Poor scores are less than -4.

The pre-construction evaluation from 2013, found that two of the segments scored in the Acceptable range (MID-1 and US-1) and two of the segments scored in the Poor range (DS-1 and US-2). However, the findings using the post-construction results are, if anything, inconclusive. There was a slight improvement in the score for the segment DS-1, from Poor to Acceptable, the segment MID-1 scored Acceptable during both 2013 and 2016 with a slight decrease in 2016. The segment US-1, which scored Acceptable in 2013, also decreased to a score of Poor in 2016. Finally, the segment US-2 also achieved a slight increase in score with a Poor rating in 2013 to an Acceptable rating in 2016. ECT characterized the results as follows:

"The metric results for each of the four Cuttle Creek sampling sites are shown in Table 10. DS-1, MID-1, and US-2 scored Acceptable… and US-1 scored as Poor. The DS-1 and MID-1 sites scored highest among the sampling locations. Despite US-1 and US-2 having a higher number of total taxa than MID-1, both were dominated by *Turbellaria* and *Chironomidae*, had a higher percentage of surface dependent families, and did not contain *Ephemeroptera* and *Plecoptera*. DS-1 had the highest number of total taxa and contained the only stonefly family present. Backwater from the St. Clair River and constant exchange of river water caused by freighters might make water temperatures in this downstream site more favorable for stoneflies. Some of these results were inconsistent with the stream habitat assessment scores. This may be a result of low water levels affecting colonization of macroinvertebrates" (ECT 2016).

Table 10 shows the comparison between the pre- and post-construction benthic macroinvertebrate assessments.

Table 10. Benthic macroinvertebrate metric scores for the subsample of collected organisms at each of the four Cuttle Creek sampling sites, using the Huron/Erie Lake Plains (HELP) eco-region scoring guide. Comparisons to the 2013 sampling period are also shown (ECT 2016).

METRIC	2013				2016			
	DS-1	MID-1	US-1	US-2	DS-1	MID-1	US-1	US-2
Total Taxa	-1	0	0	0	0	-1	-1	0
Total Ephemeroptera	-1	0	0	-1	0	0	-1	-1
Total Tricoptera	-1	0	-1	-1	-1	0	0	0
Total Plecoptera	-1	-1	-1	-1	1	-1	-1	-1
Percent Ephemeroptera	-1	-1	-1	-1	-1	-1	-1	-1
Percent Tricoptera	-1	0	-1	-1	0	0	-1	0
Percent Dominant	-1	-1	0	0	-1	-1	-1	-1
Percent Isopod, Snails, Leeches	-1	1	1	0	-1	1	1	0
Percent Surface Dependent	1	1	1	0	1	1	0	1
TOTAL SCORE	**-7**	**-1**	**-2**	**-5**	**-2**	**-2**	**-5**	**-3**
CHARACTERIZATION	**Poor**	**Acceptable**	**Acceptable**	**Poor**	**Acceptable**	**Acceptable**	**Poor**	**Acceptable**

The 2009 MDNR fish survey was intended to "document the fish community on this direct drain stream to the St. Clair River (Francis 2010). Following completion of the restoration project, a follow-up fish survey was performed in 2016.

In 2009, the MDNR evaluated two stream segments, one in the restoration area and the second upstream of the railroad and upstream of the project restoration boundary. Both of these sites were reevaluated in 2016 and a third monitoring location was added, ECT Site 2, to gauge the level of fish migration from the St. Clair River up through the restoration project and past the previously perched culvert, in-line pond, and 36-inch culvert that was removed (Figure 10).

Figure 10. Fish survey locations at Cuttle Creek.

In 2009, at ECT Site 1 (MDNR Site 1), 644 individuals of 17 species were found. In 2016, 222 individuals of 13 species were found. From the 2016 survey "emerald shiner were the most abundant (54%), followed by the fathead minnow (19%) and brook stickleback (6%)."

Note that the "fish assemblages were not similar between the two years. Of the 23-total species caught between the two years combined, only seven species were present in both datasets." This is expected as the first fish survey in 2009, prior to restoration, "the site was primarily pool habitat (60%) and some riffles (30%) and run (10%) habitat." Following construction" riffle and run habitat increased, while pool habitat decreased substantially" accounting for the change in "fish assemblages with the stream systems where an increase in lotic (i.e. swift-moving water) species and a decrease in lentic (i.e. stationary/slow waters) species occurs" (ECT 2016).

In 2016, at ECT Site 2 (unsampled by the MDNR), 234 individuals of 13 species were found. The survey found creek chub to be the "dominant species (53%), followed by white sucker (19%) and bluegill (6%)." However, other species were found in this segment, including largemouth bass and northern pike (Figure 11), with at least one of the northern pike being gravid (ECT 2016). While a direct comparison cannot be made for this site since MDNR did not sample it in 2009, it is significant that great lakes fish species are present in this area where it would have been unlikely for them to occur prior to restoration activities. In addition, according to an MDNR fisheries biologist 'the most important point is that they caught adult northern pike in spawning condition above the former perched culvert… thus showing how Cuttle Creek improvements benefit the SCDRS (St. Clair/Detroit River System)" (Harris 2017).

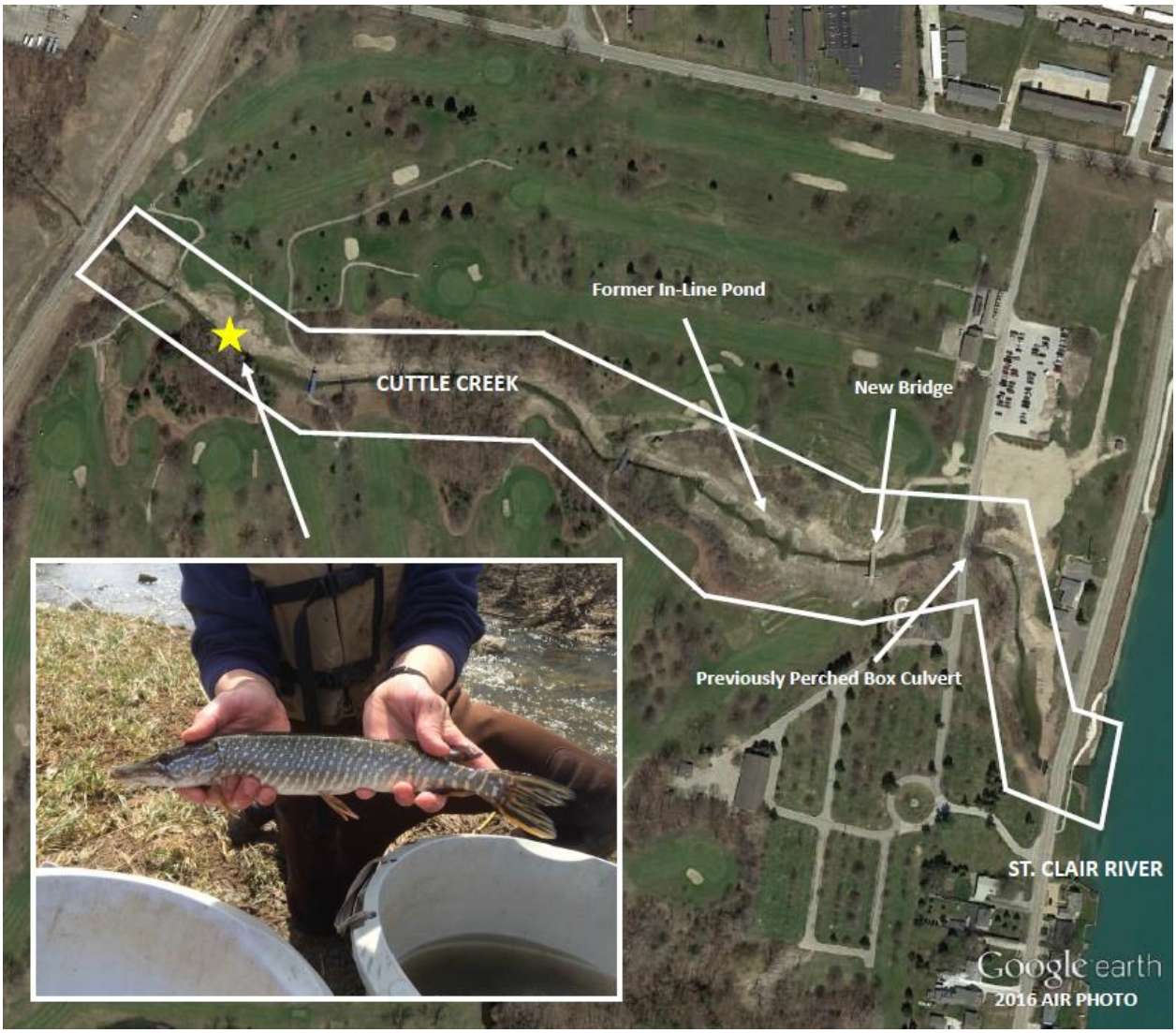

Figure 11. Fish sampling location (yellow star) where a gravid northern pike was found indicating the goal of fish passage throughout the project area had been met.

In 2009, at ECT Site 3 (MDNR Site 2), 96 individuals of 3 species were found. In 2016, "only 35 individuals of two different species, creek chub (97%) and green sunfish (3%)" were found. Because another barrier to fish migration exists between ECT Sites 2 and 3, no conclusions regarding the restoration activities can be made.

Given that the ecological monitoring was conducted very shortly after completion of construction, it is expected that as the site heals and as vegetation grows, the benefits from the restoration will continue to increase. The MDEQ and MDNR will continue to monitor the site, including an MDNR fisheries survey planned for 2018.

6. Cottrellville Township Shoreline Preservation and Restoration

In 2014, Cottrellville Township acquired four acres of property using an MDNR Natural Resources Trust Fund grant. At the time the property was transferred to Cottrellville Township ownership, it was vacant with old dilapidated docks in the water, a rusting steel seawall, and other debris along the shoreline. In years past, the property had been the site of a bar and restaurant.

According to the BPAC's habitat plan, the intent for the site was generally to "improve the nearshore and shallow water habitat" by softening the shoreline (BPAC 2013). Following the implementation of the design for the site, and using $2,500,000 in GLRI funding, the goals of the habitat plan were met in excess. Following the removal of the steel seawall, the 425 feet of shoreline was graded to create a direct yet gradual connection between the land and the waters of the St. Clair River. Cobble was placed along the shoreline to provide stabilization of the soils and habitat value for macroinvertebrates. Within the extensive shallow shelf of the river, two large breakwaters were installed creating a calm area between the shoreline and the breakwaters. Beneath the breakwaters, cobble substrate was placed throughout the shallow shelf and multiple "random boulders" were also installed creating flow diversity. Several whole trees complete with intact fine root systems were installed in the waters and inserted into the shoreline providing additional habitat for small fish and basking reptiles. Back on the landward side of the shoreline, multiple species of native vegetation were planted, both wetland and upland species of forbs, shrubs, and trees intended to provide habitat for pollinators and birds, among other wildlife species. Finally, two mallard nesting boxes were installed in the calm water areas provided by the breakwaters.

During pre-construction monitoring assessments, no live mussels were found, no herpetofauna were encountered, and the assessment for benthic macroinvertebrates resulted in an "overall habitat score for this segment as marginal" (EA 2013).

Post-construction assessments were performed by USGS in 2015 and 2016 including larval fish light traps, gill nets, electrofishing, and minnow traps. Light traps were used in two locations at the Cottrellville shoreline, at the first sampling location (LT-008), a total of 119 larval fish of four different families were caught over the two-year period, and at the second site (LT-009), a total of 647 larval fish were caught of three different families (USGS 2017) (Figure 12).

Figure 12. Location of light trap survey points for larval fish sampling (USGS 2017)

Most individual larval fish captured were only able to be identified to the family level, although some individuals such as largemouth bass were identifiable to species level. Table 11 provides a list of family groups and species caught for each of the sampling locations.

Table 11. Summary of catch data collected from light trap sites in 2015 and 2016 (USGS 2017).

SAMPLING LOCATION	LARVAL FISH CAUGHT	SPECIES CAUGHT
LT-008	119	*Catostomidae, Gyprinidae, Gobiidae,* Largemouth Bass, Tubenose Goby
LT-009	647	*Cyprinidae, Gobiidae, Percidae*, Round Goby, Tubenose Goby

In 2015 and 2016, the USGS also assessed the juvenile and adult fish community at the Cottrellville Township shoreline restoration site using multiple gear types: electrofishing, gillnetting, and minnow traps. The full results of the sampling efforts are provided in Table 12. Of special note are two rare species found, several mudpuppies, a rare aquatic amphibian species listed as special concern in Michigan was found using both electrofishing and gill-nets. Likewise, two river redhorse individuals were caught during the electrofishing survey. River redhorse are a state threatened species in Michigan.

Table 12. Catch summary for fishes collected with electrofishing, gillnetting, and minnow traps at shoreline sites at Cottrellville (USGS 2017).

SPECIES	ELECTROFISHING		GILL-NETS		MINNOW TRAPS	
	2015	2016	2015	2016	2015	2016
Blacknose Shiner	0	0	0	0	0	1
Bluegill	0	1	0	0	0	0
Bluntnose Minnow	0	14	0	0	8	9
Burbot	0	4	0	0	0	0
Crayfish spp	0	1	0	0	2	5
Emerald Shiner	0	29	0	0	0	1
Freshwater Drum	0	0	0	1	0	0
Gizzard Shad	0	0	1	25	0	0
Green Sunfish	5	2	0	0	1	7
Hornyhead Chub	0	20	0	0	138	80
Iowa Darter	0	1	0	0	0	0
Largemouth Bass	41	3	0	1	0	0
Logperch	1	5	0	0	8	1
Minnows/Shiners	0	4	0	0	0	0
Mudpuppy	0	3	0	0	7	8
Muskellunge	0	0	1	2	0	0
Northern Pike	0	0	0	1	0	0
Pumpkinseed Sunfish	0	0	0	0	3	0
Rainbow Darter	0	7	0	0	0	0
Rainbow Smelt	0	0	0	0	1	0
River Redhorse	0	2	0	0	0	0
Rock Bass	4	56	0	5	24	123
Round Goby	7	64	1	1	226	196
Silver Redhorse	0	1	0	0	0	0
Smallmouth Bass	0	107	3	0	1	5
Spotfin Shiner	0	0	0	1	0	0
Spottail Shiner	0	4	1	1	0	2
Spotted Sucker	0	0	0	1	0	0
Striped Shiner	0	1	0	1	0	0
Tubenose Goby	2	21	0	0	0	0
Unknown	0	0	0	0	0	20
Walleye	0	0	2	2	0	0
White Perch	0	0	0	1	0	0
Yellow Perch	2	16	1	3	8	48
NUMBER OF TOTAL SPECIES	**7**	**21**	**7**	**14**	**12**	**13**

7. Marine City Drain Habitat Improvements

The Marine City Drain is a tributary to the St. Clair River and is located in the lower river in the City of Algonac. The boundary of the Marine City Drain Habitat Improvements project included approximately 1,000 feet of the Marine City Drain starting from the mouth of the drain at the St. Clair River. The project width was a maximum of 200 feet (100 feet on either side of the center line of the drain), the legal easement held by the St. Clair County Drain Commissioner; however, the majority of the project was concentrated at the confluence of the Marine City Drain and the St. Clair River (Figure 13).

Figure 13. Location of the Marine City Drain Habitat Improvements project.

The goals of the Marine City Drain Habitat Improvements project were to "improve vegetation, fish, macroinvertebrates, and herpetofauna diversity/population" (EA 2014). To meet these objectives a variety of habitat enhancement features were implemented in 2015 using GLRI funds in the amount of $865,875 provided to the St. Clair County Drain Commissioner via a subgrant from the MDEQ Office of the Great Lakes.

In the St. Clair River, just upstream of the outlet of the Marine City Drain, three breakwaters were installed to create calm waters for fish; random boulders were placed providing flow diversity; large whole trees were embedded in the shoreline and beneath the breakwaters for fish and herpetofauna; and cobble was used to restore and stabilize the shoreline and as substrate enhancement. Additionally, upstream in the Marine City Drain, two areas of cobble were added to provide substrate diversity, and invasive plant species were treated through the entire drain easement area 200 foot wide by approximately 1,000 feet long.

Pre-construction ecological assessments, including a stream assessment and monitoring of mussels, macroinvertebrates, and herpetofauna, were conducted during the 2013 growing season. During post-construction monitoring in 2016, the same parameters were assessed with the exception of mussels, as mussel populations may take several years or even decades to show improvements.

Prior to the restoration project, only one species of herpetofauna was observed, a green frog (*Rana clamitans*); conversely, during post-construction surveys, "a total of 27 observations were recorded during the two-day survey, including four amphibian species and two reptile species" (ECT 2016). The species found during post-construction monitoring are listed in Table 13.

Table 13. Herpetofauna species observed during the post-construction ecological monitoring period at the Marine City Drain Habitat Improvements project (ECT 2016).

COMMON NAME	SCIENTIFIC NAME
Eastern American Toad	*Bufo americanus*
Eastern Garter Snake	*Thamnophis sirtalis*
Green Frog	*Rana clamitans*
Northern Leopard Frog	*Rana pipiens*
Painted Turtle	*Chrysemys picta*
Unknown Frog	
Western Chorus Frog	*Pseudacris triseriata triseriata*

In addition to the herpetofauna survey, a post-construction stream habitat assessment was conducted as well as a survey of benthic macroinvertebrates. Three separate segments of the Marine City Drain were evaluated for these two parameters (Figure 14).

Figure 14. Marine City Drain benthic macroinvertebrate and stream habitat assessment locations.

For the stream habitat assessment, the three segments were evaluated using MDEQ Procedure 51 Glide/Pool forms. Overall, the pre-construction stream habitat assessment found that "aquatic habitat within the evaluated segments of the Marine City Drain was Marginal" (EA 2013). The same forms were used for post-construction stream habitat assessments and it was found that scores for two of the segments did not change from Marginal, however, one segment received a slight increase from Marginal to Good, "indicating a small improvement in the ecological benefit of that section" (ECT 2016). The full scores can be found in Table 14.

Table 14. Habitat metric values and total scores for the Marine City Drain Habitat Improvements project site using the MDEQ Glide/Pool assessment forms. Both pre-restoration (2013) and post-restoration (2016) scores are reported (ECT 2016).

METRIC	RANGE	DS-1		DS-2		MID-1	
		2013	2016	2013	2016	2013	2016
Epifaunal Substrate/Available Cover	0-20	6	4	6	9	3	5
Pool Substrate Characterization	0-20	16	16	14	15	13	13
Pool Variability	0-20	10	11	11	13	11	13
Sediment Deposition	0-20	10	13	10	16	10	8
Channel Flow Status - Maintained Flow Volume	0-10	10	10	10	9	10	9
Channel Flow Status - Flashiness	0-10	9	10	9	10	9	10
Channel Alteration	0-20	13	0	13	11	15	15
Channel Sinuosity	0-20	0	0	3	5	2	1
Bank Stability	0-20	19	20	20	20	20	20
Vegetative Protection	0-20	6	0	6	6	10	10
Riparian Vegetative Zone Width	0-20	0	0	2	1	20	20
TOTAL SCORE		**99**	**84**	**104**	**115**	**123**	**124**
CHARACTERIZATION		**Marginal**	**Marginal**	**Marginal**	**Good**	**Good**	**Good**

The same three segments were surveyed for aquatic macroinvertebrates again using MDEQ Procedure 51. During pre-construction monitoring, the three "Marine City Drain segments consistently scored poorly" (EA 2013). However, "all three sites improved from the 2013 sampling" (ECT 2016) increasing from each segment scoring Poor before restoration to each segment scoring Acceptable one season following restoration. The full scores are available in Table 15.

Table 15. Benthic macroinvertebrate metric scores for the subsample of collected organisms at each of the three Marine City Drain sampling sites using the Huron/Erie Lake Plains (HELP) eco-region scoring guide. Comparisons to the 2013 sampling period are also shown (ECT 216). Excellent scores are +4 or greater. Acceptable scores are between +4 and -4, and Poor scores are less than -4.

METRIC	2013			2016		
	DS-1	DS-2	MID-1	DS-1	DS-2	MID-1
Total Taxa	0	0	0	-1	0	0
Total Ephemeroptera	-1	-1	-1	-1	0	0
Total Tricoptera	0	-1	-1	1	0	0
Total Plecoptera	-1	-1	-1	1	-1	1
Percent Ephemeroptera	-1	-1	-1	-1	-1	-1
Percent Tricoptera	-1	-1	-1	0	0	-1
Percent Dominant	-1	0	-1	-1	-1	-1
Percent Isopod, Snails, Leeches	-1	-1	0	1	-1	-1
Percent Surface Dependent	1	1	1	1	1	1
TOTAL SCORE	**-5**	**-5**	**-5**	**0**	**-3**	**-2**

8. Harsens Island Habitat Restoration

The intent of the Harsens Island Habitat Restoration project was to concentrate on the Krispin Drain which flows through Harsens Island via the Middle Channel of the St. Clair River (Figure 15).

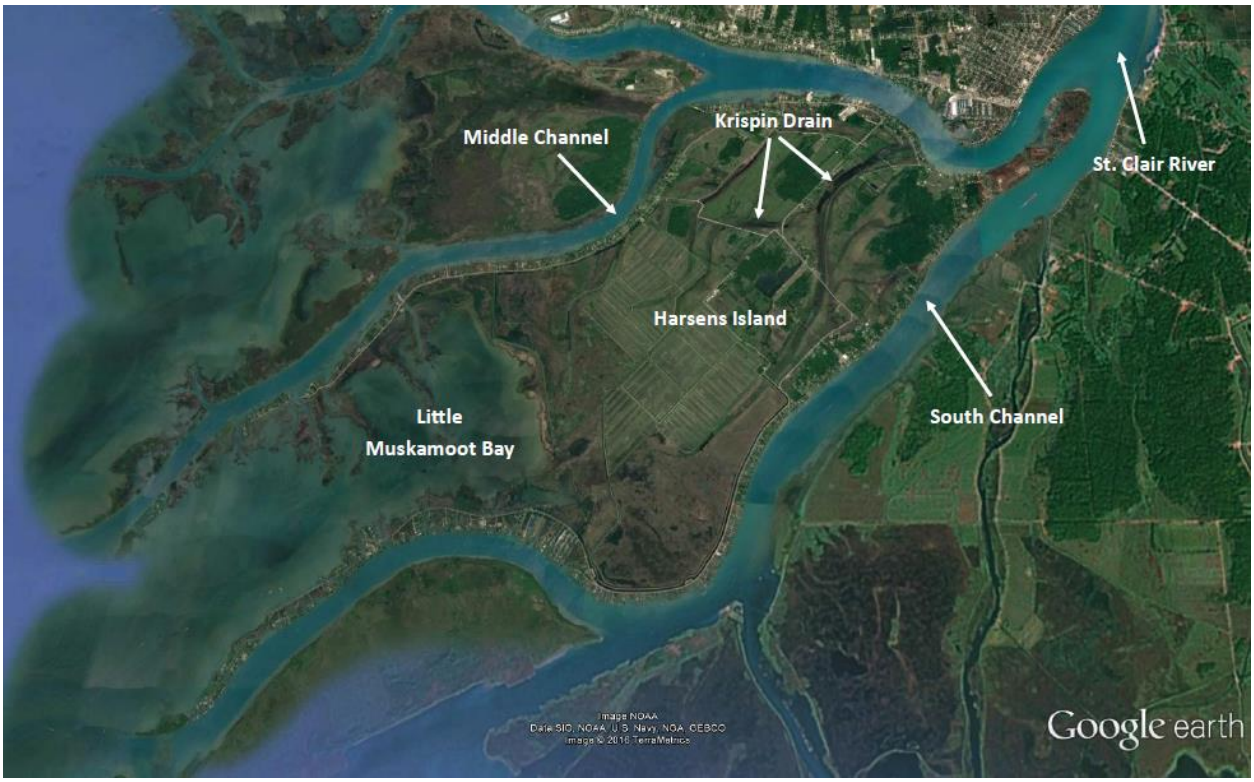

Figure 15. Location of the Harsens Island Habitat Restoration project.

The specific objectives of the project design included the removal of invasive species; the reestablishment of flow and tributary habitat; and reshaping of the drain to promote sediment transport, benthic habitat, and flow within the drain (EA 2014).

The drain was last dredged in the 1960s and flow had become sluggish over the previous several decades forming a build-up of sediment and thus providing a means for Phragmites to colonize not only the streambank, but into the bed of the stream as well. The stream restoration project was accomplished using GLRI funding in the amount of $4,000,000 and included the removal of sediment through approximately 16,000 feet of the drain. The removal of the biomass that had built up from the colonization of Phragmites allows water to now flow freely through the island. Additional herbicide treatments to Phragmites that was not mechanically removed, allowed sunlight to penetrate the soils and revive the dormant native seed bank.

The project was completed by the end of the calendar year of 2015; however post-construction monitoring is not scheduled to begin until the growing season of 2017. Although formal data is not available, photographic evidence shows the success of the project. The drain that was choked with Phragmites is now lush with native vegetation. Figure 16 shows two photographs, before and after restoration, documenting the significant increase of native species where previously there was a dominance of Phragmites.

Figure 16. Before and after photographs of the Harsens Island Habitat Restoration project.

Additionally, following completion of the restoration project, St. Clair County designated two miles of the drain as a "blueway" or the "river version of a greenway or bike trail" (The Blueways of St. Clair County website). The Krispin Drain Blueway is a two mile mapped route of the drain intended to be enjoyed by the public using no wake watercraft such as canoes and kayaks. Figure 17 shows the designated location of the Krispin Drain Blueway.

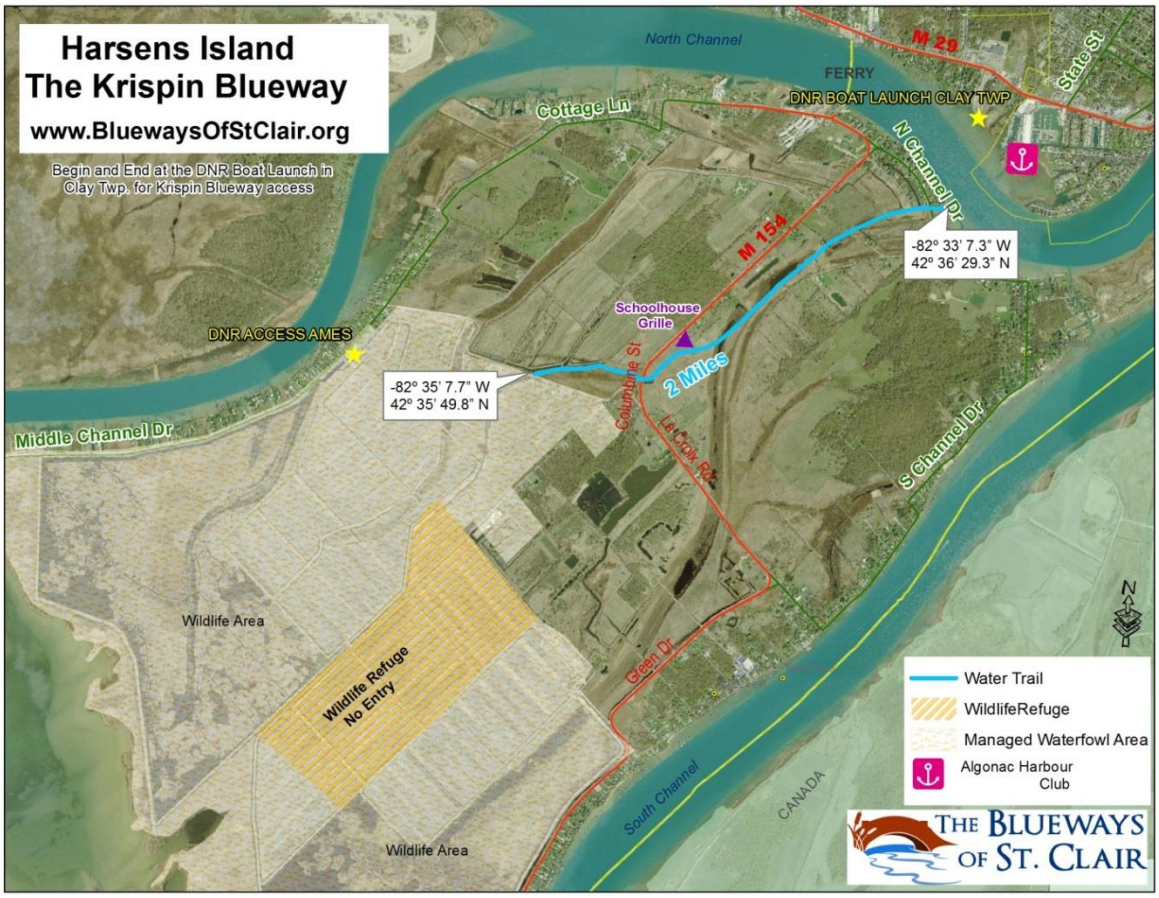

Figure 17. Location map of the Krispin Drain Blueway.

9. Restoration of In-River Habitat of the St. Clair River

In the BPAC's habitat plan, the intent of this project was to improve in-stream habitat by creating fish spawning areas. To create this fish spawning habitat, a total of three in-river reefs were constructed using a total of $4,390,000 in GLRI funds. The first reef was installed in 2012 in the Middle Channel in the delta of the St. Clair River. The remaining two reefs, the Pointe aux Chenes reef and the Harts Light reef were installed in 2014 in the lower St. Clair River (Figure 18).

Figure 18. Location of Middle Channel, Pointe aux Chenes and Harts Light fish spawning reefs in the St. Clair River.

Multiple agencies and organizations have been involved in siting, designing, and installing the fish spawning reefs, including USFWS, USGS, University of Michigan, Sea Grant, and MDNR, among others.

The locations of the three reefs typically followed the same basic criteria, "deep, clean, fast-flowing waters, stable river bottom with no existing fish spawning habitat" (Vaccaro et. al. 2016). These criteria were established through many years of study on the hydraulics of the St. Clair-Detroit River corridor. With each subsequent reef project, the criteria are further refined as an adaptive management approach is being utilized for the siting and installation of the fish spawning reefs.

Middle Channel Reef

Although fish spawning reefs had been constructed previously in the Detroit River, the first reef in the St. Clair River was the Middle Channel reef which was constructed in 2012. This reef is a total of one acre in size and is comprised of nine cells of rock as spawning substrate and a separate area of boulder just downstream intended to provide "fish a refuge from the currents" (Vaccaro et. al. 2016) (Figure 19).

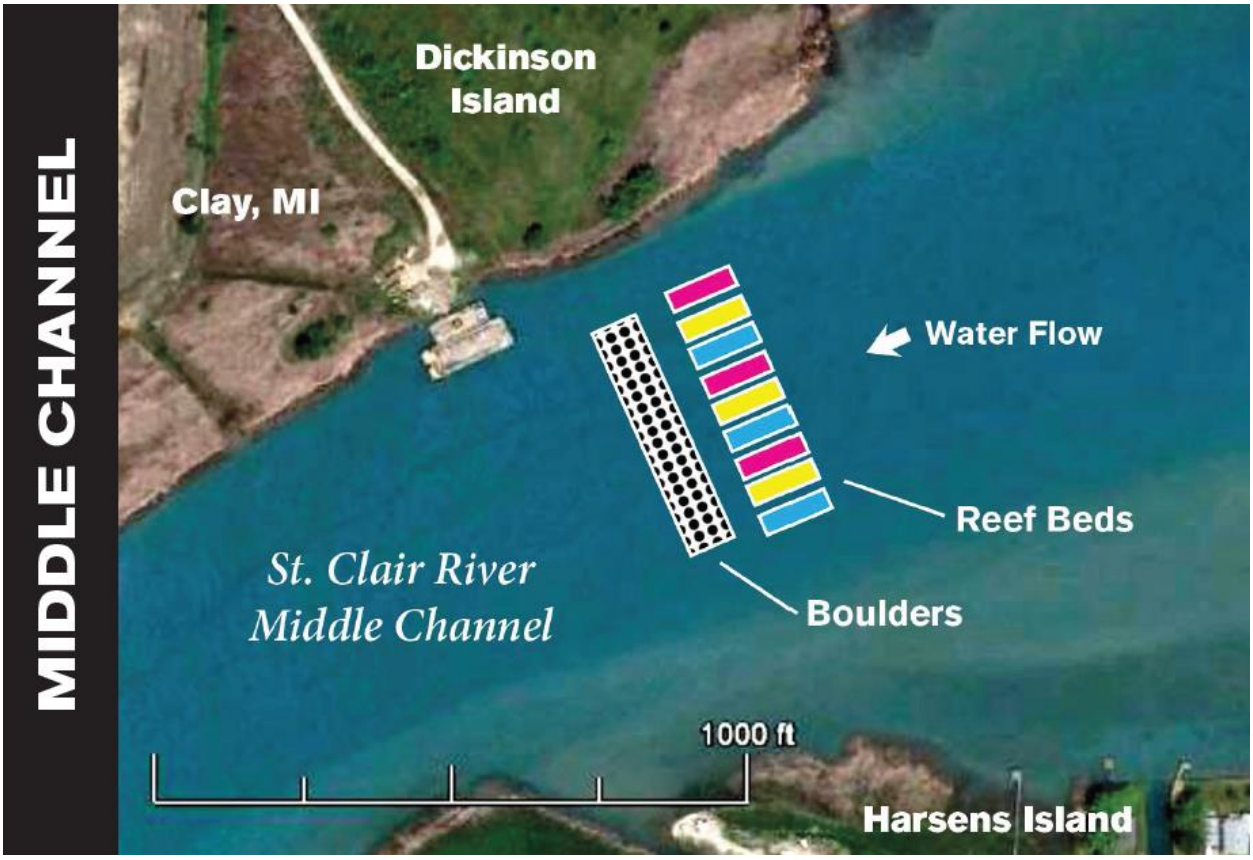

Figure 19. Middle Channel Reef project layout and location (Graphic Credit: Michigan Sea Grant).

"Prior to reef construction, 20 fish species were observed at the site, but few eggs were collected, indicating little if any spawning activity" (Vaccaro et. al. 2016). Then as reef construction was occurring, lake sturgeon immediately discovered the reef and began to spawn.

Since construction; however, sediment has accumulated, and the number of eggs at the reef has decreased since 2012 (Figure 20). However, this was also an opportunity for the scientists to learn from the experience. For the subsequent reef projects, the team designing and siting these reefs has grown significantly to include scientists with expertise in sediment transport and hydraulic engineering (Vaccaro et. al. 2016).

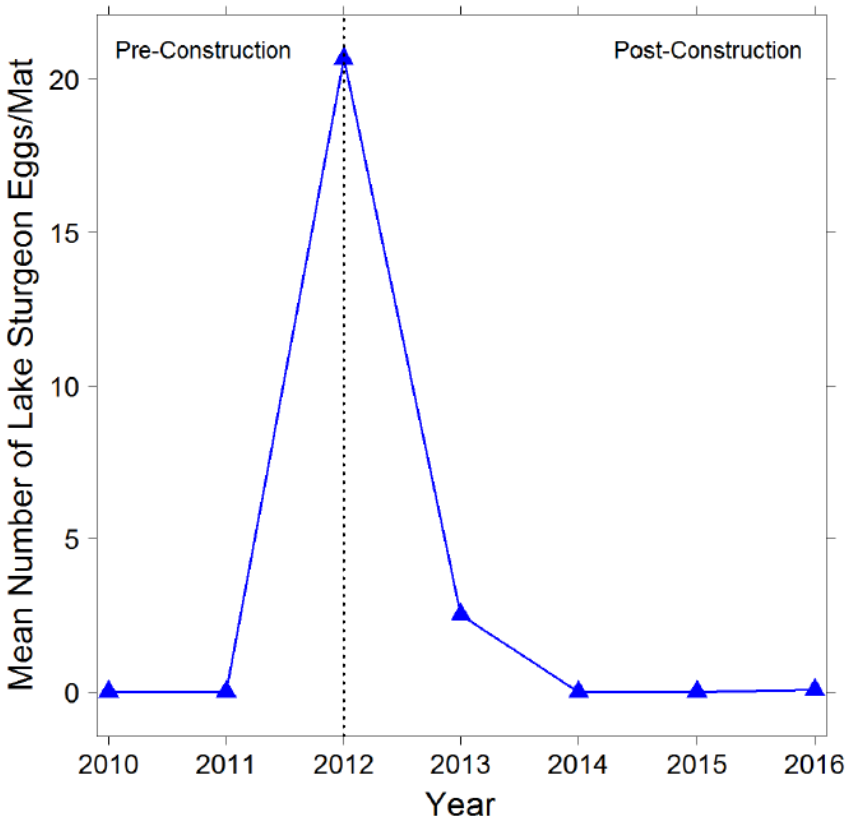

Figure 20. Mean number of Lake Sturgeon Eggs per Mat at the Middle Channel Fish Spawning Reef (USGS 2016).

Hart's Light Reef

The Hart's Light reef was constructed in 2014 and was placed in a "narrow, deep, and fast-flowing section of the St. Clair River…partially in the navigation channel, in an area that is never dredged and waters are 38 to 50 feet deep." In addition, "the shape and orientation" of the reef helps to keep "water flowing quickly around and over the reef in order to help scour away sediment" (Vacarro et. al. 2016).

The Hart's Light Reef was the largest reef constructed in the St. Clair River, at a total of 3.8 acres made up of two units (Figure 21).

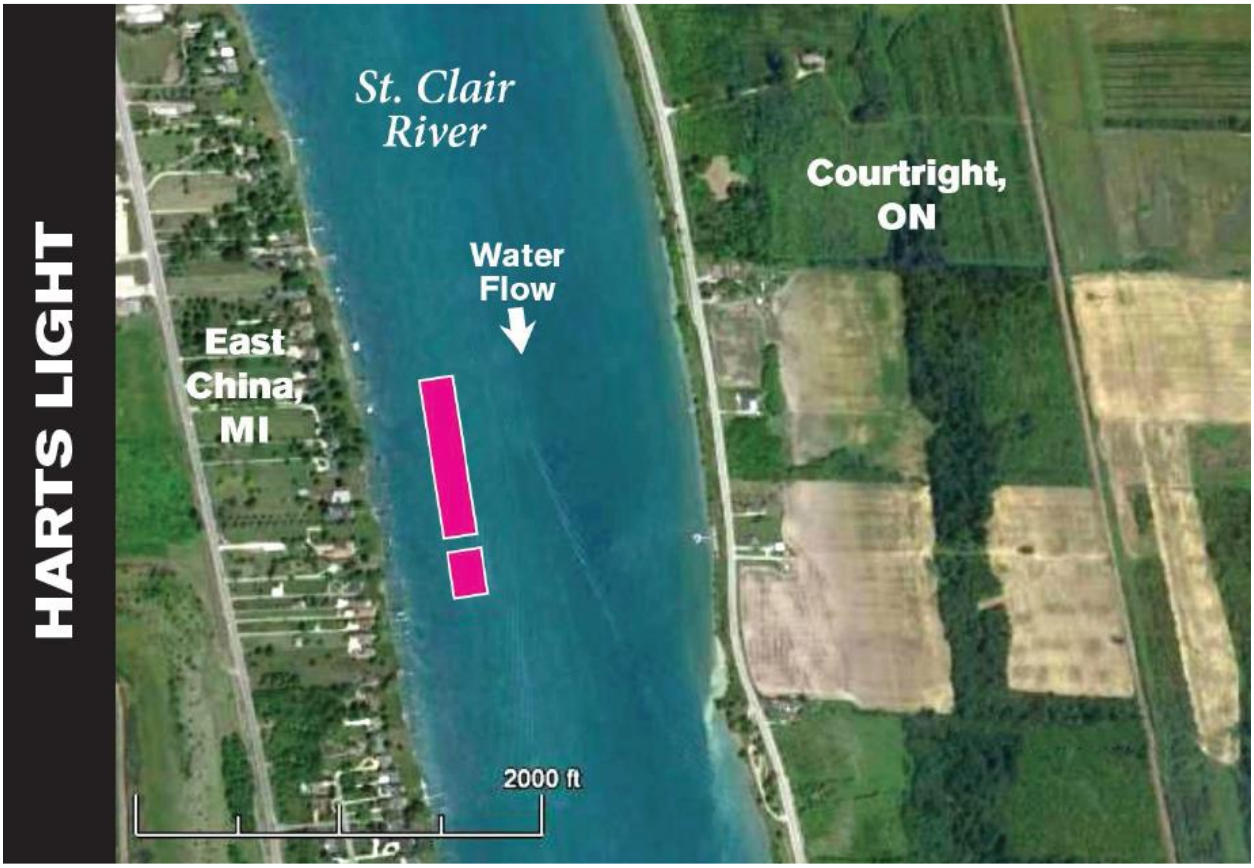

Figure 21. Location of the Harts Light fish spawning reef in the St. Clair River (Graphic Credit: Michigan Sea Grant).

Pointe aux Chenes Reef

The Pointe aux Chenes reef is located in the City of Algonac and adjacent to Russel Island (Figure 22). It is a single reef bed a total of 1.5 acres in size and was also constructed in 2014. The reef was installed in a location with the "highest water velocity and no sand," in addition, "hydrologic modeling confirmed that the site had suitable water flow that should scour away sand and finer-grained sediments" (Vaccaro et. al. 2016).

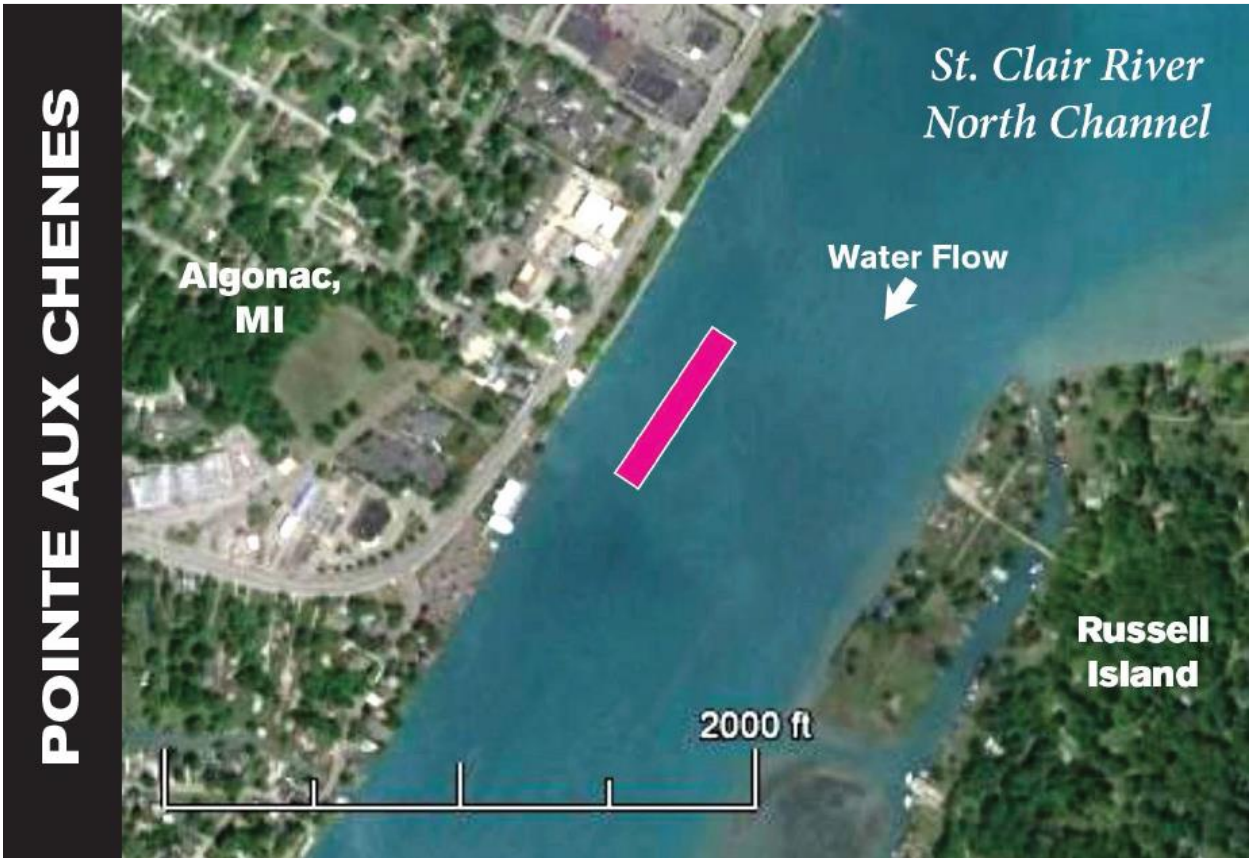

Figure 22. Location of the Pointe aux Chenes reef in the St. Clair River (Graphic Credit: Michigan Sea Grant)

The Pointe aux Chenes and Harts Light reefs are still relatively new and monitoring continues; however, the two reefs appear to be quite successful as "large numbers of sturgeon eggs were collected on each constructed reef and viable sturgeon larvae were caught drifting downstream of each reef project in 2015" (Vacarro et. al. 2016). Figure 23 provides an overall view of the numbers of sturgeon eggs collected on reefs throughout the St. Clair-Detroit River system.

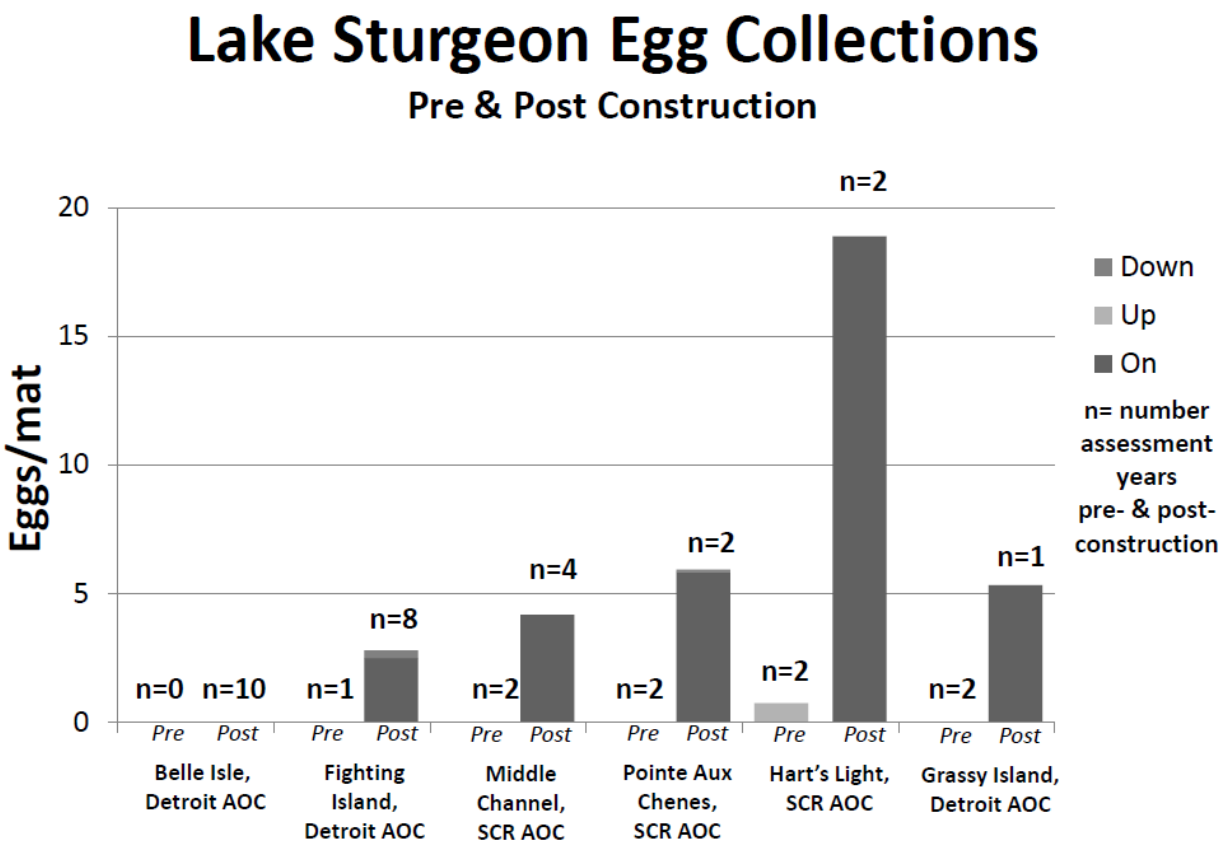

Figure 23. Number of lake sturgeon eggs per mat at the fish spawning reef sites in the St. Clair-Detroit River system (Roseman, personal communication, January 23, 2017).

Canadian Status of the Loss of Fish and Wildlife Habitat BUI

On the Canadian side of the St. Clair River AOC, the Loss of Fish and Wildlife Habitat BUI is currently considered impaired. However, it is expected that the BUI will be assessed for removal beginning in 2018 due to the significant amount of restoration that has occurred along the St. Clair River shoreline and within the watershed (April White, personal communication, March 2, 2017).

RECOMMENDATION

As required in the state's *Guidance for Delisting Michigan's Great Lakes Areas of Concern*, the nine projects outlined in the St. Clair River BPAC's 2012 plan, *Delisting Targets for Fish/Wildlife Habitat for the St. Clair River Area of Concern* have all been completed and monitored. Based on the data available from the pre- and post-monitoring reports, there is sufficient evidence to indicate success of the nine projects. There is now spawning, nesting, feeding and breeding habitat available for a variety of fish and wildlife species that was unavailable or inaccessible prior to 2010. Therefore, MDEQ, AOC Program staff request approval of the recommendation to remove the Loss of Fish and Wildlife Habitat BUIs from the U.S. side of the St. Clair River AOC.

This removal recommendation was discussed with the St. Clair River BPAC during their regular meeting on March 15, 2017. The St. Clair River BPAC submitted a formal letter of support for removal of the BUI dated April 27, 2017 (Appendix C).

In accordance with the Four Agency Letter of Commitment, Environment and Climate Change Canada (ECCC) and the Ontario Ministry of the Environment and Climate Change (OMOECC) were consulted on the removal recommendation. The removal recommendation was discussed during the Four Agency Managers teleconference meeting on June 29, 2017. ECCC and OMOECC did not have any objections to the removal of the BUI.

The proposed action was also published for a 30-day public notice period in the MDEQ Calendar from May 15 to June 14, 2017. Only one comment was received.

Prepared by: Melanie Foose, St. Clair River AOC Coordinator
Great Lakes Management Unit
Office of the Great Lakes
Michigan Department of Environmental Quality
July 12, 2017

Appendices

A – Loss of Fish and Wildlife Habitat BUI, pages 22-26 of the Guidance for Delisting Michigan's Great Lakes AOCs

B – St. Clair River BPAC Meeting Minutes

C – St. Clair River BPAC Letter of Support for the Loss of Fish and Wildlife Habitat BUI

D – List of projects required for the removal of the Loss of Fish and Wildlife Habitat BUI

E – Bird species identified at the Blue Water River Walk Wetland

F – Bird species identified at the Blue Water River Walk

G – St. Clair River AOC Habitat Projects Fact Sheet

H – St. Clair River AOC Project Photographs

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Appendix A

2015 Guidance for Delisting
Michigan's Great Lakes Areas of Concern

Loss of Fish and Wildlife Habitat and Degradation of Fish and Wildlife Populations

These two BUIs are being considered together in recognition of the integral relationship between them. For the purpose of assessing restoration, both of these BUIs will use the same criteria-setting process.

Significance in Michigan's Areas of Concern

Originally, 12 AOCs in Michigan were identified Loss of Fish and Wildlife Habitat as a BUI in their RAPs (all except Deer Lake and Torch Lake). Nine AOCs in Michigan have identified Degradation of Fish and Wildlife Populations as a BUI including: Kalamazoo River, Muskegon Lake, White Lake, Menominee River, St. Marys River, Saginaw River/Bay, Clinton River, Rouge River, and River Raisin. Little quantitative information was available in the 1980s regarding habitat loss and population degradation, when impairments were first determined. Therefore, there is wide variability in these impairments among the AOCs due to both real variability in habitat and populations as well as variability in initial assessments. The AOC program tracking table with current information about which BUIs have been restored in each AOC can be found online at www.michigan.gov/aocprogram.

Michigan Restoration Criteria and Assessment

Restoration of this BUI requires that a local aquatic habitat or population restoration plan be developed and implemented. The plan must contain at least the following components:

A. A short narrative on historical fish and wildlife habitat or population issues in the AOC, including how habitat or populations have been impaired by water quality.

B. A description of the impairment(s) and location for each aquatic habitat or population site, or for multiple sites where determined appropriate at the local level to address all habitat or population issues identified in the RAP and RAP updates.

C. A locally derived restoration target for each impacted habitat or population site. Sources of information for targets may include data from social science surveys, if appropriate. Habitat restoration targets may be based on restoration of fish and wildlife populations, if appropriate.

D. A list of all other ongoing habitat or population planning processes in the AOC, and a description of their relationship to the restoration projects proposed in the plan.

E. A scope of work for restoring each impacted aquatic habitat or population site. The scope of work should describe specific habitat or population restoration action(s) to be completed, including:

1. Timetable
2. Funding
3. Responsible entities

4. Indicators and monitoring
5. Evaluation process based on indicators
6. Public involvement

F. A component for reporting on habitat or population restoration implementation action(s) to the MDEQ.

Removal of this BUI will be based on achievement of full implementation of actions in the steps above, including monitoring conducted according to site plans and showing consistent improvement in quantity or quality of habitat or populations addressed in the criteria. Habitat values and populations need not be fully restored prior to delisting, as some may take many years to recover after actions are complete. Actions already implemented in AOCs may be reported and evaluated as long as the reports contain all the elements above. The final plans are part of the AOC program files maintained by MDEQ, AOC Coordinators.

Rationale

Practical Application in Michigan

While most Michigan AOCs have habitat impairments and/or populations degradation, none were designated as impaired primarily as a result of these. The AOCs vary widely in their levels of habitat or population degradation, historical habitat or population types, and current needs for habitat or population restoration. The extent of habitat or population restoration necessary in an AOC will be determined at the local level and documented in the RAP.

The habitat or population restoration plan will determine the type and extent of the restoration necessary to address habitat loss or population degradation issues identified in the RAPs. Individual, AOC-specific restoration plans and criteria will be developed and implemented through a federal/state/local partnership.

Sources of water quality contamination must be controlled before habitat or population restoration is conducted. In some circumstances, habitat degradation is actually contributing to water quality problems, rather than vice versa. In those instances, the workplan should discuss this issue, and the remedial actions should be targeted accordingly.

1991 IJC General Delisting Guidance: Loss of Fish and Wildlife Habitat

When the amount and quality of physical, chemical, and biological habitat required to meet fish and wildlife management goals have been achieved and protected.

IJC Delisting Guideline: Degradation of Fish and Wildlife Populations

When environmental conditions *support healthy, self-sustaining communities of desired fish and wildlife at predetermined levels of abundance that would be expected from the amount and quality of suitable physical, chemical, and biological habitat present. An effort must be made to ensure that fish and wildlife objectives for AOCs are consistent with Great Lakes ecosystem objectives and Great Lakes Fishery Commission fish community goals. Further, in the absence of community structure data, this use will be considered restored when fish and wildlife bioassays confirm no significant toxicity from water column or sediment contaminants*.

The IJC general delisting guideline for the BUI is presented here for reference. The Practical Application in Michigan subsection above describes application of specific criteria for restoration, based on existing Michigan programs and authorities.

State of Michigan Program and Authorities for Evaluating Restoration

Habitat or population restoration projects to address these use impairments will be implemented by a variety of programs at the federal, state, and local level, as determined in the restoration planning process. For the development of local habitat or population restoration plans and criteria, the MDEQ, in consultation with MDNR Fisheries and Wildlife Divisions, commits to partnering with local AOC groups to determine what those actions should be, and make available to the PACs the existing monitoring and reporting elements in state programs as applicable.

Michigan assesses water bodies throughout the state on a five-year basin rotation plan according to the MDEQ's "Strategic Environmental Quality Monitoring Program for Michigan's Surface Waters" (MDEQ, 1997) and "Michigan Water Quality Strategy Update" (MDEQ, 2005). Each year, a set of targeted watersheds are sampled at selected sites for conventional and toxic pollutants, and biological and physical habitat/morphology indicators. The set of watersheds sampled rotates each year, with each major watershed in the state revisited every five years (see Appendix 1 for maps of the basin rotations). One element of the strategy is expanded and improved monitoring of biological integrity and physical habitat.

This element includes all monitoring conducted for fish and benthic invertebrate community structure, nuisance aquatic plants, algae and slimes, and assessment of physical habitat. Because biological communities integrate the cumulative effects of multiple environmental stresses, this element is an important tool for evaluating water quality. The MDEQ's goal in conducting the watershed surveys is to assess 80% of the stream and river miles in Michigan over a five-year period.

The specific objectives of biological integrity and physical habitat monitoring are to:

1. Determine whether waters of the state are attaining standards for aquatic life.

2. Assess the biological integrity of the waters of the state.

3. Determine the extent to which sedimentation in surface waters is impacting indigenous aquatic life.

4. Determine whether the biological integrity of surface waters is changing with time.

5. Assess the effectiveness of best management practices and other restoration efforts in protecting and/or restoring biological integrity and physical habitat.

6. Evaluate the overall effectiveness of MDEQ programs in protecting the biological integrity of surface waters.

7. Identify waters that are high quality, as well as those that are not meeting standards.

8. Identify the waters of the state that are impacted by nuisance aquatic plants, algae, and bacterial slimes.

The biological integrity and physical habitat element consists of several components that, in combination, provide data necessary to achieve the following objectives:

- Rapid biological assessment of wadeable streams;
- Rapid assessment procedure for nonwadeable rivers; and
- Trend monitoring procedure for biological communities.

Rapid, qualitative biological assessments of wadeable streams and rivers are conducted using Procedure 51, which compares fish and benthic invertebrate communities at a site to the communities that are expected at an un-impacted, or reference, site. This is a key tool used by the MDEQ to determine whether waterbodies are attaining Michigan Water Quality Standards (WQS). However, this procedure cannot be used on nonwadeable rivers. The MDEQ has been partnering with Michigan State University to develop and validate a procedure for assessing aquatic communities in non-wadeable rivers which the State plans to begin implementing in 2006.

The State will support efforts in all AOCs with this BUI to complete the items in the checklist above. Support may be both direct, with partnership commitments from the MDEQ and MDNR to specific elements as appropriate, as well as indirect through grants to local AOC partners. Depending on available resources, support for local development of habitat or population restoration plans and criteria may be spread out among AOCs over multiple years.

Some local AOC communities also have programs for monitoring water quality and related parameters which may be applicable to this BUI. If an AOC chooses to use local monitoring data for the assessment of BUI restoration, the data can be submitted to the MDEQ for review. If the MDEQ determines that the data appropriately address the restoration criteria and meet quality assurance and control requirements, they may be used to demonstrate restoration success.

Appendix B

St. Clair River BPAC Meeting Minutes

ST. CLAIR RIVER BINATIONAL PUBLIC ADVISORY COUNCIL (BPAC)

Minutes - Draft
Meeting 2017-1

Wednesday, March 15, 2017
St. Clair County Administration Building Auditorium
200 Grand River Avenue
Port Huron, Michigan

ATTENDEES:

Donna Strang	Kathy Watts	Peter Westfall
Paulette Duhaime	Patty Troy	Kris Lee
Kirsten Lyons	Steve Demick	Melanie Foose
Marina Plain	Naomi Williams	Brian McDougall
Fred Kemp		

REGRETS:

Archie Kerr	April White	Ted Briggs
Jim Clatworthy	Sheri Faust	Theresa Warren
Lori Eschenburg	John Jackson	

GUESTS:
Mark Burrows – International Joint Commission

Call to Order and Introductions – P. Troy
The meeting was called to order by Kris Lee at 6:33 pm.

Adoption, Additions or Corrections of Draft Agenda – All
The draft agenda was reviewed and additions or corrections were solicited from BPAC members.

Moved by Kris Lee and seconded by Peter Westfall that the draft agenda be accepted with the following additions: 1) US Drinking Water Subcommittee Update by Paulette Duhaime after the 7 pm agenda item and 2) United States Environmental Protection Agency (USEPA) funding changes and BPAC correspondence by Patty Troy under "Other Business".

CARRIED

Approval of November 16, 2016 Draft Minutes and Actions – All
Actions arising from the last meeting on November 16, 2016 were reviewed along with the draft minutes.

Moved by Fred Kemp and seconded by Kathy Watts that the draft minutes of November 16, 2016 be accepted as prepared.

CARRIED

Election of Officers – F. Kemp and All
The Chair asked the Fred Kemp facilitate the elections process. Fred Kemp called for nominations from the floor for the following six positions. He also advised that Terry Burrell, who was unable to attend the meeting would stand as Canadian Vice Co-Chair if nominated.

United States Co-Chair:
Patty Troy was nominated by Kris Lee. No other members were nominated. **Moved by Kris Lee and seconded by Peter Westfall that nominations be closed and that a unanimous ballot be accepted.**

CARRIED

United States Vice Co-Chair:
Paulette Duhaime was nominated by Patty Troy. No other members were nominated. **Moved by Patty Troy and seconded by Kirsten Lyons that nominations be closed and that a unanimous ballot be accepted.**

CARRIED

Canadian Co-Chair:
Kris Lee was nominated by Patty Troy. No other members were nominated. **Moved by Brian McDougall and seconded by Patty Troy that nominations be closed and that a unanimous ballot be accepted.**

CARRIED

Canadian Vice Co-Chair:
Terry Burrell was nominated by Peter Westfall. No other members were nominated. **Moved by Brian McDougall and seconded by Paulette Duhaime that nominations be closed and that a unanimous ballot be accepted.**

CARRIED

Statewide Public Advisory Council (SPAC) Representatives:
Patty Troy and Paulette Duhaime were nominated by Kirsten Lyons. No other members were nominated. **Moved by Peter Westfall and seconded by Brian McDougall that nominations be closed and that a unanimous ballot be accepted.**

CARRIED

Canadian Remedial Action Plan (RAP) Implementation Committee (CRIC) Representative:
Kris Lee was nominated by Paulette Duhaime. No other members were nominated. **Moved by Patty Troy and Peter Westfall that nominations be closed and that a unanimous ballot be accepted.**

CARRIED

Loss of Fish and Wildlife Habitat Beneficial Use Impairment – Status Assessment and Recommendation – MDEQ – M. Foose
Melanie Foose presented to BPAC the Draft Removal Recommendation for the "Loss of Fish and Wildlife Habitat" Beneficial Use Impairment (BUI) on the American side of the St. Clair River Area of Concern (AOC). The delisting criteria for this BUI focused on the implementation of ten habitat projects spanning 13 locations.

Melanie advised BPAC members that nine of the ten habitat projects had been completed along with post-restoration monitoring. The tenth project (Bunce Creek) was no longer included on

the list as the property experienced a change of hands. MDEQ continues, however to advocate for the implementation of this project.

The projects completed in support of the "Loss of Fish and Wildlife Habitat" BUI included:

- Port Huron North Shoreline
- Port Huron South Shoreline
- Blue Water River Walk and Blue Water River Walk Wetlands
- Marysville Living Shoreline
- Cuttle Creek
- Cottrellville Township Shoreline
- Marine City Drain Habitat Improvements
- Krispin Drain Restoration
- St. Clair River Spawning Reefs (Hart's Light, Pointe aux Chenes and Middle Channel)

The majority of post-restoration monitoring has yielded positive results with a number of fish, reptiles and amphibian species returning to these locations. A number of "lessons learned" have also been identified and will be instrumental in the success of future habitat projects along the St. Clair River.

Moved by Kris Lee and seconded by Kathy Watts that the recommendation to remove the "Loss of Fish and Wildlife Habitat" BUI from "Impaired" to "Not Impaired" be accepted on the American side of the St. Clair River AOC.

ACTION - The draft removal recommendation will be updated and distributed to BPAC for final comment.

US Drinking Water Subcommittee Update – P. Duhaime

Paulette Duhaime updated BPAC members on recent activities by the US Drinking Water Subcommittee. A meeting of the subcommittee was last held on February 22, 2017.

- Approval of the draft delisting criteria for the "*Restrictions on Drinking Water Consumption or Taste and Odour Problems*" BUI is still pending from the Michigan Department of Environmental Quality (MDEQ).
- A number of documents have been reviewed by the subcommittee related to this BUI. Of interest have been those related to water quality monitoring at drinking water intakes along the St. Clair River.

  ACTION – Paulette Duhaime will send Donna Strang the "Lake Huron to Lake Erie Real-time Drinking Water Protection Network – An Assessment of the Current Status and Recommendations for Reactivation" document. Donna will circulate to BPAC members.
- The subcommittee identified binational spill notification and communication as an area that still requires improvement.

  BPAC members inquired about how much time typically between a spill reported to the Spills Action Centre (SAC) in Canada and notification to the Michigan State Police. Local American water users have raised concerns regarding when they are notified of an incident on the Canadian side of the St. Clair River.

  ACTION – Kris Lee will contact the Spills Action Centre and request that a list be provided that identifies when notification of a spill or other incident on the Canadian side of the St. Clair River was received by the Michigan State Police. Dates requested include 2014, 2015, 2016 and 2017 up to April 1.

Kris Lee reported to BPAC that all direct dischargers on the Canadian side of the St. Clair River have responded to the survey distributed by the CRIC. Results from the survey will be incorporated into the draft "*Restrictions on Drinking Water Consumption or Taste and Odour Problems*" discussion paper that is currently being finalized.

OMOECC, ECCC, MDEQ and USEPA Updates on Canadian and American Projects – T. Briggs, A. White, M. Foose and R. Ellison

OMOECC Update:
Ted Briggs was unable to attend the meeting. No update was available.

ECCC Update:
April White was unable to attend the meeting. No update was available.

MDEQ Update:
Melanie Foose reported that the "*Bird or Animal Deformities or Reproductive Problems*" BUI for the American side of the St. Clair River continues to be reviewed by the USEPA. Approval for the BUI removal is expected shortly.

USEPA Update:
Rose Ellison was unable to attend the meeting. No update was available.

Committee Reports:

Statewide Public Advisory Council (SPAC) – P. Troy and P. Duhaime
Patty Troy advised BPAC members that the next SPAC meeting is scheduled for March 28, 2017 in Grand Rapids, Michigan. The meeting will be followed by the annual two-day AOC conference. The annual legislative briefing with local government officials will occur at the end of May, 2017.

Friends of the St. Clair River (FOSCR) – Canada – D. Randell and T. Burrell
Darrell Randell and Terry Burrell were unable to attend the meeting. No update was available.

Friends of the St. Clair River (FOSCR) – USA – S. Faust
Kirsten Lyons updated BPAC members on recent FOSCR (USA) activities on behalf of Sheri Faust who was unable to attend the meeting. The monthly speaker series continues. In January, Paulette Duhaime presented on the habitat projects completed on the St. Clair River. In March, Kris Lee and Donna Strang will present on Canadian FOSCR activities and governance. The annual bird blast was successfully held in February and upcoming events and presentations include:

- A presentation to Marysville City Council on April 10, 2017.
- Easter Egg Hunt and Shoreline Clean-up along the Bluewater River Walk on April 15, 2017.
- Kirsten Lyons will be presenting at the AOC conference being held in Grand Rapids, Michigan.
- Paulette Duhaime and Patty Troy will be participating in "Free College Day" organized by St. Clair County Community College on March 25, 2017.

BPAC Membership Subcommittee – A. Kerr and F. Kemp
No new updates identified.

Canadian RAP Implementation Committee (CRIC) – TBD
Kris Lee advised BPAC that the last CRIC meeting was held on March 7, 2017. Major topics discussed included the draft "*Restrictions on Drinking Water Consumption or Taste and Odour Problems*" BUI discussion paper, the shoreline project along the Aamjiwnaang First Nation shoreline of the St. Clair River and a new post-2017 work plan and report of accomplishments.

Four Agency Managers Work Group – T. Briggs
The next Four Agency Managers Work Group meeting will be held via teleconference on April 9, 2017.

Other Business:

- Mark Burrows of the International Joint Commission (IJC) advised BPAC members that the IJC is holding public meetings throughout the Great Lakes region to receive public input on the Progress Report of the Parties released in January 2017. The public meetings will include the opportunity for local citizens to express their concerns and provide comments via an open-mic type session.
    - Input will be accepted until April 15th. Comments can also be submitted online at participate.ijc.ca.
    - Kris Lee and Patty Troy will be providing comments on behalf of BPAC.
- Kathy Johnson of Gregory A.D. provided comments via email to Melanie Foose on the "*Loss of Fish and Wildlife Habitat*" BUI. Her concerns centered around the exclusion of "lessons learned" from unsuccessful habitat projects in the draft removal recommendation. She urged BPAC to include such information to ensure report completeness and accuracy.
- Patty Troy requested clarification from BPAC members on when she should submit letters or comments on behalf of BPAC as she has also provided comments as a private citizen. BPAC members advised that if the letter or comment is related to a BUI, than a letter prepared by Patty on behalf of the BPAC is appropriate. If the comment or letter is not related specifically to a BUI but rather another environmental topic than the letter should be send on behalf of Patty as a private citizen.
- Patty Troy advised that the MDEQ will release a draft Statewide *E.coli* Total Maximum Daily Load (TMDL) document in early spring for comment. In addition, the MDEQ has prepared a Michigan *E. coli* Pollution and Solution Mapper that is available online.
  ACTION – Patty Troy will send the link to the MDEQ *E. coli* Pollution and Solution Mapper to Donna Strang who will circulate to BPAC members.
- Kirsten Lyons advised that on April 22, 2017, the Blue Water Sierra Club will host a bike ride along the St. Clair River from Marysville to Port Huron. In addition, the FOSCR (USA) have a human water chain planned for 6:45 pm that evening at the Blue Water River Walk. Lastly, the Port Huron Sturgeon Festival is planned for Saturday, June 3, 2017.

Next Meeting Date
The next meeting will be held on Monday, March 24, 2017 in Sarnia, Ontario.

Adjournment

Moved by Paulette Duhaime and seconded by Fred Kemp that the meeting be adjourned.
CARRIED

The meeting was adjourned by Patty Troy at 9:12 pm.

Appendix C

St. Clair River BPAC Letter of Support

St. Clair River
BINATIONAL PUBLIC ADVISORY COUNCIL

April 27, 2017

Mr. Rick Hobrla
Office of the Great Lakes
Michigan Department of Environmental Quality

Dear Rick,

At the March 15, 2017 meeting of the St. Clair River Binational Public Advisory Council the committee approved the removal of the Loss of Fish and Wildlife Habitat beneficial use impairment on the American side of the St. Clair River based on the draft MDEQ BUI assessment document. I will forward the minutes from that meeting which record this action as soon as they are available.

BPAC members noted with great appreciation the efforts of DEQ and EPA staff, especially the SCR RAP coordinator Melanie Foose and EPA liaison Rose Ellison towards the completion of our habitat project goals.

We request continued DEQ support for additional habitat project opportunities. In particular, BPAC, the Friends of the St. Clair River, the Michigan Department of Natural Resources and the Michigan Department of Environmental Quality, and the Lake St. Clair/St. Clair River Protection and Restoration Partnership have all expressed enthusiastic support for the restoration of Bunce Creek. Recognizing the importance of this restoration, we will continue to look for opportunities and work towards that goal.

Thanks, also, to you and Melanie for the work done to prepare the assessment document. There were several comments from BPAC in support of the draft BUI removal document, as well as suggestions. We look forward to review of the final BUI removal document soon.

Best regards,

Patty Troy

Patty Troy
US Co-chair
St. Clair River BPAC

Appendix D

List of Projects Required for the Removal of the Loss of Fish and Wildlife Habitat Beneficial Use Impairment

PROJECT NAME		PARTNER	FUNDING SOURCE	LOCAL MATCH	GLRI FUNDING AMOUNT
Port Huron St. Clair River Shoreline Restoration – North		City of Port Huron	U.S. EPA (GLRI)	$140,000	$944,500
Port Huron St. Clair River Shoreline Restoration – South		City of Port Huron	U.S. EPA (GLRI)		$500,000 plus design
Upper St. Clair River Shoreline Restoration	Blue Water River Walk	St. Clair Community Foundation	USFWS (GLRI) $250,000 NOAA (GLRI) $2,000,000	$1,000,000	$2,250,000
	Blue Water River Walk Wetland	St. Clair County Parks	NOAA (GLRI)		$1,039,500
Marysville St. Clair River Living Shoreline Restoration		City of Marysville	U.S. EPA (GLRI)	$289,903	$1,435,537
Cuttle Creek Restoration		City of Marysville	U.S. EPA (GLRI) via MDEQ Office of the Great Lakes		$2,753,855 plus design
Cottrellville Township Shoreline Preservation and Restorations		Cottrellville Township	$337,700 DNR Trust Fund Grant $2,500,000 U.S. EPA (GLRI)		$2,837,700 plus design
Marine City Drain Habitat Improvements		St. Clair County Drain Commission	U.S. EPA (GLRI) via MDEQ Office of the Great Lakes		$865,875 plus design
Harsens Island Habitat Restoration		Clay Township and St. Clair County Drain Commission	U.S. EPA (GLRI)		$4,000,000 plus design
Restoration of In-River Habitat of the St. Clair River	Middle Channel Reef	USGS, USFWS, Sea Grant and University of Michigan	NOAA (GLRI)		$890,223
	Pointe aux Chenes Reef	USGS, USFWS, Sea Grant and University of Michigan	U.S. EPA (GLRI) to USGS		$1,000,000
	Harts Light Reef	USGS, USFWS, Sea Grant and University of Michigan	U.S. EPA (GLRI) to USGS		$2,500,000
TOTALS				**$1,429,903**	**$21,017,190**
				GRAND TOTAL: $22,447,093	

Appendix E

Observed bird species during the course of 2015 and 2016 surveys at the Blue Water River Walk Wetland restoration site (HRM 2016).

COMMON NAME	SCIENTIFIC NAME	2015	2016
American Black Duck	*Anas rubripes*	x	
American Crow	*Corvus brachybynchos*	x	x
American Robin	*Turdus migratorious*	x	x
American Tree Sparrow	*Spizella arborea*	x	
Bald Eagle	*Haliaeetus leucocephalus*	x	
Barn Swallow	*Hirundo rustica*		x
Blue Jay	*Cyanocitta cristata*		x
Brown-headed Cowbird	*Molothrus ater*		x
Bufflehead	*Bucephala albeola*	x	x
Canada Goose	*Branta Canadensis*	x	x
Canvasback	*Authya valisineria*	x	
Cedar Waxwing	*Bombycukka cedrorum*	x	
Chimney Swift	*Chaetura pelagica*	x	
Chipping Sparrow	*Spizella passerine*	x	x
Common Goldeneye	*Bucephala clangula*	x	x
Common Grackle	*Quiscalus quiscula*		x
Common Loon	*Gavia immer*	x	
Common Merganser	*Mergus merganser*	x	x
Cooper's Hawk	*Accipiter cooperii*	x	
Dark-eyed Junco	*Junco hyemalis*	x	x
Double-crested Cormorant	*Phalacrocorax auritus*	x	x
Downy Woodpecker	*Picoides pubescens*	x	
European Starling	*Sternus vulgaris*	x	x
Forster's Tern	*Sterna forsteri*	x	
Gray Catbird	*Dumetella carolinensis*	x	x
Great Black-backed Gull	*Larus marinus*		x
Greater Scaup	*Aythya marila*	x	
Herring Gull	*Larus argentatus*	x	x
House Finch	*Haemorhous mexicanus*		x
House Sparrow	*Passer domesticus*	x	x
Killdeer	*Charadrius vociferous*	x	x
Long-tailed Duck	*Clangula hyemalis*	x	x
Mallard	*Anas platyrhynchos*	x	x
Mourning Dove	*Zenaida macroura*	x	x
Northern Cardinal	*Cardinalis cardinalis*	x	x
Northern Harrier	*Circus cyaneus*		x
Northern Rough-winged Swallow	*Stelgidopteryx serripennis*	x	x
Redhead	*Aythya Americana*	x	x
Red-breasted Merganser	*Mergus serrator*	x	
Red-eyed Vireo	*Vireo olivaceus*	x	
Red-winged Blackbird	*Agelaius phoeniceus*	x	x
Ring-billed Gull	*Larus delawarensis*	x	x
Song Sparrow	*Melospiza melodia*	x	x
Spotted Sandpiper	*Actitis macularius*		x

Appendix F

Bird species observed at the Blue Water River Walk (HRM 2014)

COMMON NAME	SCIENTIFIC NAME	2011	2012	2013	2014
American Black Duck	*Anas rubripes*		x	x	
American Coot	*Fulica americana*			x	
American Crow	*Corvus brachybynchos*	x	x		x
American Goldfinch	*Spinus tristis*	x	x	x	x
American Kestrel	*Falco sparverius*		x		
American Robin	*Turdus migratorious*		x	x	x
American Tree Sparrow	*Spizella arborea*	x	x	x	
Bald Eagle	*Haliaeetus leucocephalus*			x	x
Barn Swallow	*Hirundo rustica*		x	x	x
Black Capped Chickadee	*Poecile atricapillus*		x	x	
Belted Kingfisher	*Mergaceryle alcyon*		x	x	
Blue Jay	*Cyanocitta cristata*	x	x	x	x
Blue Winged Teal	*Anas discors*		x		
Bonaparte's Gull	*Chroicocephalus Philadelphia*	x	x	x	x
Brown Headed Cowbird	*Molothrus ater*		x	x	x
Bufflehead	*Bucephala albeola*	x	x	x	x
Canada Goose	*Branta Canaensis*	x	x	x	x
Canvasback	*Authya valisineria*			x	x
Caspian Tern	*Hydroprogne caspia*				x
Cedar Waxwing	*Bombycukka cedrorum*		x		
Chimney Swift	*Chaetura pelagica*		x	x	
Chipping Sparrow	*Spizella passerine*	x	x	x	
Cliff Swallow	*Petrochelidon pyrrhonota*		x	x	x
Common Goldeneye	*Bucephala clangula*		x	x	x
Common Grackle	*Quiscalus quiscula*		x		
Common Loon	*Gavia immer*			x	
Common Merganser	*Mergus merganser*		x	x	x
Common Tern	*Sterna hirundo*			x	x
Cooper's Hawk	*Accipiter cooperii*				x
Dark Eyed Junco	*Junco hyemalis*	x	x	x	x
Double Crested Cormorant	*Phalacrocorax auritus*	x	x		x
Downy Woodpecker	*Picoides pubescens*		x	x	
Eastern Bluebird	*Sialia sialis*				x
European Starling	*Sternus vulgaris*	x	x	x	x
Forster's Tern	*Sterna forsteri*				x
Glaucous Gull	*Larus hyperboreus*			x	
Gray Catbird	*Dumetella carolinensis*	x	x	x	x
Great Black Backed Gull	*Larus marinus*		x	x	x
Great Blue Heron	*Ardea herodias*		x	x	x
Greater Scaup	*Aythya marila*		x	x	x
Green Winged Teal	*Anas carolinensis*	x			
Herring Gull	*Larus argentatus*	x	x	x	x
Hooded Merganser	*Lophodytes cucullatus*			x	x
House Finch	*Haemorhous mexicanus*		x	x	
Horned Grebe	*Podiceps auritus*				x
Horned Lark	*Eremophila alpestris*				x
House Sparrow	*Passer domesticus*	x	x	x	x
Indigo Bunting	*Passerina cyanea*		x	x	
Killdeer	*Charadrius vociferous*	x	x	x	x

COMMON NAME	SCIENTIFIC NAME	2011	2012	2013	2014
Lesser Scaup	*Aythya affinis*			x	
Long Tailed Duck	*Clangula hyemalis*		x	x	x
Mallard	*Anas platyrhynchos*	x	x	x	x
Merlin	*Falco columbarius*			x	
Mourning Dove	*Zenaida macroura*		x	x	x
Mute Swan	*Cygnus olor*		x	x	x
Nashville Warbler	*Leiothlypis ruficapilla*		x		
Northern Cardinal	*Cardinalis cardinalis*	x	x	x	x
Northern Flicker	*Colaptes auratus*		x	x	
Northern Harrier	*Circus cyaneus*		x	x	
Northern Rough Winged Swallow	*Stelgidopteryx serripennis*		x	x	
Pine Siskin	*Spinus pinus*		x		
Pie Billed Grebe	*Podilymbus podiceps*		x		
Red Breasted Merganser	*Mergus serrator*	x	x	x	x
Red Winged Blackbird	*Agelaius phoeniceus*		x	x	x
Redhead	*Aythya americana*			x	x
Red Necked Grebe	*Podiceps grisegena*			x	x
Red Tailed Hawk	*Buteo jamaicensis*			x	
Ring Billed Gull	*Larus delawarensis*	x	x	x	x
Rock Pigeon	*Columba livia*		x	x	
Rose Breasted Grosbeak	*Pheucticus ludovicianus*			x	
Ruby Crowned Kinglet	*Regulus calendula*			x	
Sanderling	*Calidris alba*			x	
Snow Bunting	*Plectrophenax nivalis*		x		
Song Sparrow	*Melospiza melodia*		x	x	x
Spotted Sandpiper	*Actitis macularius*			x	x
Trumpeter Swan	*Cygnus buccinator*		x		
Turkey Vulture	*Cathartes aura*			x	
Warbling Vireo	*Vireo gilvus*	x			
White Crowned Sparrow	*Zonotrichia leucophrys*		x		
White Winged Scoter	*Melanitta deglandi*		x		x
Willow Flycatcher	*Empidonax traillii*	x			
Wood Duck	*Aix sponsa*		x		
Yellow Warbler	*Setophaga petechial*	x	x		

Appendix G

SCR AOC Habitat Fact Sheet

St. Clair River Habitat Restoration

Cottrellville Township Shoreline Restoration: $2,800,000 GLRI

The Cottrellville Township shoreline project included the removal of nearly 400 feet of failing steel seawall, restoring the shoreline to a natural state with cobble, woody structure and native vegetation. In addition, rock breakwalls were placed within the shallow shelf of the river to create calm areas for fish to feed and take cover.

Cuttle Creek Habitat Restoration: $2,700,000 GLRI

Cuttle Creek, a tributary to the St. Clair River, was restored using the techniques of Natural Channel Design. The project goals that were accomplished include reconnecting the creek to the floodplain and surrounding wetland, restoring benthic habitat for aquatic insects with cobble and woody structure and restoring fish passage throughout the entire 3,000 foot project area.

Marine City Drain Habitat Restoration: $866,000 GLRI

At the confluence of the Marine City Drain and the St. Clair River, over 1/4 acre of river habitat and 63 feet of shoreline was restored with the construction of in-water rock breakwalls, cobble substrate and woody structure benefitting fish and wildlife.

Port Huron Shoreline – South: $500,000 GLRI

In the upper St. Clair River, invasive species along the streambank were treated and removed, native shrubs and trees were planted and large whole trees were anchored into the streambank providing cover for young fish.

St. Clair River Reef Restoration: $4,390,000 GLRI

Three fish spawning reefs were installed in three locations throughout the river. The Middle Channel reef, constructed in 2012 is 1 acre in size. The Harts Light and Pointe aux Chenes reefs were installed in 2014 and are 3.8 acres and 1.5 acres respectively. These reefs provide spawning substrate for a variety of native fish including the state threatened Lake Sturgeon.

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St. Clair River Habitat Restoration

Marysville Living Shoreline: $1,440,000 GLRI

The shoreline just south of Chrysler Park Beach was enhanced by removing over 1,800 feet of failing steel seawall and replacing it with rock in addition to many species of native trees and wildflowers. These improvements provide habitat for a variety of fish and wildlife species.

Blue Water River Walk: $2,250,000 GLRI

Nearly one mile of shoreline was restored just south of the Maritime Center in Port Huron using rock along the shoreline edge and to create in-river breakwaters. Native shrubs and wildflowers were planted providing food and cover for wildlife. The area also serves as a destination for the public and is the site of the annual Port Huron Sturgeon Festival.

St. Clair County Parks Wetland: $1,039,500 GLRI

Just south of the Blue Water River Walk shoreline, 2.75 acres of an upland brownfield was cleaned up and converted to wetland providing habitat for reptiles, amphibians and migrating waterfowl. With a pedestrian and bike trail bisecting the various wetland habitats, the area is also able to be fully enjoyed by the public.

Port Huron Shoreline - North: $945,000 GLRI

One of the first funded projects under the Great Lakes Restoration Initiative (GLRI), the Port Huron North shoreline project included planting native wildflowers and installing rock along the 300 foot shoreline in addition to cobble placed in the river to create a substrate benefitting fish and aquatic insects.

Krispin Drain Restoration: $4,000,000 GLRI

The Krispin Drain runs through Harsens Island and out to Lake St. Clair. Decades of sediment and invasive species had severely degraded the habitat of the drain. The Krispin Drain restoration project included 3 miles of strategic dredging to re-shape the drain along with treatment and removal of Phragmites. The Drain is now St. Clair County's newest Blueways paddle route.

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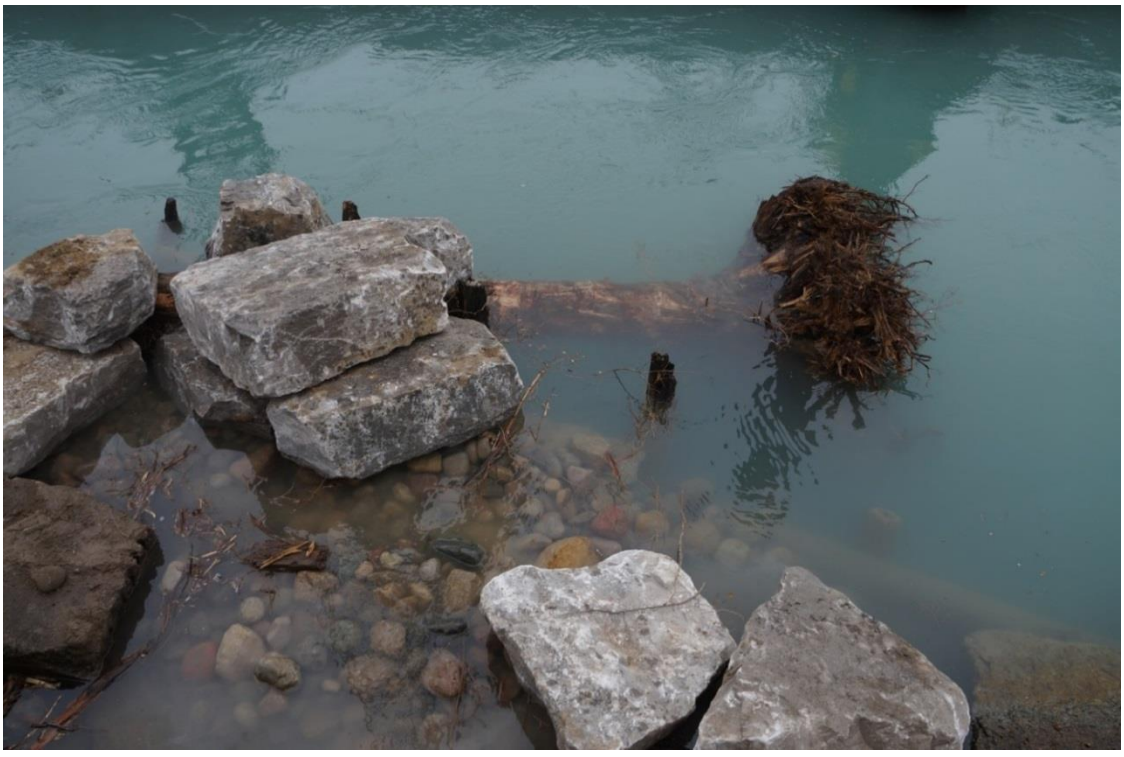
Appendix H

St. Clair River AOC Project Photographs

Port Huron North – Looking Upstream



Log Vane at Port Huron South

Port Huron South – Looking Downstream

Blue Water River Walk – Looking Downstream

Blue Water River Walk – Looking Upstream

Blue Water River Walk Wetland – Looking South

Marysville Living Shoreline – Looking Downstream

Cuttle Creek – Looking Upstream at Former In-Line Pond Area

Cuttle Creek – Looking Upstream at the Formerly Perched Culvert

Cottrellville Township Shoreline – Looking Upstream

Marine City Drain Habitat Improvements Project – Looking East

Harsens Island Habitat Restoration Project