

## 2020 Fish Surveys and Projects

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This report summarizes fish surveys and projects during the 2020 field season (Figure 1).

1. Northern Sunfish, Deepwater Sculpin, and Slimy Sculpin surveys in the Boundary Waters Canoe Area Wilderness (BWCAW).
2. Warmouth surveys in Itasca County lakes.
3. Fish tissue samples from disjunct populations and Minnesota drainages for genetic research.
4. Sensitive species translocations and monitoring in Twin Cities Metro Area (TCMA) lakes.
5. Sensitive species translocations to Signalness Lake in Glacial Lakes State Park.
6. Fish surveys of Pigs Eye Lake (Mississippi River Pool 2 backwater) prior to island construction.

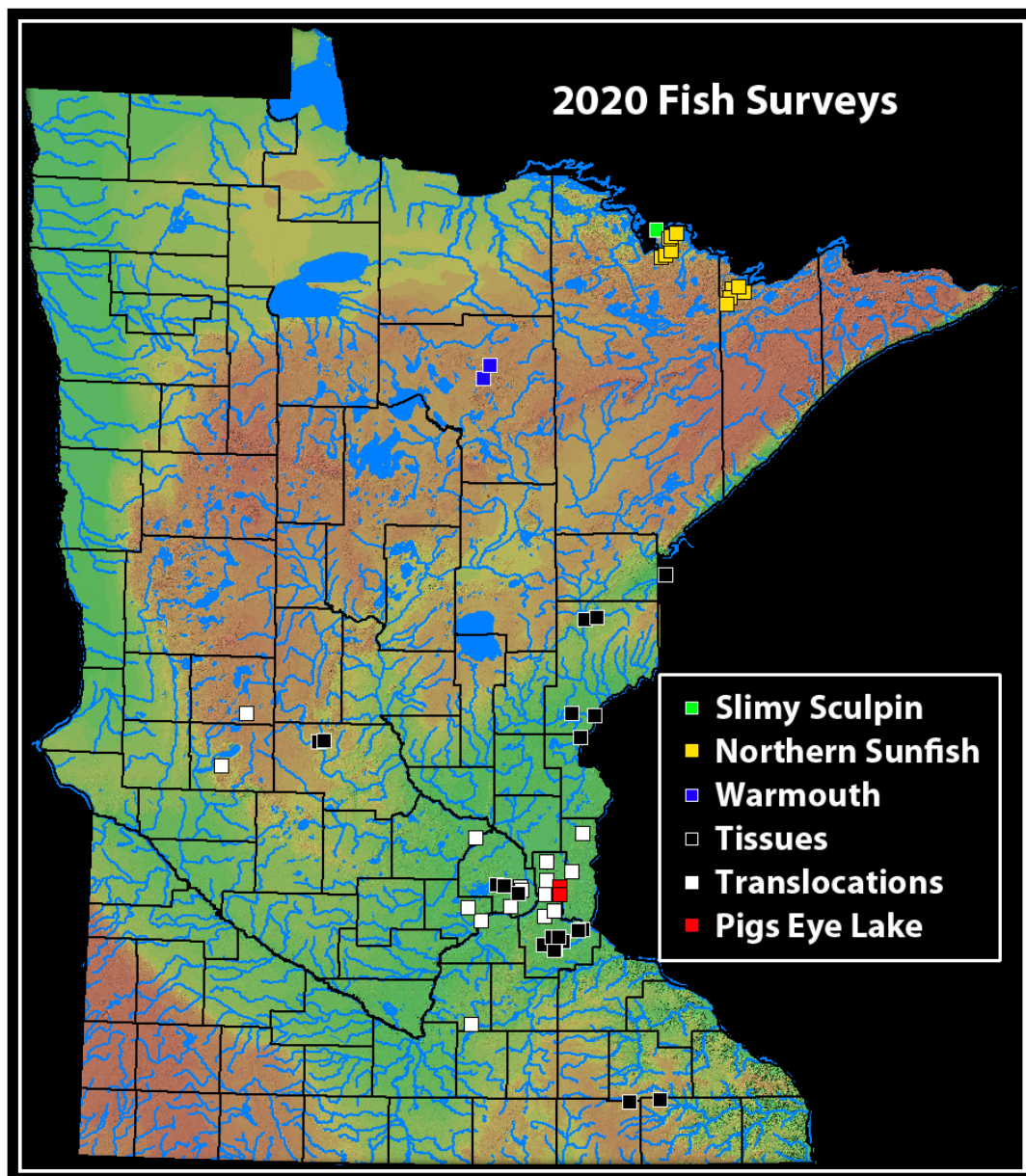


Figure 1. 2020 Fish surveys and projects localities.

Fish surveys and projects were conducted under the following permits:

1. Minnesota Department of Natural Resources (MDNR), Section of Fisheries: 29769AA and 29770.
2. MNDR Division of Ecological and Water Resources, Scientific and Natural Areas: 2020-023R.
3. MDNR Division of Parks and Trails: 202048.
4. Superior National Forest, Boundary Waters Canoe Area Wilderness (BWCAW).
5. Wisconsin Department of Natural Resources (WDNR): SCP-FM-2020-042.
6. National Park Service, St. Croix National Scenic Riverway: SACN-2020-SCI-0005.

No surveys done in 2020.

Data collected and products resulting from these current and past permits have, or will be, utilized for the following applications:

1. *Fishes of Minnesota* by Jay Hatch, Gary Phillips, and Mike McInerny (in preparation).
2. MDNR [Rare Species Guide](#).
3. MDNR Natural Heritage Information Systems [Biotics](#) database.
4. MDNR [Fishes of Minnesota Mapper](#).
5. MDNR [Invasive Species Program](#).
6. North American Native Fishes Association (NANFA) [Photo Gallery](#).
7. NANFA [American Currents](#) articles.

## Summary

This summary report was written to satisfy permit requirements and to disseminate survey information to interested parties. **All surveys conducted this year were done solely as a volunteer effort.** I cannot adequately express in words my gratitude for those who assisted me in the surveys. Without them, I would have very little to report. My fellow dedicated volunteers include: Jenny Kruckenberg, George Cunningham, Don Richmond, Bryan Stefansky, and John Olson. The scope of the 2020 field investigations included, ongoing translocations and monitoring of sensitive fishes in TCMA lakes and first-time translocations to Signalness Lake in Glacial Lakes State Park. Other ongoing projects in the BWCAW lake surveys, Itasca County lake surveys for non- indigenous Warmouth, and surveys for tissue collection. However, most of the 2020 sampling effort was in Pigs Eye Lake where artificial islands are scheduled for construction in 2021 to reduce wind fetch and erosion.

Survey records are provided in the attached Excel file: **2020 Konrad Schmidt Fish Survey Records**. The year-end results include 95 visits to 32 lakes and 15 streams in 16 Minnesota counties and one Wisconsin county (Douglas). The cumulative catch was 86 species in 19 families (Appendix 1). This includes the following Minnesota state listed species: Southern Brook Lamprey, Pugnose Shiner, Black Buffalo, Yellow Bass, Warmouth, Northern Sunfish, Least Darter, and Gilt Darter. Central Newts are rarely captured with fish sampling gear, but several specimens were found in four BWCAW lakes using dip nets, micro-fyke nets, and minnow traps. The lakes include Pipestone Bay (Basswood Lake), Hustler, Ruby, and Shell.

### **Project 1. Northern Sunfish, Deepwater Sculpin and Slimy Sculpins surveys in the BWCAW.**

Two BWCAW trips in 2020 surveyed six lakes in the Basswood Lake watershed, two in the Loon Lake watershed, and five in the Lac la Croix watershed (Figures 2 and 3). Sampling gear included micro-fykes, minnow traps, dip nets, and microfishing. In the first trip, one Northern Sunfish was captured in Fall Lake using a tandem set of micro-fyke nets (Figure 4). The site was a sheltered bay with aquatic vegetation across from the Fall Lake Campground swimming beach. Two young of year Longnose Suckers were seined adjacent to the swimming beach. This species is likely present in many BWCAW lakes, however, there are very few records available to determine its current BWCAW distribution and abundance.

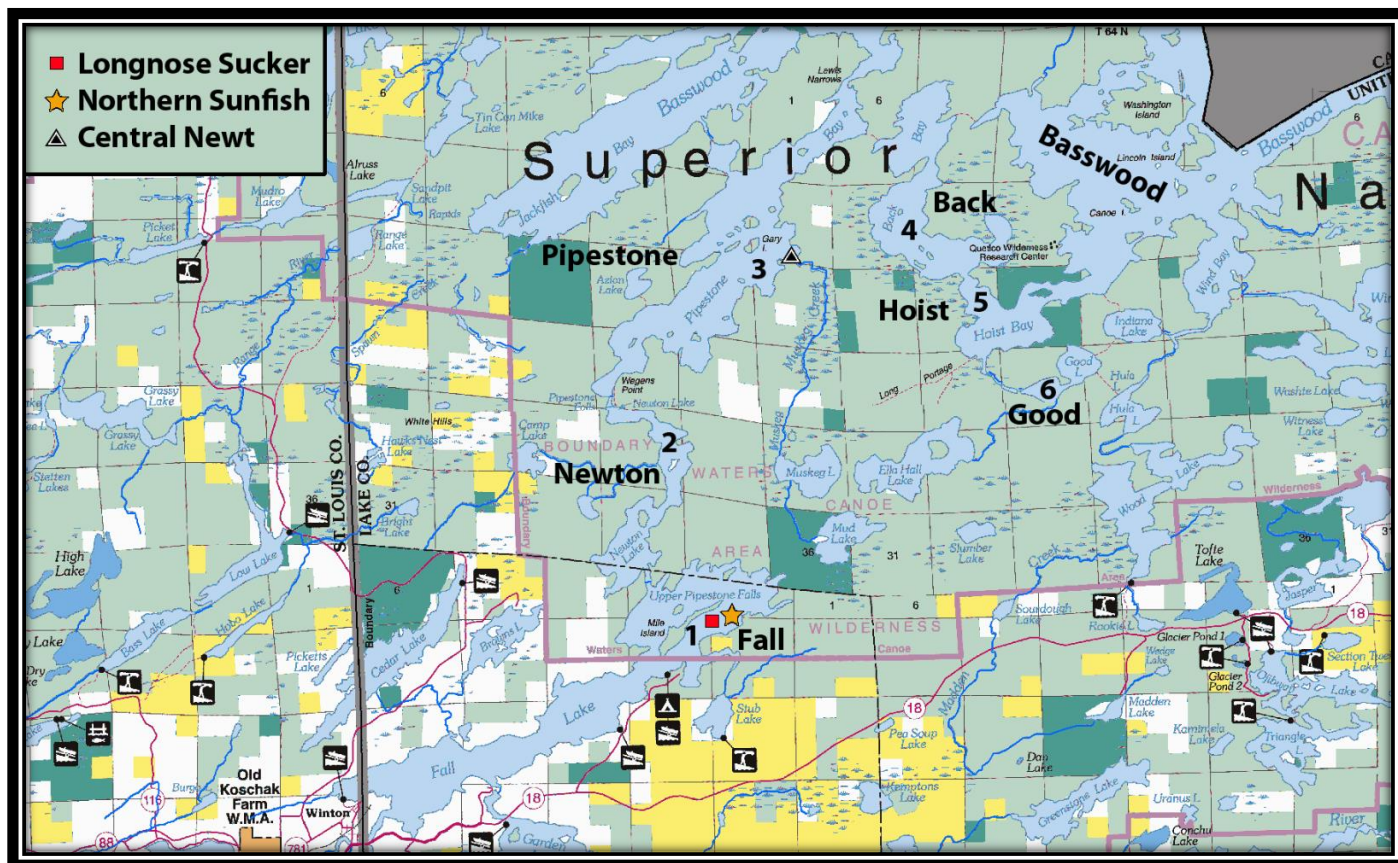


Figure 2. Lakes and bays surveyed in 2020 during the first BWCAW trip (July 12-17).

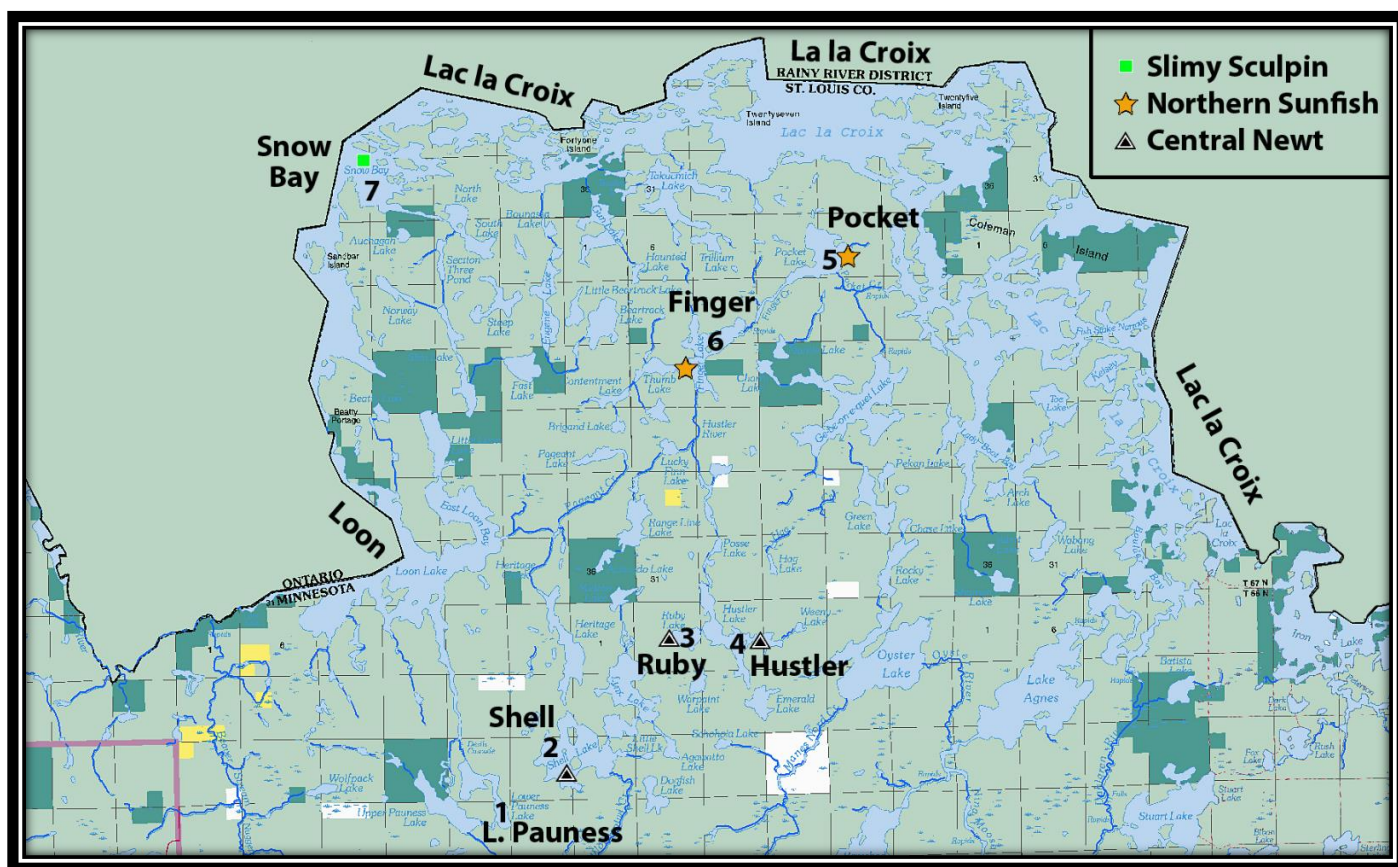


Figure 3. Lakes and bays surveyed during the second BWCAW trip (August 19-24).



Figure 4. Micro-fyke net tandem set in Fall Lake where one Northern Sunfish was captured (Konrad Schmidt).

Micro-fykes were deployed in similar habitats found in Newton, Pipestone Bay, and Back Bay. Kick nets and seines were used in all lakes and bays. No additional Northern Sunfish were found; however, this species very likely occurs throughout the Basswood Lake watershed. They are either rare and difficult to detect or they are not vulnerable to capture with the sampling gears used on the first trip. If surveys for the species are planned in the future within the watershed, microfishing should be considered as a sampling method which proved effective on the second BWCAW trip.

The route of second trip proved to be the most difficult and challenging I have taken in over 40 years of canoeing in the BWCAW. There were many and long portages that took their toll on John Olson and me. We had no choice but to pass on many lakes we had planned to survey. The collapsible micro-fykes and large minnow traps fished well and were small enough to fit inside backpacks for portaging, but they were wet and very heavy. They did not capture any Northern Sunfish and were retired after surveying Hustler Lake. In 1974, the first collection of Northern Sunfish in Minnesota came from Hustler Lake. In 2010, MDNR biologists microfished Ruby and Hustler lakes and caught Northern Sunfish in both. In 2020, John Olson microfished Ruby without success, but near-shore vegetation was extremely sparse. Habitat in Hustler appeared much more promising, but sunset fell shortly after setting the micro-fykes and minnow traps and no microfishing was done. Sampling was paused until reaching Pocket Lake where John Olson caught several Northern Sunfish with little effort in a shallow vegetated bay on “not-so-fresh” wax worms. He was very surprised how aggressively they took the bait. Later in the day, John caught another Northern Sunfish in Finger Lake at the inlet from Thumb Lake (Figures 5 and 6). Both lakes are new localities for the species and revealed microfishing should be the preferred sampling method for Northern Sunfish in future surveys.



Figure 5: Northern Sunfish from Finger Lake (John Olson).



Figure 6. John Olson microfishing Northern Sunfish site in Finger Lake (Konrad Schmidt).

Deepwater Sculpin and Slimy Sculpin surveys were conducted in Snow Bay of Lac la Croix using small minnow traps baited with glow sticks (Figure 7). This was my third attempt for sculpins in Lac la Croix since 2010. The other two unsuccessful attempts were in the southeast end of the lake north of Boulder Bay and the middle north of Takumich Lake. I was aware MDNR lake surveys had previously reported Slimy Sculpin and an unidentified sculpin in gill net sets during 2004 and 2014 lake surveys, but there were no extant specimens for identifying the latter. In 2020, ten minnow traps collected 12 Slimy Sculpins and fin clips were preserved for genetic analysis (Figure 8).



Figure 7. Baiting minnow traps for sculpin surveys (John Olson).



Figure 8. A Trophy Slimy Sculpin fin clipped, and tagged (John Olson).

The taxonomy of the Slimy Sculpin (*Cottus cognatus*) has been the focus of recent research, which Dr. Dave Neely (Tennessee Aquarium) describes in the following personal communication: “I have some mtDNA data that suggests that, yes, we’ve conflated a couple different critters as *cognatus* – in part also supported by Young et al (2013). Robins, in his unpublished 1954 dissertation, mentions that he suspected that the deepwater *cognatus* form in Lake Ontario (originally described as *C. franklini*) was valid. I suspect he was very well right. Most morphological analyses that have been done (particularly McAllister’s work in the 1950s) did not separate by habitat, and still documented some discrete breaks that roughly correspond to phylogeographic breaks from my data. More recently, I have been trying to pull together tissues for a new genomic approach. I’d be very interested in any sculpin tissues you might have, from anywhere in the upper Midwest.”

## Project 2. Warmouth surveys in Itasca County lakes.

Department of Conservation (now MDNR) fish rescue efforts of the early 1900s spread game fish species around the state. Documentation was poor, but fish rescue is the suspected source of Warmouth reported in Big Ole and East lakes near Marcell (Schmidt 2019, Figure 9). Both lakes are in the Hudson Bay drainage about 240 air miles north of the species nearest population in southeastern Minnesota.

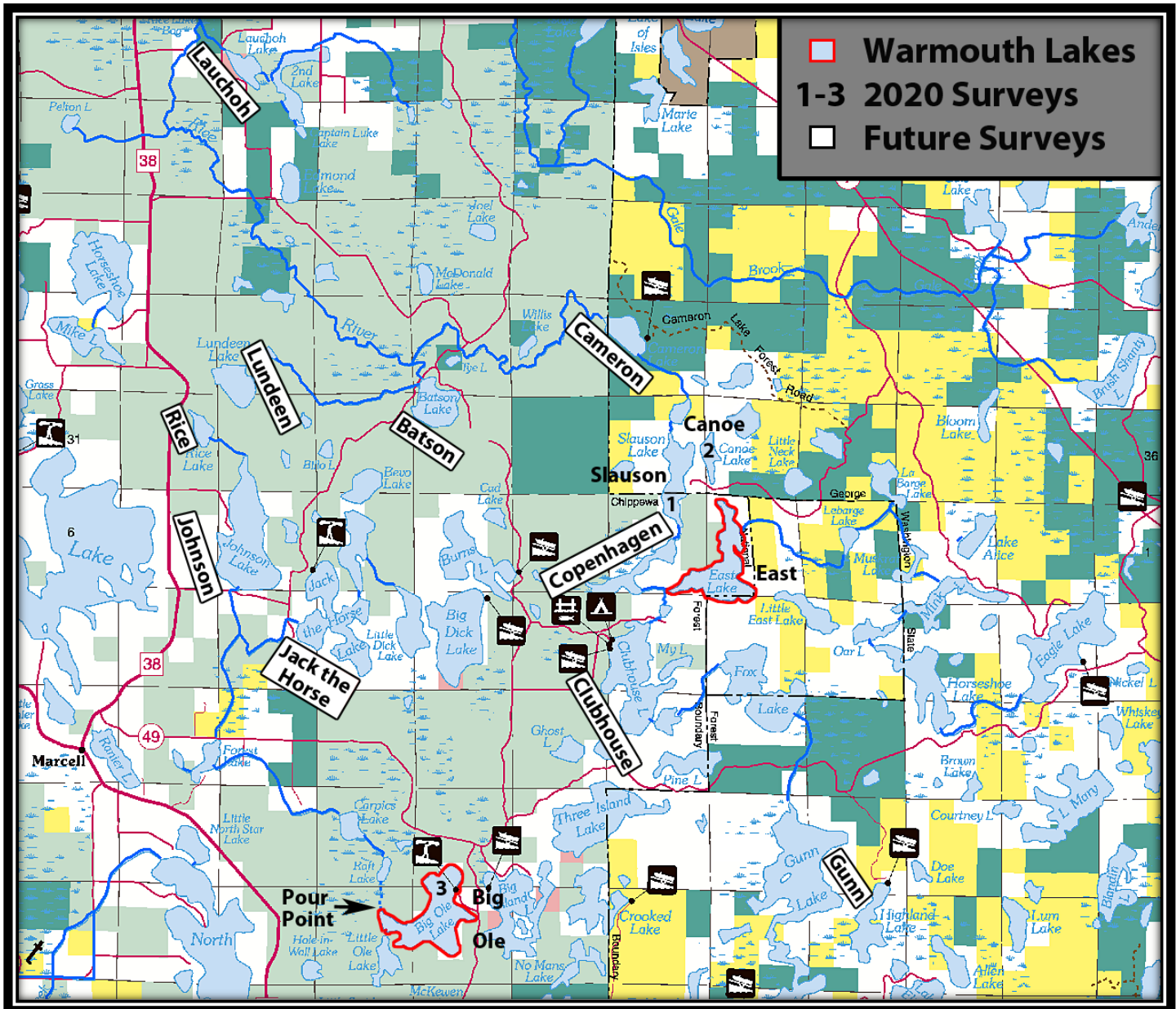


Figure 9. Warmouth have been reported in Big Ole and East lakes. My surveys of East Lake in 2018 and 2019 found no Warmouth. In 2020, no Warmouth were found downstream in either Slauson (1) or Canoe (2) lakes, but two listed species were present in Slauson (i.e., Pugnose Shiner - threatened and Northern Sunfish – special concern). Warmouth were found in Big Ole (3) and they potentially could escape through a pour point in a northwest bay when high lake levels occur.

In 1982, a MDNR Fisheries lake survey of East Lake reported one Warmouth (MDNR 2021a). In 2018 and 2019, we surveyed East Lake with seines, dip nets, mini-fyke nets, and gill nets, but no Warmouth were found. In 2001, MDNR reported 35 Warmouth in Big Ole. This was a large increase from the 1974 and 1982 surveys when 11 and 5 specimens

were captured, respectively (MDNR 2021b). In 2020, my surveys with mini-fyke nets collected six Warmouth (Figure 10). Tissues were preserved for comparison with Warmouth in southeastern Minnesota if researchers wish to explore further the “paper trail” that suggests early fish rescue efforts may be the source of the species in Big Ole Lake.



Figure 10. Warmouth from Big Ole Lake (Itasca County) on June 24, 2020 (Konrad Schmidt).

Big Ole Lake is landlocked when water levels are low to normal but it does have a pour-point through the northwest bay when lake levels are high (Schmidt 2020, Figure 9). Warmouth could have possibly escaped downstream into Raft Lake and several other lakes via Johnson Creek to the Rice River, where movement upstream to East Lake and beyond is also possible. Since Warmouth are non-indigenous to Minnesota’s Hudson Bay drainage, the species impacts on native fish communities are unknown. Hybrid crosses among other Minnesota sunfish such as Bluegill, Green Sunfish Pumpkinseed, and Orangespotted Sunfish occur frequently, and hybrids with Warmouth are also likely to occur. My observations in an aquarium revealed Warmouth are also incredibly voracious predators including on fish species that I thought were too large to consume.

On June 23, 2020, I walked through the pour point on Big Ole Lake to a logging road with a stream culvert. There was a dry but well-defined intermittent channel on this date (Figure 11). A risk assessment addressing the potential spread of this species should be considered. If the results reveal a significant concern, some type of barrier should be installed at this point to prevent Warmouth spreading further downstream into the Rice, Big Fork and Rainy river systems. An important part of a risk assessment would be conducting future surveys in other lakes within the Big Ole and East lake watersheds. I have identified the following lakes that appear to have either MDNR or Chippewa National Forest watercraft accesses (Figure 9): Jack the Horse, Johnson, Rice, Lundeen, Batson, Lauchoh, Gunn, Clubhouse, Copenhagen, and Cameron.



Figure 11. Intermittent stream channel between Big Ole and Raft lakes on June 23, 2020 (Konrad Schmidt).

### **Project 3. Fish tissue samples from disjunct populations and Minnesota drainages for genetic research.**

Genetic analyses have revealed that numerous species have been routinely “lumped” into large species complexes. In ichthyology, bragging rights likely go to the Orangethroat Darter (*Etheostoma spectabile*) complex which has expanded to well over 20 new species and there are likely a few more new species to come. Genetic analyses also can determine how different populations of the same species have diverged from each other due to isolation. A range-wide study of Pugnose Shiners from Iowa to New York revealed a distinct genetic division between the populations present in Fish Lake (Le Sueur County, MN) and Lake Okoboji (Dickson County, IA) and all eastern populations (McCusker 2012). This knowledge is vital to conserving populations with unique genomes, and these populations should be managed as ecologically significant units.

I have deposited several hundred tissue samples in the Etnier Ichthyological Collection at the University of Tennessee in Knoxville (Appendix 1). Individual lots of species range from one to ten samples, and inquiries of their current availability should be sent to the Collection Manager: Jennifer Parris Brummett <jparris@utk.edu>. My focus on tissue collections has been isolated populations above barrier falls and drainages with very rare occurrences. I have also been “banking” tissues from Minnesota’s major drainages. In 2020, tissues were collected from the Mississippi River Headwaters (above St. Anthony Falls), Mississippi River Southeast, Rainy River, Lake Superior, and St. Croix River drainages. A [map](#) of Minnesota’s major drainages can be found in Hatch (2015).

#### Project 4. TCMA Lakes Sensitive Species Translocations and Monitoring.

My translocations of sensitive fishes began in 2011 in TCMA lakes where water quality and habitats are exceptional. As of the end of 2020, twenty-one TCMA lakes have received translocations from one to five species and six additional lakes are being considered for future projects (Figure 12, Table 1). Many of these lakes have historical records of the five translocated fishes (i.e., Pugnose Shiner, Blackchin Shiner, Blacknose Shiner, Banded Killifish, and Least Darter). However, the rapid urbanization of the TCMA after World War II caused many lakes to suffer severe degradation from turbidity and eutrophication, with the result that the sensitive species were eventually extirpated. Following lakeshed restoration efforts, many lakes have recovered with astonishing water clarities rivaling BWCAW lakes and have seen the return of dense beds of submergent vegetation that are vital habitat for the sensitive species' existence. However, the historical connectivity to these lakes has been destroyed and very few populations of sensitive species remain to colonize former habitats. Furthermore, the MDNR utilizes a fish index of biotic integrity (FIBI) surveys to assess water quality and habitat in lakes. However, lakes with improved water quality and habitat that can once again support the sensitive fishes will never achieve FIBI scores reflecting their full potential without translocations of the species lost.

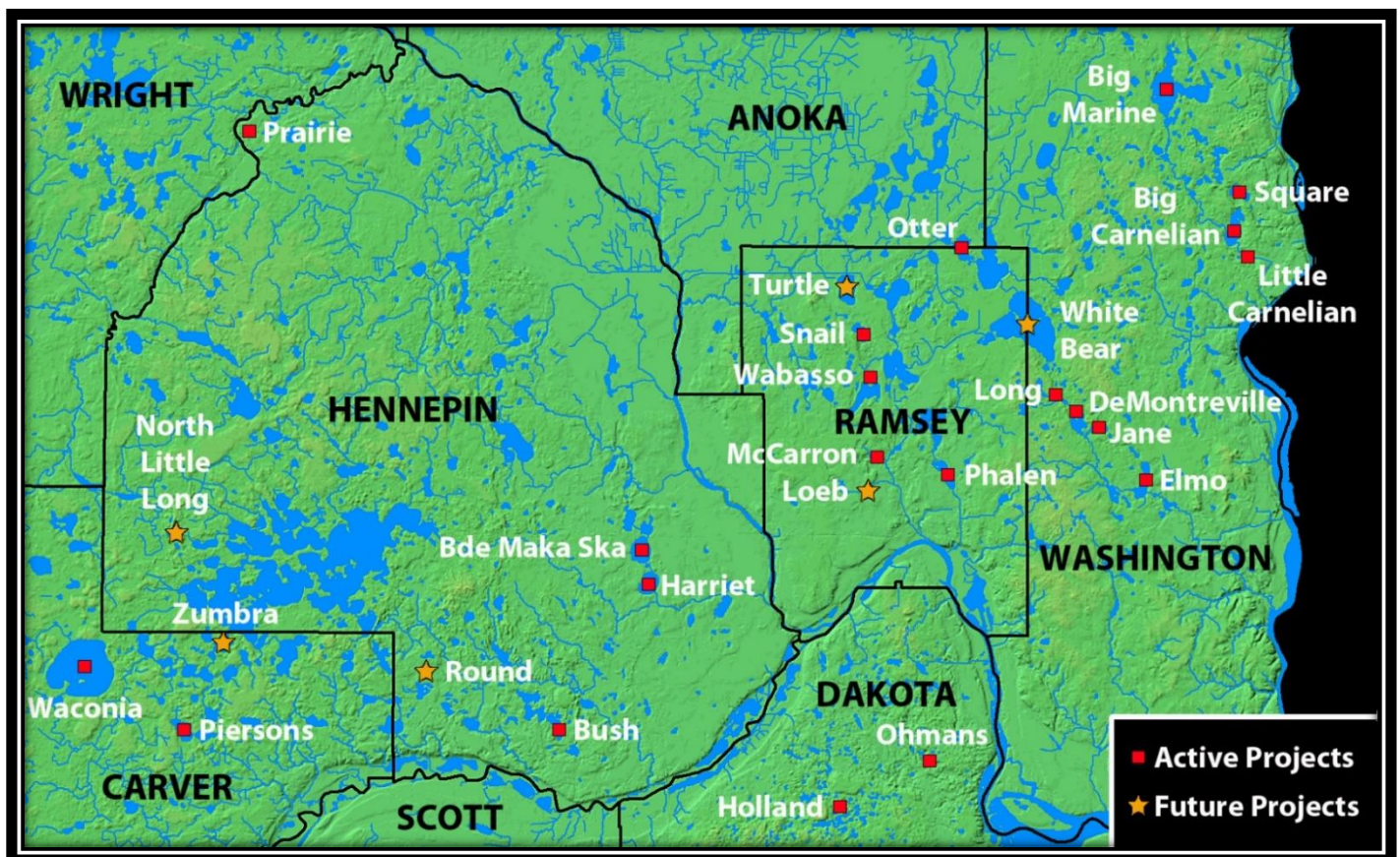


Figure 12. TCMA lakes that have received translocations, have been monitored for established species, and that have future projects under consideration.

A case in point is Lake Elmo in Washington County, which is one of the clearest lakes in the TCMA with a water transparency of 19 feet. Several years ago, the MDNR stocked Cisco (*Coregonus artedii*), which is another sensitive species related to trout, into the lake. The population now is established and represents the most southerly occurrence of the species in Minnesota. The first FIBI score available for the lake was in 1999 which was long before my Lake Elmo translocations began in 2011. The 1999 FIBI score was 55 (maximum possible score is 100) and was barely above Elmo's FIBI impairment threshold of 45. In 2014, surveys found Blackchin Shiners and Pugnose Shiners that nudged the FIBI score up to 57. In 2018, Blacknose Shiners and Banded Killifish were also present in the survey, and the FIBI bounced up to 77. However, I am curious what the FIBI score could have been if Least Darters had been found in MDNR's FIBI surveys. My monitoring surveys detected the species annually from 2013 through 2018 when monitoring ended because I felt the population was well established.

In 2020, Least Darters were once again abundant in Fish Lake (Le Sueur County), and 320 individuals were translocated to Otter Lake in Anoka County. However, other sensitive fishes were absent during my visits, and I suspect their spawning period was delayed due to another cold spring. I did find a very brief spawning frenzy in Big Marine Lake (Washington County) that produced small numbers of translocations for DeMontreville Lake (Washington County). Estimated numbers for 2020 were 48 Blackchin Shiners, 51 Blacknose Shiners, and 58 Banded Killifish.

Table 1. TCMA lake projects 2011 through 2020: current status of sensitive species and translocation history.

| Lake Name        | County     | DOW#     | Pugnose Shiner | Blackchin Shiner | Blacknose Shiner | Banded Killifish | Iowa Darter | Least Darter |
|------------------|------------|----------|----------------|------------------|------------------|------------------|-------------|--------------|
| Otter            | Anoka      | 2000300  |                |                  |                  | X                |             |              |
| Piersons         | Carver     | 10005300 |                | P                | P                | P                | P           |              |
| Waconia          | Carver     | 10005900 | X              |                  |                  |                  |             | E            |
| Zumbra           | Carver     | 10004100 |                |                  |                  | P                | P           | P            |
| Holland          | Dakota     | 19006500 | E              | E                |                  |                  |             | E            |
| Ohmans           | Dakota     | 19004200 |                |                  | E                |                  |             | E            |
| Bde Maka Ska     | Hennepin   | 27003100 |                |                  |                  |                  | P           | E            |
| Bush             | Hennepin   | 27004700 |                |                  |                  |                  | P           | E            |
| Harriet          | Hennepin   | 27001600 | X              | X                | X                | X                | P           | E            |
| Little Long      | Hennepin   | 27017900 |                | P                | P                |                  | P           | P            |
| Prairie          | Hennepin   | 27017700 |                | E                |                  |                  |             | E            |
| Round            | Hennepin   | 27007100 |                |                  |                  |                  |             |              |
| Loeb             | Ramsey     | 62023100 |                |                  |                  |                  |             |              |
| McCarrons        | Ramsey     | 62005400 | X              |                  |                  |                  | P           | E            |
| Phalen           | Ramsey     | 62001300 | E              |                  |                  |                  | P           | E            |
| Snail            | Ramsey     | 62007300 | P              | P                | P                | P                | P           | E            |
| Turtle           | Ramsey     | 62006100 |                |                  | P                | P                | P           | P            |
| Wabasso          | Ramsey     | 62008200 |                |                  |                  |                  | P           | E            |
| Big Carnelian    | Washington | 82004900 |                | P                | P                | P                | P           | E            |
| Big Marine       | Washington | 82005200 |                | P                | P                | P                | P           | E            |
| Demontreville    | Washington | 82010100 |                |                  |                  |                  | P           | E            |
| Elmo             | Washington | 82010600 | E              | E                | E                | E                | P           | E            |
| Jane             | Washington | 82010400 | E              | E                |                  | E                | P           | E            |
| Little Carnelian | Washington | 82001400 |                | P                | P                | P                | P           | E            |
| Long             | Washington | 82011800 |                |                  |                  | P                | P           | E            |
| Square           | Washington | 82004600 |                | P                | P                | P                | P           | E            |
| White Bear       | Washington | 82016700 |                | P                | P                | P                | P           | P            |

| Current Status                   | Translocation History |      |      |
|----------------------------------|-----------------------|------|------|
| P - present before translocation | 2011-2013             | 2016 | 2019 |
| E - established                  | 2014                  | 2017 | 2020 |
| X - extirpated                   | 2015                  | 2018 |      |

Monitoring of several recipient lakes was much more productive. Instead of translocating Least Darters from Fish Lake to Bde Maka Ska and Harriet (Hennepin County), I decided first to try a remnant population in Cedar Lake which is in the same chain of lakes. Cedar's water quality is marginal for Least Darters, but its Least Darter population likely represents a unique genome for the chain. The species has been much less abundant in Cedar than Fish, but efforts in 2019 yielded

more fish than in 2018. In 2020, Least Darters were found in both Bde Maka Ska and Harriet. I had also hoped to translocate Banded Killifish from Cedar, but MDNR has not reported the species there since 2007, and I did not find any during my translocation efforts. In 2020, Least Darters (translocated from Fish Lake) were also found for the first time in Bush and Prairie (Hennepin County), Waconia (Carver), Ohmans (Dakota), and DeMontreville (Washington). Piersons (Carver) received 254 Least Darters in 2019, but none were found in 2020. However, translocations of this and other sensitive species have sometimes required more than one year before their first detection. Lastly, Blacknose Shiners made their first appearances in Prairie and Ohmans.

The presence of Blackchin and Blacknose shiners in a lake prior to translocations will very likely eliminate Pugnose Shiners from future consideration because of all three species' extreme sensitivity to sorting and handling. When schools of shiners are corralled in a seine at a donor lake, all fish are scooped with lake water into a holding container. Any attempt to segregate the catch by species will result in high mortality. Furthermore, mixing Blackchin and Blacknose shiners in donor and recipient lakes must be avoided to maintain potentially unique genomes in the recipient lake. This conflict will occur in the following lakes: Piersons, Little Long, Turtle, Big and Little Carnelian, Big Marine, Square, and White Bear (Figure 12, Table 1).

#### **Project 5. Sensitive species translocations to Signalness Lake in Glacial Lakes State Park.**

In the early 1990s, I searched MDNR Fisheries lake survey reports for rare fishes, and I discovered that in 1963 Pugnose Shiners were present in Signalness Lake (Figure 13) south of Starbuck, MN (Schmidt 2018 and 1993a). However, this population was apparently extirpated due to a rotenone treatment to improve the game fishery of the lake. In 1992, I conducted a non-game fish survey of Signalness and found Blacknose Shiners and Banded Killifish (Schmidt 1993b). In 2014 and 2019, I surveyed the lake again with multiple sampling gears but did not find any sensitive fishes. The habitat and water quality still appeared excellent during both surveys, but I assumed the shiner and killifish were no longer present in Signalness. I proposed the translocation project to Ed Quinn and Cindy Lueth (MDNR Parks and Trails) who expressed great interest, because restoring historically occurring species to state parks is a high priority.



Figure 13. Signalness Lake in Glacial Lakes State Park (Jenny Kruckenberg).

Pugnose Shiner, Blacknose Shiner, and Banded Killifish constitute the majority of a sensitive “suite” of species found in high quality lakes and are often common associates of the remaining two sensitive species (i.e., Blackchin Shiner and Least Darter). Signalness Lake is today landlocked but lies within the Chippewa River system where all five species occur. It is not a great leap to assume the entire suite of sensitive species once inhabited Signalness Lake. Again, to preserve the original genetics of the lake’s fish species as much as possible, a search for donor lakes was done first in the Chippewa River system. Using my fish distribution database, I found that Villard Lake northeast of Glenwood was the only lake with all five species, but this lake was unfortunately infested with zebra mussels. Initially, Villard remained the donor lake because Signalness was thought to also be infested, but the alleged infestation in Signalness was later determined to be based on erroneous information. This development renewed the search for another donor lake, this time outside of the Chippewa River watershed. I found that Union Lake south of Alexandria met the criteria of having all five species, being free of zebra mussels, and occurring within a reasonable distance of Signalness (about 25 road miles between the two lakes).

Translocations were done on May 27-28 and June 3-4, 2020 (Figures 14-16). Dip nets were used to “rake” Muskgrass (*Chara* sp.) beds for Least Darters, and seines were used for Banded Killifish and the three shiner species. Handling the latter four species very often causes high mortality; thus, fish are instead scooped out of the seine in lake water with beverage pitchers to a holding tank. I have some confidence in the counts for Least Darters because they tend not to school. The constantly moving behavior of the other species, however, makes even rough estimates almost impossible. Nevertheless, total catches for the five species were: Pugnose Shiners (175), Blackchin Shiners (875), Blacknose Shiners (875), Banded Killifish (140), and Least Darters (450). Water from Signalness Lake was hauled to Union to acclimate fish before transport. Just before releasing fish into Signalness, the area was “mucked up” to give the small fish some cover from hungry sunfish and bass. Translocations from Union to Signalness are planned for two more years. Monitoring surveys of Signalness Lake for established species will begin in August or early September 2021 and will continue annually for two years after the last translocation. At that time, decisions can be made whether to establish any missing species and the time interval between surveys.



Figure 14. Jenny Kruckenberg acclimating Union Lake fish to Signalness Lake water (Konrad Schmidt).



Figure 15. Transferring acclimated fish to a cooler bound for Signalness Lake (Jenny Kruckenberg).



Figure 16. Konrad Schmidt and Heather Marjamaa releasing fish into Signalness Lake (Jenny Kruckenberg)

Cindy Lueth and her resource management staff are involved in other monitoring aspects of Signalness Lake including water quality and aquatic vegetation surveys. In 2020, Jacquelyn Bacigalupi (MDNR) scheduled her staff to conduct an

FIBI survey. The lake's history and size fall outside FIBI protocols (i.e., a previous rotenone treatment and surface area less than 100 acres), and the FIBI score may thus not accurately reflect environmental conditions. However, the results do establish baseline standardized data for future comparisons. There has also been discussions of how to prevent infestations of zebra mussels and other aquatic invasive species which might require closing the lake's watercraft access, thus only allowing use of boats and canoes furnished by the state park.

### Project 6. Pre-construction fish surveys of islands in Pigs Eye Lake.

Due to the volume of data gathered for this project, a separate report was submitted to MDNR Fisheries and only the summary from that report will be provided here. Anyone wishing to read the full report can request a PDF file from me at [ssminnow@usfamily.net](mailto:ssminnow@usfamily.net).

#### Summary

Pigs Eye Lake is a 629-acre shallow, backwater in upper Pool 2 of the Mississippi River downstream of St. Paul, MN (Figure 17). In 2021, artificial islands will be constructed in the lake to reduce wind fetch that has caused chronic and severe turbidity from the resuspension of bottom sediments and erosion of the shoreline. Fish surveys of the lake had not been conducted since a MDNR survey in 1999. The Minnesota Pollution Control Agency (MPCA) surveyed one site in the lower one-mile reach of Battle Creek (i.e., from Pigs Eye Lake to the Canadian Pacific [CP] Railroad) in 2000.

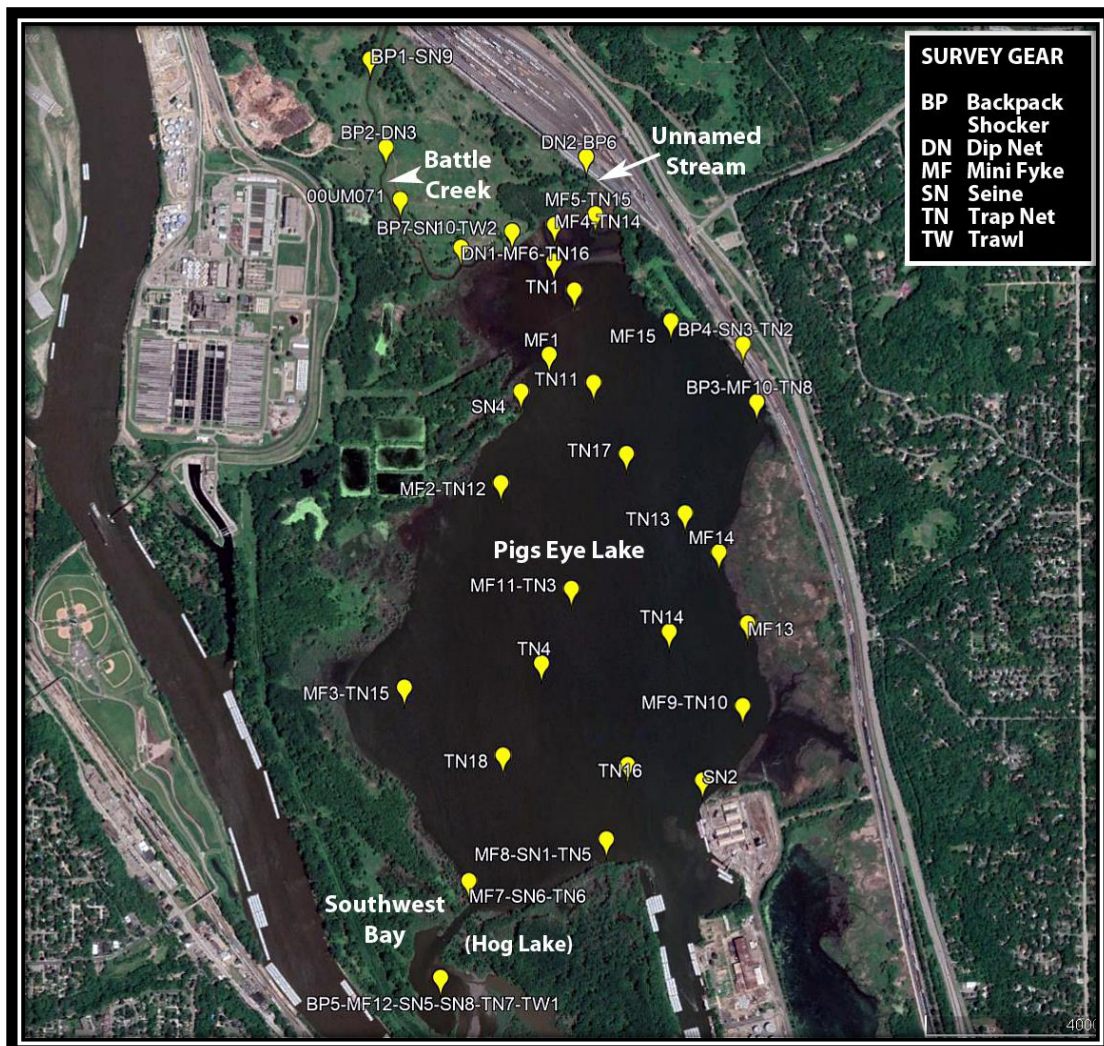


Figure 17. Pigs Eye Lake study area and fish survey stations.

More recent fish surveys prior to construction would be beneficial for assessing the efficacy of the project with follow-up monitoring, but no such surveys were scheduled. In 1987, I was a biologist with the US Fish and Wildlife Service, and I conducted monitoring surveys following an island construction project in Weaver Bottoms. This is a backwater in Pool 5 of the Mississippi River south of Wabasha, MN. I realized the value of having fish survey data from both before and after construction. I learned of the Pigs Eye Lake project in 2019 and decided to conduct fish surveys on a volunteer basis first in September 2019 and again from June through September 2020. Multiple sampling gears were deployed, and 54 species in 14 families were collected, including one state-threatened and one special concern species (i.e., Black Buffalo *Ictiobus niger* and Yellow Bass *Morone mississippiensis*, respectively).

### Acknowledgements

I must thank the following people. Jennifer Kruckenberg (North American Native Fishes Association) who was a stalwart assistant volunteering countless times for the 2020 projects. George Cunningham and John Olson who assisted with the BWCAW surveys. John also went above and beyond pulling double-duty reviewing and editing this report. Jayson Hanson (MDNR Conservation Officer) who provided a camp site on his property and access to Canoe and Slauson lakes for the Warmouth surveys. Ed Quinn and Cindy Lueth, (MDNR Parks and Trails) who handled all of the logistics involved with the Signalness Lake project and Cindy and her staff's assistance in translocating sensitive fishes. The University of Tennessee Etner Ichthyology Collection staff Ben Keck, Bruce Bauer, and Jennifer Parris Brummett for verifying identifications and for cataloging specimens and tissues into the collection. And Dr. Robert Jenkins (Roanoke College Ichthyologist, retired) who followed up with final determinations of several troubling young of the year redhorse specimens.

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Appendix 1. 2020 species list and database records (i.e., frequency).

| Common Name                             | Scientific Name                | Records |
|-----------------------------------------|--------------------------------|---------|
| <b>Lamprey Family - Petromyzontidae</b> |                                |         |
| Southern Brook Lamprey                  | <i>Ichthyomyzon gagei</i>      | 1       |
| <b>Gar Family - Lepisosteidae</b>       |                                |         |
| Shortnose Gar                           | <i>Lepisosteus platostomus</i> | 1       |
| <b>Bowfin Family - Amiidae</b>          |                                |         |
| Bowfin                                  | <i>Amia calva</i>              | 6       |
| <b>Shad Family - Clupeidae</b>          |                                |         |
| Gizzard Shad                            | <i>Dorosoma cepedianum</i>     | 13      |
| <b>Minnow Family - Cyprinidae</b>       |                                |         |
| Central Stoneroller                     | <i>Campostoma anomalum</i>     | 7       |
| Largescale Stoneroller                  | <i>Campostoma oligolepis</i>   | 1       |
| Goldfish                                | <i>Carassius auratus</i>       | 2       |
| Northern Redbelly Dace                  | <i>Chrosomus eos</i>           | 4       |
| Southern Redbelly Dace                  | <i>Chrosomus erythrogaster</i> | 2       |
| Spotfin Shiner                          | <i>Cyprinella spiloptera</i>   | 22      |
| Common Carp                             | <i>Cyprinus carpio</i>         | 35      |
| Brassy Minnow                           | <i>Hybognathus hankinsoni</i>  | 2       |
| Common Shiner                           | <i>Luxilus cornutus</i>        | 13      |
| Northern Pearl Dace                     | <i>Margariscus nachtriebi</i>  | 4       |
| Hornyhead Chub                          | <i>Nocomis biguttatus</i>      | 4       |
| Golden Shiner                           | <i>Notemigonus crysoleucas</i> | 24      |
| Pugnose Shiner                          | <i>Notropis anogenus</i>       | 5       |
| Emerald Shiner                          | <i>Notropis atherinoides</i>   | 25      |
| Bigmouth Shiner                         | <i>Notropis dorsalis</i>       | 4       |
| Blackchin Shiner                        | <i>Notropis heterodon</i>      | 11      |
| Blacknose Shiner                        | <i>Notropis heterolepis</i>    | 12      |
| Spottail Shiner                         | <i>Notropis hudsonius</i>      | 19      |
| Sand Shiner                             | <i>Notropis stramineus</i>     | 1       |
| Weed Shiner                             | <i>Notropis texanus</i>        | 5       |
| Mimic Shiner                            | <i>Notropis volucellus</i>     | 1       |
| Channel Shiner                          | <i>Notropis wickliffi</i>      | 4       |
| Bluntnose Minnow                        | <i>Pimephales notatus</i>      | 24      |
| Fathead Minnow                          | <i>Pimephales promelas</i>     | 31      |
| Bullhead Minnow                         | <i>Pimephales vigilax</i>      | 10      |
| Longnose Dace                           | <i>Rhinichthys cataractae</i>  | 9       |
| Western Blacknose Dace                  | <i>Rhinichthys obtusus</i>     | 6       |
| Creek Chub                              | <i>Semotilus atromaculatus</i> | 12      |

## Appendix 1. Continued

| Common Name                                         | Scientific Name                 | Records |
|-----------------------------------------------------|---------------------------------|---------|
| <b>Sucker Family - Catostomidae</b>                 |                                 |         |
| River Carpsucker                                    | <i>Carpionodes carpio</i>       | 1       |
| Quillback                                           | <i>Carpionodes cyprinus</i>     | 8       |
| Longnose Sucker                                     | <i>Catostomus catostomus</i>    | 1       |
| White Sucker                                        | <i>Catostomus commersonii</i>   | 39      |
| Northern Hog Sucker                                 | <i>Hypentelium nigricans</i>    | 3       |
| Smallmouth Buffalo                                  | <i>Ictiobus bubalus</i>         | 2       |
| Bigmouth Buffalo                                    | <i>Ictiobus cyprinellus</i>     | 15      |
| Black Buffalo                                       | <i>Ictiobus niger</i>           | 1       |
| Silver Redhorse                                     | <i>Moxostoma anisurum</i>       | 12      |
| Golden Redhorse                                     | <i>Moxostoma erythrurum</i>     | 2       |
| Shorthead Redhorse                                  | <i>Moxostoma macrolepidotum</i> | 8       |
| <b>North American Catfish Family - Ictaluridae</b>  |                                 |         |
| Black Bullhead                                      | <i>Ameiurus melas</i>           | 7       |
| Yellow Bullhead                                     | <i>Ameiurus natalis</i>         | 12      |
| Channel Catfish                                     | <i>Ictalurus punctatus</i>      | 6       |
| Tadpole Madtom                                      | <i>Noturus gyrinus</i>          | 28      |
| Flathead Catfish                                    | <i>Pylodictis olivaris</i>      | 1       |
| <b>Trout and Salmon Family - Salmonidae</b>         |                                 |         |
| Rainbow Trout                                       | <i>Oncorhynchus mykiss</i>      | 1       |
| Brown Trout                                         | <i>Salmo trutta</i>             | 6       |
| <b>Pike Family - Esocidae</b>                       |                                 |         |
| Northern Pike                                       | <i>Esox lucius</i>              | 30      |
| Central Mudminnow                                   | <i>Umbra limi</i>               | 34      |
| <b>New World Silverside Family - Atherinopsidae</b> |                                 |         |
| Brook Silverside                                    | <i>Labidesthes sicculus</i>     | 2       |
| <b>Trout-perch Family - Percopsidae</b>             |                                 |         |
| Trout-perch                                         | <i>Percopsis omiscomaycus</i>   | 4       |
| <b>Cod Family - Gadidae</b>                         |                                 |         |
| Burbot                                              | <i>Lota lota</i>                | 10      |
| <b>Stickleback Family - Gasterosteidae</b>          |                                 |         |
| Brook Stickleback                                   | <i>Culaea inconstans</i>        | 12      |

## Appendix 1. Continued.

| Common Name                              | Scientific Name                | Records |
|------------------------------------------|--------------------------------|---------|
| <b>Killifish Family - Fundulidae</b>     |                                |         |
| Banded Killifish                         | <i>Fundulus diaphanus</i>      | 10      |
| <b>Sculpin Family - Cottidae</b>         |                                |         |
| Mottled Sculpin                          | <i>Cottus bairdii</i>          | 1       |
| Slimy Sculpin                            | <i>Cottus cognatus</i>         | 1       |
| <b>Temperate Bass Family - Moronidae</b> |                                |         |
| White Bass                               | <i>Morone chrysops</i>         | 6       |
| Yellow Bass                              | <i>Morone mississippiensis</i> | 1       |
| <b>Sunfish Family - Centrarchidae</b>    |                                |         |
| Rock Bass                                | <i>Ambloplites rupestris</i>   | 8       |
| Green Sunfish                            | <i>Lepomis cyanellus</i>       | 40      |
| Pumpkinseed                              | <i>Lepomis gibbosus</i>        | 33      |
| Warmouth                                 | <i>Lepomis gulosus</i>         | 1       |
| Orangespotted Sunfish                    | <i>Lepomis humilis</i>         | 7       |
| Bluegill                                 | <i>Lepomis macrochirus</i>     | 69      |
| Northern Sunfish                         | <i>Lepomis peltastes</i>       | 4       |
| Smallmouth Bass                          | <i>Micropterus dolomieu</i>    | 11      |
| Largemouth Bass                          | <i>Micropterus salmoides</i>   | 55      |
| White Crappie                            | <i>Pomoxis annularis</i>       | 11      |
| Black Crappie                            | <i>Pomoxis nigromaculatus</i>  | 36      |
| <b>Perch Family - Percidae</b>           |                                |         |
| Rainbow Darter                           | <i>Etheostoma caeruleum</i>    | 1       |
| Iowa Darter                              | <i>Etheostoma exile</i>        | 34      |
| Fantail Darter                           | <i>Etheostoma flabellare</i>   | 2       |
| Least Darter                             | <i>Etheostoma microperca</i>   | 17      |
| Johnny Darter                            | <i>Etheostoma nigrum</i>       | 30      |
| Yellow Perch                             | <i>Perca flavescens</i>        | 60      |
| Logperch                                 | <i>Percina caprodes</i>        | 25      |
| Gilt Darter                              | <i>Percina evides</i>          | 2       |
| Blackside Darter                         | <i>Percina maculata</i>        | 6       |
| Slenderhead Darter                       | <i>Percina phoxocephala</i>    | 3       |
| River Darter                             | <i>Percina shumardi</i>        | 5       |
| Sauger                                   | <i>Sander canadensis</i>       | 3       |
| Walleye                                  | <i>Sander vitreus</i>          | 14      |
| <b>Drum Family - Sciaenidae</b>          |                                |         |
| Freshwater Drum                          | <i>Aplodinotus grunniens</i>   | 11      |

## Appendix 2. Fishes tissues deposited in the Etnier Ichthyological Collection at the University of Tennessee in Knoxville.

| Common Name                            | Scientific Name                | Catalog Number | General Locality       | Continental Basin | Latitude | Longitude |
|----------------------------------------|--------------------------------|----------------|------------------------|-------------------|----------|-----------|
| <b>Sturgeon Family - Acipenseridae</b> |                                |                |                        |                   |          |           |
| Lake Sturgeon                          | <i>Acipenser fulvescens</i>    | 3135 (tissue)  | Red River of the North | Hudson Bay        | 47.91255 | -97.01643 |
| <b>Shad Family - Clupeidae</b>         |                                |                |                        |                   |          |           |
| Alewife                                | <i>Alosa pseudoharengus</i>    | 29.287         | Gooseberry River       | Great Lakes       | 47.14259 | -91.45753 |
| <b>Minnow Family - Cyprinidae</b>      |                                |                |                        |                   |          |           |
| Central Stoneroller                    | <i>Campostoma anomalum</i>     | 44.13788       | Pelican River          | Hudson Bay        | 46.37947 | -96.12565 |
|                                        |                                | 44.13791       | Whisky Creek           | Hudson Bay        | 46.43344 | -96.63472 |
|                                        |                                | 44.13789       | Blueberry River        | Mississippi River | 46.78311 | -95.14865 |
|                                        |                                | 44.13790       | Elk River              | Mississippi River | 45.58721 | -94.04197 |
|                                        |                                | 44.13203       | Little Cannon River    | Mississippi River | 44.34866 | -92.95770 |
|                                        |                                | 44.14484       | Upper Bear Creek       | Mississippi River | 43.83838 | -92.31075 |
|                                        |                                | 44.14518       | Vermillion River       | Mississippi River | 44.61784 | -93.06151 |
|                                        |                                | 44.13238       | Rock River             | Missouri River    | 43.94618 | -96.14283 |
| Largescale Stoneroller                 | <i>Campostoma oligolepis</i>   | 44.14525       | Rock Creek             | Mississippi River | 45.71345 | -92.87160 |
| Northern Redbelly Dace                 | <i>Chrosomus eos</i>           | 44.13253       | Beaver River           | Great Lakes       | 47.25941 | -91.29378 |
|                                        |                                | 44.13213       | Vermillion River       | Mississippi River | 44.61992 | -93.13688 |
|                                        |                                | 44.13335       | Vermillion River       | Mississippi River | 44.68371 | -93.08554 |
|                                        |                                | 44.14488       | Vermillion River       | Mississippi River | 44.68027 | -93.03480 |
| Southern Redbelly Dace                 | <i>Chrosomus erythrogaster</i> | 44.13201       | Little Cannon River    | Mississippi River | 44.34866 | -92.95770 |
|                                        |                                | 44.14485       | Upper Bear Creek       | Mississippi River | 43.83838 | -92.31075 |
|                                        |                                | 44.13239       | Rock River             | Missouri River    | 43.94618 | -96.14283 |
| Finescale Dace                         | <i>Chrosomus neogaeus</i>      | 44.14236       | Tulaby Lake            | Hudson Bay        | 47.15104 | -95.60363 |
| Redside Dace                           | <i>Clinostomus elongatus</i>   | 44.13202       | Little Cannon River    | Mississippi River | 44.34866 | -92.95770 |
| Lake Chub                              | <i>Couesius plumbeus</i>       | 44.13259       | Greenwood River        | Great Lakes       | 47.97903 | -90.18143 |
|                                        |                                | 44.13513       | Lake Superior          | Great Lakes       | 47.74513 | -90.34581 |
|                                        |                                | 44.13512       | Stump River            | Great Lakes       | 48.01942 | -90.03475 |
|                                        |                                | 44.12163       | Swamp River            | Great Lakes       | 47.98856 | -89.93411 |
| Red Shiner                             | <i>Cyprinella lutrensis</i>    | 44.13340       | Chanarambie Creek      | Missouri River    | 43.87749 | -96.11449 |
| Spotfin Shiner                         | <i>Cyprinella spiloptera</i>   | 44.13209       | Colonial Creek         | Mississippi River | 44.90275 | -93.13381 |
|                                        |                                | 44.14504       | Minnehaha Creek        | Mississippi River | 44.94750 | -93.43472 |
|                                        |                                | 44.14526       | Rock Creek             | Mississippi River | 45.71345 | -92.87160 |
|                                        |                                | 44.14496       | Sauk River             | Mississippi River | 45.67547 | -94.80575 |
|                                        |                                | 44.13514       | Spectacle Lake         | Mississippi River | 45.57357 | -93.40558 |
|                                        |                                | 44.14227       | Square Lake            | Mississippi River | 45.15669 | -92.80447 |
| Brassy Minnow                          | <i>Hybognathus hankinsoni</i>  | 44.14233       | St. Croix River        | Mississippi River | 45.36781 | -92.68942 |
|                                        |                                | 44.14520       | Vermillion River       | Mississippi River | 44.61784 | -93.06151 |
| Common Shiner                          | <i>Luxilus cornutus</i>        | 44.13255       | Keene Creek            | Great Lakes       | 46.73236 | -92.16926 |
|                                        |                                | 44.14533       | Nemadji River          | Great Lakes       | 46.55078 | -92.24538 |
|                                        |                                | 44.13204       | Little Cannon River    | Mississippi River | 44.34866 | -92.95770 |
|                                        |                                | 44.14528       | Rock Creek             | Mississippi River | 45.71345 | -92.87160 |
|                                        |                                | 44.14497       | Sauk River             | Mississippi River | 45.67547 | -94.80575 |
|                                        |                                | 44.14244       | Champepadan Creek      | Missouri River    | 43.77676 | -96.03289 |
| Northern Pearl Dace                    | <i>Margariscus nachtriebi</i>  | 44.14237       | Tulaby Lake            | Hudson Bay        | 47.15104 | -95.60363 |
|                                        |                                | 44.13214       | Vermillion River       | Mississippi River | 44.61992 | -93.13688 |
|                                        |                                | 44.13336       | Vermillion River       | Mississippi River | 44.68371 | -93.08554 |
|                                        |                                | 44.13337       | Vermillion River       | Mississippi River | 44.67445 | -93.07668 |
| Hornyhead Chub                         | <i>Nocomis biguttatus</i>      | 44.14534       | Nemadji River          | Great Lakes       | 46.55078 | -92.24538 |
|                                        |                                | 44.13242       | Otter Tail River       | Hudson Bay        | 46.31147 | -95.97872 |
|                                        |                                | 44.14529       | Rock Creek             | Mississippi River | 45.71345 | -92.87160 |
|                                        |                                | 44.14498       | Sauk River             | Mississippi River | 45.67547 | -94.80575 |

## Appendix 2. Continued.

| Common Name            | Scientific Name                | Catalog Number | General Locality       | Continental Basin | Latitude | Longitude |
|------------------------|--------------------------------|----------------|------------------------|-------------------|----------|-----------|
| Golden Shiner          | <i>Notemigonus crysoleucas</i> | 44.14511       | Minnehaha Creek        | Mississippi River | 44.95329 | -93.48713 |
|                        |                                | 44.14499       | Sauk River             | Mississippi River | 45.67547 | -94.80575 |
|                        |                                | 44.14514       | Vermillion River       | Mississippi River | 44.68371 | -93.08554 |
| Pugnose Shiner         | <i>Notropis anogenus</i>       | 44.14223       | Fish Lake              | Mississippi River | 44.22899 | -93.66512 |
|                        |                                | 44.14512       | Minnehaha Creek        | Mississippi River | 44.95329 | -93.48713 |
|                        |                                | 44.14213       | Snail Lake             | Mississippi River | 44.95329 | -93.48713 |
| Emerald Shiner         | <i>Notropis atherinoides</i>   | 44.13210       | Colonial Creek         | Mississippi River | 44.90275 | -93.13381 |
| Bigmouth Shiner        | <i>Notropis dorsalis</i>       | 44.13205       | Little Cannon River    | Mississippi River | 44.34866 | -92.95770 |
|                        |                                | 44.13235       | Little Cannon River    | Mississippi River | 44.33695 | -93.00004 |
|                        |                                | 44.14530       | Rock Creek             | Mississippi River | 45.71345 | -92.87160 |
|                        |                                | 44.14486       | Upper Bear Creek       | Mississippi River | 43.83838 | -92.31075 |
|                        |                                | 44.14243       | Champepadan Creek      | Missouri River    | 43.77676 | -96.03289 |
|                        |                                | 44.13236       | Rock River             | Missouri River    | 43.70095 | -96.15028 |
| Blackchin Shiner       | <i>Notropis heterodon</i>      | 44.14509       | Canoe Lake             | Hudson Bay        | 47.63692 | -93.55479 |
|                        |                                | 44.14224       | Fish Lake              | Mississippi River | 44.22899 | -93.66512 |
|                        |                                | 44.14505       | Minnehaha Creek        | Mississippi River | 44.94750 | -93.43472 |
| Blacknose Shiner       | <i>Notropis heterolepis</i>    | 44.13258       | Greenwood River        | Great Lakes       | 47.97903 | -90.18143 |
| Spottail Shiner        | <i>Notropis hudsonius</i>      | 44.13200       | Chub Creek             | Mississippi River | 44.52292 | -93.01827 |
|                        |                                | 44.14500       | Sauk River             | Mississippi River | 45.67547 | -94.80575 |
|                        |                                | 44.13254       | Shields Lake           | Mississippi River | 44.37005 | -93.44134 |
| Carmine Shiner         | <i>Notropis percobromus</i>    | 44.13338       | Little Minnesota River | Mississippi River | 45.62150 | -96.89603 |
|                        |                                | 44.13339       | Whetstone River        | Mississippi River | 45.28665 | -96.47586 |
| Sand Shiner            | <i>Notropis stramineus</i>     | 44.14531       | Rock Creek             | Mississippi River | 45.71345 | -92.87160 |
|                        |                                | 44.13333       | Zumbro River           | Mississippi River | 44.07471 | -92.65128 |
|                        |                                | 44.13237       | Rock River             | Missouri River    | 43.70095 | -96.15028 |
| Weed Shiner            | <i>Notropis texanus</i>        | 44.13212       | Mississippi River      | Mississippi River | 43.68684 | -91.27209 |
| Mimic Shiner           | <i>Notropis volucellus</i>     | 44.14535       | Nemadji River          | Great Lakes       | 46.55078 | -92.24538 |
|                        |                                | 44.13110       | Otter Tail River       | Hudson Bay        | 46.35909 | -95.73397 |
|                        |                                | 44.14225       | Turtle Lake            | Hudson Bay        | 47.62734 | -93.70944 |
|                        |                                | 44.14216       | Trout Lake             | Mississippi River | 47.46094 | -93.55293 |
| Channel Shiner         | <i>Notropis wickliffi</i>      | 44.13109       | Minnehaha Creek        | Mississippi River | 44.90912 | -93.20174 |
|                        |                                | 44.14232       | St. Croix River        | Mississippi River | 45.36781 | -92.68942 |
| Pugnose Minnow         | <i>Opsopoeodus emiliae</i>     | 44.13251       | Lake Mazaska           | Mississippi River | 44.37263 | -93.39613 |
|                        |                                | 44.13252       | Lake Tetonka           | Mississippi River | 44.22361 | -93.59807 |
| Bluntnose Minnow       | <i>Pimephales notatus</i>      | 44.13206       | Little Cannon River    | Mississippi River | 44.34866 | -92.95770 |
|                        |                                | 44.14506       | Minnehaha Creek        | Mississippi River | 44.94750 | -93.43472 |
|                        |                                | 44.14489       | Sauk River             | Mississippi River | 45.68286 | -94.77104 |
|                        |                                | 44.14226       | Square Lake            | Mississippi River | 45.15669 | -92.80447 |
|                        |                                | 44.14221       | Mound Creek            | Missouri River    | 43.71398 | -96.17243 |
| Flathead Chub          | <i>Platygobio gracilis</i>     | 44.11024       | Assiniboine River      | Hudson Bay        | 49.69944 | -98.90028 |
| Longnose Dace          | <i>Rhinichthys cataractae</i>  | 44.13256       | Keene Creek            | Great Lakes       | 46.73236 | -92.16926 |
|                        |                                | 44.14536       | Nemadji River          | Great Lakes       | 46.55078 | -92.24538 |
|                        |                                | 44.13241       | Belle Creek            | Mississippi River | 44.54711 | -92.72544 |
|                        |                                | 44.14501       | Sauk River             | Mississippi River | 45.67547 | -94.80575 |
|                        |                                | 44.14502       | Willow River           | Mississippi River | 46.33751 | -92.75341 |
|                        |                                | 44.13332       | Zumbro River           | Mississippi River | 44.07471 | -92.65128 |
| Western Blacknose Dace | <i>Rhinichthys obtusus</i>     | 44.13257       | Keene Creek            | Great Lakes       | 46.73236 | -92.16926 |
|                        |                                | 44.13211       | Colonial Creek         | Mississippi River | 44.90275 | -93.13381 |
|                        |                                | 44.13207       | Little Cannon River    | Mississippi River | 44.34866 | -92.95770 |
|                        |                                | 44.14487       | Upper Bear Creek       | Mississippi River | 43.83838 | -92.31075 |
|                        |                                | 44.14522       | Vermillion River       | Mississippi River | 44.61784 | -93.06151 |
|                        |                                | 44.13240       | Rock River             | Missouri River    | 43.94618 | -96.14283 |

## Appendix 2. Continued.

| Common Name                                        | Scientific Name                 | Catalog Number | General Locality    | Continental Basin | Latitude Longitude |           |
|----------------------------------------------------|---------------------------------|----------------|---------------------|-------------------|--------------------|-----------|
| Creek Chub                                         | <i>Semotilus atromaculatus</i>  | 44.13260       | Lester River        | Great Lakes       | 46.83669           | -92.00615 |
|                                                    |                                 | 44.14538       | Nemadji River       | Great Lakes       | 46.55078           | -92.24538 |
|                                                    |                                 | 44.13208       | Little Cannon River | Mississippi River | 44.34866           | -92.95770 |
|                                                    |                                 | 44.14515       | Minnehaha Creek     | Mississippi River | 44.90464           | -93.33351 |
|                                                    |                                 | 44.14490       | Sauk River          | Mississippi River | 45.68286           | -94.77104 |
|                                                    |                                 | 44.14423       | Vermillion River    | Mississippi River | 44.61784           | -93.06151 |
|                                                    |                                 | 44.14222       | Mound Creek         | Missouri River    | 43.71398           | -96.17243 |
| <b>Sucker Family - Catostomidae</b>                |                                 |                |                     |                   |                    |           |
| Longnose Sucker                                    | <i>Catostomus catostomus</i>    | 45.2320        | Kingsbury Creek     | Great Lakes       | 46.72395           | -92.18883 |
|                                                    |                                 | 45.2183        | Lake Superior       | Great Lakes       | 47.84922           | -89.93523 |
|                                                    |                                 | 45.2184        | Lake Superior       | Great Lakes       | 47.74666           | -90.33813 |
|                                                    |                                 | 45.2180        | Temperance River    | Great Lakes       | 47.63960           | -90.84765 |
| White Sucker                                       | <i>Catostomus commersonii</i>   | 45.2309        | Colonial Creek      | Mississippi River | 44.90275           | -93.13381 |
|                                                    |                                 | 45.2308        | Little Cannon River | Mississippi River | 44.34866           | -92.95770 |
|                                                    |                                 | 45.2539        | Minnehaha Creek     | Mississippi River | 44.90464           | -93.33351 |
|                                                    |                                 | 45.2535        | Vermillion River    | Mississippi River | 44.64306           | -93.14770 |
| Northern Hog Sucker                                | <i>Hypentelium nigricans</i>    | 45.2316        | Otter Tail River    | Hudson Bay        | 46.31147           | -95.97872 |
|                                                    |                                 | 45.2543        | Rock Creek          | Mississippi River | 45.71345           | -92.87160 |
|                                                    |                                 | 45.2326        | Zumbro River        | Mississippi River | 44.07471           | -92.65128 |
| Silver Redhorse                                    | <i>Moxostoma anisurum</i>       | 45.2317        | Otter Tail River    | Hudson Bay        | 46.31147           | -95.97872 |
|                                                    |                                 | 45.2541        | Snake River         | Mississippi River | 45.82468           | -92.76714 |
|                                                    |                                 | 45.2538        | Snake River         | Mississippi River | 45.83961           | -92.93843 |
| Shorthead Redhorse                                 | <i>Moxostoma macrolepidotum</i> | 45.2318        | Otter Tail River    | Hudson Bay        | 46.31147           | -95.97872 |
|                                                    |                                 | 45.2307        | Chub Creek          | Mississippi River | 44.52292           | -93.01827 |
|                                                    |                                 | 45.2544        | Rock Creek          | Mississippi River | 45.71345           | -92.87160 |
|                                                    |                                 | 45.2473        | Rock River          | Missouri River    | 43.65056           | -96.19694 |
| <b>North American Catfish Family - Ictaluridae</b> |                                 |                |                     |                   |                    |           |
| Black Bullhead                                     | <i>Ameiurus melas</i>           | 48.1600        | Vernillion River    | Mississippi River | 44.65856           | -93.00769 |
|                                                    |                                 | 48.1605        | Vernillion River    | Mississippi River | 44.68371           | -93.08554 |
| Tadpole Madtom                                     | <i>Noturus gyrinus</i>          | 48.1603        | Minnehaha Creek     | Mississippi River | 44.94750           | -93.43472 |
|                                                    |                                 | 48.1602        | Willow River        | Mississippi River | 46.32355           | -92.83929 |
| <b>Trout and Salmon Family - Salmonidae</b>        |                                 |                |                     |                   |                    |           |
| Cisco                                              | <i>Coregonus artedii</i>        | 31.365         | Lake Superior       | Great Lakes       | 47.74171           | -90.33463 |
|                                                    |                                 | 31.383         | Lake Superior       | Great Lakes       | 46.88667           | -91.59367 |
|                                                    |                                 | 31.369         | Amoebur Lake        | Hudson Bay        | 48.12370           | -91.14622 |
|                                                    |                                 | 31.282         | Basswood Lake       | Hudson Bay        | 48.05648           | -91.62105 |
|                                                    |                                 | 31.278         | Gneiss Lake         | Hudson Bay        | 48.17573           | -90.80665 |
|                                                    |                                 | 31.388         | Granite Lake        | Hudson Bay        | 48.14989           | -90.76416 |
|                                                    |                                 | 31.343         | Lake of the Woods   | Hudson Bay        | 49.64816           | -98.90028 |
|                                                    |                                 | 31.346         | Lake of the Woods   | Hudson Bay        | 49.68991           | -94.82117 |
|                                                    |                                 | 31.348         | Lake of the Woods   | Hudson Bay        | 49.63500           | -94.34452 |
|                                                    |                                 | 31.350         | Lake of the Woods   | Hudson Bay        | 49.69287           | -94.49803 |
|                                                    |                                 | 31.351         | Lake of the Woods   | Hudson Bay        | 49.71097           | -94.40926 |
|                                                    |                                 | 31.354         | Lake of the Woods   | Hudson Bay        | 49.62972           | -94.82764 |
|                                                    |                                 | 31.302         | Little Trout Lake   | Hudson Bay        | 48.39681           | -92.52258 |
|                                                    |                                 | 31.301         | Mukooda Lake        | Hudson Bay        | 48.33627           | -92.48862 |
|                                                    |                                 | 31.283         | Ottertrack Lake     | Hudson Bay        | 48.17055           | -91.09600 |
|                                                    |                                 | 31.414         | Parent Lake         | Hudson Bay        | 47.96400           | -91.39633 |
|                                                    |                                 | 31.307         | Spring Lake         | Hudson Bay        | 48.37128           | -92.62878 |
|                                                    |                                 | 31.392         | White Iron Lake     | Hudson Bay        | 47.87262           | -91.79365 |

## Appendix 2. Continued.

| Common Name           | Scientific Name | Catalog Number | General Locality     | Continental Basin | Latitude Longitude |           |
|-----------------------|-----------------|----------------|----------------------|-------------------|--------------------|-----------|
| Cisco (dwarf form)    |                 | 31.368         | East Pike Lake       | Great Lakes       | 48.07897           | -90.10723 |
|                       |                 | 31.258         | Pine Lake            | Great Lakes       | 48.06246           | -90.16422 |
|                       |                 | 31.245         | Alpine Lake          | Hudson Bay        | 48.13059           | -90.99372 |
|                       |                 | 31.282         | Basswood Lake        | Hudson Bay        | 48.05648           | -91.62105 |
|                       |                 | 31.323         | Bear Island Lake     | Hudson Bay        | 47.77479           | -91.97727 |
|                       |                 | 31.386         | Bear Island Lake     | Hudson Bay        | 47.77479           | -91.97727 |
|                       |                 | 31.384         | Elbow Lake           | Hudson Bay        | 48.00827           | -92.64665 |
|                       |                 | 31.385         | Farm Lake            | Hudson Bay        | 47.89936           | -91.72534 |
|                       |                 | 31.308         | Johnson Lake         | Hudson Bay        | 48.33995           | -92.60018 |
|                       |                 | 31.331         | Kabetogama Lake      | Hudson Bay        | 48.46702           | -92.98611 |
|                       |                 | 31.362         | Knife Lake           | Hudson Bay        | 48.09829           | -91.18532 |
|                       |                 | 31.297         | Lac la Croix         | Hudson Bay        | 48.31725           | -92.11674 |
|                       |                 | 31.338         | Lake of the Woods    | Hudson Bay        | 49.09722           | -94.75528 |
|                       |                 | 31.284         | Little Knife Lake    | Hudson Bay        | 48.13566           | -91.15727 |
|                       |                 | 31.306         | Loon Lake            | Hudson Bay        | 48.24736           | -92.27270 |
|                       |                 | 31.301         | Mukooda Lake         | Hudson Bay        | 48.33627           | -92.48862 |
|                       |                 | 31.317         | Namakan Lake         | Hudson Bay        | 48.44953           | -92.62175 |
|                       |                 | 31.358         | North Lake           | Hudson Bay        | 48.11487           | -90.56221 |
|                       |                 | 31.372         | Northern Lights Lake | Hudson Bay        | 48.25762           | -90.64123 |
|                       |                 | 31.261         | Rainy Lake           | Hudson Bay        | 48.58892           | -92.99714 |
|                       |                 | 31.260         | Sand Point Lake      | Hudson Bay        | 48.37789           | -92.47385 |
|                       |                 | 31.292         | Sand Point Lake      | Hudson Bay        | 48.37789           | -92.47385 |
|                       |                 | 31.250         | Sea Gull Lake        | Hudson Bay        | 48.13217           | -90.92713 |
|                       |                 | 31.400         | Takucmich Lake       | Hudson Bay        | 48.33080           | -92.17513 |
|                       |                 | 31.378         | Winchester Lake      | Hudson Bay        | 48.03791           | -92.55893 |
|                       |                 | 31.390         | Hanging Horn Lake    | Mississippi River | 46.47795           | -92.69471 |
| Cisco (introgressed)  |                 | 31.352         | Lake of the Woods    | Hudson Bay        | 49.66368           | -94.34009 |
| Cisco (racer form)    |                 | 31.329         | Alton Lake           | Great Lakes       | 47.86986           | -90.90750 |
|                       |                 | 31.259         | Brule Lake           | Great Lakes       | 47.94057           | -90.68238 |
|                       |                 | 31.333         | Duncan Lake          | Great Lakes       | 48.07821           | -90.46128 |
|                       |                 | 31.326         | Flour Lake           | Great Lakes       | 48.05229           | -90.38732 |
|                       |                 | 31.254         | Greenwood Lake       | Great Lakes       | 48.00160           | -90.17304 |
|                       |                 | 31.379         | Lake Superior        | Great Lakes       | 47.50167           | -90.82317 |
|                       |                 | 31.380         | Lake Superior        | Great Lakes       | 47.44967           | -90.07467 |
|                       |                 | 31.381         | Lake Superior        | Great Lakes       | 47.24883           | -91.00500 |
|                       |                 | 31.382         | Lake Superior        | Great Lakes       | 46.94577           | -91.75128 |
|                       |                 | 31.409         | Winchell Lake        | Great Lakes       | 47.99195           | -90.60374 |
|                       |                 | 31.277         | Ojibway Lake         | Hudson Bay        | 47.94867           | -91.54728 |
| Cisco (tullibee form) |                 | 31.286         | Agnes Lake           | Hudson Bay        | 48.21615           | -92.05375 |
|                       |                 | 31.391         | Fall Lake            | Hudson Bay        | 47.94981           | -91.74229 |
|                       |                 | 31.321         | Farm Lake            | Hudson Bay        | 47.89936           | -91.72534 |
|                       |                 | 31.322         | Farm Lake            | Hudson Bay        | 47.89936           | -91.72534 |
|                       |                 | 31.407         | Gabbro Lake          | Hudson Bay        | 47.85372           | -91.58839 |
|                       |                 | 31.332         | Kabetogama Lake      | Hudson Bay        | 48.46702           | -92.98611 |
|                       |                 | 31.387         | Kjostad Lake         | Hudson Bay        | 48.11072           | -92.60343 |
|                       |                 | 31.416         | Lac la Croix         | Hudson Bay        | 49.09722           | -94.75528 |
|                       |                 | 31.337         | Lake of the Woods    | Hudson Bay        | 49.09722           | -94.75528 |
|                       |                 | 31.340         | Lake of the Woods    | Hudson Bay        | 49.46773           | -94.57456 |
|                       |                 | 31.341         | Lake of the Woods    | Hudson Bay        | 49.49467           | -94.38350 |
|                       |                 | 31.342         | Lake of the Woods    | Hudson Bay        | 49.65175           | -94.67876 |
|                       |                 | 31.345         | Lake of the Woods    | Hudson Bay        | 49.68991           | -94.82117 |
|                       |                 | 31.347         | Lake of the Woods    | Hudson Bay        | 49.63500           | -94.34452 |

## Appendix 2. Continued.

| Common Name                   | Scientific Name                         | Catalog Number | General Locality      | Continental Basin | Latitude Longitude |           |
|-------------------------------|-----------------------------------------|----------------|-----------------------|-------------------|--------------------|-----------|
|                               |                                         | 31.348         | Lake of the Woods     | Hudson Bay        | 49.63500           | -94.34452 |
|                               |                                         | 31.349         | Lake of the Woods     | Hudson Bay        | 49.54530           | -94.56184 |
|                               |                                         | 31.403         | Little Vermilion Lake | Hudson Bay        | 48.28370           | -92.40886 |
|                               |                                         | 31.314         | Locator Lake          | Hudson Bay        | 48.54007           | -93.00585 |
|                               |                                         | 31.304         | Loon Lake             | Hudson Bay        | 48.24736           | -92.27270 |
|                               |                                         | 31.393         | Mud Lake              | Hudson Bay        | 47.88364           | -92.10244 |
|                               |                                         | 31.316         | Namakan Lake          | Hudson Bay        | 48.44953           | -92.62175 |
|                               |                                         | 31.325         | Newfound Lake         | Hudson Bay        | 48.02594           | -91.45272 |
|                               |                                         | 31.261         | Rainy Lake            | Hudson Bay        | 48.58892           | -92.99714 |
|                               |                                         | 31.336         | Rainy Lake            | Hudson Bay        | 48.56667           | -93.15000 |
|                               |                                         | 31.260         | Sand Point Lake       | Hudson Bay        | 48.37789           | -92.47385 |
|                               |                                         | 31.292         | Sand Point Lake       | Hudson Bay        | 48.37789           | -92.47385 |
|                               |                                         | 31.287         | Sturgeon Lake         | Hudson Bay        | 47.68106           | -93.04946 |
|                               |                                         | 31.335         | Vermilion Lake        | Hudson Bay        | 47.89166           | -92.36666 |
| Cisco X Shortjaw Cisco        | <i>C. artedi</i> X <i>C. zenithicus</i> | 31.353         | Lake of the Woods     | Hudson Bay        | 49.66368           | -94.34009 |
|                               |                                         | 31.318         | Trout Lake            | Hudson Bay        | 47.96492           | -92.31714 |
| Lake Whitefish                | <i>Coregonus clupeaformis</i>           | 3106 (tissue)  | Moose Lake            | Great Lakes       | 48.09998           | -90.08397 |
|                               |                                         | 31.257         | Pine Lake             | Great Lakes       | 48.06246           | -90.16422 |
|                               |                                         | 1518 (tissue)  | Loon Lake             | Hudson Bay        | 48.24736           | -92.27270 |
| Nipigon Cisco                 | <i>Coregonus nipigon</i>                | 31.231         | Basswood Lake         | Hudson Bay        | 48.17573           | -90.80665 |
|                               |                                         | 31.320         | Farm Lake             | Hudson Bay        | 47.89936           | -91.72534 |
|                               |                                         | 31.279         | Gneiss Lake           | Hudson Bay        | 48.17573           | -90.80665 |
|                               |                                         | 31.411         | Gull Lake             | Hudson Bay        | 48.16423           | -90.89750 |
|                               |                                         | 31.298         | Lac la Croix          | Hudson Bay        | 49.62972           | -94.82764 |
|                               |                                         | 31.355         | Lake of the Woods     | Hudson Bay        | 49.62972           | -94.82764 |
|                               |                                         | 31.371         | Northern Lights Lake  | Hudson Bay        | 48.25762           | -90.64123 |
| Shortjaw Cisco                | <i>Coregonus zenithicus</i>             | 31.232         | Basswood Lake         | Hudson Bay        | 48.05648           | -91.62105 |
|                               |                                         | 31.399         | Gunflint Lake         | Hudson Bay        | 49.64816           | -98.90028 |
|                               |                                         | 31.299         | Lac la Croix          | Hudson Bay        | 48.31725           | -92.11674 |
|                               |                                         | 31.344         | Lake of the Woods     | Hudson Bay        | 49.62972           | -94.82764 |
|                               |                                         | 31.356         | Lake of the Woods     | Hudson Bay        | 48.39681           | -92.52258 |
|                               |                                         | 31.303         | Little Trout Lake     | Hudson Bay        | 48.39681           | -92.52258 |
|                               |                                         | 31.305         | Loon Lake             | Hudson Bay        | 48.24736           | -92.27270 |
|                               |                                         | 31.249         | North Lake            | Hudson Bay        | 48.11487           | -90.56221 |
|                               |                                         | 31.291         | Sand Point Lake       | Hudson Bay        | 48.37789           | -92.47385 |
|                               |                                         | 31.229         | Trout Lake            | Hudson Bay        | 47.96492           | -92.31714 |
| Shortjaw Cisco (dwarf form)   |                                         | 31.366         | Moose Lake            | Great Lakes       | 48.09998           | -90.08397 |
|                               |                                         | 31.389         | South Lake            | Great Lakes       | 48.05648           | -91.62105 |
|                               |                                         | 31.410         | West Pike Lake        | Great Lakes       | 48.08592           | -90.20118 |
| Round Whitefish               | <i>Prosopium cylindraceum</i>           | 31.425         | Gooseberry River      | Great Lakes       | 47.14259           | -91.45753 |
|                               |                                         | 31.253         | Lake Superior         | Great Lakes       | 47.84922           | -89.93523 |
|                               |                                         | 31.255         | Lake Superior         | Great Lakes       | 47.74666           | -90.33813 |
| <b>Pike Family - Esocidae</b> |                                         |                |                       |                   |                    |           |
| Central Mudminnow             | <i>Umbra limi</i>                       | 37.56          | Pigeon River          | Great Lakes       | 48.00450           | -89.59539 |
|                               |                                         | 37.92          | Minnehaha Creek       | Mississippi River | 44.94750           | -93.43472 |
|                               |                                         | 37.57          | Sunrise River         | Mississippi River | 45.49020           | -93.08384 |
|                               |                                         | 37.88          | Vermillion River      | Mississippi River | 44.64306           | -93.14770 |
|                               |                                         | 37.91          | Willow River          | Mississippi River | 46.32355           | -92.83929 |

## Appendix 2. Continued.

| Common Name                            | Scientific Name                 | Catalog Number | General Locality     | Continental Basin | Latitude Longitude |           |
|----------------------------------------|---------------------------------|----------------|----------------------|-------------------|--------------------|-----------|
|                                        |                                 |                |                      |                   |                    |           |
| Trout-perch Family - Percopsidae       |                                 |                |                      |                   |                    |           |
| Trout-perch                            | <i>Percopsis omiscomaycus</i>   | 79.29          | Knife River          | Great Lakes       | 46.94933           | -91.77861 |
|                                        |                                 | 79.36          | Nemadji River        | Great Lakes       | 46.55078           | -92.24538 |
|                                        |                                 | 79.35          | Sauk River           | Mississippi River | 45.67547           | -94.80575 |
|                                        |                                 |                |                      |                   |                    |           |
| Cod Family - Gadidae                   |                                 |                |                      |                   |                    |           |
| Burbot                                 | <i>Lota lota</i>                | 63.69          | Willow River         | Mississippi River | 46.32355           | -92.83929 |
|                                        |                                 |                |                      |                   |                    |           |
| New World Silversides - Atherinopsidae |                                 |                |                      |                   |                    |           |
| Brook Silverside                       | <i>Labidesthes sicculus</i>     | 158.428        | Minnehaha Creek      | Mississippi River | 44.95329           | -93.48713 |
|                                        |                                 |                |                      |                   |                    |           |
| Topminnow Family - Fundulidae          |                                 |                |                      |                   |                    |           |
| Banded Killifish                       | <i>Fundulus diaphanus</i>       | 60.1022        | Tulaby Lake          | Hudson Bay        | 47.15104           | -95.60363 |
|                                        |                                 | 60.991         | Spectacle Lake       | Mississippi River | 45.57357           | -93.40558 |
|                                        |                                 | 60.990         | Square Lake          | Mississippi River | 45.15669           | -92.80447 |
| Plains Topminnow                       | <i>Fundulus sciadicus</i>       | 60.1020        | Champepadan Creek    | Missouri River    | 43.77676           | -96.03289 |
|                                        |                                 |                |                      |                   |                    |           |
| Stickleback Family - Gasterosteidae    |                                 |                |                      |                   |                    |           |
| Brook Stickleback                      | <i>Culaea inconstans</i>        | 65.55          | Pigeon River         | Great Lakes       | 48.00450           | -89.59539 |
|                                        |                                 | 65.87          | Vermillion River     | Mississippi River | 44.68027           | -93.03480 |
| Sculpin Family - Cottidae              |                                 |                |                      |                   |                    |           |
| Mottled Sculpin                        | <i>Cottus bairdii</i>           | 129.1046       | Lester River         | Great Lakes       | 46.83669           | -92.00615 |
|                                        |                                 | 129.1014       | Otter Tail River     | Hudson Bay        | 46.35909           | -95.73397 |
|                                        |                                 | 129.1015       | Sunrise River        | Mississippi River | 45.49020           | -93.08384 |
|                                        |                                 | 129.1092       | Willow River         | Mississippi River | 46.33751           | -92.75341 |
| Slimy Sculpin                          | <i>Cottus cognatus</i>          | 129.1030       | Lake Superior        | Great Lakes       | 47.74513           | -90.34581 |
|                                        |                                 | 129.1016       | Lester River         | Great Lakes       | 46.83669           | -92.00615 |
|                                        |                                 | 129.1091       | Lac la Croix         | Hudson Bay        | 48.33667           | -92.27332 |
|                                        |                                 | 129.1070       | Little Saganaga Lake | Hudson Bay        | 48.03426           | -91.00101 |
|                                        |                                 | 129.1073       | Trout Lake           | Mississippi River | 47.46094           | -93.55293 |
|                                        |                                 | 129.1029       | Valley Branch        | Mississippi River | 44.91851           | -92.80151 |
| Deepwater Sculpin                      | <i>Myoxocephalus thompsonii</i> | 129.953        | Sea Gull Lake        | Hudson Bay        | 48.13217           | -90.92713 |
|                                        |                                 | 129.954        | Snowbank Lake        | Hudson Bay        | 47.98819           | -91.41868 |
|                                        |                                 |                |                      |                   |                    |           |
| Sunfish Family - Centrarchidae         |                                 |                |                      |                   |                    |           |
| Green Sunfish                          | <i>Lepomis cyanellus</i>        | 90.5078        | Vermillion River     | Mississippi River | 44.68371           | -93.08554 |
| Warmouth                               | <i>Lepomis gulosus</i>          | 90.5076        | Big Ole Lake         | Hudson Bay        | 47.56897           | -93.61415 |
|                                        |                                 |                |                      |                   |                    |           |
| Perch Family - Percidae                |                                 |                |                      |                   |                    |           |
| Western Sand Darter                    | <i>Ammocrypta clara</i>         | 91.9294        | St. Croix River      | Mississippi River | 45.36781           | -92.68942 |
| Mud Darter                             | <i>Etheostoma asprigene</i>     | 91.8623        | Mississippi River    | Mississippi River | 43.68684           | -91.27209 |
| Rainbow Darter                         | <i>Etheostoma caeruleum</i>     | 91.8630        | Otter Tail River     | Hudson Bay        | 46.35909           | -95.73397 |
|                                        |                                 | 91.8614        | Chub Creek           | Mississippi River | 44.52292           | -93.01827 |
|                                        |                                 | 91.8625        | Phalen Lake          | Mississippi River | 44.98750           | -93.05299 |
|                                        |                                 | 91.8646        | Root River           | Mississippi River | 43.80290           | -91.76041 |
|                                        |                                 | 91.8622        | St. Croix River      | Mississippi River | 45.19842           | -92.76781 |
|                                        |                                 | 91.8717        | Zumbro River         | Mississippi River | 44.07471           | -92.65128 |
| Iowa Darter                            | <i>Etheostoma exile</i>         | 91.9286        | Tulaby Lake          | Hudson Bay        | 47.15104           | -95.60363 |
|                                        |                                 | 91.8621        | Battle Creek         | Mississippi River | 44.93701           | -93.03366 |
|                                        |                                 | 91.8636        | Fish Lake            | Mississippi River | 44.22899           | -93.66512 |
|                                        |                                 | 91.8642        | Fish Lake            | Mississippi River | 44.22899           | -93.66512 |
|                                        |                                 | 91.9295        | Lake Minnetonka      | Mississippi River | 44.95382           | -93.49371 |

## Appendix 2. Continued.

| Common Name                   | Scientific Name                  | Catalog Number | General Locality    | Continental Basin | Latitude Longitude |           |
|-------------------------------|----------------------------------|----------------|---------------------|-------------------|--------------------|-----------|
|                               |                                  | 91.8820        | Square Lake         | Mississippi River | 45.15669           | -92.80447 |
|                               |                                  | 91.8718        | Vermillion River    | Mississippi River | 44.68371           | -93.08554 |
|                               |                                  | 91.4551        | Vermillion River    | Mississippi River | 44.64306           | -93.14770 |
|                               |                                  | 91.8715        | Kanaranzi Creek     | Missouri River    | 43.68863           | -95.90578 |
| Fantail Darter                | <i>Etheostoma flabellare</i>     | 91.8615        | Chub Creek          | Mississippi River | 44.52292           | -93.01827 |
|                               |                                  | 91.8616        | Little Cannon River | Mississippi River | 44.34866           | -92.95770 |
|                               |                                  | 91.8645        | Root River          | Mississippi River | 43.80290           | -91.76041 |
|                               |                                  | 91.9445        | Upper Bear Creek    | Mississippi River | 43.83838           | -92.31075 |
| Least Darter                  | <i>Etheostoma microperca</i>     | 91.8631        | Otter Tail River    | Hudson Bay        | 46.35909           | -95.73397 |
|                               |                                  | 91.9460        | Carey Creek         | Mississippi River | 43.82659           | -92.52933 |
|                               |                                  | 91.8634        | Cedar Lake          | Mississippi River | 44.95991           | -93.32162 |
|                               |                                  | 91.8635        | Fish Lake           | Mississippi River | 44.22899           | -93.66512 |
|                               |                                  | 91.9080        | Kettle River        | Mississippi River | 46.76512           | -95.20386 |
|                               |                                  | 91.9296        | Lake Minnetonka     | Mississippi River | 44.95382           | -93.49371 |
| Johnny Darter                 | <i>Etheostoma nigrum</i>         | 91.9081        | Artichoke River     | Great Lakes       | 46.92486           | -92.56216 |
|                               |                                  | 91.9477        | Nemadji River       | Great Lakes       | 46.55078           | -92.24538 |
|                               |                                  | 91.8641        | Sargent Creek       | Great Lakes       | 46.65353           | -92.22692 |
|                               |                                  | 91.8632        | Otter Tail River    | Hudson Bay        | 46.35909           | -95.73397 |
|                               |                                  | 91.9287        | Tulaby Lake         | Hudson Bay        | 47.15104           | -95.60363 |
|                               |                                  | 91.8617        | Little Cannon River | Mississippi River | 44.34866           | -92.95770 |
|                               |                                  | 91.9464        | Minnehaha Creek     | Mississippi River | 44.90464           | -93.33351 |
|                               |                                  | 91.8618        | Mississippi River   | Mississippi River | 44.91209           | -93.20071 |
|                               |                                  | 91.9447        | Sauk River          | Mississippi River | 45.68286           | -94.77104 |
|                               |                                  | 91.9446        | Upper Bear Creek    | Mississippi River | 43.83838           | -92.31075 |
|                               |                                  | 91.4552        | Vermillion River    | Mississippi River | 44.64306           | -93.14770 |
|                               |                                  | 91.9457        | Willow River        | Mississippi River | 46.32355           | -92.83929 |
|                               |                                  | 91.9279        | Champepadan Creek   | Missouri River    | 43.77676           | 43.77676  |
| Banded Darter                 | <i>Etheostoma zonale</i>         | 91.8624        | Cannon River        | Mississippi River | 44.56718           | -92.73804 |
|                               |                                  | 91.8647        | Root River          | Mississippi River | 43.80290           | -91.76041 |
|                               |                                  | 91.8822        | Shell Rock River    | Mississippi River | 42.88626           | -92.79293 |
|                               |                                  | 91.8716        | Zumbro River        | Mississippi River | 44.07471           | -92.65128 |
| Logperch                      | <i>Percina caprodes</i>          | 91.9478        | Nemadji River       | Great Lakes       | 46.55078           | -92.24538 |
|                               |                                  | 91.8644        | St. Louis River     | Great Lakes       | 46.65893           | -92.25524 |
|                               |                                  | 91.9465        | Minnehaha Creek     | Mississippi River | 44.90464           | -93.33351 |
|                               |                                  | 91.8620        | Mississippi River   | Mississippi River | 43.75721           | -91.24760 |
|                               |                                  | 91.9459        | Sauk River          | Mississippi River | 45.67547           | -94.80575 |
|                               |                                  | 91.9470        | Snake River         | Mississippi River | 45.82468           | -92.76714 |
|                               |                                  | 91.9293        | St. Croix River     | Mississippi River | 45.36781           | -92.68942 |
| Gilt Darter                   | <i>Percina evides</i>            | 91.9469        | Snake River         | Mississippi River | 45.82468           | -92.76714 |
|                               |                                  | 91.9292        | St. Croix River     | Mississippi River | 45.36781           | -92.68942 |
| Blackside Darter              | <i>Percina maculata</i>          | 91.8633        | Otter Tail River    | Hudson Bay        | 46.35909           | -95.73397 |
|                               |                                  | 91.8619        | Mississippi River   | Mississippi River | 44.91209           | -93.20071 |
|                               |                                  | 91.9474        | Rock Creek          | Mississippi River | 45.71345           | -92.87160 |
|                               |                                  | 91.8643        | Root River          | Mississippi River | 43.80290           | -91.76041 |
|                               |                                  | 91.9448        | Sauk River          | Mississippi River | 45.68286           | -94.77104 |
|                               |                                  | 91.9288        | Rock River          | Missouri River    | 43.65056           | -96.19694 |
| River Darter                  | <i>Percina shumardi</i>          | 91.8821        | Red Lake River      | Hudson Bay        | 47.77836           | -96.63120 |
| <b>Goby Family - Gobiidae</b> |                                  |                |                     |                   |                    |           |
| Round Goby                    | <i>Neogobius melanostomus</i>    | 122.166        | Lake Superior       | Great Lakes       | 46.73200           | -92.05586 |
| Freshwater Tubnose Goby       | <i>Proterorhinus semilunaris</i> | 122.167        | Merritt Creek       | Great Lakes       | 46.75200           | -92.14326 |