Canada Water Agency Agence de l'eau du Canada

December 24 2025

Jessi Nelson, RAP Coordinator
Niagara River Area of Concern
Niagara Peninsula Conservation Authority
Sent via email: jnelson@npca.ca

Dear Ms. Nelson,

RE: Niagara River *Degradation of Fish and Wildlife Populations* BUI Re-designation Request

Canada Water Agency and the Ontario Ministry of Environment, Conservation and Parks have undertaken a comprehensive review of the *Assessment Report: Degradation of Fish and Wildlife Populations, Beneficial Use Impairment (BUI #3), for the Niagara River (Ontario) Area of Concern.*

Following this review, I am pleased to inform you that the *Degradation of Fish and Wildlife Populations* beneficial use impairment is hereby designated “not impaired” for the Canadian portion of the Niagara River Area of Concern, pursuant to the provisions of the Great Lakes Water Quality Agreement (2012) and the Canada-Ontario Agreement on Great Lakes Water Quality and Ecosystem Health (2021).

Congratulations to all members of the Niagara River Remedial Action Plan Committees and local community members who have contributed their time and effort over the years to attain this important environmental milestone.

I look forward to continued collaboration toward our shared goal of restoring the Niagara River Area of Concern.

Sincerely,

Digitally signed by: HiriartBaer, Veronique
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NIAGARA RIVER
Remedial Action Plan

ASSESSMENT REPORT

DEGRADATION OF FISH AND WILDLIFE POPULATIONS

BENEFICIAL USE IMPAIRMENT #3

2025

Assessment Report:
Degradation of Fish and Wildlife Populations
Beneficial Use Impairment (BUI #3)
for the Niagara River (Ontario) Area of Concern

March 2024	Recommendation to re-designate the BUI endorsed by Niagara River RAP Council and to proceed with engagement process
April 2024- June 2025	Engagement process implemented
June 2025	Report updated to incorporate engagement results
July 2025	Report submitted to Canada-Ontario Agreement (COA) Annex 5 Co-leads for review and to re-designate BUI to "Not Impaired"
December 2025	Support for BUI re-designation received from COA Annex 5 Co-leads

Final Report

July 2025

Suggested citation: Niagara River Remedial Action Plan (NRRAP). (2025). J. Nelson, N. Green, M. Chambers E.Tahirali, & T. MacDougall (Eds.), *Assessment Report: Degradation of Fish and Wildlife Populations Beneficial Use Impairment (BUI #3) for the Niagara River (Ontario) Area of Concern.* Thorold, ON.

ACKNOWLEDGMENTS

The authors gratefully acknowledge each of the Technical Working Group members (past and current) for contributing their expertise, time, and effort toward this assessment process including multiple years of monitoring, data analysis, technical report writing, updating delisting criteria, identifying actions, and preparing and editing this assessment report. Thank you to the Niagara River Remedial Action Plan (RAP) Council members for their support and feedback during the development of this document.

Special thanks to Mark Filipski, U.S. RAP Coordinator with the New York State Department of Environmental Conservation, for facilitating a data gathering exercise with U.S. technical experts that supported the 'Degradation of Fish Populations' section of this report.

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TABLE OF CONTENTS

EXECUTIVE SUMMARY

In the late 1980s, the Niagara River was identified as an Area of Concern (AOC), one of several degraded Great Lakes locations requiring effort to restore and improve its water quality and ecosystem health. The *Degradation of Fish and Wildlife Populations* Beneficial Use Impairment (BUI) is one of 14 potential impairments identified in the Canada-U.S. Great Lakes Water Quality Agreement used to address human-induced, legacy pollution issues that negatively impact the biological, chemical, and physical integrity of the Great Lakes. This BUI was designated 'impaired' on the Canadian side of the Niagara River AOC in the Stage 1 and Stage 2 Remedial Action Plan (RAP) reports, released in 1993 and 1995 respectively. The BUI was also designated impaired on the U.S. side of the AOC[1].

Following years of improvements to the Niagara River ecosystem, several comprehensive studies were undertaken to determine the current status of the Niagara River as it pertains to the health and condition of fish and aquatic wildlife. The studies included a seasonal three-year Niagara River fish community study, an expert survey of fisheries professionals from both the U.S. and Canada, recreational fishing surveys, and long-term colonial waterbird monitoring. Based on the results of these studies that conclude the BUI delisting criteria have been met, in addition to a commitment for other long-term monitoring actions, the Niagara River Remedial Action Plan (NRRAP) team recommends changing the status of the *Degradation of Fish and Wildlife Populations* BUI for the Canadian side of the Niagara River AOC to 'NOT IMPAIRED'.

This report presents the most recent scientific information and expert opinion used to assess the status of the BUI against the established delisting criteria. Below is a summary of the results of this assessment:

BUI Delisting Criteria:	**Result**
• multiple lines of evidence indicate similarity between the Niagara River fish community and expectations based on the adjoining Great Lakes;	☑
• a monitoring plan is developed and there is a commitment confirmed by local partners for long-term implementation at suitable wetland sites along the Upper Niagara River;	☑
• breeding colonial waterbird populations within the Niagara River AOC are the same as (or better than) suitable reference sites;	☑
• temporal trends in contaminant concentrations in eggs, tissues, or whole-body burden of sentinel species in the Niagara River AOC are stable or declining;	☑
• spatial comparisons show that contaminant concentrations in eggs, tissues, or whole-body burden of sentinel species in the Niagara River AOC are the same as (or better than) suitable reference sites;	☑
• If the temporal or spatial contaminant concentrations above are not met, then they must not exceed established thresholds associated with potential population-level effects (i.e., reproductive impacts).	☑

[1] https://www.epa.gov/great-lakes-aocs/niagara-river-aoc-0

INTRODUCTION

The Niagara River is a 58-kilometre bi-national connecting channel flowing from Lake Erie to Lake Ontario that supports complex and diverse ecosystems. With hundreds of bird species relying on the Niagara River for migration and breeding, it was designated an Important Bird and Biodiversity Area in the 1990s. In addition, the river provides important aquatic habitat for a diversity of fishes and contributes to world-class fisheries.

The Niagara River is known for its noticeable drop in elevation resulting in the Niagara Falls that span both sides of the border. This unique natural feature gave rise to hydroelectric power generation and led to significant industrial and residential development in the area, particularly on the New York side. By the early 1900s, numerous pollution problems were documented as a result of industrial activities, because at that time there lacked environmental knowledge and regulations that exist today. As a result of decades of water quality issues, the Niagara River was listed as one of 43 Great Lakes Areas of Concern (AOC) in 1987 through the Canada-U.S. Great Lakes Water Quality Agreement (GLWQA). The GLWQA is the document through which Canada and United States commit to maintaining and restoring the environmental integrity of the waters of the Great Lakes.

Through the GLWQA, a Remedial Action Plan (RAP) is required in each AOC to address ecosystem health and water quality impairments, termed Beneficial Use Impairments (BUIs). The goal of a RAP is not to restore the river to a pristine, pre-settlement state. Rather, the achievement of BUI restoration goals (delisting criteria) means the environmental state of the Niagara River is improved —and no longer worse than other Great Lakes locations. The BUIs are used as ecosystem indicators to focus monitoring activities and remedial action efforts such as pollution abatement and habitat restoration.

The *Degradation of Fish and Wildlife Populations* BUI is an environmental indicator[2] intended to understand the condition and impacts of legacy issues (e.g., water and/or sediment pollution) on the overall health of fish and aquatic wildlife that rely on the waters of the Niagara River for breeding and feeding, such as colonial, fish-eating waterbirds and marsh-dependent birds. Individual fish and wildlife organisms consistently exposed to elevated levels of pollutants can develop diseases, deformities, or other health issues that can affect their survival, growth, and ability to reproduce; subsequently leading to population-level impacts. For example, pollution may reduce numbers of certain sensitive fish species or result in a community structure with increased proportions of pollution-tolerant species, with fewer top predators and trophic specialists. Understanding the extent and potential for population-level effects from Niagara River AOC legacy pollution is integral in making meaningful progress towards ecosystem improvements that support healthy fish and wildlife populations.

[2] The Niagara River Remedial Action Plan (RAP) has historically divided this indicator into two separate sub-BUIs focused on either fish or wildlife populations with their own specific delisting criteria and assessed individually.

PURPOSE

The purpose of this report is to highlight the completed actions (refer to Appendix 1) and summarize the most recent scientific information and expert opinion to assess the status of the *Degradation of Fish and Wildlife Populations* BUI for the Canadian side of the Niagara River AOC.

BUI DELISTING CRITERIA

As part of the Niagara River RAP's 5-year Delisting Strategy (Green et al. 2021), updated BUI delisting criteria were developed with community participation, and targeted remediation and monitoring actions were identified to make progress on achieving overall ecosystem health of the Niagara River.

The delisting criteria state that the *Degradation of Fish and Wildlife Populations* BUI will no longer be impaired when:

1a) multiple lines of evidence indicate similarity between the Niagara River fish community and expectations based on the adjoining Great Lakes; *AND*

1b) a monitoring plan is developed and there is a commitment confirmed by local partners for long-term implementation at suitable wetland sites along the Upper Niagara River; *AND*

2) breeding colonial waterbird populations within the Niagara River AOC are the same as (or better than) suitable reference sites; *AND*

3a) temporal trends in contaminant concentrations in eggs, tissues, or whole-body burden of sentinel species in the Niagara River AOC are stable or declining; *AND*

3b) spatial comparisons show that contaminant concentrations in eggs, tissues, or whole-body burden of sentinel species in the Niagara River AOC are the same as (or better than) suitable reference sites; *OR*

3c) If the contaminant concentrations in 3a or 3b are not met, then they must not exceed established thresholds associated with potential population-level effects (i.e., reproductive impacts).

When relevant remedial actions are complete and scientific evidence through a BUI assessment shows these delisting criteria have been met, the RAP Team prepares a recommendation to redesignate the status of the applicable BUI. More information about the rationale and explanation of terminology used in the BUI delisting criteria is provided in detail in the Niagara River Delisting Strategy[3].

[3] http://ourniagarariver.ca/wp-content/uploads/2021/05/Niagara-River-Area-of-Concern-Delisting-Strategy-FINAL-May-2021.pdf

ASSESSMENT OF FISH POPULATIONS BUI CRITERION

Background

Overview of fish communities in the Niagara River

The Niagara River supports two geographically separated fish communities in the Upper and Lower sections of the river, which are divided by Niagara Falls. The Lower Niagara River (i.e., downstream of the Niagara Falls to Lake Ontario) supports a cold, cool, and warmwater fish community that is similar to that found in Lake Ontario. Angler harvest in the lower river is dominated by Rainbow Trout (*Oncorhynchus mykiss*), Lake Trout (*Salvelinus namaycush*), Coho Salmon (*Oncorhynchus kisutch*), and White Bass (*Morone chrysops*) with notable catches of Yellow Perch (*Perca flavescens*), Freshwater Drum (*Aplodinotus grunniens*) and Rock Bass (*Ambloplites rupestris*). Similarly, the Upper Niagara River (Lake Erie upstream of the Niagara Falls) reflects the fish community in adjoining Lake Erie with angler harvest dominated by Smallmouth Bass (*Micropterus dolomieu*), Yellow Perch, Rock Bass, Rainbow Smelt (*Osmerus mordax*), Walleye (*Sander vitreus*) and White Bass.

History of Fish Populations BUI Status

The status of the fish populations portion of the BUI in the Niagara River has been inconsistent over time. In the 1993 Stage 1 RAP Report (NRRAP 1993a), fish populations in the Niagara River were noted as generally not degraded and reflected those in the nearby Great Lakes. The report indicated that the Niagara River AOC supported a vibrant sport fishery with an impressive array of fish species, but also described reduced populations of certain species in the Upper Niagara River (i.e., Lake Sturgeon, Emerald Shiner, Northern Pike), which led to conflicting conclusions on the state of the Niagara River fish community at that time. These anecdotal observations along with concerns in the Welland River, a tributary of the Niagara River, resulted in an 'Impaired' status for this indicator on the Canadian side of the AOC. Despite some limited monitoring efforts on the Niagara River proper between 1997-2011, the status of the BUI remained 'Impaired' on the Canadian side of the AOC largely due to the conditions of the fish populations in the Welland River. During this time, extensive monitoring and remediation efforts (e.g., removal of fish barriers) were implemented in the Welland River watershed. Before 2012, the AOC included the Niagara River proper as well as the entire watershed, making these prior concerns from the Welland River relevant in the BUI impairment status. In 2012, the scope of the GLWQA was clarified and stated that the BUIs apply to the "Waters of the Great Lakes", which resulted in a need to re-examine the status of the Fish Populations BUI in the context of the Niagara River proper. Recent studies were intended to address information gaps and apply an appropriate scientific approach to assessing the current status of the BUI.

Known Challenges & Limitations

The main limitation for evaluating the status of fish populations in the Niagara River has been the practical challenges of sampling the river. Assessing fish communities using standard fisheries techniques such as electrofishing, gillnetting, and trawling have proven to be difficult in the deep, fast-flowing waters of connecting channels (e.g., St. Clair River, Detroit River and Niagara River) (OMNRF 2020). In the Niagara River, sampling is further limited by large sections of river that are unsafe due to currents and natural hazards (e.g., immediately above and below the Niagara Falls and the whirlpools). These sampling challenges have resulted in an inability to consistently monitor the fish community and help explain the lack of robust historical fish community data from the river.

In addition, the Niagara River faces non-AOC specific pressures/challenges experienced across the Great Lakes basin, including impacts from invasive species, broadscale land use changes, and climate change. For example, invasive species including *Dreissenid spp.* mussels, Round Goby (*Neogobius melanostomus*) and Common Reed (*Phragmites australis*) cause impacts to native species and habitats across the Great Lakes. These pressures, although important as part of ecosystem health, are not specific nor unique to the Niagara River. These broad-scale challenges are addressed in other existing, ongoing programs that will continue beyond the scope of the Niagara River RAP. A full list of relevant monitoring programs can be found in Appendix 2.

To overcome these challenges, an approach to determining the BUI status was developed that compared the composition of fish species that would be expected in an unimpaired Niagara River ecosystem - a function of species available from Great Lakes species pool - to the species currently found through agency sampling. With this approach, a large number of missing species may indicate potential impairment; whereas compositional similarity between expected and observed species would indicate a lack of impairment.

Summary of Relevant Studies

<u>Niagara River Fish Community Monitoring (2015-2017)</u>

Fisheries and Oceans Canada (DFO) designed and conducted a comprehensive nearshore fish community assessment in the Niagara River between 2015 and 2017 (Gáspárdy et al. 2020; Lamothe et al. 2020). The goal of the survey was to resample areas fished by the Ontario Ministry of Natural Resources and Forestry (MNRF) in 2004 and 2008 (Yagi & Blott 2012). DFO sampling used boat electrofishing techniques to evaluate seasonal fish community composition (occurrence and relative abundance of fish species) at 10 sites through the river (6 Upper Niagara River, 4 Lower Niagara River).

DFO's 3-year fish sampling effort captured 41,365 fishes representing 65 species (Gáspárdy et al. 2020; Lamothe et al. 2020). Three species made up 60% of the total catch across all sampling events: White Sucker (*Catostomus commersonii;* 26.47%), Emerald Shiner (*Notropis atherinoides*; 21.07%), and Yellow Perch (12.42%). Eight species were only captured in the Lower Niagara River, including Silver Redhorse (*Moxostoma anisurum*), American Eel (*Anguilla rostrata*), Sea Lamprey (*Petromyzon marinus*), and several salmonid species (Coho Salmon, Chinook Salmon, Atlantic Salmon (*Salmo salar*), and Lake Trout). Species captured only in the Upper Niagara River included White Crappie (*Pomoxis annularis*), American Brook Lamprey (*Lethenteron appendix),* Trout-Perch (*Percopsis omiscomaycus*), Rainbow Darter (*Etheostoma caeruleum*) and Johnny Darter (*Etheostoma nigrum*). Refer to Appendix 3 for the full data report of DFO sampling results.

Analysis of observed versus expected fish species in the Niagara River (2019)

Based on the premise that the fish species occurring in a healthy Niagara River should be similar to the species composition in the adjacent Great Lakes (after correcting for non-riverine, geographically distinct, rare, or habitat-specialist species), a list of species present in the Lake Erie and Ontario drainages was created, based on Roth et al. (2012). Of the base pool of species from the Lake Ontario (123 fish species) and Lake Erie (134 fish species) drainages, it was recognized that only a subset of species would be expected in an unimpaired Niagara River due to the species' habitat requirements, rarity, life history, and geographic proximity to the river (Drake et al. in prep.). Using these criteria, 74 and 67 fish species were expected to be present in the Upper and Lower Niagara River, respectively.

Given that the multi-year DFO electrofishing survey (Gáspárdy et al. 2020) used a single gear to sample and determine the composition and relative abundance of the fish community, it did not necessarily detect all fish species occurring in the river. Therefore, a list of observed species in the Niagara River was developed by combining the DFO sampling results with recent catch records in scientific literature, ongoing studies, and other recent agency assessments. Together, this was used to develop a list of observed species over the recent 10-year sampling interval.

In total, the list of observed fish species (using results from DFO sampling together with recent (10 year) catch records from the scientific literature, ongoing studies, and other U.S. and Canada agency assessments, regardless of fishing gear used) indicated 76 fish species detected in the Upper Niagara River and 68 fish species detected in the Lower Niagara River. Of the subset of species that were expected, 70 species were detected in the Upper Niagara River (indicating 95% compositional similarity with 74 expected) and 65 species detected in the Lower Niagara River (indicating 97% compositional similarity with 67 expected; Drake et al. in prep). Moreover, in both cases, the *total* number of fish species detected was greater than those expected because some species were detected that were not expected, and assumed to occupy the Niagara River sporadically despite overall habitat limitations. Collectively, the results do not indicate signs of fish community impairment because: a) only a few species expected were not detected (e.g., Lower Niagara River: Silver Lamprey, Brindled Madtom); and b) these species likely exist in the river but remain undetected due to specialized sampling techniques that are difficult to implement in the river. Refer to Appendix 4 for a detailed summary of observed versus expected species.

Recreational Fishing in the Niagara River (2020)

A recreational fishing survey conducted by MNRF in 2020 provides valuable insight into the significance and value of Niagara River fisheries (Hunt et al. 2023). The 2020 survey used the same methodology and was complementary to previous DFO/MNRF collaborative Recreational fishery surveys completed in 2010 and 2015. The 2020 Ontario survey analyzed data on a finer spatial scale, and for the first time, provided the ability to compare the Upper and Lower Niagara River to other waterbodies across the province.

While fishing activity and total number of fish caught in the Upper and Lower Niagara River did not exceed those observed in neighbouring waterbodies (i.e., Lake Erie and Lake Ontario) or similar nearby waterbodies (e.g., Detroit River, St. Clair River, the Bay of Quinte, St. Lawrence River, and Lake St. Francis)[4], the survey demonstrated that the Niagara River supports provincially valuable fisheries. Notably, Smallmouth Bass in the Upper Niagara River and Rainbow Trout and Lake Trout in the Lower Niagara River. The catches in each of these fisheries exceeded by ~two or more times, those observed in neighbouring or similar nearby water bodies. Walleye (*Sander vitreus*) catches in the Upper Niagara River were similar to those observed in Lake Erie's eastern basin and the Bay of Quinte. The collective Muskellunge (*Esox masquinongy*) catches throughout the river (i.e., 700 fish) were similar to 'Musky' fisheries in the Detroit River and Lake St. Francis (approx. 500 fish, respectively), two known popular Muskellunge fisheries.

Results from the 2020 recreational fishing survey suggest that the Niagara River fish populations are healthy and demonstrate that beneficial uses of the river through recreational fishing opportunities are comparable to locations across the province.

Key Findings & Conclusion

In summary, multiple lines of evidence indicate fish populations in the Niagara River are healthy and are not impaired by the historic human-induced legacy pollution issues and habitat degradation. These multiple lines of evidence include:

- The fish communities of the Upper and Lower Niagara River show strong compositional, functional, and trophic similarities to the fish communities that would be expected based on the species pool in the corresponding Great Lakes.
- The expected species are in fact present in the Upper and Lower Niagara River, and span unique life history and habitat requirements, including those of two species of conservation concern: Grass Pickerel (*Esox americanus vermiculatus*) and the American Eel (*Anguilla rostrata*).
- The fish populations in the Upper and Lower Niagara River are providing beneficial uses through recreational fishing opportunities in ways that are comparable to locations across the province.

Based on these lines of evidence, fish populations do not show signs of impairment which indicates that criterion 1a has been met.

[4] While these locations are also considered AOCs, they are the most functionally similar to the Niagara River connecting channel, are the most suitable for comparison, and are all in the process of re-designating their fish population BUIs.

ASSESSMENT OF WILDLIFE POPULATIONS BUI CRITERIA

Background

Overview of Niagara River wildlife populations

The Niagara River corridor is an important area that supports various wildlife species including hundreds of species of birds that rely on its waters for migration, overwintering habitat, breeding, and feeding. At least six waterbird species congregate in the Niagara River corridor in globally significant numbers based on single day surveys, including Canvasback (*Aythya valisineria*), Greater Scaup (*Aythya marila*), Red-breasted Merganser (*Mergus serrator*), Bonaparte's Gull (*Chroicocephalus philadelphia*), Herring Gull (*Larus argentatus*), and Ring-billed Gull (*Larus delawarensis*). In fact, the Niagara River was designated an Important Bird and Biodiversity Area in the 1990s namely because it supports up to 25% of the global population of Bonaparte's Gull.

The wildlife portion of the BUI is focused on specific aquatic wildlife species that spend most (or all) of their lives near water and rely on the Niagara River for breeding and feeding, such as colonial waterbirds, marsh-dependent birds, and amphibians. This close connection to the aquatic environment is vital in understanding whether the Niagara River's water quality (i.e., due to legacy pollutants such as polychlorinated biphenyls (PCBs) and mercury) is impacting the biological integrity of organisms within the aquatic ecosystem. Two colonial waterbird species that breed and forage within the Niagara River AOC selected for this BUI assessment are Herring Gull and Double-crested Cormorant (*Phalacrocorax auritus*). These colonial waterbirds are important because they are top predators in the food web, they nest in colonies near water, and obtain almost all of their food (fish and aquatic invertebrates) from the water (USFWS 2002). The Herring Gull has been used as an indicator species in Great Lakes environmental monitoring for decades, which allows for the study of change over time.

History of Wildlife Populations BUI Status

When the Niagara River was first listed as an AOC, the status of wildlife populations was considered 'Unknown' as there was limited information available (NRRAP 1993a). The Stage 1 RAP Report (1993a) noted that while the Niagara Peninsula had a wide diversity of bird species, a number of wildlife species were endangered or extinct. However, the threats leading to the endangered or extinct status were widespread across the developed portion of Ontario, not specifically linked to issues in AOCs. A follow-up to the RAP Stage 1 Report noted that long-term contaminant data (1977-1990) in colonial waterbird eggs showed declining trends, and that the number of nests were increasing (NRRAP 1993b). Despite evidence suggesting improved health of colonial waterbirds nesting within the Niagara River, the wildlife BUI status was changed from 'Unknown' to 'Impaired' through the completion of the RAP Stage 2 Update Report (NRRAP 2009).

Summary of relevant studies

Long-term Wildlife Monitoring Plan

The Great Lakes Marsh Monitoring Program (GLMMP) was established in 1995 as a partnership between Birds Canada, ECCC, and the U.S. Environmental Protection Agency. The program focuses on marshes in the Great Lakes basin with a special emphasis on coastal Great Lakes marshes since many of these locations experienced declines in health due to heavy pollution and development (Birds Canada 2009). Given the Niagara River's unique natural features and its fast-flowing waters, it does not support the typical marsh-type habitats used by the GLMMP (Bichel 2022). Since 2016, seven coastal wetland habitat restoration projects, as well as an addition wetland project at Gonder's Flats, have been completed by NRRAP partners along the Canadian side of the Upper Niagara River. While these sites are vegetated and beginning to establish, only one (Gonder's Flats) meets the GLMMP site criteria. As such, a different approach and appropriate monitoring sites were needed to understand and assess wildlife in the Niagara River.

In 2022, a Long-Term Wildlife Monitoring Plan was prepared for the Niagara River AOC by Birds Canada in collaboration with staff from the Niagara Peninsula Conservation Authority (NPCA) and Niagara Parks Commission (NPC) (Bichel 2022). The plan outlines the implementation of repeatable, annual surveys using established methodology easily conducted by staff or community volunteers to monitor presence/absence of breeding bird species at four Upper Niagara River Sites (Ussher's Creek, Baker's Creek, Service Road 3, and Frenchman's Creek), as well as the presence of breeding amphibian species at two Upper Niagara River sites (Gonder's Flat's and Dufferin Islands) over time. The monitoring is being implemented by relevant partners through existing organizational, environmental strategies beyond the scope and life of the RAP. Refer to Appendix 5 for more information.

Colonial waterbird populations and current trends 2018-2019

Since the 1970s, scientists from ECCC have been monitoring spatial and temporal contaminant trends, and nest counts in Great Lakes colonial waterbirds as part of its Great Lakes Herring Gull Contaminant Monitoring program. The NRRAP Team identified the need to update monitoring efforts to validate earlier evidence of improving contaminants trends and nest counts of colonial waterbirds in the Niagara River AOC. As a result, ECCC conducted a 2-year study (2018-2019) examining nest counts of colonial waterbird populations in the Niagara River AOC, as well as the spatial and temporal trends for a suite of historic, relevant contaminants (e.g., polychlorinated biphenyls (PCBs), mercury, organochlorine compounds, and polybrominated diphenyl ethers (PBDEs)) (Hughes et al. 2020).

There were two components to the assessment of colonial waterbird populations. First, a laboratory incubation of cormorant eggs to assess embryonic viability and deformity frequencies. Second, an analysis of contaminants in gull and cormorant eggs to evaluate spatial and temporal trends against thresholds with established population-level effects. Gull and cormorant eggs were collected from the Buffalo Harbour (U.S.) and appropriate reference sites in eastern Lake Erie to complement previous long-term monitoring within the Niagara River AOC at the "Weseloh Rocks". From 1979 to 2017, the annual collections of Herring Gull eggs for the monitoring program were conducted at Weseloh Rocks near the top of the Niagara Falls, but record-breaking high-water levels at this site in 2018 and 2019 reduced nesting habitat available for Herring Gulls (as ground-nesters) compared to earlier years. Therefore, new sampling sites near the Buffalo Harbor were sampled in 2018 and 2019. Nesting locations at Mohawk Island and Port Colborne in the eastern basin of Lake Erie were used as reference sites in the study. Refer to Appendix 6 for the full technical report.

Key Findings & Conclusion

In conclusion, a monitoring plan is in place and there is a confirmed commitment by local partners for its long-term implementation at suitable wetland sites along the Upper Niagara River. Criterion 1B has been met.

Additionally, results from the ECCC colonial waterbirds study indicate stable or decreasing contaminants levels in the AOC over time that are similar to reference locations and have minimal potential impacts on reproduction and survival rates of colonial waterbirds in the Niagara River AOC. Specific findings related to the BUI delisting criteria are:

- Egg viability was similar in cormorant eggs collected from Buffalo Harbor (85%) and the reference colony (80%) following artificial incubation in the two study years. Egg viability in cormorants was considered to be not impaired. Criterion 2 has been met.
- Based on long-term collections of Herring Gull eggs from Weseloh Rocks and recent egg collections from another colony within the AOC at Buffalo Harbor, temporal trends in contaminant levels indicate that concentrations have declined (for PCBs) or are stable (for mercury) between the late 1970s/early 1980s to 2019. Criteria 3A has been met.
- Spatial comparisons indicate that the majority of contaminant concentrations (except mercury) in eggs under the influence of the AOC are the same as those at the upstream reference site and outside of the influence of the AOC. Criterion 3B has been met, except for mercury.
- For mercury, higher concentrations were found in gull eggs from the AOC colony compared to the reference colony; however, mercury burdens were well below those associated with population-level effects in colonial waterbirds. Criterion 3C has been met.

This assessment shows that all wildlife-related BUI delisting criteria have been met.

RECOMMENDATION

This report outlines multiple studies used to assess the status of fish populations and wildlife populations in the Niagara River AOC. The lines of scientific evidence indicate all delisting criteria for the *Degradation of Fish and Wildlife Populations* BUI have been met, and all relevant remaining actions under the RAP have been completed. Therefore, the Niagara River RAP Team **recommends that the status of the *Degradation of Fish and Wildlife Populations* BUI for the Canadian side of the Niagara River be officially changed to 'NOT IMPAIRED'.**

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APPENDIX 1: LIST OF COMPLETED ACTIONS

These actions were identified by the RAP's Technical Expert Working Group members as part of the development of the Niagara River (ON) Delisting Strategy (Green et al. 2021).

#	Recommended Action	2019	2020	2021	2022	2023	Beyond	Lead(s)
MONITORING								
3.1	Develop and administer a survey applying professional judgment to identify which fishes are expected in the Niagara River and to validate the presence/absence of the remaining fish on the Niagara River fishes list.	✓						DFO, MNRF, NRRAP
3.2	Finalize the list of expected Niagara River fishes using the information gathered from the professional judgment survey (above).	✓						DFO, MNRF, NRRAP
3.3	Complete colonial waterbird survey (year 2 of 2; year 1 done in 2018) and data analysis to evaluate criterion 2 and 3, related to contaminants/body burdens.	✓						ECCC
3.4	Identify and validate potential wildlife monitoring sites to support preparation of monitoring plan.		✓					Birds Canada
3.5	Develop a long-term wildlife monitoring plan leveraging established monitoring protocols, existing programs, and relevant strategies for partners to implement beyond the RAP initiative.			✓				Birds Canada, Niagara Parks, NPCA
REPORTING								
3.6	Prepare report on colonial waterbird study results, including recommendations about re-designation or further remedial actions required.		✓					ECCC
3.7	Finalize monitoring plan and confirm commitment from local partners to implement the plan in an ongoing basis (post-RAP).			✓			•	Birds Canada, Niagara Parks, NPCA
BUI ASSESSMENT								
3.8	Gather all relevant information and assess the status of the BUI.				✓			NRRAP
	• If not impaired, proceed with re-designation process.					✓		

APPENDIX 2: LIST OF RELEVANT EXISTING MONITORING PROGRAMS

A number of existing, ongoing Canadian monitoring programs are implemented in the Niagara River AOC by various agencies. These programs, funded outside of the RAP, are very important as they provide key information/data required to assess and monitor the status of several environmental issues related to BUIs. There is a need and desire for long-term monitoring in the Niagara River to show sustained improvements of the ecosystem over time, or to identify any possible deterioration. Therefore, it is recommended (and expected) that these programs will continue in the region even after the AOC is delisted. Below is a brief overview of each program implemented in the Niagara River (and other Great Lakes locations) including the timing and lead agency. For more information about a program, contact the lead agency.

a) **Angler Creel Survey Program – OMNRF**
   Angler creel surveys provide information on angler harvest, effort, catch characteristics, harvest rate, target species effort and distribution. Occurs periodically.

b) **Caged Mussel Biomonitoring – MECP**
   Since 1983, MECP researchers have examined the concentrations of contaminants in caged mussels, and special sampling devices to measure a variety of toxic chemicals that can accumulate in living organisms in the Niagara River.

c) **Connecting Waterways Fish Community Assessment Program – MNRF**
   Monitors the small and large bodied fish communities of the following Great Lakes' connecting channels: St. Clair River, Detroit River, and Upper Niagara River. The fish communities in each river are sampled using a combination of boat electrofishing, large mesh gill nets, and small benthic trawls on a rotating three-year cycle. The Niagara River was first sampled in 2019, as part of the program pilot, with the first rotational assessment being completed in 2022. The connecting channels program will sample the Detroit River in 2023 and St. Clair River in 2024 before returning to the Niagara River in 2025, and every three years thereafter.

d) **Upstream-Downstream Water Quality Monitoring – ECCC**
   This water quality monitoring program has been ongoing for over 30 years. There is a monitoring station at the head (near Fort Erie) and mouth (near Niagara-on-the-Lake) of the Niagara River to monitor for 18 priority contaminants, mainly to inform the Niagara River Toxics Management Plan.

e) **Great Lakes Herring Gull Egg Contaminant Monitoring Program – ECCC**
   Program implemented since 1970 to understand the temporal and spatial trends of environmental contaminant levels in Great Lakes herring gulls. Sampling of colonial waterbirds (gull, cormorants) eggs is done routinely, and results are compared with those from previous years.

f) **Great Lakes Marsh Monitoring Program – Birds Canada/NPCA/Volunteers**
A binational monitoring program conducted in Great Lakes coastal and inland marshes with volunteers to assess wetland status and identify long-term trends in wetland bird and amphibian populations. Ongoing annually since 1995.

g) **Great Lakes Surveillance Program – ECCC**
Monitoring of nutrients and priority legacy contaminants (PCBs, dioxins, mercury) in Great Lakes water (various locations) to examine trends over time. Data are typically provided within one year of the completion of sampling and samples are collected from the upper and lower Great Lakes in alternating years.

h) **Great Lakes Sediment Monitoring Program – ECCC**
Monitoring of contaminants in Great Lakes sediment. One Canadian Great Lakes is done on the cycle of the Cooperative Science and Monitoring Initiative (CSMI). Data are typically provided within one year of the completion of sampling.

i) **Great Lakes Coastal Wetland Monitoring – ECCC**
Monitoring and assessment of coastal wetlands throughout the Canadian Great Lakes (for over a decade) to monitor wetland wildlife communities and their habitat. The biological condition of coastal wetlands is determined using indices for each biological community (marsh birds, aquatic macroinvertebrates and submerged aquatic vegetation) as well as water quality.

j) **Long-term Monitoring of Marsh Birds, Amphibians, and their Habitat – NPCA/NPC**
Collaborative monitoring between staff of the Niagara Parks Commission and Niagara Peninsula Conservation Authority with support from volunteers and Birds Canada as part of the Wildlife Monitoring Plan for the Niagara River (Ontario) AOC (Birds Canada 2022) This plan outlines monitoring for breeding birds, amphibians and their habitat at specific sites along the Niagara River. Ongoing annually.

k) **MISA Discharger Assessment and Reporting – MECP/Industries**
Ontario's Municipal/Industrial Strategy for Abatement (MISA) program requires direct dischargers in 9 sectors (e.g., inorganic chemicals, industrial, metal casting) to maintain detailed records of their regulated discharges and report them to the MECP on a regular basis.

l) **Provincial Water Quality Monitoring Network (PWQMN) – MECP/NPCA**
Surface water quality information collected from rivers and streams at nearly 400 locations in Ontario. In the Niagara River AOC watershed there are 5 PWQWM monitoring sites with 4 of these in the Welland River and one in Black Creek. Various water quality parameters are monitored at each PWQMN station, including chloride, nutrients, suspended solids, trace metals, bacteria, and other general chemistry parameters.

Pesticides and other contaminants are monitored in detailed water quality surveys in priority watersheds. Monitoring captures a range of regular weather and wet weather sampling complemented by flow and water level measurements at certain strategic locations. Ongoing annually.

m) Niagara Peninsula Watershed Surface Water Monitoring Program – NPCA

In addition to the sites notes above (m), NPCA monitors surface water quality at 29 sites across the Niagara River AOC watershed which includes 24 in the Welland River, 1 in Frenchmans Creek, one in Black Creek, one in Ushers Creek and 1 in the Chippawa Power Canal. Various water quality parameters are monitored at each station, including chloride, nutrients, suspended solids, trace metals bacteria and other general chemistry parameters. Other contaminants are monitored in detailed water quality surveys in priority watersheds. Monitoring captures a range of regular weather and wet weather sampling complemented by flow and water level measurements at certain strategic locations. Ongoing annually.

n) Fish Contaminant Monitoring Program – MECP/MNRF

One of the flagship monitoring programs across Ontario, including within the Great Lakes. Monitoring of contaminants (mercury, PCBs, dioxins, mirex, and DDT) in the dorsal muscle tissue of various sport fish in the Niagara River (and other province-wide lakes). Results from this work are published biennially in the Guide to Eating Ontario Fish.

o) Young-of-the-Year Fish Monitoring Program – MECP/OMNRF

Forage fish such as the Spottail Shiner (*Notropis hudsonius*) provide excellent temporal and spatial monitoring of contaminants. Generally, this program focuses on tributary inputs, and it should be expanded similar to the mussel biomonitoring program (on a 3-year cycle) to provide a more detailed spatial assessment of contaminants in fish than is available from the fish contaminants monitoring program.

APPENDIX 3: DFO TECHNICAL REPORT ON NIAGARA RIVER FISH COMMUNITIES

Nearshore fish community assessment of the upper and lower Niagara River, 2015-2017

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2020

**Canadian Data Report of
Fisheries and Aquatic Sciences 1304**

Fisheries and Oceans Canada / Pêches et Océans Canada

Canada

Canadian Data Report of Fisheries and Aquatic Sciences

Data reports provide a medium for filing and archiving data compilations where little or no analysis is included. Such compilations commonly will have been prepared in support of other journal publications or reports. The subject matter of the series reflects the broad interests and policies of Fisheries and Oceans Canada, namely, fisheries management, technology and development, ocean sciences, and aquatic environments relevant to Canada.

Data reports are not intended for general distribution and the contents must not be referred to in other publications without prior written clearance from the issuing establishment. The correct citation appears above the abstract of each report. Each report is abstracted in the data base *Aquatic Sciences and Fisheries Abstracts*.

Data reports are produced regionally but are numbered nationally. Requests for individual reports will be filled by the issuing establishment listed on the front cover and title page.

Numbers 1-25 in this series were issued as Fisheries and Marine Service Data Records. Numbers 26-160 were issued as Department of Fisheries and Environment, Fisheries and Marine Service Data Reports. The current series name was changed with report number 161.

Rapport statistique canadien des sciences halieutiques et aquatiques

Les rapports statistiques servent de base à la compilation des données de classement et d'archives pour lesquelles il y a peu ou point d'analyse. Cette compilation aura d'ordinaire été préparée pour appuyer d'autres publications ou rapports. Les sujets des rapports statistiques reflètent la vaste gamme des intérêts et politiques de Pêches et Océans Canada, notamment la gestion des pêches, la technologie et le développement, les sciences océaniques et l'environnement aquatique, au Canada.

Les rapports statistiques ne sont pas préparés pour une vaste distribution et leur contenu ne doit pas être mentionné dans une publication sans autorisation écrite préalable de l'établissement auteur. Le titre exact figure au haut du résumé de chaque rapport. Les rapports à l'industrie sont résumés dans la base de données *Résumés des sciences aquatiques et halieutiques*.

Les rapports statistiques sont produits à l'échelon régional, mais numérotés à l'échelon national. Les demandes de rapports seront satisfaites par l'établissement d'origine dont le nom figure sur la couverture et la page du titre.

Les numéros 1 à 25 de cette série ont été publiés à titre de Records statistiques, Service des pêches et de la mer. Les numéros 26-160 ont été publiés à titre de Rapports statistiques du Service des pêches et de la mer, ministère des Pêches et de l'Environnement. Le nom de la série a été modifié à partir du numéro 161.

Canadian Data Report of
Fisheries and Aquatic Sciences 1304

2020

Nearshore fish community assessment of the upper and lower Niagara River, 2015-2017

by

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDICES

ABSTRACT

Gáspárdy, R.C., Barnucz, J., and Drake, D.A.R. 2020. Nearshore fish community assessment of the upper and lower Niagara River, 2015-2017. Can. Data Rep. Fish. Aquat. Sci. 1304: vi + 75 p.

In 1987, fish populations in the Niagara River watershed were considered to be impaired as part of the designation of the Niagara River as an "Area of Concern" (AOC) under the authority of the Great Lakes Water Quality Agreement. To better understand the composition and relative abundance of the nearshore Niagara River fish community as part of an updated assessment of the AOC, Fisheries and Oceans Canada conducted a multi-year (2015-2017), multi-season (spring, summer, fall) fish community assessment of the nearshore upper and lower river. Boat electrofishing and aquatic habitat measurements were conducted at 10 index stations (n = 6 upper; n = 4 lower). Total boat electrofishing effort was 499,949 shocking seconds, resulting in the capture of 41,365 fishes representing 65 species. Average CPUE was generally higher in the upper section than in the lower section, lowest in the spring, and highest in the fall. Total catch was highest in 2015 and 2016, with a total of 15,698 and 15,695 fishes captured, respectively, but dropped in 2017 when only 9,972 fishes were captured. Two individual Grass Pickerel (*Esox americanus vermiculatus,* SARA Special Concern; 178 mm and 215 mm TL) were captured near the mouth of Ussher's Creek in fall of 2015, while a total of 29 American Eel (*Anguilla rostrata*, assessed as Threatened by COSEWIC; 436-974 mm TL) were captured in the lower Niagara River, with individuals captured at each station during almost every sampling effort (excluding spring 2015 and fall 2017). Three species made up 60% of total abundance across all sampling events (White Sucker 26.47% of total catch; Emerald Shiner, 21.07%; Yellow Perch, 12.42%). Emerald Shiner was the most abundant species captured during spring sampling, comprising 30% of the total catch across years (combined across river sections). More Emerald Shiner were captured in the upper section of the Niagara River (87% of total Emerald Shiner catch) than the lower section. In spring 2016, Emerald Shiner was at its highest relative abundance when it made up 44% of the overall catch. The 2015-2017 boat electrofishing program represents the largest standardized sampling effort for fishes in the Canadian waters of the Niagara River and provides a comprehensive dataset to better understand the status of nearshore fish communities in the Niagara River.

RÉSUMÉ

Gáspárdy, R.C., Barnucz, J., and Drake, D.A.R. 2020. Nearshore fish community assessment of the upper and lower Niagara River, 2015-2017. Can. Data Rep. Fish. Aquat. Sci. 1304: vi + 75 p.

En 1987, les populations de poissons dans le bassin hydrographique de la rivière Niagara ont été jugées compromises dans le cadre de la désignation de la rivière Niagara comme « secteur préoccupant » en vertu de l'Accord relatif à la qualité de l'eau dans les Grands Lacs. Afin de mieux comprendre la composition et l'abondance relative de la communauté de poissons de la rivière Niagara dans le cadre d'une évaluation actualisée du secteur préoccupant, Pêches et Océans Canada a réalisé une évaluation pluriannuelle (de 2015 à 2017) et multisaisionnière (printemps, été et automne) de la communauté côtière de poissons dans les cours supérieur et inférieur de la rivière Niagara. De la pêche à l'électricité à partir d'embarcations et des mesures de l'habitat aquatique ont été effectuées à dix stations d'indice (n = 6 dans le cours supérieur; n = 4 dans le cours inférieur). Au total, l'effort d'électrocution s'est étendu sur 499 949 secondes et s'est soldé par la capture de 41 365 poissons représentant 65 espèces. Les CPUE moyennes étaient généralement plus élevées dans le cours supérieur que dans le cours inférieur, la plus faible au printemps et la plus élevée à l'automne. Les prises totales ont été les plus élevées en 2015 et 2016, avec 15 698 et 15 695 poissons capturés, respectivement, mais ont chuté à 9 972 poissons capturés en 2017. Deux individus de brochet vermiculé (*Esox americanus vermiculatus*, espèce préoccupante en vertu de la *Loi sur les espèces en péril*; longueur totale de 178 mm et de 215 mm) ont été capturés près de l'embouchure du ruisseau Usshers à l'automne 2015, et un total de 29 anguilles d'Amérique (*Anguilla rostrata*, espèce évaluée comme étant menacée par le Comité sur la situation des espèces en péril au Canada; longueur totale allant de 436 à 974 mm) ont été capturées dans le cours inférieur de la rivière Niagara, avec des individus capturés à chaque station pendant presque tous les efforts d'échantillonnage (sauf au printemps 2015 et à l'automne 2017). Trois espèces représentaient 60 % de l'abondance totale pour l'ensemble des échantillonnages (le meunier noir, représentant 26,47 % des prises totales, le méné émeraude, 21,07 %, et la perchaude,12,42 %). Le méné émeraude était l'espèce la plus abondante capturée au cours de l'échantillonnage de printemps, représentant 30 % des prises totales au fil des ans (prises combinées sur l'ensemble des sections de rivière). Un nombre plus élevé de ménés émeraude ont été capturés dans la partie supérieure de la rivière Niagara (87 % des prises totales de ménés émeraude) que dans la partie inférieure. Au printemps 2016, le méné émeraude était à son abondance relative la plus élevée et représentait alors 44 % des prises totales. Le programme de pêche à l'électricité à partir d'embarcations mené de 2015 à 2017 constitue le plus grand effort d'échantillonnage normalisé des poissons dans les eaux canadiennes de la rivière Niagara et fournit un ensemble de données approfondi permettant de mieux comprendre l'état des communautés côtières de poissons dans la rivière Niagara.

INTRODUCTION

The Niagara River is a 58 km flowing channel in the Great Lakes basin that connects Lake Erie with Lake Ontario. In 1987, the Niagara River was designated as an Area of Concern (AOC) by the International Joint Commission under the authority of the Great Lakes Water Quality Agreement. The designation of the Niagara River as an AOC focused on 14 possible degraded components of the ecosystem and (or) related ecosystem services ("Beneficial Use Impairments" - BUIs), which included the degradation of fish populations (NRRAP 1993). In 1993, rationale for the Fish Populations BUI included evidence of degraded fish populations in the Welland River and a reduction of Lake Sturgeon *Ascipencer fulvescens*, Emerald Shiner *Notropis atherinoides*, and Northern Pike *Esox lucius* in the upper river. Factors implicated in impairment included habitat degradation, salmonid stocking, chronic/acute toxicity from spills, and changes in thermal regime owing to the operation of the ice boom near Niagara Falls (NRRAP 1993).

Evaluating the response of the Niagara River fish community to remedial actions – a core component of the Remedial Action Plan program - requires an updated assessment of the composition and relative abundance of fishes in the upper and lower river. However, despite the Niagara River's importance as a bi-national Great Lakes fishery resource, fish community data to support the AOC designation and the response to remedial actions is sparse owing to a challenging sampling environment. High river velocity and narrow chutes, particularly in the lower river between Niagara Falls and Queenston, make sampling difficult with conventional methods. Deepwater sampling is also difficult throughout the upper and lower river due to swift flows and irregular bathymetry. Despite these challenges, in 2004 the Ontario Ministry of Natural Resources and Forestry (OMNRF) sampled five stations in the lower river between Queenston and Niagara-on-the-Lake with boat electrofishing methods to establish baseline community data and support an evaluation of the Fish Population BUI. Sampling was also conducted by OMNRF in the upper river in 1999, 2004, and 2008 (Yagi and Blott 2012).

In 2015, 2016, and 2017, Fisheries and Oceans Canada conducted a multi-season fish community survey of the nearshore upper and lower Niagara River in support of an updated assessment of the Fish Populations BUI. The goal of the survey was to re-sample areas fished by OMNRF in 2004 and 2008, focusing on the composition (occurrence, relative abundance) of fishes susceptible to boat electrofishing capture methods, including seasonal (spring, summer, fall) differences. This data report presents an overview of fish and habitat data collected as part of the multi-year survey.

METHODS

SITE SELECTION

Fish community sampling was conducted at 10 stations on the Canadian side of the Niagara River during the spring, summer, and fall of 2015, 2016, and 2017. Stations were chosen based on previous boat electrofishing surveys conducted by OMNRF (Yagi and Blott, 2012). The OMNRF sampling locations included four stations in the lower Niagara River and six in the upper river, where approximately 500 m of shoreline was sampled at each location by boat electrofishing. The DFO sampling stations were positioned as close to the OMNRF stations as possible, though station dimensions differed from the OMNRF sampling to ensure comparability to DFO boat electrofishing methods employed in other Great Lakes Connecting Channel AOCs. As such, DFO sampling stations were 1000 m in length, divided into two 500 m transects end-to-end (Figure 1, Table 1). Due to space constraints in the lower river and the additional 500 m at each sampling location, only four of the five OMNRF sampling locations were used for the 2015-2017 sampling program. In the upper Niagara River, sampling stations selected by the OMNRF were in the vicinity of the influence of the tributary creeks, as well as around Navy Island (Yagi and Blott, 2012). DFO sampled each of these 10 sampling stations once in the spring, summer, and fall of 2015, 2016, and 2017 (Appendix 1).

FISH COMMUNITY SAMPLING

Boat Electrofishing

All fish community sampling was conducted during the day using a Smith-Root Electrofishing Boat (primarily a 20 ft., 7.5 GPP, dual boom vessel, but a 14 ft., 5.0 GPP, dual boom vessel was used on one sampling occasion due to equipment malfunction). Two trained field crew members were tasked as 'netters' and stationed on the bow of the electrofishing boat to capture stunned fishes with long-handled nets. Three repeat passes were performed along a 500 m transect, travelling parallel to the shoreline along the 2 m depth contour in the same direction as the current at a speed of approximately 2 km/h. During sampling, the bow of the vessel was pointed downstream. Sampling speed was increased in areas of higher water velocities to enable netters to capture stunned fishes before they were carried downstream ahead of the boat. Once netted, fishes were placed in a large aerated live-well of recirculating river water where they were held until the sampling pass was completed. A total of approximately 6000 seconds per station (approximately 3000 seconds per transect) were sampled during each sampling event. Power output during sampling was standardized at approximately 1800 W with voltage and percent power adjustments made to account for differences in temperature and conductivity throughout each sampling pass (Appendix 2). Numerous articles have been written about capture bias associated with boat electrofishing; the boat electrofishing methods employed in the survey were most effective at capturing fishes occupying shallow waters (e.g., < 4 m in depth) in the nearshore zone of the upper and lower river.

Enumeration of Fishes

Fishes were processed separately at the end of each pass of each transect in a location offshore and downstream of the station. This allowed species composition and abundance to be partitioned into the first, second, or third pass of each transect and also ensured that released fishes would not immediately return to the station prior to subsequent electrofishing passes. Captured fishes were identified to species level (when possible), enumerated, and the minimum and maximum total lengths (TL; mm) were measured for each species and pass. In addition, individual TL measurements were taken for any species listed under Canada's *Species at Risk Act*. At least one representative specimen of each species at each station and transect was retained as a voucher, which involved preservation in a 10% formalin solution or digital photographs of key identification features for subsequent species identification in the laboratory. As well, individuals unable to be identified to the species level *in situ* (e.g., juveniles) were retained and preserved for laboratory identification.

HABITAT SAMPLING

Habitat parameters were measured after fish sampling was completed. Occasionally, habitat parameters were assessed prior to sampling due to situations encountered in the field such as weather or boat traffic. Three depth and water velocity measurements were taken at the upstream, center, and downstream points of each transect. Depth was measured using either a

Laylin Speedtech SM-5 Depthmate portable depth sounder or an on-board depth-sounder and GPS unit. Water velocity was measured at approximately 1 m below the water surface using a Swoffer 2100 Current Velocity Meter. At the midpoint of each transect, surface water temperature (°C), conductivity (µS), turbidity (NTU), and dissolved oxygen (mg/L) were measured at approximately 0.2-0.5 m beneath the water's surface using a YSI EX02 Multiparameter Sonde, which was deployed and allowed to stabilize for approximately 1 minute before measurements were recorded. Air temperature (°C) was measured using a Kestrel 3000 Wind Meter.

Due to high water clarity, the boat operator and crew visually assessed aquatic macrophyte and substrate composition during sampling of the station. The visual assessment of aquatic macrophytes involved identifying the percent composition of the following vegetation classes within the transect sample area to a total of 100%: open water, emergent vegetation, submerged vegetation, and floating vegetation. The dominant species of vegetation was identified and recorded at each transect, as well as all other vegetation species present within the transect. Riparian vegetation was assessed visually at each transect by determining the percent composition of vegetation types (deciduous, coniferous, herbaceous, shrubs, or none) occurring in the riparian zone directly adjacent to each transect.

A coarse evaluation of substrate composition within the transect was analyzed using a combination of visual assessment and a Petite Ponar dredge sample at each transect. The single Petite Ponar grab at the center of each transect was used to measure the composition and presence of smaller particle substrate types. The percent composition of each substrate type was based on the median particle diameters derived from Bain's (1999) modified Wentworth substrate classification: clay (<0.005 mm), silt (0.005–0.05 mm), sand (0.05–2 mm), gravel (2–65 mm), cobble (65–250 mm), boulder (250-4000 mm), bedrock (>4000 mm, solid unweathered rock), hardpan (compacted layer of soil), rubble (broken manmade material), and organic (plant and animal material, excluding mussels).

Distance from shore (m) was measured at the midpoint of the transect, perpendicular to the bank, using a Nikon Laser 1200S Waterproof Laser Range Finder. Station location (latitude, longitude) was determined using a Garmin Montana 600 handheld GPS unit using a Backroads Mapbook Ontario GPS chip or on-board Humminbird with Navionics chip.

SAMPLING PERMITS AND DATA ARCHIVING

Boat electrofishing activities were conducted under Animal Use Protocol AUP 1322-A and Standard Operating Protocol GWACC-111. All sampling activities were approved by the Environment and Climate Change Canada and DFO Animal Care Committee (operated under the approval of the Canadian Coincil on Animal Care). approved by the DFO and Environment and Climate Change Canada Animal Care Committee (operated under approval of the Canadian Council on Animal Care). Data associated with the collections in this report are housed under the project codes "2015-GLAP-NR", "2016-GLAP-NR", and "2017-GLAP-NR" in the Biodiversity Science database within the Great Lakes Laboratory for Fisheries and Aquatic Sciences. Every effort has been made to ensure the accuracy of data contained in this report; however, species identities and other sampling results may be revised as part of a long-term data archiving process conducted in partnership with the Royal Ontario Museum. Data associated with this report may be obtained by contacting the Great Lakes Laboratory for Fisheries and Aquatic Sciences.

RESULTS

FISH ASSEMBLAGE SAMPLING

The 2015-2017 boat electrofishing program represents the largest standardized sampling effort of fishes in the Canadian waters of the Niagara River to date. In total, 499,949 shocking seconds were performed resulting in the capture of 41,365 fishes representing 65 species (Table 2, Appendix 3). In total, the average catch per unit effort (CPUE) for all sampling was 0.081 fishes per shocking second. The average CPUE was generally higher in the upper section than in the lower section, lowest in the spring, and highest in the fall. Total catch was highest in 2015 and 2016, with a total of 15,698 and 15,695 fishes captured, respectively, but dropped in 2017 when only 9,972 fishes were captured. A caveat to this decline in total catch is that 2.5 stations in the upper section were not sampled in spring 2017 due to the use of the smaller electrofishing vessel and resulting safety concerns of sampling upstream of Niagara Falls.

Two species of conservation concern were captured during this survey. Two individual Grass Pickerel (*Esox americanus vermiculatus,* SARA Special Concern; 178 mm and 215 mm TL) were captured near the mouth of Ussher's Creek in Fall of 2015. A total of 29 American Eel (*Anguilla rostrata*, assessed as Threatened by COSEWIC; 436-974 mm TL) were captured in the lower Niagara River, with individuals captured at each station during almost every sampling effort (excluding spring 2015 and fall 2017).

While 65 species in total were captured across the duration of the sampling program, the number of species captured varied by season, year, and river section. Several species were only captured once or during a single sampling period; for example, a single Channel Catfish (*Ictalurus punctatus*) was captured in the summer of 2015 near Frenchman's Creek, one large adult Atlantic Salmon (*Salmo salar*) was captured upstream of Niagara-on-the-Lake in fall 2015, and one adult Sea Lamprey (*Petromyzon marinus*) was captured in the spring of 2017 in the lower section of the Niagara River while parasitizing a captured redhorse (*Moxostoma* sp.). A single Tiger Trout (*Salmo trutta* X *Salvelinus fontinalis*) was potentially captured in the lower section during the spring of 2015, however, the specimen was not kept for verification and the digital photographs did not adequately show features required for positive identification. Eight species were only captured in the lower section of the Niagara River, including Silver Redhorse (*Moxostoma anisurum*), American Eel, Sea Lamprey, and several salmonid species: Coho Salmon (*Oncorhynchus kisutch*), Chinook Salmon (*Oncorhynchus tshawytscha*), Atlantic Salmon, and Lake Trout (*Salvelinus namaycush*). Species detected only in the upper River (10 species) included White Crappie (*Pomoxis annularis*), American Brook Lamprey (*Lethenteron appendix*), Trout-Perch (*Percopsis omiscomaycus*) and darter species such as Rainbow Darter (*Etheostoma caeruleum*) and Johnny Darter (*Etheostoma nigrum*).

Three species made up 60% of the total catch across all sampling events: White Sucker (*Catostomus commersonii*, 26.47%), Emerald Shiner (*Notropis atherinoides*, 21.07%), and Yellow Perch (*Perca flavescens*, 12.42%; Table 3); however, there was variation in the relative abundance of these species annually, seasonally, and between river sections. For example, in spring 2015, White Sucker was in low relative abundance while Smallmouth Bass (*Micropterus dolomieu*) and Greater Redhorse (*Moxostoma valenciennesi*) made up 15% and 11% of the catch, respectively (combined upper and lower sections). In the lower section of the Niagara River in 2017, both Emerald Shiner and White Sucker were at lower relative abundance, making up only 17% of the catch, while Gizzard Shad (*Dorosoma cepedianum*) and Yellow Perch were at higher relative abundance making up 48% of the catch (combined across seasons).

During the spring sampling events, Emerald Shiner was the most abundant species captured, comprising 30% of the total catch across years (combined across sections). More Emerald Shiner were captured in the upper section of the Niagara River (87% of total Emerald Shiner catch) than the lower section. In spring 2016, Emerald Shiner was at its highest relative abundance when it made up 44% of the overall catch.

All fish families (with the exception of Eels, Gars, and Trout-Perches in the lower section) were represented in the upper and lower sections of the river; however, the relative abundance of the families differed (Table 4). In the upper section, the Cyprinidae family made up 42% of the catch across seasons, while Cyprinidae comprised 19% of the total catch in the lower section across seasons. A total of 15 Cyprinidae species were captured in the upper river section and 13 in the lower river section. Creek Chub (*Semotilus atromaculatus*) and Fathead Minnow (*Pimephales promelas*) were not captured in the lower Niagara River, but were only represented by a single individual in the upper section. Bluntnose Minnow (*Pimephales notatus*) and Spottail Shiner (*Notropis husdonius*) were the two most abundant species of Cyprinidae after Emerald Shiner.

HABITAT SAMPLING

The water quality data is summarized in Table 5 and provided in its entirety in Appendix 4. The Niagara River is known for its clear water, and on average, measured turbidity was 3.61 ntu. Average water temperature across years during three sampling seasons was 22.8, 25.2, and 11.6 °C in spring, summer, and fall sampling, respectively. Conductivity measurements averaged 322.8 µS across all sampling events. Some seasonal variation was observed, with averages of 300.3 µS in spring, 368.8 µS in summer, and 297.4 µS in fall. Conductivity was similar between the upper and lower river sections. Most often, conductivity was below 300 µS, however, conductivity spiked above 400 µS in 29% of samples, most notably in summer of 2016 when conductivity averaged 558.6 µS. Average dissolved oxygen across all sampling events was 9.35 mg/L with some seasonal variation observed (8.91, 8.54, and 10.58 on average in spring, summer, and fall sampling, respectively). Average measured pH across seasons, sections, and years was 8.77, with higher pH measured in the summer and fall of 2016 (9.27 and 9.40, respectively).

The sampling protocol followed the 2 m depth contour along each transect and across all sampling events. In both the upper and lower sections of the Niagara River, there was often a steep drop-off along the 2 m contour that coincided with a current break. To keep the electrofishing boat positioned within the slower flowing water (required for maintaining optimal speed) and to effectively sample the 2 m contour, the boat was kept just inside the 2 m contour where the nearshore (port-side) anode was sometimes in shallower water than the offshore (starboard-side) anode, with anodes set approximately 3-4 m apart. As a result, depth varied along each transect, which is reflected by the minimum depth of 0.5 m and maximum depth of 4.9 m sampled, where the deepest point along any transect sampled was near the south-east side of Navy-Island (Table 6, Appendix 4).

Average water velocity in sampled nearshore area across all sampling events was 0.18 m/s. Average water velocity at sites in the upper river was slightly faster than water velocity at sites sampled in the lower river (0.20 m/s and 0.18 m/s, respectively; Table 6). Similar to the variation in depth, the stations covered a gradient of water velocity, with the fastest velocity measured at 0.93 m/s in the upper Niagara River (at the same point alongside Navy Island) and 0.80 m/s in the lower section. Backwater habitats with little to no flow at the time of sampling were also sampled in both the upper and lower river. Depth and flow was highly variable between and within stations, and some variation can be observed between seasons and years (Appendix 4).

The substrate assessment during the study involved visual methods spanning a large physical area, making accurate assessments challenging. Variation in dominant substrate (Table 7) and percent composition (Appendix 5) were observed during the different sampling events. Overall, smaller substrates (silt to cobble) were most commonly noted as dominant, though larger substrates (e.g., boulder and hardpan) were present and dominant in some areas. Furthermore, substrate varied greatly within each 1 km long station (two 500 m transects) with areas of fast-flowing water dominated by larger substrate types and areas with slower flows dominated by smaller substrates. It should be noted that the petite Ponar dredge is most efficient in shallow, slow-flowing water and was unable to scoop substrates larger than small cobble.

The dominant aquatic vegetation was most commonly classified as submerged or open water across all stations and sampling events (Table 8), with Wild Celery (*Vallisneria americana*) the most common species (Table 9, Appendix 6). Open water was observed most commonly in the spring and fall, whereas submerged aquatic vegetation became more dominant during the summer. Similar to substrate, aquatic vegetation composition varied among sampling station; deep areas with high water velocity generally had little vegetation, whereas shallow areas with slower flows had large beds of Wild Celery and other submergent species. The lower section of the river typically did not support emergent or floating vegetation.

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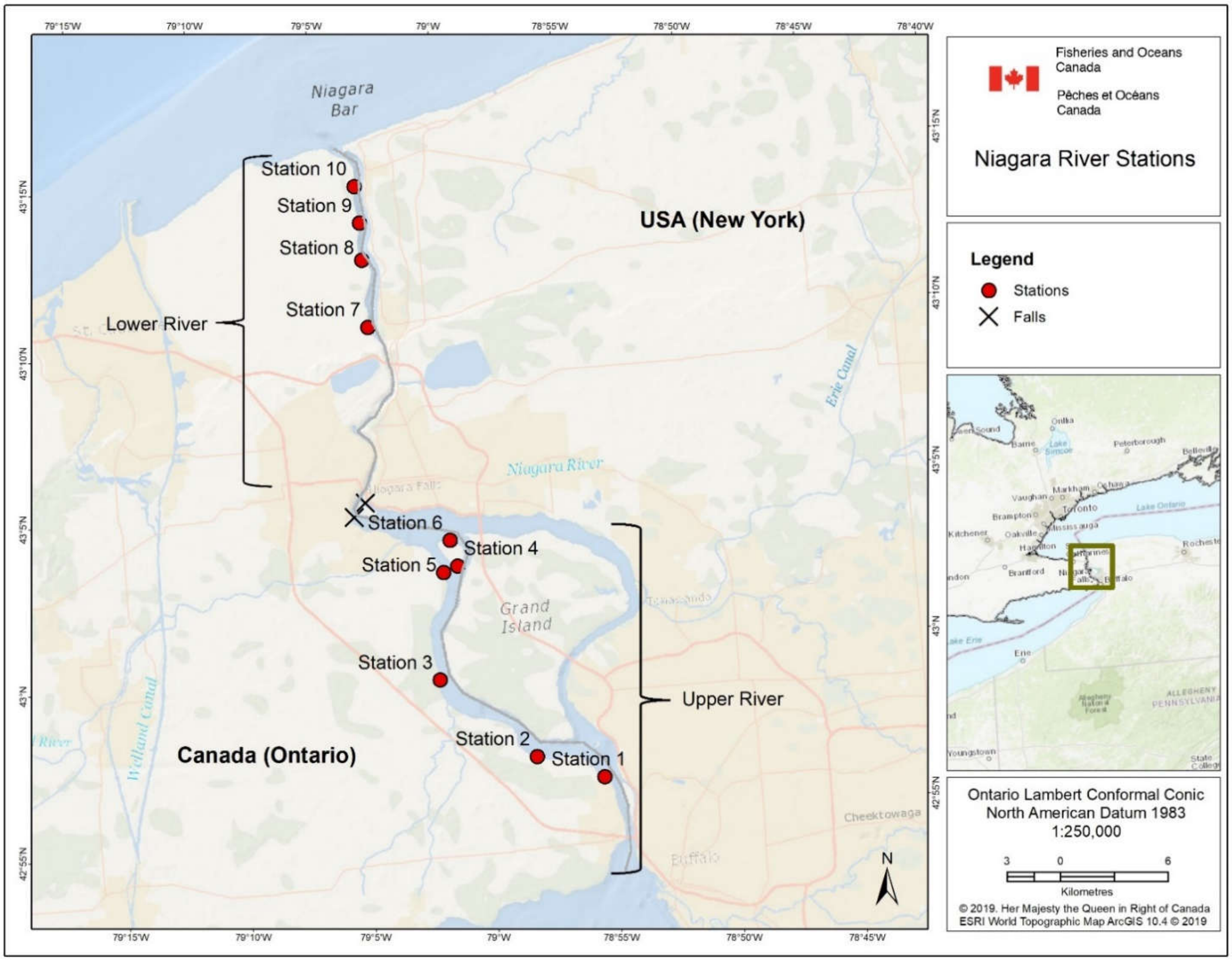

Figure 1. *Niagara River stations sampled by DFO in 2015-2017.*

Table 1. *Location of DFO sampling stations in the Niagara River, 2015-2017. Ten stations were sampled seasonally, where each station was split into two 500 m transects (an upstream and a downstream transect). Last 3 digits of Transect code (XXY) reflects location: XX = station number, Y = transect placement where 1 = upstream, 2 = downstream; transect code used in all field numbers (Appendix 1) to indicate date and location of sample.*

Station Number	River section	Station locality / landmark	Transect placement	Transect code	Start latitude	Start longitude	Stop latitude	Stop longitude
1	Upper	Frenchman's Creek	Upstream	GLAP-NR-011	42.93806	-78.91957	42.94123	-78.92434
			Downstream	GLAP-NR-012	42.94123	-78.92434	42.94436	-78.92866
2	Upper	Miller's Creek	Upstream	GLAP-NR-021	42.95077	-78.96437	42.95266	-78.96989
			Downstream	GLAP-NR-022	42.95385	-78.97224	42.95729	-78.97263
3	Upper	Boyer's Creek	Upstream	GLAP-NR-031	42.99281	-79.02642	42.99754	-79.02752
			Downstream	GLAP-NR-032	42.99754	-79.02752	43.00195	-79.02891
4	Upper	Navy Island South	Upstream	GLAP-NR-041	43.04903	-79.00829	43.05263	-79.00451
			Downstream	GLAP-NR-042	43.05263	-79.00451	43.05703	-79.00420
5	Upper	Ussher's Creek	Upstream	GLAP-NR-051	43.04627	-79.01818	43.05026	-79.02074
			Downstream	GLAP-NR-052	43.05026	-79.02074	43.05397	-79.02431
6	Upper	Navy Island North	Upstream	GLAP-NR-061	43.06213	-79.01226	43.06255	-79.01846
			Downstream	GLAP-NR-062	43.06255	-79.01846	43.06265	-79.02489
7	Lower	Queenston	Upstream	GLAP-NR-071	43.17192	-79.0568	43.17643	-79.05659
			Downstream	GLAP-NR-072	43.17643	-79.05659	43.18084	-79.05638
8	Lower	North of Queenston	Upstream	GLAP-NR-081	43.20575	-79.05744	43.20989	-79.05959
			Downstream	GLAP-NR-082	43.20989	-79.05959	43.21438	-79.05985
9	Lower	South of Niagara on the Lake	Upstream	GLAP-NR-091	43.22437	-79.05698	43.22873	-79.05854
			Downstream	GLAP-NR-092	43.22873	-79.05854	43.23321	-79.05947
10	Lower	Niagara on the Lake	Upstream	GLAP-NR-101	43.24280	-79.05869	43.24721	-79.05809
			Downstream	GLAP-NR-102	43.24721	-79.05809	43.25178	-79.05839

Table 2. *Summary of sampling effort and resulting catch for boat electrofishing sampling at ten stations in the Niagara River, 2015-2017.*

		2015			2016			2017			ALL YEARS		
		Upper	Lower	Total	Upper	Lower	Total	Upper	Lower	Total	Upper	Lower	Total
Sampling Stations	All	6	4	10	6	4	10	6	4	10	6	4	10
Stations Sampled	Spring	6	4	10	6	4	10	6	4	10	18	12	30
	Summer	6	4	10	6	4	10	6	4	10	18	12	30
	Fall	6	4	10	6	4	10	3.5	4	7.5	15.5	12	27.5
	Combined	18	12	30	18	12	30	15.5	12	87.5	52.5	36	87.5
Total fishes captured	Spring	848	687	1535	2653	1648	4301	1878	1471	3349	5379	3806	9185
	Summer	3517	491	4008	4093	664	4757	4075	290	4365	11685	1445	13130
	Fall	8562	1593	10155	4964	1673	6637	1444	814	2258	14970	4080	19050
	Combined	12927	2771	15698	11710	3985	15695	7397	2575	9972	32034	9331	41365
Species Detected	Spring	25	29	38	28	33	40	39	35	49	45	41	53
	Summer	35	24	40	41	30	45	39	26	43	46	39	52
	Fall	41	41	52	42	41	43	32	38	46	47	52	59
	Combined	49	44	58	48	47	56	46	45	56	57	55	65
Fish SAR* Species Detected	Spring	0	0	0	0	1	1	0	1	1	0	1	1
	Summer	0	1	1	0	1	1	0	1	1	0	1	1
	Fall	1	1	2	0	1	1	0	0	0	1	1	2
	Combined	1	1	2	0	1	1	0	1	1	1	1	2
Total Effort (Seconds)	Spring	27352	22973	50325	34649	24180	58829	20873	24397	45270	82874	71550	154424
	Summer	36145	23776	59921	35118	23841	58959	34510	31820	56330	105773	69437	175210
	Fall	34613	23546	58159	35841	23712	56330	30871	31277	52148	101325	68535	169860
	Combined	98110	70295	168405	105608	71733	177341	86254	67494	153748	289972	209522	499494
Mean Effort/Station (Seconds)	Spring	2279	2872	2516	2887	3023	2941	2982	3050	3018	2673	2981	2808
	Summer	3012	2972	2996	2927	2980	2948	2876	2728	2817	2938	2893	2920
	Fall	2884	2943	2908	2987	2964	2978	2573	2660	2607	2815	2856	2831
	Combined	2725	2929	2807	2934	2989	2956	2782	2812	2795	2815	2910	2854
Mean CPUE/Station (fishes per second)	Spring	0.030	0.030	0.03	0.075	0.068	0.073	0.089	0.06	0.073	0.061	0.053	0.057
	Summer	0.098	0.020	0.067	0.117	0.028	0.082	0.117	0.014	0.075	0.11	0.021	0.075
	Fall	0.245	0.068	0.174	0.138	0.07	0.011	0.046	0.037	0.043	0.143	0.058	0.109
	Combined	0.124	0.039	0.09	0.11	0.056	0.088	0.083	0.037	0.063	0.107	0.044	0.081

**SARA-listed or COSEWIC-assessed species*

Table 3. *Summary of relative abundance (expressed as percentage of total catch, per column) for each species captured by year, season, and river section. *SARA-listed or COSEWIC-assessed species, **non-native species*

	2015						2016					
Species	**UPPER**	**LOWER**	**SPRING**	**SUMMER**	**FALL**	**TOTAL**	**UPPER**	**LOWER**	**SPRING**	**SUMMER**	**FALL**	**TOTAL**
Amia calva	0.02%	0.90%	0.46%	0.35%	0.06%	**0.17%**	0.17%	0.58%	0.09%	0.48%	0.24%	**0.27%**
Ameiurus melas	1.90%	1.80%	2.48%	4.79%	0.65%	**1.89%**	1.35%	0.80%	0.09%	1.62%	1.64%	**1.21%**
Ameiurus natalis	0.05%	0.43%	0.39%	0.00%	0.12%	**0.11%**	0.12%	0.00%	0.00%	0.00%	0.21%	**0.09%**
Ameiurus nebulosus	0.98%	0.69%	0.91%	1.50%	0.71%	**0.93%**	0.22%	1.05%	0.70%	0.21%	0.42%	**0.43%**
Ictalurus punctatus	0.01%	0.00%	0.00%	0.02%	0.00%	**0.01%**	0.00%	0.00%	0.00%	0.00%	0.00%	**0.00%**
Aplodinotus grunniens	0.09%	0.43%	0.78%	0.25%	0.01%	**0.15%**	0.04%	0.20%	0.12%	0.13%	0.03%	**0.08%**
*Anguilla rostrata**	0.00%	0.36%	0.00%	0.12%	0.05%	**0.06%**	0.00%	0.28%	0.07%	0.15%	0.02%	**0.07%**
Lepisosteus osseus	0.00%	1.55%	2.35%	0.15%	0.01%	**0.27%**	0.00%	0.73%	0.23%	0.38%	0.02%	**0.18%**
*Neogobius melanostomus***	0.67%	1.37%	0.46%	0.62%	0.91%	**0.79%**	0.77%	1.58%	1.12%	0.42%	1.28%	**0.97%**
*Alosa pseudoharengus***	0.39%	1.01%	1.69%	0.00%	0.51%	**0.50%**	0.28%	1.93%	1.42%	0.71%	0.23%	**0.70%**
Dorosoma cepedianum	0.01%	2.78%	1.30%	1.37%	0.03%	**0.50%**	0.72%	6.47%	5.44%	1.62%	0.47%	**2.18%**
Fundulus diaphanus	0.12%	0.04%	0.00%	0.05%	0.15%	**0.11%**	0.13%	0.08%	0.02%	0.13%	0.17%	**0.11%**
Lethenteron appendix	0.04%	0.00%	0.13%	0.00%	0.03%	**0.03%**	0.07%	0.00%	0.16%	0.00%	0.02%	**0.05%**
*Petromyzon marinus***	0.00%	0.00%	0.00%	0.00%	0.00%	**0.00%**	0.00%	0.00%	0.00%	0.00%	0.00%	**0.00%**
*Carassius auratus***	0.29%	0.29%	0.13%	0.37%	0.28%	**0.29%**	0.45%	0.03%	0.00%	0.65%	0.35%	**0.34%**
Cyprinella spiloptera	0.00%	0.00%	0.00%	0.00%	0.00%	**0.00%**	0.12%	0.00%	0.05%	0.25%	0.00%	**0.09%**
*Cyprinus carpio***	1.72%	3.10%	2.80%	4.89%	0.68%	**1.96%**	1.41%	0.80%	0.51%	2.33%	0.96%	**1.26%**
Labidesthes sicculus	0.00%	0.00%	0.00%	0.00%	0.00%	**0.00%**	0.47%	1.61%	0.00%	0.21%	1.64%	**0.76%**
Luxilus chrysocephalus	0.06%	0.00%	0.07%	0.15%	0.01%	**0.05%**	0.50%	0.18%	0.28%	0.80%	0.24%	**0.42%**
Luxilus cornutus	0.00%	0.00%	0.00%	0.00%	0.00%	**0.00%**	0.05%	0.03%	0.00%	0.15%	0.00%	**0.04%**
Nocomis biguttatus	1.14%	0.40%	0.07%	1.20%	1.07%	**1.01%**	1.26%	0.28%	0.07%	1.22%	1.46%	**1.01%**
Notemigonus crysoleucas	0.31%	0.00%	0.00%	0.52%	0.19%	**0.25%**	0.61%	0.23%	0.00%	1.22%	0.35%	**0.52%**
Notropis atherinoides	24.89%	12.81%	33.49%	14.62%	24.34%	**22.75%**	19.91%	12.05%	47.31%	8.07%	5.91%	**17.91%**
Notropis hudsonius	7.57%	0.69%	1.30%	11.10%	5.25%	**6.36%**	6.29%	2.13%	5.42%	6.05%	4.54%	**5.24%**
Notropis volucellus	0.00%	0.00%	0.00%	0.00%	0.00%	**0.00%**	0.01%	0.13%	0.00%	0.08%	0.03%	**0.04%**
Pimephales notatus	4.70%	0.83%	0.00%	3.32%	4.89%	**4.01%**	5.18%	0.53%	0.84%	6.05%	4.58%	**4.00%**
Pimephales promelas	0.01%	0.00%	0.07%	0.00%	0.00%	**0.01%**	0.00%	0.00%	0.00%	0.00%	0.00%	**0.00%**
Scardinius erythrophthalmus	0.20%	0.32%	0.13%	0.47%	0.14%	**0.22%**	0.27%	0.23%	0.05%	0.29%	0.38%	**0.26%**
Semotilus atromaculatus	0.00%	0.00%	0.00%	0.00%	0.00%	**0.00%**	0.01%	0.00%	0.00%	0.02%	0.00%	**0.01%**
Etheostoma caeruleum	0.19%	0.00%	0.07%	0.30%	0.12%	**0.16%**	0.07%	0.00%	0.00%	0.11%	0.05%	**0.05%**
Etheostoma flabellare	0.02%	0.00%	0.00%	0.05%	0.01%	**0.02%**	0.00%	0.00%	0.00%	0.00%	0.00%	**0.00%**
Etheostoma nigrum	0.02%	0.00%	0.00%	0.00%	0.02%	**0.01%**	0.01%	0.00%	0.02%	0.00%	0.00%	**0.01%**
Perca flavescens	7.33%	12.09%	1.95%	7.66%	9.32%	**8.17%**	11.30%	24.89%	10.30%	19.68%	14.10%	**14.75%**
Percina caprodes	0.26%	0.07%	0.33%	0.67%	0.04%	**0.23%**	0.20%	0.05%	0.09%	0.27%	0.12%	**0.16%**
Sander vitreus	0.01%	0.04%	0.00%	0.05%	0.00%	**0.01%**	0.43%	0.08%	0.00%	0.67%	0.32%	**0.34%**
*Esox americanus vermiculatus**	0.02%	0.00%	0.00%	0.00%	0.02%	**0.01%**	0.00%	0.00%	0.00%	0.00%	0.00%	**0.00%**
Esox lucius	0.05%	0.22%	0.52%	0.00%	0.05%	**0.08%**	0.03%	0.15%	0.09%	0.06%	0.05%	**0.06%**

Species	2015 UPPER	LOWER	SPRING	SUMMER	FALL	TOTAL	2016 UPPER	LOWER	SPRING	SUMMER	FALL	TOTAL
Esox masquinongy	0.15%	0.18%	0.72%	0.12%	0.08%	**0.15%**	0.22%	0.08%	0.35%	0.04%	0.18%	**0.18%**
Esox masquinongy X Esox lucius	0.00%	0.00%	0.00%	0.00%	0.00%	**0.00%**	0.00%	0.03%	0.00%	0.02%	0.00%	**0.01%**
Umbra limi	0.01%	0.00%	0.00%	0.00%	0.01%	**0.01%**	0.00%	0.00%	0.00%	0.00%	0.00%	**0.00%**
Cottus bairdii	0.03%	0.04%	0.00%	0.05%	0.03%	**0.03%**	0.02%	0.00%	0.00%	0.02%	0.02%	**0.01%**
Osmerus mordax	6.39%	5.59%	4.30%	0.97%	8.63%	**6.25%**	1.66%	0.35%	4.37%	0.00%	0.30%	**1.33%**
Carpiodes cyprinus	0.02%	0.00%	0.13%	0.00%	0.00%	**0.01%**	0.00%	0.08%	0.07%	0.00%	0.00%	**0.02%**
Catostomus commersonii	32.14%	26.74%	8.14%	36.65%	32.52%	**31.19%**	33.98%	23.16%	10.16%	32.27%	44.15%	**31.23%**
Hypentelium nigricans	0.13%	0.00%	0.07%	0.12%	0.11%	**0.11%**	0.15%	0.03%	0.14%	0.17%	0.08%	**0.12%**
Moxostoma anisurum	0.00%	0.14%	0.26%	0.00%	0.00%	**0.03%**	0.00%	0.05%	0.05%	0.00%	0.00%	**0.01%**
Moxostoma erythrurum	0.04%	0.40%	0.65%	0.12%	0.01%	**0.10%**	0.02%	0.05%	0.00%	0.04%	0.03%	**0.03%**
Moxostoma macrolepidotum	0.63%	1.77%	0.85%	0.30%	1.03%	**0.83%**	0.80%	1.76%	0.91%	1.37%	0.90%	**1.04%**
Moxostoma sp.	0.02%	0.29%	0.07%	0.02%	0.08%	**0.06%**	0.00%	0.00%	0.00%	0.00%	0.00%	**0.00%**
Moxostoma valenciennesi	3.78%	2.67%	11.53%	2.59%	2.78%	**3.59%**	4.82%	3.71%	3.12%	2.90%	6.64%	**4.54%**
Ambloplites rupestris	0.52%	0.18%	0.07%	0.67%	0.43%	**0.46%**	0.88%	0.50%	0.16%	0.67%	1.27%	**0.78%**
Lepomis cyanellus	0.00%	0.04%	0.00%	0.00%	0.01%	**0.01%**	0.00%	0.03%	0.00%	0.00%	0.02%	**0.01%**
Lepomis gibbosus	0.19%	0.11%	0.00%	0.10%	0.23%	**0.17%**	0.36%	0.00%	0.00%	0.50%	0.27%	**0.27%**
Lepomis macrochirus	0.31%	0.29%	0.00%	0.05%	0.45%	**0.31%**	0.27%	0.23%	0.00%	0.19%	0.48%	**0.26%**
Lepomis sp.	0.02%	0.00%	0.00%	0.05%	0.00%	**0.01%**	0.00%	0.00%	0.00%	0.00%	0.00%	**0.00%**
Micropterus dolomieu	1.32%	9.82%	15.83%	2.22%	1.08%	**2.82%**	1.15%	5.14%	3.63%	2.35%	1.08%	**2.17%**
Micropterus salmoides	0.89%	3.18%	0.26%	1.15%	1.51%	**1.29%**	2.63%	3.31%	0.14%	5.00%	2.95%	**2.80%**
Pomoxis annularis	0.00%	0.00%	0.00%	0.00%	0.00%	**0.00%**	0.00%	0.00%	0.00%	0.00%	0.00%	**0.00%**
Pomoxis nigromaculatus	0.02%	0.04%	0.00%	0.00%	0.03%	**0.02%**	0.10%	0.00%	0.00%	0.08%	0.12%	**0.08%**
Morone americana	0.28%	2.42%	0.00%	0.10%	0.97%	**0.66%**	0.36%	1.30%	0.05%	0.04%	1.36%	**0.60%**
Morone chrysops	0.07%	0.00%	0.46%	0.05%	0.00%	**0.06%**	0.09%	0.13%	0.07%	0.23%	0.03%	**0.10%**
*Oncorhynchus kisutch***	0.00%	0.29%	0.00%	0.00%	0.08%	**0.05%**	0.00%	0.18%	0.07%	0.00%	0.06%	**0.04%**
*Oncorhynchus mykiss***	0.02%	0.61%	0.26%	0.00%	0.16%	**0.13%**	0.02%	0.25%	0.12%	0.00%	0.11%	**0.08%**
*Oncorhynchus tshawytscha***	0.00%	2.49%	4.04%	0.02%	0.06%	**0.44%**	0.00%	2.03%	1.65%	0.00%	0.15%	**0.52%**
Salmo salar	0.00%	0.04%	0.00%	0.00%	0.01%	**0.01%**	0.00%	0.00%	0.00%	0.00%	0.00%	**0.00%**
*Salmo trutta***	0.00%	0.36%	0.46%	0.00%	0.03%	**0.06%**	0.01%	0.53%	0.47%	0.04%	0.00%	**0.14%**
Salmo trutta X Salvelinus fontinalis	0.00%	0.04%	0.07%	0.00%	0.00%	**0.01%**	0.00%	0.00%	0.00%	0.00%	0.00%	**0.00%**
Salvelinus namaycush	0.00%	0.07%	0.00%	0.00%	0.02%	**0.01%**	0.00%	0.03%	0.00%	0.00%	0.02%	**0.01%**
Percopsis omiscomaycus	0.01%	0.00%	0.00%	0.00%	0.01%	**0.01%**	0.00%	0.00%	0.00%	0.00%	0.00%	**0.00%**

Table 3. *(continued). Summary of relative abundance (expressed as percentage of total catch, per column) for each species captured by year, season, and river section. *SARA-listed or COSEWIC-assessed species, **non-native species*

	2017						All years					
Species	**UPPER**	**LOWER**	**SPRING**	**SUMMER**	**FALL**	**TOTAL**	**UPPER**	**LOWER**	**SPRING**	**SUMMER**	**FALL**	**TOTAL**
Amia calva	0.19%	0.70%	0.18%	0.50%	0.18%	**0.32%**	0.11%	0.71%	0.19%	0.45%	0.14%	**0.25%**
Ameiurus melas	0.88%	0.43%	1.28%	0.46%	0.58%	**0.76%**	1.46%	1.00%	0.93%	2.20%	0.99%	**1.36%**
Ameiurus natalis	0.16%	0.00%	0.00%	0.27%	0.00%	**0.12%**	0.10%	0.13%	0.07%	0.09%	0.14%	**0.11%**
Ameiurus nebulosus	1.39%	0.23%	1.34%	0.80%	1.28%	**1.09%**	0.80%	0.72%	0.97%	0.80%	0.68%	**0.78%**
Ictalurus punctatus	0.00%	0.00%	0.00%	0.00%	0.00%	**0.00%**	0.00%	0.00%	0.00%	0.01%	0.00%	**0.00%**
Aplodinotus grunniens	0.15%	0.39%	0.51%	0.07%	0.04%	**0.21%**	0.08%	0.32%	0.37%	0.14%	0.02%	**0.14%**
*Anguilla rostrata**	0.00%	0.31%	0.18%	0.05%	0.00%	**0.08%**	0.00%	0.31%	0.10%	0.11%	0.03%	**0.07%**
Lepisosteus osseus	0.00%	1.13%	0.75%	0.07%	0.04%	**0.29%**	0.00%	1.08%	0.77%	0.21%	0.02%	**0.24%**
*Neogobius melanostomus***	0.20%	0.12%	0.18%	0.07%	0.40%	**0.18%**	0.60%	1.11%	0.66%	0.37%	0.98%	**0.71%**
*Alosa pseudoharengus ***	0.93%	1.01%	0.03%	2.13%	0.04%	**0.95%**	0.47%	1.40%	0.96%	0.97%	0.36%	**0.68%**
Dorosoma cepedianum	1.01%	27.50%	19.23%	0.73%	4.74%	**7.85%**	0.50%	11.18%	9.78%	1.25%	0.74%	**2.91%**
Fundulus diaphanus	0.04%	0.04%	0.00%	0.09%	0.00%	**0.04%**	0.11%	0.05%	0.01%	0.09%	0.14%	**0.09%**
Lethenteron appendix	0.16%	0.00%	0.06%	0.00%	0.44%	**0.12%**	0.08%	0.00%	0.12%	0.00%	0.07%	**0.06%**
*Petromyzon marinus***	0.00%	0.04%	0.03%	0.00%	0.00%	**0.01%**	0.00%	0.01%	0.01%	0.00%	0.00%	**0.00%**
*Carassius auratus***	0.27%	0.08%	0.24%	0.25%	0.13%	**0.22%**	0.34%	0.12%	0.11%	0.43%	0.28%	**0.29%**
Cyprinella spiloptera	0.53%	0.08%	0.57%	0.48%	0.04%	**0.41%**	0.17%	0.02%	0.23%	0.25%	0.01%	**0.13%**
*Cyprinus carpio***	1.66%	1.90%	1.76%	2.06%	1.02%	**1.72%**	1.59%	1.79%	1.35%	3.02%	0.82%	**1.64%**
Labidesthes sicculus	0.97%	2.95%	0.33%	0.73%	4.65%	**1.48%**	0.40%	1.50%	0.12%	0.32%	1.12%	**0.65%**
Luxilus chrysocephalus	1.50%	0.00%	1.79%	1.15%	0.04%	**1.11%**	0.56%	0.08%	0.79%	0.72%	0.09%	**0.45%**
Luxilus cornutus	0.05%	0.00%	0.00%	0.09%	0.00%	**0.04%**	0.03%	0.01%	0.00%	0.08%	0.00%	**0.03%**
Nocomis biguttatus	2.04%	0.31%	1.46%	2.06%	0.89%	**1.59%**	1.39%	0.32%	0.58%	1.49%	1.19%	**1.15%**
Notemigonus crysoleucas	0.22%	0.04%	0.21%	0.23%	0.00%	**0.17%**	0.40%	0.11%	0.08%	0.68%	0.22%	**0.33%**
Notropis atherinoides	27.75%	10.83%	6.96%	34.11%	27.02%	**23.39%**	23.73%	11.94%	30.29%	18.73%	18.24%	**21.07%**
Notropis hudsonius	11.96%	2.99%	8.33%	13.45%	4.25%	**9.65%**	8.12%	1.94%	5.79%	10.05%	4.88%	**6.73%**
Notropis volucellus	0.01%	0.00%	0.00%	0.00%	0.04%	**0.01%**	0.01%	0.05%	0.00%	0.03%	0.02%	**0.02%**
Pimephales notatus	8.33%	0.27%	11.76%	4.28%	1.86%	**6.25%**	5.71%	0.55%	4.68%	4.63%	4.43%	**4.55%**
Pimephales promelas	0.00%	0.00%	0.00%	0.00%	0.00%	**0.00%**	0.00%	0.00%	0.01%	0.00%	0.00%	**0.00%**
Scardinius erythrophthalmus	0.64%	0.66%	0.54%	1.01%	0.09%	**0.64%**	0.33%	0.38%	0.24%	0.59%	0.22%	**0.34%**
Semotilus atromaculatus	0.00%	0.00%	0.00%	0.00%	0.00%	**0.00%**	0.00%	0.00%	0.00%	0.01%	0.00%	**0.00%**
Etheostoma caeruleum	0.04%	0.00%	0.09%	0.00%	0.00%	**0.03%**	0.11%	0.00%	0.04%	0.13%	0.08%	**0.09%**
Etheostoma flabellare	0.00%	0.00%	0.00%	0.00%	0.00%	**0.00%**	0.01%	0.00%	0.00%	0.02%	0.01%	**0.01%**
Etheostoma nigrum	0.01%	0.04%	0.03%	0.00%	0.04%	**0.02%**	0.01%	0.01%	0.02%	0.00%	0.02%	**0.01%**
Perca flavescens	13.60%	20.66%	9.76%	15.42%	23.83%	**15.42%**	10.23%	19.92%	8.71%	14.59%	12.70%	**12.42%**
Percina caprodes	0.37%	0.00%	0.69%	0.07%	0.04%	**0.27%**	0.26%	0.04%	0.35%	0.33%	0.07%	**0.21%**
Sander vitreus	0.12%	0.16%	0.00%	0.21%	0.18%	**0.13%**	0.19%	0.09%	0.00%	0.33%	0.13%	**0.16%**

	2017						All years					
Species	**UPPER**	**LOWER**	**SPRING**	**SUMMER**	**FALL**	**TOTAL**	**UPPER**	**LOWER**	**SPRING**	**SUMMER**	**FALL**	**TOTAL**
*Esox americanus vermiculatus**	0.00%	0.00%	0.00%	0.00%	0.00%	**0.00%**	0.01%	0.00%	0.00%	0.00%	0.01%	**0.00%**
Esox lucius	0.03%	0.23%	0.09%	0.02%	0.18%	**0.08%**	0.04%	0.19%	0.16%	0.03%	0.06%	**0.07%**
Esox masquinongy	0.19%	0.16%	0.15%	0.07%	0.44%	**0.18%**	0.18%	0.13%	0.34%	0.08%	0.16%	**0.17%**
Esox masquinongy X Esox lucius	0.00%	0.00%	0.00%	0.00%	0.00%	**0.00%**	0.00%	0.01%	0.00%	0.01%	0.00%	**0.00%**
Umbra limi	0.00%	0.00%	0.00%	0.00%	0.00%	**0.00%**	0.00%	0.00%	0.00%	0.00%	0.01%	**0.00%**
Cottus bairdii	0.00%	0.00%	0.00%	0.00%	0.00%	**0.00%**	0.02%	0.01%	0.00%	0.02%	0.02%	**0.02%**
Osmerus mordax	2.04%	0.97%	0.27%	0.00%	7.40%	**1.76%**	3.66%	2.08%	2.86%	0.30%	5.58%	**3.30%**
Carpiodes cyprinus	0.00%	0.08%	0.03%	0.00%	0.04%	**0.02%**	0.01%	0.05%	0.07%	0.00%	0.01%	**0.02%**
Catostomus commersonii	13.46%	6.02%	15.95%	9.46%	9.03%	**11.54%**	28.50%	19.49%	11.93%	26.02%	33.78%	**26.47%**
Hypentelium nigricans	0.19%	0.00%	0.27%	0.09%	0.04%	**0.14%**	0.15%	0.01%	0.17%	0.13%	0.09%	**0.12%**
Moxostoma anisurum	0.00%	0.70%	0.36%	0.09%	0.09%	**0.18%**	0.00%	0.26%	0.20%	0.03%	0.01%	**0.06%**
Moxostoma erythrurum	0.00%	0.54%	0.09%	0.11%	0.27%	**0.14%**	0.02%	0.29%	0.14%	0.09%	0.05%	**0.08%**
Moxostoma macrolepidotum	0.54%	0.62%	0.57%	0.60%	0.49%	**0.56%**	0.67%	1.45%	0.77%	0.78%	0.92%	**0.85%**
Moxostoma sp.	0.03%	0.00%	0.00%	0.05%	0.00%	**0.02%**	0.01%	0.09%	0.01%	0.02%	0.04%	**0.03%**
Moxostoma valenciennesi	3.07%	3.15%	4.30%	2.20%	3.01%	**3.09%**	4.00%	3.25%	4.95%	2.57%	4.15%	**3.83%**
Ambloplites rupestris	0.62%	0.12%	0.15%	0.94%	0.13%	**0.49%**	0.67%	0.30%	0.14%	0.76%	0.69%	**0.59%**
Lepomis cyanellus	0.03%	0.00%	0.03%	0.02%	0.00%	**0.02%**	0.01%	0.02%	0.01%	0.01%	0.01%	**0.01%**
Lepomis gibbosus	0.54%	0.12%	0.51%	0.50%	0.18%	**0.43%**	0.33%	0.06%	0.19%	0.38%	0.24%	**0.27%**
Lepomis macrochirus	0.66%	0.04%	0.06%	0.89%	0.40%	**0.50%**	0.38%	0.19%	0.02%	0.38%	0.46%	**0.34%**
Lepomis sp.	0.00%	0.00%	0.00%	0.00%	0.00%	**0.00%**	0.01%	0.00%	0.00%	0.02%	0.00%	**0.00%**
Micropterus dolomieu	0.51%	4.62%	3.52%	0.48%	0.80%	**1.57%**	1.07%	6.39%	5.63%	1.69%	1.05%	**2.27%**
Micropterus salmoides	2.37%	1.20%	1.34%	3.25%	0.84%	**2.07%**	1.87%	2.69%	0.60%	3.24%	1.93%	**2.05%**
Pomoxis annularis	0.01%	0.00%	0.03%	0.00%	0.00%	**0.01%**	0.00%	0.00%	0.01%	0.00%	0.00%	**0.00%**
Pomoxis nigromaculatus	0.05%	0.00%	0.03%	0.05%	0.04%	**0.04%**	0.06%	0.01%	0.01%	0.05%	0.06%	**0.05%**
Morone americana	0.34%	0.23%	0.12%	0.27%	0.66%	**0.31%**	0.32%	1.34%	0.07%	0.14%	1.07%	**0.55%**
Morone chrysops	0.07%	0.43%	0.42%	0.05%	0.00%	**0.16%**	0.08%	0.17%	0.26%	0.11%	0.01%	**0.10%**
*Oncorhynchus kisutch***	0.00%	0.39%	0.00%	0.00%	0.44%	**0.10%**	0.00%	0.27%	0.03%	0.00%	0.12%	**0.06%**
*Oncorhynchus mykiss***	0.04%	2.95%	0.81%	0.00%	2.30%	**0.79%**	0.02%	1.10%	0.39%	0.00%	0.39%	**0.27%**
*Oncorhynchus tshawytscha***	0.00%	2.99%	2.15%	0.00%	0.22%	**0.77%**	0.00%	2.43%	2.23%	0.01%	0.11%	**0.55%**
Salmo salar	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.01%	0.00%	0.00%	0.01%	**0.00%**
*Salmo trutta***	0.00%	1.28%	0.48%	0.00%	0.75%	**0.33%**	0.00%	0.69%	0.47%	0.02%	0.10%	**0.16%**
Salmo trutta X Salvelinus fontinalis	0.00%	0.00%	0.00%	0.00%	0.00%	**0.00%**	0.00%	0.01%	0.01%	0.00%	0.00%	**0.00%**
Salvelinus namaycush	0.00%	0.31%	0.00%	0.00%	0.35%	**0.08%**	0.00%	0.12%	0.00%	0.00%	0.06%	**0.03%**
Percopsis omiscomaycus	0.00%	0.00%	0.00%	0.00%	0.00%	**0.00%**	0.00%	0.00%	0.00%	0.00%	0.01%	**0.00%**

Table 4. *Relative abundance of fishes (expressed as percentage of total catch, per column), by family, during combined 2015-2017 sampling.*

Family	Upper	Lower	Spring	Summer	Fall	Total
Bowfin	0.11%	0.71%	0.19%	0.45%	0.14%	0.25%
Catfish	2.37%	1.84%	1.96%	3.10%	1.80%	2.25%
Drum	0.08%	0.32%	0.37%	0.14%	0.02%	0.14%
Eel	0.00%	0.31%	0.10%	0.11%	0.03%	0.07%
Gar	0.00%	1.08%	0.77%	0.21%	0.02%	0.24%
Goby	0.60%	1.11%	0.66%	0.37%	0.98%	0.71%
Herring	0.97%	12.58%	10.73%	2.22%	1.10%	3.59%
Killifish	0.11%	0.05%	0.01%	0.09%	0.14%	0.09%
Lamprey	0.08%	0.01%	0.13%	0.00%	0.07%	0.06%
Minnow	42.77%	18.80%	44.27%	41.04%	31.51%	37.36%
Perch	10.81%	20.06%	9.12%	15.39%	13.00%	12.90%
Pike	0.23%	0.33%	0.50%	0.11%	0.24%	0.26%
Sculpin	0.02%	0.01%	0.00%	0.02%	0.02%	0.02%
Smelt	3.66%	2.08%	2.86%	0.30%	5.58%	3.30%
Sucker	33.36%	24.88%	18.25%	29.66%	39.06%	31.45%
Sunfish	4.39%	9.67%	6.61%	6.53%	4.44%	5.58%
Temperate Basses	0.40%	1.51%	0.33%	0.25%	1.08%	0.65%
Trout	0.03%	4.63%	3.14%	0.02%	0.79%	1.07%
Trout-Perch	0.00%	0.00%	0.00%	0.00%	0.01%	0.00%

Table 5. *Summary of abiotic habitat: average water quality parameter measures during sampling at each station on the Niagara River, 2015-2017.*

		2015			2016			2017			All years		
Measure	**Season**	**Upper**	**Lower**	**Total**	**Upper**	**Lower**	**Total**	**Upper**	**Lower**	**Total**	**Upper**	**Lower**	**Total**
Air Temperature (°C)	Spring	24.3	22.2	**23.4**	24.6	18.1	**22.0**	24.8	21.4	**22.8**	24.5	20.6	**22.8**
	Summer	23.7	25.7	**24.5**	25.3	27.3	**26.1**	23.1	28.0	**25.0**	24.0	27.0	**25.2**
	Fall	16.7	15.1	**16.1**	12.8	10.8	**12.0**	5.0	7.7	**6.2**	11.9	11.2	**11.6**
	Combined	**21.6**	**21.0**	**21.3**	**20.9**	**18.7**	**20.0**	**17.0**	**19.0**	**17.9**	**20.0**	**19.6**	**19.8**
Water Temperature (°C)	Spring	15.49	17.29	**16.21**	15.36	17.38	**16.18**	21.58	20.68	**21.10**	16.82	18.45	**17.53**
	Summer	23.00	23.15	**23.06**	25.06	25.20	**25.12**	22.58	24.01	**23.15**	23.55	24.12	**23.78**
	Fall	15.59	14.69	**15.23**	14.17	13.93	**14.08**	9.20	11.13	**9.97**	12.99	13.25	**13.09**
	Combined	**18.03**	**18.37**	**18.17**	**18.20**	**18.84**	**18.46**	**17.18**	**18.61**	**17.80**	**17.83**	**18.61**	**18.15**
Conductivity (μS)	Spring	230.0	245.0	**236.6**	349.0	462.5	**394.4**	261.6	258.9	**230.2**	283.2	322.4	**300.3**
	Summer	271.1	273.9	**272.3**	558.5	558.7	**558.6**	272.5	279.8	**275.4**	367.4	370.8	**368.8**
	Fall	454.8	445.2	**451.0**	237.4	230.4	**234.6**	206.6	206.8	**206.7**	299.6	294.2	**297.4**
	Combined	**318.7**	**321.6**	**319.8**	**381.6**	**417.2**	**395.9**	**244.5**	**248.5**	**246.3**	**318.3**	**329.1**	**322.8**
Dissolved Oxygen (mg/L)	Spring	10.78	10.52	**10.68**	4.55	10.10	**6.77**	9.02	9.76	**9.42**	7.97	10.13	**8.91**
	Summer	8.54	8.94	**8.70**	7.60	8.76	**8.07**	8.64	9.16	**8.85**	8.26	8.95	**8.54**
	Fall	9.83	10.63	**10.15**	9.98	10.98	**10.38**	10.88	11.68	**11.20**	10.23	11.10	**10.58**
	Combined	**9.72**	**10.03**	**9.84**	**7.38**	**9.95**	**8.41**	**9.59**	**10.20**	**9.86**	**8.86**	**10.06**	**9.35**
pH	Spring	8.40	8.32	**8.37**	8.92	8.95	**8.93**	8.41	8.30	**8.35**	8.60	8.52	**8.57**
	Summer	8.63	8.54	**8.59**	9.33	9.17	**9.27**	8.56	8.44	**8.51**	8.84	8.72	**8.79**
	Fall	8.65	8.58	**8.62**	9.37	9.43	**9.40**	8.76	8.80	**8.78**	8.93	8.94	**8.93**
	Combined	**8.56**	**8.48**	**8.53**	**9.21**	**9.19**	**9.20**	**8.60**	**8.51**	**8.56**	**8.80**	**8.73**	**8.77**
Turbidity (ntu)	Spring	1.91	2.94	**2.32**	1.72	2.57	**2.06**	1.79	3.74	**2.83**	1.81	3.09	**2.36**
	Summer	1.78	1.39	**1.62**	2.55	1.41	**2.10**	1.47	1.74	**1.58**	1.93	1.51	**1.76**
	Fall	1.40	4.26	**2.54**	3.05	1.95	**2.61**	19.83	6.76	**14.60**	8.09	4.32	**6.58**
	Combined	**1.69**	**2.86**	**2.16**	**2.44**	**1.98**	**2.26**	**8.65**	**4.08**	**6.66**	**4.05**	**2.97**	**3.61**

Table 6. *Average water depth and velocity measures during sampling at each station on the Niagara River, 2015-2017.*

		2015			2016			2017			All Years		
Measure	**Season**	**Upper**	**Lower**	**Total**	**Upper**	**Lower**	**Total**	**Upper**	**Lower**	**Total**	**Upper**	**Lower**	**Total**
Average depth (m)	Spring	1.9	1.5	**1.7**	1.7	1.9	**1.8**	1.6	2.2	**1.9**	1.7	1.9	**1.8**
	Summer	1.5	1.4	**1.5**	1.7	1.9	**1.7**	2.0	2.1	**2.0**	1.7	1.8	**1.7**
	Fall	1.2	1.2	**1.2**	1.7	1.9	**1.8**	1.8	2.0	**1.9**	1.6	1.7	**1.6**
	Combined	**1.5**	**1.4**	**1.5**	**1.7**	**1.9**	**1.8**	**1.8**	**2.1**	**1.9**	**1.7**	**1.8**	**1.7**
Maximum depth (m)	Spring	4.9	2.2	**4.9**	3.5	2.4	**3.5**	2.1	2.7	**2.7**	4.9	2.7	**4.9**
	Summer	3.5	2.3	**3.5**	3.3	2.3	**3.3**	3.0	2.8	**3.0**	3.5	2.8	**3.8**
	Fall	2.3	1.9	**2.3**	2.8	2.4	**2.8**	2.2	2.4	**2.4**	2.8	2.4	**2.8**
	Combined	**4.9**	**2.3**	**4.9**	**3.5**	**2.4**	**2.3**	**3.0**	**2.8**	**3.0**	**4.9**	**2.8**	**4.9**
Minimum depth (m)	Spring	0.5	0.7	**0.5**	1.1	1.4	**1.1**	1.4	1.7	**1.4**	0.5	0.7	**0.5**
	Summer	0.7	0.9	**0.7**	1.1	1.3	**1.1**	1.3	1.6	**1.3**	0.7	0.9	**0.7**
	Fall	0.5	0.5	**0.5**	1.2	1.4	**1.2**	1.3	1.2	**1.2**	0.5	0.5	**0.5**
	Combined	**0.5**	**0.5**	**0.5**	**1.1**	**1.3**	**1.1**	**1.3**	**1.3**	**1.3**	**0.5**	**0.5**	**0.5**
Average water velocity (m/s)	Spring	0.34	0.20	**0.28**	0.30	0.19	**0.26**	0.16	0.13	**0.14**	0.29	0.18	**0.24**
	Summer	0.14	0.10	**0.13**	0.13	0.11	**0.12**	0.14	0.13	**0.13**	0.14	0.11	**0.13**
	Fall	0.16	0.14	**0.15**	0.21	0.11	**0.17**	0.18	0.20	**0.18**	0.18	0.15	**0.17**
	Combined	**0.21**	**0.15**	**0.18**	**0.21**	**0.14**	**0.18**	**0.16**	**0.15**	**0.15**	**0.20**	**0.15**	**0.18**
Maximum water velocity (m/s)	Spring	0.93	0.44	**0.93**	0.59	0.66	**0.66**	0.49	0.47	**0.49**	0.93	0.66	**0.93**
	Summer	0.51	0.25	**0.51**	0.32	0.43	**0.43**	0.47	0.35	**0.47**	0.51	0.43	**0.51**
	Fall	0.48	0.55	**0.55**	0.68	0.34	**0.68**	0.55	0.80	**0.80**	0.68	0.80	**0.80**
	Combined	**0.93**	**0.55**	**0.93**	**0.68**	**0.66**	**0.68**	**0.55**	**0.80**	**0.80**	**0.93**	**0.80**	**0.93**
Minimum water velocity (m/s)	Spring	0.04	0.02	**0.02**	0.02	0.05	**0.02**	0.02	0.00	**0.00**	0.02	0.00	**0.00**
	Summer	0.01	0.02	**0.01**	0.00	0.00	**0.00**	0.00	0.00	**0.00**	0.00	0.00	**0.00**
	Fall	0.01	0.01	**0.01**	0.01	0.00	**0.00**	0.01	0.00	**0.00**	0.01	0.00	**0.00**
	Combined	**0.01**	**0.01**	**0.01**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Table 7. *Summary of the most frequently occurring dominant substrate type recorded during all sampling events in the Niagara River, 2015-2017.*

Year	Section	Spring	Summer	Fall	Combined
2015	Upper	Clay	Sand	Silt	Sand
	Lower	Clay	Sand	Silt	Sand
	Total	Clay	Sand	Silt	Sand
2016	Upper	Silt	Sand	Silt	Silt
	Lower	Silt	Silt	Silt	Silt
	Total	Silt	Silt	Silt	Silt
2017	Upper	Sand	Silt	Sand	Cobble
	Lower	Cobble	Cobble	Silt	Cobble
	Total	Cobble	Silt	Cobble	Cobble
All years	Upper	Sand	Silt	Silt	Silt
	Lower	Silt	Sand	Silt	Silt
	Total	Sand	Sand	Silt	Silt

Table 8. *Most frequently occurring dominant aquatic and riparian vegetation type at sampling stations across seasons and years in the Niagara River, 2015-2017.*

		Dominant Aquatic Vegetation Type				**Dominant Riparian Vegetation Type**			
Year	**Section**	Spring	Summer	Fall	**Combined**	Spring	Summer	Fall	**Combined**
2015	**Upper**	Open Water	Submerged	Submerged	**Submerged**	Deciduous	Herbaceous	Deciduous	**Deciduous**
	Lower	Open Water	Submerged	Open Water	**Submerged**	Deciduous	Deciduous	Deciduous	**Deciduous**
	Total	**Open Water**	**Submerged**	**Submerged**	**Submerged**	**Deciduous**	**Deciduous**	**Deciduous**	**Deciduous**
2016	**Upper**	Open Water	Submerged	Submerged	**Submerged**	Deciduous	None	None	**None**
	Lower	Open Water	Submerged	Open Water	**Open Water**	Deciduous	Deciduous	None	**None**
	Total	**Open Water**	**Submerged**	**Open Water**	**Open Water**	**Deciduous**	**None**	**None**	**None**
2017	**Upper**	Submerged	Submerged	Open Water	**Submerged**	Deciduous	Deciduous	None	**Deciduous**
	Lower	Submerged	Open Water	Open Water	**Open Water**	Deciduous	Deciduous	None	**Deciduous**
	Total	**Submerged**	**Submerged**	**Open Water**	**Open Water**	**Deciduous**	**Deciduous**	**None**	**Deciduous**
All years	**Upper**	Open Water	Submerged	Submerged	**Submerged**	Deciduous	Deciduous	None	**Deciduous**
	Lower	Open Water	Submerged	Open Water	**Open Water**	Deciduous	Deciduous	None	**Deciduous**
	Total	**Open Water**	**Submerged**	**Open Water**	**Submerged**	**Deciduous**	**Deciduous**	**None**	**Deciduous**

Table 9. *List of aquatic vegetation species identified at sampling stations throughout all sampling events. Wild Celery, Vallisneria americana, was most commonly the dominant species of aquatic vegetation when aquatic vegetation present.*

Species Name	Common Name
Vallisneria americana	Wild Celery
Ceratophyllum demersum	Coontail
Myriophyllum sp.	Milfoil sp.
Stuckenia pectinatus	Sago pondweed
Elodea canadensis	Canadian waterweed
Potamogeton crispus	Curly-leaf pondweed
Potamogeton richardsonii	Richardson's pondweed
filamentous algae	Filamentous algae
Phragmites australis	European Common Reed
Typha sp.	Cattail sp.
Lemna sp.	Duckweed sp.
Poaceae	Grass sp.

APPENDICES

Appendix 1. *Unique field number and date for seasonal sampling events at each of the 10 stations.*

Station code	Season	Field number	Date sampled
GLAP-NR-011	SPRING	2015-GLAP-NR-120615-011A	12-Jun-2015
GLAP-NR-011	SPRING	2016-GLAP-NR-250516-011A	25-May-2016
GLAP-NR-011	SPRING	2017-GLAP-NR-050717-011A	5-Jul-2017
GLAP-NR-011	SUMMER	2015-GLAP-NR-180815-011A	18-Aug-2015
GLAP-NR-011	SUMMER	2016-GLAP-NR-150816-011A	15-Aug-2016
GLAP-NR-011	SUMMER	2017-GLAP-NR-280817-011A	28-Aug-2017
GLAP-NR-011	FALL	2015-GLAP-NR-071015-011A	7-Oct-2015
GLAP-NR-011	FALL	2016-GLAP-NR-171016-011A	17-Oct-2016
GLAP-NR-011	FALL	2017-GLAP-NR-221117-011A	22-Nov-2017
GLAP-NR-012	SPRING	2015-GLAP-NR-120615-012A	12-Jun-2015
GLAP-NR-012	SPRING	2016-GLAP-NR-250516-012A	25-May-2016
GLAP-NR-012	SPRING	2017-GLAP-NR-060717-012A	6-Jul-2017
GLAP-NR-012	SUMMER	2015-GLAP-NR-180815-012A	18-Aug-2015
GLAP-NR-012	SUMMER	2016-GLAP-NR-150816-012A	15-Aug-2016
GLAP-NR-012	SUMMER	2017-GLAP-NR-280817-012A	28-Aug-2017
GLAP-NR-012	FALL	2015-GLAP-NR-071015-012A	7-Oct-2015
GLAP-NR-012	FALL	2016-GLAP-NR-171016-012A	17-Oct-2016
GLAP-NR-012	FALL	2017-GLAP-NR-221117-012A	22-Nov-2017
GLAP-NR-021	SPRING	2015-GLAP-NR-110615-021A	11-Jun-2015
GLAP-NR-021	SPRING	2016-GLAP-NR-260516-021A	26-May-2016
GLAP-NR-021	SPRING	2017-GLAP-NR-040717-021A	4-Jul-2017
GLAP-NR-021	SUMMER	2015-GLAP-NR-110815-021A	11-Aug-2015
GLAP-NR-021	SUMMER	2016-GLAP-NR-180816-021A	18-Aug-2016
GLAP-NR-021	SUMMER	2017-GLAP-NR-300817-021A	30-Aug-2017
GLAP-NR-021	FALL	2015-GLAP-NR-061015-021A	6-Oct-2015
GLAP-NR-021	FALL	2016-GLAP-NR-241016-021A	24-Oct-2016
GLAP-NR-021	FALL	2017-GLAP-NR-231117-021A	23-Nov-2017
GLAP-NR-022	SPRING	2015-GLAP-NR-110615-022A	11-Jun-2015
GLAP-NR-022	SPRING	2016-GLAP-NR-260516-022A	26-May-2016
GLAP-NR-022	SPRING	2017-GLAP-NR-040717-022A	4-Jul-2017
GLAP-NR-022	SUMMER	2015-GLAP-NR-110815-022A	11-Aug-2015
GLAP-NR-022	SUMMER	2016-GLAP-NR-180816-022A	18-Aug-2016
GLAP-NR-022	SUMMER	2017-GLAP-NR-300817-022A	30-Aug-2017
GLAP-NR-022	FALL	2015-GLAP-NR-061015-022A	6-Oct-2015
GLAP-NR-022	FALL	2016-GLAP-NR-261016-022A	26-Oct-2016
GLAP-NR-022	FALL	2017-GLAP-NR-231117-022A	23-Nov-2017
GLAP-NR-031	SPRING	2015-GLAP-NR-110615-031A	11-Jun-2015
GLAP-NR-031	SPRING	2016-GLAP-NR-270516-031A	27-May-2016
GLAP-NR-031	SPRING	2017-GLAP-NR-060717-031A	6-Jul-2017
GLAP-NR-031	SUMMER	2015-GLAP-NR-100815-031A	10-Aug-2015
GLAP-NR-031	SUMMER	2016-GLAP-NR-170816-031A	17-Aug-2016
GLAP-NR-031	SUMMER	2017-GLAP-NR-290817-031A	29-Aug-2017
GLAP-NR-031	FALL	2015-GLAP-NR-141015-031A	14-Oct-2015
GLAP-NR-031	FALL	2016-GLAP-NR-261016-031A	26-Oct-2016
GLAP-NR-031	FALL	2017-GLAP-NR-231117-031A	23-Nov-2017
GLAP-NR-032	SPRING	2015-GLAP-NR-110615-032A	11-Jun-2015
GLAP-NR-032	SPRING	2016-GLAP-NR-270516-032A	27-May-2016

Station code	Season	Field number	Date sampled
GLAP-NR-032	SPRING	2017-GLAP-NR-070717-032A	7-Jul-2017
GLAP-NR-032	SUMMER	2015-GLAP-NR-100815-032A	10-Aug-2015
GLAP-NR-032	SUMMER	2016-GLAP-NR-170816-032A	17-Aug-2016
GLAP-NR-032	SUMMER	2017-GLAP-NR-290817-032A	29-Aug-2017
GLAP-NR-032	FALL	2015-GLAP-NR-141015-032A	14-Oct-2015
GLAP-NR-032	FALL	2016-GLAP-NR-261016-032A	26-Oct-2016
GLAP-NR-032	FALL	2017-GLAP-NR-231117-032A	23-Nov-2017
GLAP-NR-041	SPRING	2015-GLAP-NR-100615-041A	10-Jun-2015
GLAP-NR-041	SPRING	2016-GLAP-NR-070616-041A	7-Jun-2016
GLAP-NR-041	SPRING	2017 Not Sampled	-
GLAP-NR-041	SUMMER	2015-GLAP-NR-250815-041A	25-Aug-2015
GLAP-NR-041	SUMMER	2016-GLAP-NR-080816-041A	8-Aug-2016
GLAP-NR-041	SUMMER	2017-GLAP-NR-310717-041A	31-Jul-2017
GLAP-NR-041	FALL	2015-GLAP-NR-051015-041A	5-Oct-2015
GLAP-NR-041	FALL	2016-GLAP-NR-021116-041A	2-Nov-2016
GLAP-NR-041	FALL	2017-GLAP-NR-151117-041A	15-Nov-2017
GLAP-NR-042	SPRING	2015-GLAP-NR-100615-042A	10-Jun-2015
GLAP-NR-042	SPRING	2016-GLAP-NR-070616-042A	7-Jun-2016
GLAP-NR-042	SPRING	2017 Not Sampled	-
GLAP-NR-042	SUMMER	2015-GLAP-NR-250815-042A	25-Aug-2015
GLAP-NR-042	SUMMER	2016-GLAP-NR-080816-042A	8-Aug-2016
GLAP-NR-042	SUMMER	2017-GLAP-NR-310717-042A	31-Jul-2017
GLAP-NR-042	FALL	2015-GLAP-NR-051015-042A	5-Oct-2015
GLAP-NR-042	FALL	2016-GLAP-NR-021116-042A	2-Nov-2016
GLAP-NR-042	FALL	2017-GLAP-NR-151117-042A	15-Nov-2017
GLAP-NR-051	SPRING	2015-GLAP-NR-100615-051A	10-Jun-2015
GLAP-NR-051	SPRING	2016-GLAP-NR-060616-051A	6-Jun-2016
GLAP-NR-051	SPRING	2017 Not Sampled	-
GLAP-NR-051	SUMMER	2015-GLAP-NR-210815-051A	21-Aug-2015
GLAP-NR-051	SUMMER	2016-GLAP-NR-100816-051A	10-Aug-2016
GLAP-NR-051	SUMMER	2017-GLAP-NR-010817-051A	1-Aug-2017
GLAP-NR-051	FALL	2015-GLAP-NR-151015-051A	15-Oct-2015
GLAP-NR-051	FALL	2016-GLAP-NR-251016-051A	25-Oct-2016
GLAP-NR-051	FALL	2017-GLAP-NR-061117-051A	6-Nov-2017
GLAP-NR-052	SPRING	2015-GLAP-NR-100615-052A	10-Jun-2015
GLAP-NR-052	SPRING	2016-GLAP-NR-060616-052A	6-Jun-2016
GLAP-NR-052	SPRING	2017-GLAP-NR-070717-052A	7-Jul-2017
GLAP-NR-052	SUMMER	2015-GLAP-NR-210815-052A	21-Aug-2015
GLAP-NR-052	SUMMER	2016-GLAP-NR-100816-052A	10-Aug-2016
GLAP-NR-052	SUMMER	2017-GLAP-NR-010817-052A	1-Aug-2017
GLAP-NR-052	FALL	2015-GLAP-NR-151015-052A	15-Oct-2015
GLAP-NR-052	FALL	2016-GLAP-NR-251016-052A	25-Oct-2016
GLAP-NR-052	FALL	2017-GLAP-NR-061117-052A	6-Nov-2017
GLAP-NR-061	SPRING	2015-GLAP-NR-090615-061A	9-Jun-2015
GLAP-NR-061	SPRING	2016-GLAP-NR-240516-061A	24-May-2016
GLAP-NR-061	SPRING	2017 Not Sampled	-
GLAP-NR-061	SUMMER	2015-GLAP-NR-240815-061A	24-Aug-2015
GLAP-NR-061	SUMMER	2016-GLAP-NR-090816-061A	9-Aug-2016
GLAP-NR-061	SUMMER	2017-GLAP-NR-310717-061A	31-Jul-2017
GLAP-NR-061	FALL	2015-GLAP-NR-081015-061A	8-Oct-2015
GLAP-NR-061	FALL	2016-GLAP-NR-011116-061A	1-Nov-2016
GLAP-NR-061	FALL	2017-GLAP-NR-151117-061A	15-Nov-2017
GLAP-NR-062	SPRING	2015-GLAP-NR-090615-062A	9-Jun-2015
GLAP-NR-062	SPRING	2016-GLAP-NR-240516-062A	24-May-2016
GLAP-NR-062	SPRING	Not Sampled	-

Station code	Season	Field number	Date sampled
GLAP-NR-062	SUMMER	2015-GLAP-NR-240815-062A	24-Aug-2015
GLAP-NR-062	SUMMER	2016-GLAP-NR-090816-062A	9-Aug-2016
GLAP-NR-062	SUMMER	2017-GLAP-NR-010817-062A	1-Aug-2017
GLAP-NR-062	FALL	2015-GLAP-NR-081015-062A	8-Oct-2015
GLAP-NR-062	FALL	2016-GLAP-NR-011116-062A	1-Nov-2016
GLAP-NR-062	FALL	2017-GLAP-NR-151117-062A	15-Nov-2017
GLAP-NR-071	SPRING	2015-GLAP-NR-170615-071A	17-Jun-2015
GLAP-NR-071	SPRING	2016-GLAP-NR-080616-071A	8-Jun-2016
GLAP-NR-071	SPRING	2017-GLAP-NR-260617-071A	26-Jun-2017
GLAP-NR-071	SUMMER	2015-GLAP-NR-200815-071A	20-Aug-2015
GLAP-NR-071	SUMMER	2016-GLAP-NR-020816-071A	2-Aug-2016
GLAP-NR-071	SUMMER	2017-GLAP-NR-040817-071A	4-Aug-2017
GLAP-NR-071	FALL	2015-GLAP-NR-131015-071A	13-Oct-2015
GLAP-NR-071	FALL	2016-GLAP-NR-181016-071A	18-Oct-2016
GLAP-NR-071	FALL	2017-GLAP-NR-081117-071A	8-Nov-2017
GLAP-NR-072	SPRING	2015-GLAP-NR-170615-072A	17-Jun-2015
GLAP-NR-072	SPRING	2016-GLAP-NR-080616-072A	8-Jun-2016
GLAP-NR-072	SPRING	2017-GLAP-NR-270617-072A	27-Jun-2017
GLAP-NR-072	SUMMER	2015-GLAP-NR-200815-072A	20-Aug-2015
GLAP-NR-072	SUMMER	2016-GLAP-NR-020816-072A	2-Aug-2016
GLAP-NR-072	SUMMER	2017-GLAP-NR-040817-072A	4-Aug-2017
GLAP-NR-072	FALL	2015-GLAP-NR-131015-072A	13-Oct-2015
GLAP-NR-072	FALL	2016-GLAP-NR-181016-072A	18-Oct-2016
GLAP-NR-072	FALL	2017-GLAP-NR-081117-072A	8-Nov-2017
GLAP-NR-081	SPRING	2015-GLAP-NR-190615-081A	19-Jun-2015
GLAP-NR-081	SPRING	2016-GLAP-NR-090616-081A	9-Jun-2016
GLAP-NR-081	SPRING	2017-GLAP-NR-270617-081A	27-Jun-2017
GLAP-NR-081	SUMMER	2015-GLAP-NR-120815-081A	12-Aug-2015
GLAP-NR-081	SUMMER	2016-GLAP-NR-030816-081A	3-Aug-2016
GLAP-NR-081	SUMMER	2017-GLAP-NR-030817-081A	3-Aug-2017
GLAP-NR-081	FALL	2015-GLAP-NR-161015-081A	16-Oct-2015
GLAP-NR-081	FALL	2016-GLAP-NR-281016-081A	28-Oct-2016
GLAP-NR-081	FALL	2017-GLAP-NR-091117-081A	9-Nov-2017
GLAP-NR-082	SPRING	2015-GLAP-NR-190615-082A	19-Jun-2015
GLAP-NR-082	SPRING	2016-GLAP-NR-090616-082A	9-Jun-2016
GLAP-NR-082	SPRING	2017-GLAP-NR-270617-082A	27-Jun-2017
GLAP-NR-082	SUMMER	2015-GLAP-NR-120815-082A	12-Aug-2015
GLAP-NR-082	SUMMER	2016-GLAP-NR-030816-082A	3-Aug-2016
GLAP-NR-082	SUMMER	2017-GLAP-NR-030817-082A	3-Aug-2017
GLAP-NR-082	FALL	2015-GLAP-NR-161015-082A	16-Oct-2015
GLAP-NR-082	FALL	2016-GLAP-NR-281016-082A	28-Oct-2016
GLAP-NR-082	FALL	2017-GLAP-NR-091117-082A	9-Nov-2017
GLAP-NR-091	SPRING	2015-GLAP-NR-190615-091A	19-Jun-2015
GLAP-NR-091	SPRING	2016-GLAP-NR-090616-091A	9-Jun-2016
GLAP-NR-091	SPRING	2017-GLAP-NR-290617-091A	29-Jun-2017
GLAP-NR-091	SUMMER	2015-GLAP-NR-190815-091A	19-Aug-2015
GLAP-NR-091	SUMMER	2016-GLAP-NR-110816-091A	11-Aug-2016
GLAP-NR-091	SUMMER	2017-GLAP-NR-030817-091A	3-Aug-2017
GLAP-NR-091	FALL	2015-GLAP-NR-221015-091A	22-Oct-2015
GLAP-NR-091	FALL	2016-GLAP-NR-041116-091A	4-Nov-2016
GLAP-NR-091	FALL	2017-GLAP-NR-161117-091A	16-Nov-2017
GLAP-NR-092	SPRING	2015-GLAP-NR-180615-092A	18-Jun-2015
GLAP-NR-092	SPRING	2016-GLAP-NR-100616-092A	10-Jun-2016
GLAP-NR-092	SPRING	2017-GLAP-NR-290617-092A	29-Jun-2017
GLAP-NR-092	SUMMER	2015-GLAP-NR-190815-092A	19-Aug-2015

Station code	Season	Field number	Date sampled
GLAP-NR-092	SUMMER	2016-GLAP-NR-110816-092A	11-Aug-2016
GLAP-NR-092	SUMMER	2017-GLAP-NR-020817-092A	2-Aug-2017
GLAP-NR-092	FALL	2015-GLAP-NR-221015-092A	22-Oct-2015
GLAP-NR-092	FALL	2016-GLAP-NR-041116-092A	4-Nov-2016
GLAP-NR-092	FALL	2017-GLAP-NR-161117-092A	16-Nov-2017
GLAP-NR-101	SPRING	2015-GLAP-NR-180615-101A	18-Jun-2015
GLAP-NR-101	SPRING	2016-GLAP-NR-100616-101A	10-Jun-2016
GLAP-NR-101	SPRING	2017-GLAP-NR-300617-101A	30-Jun-2017
GLAP-NR-101	SUMMER	2015-GLAP-NR-130815-101A	13-Aug-2015
GLAP-NR-101	SUMMER	2016-GLAP-NR-040816-101A	4-Aug-2016
GLAP-NR-101	SUMMER	2017-GLAP-NR-020817-101A	2-Aug-2017
GLAP-NR-101	FALL	2015-GLAP-NR-231015-101A	23-Oct-2015
GLAP-NR-101	FALL	2016-GLAP-NR-311016-101A	31-Oct-2016
GLAP-NR-101	FALL	2017-GLAP-NR-161117-101A	16-Nov-2017
GLAP-NR-102	SPRING	2015-GLAP-NR-180615-102A	18-Jun-2015
GLAP-NR-102	SPRING	2016-GLAP-NR-100616-102A	10-Jun-2016
GLAP-NR-102	SPRING	2017-GLAP-NR-300617-102A	30-Jun-2017
GLAP-NR-102	SUMMER	2015-GLAP-NR-130815-102A	13-Aug-2015
GLAP-NR-102	SUMMER	2016-GLAP-NR-040816-102A	4-Aug-2016
GLAP-NR-102	SUMMER	2017-GLAP-NR-080817-102A	8-Aug-2017
GLAP-NR-102	FALL	2015-GLAP-NR-231015-102A	23-Oct-2015
GLAP-NR-102	FALL	2016-GLAP-NR311016-102A	31-Oct-2016
GLAP-NR-102	FALL	2017-GLAP-NR-161117-102A	16-Nov-2017

Appendix 2. *Sampling effort (electrofishing settings and shocking seconds per pass) for each sampling event at each station.*

Station Code	Year	Season	Pass 1 Effort (s)	Pass 2 Effort (s)	Pass 3 Effort (s)	Total Effort (s)	Amps (A)	Volts (V)	Power (%)	Pulse/sec (Hz)	Watts (W)
GLAP-NR-011	2015	SPRING	899	824	858	2581	10.5	340	50	60	1400
GLAP-NR-011	2016	SPRING	1058	1039	1034	3131	11.9	340	60	60	1775
GLAP-NR-011	2017	SPRING	1076	1145	1164	3385	9.9	164	50	60	1725
GLAP-NR-011	2015	SUMMER	1000	1052	1054	3106	13.5	340	60	60	1800
GLAP-NR-011	2016	SUMMER	1039	1001	989	3029	13.6	340	55	60	1765
GLAP-NR-011	2017	SUMMER	994	950	881	2825	12.2	148	65	60	1800
GLAP-NR-011	2015	FALL	1027	952	1030	3009	12.0	340	60	60	1600
GLAP-NR-011	2016	FALL	989	975	896	2860	12.5	340	70	60	1830
GLAP-NR-011	2017	FALL	909	854	772	2535	11.4	340	80	60	1800
GLAP-NR-012	2015	SPRING	922	982	923	2827	11.0	340	50	60	1450
GLAP-NR-012	2016	SPRING	1018	968	1000	2986	12.3	340	65	60	1800
GLAP-NR-012	2017	SPRING	1068	979	1055	3102	9.1	187	50	60	1775
GLAP-NR-012	2015	SUMMER	1071	1046	1045	3162	13.5	340	60	60	1850
GLAP-NR-012	2016	SUMMER	965	979	985	2929	13.8	340	55	60	1775
GLAP-NR-012	2017	SUMMER	1028	979	1047	3054	12.3	149	70	60	1825
GLAP-NR-012	2015	FALL	966	922	1000	2888	12.0	340	60	60	1600
GLAP-NR-012	2016	FALL	1053	1021	968	3042	13.2	340	60	60	1800
GLAP-NR-012	2017	FALL	951	882	992	2825	12.2	340	75	60	1800
GLAP-NR-021	2015	SPRING	831	745	724	2300	11.0	340	60	60	1600
GLAP-NR-021	2016	SPRING	891	1000	1039	2930	12.4	340	60	60	1800
GLAP-NR-021	2017	SPRING	1006	856	938	2800	9.8	176	50	60	1700
GLAP-NR-021	2015	SUMMER	1076	989	996	3061	13.0	340	50	60	1650
GLAP-NR-021	2016	SUMMER	954	992	963	2909	13.4	340	60	60	1775
GLAP-NR-021	2017	SUMMER	983	931	948	2862	12.2	340	65	60	1775
GLAP-NR-021	2015	FALL	973	969	1070	3012	12.0	340	55	60	1600
GLAP-NR-021	2016	FALL	1053	1020	1060	3133	12.5	340	80	60	1850
GLAP-NR-021	2017	FALL	885	861	848	2594	11.5	340	80	60	1750
GLAP-NR-022	2015	SPRING	709	706	709	2124	11.0	340	60	60	1700
GLAP-NR-022	2016	SPRING	931	1002	977	2910	13.0	340	55	60	1750
GLAP-NR-022	2017	SPRING	989	1000	991	2980	9.7	180	50	60	1750
GLAP-NR-022	2015	SUMMER	1031	993	1067	3091	13.0	340	50	60	1650
GLAP-NR-022	2016	SUMMER	936	995	973	2904	13.9	340	60	60	1830
GLAP-NR-022	2017	SUMMER	993	956	958	2907	12.6	340	60	60	1825
GLAP-NR-022	2015	FALL	997	920	1000	2917	12.0	340	55	60	1600
GLAP-NR-022	2016	FALL	911	1019	965	2895	12.5	340	80	60	1850
GLAP-NR-022	2017	FALL	841	863	898	2602	11.0	340	80	60	1700
GLAP-NR-031	2015	SPRING	736	837	857	2430	10.6	340	55	60	1475
GLAP-NR-031	2016	SPRING	935	914	904	2753	12.6	340	60	60	1750
GLAP-NR-031	2017	SPRING	1029	1040	1034	3103	11.0	160	45	60	1775
GLAP-NR-031	2015	SUMMER	978	1027	987	2992	13.0	340	50	60	2400
GLAP-NR-031	2016	SUMMER	905	947	929	2781	14.0	340	60	60	1800
GLAP-NR-031	2017	SUMMER	932	1033	917	2882	13.4	340	55	60	1800
GLAP-NR-031	2015	FALL	951	910	996	2857	12.4	340	55	60	1650
GLAP-NR-031	2016	FALL	1018	928	1000	2946	12.4	340	70	60	1825
GLAP-NR-031	2017	FALL	866	844	854	2564	11.0	340	80	60	1700
GLAP-NR-032	2015	SPRING	826	916	915	2657	11.5	340	60	60	1650
GLAP-NR-032	2016	SPRING	996	912	891	2799	12.1	340	65	60	1775
GLAP-NR-032	2017	SPRING	948	897	993	2838	10.2	175	50	60	1800
GLAP-NR-032	2015	SUMMER	1000	1013	1004	3017	13.0	340	50	60	1600
GLAP-NR-032	2016	SUMMER	940	967	945	2852	13.8	340	55	60	1825
GLAP-NR-032	2017	SUMMER	985	1055	975	3015	13.2	340	55	60	1750
GLAP-NR-032	2015	FALL	1083	1009	995	3087	12.0	340	55	60	1650
GLAP-NR-032	2016	FALL	972	1022	1022	3016	12.0	340	80	60	1825
GLAP-NR-032	2017	FALL	924	954	971	2849	12.0	340	80	60	1800
GLAP-NR-041	2015	SPRING	526	623	636	1785	12.9	340	60	60	1800
GLAP-NR-041	2016	SPRING	987	970	993	2950	12.4	340	60	60	1725
GLAP-NR-041	2017	SPRING	-	-	-	-	-	-	-	-	-
GLAP-NR-041	2015	SUMMER	894	1026	986	2906	13.5	340	60	60	1800
GLAP-NR-041	2016	SUMMER	978	1016	965	2959	13.8	340	60	60	1750
GLAP-NR-041	2017	SUMMER	907	908	882	2697	12.7	340	60	60	1810

Station Code	Year	Season	Pass 1 Effort (s)	Pass 2 Effort (s)	Pass 3 Effort (s)	Total Effort (s)	Amps (A)	Volts (V)	Power (%)	Pulse/sec (Hz)	Watts (W)
GLAP-NR-041	2015	FALL	955	984	954	2893	12.5	340	50	60	1650
GLAP-NR-041	2016	FALL	958	1030	1001	2989	12.6	340	70	60	1825
GLAP-NR-041	2017	FALL	635	785	727	2147	11.5	340	80	60	1700
GLAP-NR-042	2015	SPRING	653	716	646	2015	11.5	340	70	60	1800
GLAP-NR-042	2016	SPRING	900	900	1015	2815	12.8	340	65	60	1775
GLAP-NR-042	2017	SPRING	-	-	-	-	-	-	-	-	-
GLAP-NR-042	2015	SUMMER	953	1062	944	2959	13.5	340	60	60	1800
GLAP-NR-042	2016	SUMMER	1114	984	1030	3128	13.7	340	60	60	1800
GLAP-NR-042	2017	SUMMER	961	946	919	2826	12.7	340	60	60	1800
GLAP-NR-042	2015	FALL	1061	1015	1038	3114	12.0	340	50	60	1600
GLAP-NR-042	2016	FALL	952	1054	1114	3120	12.3	340	70	60	1850
GLAP-NR-042	2017	FALL	822	821	795	2438	11.0	340	80	60	1700
GLAP-NR-051	2015	SPRING	636	555	817	2008	13.0	340	60	60	1800
GLAP-NR-051	2016	SPRING	885	829	921	2635	12.8	340	55	60	1775
GLAP-NR-051	2017	SPRING	-	-	-	-	-	-	-	-	-
GLAP-NR-051	2015	SUMMER	955	1023	978	2956	14.0	340	60	60	1800
GLAP-NR-051	2016	SUMMER	1001	896	905	2802	14.0	340	60	60	1775
GLAP-NR-051	2017	SUMMER	922	891	889	2702	13.3	340	60	60	1800
GLAP-NR-051	2015	FALL	780	830	804	2414	11.8	340	60	60	1625
GLAP-NR-051	2016	FALL	949	918	938	2805	12.0	340	75	60	1850
GLAP-NR-051	2017	FALL	975	832	720	2527	10.0	340	80	60	1700
GLAP-NR-052	2015	SPRING	665	614	634	1913	11.5	340	50	60	1550
GLAP-NR-052	2016	SPRING	1010	953	959	2922	12.8	340	60	60	1775
GLAP-NR-052	2017	SPRING	902	873	890	2665	9.5	180	50	60	1775
GLAP-NR-052	2015	SUMMER	1030	1028	993	3051	14.0	340	50	60	1800
GLAP-NR-052	2016	SUMMER	1028	1014	964	3006	13.9	340	60	60	1800
GLAP-NR-052	2017	SUMMER	1052	944	888	2884	13.3	340	60	60	1800
GLAP-NR-052	2015	FALL	884	851	950	2685	11.5	340	60	60	1600
GLAP-NR-052	2016	FALL	1067	1021	1064	3152	11.6	340	75	60	1800
GLAP-NR-052	2017	FALL	865	782	743	2390	11.5	340	80	60	1750
GLAP-NR-061	2015	SPRING	745	691	810	2246	11.4	340	80	60	1800
GLAP-NR-061	2016	SPRING	952	1015	978	2945	12.0	340	65	60	1750
GLAP-NR-061	2017	SPRING	-	-	-	-	-	-	-	-	-
GLAP-NR-061	2015	SUMMER	1067	978	954	2999	13.5	340	60	60	1850
GLAP-NR-061	2016	SUMMER	1005	1064	1014	3083	13.4	340	55	60	1810
GLAP-NR-061	2017	SUMMER	963	972	1000	2935	12.4	340	70	60	1815
GLAP-NR-061	2015	FALL	945	1000	1010	2955	11.0	340	60	60	1500
GLAP-NR-061	2016	FALL	1016	1038	1040	3094	12.6	340	70	60	1850
GLAP-NR-061	2017	FALL	884	888	874	2646	10.5	340	80	60	1650
GLAP-NR-062	2015	SPRING	840	691	935	2466	11.5	340	80	60	1800
GLAP-NR-062	2016	SPRING	937	969	967	2873	12.0	340	70	60	1750
GLAP-NR-062	2017	SPRING	-	-	-	-	-	-	-	-	-
GLAP-NR-062	2015	SUMMER	925	995	925	2845	13.5	340	60	60	1850
GLAP-NR-062	2016	SUMMER	905	948	883	2736	14.2	340	50	60	1815
GLAP-NR-062	2017	SUMMER	956	990	975	2921	13.1	340	60	60	1800
GLAP-NR-062	2015	FALL	907	965	910	2782	11.0	340	60	60	1500
GLAP-NR-062	2016	FALL	966	910	913	2789	12.3	340	70	60	1850
GLAP-NR-062	2017	FALL	895	942	917	2754	11.0	340	80	60	1700
GLAP-NR-071	2015	SPRING	936	1199	1000	3135	10.5	340	90	60	1400
GLAP-NR-071	2016	SPRING	1038	1030	1033	3101	12.5	340	65	60	1750
GLAP-NR-071	2017	SPRING	1008	1103	977	3088	12.6	340	60	60	1800
GLAP-NR-071	2015	SUMMER	931	1020	973	2924	13.5	340	60	60	1850
GLAP-NR-071	2016	SUMMER	1072	1060	1024	3156	13.7	340	55	60	1775
GLAP-NR-071	2017	SUMMER	900	1011	903	2814	13.0	340	60	60	1825
GLAP-NR-071	2015	FALL	939	957	865	2761	12.0	340	55	60	1600
GLAP-NR-071	2016	FALL	1043	1027	986	3056	12.8	340	60	60	1850
GLAP-NR-071	2017	FALL	941	930	943	2814	12.4	340	65	60	1825
GLAP-NR-072	2015	SPRING	836	781	827	2444	10.5	340	90	60	1450
GLAP-NR-072	2016	SPRING	1004	953	1006	2963	12.6	340	60	60	1775
GLAP-NR-072	2017	SPRING	933	965	843	2741	13.3	340	60	60	1800
GLAP-NR-072	2015	SUMMER	968	951	1019	2938	13.5	340	60	60	1800
GLAP-NR-072	2016	SUMMER	1041	993	962	2996	13.4	340	60	60	1775
GLAP-NR-072	2017	SUMMER	938	904	188	2030	13.3	340	60	60	1825
GLAP-NR-072	2015	FALL	875	950	900	2725	11.2	340	55	60	1500

Station Code	Year	Season	Pass 1 Effort (s)	Pass 2 Effort (s)	Pass 3 Effort (s)	Total Effort (s)	Amps (A)	Volts (V)	Power (%)	Pulse/sec (Hz)	Watts (W)
GLAP-NR-072	2016	FALL	818	856	809	2483	13.2	340	60	60	1850
GLAP-NR-072	2017	FALL	900	820	907	2627	12.2	340	70	60	1800
GLAP-NR-081	2015	SPRING	1151	1023	959	3133	9.5	340	100	60	1400
GLAP-NR-081	2016	SPRING	1140	1010	1023	3173	11.8	340	65	60	1775
GLAP-NR-081	2017	SPRING	1119	1056	1070	3245	12.9	340	60	60	1800
GLAP-NR-081	2015	SUMMER	1045	883	911	2839	13.0	340	50	60	1600
GLAP-NR-081	2016	SUMMER	1013	967	1006	2986	13.2	340	60	60	1815
GLAP-NR-081	2017	SUMMER	1060	966	890	2916	12.5	340	65	60	1815
GLAP-NR-081	2015	FALL	977	966	1045	2988	11.5	340	60	60	1625
GLAP-NR-081	2016	FALL	1096	1020	948	3064	11.7	340	80	60	1840
GLAP-NR-081	2017	FALL	1034	992	954	2980	11.5	340	80	60	1800
GLAP-NR-082	2015	SPRING	1067	1123	990	3180	9.0	340	100	60	1300
GLAP-NR-082	2016	SPRING	948	1014	1011	2973	12.0	340	65	60	1750
GLAP-NR-082	2017	SPRING	974	1000	1106	3080	12.9	340	60	60	1800
GLAP-NR-082	2015	SUMMER	1092	1112	1101	3305	13.0	340	50	60	1700
GLAP-NR-082	2016	SUMMER	934	955	1003	2892	13.4	340	55	60	1800
GLAP-NR-082	2017	SUMMER	939	962	910	2811	12.8	340	60	60	1800
GLAP-NR-082	2015	FALL	960	1057	897	2914	11.8	340	60	60	1600
GLAP-NR-082	2016	FALL	1100	945	999	3044	11.9	340	80	60	1850
GLAP-NR-082	2017	FALL	901	1114	934	2949	11.5	340	80	60	1800
GLAP-NR-091	2015	SPRING	1046	1016	1016	3078	9.0	340	100	60	1350
GLAP-NR-091	2016	SPRING	1098	939	1019	3056	12.0	340	60	60	1750
GLAP-NR-091	2017	SPRING	1023	1041	1009	3073	13.3	340	60	60	1825
GLAP-NR-091	2015	SUMMER	1064	1066	978	3108	13.0	340	60	60	1800
GLAP-NR-091	2016	SUMMER	1012	1041	1026	3079	13.6	340	60	60	1825
GLAP-NR-091	2017	SUMMER	1094	1064	1032	3190	12.1	340	70	60	1800
GLAP-NR-091	2015	FALL	1009	1006	1000	3015	11.9	340	55	60	1650
GLAP-NR-091	2016	FALL	925	998	943	2866	11.6	340	100	60	1825
GLAP-NR-091	2017	FALL	878	848	864	2590	11.0	340	80	60	1650
GLAP-NR-092	2015	SPRING	861	861	852	2574	10.0	340	100	60	1450
GLAP-NR-092	2016	SPRING	933	993	933	2859	12.0	340	60	60	1750
GLAP-NR-092	2017	SPRING	1039	1015	973	3027	13.2	340	60	60	1825
GLAP-NR-092	2015	SUMMER	966	974	1102	3042	13.0	340	60	60	1800
GLAP-NR-092	2016	SUMMER	1088	1014	954	3056	13.4	340	60	60	1850
GLAP-NR-092	2017	SUMMER	1063	1079	933	3075	12.8	340	70	60	1825
GLAP-NR-092	2015	FALL	1069	1010	1088	3167	11.1	340	75	60	1700
GLAP-NR-092	2016	FALL	935	1049	948	2932	11.5	340	100	60	1850
GLAP-NR-092	2017	FALL	839	839	783	2461	11.5	340	80	60	1700
GLAP-NR-101	2015	SPRING	924	983	869	2776	10.4	340	100	60	1450
GLAP-NR-101	2016	SPRING	1086	1033	1007	3126	11.8	340	75	60	1750
GLAP-NR-101	2017	SPRING	1052	963	1043	3058	12.7	340	60	60	1775
GLAP-NR-101	2015	SUMMER	971	1000	947	2918	12.5	340	60	60	1700
GLAP-NR-101	2016	SUMMER	1026	1001	887	2914	13.5	340	60	60	1800
GLAP-NR-101	2017	SUMMER	942	1000	946	2888	12.3	340	65	60	1800
GLAP-NR-101	2015	FALL	961	1060	1000	3021	11.0	340	75	60	1675
GLAP-NR-101	2016	FALL	1107	1090	1031	3228	11.4	340	100	60	1800
GLAP-NR-101	2017	FALL	849	781	781	2411	11.0	340	80	60	1700
GLAP-NR-102	2015	SPRING	912	861	880	2653	10.3	340	95	60	1450
GLAP-NR-102	2016	SPRING	1001	984	944	2929	11.9	340	75	60	1725
GLAP-NR-102	2017	SPRING	1032	1026	1027	3085	13.0	340	60	60	1850
GLAP-NR-102	2015	SUMMER	747	968	987	2702	13.0	340	60	60	1700
GLAP-NR-102	2016	SUMMER	1035	893	834	2762	13.5	340	60	60	1775
GLAP-NR-102	2017	SUMMER	690	693	713	2096	13.0	340	70	60	1800
GLAP-NR-102	2015	FALL	1000	980	975	2955	10.9	340	70	60	1650
GLAP-NR-102	2016	FALL	1037	957	1045	3039	11.5	340	100	60	1800
GLAP-NR-102	2017	FALL	781	832	832	2445	11.0	340	80	60	1650

Appendix 3. *Number of fishes captured and identified to species in each of three passes during each sampling event at each station in spring, summer, and fall of 2015, 2016, and 2017.*

Field Number	Sampling Pass	*Alosa pseudoharengus*	*Ambloplites rupestris*	*Ameiurus melas*	*Ameiurus natalis*	*Ameiurus nebulosus*	*Amia calva*	*Anguilla rostrata*	*Aplodinotus grunniens*	*Carassius auratus*	*Carpiodes cyprinus*	*Catostomus commersonii*	*Cottus bairdii*	*Cyprinella spiloptera*	*Cyprinus carpio*	*Dorosoma cepedianum*	*Esox americanus vermiculatus*	*Esox lucius*	*Esox masquinongy*	*Esox masquinongy X Esox lucius*	*Etheostoma caeruleum*	*Etheostoma flabellare*	*Etheostoma nigrum*	*Fundulus diaphanus*	*Hypentelium nigricans*	*Ictalurus punctatus*	*Labidesthes sicculus*	*Lepisosteus osseus*	*Lepomis cyanellus*	*Lepomis gibbosus*	*Lepomis macrochirus*	*Lepomis sp.*	*Lethenteron appendix*	*Luxilus chrysocephalus*	*Luxilus cornutus*
2015-GLAP-NR-120615-011A	1	0	0	1	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
2015-GLAP-NR-120615-011A	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-120615-011A	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-180815-011A	1	0	0	10	0	0	0	0	0	1	0	23	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-180815-011A	2	0	0	7	0	0	0	0	0	0	0	26	0	0	2	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0
2015-GLAP-NR-180815-011A	3	0	0	5	0	0	0	0	0	0	0	10	0	0	8	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-071015-011A	1	0	0	4	0	0	0	0	0	5	0	250	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0
2015-GLAP-NR-071015-011A	2	0	1	1	0	2	0	0	0	0	0	203	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	2	0	0	0	0
2015-GLAP-NR-071015-011A	3	0	1	0	0	0	0	0	0	0	0	59	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
2016-GLAP-NR-250516-011A	1	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-250516-011A	2	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-250516-011A	3	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-150816-011A	1	20	3	2	0	0	0	0	0	0	0	47	0	3	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0
2016-GLAP-NR-150816-011A	2	0	1	2	0	0	0	0	1	0	0	23	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0
2016-GLAP-NR-150816-011A	3	0	0	1	0	0	0	0	0	0	0	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-171016-011A	1	0	1	2	14	3	0	0	0	2	0	85	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
2016-GLAP-NR-171016-011A	2	0	1	3	0	0	0	0	0	0	0	58	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0
2016-GLAP-NR-171016-011A	3	0	1	0	0	0	0	0	0	1	0	48	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-050717-011A	1	0	1	2	0	5	1	0	0	0	0	27	0	3	3	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	3	0
2017-GLAP-NR-050717-011A	2	0	0	1	0	1	0	0	1	0	0	9	0	0	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0
2017-GLAP-NR-050717-011A	3	0	2	1	0	2	1	0	0	0	0	5	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0
2017-GLAP-NR-280817-011A	1	5	0	2	0	0	0	0	0	2	0	13	0	0	3	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0	0	0	1	0
2017-GLAP-NR-280817-011A	2	0	0	0	0	1	0	0	0	0	0	13	0	1	0	0	0	0	0	0	0	0	0	1	0	0	3	0	0	1	0	0	0	0	0
2017-GLAP-NR-280817-011A	3	0	0	0	0	1	1	0	0	1	0	8	0	2	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	3	0
2017-GLAP-NR-221117-011A	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-221117-011A	2	0	0	0	0	2	0	0	0	0	0	2	0	0	1	0	0	0	0	0	0	0	0	0	0	0	9	0	0	0	0	0	0	0	0
2017-GLAP-NR-221117-011A	3	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-120615-012A	1	0	0	0	0	0	0	0	1	0	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-120615-012A	2	0	0	2	0	0	0	0	1	0	0	1	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Field Number	Sampling Pass	*Alosa pseudoharengus*	*Ambloplites rupestris*	*Ameiurus melas*	*Ameiurus natalis*	*Ameiurus nebulosus*	*Amia calva*	*Anguilla rostrata*	*Aplodinotus grunniens*	*Carassius auratus*	*Carpiodes cyprinus*	*Catostomus commersonii*	*Cottus bairdii*	*Cyprinella spiloptera*	*Cyprinus carpio*	*Dorosoma cepedianum*	*Esox americanus vermiculatus*	*Esox lucius*	*Esox masquinongy*	*Esox masquinongy X Esox lucius*	*Etheostoma caeruleum*	*Etheostoma flabellare*	*Etheostoma nigrum*	*Fundulus diaphanus*	*Hypentelium nigricans*	*Ictalurus punctatus*	*Labidesthes sicculus*	*Lepisosteus osseus*	*Lepomis cyanellus*	*Lepomis gibbosus*	*Lepomis macrochirus*	*Lepomis sp.*	*Lethenteron appendix*	*Luxilus chrysocephalus*	*Luxilus cornutus*
2015-GLAP-NR-120615-012A	3	0	0	0	6	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-180815-012A	1	0	0	15	0	1	0	0	0	0	0	52	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-180815-012A	2	0	0	4	0	0	0	0	0	1	0	44	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
2015-GLAP-NR-180815-012A	3	0	3	8	0	0	0	0	0	0	0	11	0	0	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-071015-012A	1	0	2	0	0	6	0	0	0	2	0	129	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	6	0	0	0	0
2015-GLAP-NR-071015-012A	2	0	0	0	0	3	0	0	0	0	0	73	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	2	0	0	0	0
2015-GLAP-NR-071015-012A	3	0	2	1	0	6	0	0	0	0	0	36	0	0	3	0	0	1	0	0	0	0	0	1	0	0	0	0	0	1	3	0	0	0	0
2016-GLAP-NR-250516-012A	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-250516-012A	2	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-250516-012A	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-150816-012A	1	0	3	3	0	4	1	0	0	4	0	56	0	3	2	1	0	0	0	0	0	0	0	0	0	0	1	0	0	4	1	0	0	0	0
2016-GLAP-NR-150816-012A	2	4	0	4	0	0	0	0	0	12	0	38	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-150816-012A	3	0	1	3	0	0	0	0	0	1	0	52	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0
2016-GLAP-NR-171016-012A	1	0	4	5	0	0	0	0	0	2	0	98	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
2016-GLAP-NR-171016-012A	2	0	0	10	0	0	0	0	0	2	0	64	0	0	4	0	0	0	0	0	0	0	0	0	0	0	6	0	0	4	3	0	0	0	0
2016-GLAP-NR-171016-012A	3	0	1	6	0	1	1	0	0	1	0	55	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	4	2	0	0	0	0
2017-GLAP-NR-060717-012A	1	0	0	6	0	3	0	0	1	0	0	9	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-060717-012A	2	0	0	3	0	2	0	0	0	1	0	3	0	4	3	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0
2017-GLAP-NR-060717-012A	3	0	0	2	0	1	0	0	0	0	0	2	0	1	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0
2017-GLAP-NR-280817-012A	1	15	1	0	0	0	2	0	1	0	0	15	0	0	10	1	0	0	0	0	0	0	0	0	0	0	3	0	0	1	2	0	0	0	0
2017-GLAP-NR-280817-012A	2	10	1	0	0	3	2	0	0	0	0	4	0	0	3	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	1
2017-GLAP-NR-280817-012A	3	14	0	0	0	2	1	0	0	0	0	18	0	6	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	0	0	2	0
2017-GLAP-NR-221117-012A	1	0	0	1	0	0	0	0	0	0	0	3	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-221117-012A	2	0	0	0	0	0	1	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0
2017-GLAP-NR-221117-012A	3	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
2015-GLAP-NR-110615-021A	1	0	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-110615-021A	2	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-110615-021A	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-110815-021A	1	0	3	19	0	9	0	0	0	0	0	26	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-110815-021A	2	0	3	29	0	10	0	0	0	0	0	36	0	0	2	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-110815-021A	3	0	0	9	0	4	0	0	0	1	0	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-061015-021A	1	42	5	15	0	0	0	0	0	3	0	130	1	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	7	0	0	0	0

Field Number	Sampling Pass	*Alosa pseudoharengus*	*Ambloplites rupestris*	*Ameiurus melas*	*Ameiurus natalis*	*Ameiurus nebulosus*	*Amia calva*	*Anguilla rostrata*	*Aplodinotus grunniens*	*Carassius auratus*	*Carpiodes cyprinus*	*Catostomus commersonii*	*Cottus bairdii*	*Cyprinella spiloptera*	*Cyprinus carpio*	*Dorosoma cepedianum*	*Esox americanus vermiculatus*	*Esox lucius*	*Esox masquinongy*	*Esox masquinongy X Esox lucius*	*Etheostoma caeruleum*	*Etheostoma flabellare*	*Etheostoma nigrum*	*Fundulus diaphanus*	*Hypentelium nigricans*	*Ictalurus punctatus*	*Labidesthes sicculus*	*Lepisosteus osseus*	*Lepomis cyanellus*	*Lepomis gibbosus*	*Lepomis macrochirus*	*Lepomis sp.*	*Lethenteron appendix*	*Luxilus chrysocephalus*	*Luxilus cornutus*
2015-GLAP-NR-061015-021A	2	2	2	4	0	13	1	0	0	3	0	117	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-061015-021A	3	0	3	6	0	10	0	0	0	1	0	68	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3	0	0	0	0
2016-GLAP-NR-260516-021A	1	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-260516-021A	2	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-260516-021A	3	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-180816-021A	1	1	2	3	0	0	0	0	0	0	0	13	0	0	0	17	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	0
2016-GLAP-NR-180816-021A	2	2	0	7	0	0	0	0	1	0	0	59	0	0	0	21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11	0
2016-GLAP-NR-180816-021A	3	2	1	2	0	2	2	0	0	0	0	74	0	0	0	7	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	3	0
2016-GLAP-NR-241016-021A	1	0	2	6	0	0	3	0	0	2	0	59	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	6	0	0	0	0
2016-GLAP-NR-241016-021A	2	0	2	2	0	0	0	0	0	0	0	37	0	0	1	0	0	0	0	0	0	0	0	1	0	0	11	0	0	1	0	0	0	0	0
2016-GLAP-NR-241016-021A	3	1	2	3	0	0	2	0	0	0	0	49	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	0	0	0	0	0	0	1	0
2017-GLAP-NR-040717-021A	1	0	0	4	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
2017-GLAP-NR-040717-021A	2	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-040717-021A	3	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-300817-021A	1	0	7	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	9	0	0	0	1
2017-GLAP-NR-300817-021A	2	0	1	0	0	2	1	0	0	2	0	3	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	0	0	0	0
2017-GLAP-NR-300817-021A	3	0	5	0	0	1	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	2	2	0	0	0	0
2017-GLAP-NR-231117-021A	1	0	0	4	0	9	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-231117-021A	2	0	0	1	0	2	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
2017-GLAP-NR-231117-021A	3	0	0	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-110615-022A	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-110615-022A	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-110615-022A	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-110815-022A	1	0	4	18	0	14	0	0	0	2	0	36	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0
2015-GLAP-NR-110815-022A	2	0	1	20	0	6	0	0	0	2	0	51	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-110815-022A	3	0	0	13	0	0	0	0	0	1	0	49	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-061015-022A	1	1	0	10	0	0	0	0	0	0	0	45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
2015-GLAP-NR-061015-022A	2	0	1	11	0	0	0	0	0	0	0	19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0
2015-GLAP-NR-061015-022A	3	1	0	3	0	2	0	0	0	1	0	24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0
2016-GLAP-NR-260516-022A	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-260516-022A	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-260516-022A	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Field Number	Sampling Pass	*Alosa pseudoharengus*	*Ambloplites rupestris*	*Ameiurus melas*	*Ameiurus natalis*	*Ameiurus nebulosus*	*Amia calva*	*Anguilla rostrata*	*Aplodinotus grunniens*	*Carassius auratus*	*Carpiodes cyprinus*	*Catostomus commersonii*	*Cottus bairdii*	*Cyprinella spiloptera*	*Cyprinus carpio*	*Dorosoma cepedianum*	*Esox americanus vermiculatus*	*Esox lucius*	*Esox masquinongy*	*Esox masquinongy X Esox lucius*	*Etheostoma caeruleum*	*Etheostoma flabellare*	*Etheostoma nigrum*	*Fundulus diaphanus*	*Hypentelium nigricans*	*Ictalurus punctatus*	*Labidesthes sicculus*	*Lepisosteus osseus*	*Lepomis cyanellus*	*Lepomis gibbosus*	*Lepomis macrochirus*	*Lepomis sp.*	*Lethenteron appendix*	*Luxilus chrysocephalus*	*Luxilus cornutus*
2016-GLAP-NR-180816-022A	1	0	1	14	0	0	1	0	0	2	0	18	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0
2016-GLAP-NR-180816-022A	2	0	0	5	0	0	0	0	0	2	0	10	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
2016-GLAP-NR-180816-022A	3	0	0	12	0	0	1	0	0	0	0	51	0	0	0	1	0	1	0	0	0	0	0	0	0	0	4	0	0	1	0	0	0	0	0
2016-GLAP-NR-261016-022A	1	0	4	5	0	0	0	0	0	0	0	57	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	1	0	0	1	0
2016-GLAP-NR-261016-022A	2	0	17	11	0	0	2	0	0	1	0	26	0	0	0	0	0	0	0	0	0	0	0	1	0	0	3	0	0	0	5	0	0	0	0
2016-GLAP-NR-261016-022A	3	0	6	6	0	1	0	0	0	0	0	29	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0
2017-GLAP-NR-040717-022A	1	0	0	0	0	2	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-040717-022A	2	0	0	3	0	1	0	0	2	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-040717-022A	3	0	0	9	0	3	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-300817-022A	1	1	12	6	0	0	0	0	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	2	0	0	0	0
2017-GLAP-NR-300817-022A	2	1	1	0	0	4	0	0	0	1	0	2	0	3	1	0	0	1	0	0	0	0	0	0	0	0	2	0	0	2	2	0	0	1	1
2017-GLAP-NR-300817-022A	3	0	2	0	0	8	1	0	0	0	0	5	0	2	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	4	0
2017-GLAP-NR-231117-022A	1	0	0	1	0	1	0	0	0	0	0	22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0
2017-GLAP-NR-231117-022A	2	0	0	0	0	1	0	0	0	0	0	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-231117-022A	3	0	0	0	0	0	0	0	0	0	0	21	0	0	2	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0
2015-GLAP-NR-110615-031A	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-110615-031A	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
2015-GLAP-NR-110615-031A	3	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-100815-031A	1	0	0	8	0	2	0	0	0	0	0	10	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-100815-031A	2	0	0	0	0	2	0	0	1	0	0	20	0	0	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
2015-GLAP-NR-100815-031A	3	0	4	0	0	5	0	0	0	0	0	72	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0
2015-GLAP-NR-141015-031A	1	0	2	1	0	5	0	0	0	0	0	250	0	0	2	0	0	1	0	0	0	0	1	0	0	0	0	0	0	2	0	0	0	0	0
2015-GLAP-NR-141015-031A	2	3	1	0	0	1	0	0	0	0	0	117	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
2015-GLAP-NR-141015-031A	3	0	0	0	0	1	0	0	0	0	0	60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
2016-GLAP-NR-270516-031A	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-270516-031A	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
2016-GLAP-NR-270516-031A	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
2016-GLAP-NR-170816-031A	1	0	1	6	0	0	0	0	0	0	0	147	0	0	2	0	0	1	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	3	0
2016-GLAP-NR-170816-031A	2	0	1	5	0	1	0	0	0	0	0	84	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0
2016-GLAP-NR-170816-031A	3	0	1	2	0	0	0	0	0	0	0	95	0	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	0	0	0	0
2016-GLAP-NR-261016-031A	1	0	1	0	0	2	0	0	0	0	0	87	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
2016-GLAP-NR-261016-031A	2	0	0	2	0	1	0	0	0	0	0	73	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Field Number	Sampling Pass	*Alosa pseudoharengus*	*Ambloplites rupestris*	*Ameiurus melas*	*Ameiurus natalis*	*Ameiurus nebulosus*	*Amia calva*	*Anguilla rostrata*	*Aplodinotus grunniens*	*Carassius auratus*	*Carpiodes cyprinus*	*Catostomus commersonii*	*Cottus bairdii*	*Cyprinella spiloptera*	*Cyprinus carpio*	*Dorosoma cepedianum*	*Esox americanus vermiculatus*	*Esox lucius*	*Esox masquinongy*	*Esox masquinongy X Esox lucius*	*Etheostoma caeruleum*	*Etheostoma flabellare*	*Etheostoma nigrum*	*Fundulus diaphanus*	*Hypentelium nigricans*	*Ictalurus punctatus*	*Labidesthes sicculus*	*Lepisosteus osseus*	*Lepomis cyanellus*	*Lepomis gibbosus*	*Lepomis macrochirus*	*Lepomis sp.*	*Lethenteron appendix*	*Luxilus chrysocephalus*	*Luxilus cornutus*
2016-GLAP-NR-261016-031A	3	0	0	3	0	0	1	0	0	0	0	88	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-060717-031A	1	0	0	1	0	2	0	0	0	0	0	125	0	1	0	1	0	0	1	0	0	0	0	0	3	0	0	0	0	0	0	0	0	20	0
2017-GLAP-NR-060717-031A	2	0	0	1	0	1	0	0	0	1	0	75	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	3	2	0	1	8	0
2017-GLAP-NR-060717-031A	3	0	0	0	0	0	0	0	1	0	0	86	0	0	0	4	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	11	0
2017-GLAP-NR-290817-031A	1	0	2	4	0	0	0	0	0	0	0	49	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	2	1
2017-GLAP-NR-290817-031A	2	1	0	0	0	2	0	0	0	1	0	13	0	0	3	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	1	0	0	5	0
2017-GLAP-NR-290817-031A	3	1	0	0	12	1	0	0	0	0	0	26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	0	0	0	0
2017-GLAP-NR-231117-031A	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0
2017-GLAP-NR-231117-031A	2	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
2017-GLAP-NR-231117-031A	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-110615-032A	1	0	0	1	0	0	0	0	0	0	0	1	0	0	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-110615-032A	2	0	0	0	0	1	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-110615-032A	3	0	0	1	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
2015-GLAP-NR-100815-032A	1	0	0	0	0	0	0	0	1	0	0	7	0	0	27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-100815-032A	2	0	0	1	0	2	0	0	1	0	0	18	0	0	17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-100815-032A	3	0	1	1	0	2	0	0	0	0	0	16	0	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0
2015-GLAP-NR-141015-032A	1	0	2	0	0	5	0	0	0	1	0	139	0	0	12	0	1	0	4	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
2015-GLAP-NR-141015-032A	2	0	2	0	0	1	0	0	0	5	0	84	0	0	7	0	0	0	1	0	0	0	0	1	0	0	0	0	0	1	1	0	0	0	0
2015-GLAP-NR-141015-032A	3	0	2	0	0	0	1	0	0	3	0	81	0	0	3	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0
2016-GLAP-NR-270516-032A	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-270516-032A	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-270516-032A	3	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-170816-032A	1	0	0	0	0	0	0	0	0	1	0	15	0	0	15	1	0	0	1	0	0	0	0	0	1	0	0	0	0	1	2	0	0	0	0
2016-GLAP-NR-170816-032A	2	0	4	0	0	0	0	0	0	1	0	15	0	0	14	1	0	0	0	0	0	0	0	1	0	0	0	0	0	2	2	0	0	0	0
2016-GLAP-NR-170816-032A	3	0	0	0	0	0	0	0	0	2	0	43	0	0	4	3	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3	0	0	0	0
2016-GLAP-NR-261016-032A	1	0	1	5	0	0	1	0	0	0	0	102	0	0	8	0	0	0	2	0	0	0	0	0	0	0	0	0	0	1	0	0	0	2	0
2016-GLAP-NR-261016-032A	2	0	2	5	0	2	1	0	0	0	0	85	0	0	6	0	0	1	2	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0
2016-GLAP-NR-261016-032A	3	0	0	2	0	0	1	0	0	0	0	58	0	0	2	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0
2017-GLAP-NR-070717-032A	1	0	0	0	0	4	1	0	2	3	0	42	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	0	0	4	0
2017-GLAP-NR-070717-032A	2	0	0	0	0	2	0	0	0	1	0	28	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	0	0	1	0
2017-GLAP-NR-070717-032A	3	0	1	0	0	7	0	0	2	2	0	18	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0
2017-GLAP-NR-290817-032A	1	1	0	1	0	0	0	0	0	0	0	1	0	3	6	0	0	0	1	0	0	0	0	0	0	0	1	0	0	1	3	0	0	0	0

Field Number	Sampling Pass	*Alosa pseudoharengus*	*Ambloplites rupestris*	*Ameiurus melas*	*Ameiurus natalis*	*Ameiurus nebulosus*	*Amia calva*	*Anguilla rostrata*	*Aplodinotus grunniens*	*Carassius auratus*	*Carpiodes cyprinus*	*Catostomus commersonii*	*Cottus bairdii*	*Cyprinella spiloptera*	*Cyprinus carpio*	*Dorosoma cepedianum*	*Esox americanus vermiculatus*	*Esox lucius*	*Esox masquinongy*	*Esox masquinongy X Esox lucius*	*Etheostoma caeruleum*	*Etheostoma flabellare*	*Etheostoma nigrum*	*Fundulus diaphanus*	*Hypentelium nigricans*	*Ictalurus punctatus*	*Labidesthes sicculus*	*Lepisosteus osseus*	*Lepomis cyanellus*	*Lepomis gibbosus*	*Lepomis macrochirus*	*Lepomis sp.*	*Lethenteron appendix*	*Luxilus chrysocephalus*	*Luxilus cornutus*
2017-GLAP-NR-290817-032A	2	1	0	0	0	0	0	0	0	0	0	1	0	0	4	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-290817-032A	3	2	1	0	0	0	0	0	0	0	0	1	0	1	4	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-231117-032A	1	0	0	3	0	0	0	0	0	1	0	5	0	0	1	0	0	0	0	0	0	0	0	0	0	0	6	0	0	0	0	0	0	0	0
2017-GLAP-NR-231117-032A	2	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0
2017-GLAP-NR-231117-032A	3	0	0	0	0	0	0	0	0	0	0	3	0	0	2	0	0	0	7	0	0	0	0	0	0	0	6	0	0	0	0	0	3	0	0
2015-GLAP-NR-100615-041A	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-100615-041A	2	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-100615-041A	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-250815-041A	1	0	0	0	0	0	0	0	0	0	0	81	0	0	0	0	0	0	0	0	4	1	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-250815-041A	2	0	0	0	0	0	0	0	1	0	0	122	1	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-250815-041A	3	0	0	0	0	0	0	0	0	0	0	56	1	0	0	0	0	0	0	0	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-051015-041A	1	0	5	0	0	0	0	0	0	0	0	178	0	0	1	0	0	0	0	0	3	1	0	1	2	0	0	0	0	1	0	0	0	0	0
2015-GLAP-NR-051015-041A	2	1	6	0	0	0	0	0	0	0	0	80	1	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	2	0	0	0	0	0
2015-GLAP-NR-051015-041A	3	0	0	0	0	0	0	0	0	0	0	60	0	0	0	0	0	0	0	0	2	0	0	0	3	0	0	0	0	1	0	0	0	0	0
2016-GLAP-NR-070616-041A	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-070616-041A	2	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-070616-041A	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-080816-041A	1	0	1	0	0	0	0	0	0	0	0	20	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-080816-041A	2	0	0	0	0	0	0	0	0	0	0	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-080816-041A	3	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-021116-041A	1	0	5	0	0	0	0	0	0	0	0	134	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	2	0	0	0	0	0
2016-GLAP-NR-021116-041A	2	0	10	0	0	0	0	0	0	0	0	59	0	0	0	0	0	0	0	0	2	0	0	0	2	0	0	0	0	1	0	0	0	0	0
2016-GLAP-NR-021116-041A	3	0	3	0	0	0	0	0	0	0	0	44	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-310717-041A	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-310717-041A	2	4	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-310717-041A	3	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
2017-GLAP-NR-151117-041A	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-151117-041A	2	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0
2017-GLAP-NR-151117-041A	3	0	0	0	0	1	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-100615-042A	1	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-100615-042A	2	0	0	0	0	0	0	0	0	0	0	4	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-100615-042A	3	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Field Number	Sampling Pass	*Alosa pseudoharengus*	*Ambloplites rupestris*	*Ameiurus melas*	*Ameiurus natalis*	*Ameiurus nebulosus*	*Amia calva*	*Anguilla rostrata*	*Aplodinotus grunniens*	*Carassius auratus*	*Carpiodes cyprinus*	*Catostomus commersonii*	*Cottus bairdii*	*Cyprinella spiloptera*	*Cyprinus carpio*	*Dorosoma cepedianum*	*Esox americanus vermiculatus*	*Esox lucius*	*Esox masquinongy*	*Esox masquinongy X Esox lucius*	*Etheostoma caeruleum*	*Etheostoma flabellare*	*Etheostoma nigrum*	*Fundulus diaphanus*	*Hypentelium nigricans*	*Ictalurus punctatus*	*Labidesthes sicculus*	*Lepisosteus osseus*	*Lepomis cyanellus*	*Lepomis gibbosus*	*Lepomis macrochirus*	*Lepomis sp.*	*Lethenteron appendix*	*Luxilus chrysocephalus*	*Luxilus cornutus*
2015-GLAP-NR-250815-042A	1	0	4	0	0	0	0	0	0	0	0	20	0	0	13	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-250815-042A	2	0	0	0	0	0	0	0	0	0	0	16	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-250815-042A	3	0	1	0	0	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-051015-042A	1	0	1	0	0	0	0	0	0	0	0	44	0	0	1	0	0	0	0	0	2	0	0	0	1	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-051015-042A	2	0	0	0	0	0	0	0	0	0	0	30	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-051015-042A	3	0	0	0	0	0	0	0	0	0	0	40	0	0	0	0	0	0	0	0	2	0	0	0	2	0	0	0	0	0	1	0	0	0	0
2016-GLAP-NR-070616-042A	1	0	0	0	0	0	0	0	0	0	0	1	0	0	5	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-070616-042A	2	0	0	0	0	0	0	0	0	0	0	2	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-070616-042A	3	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-080816-042A	1	0	0	0	0	0	0	0	0	0	0	5	0	0	8	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-080816-042A	2	0	0	0	0	0	0	0	0	0	0	6	0	0	5	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-080816-042A	3	0	0	0	0	0	0	0	0	0	0	14	0	0	3	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-021116-042A	1	0	4	0	0	0	0	0	0	0	0	80	0	0	0	22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-021116-042A	2	0	3	0	0	0	1	0	0	0	0	28	0	0	1	4	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0
2016-GLAP-NR-021116-042A	3	0	2	0	0	0	0	0	0	0	0	62	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-310717-042A	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-310717-042A	2	2	0	0	0	0	0	0	0	0	0	2	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-310717-042A	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-151117-042A	1	0	0	0	0	0	0	0	0	0	0	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
2017-GLAP-NR-151117-042A	2	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-151117-042A	3	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	0	0	0	0	0	0	0	0
2015-GLAP-NR-100615-051A	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-100615-051A	2	0	0	0	0	0	0	0	1	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-100615-051A	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-210815-051A	1	0	0	0	0	0	0	0	2	0	0	20	0	0	11	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-210815-051A	2	0	0	0	0	2	0	0	0	0	0	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0
2015-GLAP-NR-210815-051A	3	0	0	0	0	0	0	0	0	0	0	28	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-151015-051A	1	0	0	0	0	0	0	0	0	0	0	39	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-151015-051A	2	0	0	0	0	0	0	0	0	0	0	18	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
2015-GLAP-NR-151015-051A	3	0	0	0	0	2	0	0	0	0	0	13	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-060616-051A	1	0	0	0	0	0	0	0	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0
2016-GLAP-NR-060616-051A	2	0	0	0	0	0	0	0	0	0	0	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	2	0

Field Number	Sampling Pass	*Alosa pseudoharengus*	*Ambloplites rupestris*	*Ameiurus melas*	*Ameiurus natalis*	*Ameiurus nebulosus*	*Amia calva*	*Anguilla rostrata*	*Aplodinotus grunniens*	*Carassius auratus*	*Carpiodes cyprinus*	*Catostomus commersonii*	*Cottus bairdii*	*Cyprinella spiloptera*	*Cyprinus carpio*	*Dorosoma cepedianum*	*Esox americanus vermiculatus*	*Esox lucius*	*Esox masquinongy*	*Esox masquinongy X Esox lucius*	*Etheostoma caeruleum*	*Etheostoma flabellare*	*Etheostoma nigrum*	*Fundulus diaphanus*	*Hypentelium nigricans*	*Ictalurus punctatus*	*Labidesthes sicculus*	*Lepisosteus osseus*	*Lepomis cyanellus*	*Lepomis gibbosus*	*Lepomis macrochirus*	*Lepomis sp.*	*Lethenteron appendix*	*Luxilus chrysocephalus*	*Luxilus cornutus*
2016-GLAP-NR-060616-051A	3	0	0	0	0	0	0	0	0	0	0	3	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	2	0	0
2016-GLAP-NR-100816-051A	1	0	0	0	0	0	0	0	0	0	0	15	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0
2016-GLAP-NR-100816-051A	2	0	3	1	0	0	0	0	0	1	0	13	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0
2016-GLAP-NR-100816-051A	3	0	0	0	0	0	0	0	1	1	0	12	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
2016-GLAP-NR-251016-051A	1	0	0	0	0	0	0	0	0	0	0	13	0	0	2	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0
2016-GLAP-NR-251016-051A	2	0	0	0	0	0	0	0	0	0	0	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-251016-051A	3	0	0	0	0	0	0	0	0	0	0	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0
2017-GLAP-NR-010817-051A	1	0	1	2	0	0	0	0	0	0	0	9	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0
2017-GLAP-NR-010817-051A	2	0	0	0	0	3	0	0	0	0	0	15	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	0	0	1	0
2017-GLAP-NR-010817-051A	3	2	1	0	0	1	0	0	0	0	0	12	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	3	0
2017-GLAP-NR-061117-051A	1	0	0	0	0	0	0	0	0	0	0	2	0	0	2	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0
2017-GLAP-NR-061117-051A	2	0	0	0	0	0	0	0	0	0	0	3	0	0	2	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	2	0	0
2017-GLAP-NR-061117-051A	3	0	0	0	0	0	0	0	0	0	0	2	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-100615-052A	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-100615-052A	2	0	0	0	0	0	0	0	0	0	0	2	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-100615-052A	3	0	0	0	0	0	0	0	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-210815-052A	1	0	1	4	0	0	0	0	0	0	0	52	0	0	10	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
2015-GLAP-NR-210815-052A	2	0	0	1	0	1	0	0	0	0	0	60	0	0	2	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-210815-052A	3	0	0	2	0	0	0	0	1	0	0	32	0	0	2	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-151015-052A	1	0	0	2	0	0	0	0	0	0	0	36	0	0	5	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-151015-052A	2	0	0	0	0	0	0	0	0	0	0	40	0	0	1	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-151015-052A	3	0	0	0	0	0	0	0	0	0	0	40	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
2016-GLAP-NR-060616-052A	1	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0
2016-GLAP-NR-060616-052A	2	1	0	0	0	0	0	0	0	0	0	11	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	3	0
2016-GLAP-NR-060616-052A	3	0	0	0	0	0	0	0	0	0	0	11	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0
2016-GLAP-NR-100816-052A	1	0	0	1	0	0	0	0	0	0	0	42	0	0	12	0	0	0	1	0	0	0	0	0	1	0	0	0	0	1	0	0	0	2	0
2016-GLAP-NR-100816-052A	2	0	0	1	0	0	0	0	1	1	0	33	0	0	4	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-100816-052A	3	2	0	0	0	0	0	0	0	0	0	34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	2	6
2016-GLAP-NR-251016-052A	1	0	1	3	0	0	0	0	0	5	0	35	0	0	7	0	0	0	1	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0
2016-GLAP-NR-251016-052A	2	0	0	1	0	1	0	0	0	1	0	16	0	0	1	0	0	0	2	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
2016-GLAP-NR-251016-052A	3	0	0	0	0	0	0	0	0	1	0	13	0	0	1	2	0	0	0	0	0	0	0	0	1	0	2	0	0	0	0	0	0	0	0
2017-GLAP-NR-070717-052A	1	0	0	2	0	0	0	0	0	0	0	12	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Field Number	Sampling Pass	*Alosa pseudoharengus*	*Ambloplites rupestris*	*Ameiurus melas*	*Ameiurus natalis*	*Ameiurus nebulosus*	*Amia calva*	*Anguilla rostrata*	*Aplodinotus grunniens*	*Carassius auratus*	*Carpiodes cyprinus*	*Catostomus commersonii*	*Cottus bairdii*	*Cyprinella spiloptera*	*Cyprinus carpio*	*Dorosoma cepedianum*	*Esox americanus vermiculatus*	*Esox lucius*	*Esox masquinongy*	*Esox masquinongy X Esox lucius*	*Etheostoma caeruleum*	*Etheostoma flabellare*	*Etheostoma nigrum*	*Fundulus diaphanus*	*Hypentelium nigricans*	*Ictalurus punctatus*	*Labidesthes sicculus*	*Lepisosteus osseus*	*Lepomis cyanellus*	*Lepomis gibbosus*	*Lepomis macrochirus*	*Lepomis sp.*	*Lethenteron appendix*	*Luxilus chrysocephalus*	*Luxilus cornutus*
2017-GLAP-NR-070717-052A	2	0	0	0	0	0	0	0	0	0	0	8	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-070717-052A	3	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	1	0	3	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-010817-052A	1	1	0	1	0	0	0	0	1	0	0	14	0	1	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	16	0
2017-GLAP-NR-010817-052A	2	2	0	0	0	2	0	0	0	0	0	2	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	3	0	0	8	0
2017-GLAP-NR-010817-052A	3	0	0	0	0	1	0	0	0	0	0	8	0	0	0	1	0	0	1	0	0	0	0	0	1	0	0	0	0	3	0	0	0	4	0
2017-GLAP-NR-061117-052A	1	0	0	0	0	0	0	0	0	0	0	8	0	0	2	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
2017-GLAP-NR-061117-052A	2	0	0	0	0	0	0	0	0	0	0	3	0	0	0	22	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-061117-052A	3	0	0	0	0	0	0	0	0	0	0	4	0	0	0	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
2015-GLAP-NR-090615-061A	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-090615-061A	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-090615-061A	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-240815-061A	1	0	0	0	0	0	0	0	0	0	0	82	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-240815-061A	2	0	0	0	0	0	0	0	0	1	0	76	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-240815-061A	3	0	0	0	0	0	0	0	0	0	0	92	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
2015-GLAP-NR-081015-061A	1	0	2	0	0	0	0	0	0	0	0	114	0	0	2	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	1	0	0	0	0
2015-GLAP-NR-081015-061A	2	0	2	0	0	2	0	0	0	0	0	56	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-081015-061A	3	0	0	0	0	1	0	0	0	0	0	19	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-240516-061A	1	0	0	0	0	0	0	0	0	0	0	4	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-240516-061A	2	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-240516-061A	3	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-090816-061A	1	0	0	0	0	0	0	0	0	0	0	69	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-090816-061A	2	0	0	0	0	0	0	0	0	1	0	86	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-090816-061A	3	0	0	0	0	0	0	0	0	1	0	64	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-011116-061A	1	0	1	1	0	0	0	0	0	1	0	222	0	0	8	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-011116-061A	2	0	0	0	0	0	0	0	0	0	0	154	0	0	3	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-011116-061A	3	0	1	0	0	0	0	0	0	0	0	143	0	0	3	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-310717-061A	1	2	0	0	0	0	0	0	0	0	0	12	0	0	8	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-310717-061A	2	1	0	0	0	0	0	0	0	0	0	3	0	0	7	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-310717-061A	3	0	0	0	0	1	0	0	0	0	0	25	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-151117-061A	1	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	1	0	0	0	0
2017-GLAP-NR-151117-061A	2	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-151117-061A	3	0	1	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0

Field Number	Sampling Pass	*Alosa pseudoharengus*	*Ambloplites rupestris*	*Ameiurus melas*	*Ameiurus natalis*	*Ameiurus nebulosus*	*Amia calva*	*Anguilla rostrata*	*Aplodinotus grunniens*	*Carassius auratus*	*Carpiodes cyprinus*	*Catostomus commersonii*	*Cottus bairdii*	*Cyprinella spiloptera*	*Cyprinus carpio*	*Dorosoma cepedianum*	*Esox americanus vermiculatus*	*Esox lucius*	*Esox masquinongy*	*Esox masquinongy X Esox lucius*	*Etheostoma caeruleum*	*Etheostoma flabellare*	*Etheostoma nigrum*	*Fundulus diaphanus*	*Hypentelium nigricans*	*Ictalurus punctatus*	*Labidesthes sicculus*	*Lepisosteus osseus*	*Lepomis cyanellus*	*Lepomis gibbosus*	*Lepomis macrochirus*	*Lepomis sp.*	*Lethenteron appendix*	*Luxilus chrysocephalus*	*Luxilus cornutus*
2015-GLAP-NR-090615-062A	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-090615-062A	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-090615-062A	3	0	0	0	0	0	0	0	0	0	0	11	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-240815-062A	1	0	0	0	0	0	0	0	0	0	0	34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0
2015-GLAP-NR-240815-062A	2	0	0	0	0	0	0	0	0	1	0	31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-240815-062A	3	0	0	0	0	0	0	0	0	1	0	38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-081015-062A	1	0	0	0	0	0	0	0	0	1	0	25	0	0	2	0	0	0	1	0	0	0	0	3	0	0	0	0	0	0	1	0	0	0	0
2015-GLAP-NR-081015-062A	2	0	0	0	0	0	0	0	0	1	0	14	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
2015-GLAP-NR-081015-062A	3	0	0	0	0	0	0	0	0	0	0	11	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-240516-062A	1	0	0	0	0	0	0	0	0	0	0	9	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-240516-062A	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-240516-062A	3	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-090816-062A	1	0	3	0	0	0	0	0	0	0	0	51	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-090816-062A	2	0	1	0	0	0	1	0	0	0	0	74	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-090816-062A	3	0	0	0	0	1	0	0	0	1	0	28	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-011116-062A	1	0	1	0	0	0	1	0	0	2	0	86	0	0	1	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-011116-062A	2	0	0	1	0	0	0	0	0	1	0	119	0	0	3	0	0	0	2	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-011116-062A	3	0	0	2	0	0	0	0	0	0	0	64	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
2017-GLAP-NR-010817-062A	1	1	2	0	0	0	0	0	0	2	0	13	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-010817-062A	2	1	1	0	0	0	0	0	0	1	0	48	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-010817-062A	3	0	2	1	0	0	0	0	0	0	0	61	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-151117-062A	1	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-151117-062A	2	0	0	0	0	1	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-151117-062A	3	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
2015-GLAP-NR-170615-071A	1	0	0	0	0	0	0	0	1	0	0	0	0	0	1	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-170615-071A	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0
2015-GLAP-NR-170615-071A	3	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-200815-071A	1	0	0	1	0	0	4	1	0	0	0	3	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-200815-071A	2	0	0	1	0	0	0	0	0	0	0	1	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-200815-071A	3	0	0	1	0	0	0	0	0	1	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-131015-071A	1	0	0	6	0	0	3	0	0	0	0	23	0	0	3	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	2	0	0	0	0
2015-GLAP-NR-131015-071A	2	0	0	0	0	2	0	1	0	0	0	31	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0

Field Number	Sampling Pass	*Alosa pseudoharengus*	*Ambloplites rupestris*	*Ameiurus melas*	*Ameiurus natalis*	*Ameiurus nebulosus*	*Amia calva*	*Anguilla rostrata*	*Aplodinotus grunniens*	*Carassius auratus*	*Carpiodes cyprinus*	*Catostomus commersonii*	*Cottus bairdii*	*Cyprinella spiloptera*	*Cyprinus carpio*	*Dorosoma cepedianum*	*Esox americanus vermiculatus*	*Esox lucius*	*Esox masquinongy*	*Esox masquinongy X Esox lucius*	*Etheostoma caeruleum*	*Etheostoma flabellare*	*Etheostoma nigrum*	*Fundulus diaphanus*	*Hypentelium nigricans*	*Ictalurus punctatus*	*Labidesthes sicculus*	*Lepisosteus osseus*	*Lepomis cyanellus*	*Lepomis gibbosus*	*Lepomis macrochirus*	*Lepomis sp.*	*Lethenteron appendix*	*Luxilus chrysocephalus*	*Luxilus cornutus*
2015-GLAP-NR-131015-071A	3	0	0	0	0	1	0	0	0	0	0	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
2016-GLAP-NR-080616-071A	1	0	0	1	0	0	0	0	0	0	1	0	0	0	1	27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-080616-071A	2	0	0	0	0	0	0	0	0	0	0	1	0	0	0	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-080616-071A	3	0	0	0	0	0	0	0	0	0	0	0	0	0	1	41	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-020816-071A	1	0	0	0	0	0	1	0	0	0	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
2016-GLAP-NR-020816-071A	2	0	0	1	0	1	0	1	0	0	0	1	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-020816-071A	3	0	0	0	0	0	2	0	0	0	0	4	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0
2016-GLAP-NR-181016-071A	1	0	0	2	0	0	1	0	0	0	0	45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	0	0	0	1	0	0	1	0
2016-GLAP-NR-181016-071A	2	0	0	0	0	0	0	0	0	0	0	30	0	0	0	0	0	0	0	0	0	0	0	1	0	0	15	0	0	0	0	0	0	0	0
2016-GLAP-NR-181016-071A	3	0	0	0	0	4	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	1	0	0	7	0	0	0	1	0	0	0	0
2017-GLAP-NR-260617-071A	1	0	0	1	0	0	1	1	0	0	0	2	0	0	0	2	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
2017-GLAP-NR-260617-071A	2	0	0	0	0	0	0	0	0	0	0	5	0	0	1	12	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0
2017-GLAP-NR-260617-071A	3	0	1	1	0	0	0	0	0	0	0	1	0	1	0	9	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0
2017-GLAP-NR-040817-071A	1	0	0	3	0	0	4	0	0	0	0	1	0	0	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-040817-071A	2	0	0	0	0	0	3	1	0	0	0	0	0	0	2	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
2017-GLAP-NR-040817-071A	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-081117-071A	1	0	0	0	0	1	0	0	0	0	0	2	0	0	0	4	0	1	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0
2017-GLAP-NR-081117-071A	2	0	0	0	0	0	0	0	0	0	0	1	0	0	2	2	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0
2017-GLAP-NR-081117-071A	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0
2015-GLAP-NR-170615-072A	1	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	12	0	0	0	0	0	0	0
2015-GLAP-NR-170615-072A	2	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	8	0	0	0	0	0	0	0
2015-GLAP-NR-170615-072A	3	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0
2015-GLAP-NR-200815-072A	1	0	0	0	0	0	1	0	0	0	0	2	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0
2015-GLAP-NR-200815-072A	2	0	1	0	0	0	0	0	2	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
2015-GLAP-NR-200815-072A	3	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-131015-072A	1	0	0	0	0	1	0	1	0	0	0	10	1	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-131015-072A	2	0	0	0	0	0	0	0	0	0	0	4	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-131015-072A	3	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-080616-072A	1	0	1	0	0	0	0	0	0	0	2	0	0	0	0	12	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0
2016-GLAP-NR-080616-072A	2	0	0	0	0	0	0	0	1	0	0	1	0	0	2	28	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0
2016-GLAP-NR-080616-072A	3	0	0	0	0	0	0	0	1	0	0	1	0	0	1	29	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
2016-GLAP-NR-020816-072A	1	0	0	0	0	0	1	0	1	0	0	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	1

Field Number	Sampling Pass	*Alosa pseudoharengus*	*Ambloplites rupestris*	*Ameiurus melas*	*Ameiurus natalis*	*Ameiurus nebulosus*	*Amia calva*	*Anguilla rostrata*	*Aplodinotus grunniens*	*Carassius auratus*	*Carpiodes cyprinus*	*Catostomus commersonii*	*Cottus bairdii*	*Cyprinella spiloptera*	*Cyprinus carpio*	*Dorosoma cepedianum*	*Esox americanus vermiculatus*	*Esox lucius*	*Esox masquinongy*	*Esox masquinongy X Esox lucius*	*Etheostoma caeruleum*	*Etheostoma flabellare*	*Etheostoma nigrum*	*Fundulus diaphanus*	*Hypentelium nigricans*	*Ictalurus punctatus*	*Labidesthes sicculus*	*Lepisosteus osseus*	*Lepomis cyanellus*	*Lepomis gibbosus*	*Lepomis macrochirus*	*Lepomis sp.*	*Lethenteron appendix*	*Luxilus chrysocephalus*	*Luxilus cornutus*
2016-GLAP-NR-020816-072A	2	0	0	0	0	0	0	1	0	0	0	3	0	0	2	17	0	0	0	0	0	0	0	0	0	0	0	6	0	0	0	0	0	0	0
2016-GLAP-NR-020816-072A	3	0	0	0	0	0	0	0	1	0	0	2	0	0	1	2	0	0	0	1	0	0	0	0	0	0	1	4	0	0	0	0	0	0	0
2016-GLAP-NR-181016-072A	1	0	0	0	0	0	0	0	0	0	0	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	0	0	1	0	0	1	0
2016-GLAP-NR-181016-072A	2	0	0	0	0	0	0	0	1	0	0	2	0	0	1	0	0	0	0	0	0	0	0	1	0	0	8	0	0	0	0	0	0	0	0
2016-GLAP-NR-181016-072A	3	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	1	0	0	0	0
2017-GLAP-NR-270617-072A	1	0	0	0	0	0	0	0	0	0	0	1	0	0	5	3	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0	0	0	0
2017-GLAP-NR-270617-072A	2	0	0	0	0	0	0	0	1	0	1	0	0	0	0	16	0	0	0	0	0	0	0	0	0	0	1	7	0	0	0	0	0	0	0
2017-GLAP-NR-270617-072A	3	0	0	0	0	0	0	0	1	0	0	0	0	0	3	6	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0
2017-GLAP-NR-040817-072A	1	3	0	0	0	0	0	0	0	0	0	0	0	0	3	1	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0
2017-GLAP-NR-040817-072A	2	3	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-040817-072A	3	0	0	0	0	0	1	0	1	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-081117-072A	1	0	1	0	0	0	0	0	0	0	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	11	0	0	0	0	0	0	0	0
2017-GLAP-NR-081117-072A	2	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
2017-GLAP-NR-081117-072A	3	0	0	0	0	0	1	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
2015-GLAP-NR-190615-081A	1	0	0	19	0	0	3	0	0	1	0	11	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
2015-GLAP-NR-190615-081A	2	0	0	0	0	2	0	0	0	0	0	10	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0
2015-GLAP-NR-190615-081A	3	0	0	0	0	2	0	0	0	0	0	2	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
2015-GLAP-NR-120815-081A	1	0	0	4	0	0	0	0	0	1	0	3	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-120815-081A	2	0	0	2	0	0	1	0	0	0	0	14	0	0	1	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-120815-081A	3	0	0	1	0	0	0	0	0	0	0	3	0	0	0	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-161015-081A	1	0	0	2	0	0	0	0	0	1	0	119	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-161015-081A	2	1	0	0	12	0	0	0	0	0	0	60	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-161015-081A	3	0	0	0	0	0	0	0	0	0	0	31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-090616-081A	1	42	0	1	0	8	2	0	0	0	0	18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-090616-081A	2	15	0	0	0	4	1	0	0	0	0	4	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-090616-081A	3	3	0	0	0	3	1	0	0	0	0	17	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-030816-081A	1	0	0	0	0	0	1	0	0	0	0	0	0	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-030816-081A	2	0	0	0	0	0	0	0	0	0	0	3	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-030816-081A	3	0	0	0	0	0	2	0	0	0	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-281016-081A	1	0	0	1	0	2	1	0	0	0	0	46	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-281016-081A	2	2	2	6	0	0	0	0	0	0	0	49	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
2016-GLAP-NR-281016-081A	3	0	1	3	0	1	0	0	0	0	0	47	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Field Number	Sampling Pass	*Alosa pseudoharengus*	*Ambloplites rupestris*	*Ameiurus melas*	*Ameiurus natalis*	*Ameiurus nebulosus*	*Amia calva*	*Anguilla rostrata*	*Aplodinotus grunniens*	*Carassius auratus*	*Carpiodes cyprinus*	*Catostomus commersonii*	*Cottus bairdii*	*Cyprinella spiloptera*	*Cyprinus carpio*	*Dorosoma cepedianum*	*Esox americanus vermiculatus*	*Esox lucius*	*Esox masquinongy*	*Esox masquinongy X Esox lucius*	*Etheostoma caeruleum*	*Etheostoma flabellare*	*Etheostoma nigrum*	*Fundulus diaphanus*	*Hypentelium nigricans*	*Ictalurus punctatus*	*Labidesthes sicculus*	*Lepisosteus osseus*	*Lepomis cyanellus*	*Lepomis gibbosus*	*Lepomis macrochirus*	*Lepomis sp.*	*Lethenteron appendix*	*Luxilus chrysocephalus*	*Luxilus cornutus*
2017-GLAP-NR-270617-081A	1	0	0	0	0	0	1	0	0	0	0	6	0	0	1	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-270617-081A	2	0	0	2	0	0	0	0	0	0	0	7	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-270617-081A	3	0	0	0	0	0	0	0	0	0	0	9	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-030817-081A	1	0	0	0	0	1	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-030817-081A	2	1	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-030817-081A	3	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-091117-081A	1	0	0	0	0	1	0	0	0	1	0	6	0	0	0	5	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-091117-081A	2	0	0	0	0	0	0	0	0	0	0	5	0	0	0	1	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0
2017-GLAP-NR-091117-081A	3	0	0	0	0	0	0	0	0	0	0	2	0	0	0	11	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
2015-GLAP-NR-190615-082A	1	0	0	1	0	0	0	0	0	0	0	2	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-190615-082A	2	0	0	0	0	2	2	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
2015-GLAP-NR-190615-082A	3	0	0	0	0	1	2	0	0	1	0	7	0	0	3	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
2015-GLAP-NR-120815-082A	1	0	0	2	0	0	3	2	0	0	0	11	0	0	12	13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-120815-082A	2	0	0	2	0	0	1	2	0	1	0	10	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-120815-082A	3	0	1	2	0	0	2	0	0	0	0	12	0	0	5	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-161015-082A	1	0	0	0	0	1	0	0	1	0	0	49	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
2015-GLAP-NR-161015-082A	2	0	2	0	0	0	0	0	0	0	0	57	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0
2015-GLAP-NR-161015-082A	3	0	0	0	0	2	1	0	0	1	0	21	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
2016-GLAP-NR-090616-082A	1	0	0	2	0	0	0	0	0	0	0	39	0	0	0	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-090616-082A	2	0	0	0	0	2	0	0	0	0	0	20	0	0	1	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-090616-082A	3	0	0	0	0	2	0	0	0	0	0	13	0	0	0	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-030816-082A	1	0	1	0	0	1	2	1	0	0	0	6	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-030816-082A	2	2	0	0	0	0	2	0	0	0	0	1	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
2016-GLAP-NR-030816-082A	3	0	0	1	0	0	1	1	0	0	0	6	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-281016-082A	1	3	1	2	0	3	0	1	0	0	0	59	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0
2016-GLAP-NR-281016-082A	2	9	0	5	0	0	0	0	0	0	0	57	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	3	0
2016-GLAP-NR-281016-082A	3	0	0	5	0	0	0	0	0	0	0	27	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-270617-082A	1	1	0	1	0	0	0	2	0	0	0	6	0	0	1	103	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-270617-082A	2	0	0	0	0	0	0	1	0	0	0	5	0	0	2	16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-270617-082A	3	0	0	1	0	0	0	0	0	0	0	8	0	0	0	4	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-030817-082A	1	3	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-030817-082A	2	10	0	0	0	0	2	0	0	1	0	0	0	0	2	3	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0

Field Number	Sampling Pass	*Alosa pseudoharengus*	*Ambloplites rupestris*	*Ameiurus melas*	*Ameiurus natalis*	*Ameiurus nebulosus*	*Amia calva*	*Anguilla rostrata*	*Aplodinotus grunniens*	*Carassius auratus*	*Carpiodes cyprinus*	*Catostomus commersonii*	*Cottus bairdii*	*Cyprinella spiloptera*	*Cyprinus carpio*	*Dorosoma cepedianum*	*Esox americanus vermiculatus*	*Esox lucius*	*Esox masquinongy*	*Esox masquinongy X Esox lucius*	*Etheostoma caeruleum*	*Etheostoma flabellare*	*Etheostoma nigrum*	*Fundulus diaphanus*	*Hypentelium nigricans*	*Ictalurus punctatus*	*Labidesthes sicculus*	*Lepisosteus osseus*	*Lepomis cyanellus*	*Lepomis gibbosus*	*Lepomis macrochirus*	*Lepomis sp.*	*Lethenteron appendix*	*Luxilus chrysocephalus*	*Luxilus cornutus*
2017-GLAP-NR-030817-082A	3	2	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-091117-082A	1	0	0	0	0	1	0	0	0	0	0	14	0	0	0	4	0	1	0	0	0	0	0	0	0	0	7	0	0	1	0	0	0	0	0
2017-GLAP-NR-091117-082A	2	0	0	0	0	1	0	0	0	0	0	9	0	0	0	7	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0
2017-GLAP-NR-091117-082A	3	0	0	0	0	1	0	0	0	0	0	12	0	0	0	5	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0
2015-GLAP-NR-190615-091A	1	0	0	1	0	0	0	0	0	0	0	4	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
2015-GLAP-NR-190615-091A	2	0	0	0	0	0	0	0	0	0	0	3	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
2015-GLAP-NR-190615-091A	3	0	0	0	0	0	0	0	0	0	0	1	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-190815-091A	1	0	0	2	0	0	1	0	1	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-190815-091A	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-190815-091A	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-221015-091A	1	0	0	0	0	3	0	3	0	0	0	32	0	0	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
2015-GLAP-NR-221015-091A	2	0	0	0	0	0	0	0	0	0	0	13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-221015-091A	3	1	0	0	0	1	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-090616-091A	1	0	0	0	0	3	0	1	0	0	0	6	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-090616-091A	2	0	1	0	0	1	0	2	0	0	0	10	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-090616-091A	3	0	1	0	0	0	0	0	0	0	0	8	0	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-110816-091A	1	0	0	1	0	0	3	3	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-110816-091A	2	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-110816-091A	3	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
2016-GLAP-NR-041116-091A	1	0	1	0	0	2	0	0	0	0	0	29	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
2016-GLAP-NR-041116-091A	2	0	0	0	0	0	0	0	0	0	0	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
2016-GLAP-NR-041116-091A	3	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-290617-091A	1	0	0	0	0	0	0	1	0	0	0	1	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-290617-091A	2	0	0	0	0	0	1	1	1	0	0	2	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
2017-GLAP-NR-290617-091A	3	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-030817-091A	1	0	0	0	0	0	0	0	0	0	0	0	0	0	2	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-030817-091A	2	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0
2017-GLAP-NR-030817-091A	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-161117-091A	1	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0
2017-GLAP-NR-161117-091A	2	0	0	1	0	0	0	0	0	0	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	13	0	0	0	0	0	0	0	0
2017-GLAP-NR-161117-091A	3	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	1	0	0	0	0	0	0	0	0	10	0	0	0	0	0	0	0	0
2015-GLAP-NR-180615-092A	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0

Field Number	Sampling Pass	*Alosa pseudoharengus*	*Ambloplites rupestris*	*Ameiurus melas*	*Ameiurus natalis*	*Ameiurus nebulosus*	*Amia calva*	*Anguilla rostrata*	*Aplodinotus grunniens*	*Carassius auratus*	*Carpiodes cyprinus*	*Catostomus commersonii*	*Cottus bairdii*	*Cyprinella spiloptera*	*Cyprinus carpio*	*Dorosoma cepedianum*	*Esox americanus vermiculatus*	*Esox lucius*	*Esox masquinongy*	*Esox masquinongy X Esox lucius*	*Etheostoma caeruleum*	*Etheostoma flabellare*	*Etheostoma nigrum*	*Fundulus diaphanus*	*Hypentelium nigricans*	*Ictalurus punctatus*	*Labidesthes sicculus*	*Lepisosteus osseus*	*Lepomis cyanellus*	*Lepomis gibbosus*	*Lepomis macrochirus*	*Lepomis* sp.	*Lethenteron appendix*	*Luxilus chrysocephalus*	*Luxilus cornutus*
2015-GLAP-NR-180615-092A	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
2015-GLAP-NR-180615-092A	3	7	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-190815-092A	1	0	0	0	0	0	0	0	0	0	0	2	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-190815-092A	2	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-190815-092A	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-221015-092A	1	0	0	0	0	0	0	0	0	0	0	24	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-221015-092A	2	0	0	0	0	0	0	0	0	0	0	19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-221015-092A	3	0	0	0	0	0	0	0	0	0	0	17	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-100616-092A	1	0	2	0	0	0	0	0	0	0	0	60	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-100616-092A	2	0	1	0	0	0	0	0	0	0	0	45	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-100616-092A	3	0	1	0	0	0	0	0	0	0	0	11	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
2016-GLAP-NR-110816-092A	1	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-110816-092A	2	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-110816-092A	3	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-041116-092A	1	0	0	0	0	2	0	0	0	0	0	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-041116-092A	2	0	0	0	0	2	0	0	0	0	0	14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-041116-092A	3	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-290617-092A	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-290617-092A	2	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	0	0	0	0	0	0	0
2017-GLAP-NR-290617-092A	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-020817-092A	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-020817-092A	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-020817-092A	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-161117-092A	1	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-161117-092A	2	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0
2017-GLAP-NR-161117-092A	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-180615-101A	1	0	0	0	0	0	0	0	0	0	0	5	0	0	7	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-180615-101A	2	16	0	0	0	0	0	0	1	0	0	2	0	0	4	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-180615-101A	3	2	0	0	0	0	0	0	1	0	0	1	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-130815-101A	1	0	0	0	0	0	0	0	0	0	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-130815-101A	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-130815-101A	3	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Field Number	Sampling Pass	*Alosa pseudoharengus*	*Ambloplites rupestris*	*Ameiurus melas*	*Ameiurus natalis*	*Ameiurus nebulosus*	*Amia calva*	*Anguilla rostrata*	*Aplodinotus grunniens*	*Carassius auratus*	*Carpiodes cyprinus*	*Catostomus commersonii*	*Cottus bairdii*	*Cyprinella spiloptera*	*Cyprinus carpio*	*Dorosoma cepedianum*	*Esox americanus vermiculatus*	*Esox lucius*	*Esox masquinongy*	*Esox masquinongy X Esox lucius*	*Etheostoma caeruleum*	*Etheostoma flabellare*	*Etheostoma nigrum*	*Fundulus diaphanus*	*Hypentelium nigricans*	*Ictalurus punctatus*	*Labidesthes sicculus*	*Lepisosteus osseus*	*Lepomis cyanellus*	*Lepomis gibbosus*	*Lepomis macrochirus*	*Lepomis* sp.	*Lethenteron appendix*	*Luxilus chrysocephalus*	*Luxilus cornutus*
2015-GLAP-NR-231015-101A	1	0	0	0	0	0	0	0	0	0	0	2	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-231015-101A	2	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-231015-101A	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
2016-GLAP-NR-100616-101A	1	0	0	0	0	0	0	0	2	0	0	17	0	0	0	21	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-100616-101A	2	0	0	0	0	0	0	0	0	0	0	13	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-100616-101A	3	0	0	0	0	0	0	0	0	0	0	9	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-040816-101A	1	0	1	0	0	0	1	0	0	0	0	7	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-040816-101A	2	0	0	0	0	0	0	0	0	0	0	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
2016-GLAP-NR-040816-101A	3	0	1	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-311016-101A	1	0	2	0	0	0	0	0	0	0	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-311016-101A	2	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
2016-GLAP-NR-311016-101A	3	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0
2017-GLAP-NR-300617-101A	1	0	0	0	0	0	0	0	1	0	0	5	0	0	2	370	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-300617-101A	2	0	0	1	0	0	0	0	1	0	0	3	0	0	4	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-300617-101A	3	0	0	0	0	0	0	0	1	0	0	3	0	0	4	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-020817-101A	1	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-020817-101A	2	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-020817-101A	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-161117-101A	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0
2017-GLAP-NR-161117-101A	2	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-161117-101A	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-180615-102A	1	0	0	0	0	0	0	0	2	0	0	13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-180615-102A	2	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-180615-102A	3	1	0	1	0	0	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-130815-102A	1	0	0	0	0	0	0	0	0	0	0	6	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-130815-102A	2	0	0	0	0	0	0	0	0	0	0	2	0	0	0	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-130815-102A	3	0	0	0	0	0	0	0	0	0	0	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-231015-102A	1	0	0	0	0	0	0	0	0	0	0	17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
2015-GLAP-NR-231015-102A	2	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0
2015-GLAP-NR-231015-102A	3	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-100616-102A	1	0	0	0	0	0	0	0	0	0	0	27	0	0	0	2	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-100616-102A	2	0	0	0	0	0	0	0	0	0	0	14	0	0	0	4	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Field Number	Sampling Pass	*Alosa pseudoharengus*	*Ambloplites rupestris*	*Ameiurus melas*	*Ameiurus natalis*	*Ameiurus nebulosus*	*Amia calva*	*Anguilla rostrata*	*Aplodinotus grunniens*	*Carassius auratus*	*Carpiodes cyprinus*	*Catostomus commersonii*	*Cottus bairdii*	*Cyprinella spiloptera*	*Cyprinus carpio*	*Dorosoma cepedianum*	*Esox americanus vermiculatus*	*Esox lucius*	*Esox masquinongy*	*Esox masquinongy X Esox lucius*	*Etheostoma caeruleum*	*Etheostoma flabellare*	*Etheostoma nigrum*	*Fundulus diaphanus*	*Hypentelium nigricans*	*Ictalurus punctatus*	*Labidesthes sicculus*	*Lepisosteus osseus*	*Lepomis cyanellus*	*Lepomis gibbosus*	*Lepomis macrochirus*	*Lepomis sp.*	*Lethenteron appendix*	*Luxilus chrysocephalus*	*Luxilus cornutus*
2016-GLAP-NR-100616-102A	3	0	0	0	0	0	0	0	0	0	0	9	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-040816-102A	1	0	0	0	0	0	0	0	0	0	0	19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-040816-102A	2	0	1	0	0	0	0	0	0	0	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
2016-GLAP-NR-040816-102A	3	0	1	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR311016-102A	1	0	1	0	0	0	0	0	1	1	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	2	0	0	0	0
2016-GLAP-NR311016-102A	2	0	0	1	0	0	0	0	0	0	0	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0
2016-GLAP-NR311016-102A	3	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0
2017-GLAP-NR-300617-102A	1	0	0	0	0	0	0	0	1	0	0	8	0	0	0	30	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-300617-102A	2	0	0	0	0	0	0	0	0	0	0	3	0	0	6	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-300617-102A	3	0	0	0	0	0	0	0	0	0	0	0	0	0	1	31	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
2017-GLAP-NR-080817-102A	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-080817-102A	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-080817-102A	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-161117-102A	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-161117-102A	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-161117-102A	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Appendix 3. *(continued). Number of fishes captured and identified to species in each of three passes during each sampling event at each station in spring, summer, and fall of 2015, 2016, and 2017.*

Field Number	Sampling Pass	*Micropterus dolomieu*	*Micropterus salmoides*	*Morone americana*	*Morone chrysops*	*Moxostoma anisurum*	*Moxostoma erythrurum*	*Moxostoma macrolepidotum*	*Moxostoma sp.*	*Moxostoma valenciennesi*	*Neogobius melanostomus*	*Nocomis biguttatus*	*Notemigonus crysoleucas*	*Notropis atherinoides*	*Notropis hudsonius*	*Notropis volucellus*	*Oncorhynchus kisutch*	*Oncorhynchus mykiss*	*Oncorhynchus tshawytscha*	*Osmerus mordax*	*Perca flavescens*	*Percina caprodes*	*Percopsis omiscomaycus*	*Petromyzon marinus*	*Pimephales notatus*	*Pimephales promelas*	*Pomoxis annularis*	*Pomoxis nigromaculatus*	*Salmo salar*	*Salmo trutta*	*Salmo trutta X Salvelinus fontinalis*	*Salvelinus namaycush*	*Sander vitreus*	*Scardinius erythrophthalmus*	*Semotilus atromaculatus*	*Umbra limi*
2015-GLAP-NR-120615-011A	1	1	0	0	0	0	0	1	0	4	0	0	0	24	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-120615-011A	2	5	0	0	0	0	0	0	0	6	0	0	0	11	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-120615-011A	3	2	0	0	0	0	0	1	0	0	1	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-180815-011A	1	0	0	0	0	0	1	0	0	0	0	1	0	0	3	0	0	0	0	32	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-180815-011A	2	0	1	0	0	0	1	0	0	0	0	1	0	1	1	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-180815-011A	3	0	1	0	0	0	0	0	0	1	0	0	0	18	0	0	0	0	0	3	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-071015-011A	1	2	4	4	0	0	0	2	0	4	0	13	0	39	34	0	0	0	0	29	18	0	0	0	30	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-071015-011A	2	0	3	1	0	0	0	0	0	3	0	10	0	75	10	0	0	0	0	0	19	0	0	0	23	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-071015-011A	3	1	0	6	0	0	0	0	0	3	0	4	0	66	4	0	0	0	0	0	8	0	0	0	7	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-250516-011A	1	0	0	0	0	0	0	0	0	12	1	0	0	229	1	0	0	0	0	28	17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-250516-011A	2	1	0	0	0	0	0	0	0	6	1	0	0	250	3	0	0	0	0	0	19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-250516-011A	3	0	0	0	1	0	0	0	0	12	3	0	0	123	0	0	0	0	0	1	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-150816-011A	1	1	8	0	0	0	0	2	0	0	0	5	0	4	19	0	0	0	0	0	20	1	0	0	4	0	0	0	0	0	0	0	2	0	0	0
2016-GLAP-NR-150816-011A	2	1	1	0	0	0	0	6	0	0	0	1	3	1	5	0	0	0	0	0	15	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0
2016-GLAP-NR-150816-011A	3	0	2	0	1	0	0	0	0	0	0	1	0	16	3	0	0	0	0	0	11	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-171016-011A	1	1	0	0	0	0	0	0	0	0	1	3	0	0	2	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0
2016-GLAP-NR-171016-011A	2	1	0	0	0	0	0	0	0	2	0	4	0	3	0	0	0	0	0	0	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-171016-011A	3	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	8	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
2017-GLAP-NR-050717-011A	1	10	2	0	0	0	0	0	0	1	0	0	0	19	5	0	0	0	0	0	36	2	0	0	0	0	0	0	0	0	0	0	0	1	0	0
2017-GLAP-NR-050717-011A	2	2	0	0	0	0	0	0	0	1	0	2	0	6	2	0	0	0	0	0	22	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-050717-011A	3	1	0	0	0	0	0	1	0	0	0	2	0	12	5	0	0	0	0	1	12	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-280817-011A	1	0	8	0	0	0	0	0	0	1	0	2	0	0	15	0	0	0	0	0	15	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0
2017-GLAP-NR-280817-011A	2	0	5	0	0	0	0	0	0	2	0	3	1	0	8	0	0	0	0	0	25	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
2017-GLAP-NR-280817-011A	3	1	3	0	0	0	0	0	0	2	0	1	1	0	7	0	0	0	0	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-221117-011A	1	0	0	0	0	0	0	0	0	1	0	0	0	2	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-221117-011A	2	0	1	1	0	0	0	0	0	0	0	0	0	6	0	0	0	1	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-221117-011A	3	0	0	0	0	0	0	3	0	0	0	0	0	8	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-120615-012A	1	3	0	0	2	0	0	0	0	15	0	0	0	3	0	0	0	0	0	3	10	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-120615-012A	2	0	0	0	0	0	0	0	0	28	0	0	0	116	0	0	0	0	0	0	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Field Number	Sampling Pass	*Micropterus dolomieu*	*Micropterus salmoides*	*Morone americana*	*Morone chrysops*	*Moxostoma anisurum*	*Moxostoma erythrurum*	*Moxostoma macrolepidotum*	*Moxostoma sp.*	*Moxostoma valenciennesi*	*Neogobius melanostomus*	*Nocomis biguttatus*	*Notemigonus crysoleucas*	*Notropis atherinoides*	*Notropis hudsonius*	*Notropis volucellus*	*Oncorhynchus kisutch*	*Oncorhynchus mykiss*	*Oncorhynchus tshawytscha*	*Osmerus mordax*	*Perca flavescens*	*Percina caprodes*	*Percopsis omiscomaycus*	*Petromyzon marinus*	*Pimephales notatus*	*Pimephales promelas*	*Pomoxis annularis*	*Pomoxis nigromaculatus*	*Salmo salar*	*Salmo trutta*	*Salmo trutta X Salvelinus fontinalis*	*Salvelinus namaycush*	*Sander vitreus*	*Scardinius erythrophthalmus*	*Semotilus atromaculatus*	*Umbra limi*
2015-GLAP-NR-120615-012A	3	4	0	0	0	0	0	0	0	18	0	0	0	59	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-180815-012A	1	0	2	0	0	0	0	0	0	0	0	1	0	8	1	0	0	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-180815-012A	2	0	3	0	0	0	0	0	0	0	0	1	0	2	2	0	0	0	0	0	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-180815-012A	3	1	0	0	0	0	0	0	0	2	0	0	0	32	3	0	0	0	0	0	7	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-071015-012A	1	0	18	1	0	0	0	0	0	4	1	2	0	250	27	0	0	0	0	9	55	0	0	0	6	0	0	0	0	0	0	0	0	2	0	0
2015-GLAP-NR-071015-012A	2	0	13	4	0	0	0	0	0	6	0	2	0	250	4	0	0	1	0	1	37	0	0	0	2	0	0	0	0	0	0	0	0	1	0	0
2015-GLAP-NR-071015-012A	3	1	6	0	0	0	0	0	0	2	0	3	0	83	1	0	0	1	0	4	20	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
2016-GLAP-NR-250516-012A	1	0	0	0	0	0	0	0	0	4	0	0	0	169	3	0	0	0	0	1	101	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-250516-012A	2	0	0	0	0	0	0	0	0	4	0	0	0	183	0	0	0	0	0	0	63	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-250516-012A	3	0	0	0	0	0	0	0	0	7	0	0	0	116	1	0	0	0	0	0	36	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-150816-012A	1	0	7	0	0	0	0	0	0	2	0	4	0	2	6	0	0	0	0	0	38	0	0	0	3	0	0	0	0	0	0	0	1	3	1	0
2016-GLAP-NR-150816-012A	2	4	11	0	1	0	0	0	0	4	1	4	0	2	11	0	0	0	0	0	52	0	0	0	3	0	0	0	0	0	0	0	2	1	0	0
2016-GLAP-NR-150816-012A	3	4	13	0	0	0	0	0	0	4	0	2	0	2	2	0	0	0	0	0	60	0	0	0	2	0	0	2	0	0	0	0	0	1	0	0
2016-GLAP-NR-171016-012A	1	0	13	2	0	0	0	1	0	10	0	1	0	14	2	0	0	0	0	0	22	0	0	0	1	0	0	1	0	0	0	0	8	1	0	0
2016-GLAP-NR-171016-012A	2	0	4	1	0	0	0	3	0	8	1	2	0	43	2	0	0	0	0	0	32	0	0	0	3	0	0	4	0	0	0	0	6	4	0	0
2016-GLAP-NR-171016-012A	3	1	4	2	0	0	0	3	0	5	0	4	0	36	3	0	0	0	0	0	30	1	0	0	3	0	0	0	0	0	0	0	0	5	0	0
2017-GLAP-NR-060717-012A	1	0	0	0	1	0	0	0	0	3	0	1	0	1	1	0	0	0	0	0	20	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-060717-012A	2	0	5	0	0	0	0	0	0	1	0	0	0	1	2	0	0	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-060717-012A	3	1	0	0	0	0	0	0	0	1	0	0	0	8	0	0	0	0	0	5	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-280817-012A	1	1	25	0	0	0	0	0	0	3	0	2	1	6	5	0	0	0	0	0	43	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
2017-GLAP-NR-280817-012A	2	1	12	2	0	0	0	2	0	3	0	4	0	35	9	0	0	0	0	0	45	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
2017-GLAP-NR-280817-012A	3	0	8	0	0	0	0	1	0	1	0	3	0	2	25	0	0	0	0	0	48	0	0	0	4	0	0	1	0	0	0	0	1	1	0	0
2017-GLAP-NR-221117-012A	1	0	0	0	0	0	0	0	0	0	0	0	0	7	3	0	0	1	0	0	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-221117-012A	2	0	1	0	0	0	0	0	0	0	0	0	0	12	0	0	0	0	0	5	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-221117-012A	3	0	0	0	0	0	0	0	0	0	0	0	0	106	1	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-110615-021A	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-110615-021A	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-110615-021A	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-110815-021A	1	1	1	0	0	0	0	0	0	4	0	0	0	8	10	0	0	0	0	0	12	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-110815-021A	2	0	0	0	0	0	0	1	0	3	0	2	0	1	10	0	0	0	0	0	13	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-110815-021A	3	0	2	0	0	0	0	0	0	4	0	1	0	0	2	0	0	0	0	0	16	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0

Field Number	Sampling Pass	*Micropterus dolomieu*	*Micropterus salmoides*	*Morone americana*	*Morone chrysops*	*Moxostoma anisurum*	*Moxostoma erythrurum*	*Moxostoma macrolepidotum*	*Moxostoma sp.*	*Moxostoma valenciennesi*	*Neogobius melanostomus*	*Nocomis biguttatus*	*Notemigonus crysoleucas*	*Notropis atherinoides*	*Notropis hudsonius*	*Notropis volucellus*	*Oncorhynchus kisutch*	*Oncorhynchus mykiss*	*Oncorhynchus tshawytscha*	*Osmerus mordax*	*Perca flavescens*	*Percina caprodes*	*Percopsis omiscomaycus*	*Petromyzon marinus*	*Pimephales notatus*	*Pimephales promelas*	*Pomoxis annularis*	*Pomoxis nigromaculatus*	*Salmo salar*	*Salmo trutta*	*Salmo trutta X Salvelinus fontinalis*	*Salvelinus namaycush*	*Sander vitreus*	*Scardinius erythrophthalmus*	*Semotilus atromaculatus*	*Umbra limi*
2015-GLAP-NR-061015-021A	1	0	13	4	0	0	0	1	0	28	0	3	0	182	7	0	0	0	0	1	69	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-061015-021A	2	1	7	0	0	0	0	0	0	3	0	1	0	164	1	0	0	0	0	0	52	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-061015-021A	3	2	2	0	0	0	0	0	0	9	0	1	0	100	3	0	0	0	0	0	35	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-260516-021A	1	0	0	0	0	0	0	0	0	0	2	0	0	16	0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-260516-021A	2	0	0	0	0	0	0	0	0	0	3	0	0	47	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-260516-021A	3	0	0	0	0	0	0	0	0	0	0	0	0	17	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-180816-021A	1	0	5	0	1	0	0	0	0	2	0	0	0	2	1	0	0	0	0	0	38	0	0	0	17	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-180816-021A	2	1	14	1	2	0	0	0	0	8	0	0	1	3	7	0	0	0	0	0	34	0	0	0	23	0	0	1	0	0	0	0	3	0	0	0
2016-GLAP-NR-180816-021A	3	1	12	0	0	0	0	0	0	1	0	0	0	2	4	0	0	0	0	0	39	0	0	0	16	0	0	0	0	0	0	0	1	0	0	0
2016-GLAP-NR-241016-021A	1	0	12	4	0	0	0	1	0	8	0	0	0	23	2	0	0	0	0	1	17	0	0	0	20	0	0	0	0	0	0	0	0	2	0	0
2016-GLAP-NR-241016-021A	2	0	4	1	0	0	0	0	0	3	0	2	0	9	3	0	0	0	0	0	9	0	0	0	14	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-241016-021A	3	0	4	8	1	0	0	0	0	3	0	2	0	61	1	0	0	0	0	3	14	0	0	0	14	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-040717-021A	1	0	0	0	0	0	0	0	0	2	0	0	0	0	3	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-040717-021A	2	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	1	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-040717-021A	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-300817-021A	1	0	3	1	0	0	0	2	0	3	0	1	0	17	6	0	0	0	0	0	57	0	0	0	15	0	0	0	0	0	0	0	1	3	0	0
2017-GLAP-NR-300817-021A	2	0	6	3	0	0	0	0	0	1	0	2	1	57	18	0	0	0	0	0	45	0	0	0	8	0	0	0	0	0	0	0	1	0	0	0
2017-GLAP-NR-300817-021A	3	1	3	0	0	0	0	1	0	0	0	0	0	136	7	0	0	0	0	0	44	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-231117-021A	1	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-231117-021A	2	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-231117-021A	3	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-110615-022A	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-110615-022A	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-110615-022A	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-110815-022A	1	1	0	0	0	0	0	2	0	2	0	9	3	28	1	0	0	0	0	0	9	0	0	0	8	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-110815-022A	2	0	0	0	0	0	1	1	0	1	0	6	0	7	3	0	0	0	0	0	7	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-110815-022A	3	0	0	0	0	0	0	1	0	1	0	4	0	21	3	0	0	0	0	0	9	0	0	0	7	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-061015-022A	1	0	3	0	0	0	0	3	0	3	0	4	0	86	1	0	0	0	0	24	6	0	0	0	8	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-061015-022A	2	0	0	0	0	0	0	1	0	1	0	0	0	24	1	0	0	0	0	9	6	0	0	0	8	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-061015-022A	3	0	1	0	0	0	0	2	0	1	0	0	0	181	0	0	0	0	0	13	8	0	0	0	11	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-260516-022A	1	0	0	0	0	0	0	0	0	0	1	0	0	10	4	0	0	0	0	7	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Field Number	Sampling Pass	*Micropterus dolomieu*	*Micropterus salmoides*	*Morone americana*	*Morone chrysops*	*Moxostoma anisurum*	*Moxostoma erythrurum*	*Moxostoma macrolepidotum*	*Moxostoma sp.*	*Moxostoma valenciennesi*	*Neogobius melanostomus*	*Nocomis biguttatus*	*Notemigonus crysoleucas*	*Notropis atherinoides*	*Notropis hudsonius*	*Notropis volucellus*	*Oncorhynchus kisutch*	*Oncorhynchus mykiss*	*Oncorhynchus tshawytscha*	*Osmerus mordax*	*Perca flavescens*	*Percina caprodes*	*Percopsis omiscomaycus*	*Petromyzon marinus*	*Pimephales notatus*	*Pimephales promelas*	*Pomoxis annularis*	*Pomoxis nigromaculatus*	*Salmo salar*	*Salmo trutta*	*Salmo trutta X Salvelinus fontinalis*	*Salvelinus namaycush*	*Sander vitreus*	*Scardinius erythrophthalmus*	*Semotilus atromaculatus*	*Umbra limi*
2016-GLAP-NR-260516-022A	2	0	0	1	0	0	0	0	0	1	0	0	0	28	9	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-260516-022A	3	1	0	0	0	0	0	0	0	0	0	0	0	23	8	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-180816-022A	1	3	6	0	0	0	0	0	0	2	0	4	0	1	18	0	0	0	0	0	42	0	0	0	12	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-180816-022A	2	1	4	1	0	0	0	0	0	0	0	2	0	1	2	0	0	0	0	0	20	0	0	0	12	0	0	1	0	0	0	0	0	1	0	0
2016-GLAP-NR-180816-022A	3	0	8	0	0	0	0	0	0	3	0	1	0	1	1	0	0	0	0	0	18	0	0	0	26	0	0	0	0	0	0	0	1	0	0	0
2016-GLAP-NR-261016-022A	1	2	3	0	0	0	0	0	0	2	0	5	0	8	3	0	0	1	0	0	3	0	0	0	8	0	0	1	0	0	0	0	0	0	0	0
2016-GLAP-NR-261016-022A	2	0	5	1	0	0	0	1	0	1	1	10	0	17	0	0	0	0	0	0	17	0	0	0	39	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-261016-022A	3	0	1	1	0	0	0	1	0	5	0	3	0	19	0	0	0	0	0	0	4	0	0	0	25	0	0	0	0	0	0	0	1	1	0	0
2017-GLAP-NR-040717-022A	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0
2017-GLAP-NR-040717-022A	2	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-040717-022A	3	1	0	0	0	0	0	0	0	7	0	0	0	0	0	0	0	0	0	0	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-300817-022A	1	0	6	6	0	0	0	1	0	2	0	1	0	101	8	0	0	0	0	0	35	0	0	0	14	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-300817-022A	2	0	3	0	0	0	0	1	0	2	0	0	0	109	9	0	0	0	0	0	24	0	0	0	11	0	0	0	0	0	0	0	1	0	0	0
2017-GLAP-NR-300817-022A	3	0	2	0	0	0	0	6	0	3	0	1	0	114	23	0	0	0	0	0	26	0	0	0	21	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-231117-022A	1	0	1	1	0	0	0	1	0	6	0	2	0	2	11	0	0	0	0	0	34	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-231117-022A	2	1	1	0	0	0	0	0	0	9	0	0	0	3	1	0	0	0	0	0	10	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-231117-022A	3	0	0	0	0	0	0	0	0	8	0	5	0	2	9	0	0	0	0	1	22	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-110615-031A	1	3	0	0	0	0	0	1	0	6	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-110615-031A	2	1	0	0	0	0	0	1	0	10	0	0	0	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-110615-031A	3	0	0	0	0	0	0	1	0	9	0	0	0	0	0	0	0	0	0	6	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-100815-031A	1	1	0	0	0	0	0	0	0	1	1	0	0	0	3	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-100815-031A	2	0	0	0	0	0	0	0	0	5	0	1	0	13	4	0	0	0	0	0	4	3	0	0	0	0	0	0	0	0	0	0	0	1	0	0
2015-GLAP-NR-100815-031A	3	1	0	0	2	0	0	0	1	6	0	5	0	7	20	0	0	0	0	0	5	10	0	0	10	0	0	0	0	0	0	0	1	0	0	0
2015-GLAP-NR-141015-031A	1	4	0	2	0	0	0	2	0	47	3	16	0	116	13	0	0	0	0	23	45	0	0	0	29	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-141015-031A	2	1	1	2	0	0	0	5	0	17	1	10	1	53	3	0	0	0	0	6	29	0	0	0	46	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-141015-031A	3	2	0	0	0	0	0	1	0	4	2	2	1	67	4	0	0	0	0	33	23	0	0	0	33	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-270516-031A	1	0	0	0	0	0	0	1	0	27	0	0	0	4	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-270516-031A	2	0	0	1	0	0	0	0	0	12	0	0	0	17	0	0	0	0	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-270516-031A	3	1	0	0	0	0	0	0	0	4	0	0	0	5	1	0	0	0	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-170816-031A	1	0	11	0	0	0	0	9	0	14	0	11	11	1	25	0	0	0	0	0	19	1	0	0	58	0	0	0	0	0	0	0	3	0	0	0
2016-GLAP-NR-170816-031A	2	0	16	0	0	0	0	6	0	10	0	4	4	0	10	0	0	0	0	0	5	2	0	0	13	0	0	0	0	0	0	0	5	0	0	0

Field Number	Sampling Pass	*Micropterus dolomieu*	*Micropterus salmoides*	*Morone americana*	*Morone chrysops*	*Moxostoma anisurum*	*Moxostoma erythrurum*	*Moxostoma macrolepidotum*	*Moxostoma sp.*	*Moxostoma valenciennesi*	*Neogobius melanostomus*	*Nocomis biguttatus*	*Notemigonus crysoleucas*	*Notropis atherinoides*	*Notropis hudsonius*	*Notropis volucellus*	*Oncorhynchus kisutch*	*Oncorhynchus mykiss*	*Oncorhynchus tshawytscha*	*Osmerus mordax*	*Perca flavescens*	*Percina caprodes*	*Percopsis omiscomaycus*	*Petromyzon marinus*	*Pimephales notatus*	*Pimephales promelas*	*Pomoxis annularis*	*Pomoxis nigromaculatus*	*Salmo salar*	*Salmo trutta*	*Salmo trutta X Salvelinus fontinalis*	*Salvelinus namaycush*	*Sander vitreus*	*Scardinius erythrophthalmus*	*Semotilus atromaculatus*	*Umbra limi*
2016-GLAP-NR-170816-031A	3	1	9	0	0	0	0	4	0	11	0	4	3	0	14	0	0	0	0	0	17	2	0	0	15	0	0	0	0	0	0	0	2	0	0	0
2016-GLAP-NR-261016-031A	1	7	3	0	0	0	0	0	0	33	0	14	0	0	0	0	0	0	0	1	22	0	0	0	25	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-261016-031A	2	1	0	1	0	0	0	0	0	11	1	9	0	1	6	0	0	0	0	1	15	0	0	0	21	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-261016-031A	3	2	0	0	0	0	0	0	0	22	2	13	0	0	1	0	0	0	0	0	15	0	0	0	16	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-060717-031A	1	2	2	0	0	0	0	3	0	19	1	10	1	0	30	0	0	0	0	0	26	3	0	0	71	0	0	1	0	0	0	0	0	0	0	0
2017-GLAP-NR-060717-031A	2	3	10	0	0	0	0	2	0	8	0	5	5	0	4	0	0	0	0	0	15	8	0	0	86	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-060717-031A	3	4	4	2	0	0	0	1	0	11	1	8	0	2	68	0	0	0	0	0	22	5	0	0	63	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-290817-031A	1	0	8	0	0	0	0	0	0	5	0	11	3	59	60	0	0	0	0	0	12	1	0	0	32	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-290817-031A	2	1	2	0	0	0	0	0	0	0	0	13	1	151	46	0	0	0	0	0	7	0	0	0	13	0	0	0	0	0	0	0	0	1	0	0
2017-GLAP-NR-290817-031A	3	0	2	0	0	0	0	0	0	2	0	6	0	64	31	0	0	0	0	0	0	0	0	0	18	0	0	0	0	0	0	0	0	2	0	0
2017-GLAP-NR-231117-031A	1	0	0	0	0	0	0	1	0	0	0	0	0	38	0	0	0	1	0	14	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-231117-031A	2	1	0	1	0	0	0	0	0	3	0	0	0	23	1	0	0	0	0	2	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-231117-031A	3	0	0	0	0	0	0	0	0	2	0	0	0	16	3	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-110615-032A	1	2	0	0	4	0	0	0	0	9	0	0	0	37	0	0	0	0	0	1	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-110615-032A	2	2	0	0	0	0	0	1	0	11	0	0	0	2	5	0	0	0	0	11	3	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
2015-GLAP-NR-110615-032A	3	0	0	0	0	0	0	0	0	10	0	0	0	2	0	0	0	0	0	5	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-100815-032A	1	0	0	0	0	0	0	1	0	2	0	0	0	0	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0
2015-GLAP-NR-100815-032A	2	0	0	0	0	0	1	1	0	1	0	0	2	0	18	0	0	0	0	0	5	0	0	0	5	0	0	0	0	0	0	0	0	2	0	0
2015-GLAP-NR-100815-032A	3	0	0	0	0	0	0	0	0	3	0	0	1	0	24	0	0	0	0	0	8	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0
2015-GLAP-NR-141015-032A	1	2	10	1	0	0	0	0	0	30	1	0	4	72	3	0	0	0	0	28	43	0	1	0	54	0	0	0	0	0	0	0	0	1	0	0
2015-GLAP-NR-141015-032A	2	0	4	1	0	0	0	1	0	14	0	0	8	155	6	0	0	0	0	45	56	0	0	0	95	0	0	0	0	0	0	0	0	2	0	0
2015-GLAP-NR-141015-032A	3	0	1	1	0	0	0	2	0	15	0	0	5	104	1	0	0	0	0	21	20	0	0	0	49	0	0	1	0	0	0	0	0	2	0	1
2016-GLAP-NR-270516-032A	1	0	0	0	0	0	0	0	0	5	0	0	0	64	0	0	0	0	0	35	6	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0
2016-GLAP-NR-270516-032A	2	0	0	0	0	0	0	0	0	2	0	0	0	25	1	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-270516-032A	3	0	1	0	0	0	0	0	0	4	0	0	0	43	2	0	0	0	0	52	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-170816-032A	1	0	2	0	0	0	0	0	0	0	0	0	5	2	7	0	0	0	0	0	26	0	0	0	14	0	0	0	0	0	0	0	3	2	0	0
2016-GLAP-NR-170816-032A	2	0	3	0	0	0	0	4	0	4	0	0	10	3	10	0	0	0	0	0	31	1	0	0	8	0	0	0	0	0	0	0	2	0	0	0
2016-GLAP-NR-170816-032A	3	0	5	0	0	0	0	1	0	8	0	0	2	2	3	0	0	0	0	0	48	0	0	0	3	0	0	0	0	0	0	0	3	0	0	0
2016-GLAP-NR-261016-032A	1	0	14	1	0	0	0	0	0	44	1	2	4	0	11	0	0	0	0	0	13	1	0	0	17	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-261016-032A	2	1	9	2	0	0	1	2	0	24	0	5	10	0	0	0	0	0	0	3	10	0	0	0	21	0	0	0	0	0	0	0	0	1	0	0
2016-GLAP-NR-261016-032A	3	1	7	1	0	0	0	0	0	30	1	4	4	1	1	0	0	0	0	1	9	0	0	0	5	0	0	0	0	0	0	0	0	1	0	0

Field Number	Sampling Pass	*Micropterus dolomieu*	*Micropterus salmoides*	*Morone americana*	*Morone chrysops*	*Moxostoma anisurum*	*Moxostoma erythrurum*	*Moxostoma macrolepidotum*	*Moxostoma sp.*	*Moxostoma valenciennesi*	*Neogobius melanostomus*	*Nocomis biguttatus*	*Notemigonus crysoleucas*	*Notropis atherinoides*	*Notropis hudsonius*	*Notropis volucellus*	*Oncorhynchus kisutch*	*Oncorhynchus mykiss*	*Oncorhynchus tshawytscha*	*Osmerus mordax*	*Perca flavescens*	*Percina caprodes*	*Percopsis omiscomaycus*	*Petromyzon marinus*	*Pimephales notatus*	*Pimephales promelas*	*Pomoxis annularis*	*Pomoxis nigromaculatus*	*Salmo salar*	*Salmo trutta*	*Salmo trutta X Salvelinus fontinalis*	*Salvelinus namaycush*	*Sander vitreus*	*Scardinius erythrophthalmus*	*Semotilus atromaculatus*	*Umbra limi*
2017-GLAP-NR-070717-032A	1	0	7	0	2	0	0	3	0	8	0	5	0	1	35	0	0	0	0	0	14	1	0	0	66	0	0	0	0	0	0	0	0	1	0	0
2017-GLAP-NR-070717-032A	2	0	4	0	1	0	0	1	0	5	1	0	0	1	49	0	0	0	0	0	3	1	0	0	51	0	0	0	0	0	0	0	0	1	0	0
2017-GLAP-NR-070717-032A	3	0	4	0	0	0	0	0	0	9	0	2	0	1	29	0	0	0	0	0	4	0	0	0	47	0	1	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-290817-032A	1	0	7	0	0	0	0	0	0	3	0	2	1	188	23	0	0	0	0	0	12	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-290817-032A	2	0	4	0	0	0	0	0	0	1	0	3	0	61	5	0	0	0	0	0	21	0	0	0	6	0	0	0	0	0	0	0	0	1	0	0
2017-GLAP-NR-290817-032A	3	0	8	0	0	0	0	0	0	2	0	0	1	178	3	0	0	0	0	0	18	0	0	0	10	0	0	0	0	0	0	0	0	1	0	0
2017-GLAP-NR-231117-032A	1	0	0	0	0	0	0	0	0	2	0	0	0	34	1	0	0	0	0	52	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-231117-032A	2	0	0	0	0	0	0	0	0	3	0	0	0	18	4	0	0	0	0	17	8	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-231117-032A	3	0	0	0	0	0	0	1	0	3	0	0	0	17	0	0	0	0	0	13	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-100615-041A	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-100615-041A	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-100615-041A	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-250815-041A	1	11	1	0	0	0	0	0	0	1	11	0	0	0	3	0	0	0	0	0	1	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-250815-041A	2	8	0	1	0	0	0	0	0	0	2	0	0	1	26	0	0	0	0	0	1	2	0	0	3	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-250815-041A	3	8	0	0	0	0	0	0	0	1	4	0	0	1	41	0	0	0	0	0	5	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-051015-041A	1	10	1	3	0	0	0	10	0	16	13	0	0	0	128	0	0	0	0	0	25	2	0	0	7	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-051015-041A	2	7	0	1	0	0	0	7	0	5	7	0	0	1	12	0	0	0	0	1	35	0	0	0	6	0	0	0	0	0	0	0	0	1	0	0
2015-GLAP-NR-051015-041A	3	3	0	1	0	0	0	3	0	4	12	0	0	0	16	0	0	0	0	3	22	1	0	0	5	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-070616-041A	1	2	0	0	0	0	0	0	0	0	0	0	0	13	20	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-070616-041A	2	1	0	0	0	0	0	3	0	0	1	0	0	15	24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-070616-041A	3	0	0	0	0	0	0	0	0	0	0	0	0	0	7	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-080816-041A	1	3	0	0	0	0	0	0	0	2	5	0	0	0	0	0	0	0	0	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-080816-041A	2	6	1	0	0	0	0	0	0	4	1	0	0	1	2	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-080816-041A	3	2	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-021116-041A	1	3	1	0	0	0	0	1	0	14	8	0	0	0	10	0	0	0	0	0	28	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
2016-GLAP-NR-021116-041A	2	1	0	1	0	0	0	2	0	15	18	0	0	0	2	0	0	0	0	0	31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-021116-041A	3	2	0	0	0	0	0	1	0	7	5	0	0	0	0	0	0	0	0	0	20	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-310717-041A	1	0	0	0	0	0	0	1	0	3	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-310717-041A	2	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-310717-041A	3	0	0	0	1	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-151117-041A	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Field Number	Sampling Pass	*Micropterus dolomieu*	*Micropterus salmoides*	*Morone americana*	*Morone chrysops*	*Moxostoma anisurum*	*Moxostoma erythrurum*	*Moxostoma macrolepidotum*	*Moxostoma sp.*	*Moxostoma valenciennesi*	*Neogobius melanostomus*	*Nocomis biguttatus*	*Notemigonus crysoleucas*	*Notropis atherinoides*	*Notropis hudsonius*	*Notropis volucellus*	*Oncorhynchus kisutch*	*Oncorhynchus mykiss*	*Oncorhynchus tshawytscha*	*Osmerus mordax*	*Perca flavescens*	*Percina caprodes*	*Percopsis omiscomaycus*	*Petromyzon marinus*	*Pimephales notatus*	*Pimephales promelas*	*Pomoxis annularis*	*Pomoxis nigromaculatus*	*Salmo salar*	*Salmo trutta*	*Salmo trutta X Salvelinus fontinalis*	*Salvelinus namaycush*	*Sander vitreus*	*Scardinius erythrophthalmus*	*Semotilus atromaculatus*	*Umbra limi*
2017-GLAP-NR-151117-041A	2	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-151117-041A	3	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	7	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-100615-042A	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-100615-042A	2	1	0	0	0	0	0	0	1	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-100615-042A	3	1	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-250815-042A	1	5	0	1	0	0	0	0	0	1	2	0	0	0	9	0	0	0	0	0	2	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-250815-042A	2	4	0	0	0	0	0	0	0	2	0	0	1	1	16	0	0	0	0	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-250815-042A	3	5	0	0	0	0	0	0	0	0	0	0	10	1	4	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-051015-042A	1	1	0	0	0	0	0	2	0	2	3	0	0	47	12	0	0	0	0	17	8	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-051015-042A	2	1	0	0	0	0	0	0	0	1	1	0	0	9	4	0	0	0	0	4	13	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-051015-042A	3	0	0	1	0	0	0	4	0	0	5	0	0	2	2	0	0	0	0	17	10	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-070616-042A	1	1	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-070616-042A	2	0	0	0	0	0	0	0	0	0	0	0	0	25	31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-070616-042A	3	0	0	0	0	0	0	0	0	0	0	0	0	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-080816-042A	1	5	7	0	1	0	0	0	0	0	2	0	0	74	2	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-080816-042A	2	3	1	0	0	0	0	0	0	0	1	0	0	43	1	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-080816-042A	3	1	3	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-021116-042A	1	2	0	0	0	0	0	2	0	10	3	0	0	0	4	1	0	0	0	1	10	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-021116-042A	2	1	0	0	0	0	0	2	0	2	6	0	0	2	9	0	0	0	0	0	3	2	0	0	10	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-021116-042A	3	0	0	0	0	0	0	0	0	4	3	0	0	1	10	0	0	0	0	0	21	1	0	0	8	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-310717-042A	1	0	4	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-310717-042A	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-310717-042A	3	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-151117-042A	1	0	0	2	0	0	0	0	0	0	1	0	0	40	10	0	0	0	0	1	10	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-151117-042A	2	0	0	0	0	0	0	1	0	0	1	0	0	5	4	0	0	0	0	3	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-151117-042A	3	0	0	0	0	0	0	0	0	0	2	0	0	11	3	0	0	0	0	0	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-100615-051A	1	0	0	0	0	0	0	1	0	3	0	0	0	69	2	0	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-100615-051A	2	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-100615-051A	3	0	0	0	1	0	0	0	0	1	0	0	0	1	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-210815-051A	1	3	1	0	0	0	0	0	0	4	0	2	0	163	8	0	0	0	0	0	6	2	0	0	1	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-210815-051A	2	2	1	0	0	0	0	0	0	4	0	0	1	76	5	0	0	0	0	0	7	3	0	0	4	0	0	0	0	0	0	0	0	0	0	0

Field Number	Sampling Pass	*Micropterus dolomieu*	*Micropterus salmoides*	*Morone americana*	*Morone chrysops*	*Moxostoma anisurum*	*Moxostoma erythrurum*	*Moxostoma macrolepidotum*	*Moxostoma sp.*	*Moxostoma valenciennesi*	*Neogobius melanostomus*	*Nocomis biguttatus*	*Notemigonus crysoleucas*	*Notropis atherinoides*	*Notropis hudsonius*	*Notropis volucellus*	*Oncorhynchus kisutch*	*Oncorhynchus mykiss*	*Oncorhynchus tshawytscha*	*Osmerus mordax*	*Perca flavescens*	*Percina caprodes*	*Percopsis omiscomaycus*	*Petromyzon marinus*	*Pimephales notatus*	*Pimephales promelas*	*Pomoxis annularis*	*Pomoxis nigromaculatus*	*Salmo salar*	*Salmo trutta*	*Salmo trutta X Salvelinus fontinalis*	*Salvelinus namaycush*	*Sander vitreus*	*Scardinius erythrophthalmus*	*Semotilus atromaculatus*	*Umbra limi*
2015-GLAP-NR-210815-051A	3	3	1	0	0	0	0	1	0	4	0	2	2	46	2	0	0	0	0	0	4	1	0	0	4	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-151015-051A	1	1	0	0	0	0	0	2	0	0	2	1	0	21	2	0	0	1	0	24	2	0	0	0	9	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-151015-051A	2	4	0	0	0	0	0	0	0	2	0	0	0	12	2	0	0	0	0	71	1	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-151015-051A	3	0	0	0	0	0	0	0	0	0	3	1	0	20	1	0	0	0	0	63	1	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-060616-051A	1	0	0	0	0	0	0	0	0	1	0	0	0	36	29	0	0	0	0	2	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-060616-051A	2	0	0	0	0	0	0	2	0	2	0	0	0	56	26	0	0	0	0	14	0	0	0	0	10	0	0	0	0	1	0	0	0	0	0	0
2016-GLAP-NR-060616-051A	3	0	0	0	0	0	0	0	0	2	0	0	0	63	11	0	0	0	0	6	0	0	0	0	11	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-100816-051A	1	9	10	0	0	0	0	1	0	3	0	0	2	11	1	0	0	0	0	0	1	2	0	0	1	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-100816-051A	2	6	10	0	0	0	0	0	0	4	0	2	4	7	5	0	0	0	0	0	6	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-100816-051A	3	6	5	0	3	0	0	0	0	4	0	2	1	10	0	0	0	0	0	0	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-251016-051A	1	5	0	0	0	0	0	0	0	2	0	3	0	7	4	0	0	0	0	2	4	0	0	0	3	0	0	1	0	0	0	0	0	0	0	0
2016-GLAP-NR-251016-051A	2	1	0	0	0	0	0	0	0	6	0	1	0	15	7	0	0	0	0	1	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-251016-051A	3	2	0	0	0	0	0	0	0	2	1	0	0	28	17	0	0	0	0	0	1	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-010817-051A	1	2	1	0	0	0	0	1	1	5	0	3	0	13	3	0	0	0	0	0	4	1	0	0	2	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-010817-051A	2	0	2	0	0	0	0	1	0	2	0	5	0	8	7	0	0	0	0	0	7	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-010817-051A	3	0	2	0	0	0	0	2	0	2	0	3	0	3	5	0	0	0	0	0	5	0	0	0	1	0	0	0	0	0	0	0	0	2	0	0
2017-GLAP-NR-061117-051A	1	0	0	3	0	0	0	0	0	2	0	2	0	62	4	0	0	0	0	8	7	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-061117-051A	2	0	0	0	0	0	0	0	0	0	0	1	0	31	1	0	0	0	0	4	7	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-061117-051A	3	0	0	0	0	0	0	0	0	0	0	0	0	25	0	0	0	0	0	11	1	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-100615-052A	1	1	0	0	0	0	0	1	0	12	0	0	0	0	0	0	0	0	0	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-100615-052A	2	1	0	0	0	0	0	0	0	4	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-100615-052A	3	0	0	0	0	0	0	0	0	0	0	0	0	86	1	0	0	0	0	7	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-210815-052A	1	3	7	0	0	0	0	0	0	16	0	4	0	50	6	0	0	0	0	0	19	1	0	0	6	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-210815-052A	2	2	2	0	0	0	1	1	0	8	2	8	0	25	3	0	0	0	0	0	8	1	0	0	6	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-210815-052A	3	5	4	0	0	0	0	0	0	10	2	0	0	6	0	0	0	0	0	1	7	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-151015-052A	1	1	0	0	0	0	0	1	0	7	3	13	0	36	11	0	0	0	0	12	13	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-151015-052A	2	1	0	0	0	0	0	1	0	3	0	7	0	48	7	0	0	0	0	79	2	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-151015-052A	3	0	1	0	0	0	0	2	0	2	0	6	0	17	5	0	0	0	0	16	7	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
2016-GLAP-NR-060616-052A	1	0	0	0	0	0	0	0	0	2	0	0	0	22	22	0	0	0	0	8	2	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-060616-052A	2	0	0	0	0	0	0	4	0	0	0	0	0	16	6	0	0	0	0	1	4	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-060616-052A	3	0	0	0	0	0	0	2	0	0	0	0	0	12	7	0	0	0	0	3	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0

Field Number	Sampling Pass	*Micropterus dolomieu*	*Micropterus salmoides*	*Morone americana*	*Morone chrysops*	*Moxostoma anisurum*	*Moxostoma erythrurum*	*Moxostoma macrolepidotum*	*Moxostoma sp.*	*Moxostoma valenciennesi*	*Neogobius melanostomus*	*Nocomis biguttatus*	*Notemigonus crysoleucas*	*Notropis atherinoides*	*Notropis hudsonius*	*Notropis volucellus*	*Oncorhynchus kisutch*	*Oncorhynchus mykiss*	*Oncorhynchus tshawytscha*	*Osmerus mordax*	*Perca flavescens*	*Percina caprodes*	*Percopsis omiscomaycus*	*Petromyzon marinus*	*Pimephales notatus*	*Pimephales promelas*	*Pomoxis annularis*	*Pomoxis nigromaculatus*	*Salmo salar*	*Salmo trutta*	*Salmo trutta X Salvelinus fontinalis*	*Salvelinus namaycush*	*Sander vitreus*	*Scardinius erythrophthalmus*	*Semotilus atromaculatus*	*Umbra limi*
2016-GLAP-NR-100816-052A	1	6	12	0	0	0	0	0	0	13	0	5	4	30	0	0	0	0	0	0	9	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-100816-052A	2	3	14	0	0	0	0	1	0	7	0	1	2	82	2	0	0	0	0	0	16	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-100816-052A	3	5	6	0	0	0	0	0	0	4	0	3	1	60	2	0	0	0	0	0	21	1	0	0	4	0	0	0	0	0	0	0	1	0	0	0
2016-GLAP-NR-251016-052A	1	3	2	0	0	0	0	0	0	15	1	2	0	6	2	0	0	1	0	1	17	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-251016-052A	2	0	0	0	0	0	0	1	0	5	0	1	0	8	2	0	0	0	0	0	6	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-251016-052A	3	0	0	1	0	0	0	0	0	4	1	1	0	12	1	0	0	0	0	0	3	0	0	0	5	0	0	0	0	0	0	0	0	2	0	0
2017-GLAP-NR-070717-052A	1	0	2	0	0	0	0	0	0	8	0	2	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-070717-052A	2	0	1	0	0	0	0	0	0	8	1	9	0	0	0	0	0	0	0	0	2	0	0	0	7	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-070717-052A	3	0	1	0	0	0	0	0	0	3	1	1	0	0	0	0	0	0	0	0	2	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-010817-052A	1	0	1	0	0	0	0	2	0	10	0	12	0	26	14	0	0	0	0	0	16	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-010817-052A	2	0	1	0	0	0	0	0	0	6	2	8	0	60	6	0	0	0	0	0	8	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-010817-052A	3	0	2	0	0	0	0	1	0	5	0	2	0	14	8	0	0	0	0	0	6	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-061117-052A	1	0	0	0	0	0	0	0	0	4	0	2	0	47	3	0	0	0	0	3	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-061117-052A	2	0	0	1	0	0	0	0	0	0	0	1	0	12	3	1	0	0	0	5	7	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0
2017-GLAP-NR-061117-052A	3	0	0	0	0	0	0	0	0	0	0	0	0	5	4	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
2015-GLAP-NR-090615-061A	1	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-090615-061A	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-090615-061A	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-240815-061A	1	3	0	0	0	0	0	0	0	2	0	0	0	0	44	0	0	0	0	0	2	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-240815-061A	2	0	0	0	0	0	0	0	0	5	0	0	0	1	22	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-240815-061A	3	5	0	0	0	0	0	0	0	2	0	0	0	0	16	0	0	0	0	0	8	0	0	0	29	0	0	0	0	0	0	0	0	1	0	0
2015-GLAP-NR-081015-061A	1	1	0	0	0	0	0	4	0	1	0	0	0	2	42	0	0	0	0	121	5	0	0	0	8	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-081015-061A	2	1	0	1	0	0	0	3	0	2	2	0	0	1	59	0	0	0	0	2	3	0	0	0	9	0	0	1	0	0	0	0	0	0	0	0
2015-GLAP-NR-081015-061A	3	1	0	0	0	0	0	3	0	0	0	0	0	0	48	0	0	0	0	2	3	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
2016-GLAP-NR-240516-061A	1	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-240516-061A	2	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-240516-061A	3	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-090816-061A	1	3	2	0	0	0	1	0	0	0	0	0	0	1	35	0	0	0	0	0	3	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-090816-061A	2	0	1	0	0	0	0	0	0	1	0	0	0	0	19	0	0	0	0	0	2	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-090816-061A	3	4	1	0	0	0	0	0	0	2	0	0	0	0	10	0	0	0	0	0	1	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-011116-061A	1	0	0	4	0	0	0	7	0	7	1	0	0	0	27	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Field Number	Sampling Pass	*Micropterus dolomieu*	*Micropterus salmoides*	*Morone americana*	*Morone chrysops*	*Moxostoma anisurum*	*Moxostoma erythrurum*	*Moxostoma macrolepidotum*	*Moxostoma sp.*	*Moxostoma valenciennesi*	*Neogobius melanostomus*	*Nocomis biguttatus*	*Notemigonus crysoleucas*	*Notropis atherinoides*	*Notropis hudsonius*	*Notropis volucellus*	*Oncorhynchus kisutch*	*Oncorhynchus mykiss*	*Oncorhynchus tshawytscha*	*Osmerus mordax*	*Perca flavescens*	*Percina caprodes*	*Percopsis omiscomaycus*	*Petromyzon marinus*	*Pimephales notatus*	*Pimephales promelas*	*Pomoxis annularis*	*Pomoxis nigromaculatus*	*Salmo salar*	*Salmo trutta*	*Salmo trutta X Salvelinus fontinalis*	*Salvelinus namaycush*	*Sander vitreus*	*Scardinius erythrophthalmus*	*Semotilus atromaculatus*	*Umbra limi*
2016-GLAP-NR-011116-061A	2	1	0	2	0	0	0	3	0	8	2	0	0	0	32	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-011116-061A	3	2	0	1	0	0	0	3	0	1	3	0	1	0	6	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-310717-061A	1	0	0	0	0	0	0	0	0	0	0	0	0	14	14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11	0	0
2017-GLAP-NR-310717-061A	2	0	0	0	0	0	0	0	1	1	0	0	0	17	94	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	0
2017-GLAP-NR-310717-061A	3	0	0	0	0	0	0	0	0	2	0	0	0	19	27	0	0	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	9	0	0
2017-GLAP-NR-151117-061A	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-151117-061A	2	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-151117-061A	3	0	0	0	0	0	0	0	0	0	0	0	0	2	2	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-090615-062A	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-090615-062A	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-090615-062A	3	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-240815-062A	1	0	0	0	0	0	0	0	0	1	0	0	1	0	19	0	0	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-240815-062A	2	0	0	0	0	0	0	0	0	1	1	0	0	0	46	0	0	0	0	0	4	0	0	0	9	0	0	0	0	0	0	0	0	1	0	0
2015-GLAP-NR-240815-062A	3	1	0	0	0	0	0	0	0	1	0	0	0	0	39	0	0	0	0	0	4	0	0	0	11	0	0	0	0	0	0	0	0	2	0	0
2015-GLAP-NR-081015-062A	1	2	0	0	0	0	0	0	0	1	0	0	0	0	32	0	0	0	0	32	5	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-081015-062A	2	1	0	0	0	0	0	2	0	1	0	0	0	0	10	0	0	0	0	10	6	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-081015-062A	3	0	0	0	0	0	0	0	0	1	0	0	0	2	14	0	0	0	0	8	5	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
2016-GLAP-NR-240516-062A	1	0	0	0	0	0	0	0	0	0	1	0	0	3	1	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-240516-062A	2	1	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-240516-062A	3	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-090816-062A	1	2	7	0	0	0	0	0	0	1	1	0	0	0	19	0	0	0	0	0	7	0	0	0	20	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-090816-062A	2	6	2	0	0	0	0	1	0	3	1	0	0	1	13	0	0	0	0	0	3	0	0	0	9	0	0	0	0	0	0	0	1	1	0	0
2016-GLAP-NR-090816-062A	3	0	2	0	0	0	0	0	0	2	1	0	0	0	8	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-011116-062A	1	0	0	3	0	0	0	5	0	3	1	0	0	1	47	0	0	0	0	0	10	0	0	0	3	0	0	0	0	0	0	0	0	3	0	0
2016-GLAP-NR-011116-062A	2	0	0	1	0	0	0	6	0	12	0	0	0	3	21	0	0	0	0	0	14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-011116-062A	3	0	0	0	0	0	0	2	0	3	0	0	0	4	4	0	0	0	0	0	5	0	0	0	3	0	0	1	0	0	0	0	0	1	0	0
2017-GLAP-NR-010817-062A	1	0	0	0	0	0	0	0	0	2	0	0	0	0	26	0	0	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-010817-062A	2	1	0	0	0	0	0	0	0	0	1	1	0	0	11	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0
2017-GLAP-NR-010817-062A	3	0	0	0	0	0	0	0	0	5	0	1	0	1	57	0	0	0	0	0	20	0	0	0	2	0	0	0	0	0	0	0	0	3	0	0
2017-GLAP-NR-151117-062A	1	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-151117-062A	2	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Nocomis biguttatus	*Notemigonus crysoleucas*	*Notropis atherinoides*	*Notropis hudsonius*	*Notropis volucellus*	*Oncorhynchus kisutch*	*Oncorhynchus mykiss*	*Oncorhynchus tshawytscha*	*Osmerus mordax*	*Perca flavescens*	*Percina caprodes*	*Percopsis omiscomaycus*	*Petromyzon marinus*	*Pimephales notatus*	*Pimephales promelas*	*Pomoxis annularis*	*Pomoxis nigromaculatus*	*Salmo salar*	*Salmo trutta*	*Salmo trutta X Salvelinus fontinalis*	*Salvelinus namaycush*	*Sander vitreus*	*Scardinius erythrophthalmus*	*Semotilus atromaculatus*	*Umbra limi*
0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	14	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	1	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	4	0	0
0	0	2	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	1	0	11	2	0	0	0	10	0	0	0	0	0	0	0	0	1	0	0
2	0	2	0	0	0	0	0	18	4	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0
2	0	2	0	0	0	0	0	13	1	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	30	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	69	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	1	0	0	0	0	0	0	16	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0
0	1	1	2	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	4	0	1	0	0	0	2	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	2	3	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	7	2	0	0	0	8	0	2	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
0	0	29	6	0	0	0	5	0	1	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0
0	0	2	0	0	0	0	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
0	0	0	0	0	0	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0
0	0	0	0	0	0	0	0	0	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	2	0	0	0	4	1	2	2	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0
0	0	2	0	0	0	5	2	2	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
0	0	3	1	0	0	7	1	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	10	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Field Number	Sampling Pass	*Micropterus dolomieu*	*Micropterus salmoides*	*Morone americana*	*Morone chrysops*	*Moxostoma anisurum*	*Moxostoma erythrurum*	*Moxostoma macrolepidotum*	*Moxostoma sp.*	*Moxostoma valenciennesi*	*Neogobius melanostomus*	*Nocomis biguttatus*	*Notemigonus crysoleucas*	*Notropis atherinoides*	*Notropis hudsonius*	*Notropis volucellus*	*Oncorhynchus kisutch*	*Oncorhynchus mykiss*	*Oncorhynchus tshawytscha*	*Osmerus mordax*	*Perca flavescens*	*Percina caprodes*	*Percopsis omiscomaycus*	*Petromyzon marinus*	*Pimephales notatus*	*Pimephales promelas*	*Pomoxis annularis*	*Pomoxis nigromaculatus*	*Salmo salar*	*Salmo trutta*	*Salmo trutta X Salvelinus fontinalis*	*Salvelinus namaycush*	*Sander vitreus*	*Scardinius erythrophthalmus*	*Semotilus atromaculatus*	*Umbra limi*
2015-GLAP-NR-200815-072A	1	1	0	0	0	0	0	0	0	0	0	0	0	11	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
2015-GLAP-NR-200815-072A	2	1	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-200815-072A	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
2015-GLAP-NR-131015-072A	1	4	2	2	0	0	1	1	0	0	0	0	0	20	1	0	0	0	1	7	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-131015-072A	2	1	0	0	0	0	0	0	0	0	2	1	0	0	0	0	1	0	0	5	6	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-131015-072A	3	3	1	0	0	0	0	0	0	0	0	1	0	5	1	0	0	0	0	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-080616-072A	1	6	0	0	1	0	0	1	0	5	0	0	0	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-080616-072A	2	5	1	0	1	1	0	0	0	1	0	0	0	34	0	0	2	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-080616-072A	3	6	1	0	0	0	0	1	0	4	0	0	0	0	0	0	0	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-020816-072A	1	6	1	0	0	0	0	7	0	0	0	0	0	0	0	0	0	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-020816-072A	2	2	1	0	0	0	0	0	0	2	0	0	0	0	1	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
2016-GLAP-NR-020816-072A	3	0	1	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	4	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0
2016-GLAP-NR-181016-072A	1	3	4	0	0	0	0	1	0	1	0	1	0	3	20	0	1	2	1	0	16	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-181016-072A	2	0	7	0	0	0	0	0	0	0	0	0	0	21	3	0	0	0	0	0	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-181016-072A	3	1	1	0	0	0	1	0	0	0	0	1	0	0	2	0	0	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-270617-072A	1	4	0	1	0	3	1	1	0	2	0	0	0	4	0	0	0	0	0	0	2	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-270617-072A	2	6	1	1	1	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-270617-072A	3	1	0	0	1	3	0	0	0	2	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
2017-GLAP-NR-040817-072A	1	2	2	0	0	0	0	3	0	2	0	0	0	9	0	0	0	0	0	0	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-040817-072A	2	0	0	0	0	1	2	1	0	1	0	0	0	20	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-040817-072A	3	2	2	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-081117-072A	1	1	2	0	0	0	0	0	0	2	0	0	0	8	11	0	1	4	0	0	11	0	0	0	0	0	0	0	0	2	0	1	1	0	0	0
2017-GLAP-NR-081117-072A	2	1	1	0	0	1	0	0	0	0	0	0	0	3	0	0	2	7	0	0	18	0	0	0	0	0	0	0	0	4	0	3	1	0	0	0
2017-GLAP-NR-081117-072A	3	0	1	0	0	0	0	0	0	0	0	0	0	2	1	0	0	5	0	1	11	0	0	0	0	0	0	0	0	3	0	1	0	0	0	0
2015-GLAP-NR-190615-081A	1	33	0	0	0	0	0	0	0	2	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
2015-GLAP-NR-190615-081A	2	21	0	0	0	0	0	0	0	1	0	0	0	2	2	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-190615-081A	3	2	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-120815-081A	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-120815-081A	2	3	1	1	0	0	0	0	0	1	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-120815-081A	3	2	0	0	0	0	0	0	0	0	0	0	0	9	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-161015-081A	1	0	2	1	0	0	0	10	0	6	0	2	0	0	0	0	0	0	0	0	25	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0

Field Number	Sampling Pass	Micropterus dolomieu	Micropterus salmoides	Morone americana	Morone chrysops	Moxostoma anisurum	Moxostoma erythrurum	Moxostoma macrolepidotum	Moxostoma sp.	Moxostoma valenciennesi	Neogobius melanostomus	Nocomis biguttatus	Notemigonus crysoleucas	Notropis atherinoides	Notropis hudsonius	Notropis volucellus	Oncorhynchus kisutch	Oncorhynchus mykiss	Oncorhynchus tshawytscha	Osmerus mordax	Perca flavescens	Percina caprodes	Percopsis omiscomaycus	Petromyzon marinus	Pimephales notatus	Pimephales promelas	Pomoxis annularis	Pomoxis nigromaculatus	Salmo salar	Salmo trutta	Salmo trutta X Salvelinus fontinalis	Salvelinus namaycush	Sander vitreus	Scardinius erythrophthalmus	Semotilus atromaculatus	Umbra limi
2015-GLAP-NR-161015-081A	2	0	1	0	0	0	0	0	0	2	0	2	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-161015-081A	3	0	3	1	0	0	0	2	0	2	0	0	0	1	0	0	0	0	0	0	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-090616-081A	1	3	1	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-090616-081A	2	8	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	1	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-090616-081A	3	4	0	0	0	0	0	0	0	0	1	0	0	32	0	0	0	0	4	1	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-030816-081A	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-030816-081A	2	0	1	0	1	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-030816-081A	3	1	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-281016-081A	1	1	3	1	0	0	0	1	0	11	0	0	0	1	7	0	0	0	0	0	44	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-281016-081A	2	1	3	0	0	0	0	0	0	17	0	1	0	1	3	0	0	0	0	0	30	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-281016-081A	3	1	4	7	0	0	0	5	0	8	0	2	0	0	0	0	0	0	0	0	22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-270617-081A	1	11	0	0	0	0	0	0	0	1	0	0	0	6	3	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-270617-081A	2	5	0	0	2	0	0	0	0	2	0	0	0	12	6	0	0	0	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
2017-GLAP-NR-270617-081A	3	4	0	0	0	0	0	0	0	4	0	0	1	3	2	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-030817-081A	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-030817-081A	2	2	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-030817-081A	3	1	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-091117-081A	1	2	1	1	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	2	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-091117-081A	2	1	2	0	0	0	0	0	0	5	0	0	0	2	1	0	0	1	0	1	17	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
2017-GLAP-NR-091117-081A	3	1	0	0	0	0	0	1	0	1	0	0	0	2	1	0	0	3	0	1	17	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0
2015-GLAP-NR-190615-082A	1	5	0	0	0	0	1	0	0	4	0	0	0	16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-190615-082A	2	3	0	0	0	0	0	0	0	1	0	0	0	6	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-190615-082A	3	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-120815-082A	1	5	1	0	0	0	0	0	0	1	0	0	0	4	6	0	0	0	0	0	31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-120815-082A	2	0	3	0	0	0	0	0	0	0	0	0	0	2	3	0	0	0	0	0	28	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
2015-GLAP-NR-120815-082A	3	1	0	0	0	0	0	0	0	1	0	0	0	7	4	0	0	0	1	0	10	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
2015-GLAP-NR-161015-082A	1	0	5	3	0	0	0	5	0	0	0	0	0	2	1	0	0	0	0	0	38	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-161015-082A	2	0	5	0	0	0	0	3	0	10	0	0	0	6	0	0	1	0	0	9	30	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-161015-082A	3	2	3	2	0	0	0	1	0	1	0	0	0	2	0	0	0	0	0	13	16	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-090616-082A	1	8	0	0	0	0	0	1	0	1	0	1	0	2	1	0	0	0	5	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-090616-082A	2	2	0	0	0	1	0	0	0	1	0	0	0	1	4	0	0	0	8	3	15	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0

Field Number	Sampling Pass	*Micropterus dolomieu*	*Micropterus salmoides*	*Morone americana*	*Morone chrysops*	*Moxostoma anisurum*	*Moxostoma erythrurum*	*Moxostoma macrolepidotum*	*Moxostoma sp.*	*Moxostoma valenciennesi*	*Neogobius melanostomus*	*Nocomis biguttatus*	*Notemigonus crysoleucas*	*Notropis atherinoides*	*Notropis hudsonius*	*Notropis volucellus*	*Oncorhynchus kisutch*	*Oncorhynchus mykiss*	*Oncorhynchus tshawytscha*	*Osmerus mordax*	*Perca flavescens*	*Percina caprodes*	*Percopsis omiscomaycus*	*Petromyzon marinus*	*Pimephales notatus*	*Pimephales promelas*	*Pomoxis annularis*	*Pomoxis nigromaculatus*	*Salmo salar*	*Salmo trutta*	*Salmo trutta X Salvelinus fontinalis*	*Salvelinus namaycush*	*Sander vitreus*	*Scardinius erythrophthalmus*	*Semotilus atromaculatus*	*Umbra limi*
2016-GLAP-NR-090616-082A	3	3	0	0	0	0	0	1	0	1	1	0	0	5	1	0	0	0	5	1	11	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0
2016-GLAP-NR-030816-082A	1	0	0	0	0	0	0	5	0	0	0	0	1	0	3	0	0	0	0	0	15	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
2016-GLAP-NR-030816-082A	2	2	0	0	0	0	0	1	0	0	0	0	0	0	3	0	0	0	0	0	14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-030816-082A	3	0	0	0	0	0	0	2	0	1	0	0	0	0	2	0	0	0	0	0	26	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
2016-GLAP-NR-281016-082A	1	1	2	4	0	0	0	2	0	16	0	0	0	0	3	0	0	0	1	0	39	0	0	0	8	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-281016-082A	2	0	7	5	0	0	0	0	0	7	0	0	0	14	3	0	0	1	0	1	49	0	0	0	2	0	0	0	0	0	0	0	1	0	0	0
2016-GLAP-NR-281016-082A	3	1	3	6	0	0	0	2	0	1	0	0	0	25	1	1	0	0	0	0	34	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-270617-082A	1	2	1	0	0	0	0	0	0	0	0	0	0	28	6	0	0	0	7	0	9	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0
2017-GLAP-NR-270617-082A	2	1	0	0	0	0	0	0	0	1	0	0	0	78	12	0	0	0	3	0	14	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0
2017-GLAP-NR-270617-082A	3	1	0	0	0	0	0	0	0	1	0	0	0	6	7	0	0	0	2	1	12	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
2017-GLAP-NR-030817-082A	1	0	2	0	0	0	0	0	0	0	0	0	0	1	3	0	0	0	0	0	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-030817-082A	2	0	0	0	0	0	0	0	0	0	0	0	0	4	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-030817-082A	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-091117-082A	1	1	1	1	0	0	2	1	0	3	0	3	0	8	0	0	1	0	0	2	55	0	0	0	5	0	0	0	0	1	0	1	0	0	0	0
2017-GLAP-NR-091117-082A	2	2	0	0	0	0	0	0	0	5	1	4	0	2	1	0	0	0	0	3	23	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0
2017-GLAP-NR-091117-082A	3	0	2	2	0	0	0	0	0	4	0	0	0	0	2	0	1	0	0	2	34	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
2015-GLAP-NR-190615-091A	1	42	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-190615-091A	2	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-190615-091A	3	16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-190815-091A	1	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-190815-091A	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-190815-091A	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-221015-091A	1	4	2	0	0	0	0	4	0	2	0	0	0	2	0	0	0	3	0	6	15	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
2015-GLAP-NR-221015-091A	2	1	2	3	0	0	0	1	0	4	1	0	0	12	0	0	0	0	1	15	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-221015-091A	3	1	0	2	0	0	0	1	5	5	0	0	0	39	0	0	0	0	0	2	21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-090616-091A	1	24	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0	1	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-090616-091A	2	13	0	0	0	0	0	1	0	0	1	0	0	1	0	0	0	0	1	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-090616-091A	3	10	0	0	0	0	0	1	0	0	1	0	0	23	0	0	0	0	2	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-110816-091A	1	1	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-110816-091A	2	0	0	0	0	0	0	0	0	0	0	0	1	3	3	3	0	0	0	0	13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-110816-091A	3	1	0	0	0	0	0	0	0	0	0	0	0	2	2	1	0	0	0	0	18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Field Number	Sampling Pass	*Micropterus dolomieu*	*Micropterus salmoides*	*Morone americana*	*Morone chrysops*	*Moxostoma anisurum*	*Moxostoma erythrurum*	*Moxostoma macrolepidotum*	*Moxostoma sp.*	*Moxostoma valenciennesi*	*Neogobius melanostomus*	*Nocomis biguttatus*	*Notemigonus crysoleucas*	*Notropis atherinoides*	*Notropis hudsonius*	*Notropis volucellus*	*Oncorhynchus kisutch*	*Oncorhynchus mykiss*	*Oncorhynchus tshawytscha*	*Osmerus mordax*	*Perca flavescens*	*Percina caprodes*	*Percopsis omiscomaycus*	*Petromyzon marinus*	*Pimephales notatus*	*Pimephales promelas*	*Pomoxis annularis*	*Pomoxis nigromaculatus*	*Salmo salar*	*Salmo trutta*	*Salmo trutta X Salvelinus fontinalis*	*Salvelinus namaycush*	*Sander vitreus*	*Scardinius erythrophthalmus*	*Semotilus atromaculatus*	*Umbra limi*
2016-GLAP-NR-041116-091A	1	0	5	0	0	0	0	0	0	13	0	0	0	1	0	0	0	0	0	0	48	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
2016-GLAP-NR-041116-091A	2	0	7	1	0	0	0	0	0	7	0	0	0	0	0	0	0	0	0	0	29	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0
2016-GLAP-NR-041116-091A	3	1	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	1	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-290617-091A	1	3	0	0	0	0	0	1	0	2	0	0	0	0	0	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0
2017-GLAP-NR-290617-091A	2	3	0	0	0	0	1	1	0	1	0	0	0	0	0	0	0	0	1	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-290617-091A	3	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-030817-091A	1	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-030817-091A	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-030817-091A	3	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-161117-091A	1	0	0	0	0	0	0	1	0	0	0	0	0	4	0	0	0	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-161117-091A	2	0	0	0	0	0	2	0	0	1	0	0	0	0	1	0	0	1	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-161117-091A	3	0	0	0	0	0	0	0	0	0	0	0	0	9	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-180615-092A	1	23	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	1	5	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0
2015-GLAP-NR-180615-092A	2	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-180615-092A	3	3	0	0	0	0	0	0	0	0	0	0	0	6	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
2015-GLAP-NR-190815-092A	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-190815-092A	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-190815-092A	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-221015-092A	1	0	3	0	0	0	0	2	0	0	0	0	0	0	0	0	0	1	0	0	17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-221015-092A	2	3	4	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	2	9	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0
2015-GLAP-NR-221015-092A	3	1	1	0	0	0	0	4	0	3	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-100616-092A	1	18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-100616-092A	2	4	0	0	0	0	0	0	0	1	7	1	0	20	0	0	0	0	3	0	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-100616-092A	3	1	0	0	0	0	0	1	0	0	1	1	0	37	0	0	0	0	4	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-110816-092A	1	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-110816-092A	2	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-110816-092A	3	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-041116-092A	1	2	3	0	0	0	0	0	0	4	5	0	0	0	2	0	0	1	0	0	33	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
2016-GLAP-NR-041116-092A	2	0	4	3	0	0	0	0	0	2	0	1	0	0	0	0	0	0	5	0	29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-041116-092A	3	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-290617-092A	1	12	0	0	0	2	0	0	0	1	0	0	0	0	0	0	0	0	5	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Field Number	Sampling Pass	*Micropterus dolomieu*	*Micropterus salmoides*	*Morone americana*	*Morone chrysops*	*Moxostoma anisurum*	*Moxostoma erythrurum*	*Moxostoma macrolepidotum*	*Moxostoma sp.*	*Moxostoma valenciennesi*	*Neogobius melanostomus*	*Nocomis biguttatus*	*Notemigonus crysoleucas*	*Notropis atherinoides*	*Notropis hudsonius*	*Notropis volucellus*	*Oncorhynchus kisutch*	*Oncorhynchus mykiss*	*Oncorhynchus tshawytscha*	*Osmerus mordax*	*Perca flavescens*	*Percina caprodes*	*Percopsis omiscomaycus*	*Petromyzon marinus*	*Pimephales notatus*	*Pimephales promelas*	*Pomoxis annularis*	*Pomoxis nigromaculatus*	*Salmo salar*	*Salmo trutta*	*Salmo trutta X Salvelinus fontinalis*	*Salvelinus namaycush*	*Sander vitreus*	*Scardinius erythrophthalmus*	*Semotilus atromaculatus*	*Umbra limi*
2017-GLAP-NR-290617-092A	2	4	0	0	0	0	1	0	0	2	0	1	0	0	1	0	0	3	2	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-290617-092A	3	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-020817-092A	1	0	2	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-020817-092A	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-020817-092A	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-161117-092A	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-161117-092A	2	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-161117-092A	3	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-180615-101A	1	4	0	0	0	0	3	1	0	2	4	0	0	17	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-180615-101A	2	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
2015-GLAP-NR-180615-101A	3	4	0	0	0	0	1	0	0	1	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-130815-101A	1	0	0	1	0	0	0	0	0	1	0	0	0	11	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-130815-101A	2	0	2	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-130815-101A	3	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-231015-101A	1	6	0	5	0	0	0	0	0	1	11	0	0	9	0	0	0	1	2	35	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-231015-101A	2	3	1	6	0	0	0	2	1	0	7	0	0	6	0	0	1	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-231015-101A	3	3	0	0	0	0	0	0	0	0	3	0	0	1	0	0	1	3	0	3	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
2016-GLAP-NR-100616-101A	1	7	0	0	0	0	0	3	0	0	2	0	0	15	0	0	1	0	0	0	11	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
2016-GLAP-NR-100616-101A	2	6	0	0	0	0	0	0	0	0	9	0	0	25	0	0	0	1	5	1	22	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0
2016-GLAP-NR-100616-101A	3	2	0	0	0	0	0	1	0	0	1	0	0	19	0	0	0	0	5	0	10	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0
2016-GLAP-NR-040816-101A	1	1	1	0	0	0	0	1	0	0	1	0	0	0	1	0	0	0	0	0	36	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-040816-101A	2	5	1	0	0	0	0	2	0	4	0	0	0	0	0	0	0	0	0	0	27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-040816-101A	3	2	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-311016-101A	1	4	3	0	0	0	0	0	0	1	3	0	0	0	1	0	1	0	0	0	22	1	0	0	2	0	0	0	0	0	0	0	0	0	0	0
2016-GLAP-NR-311016-101A	2	0	4	2	1	0	0	0	0	0	3	0	0	0	1	0	0	1	0	0	4	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
2016-GLAP-NR-311016-101A	3	2	2	3	0	0	0	0	0	1	2	0	0	2	6	0	0	0	0	3	12	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
2017-GLAP-NR-300617-101A	1	5	0	0	2	0	0	0	0	5	0	0	0	0	0	0	0	5	10	0	8	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0
2017-GLAP-NR-300617-101A	2	6	0	0	0	1	0	1	0	2	0	0	0	0	0	0	0	5	4	1	8	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
2017-GLAP-NR-300617-101A	3	6	0	0	0	0	0	1	0	4	0	0	0	1	0	0	0	4	7	0	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-020817-101A	1	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-020817-101A	2	2	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Field Number	Sampling Pass	*Micropterus dolomieu*	*Micropterus salmoides*	*Morone americana*	*Morone chrysops*	*Moxostoma anisurum*	*Moxostoma erythrurum*	*Moxostoma macrolepidotum*	*Moxostoma sp.*	*Moxostoma valenciennesi*	*Neogobius melanostomus*	*Nocomis biguttatus*	*Notemigonus crysoleucas*	*Notropis atherinoides*	*Notropis hudsonius*	*Notropis volucellus*	*Oncorhynchus kisutch*	*Oncorhynchus mykiss*	*Oncorhynchus tshawytscha*	*Osmerus mordax*	*Perca flavescens*	*Percina caprodes*	*Percopsis omiscomaycus*	*Petromyzon marinus*	*Pimephales notatus*	*Pimephales promelas*	*Pomoxis annularis*	*Pomoxis nigromaculatus*	*Salmo salar*	*Salmo trutta*	*Salmo trutta X Salvelinus fontinalis*	*Salvelinus namaycush*	*Sander vitreus*	*Scardinius erythrophthalmus*	*Semotilus atromaculatus*	*Umbra limi*
2017-GLAP-NR-020817-101A	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-GLAP-NR-161117-101A	1	1	2	0	0	0	0	0	0	0	0	0	0	6	0	0	1	1	0	5	6	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0
2017-GLAP-NR-161117-101A	2	1	0	0	0	0	0	0	0	1	0	0	0	1	1	0	0	1	0	0	6	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0
2017-GLAP-NR-161117-101A	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	0	0	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-180615-102A	1	3	0	0	0	0	2	2	0	1	0	1	0	0	0	0	0	1	12	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
2015-GLAP-NR-180615-102A	2	1	0	0	0	0	1	1	0	0	0	0	0	10	0	0	0	0	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-180615-102A	3	0	1	0	0	0	0	1	0	0	1	0	0	4	0	0	0	1	7	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
2015-GLAP-NR-130815-102A	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-130815-102A	2	0	0	0	0	0	0	1	0	0	0	0	0	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-130815-102A	3	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015-GLAP-NR-231015-102A	1	14	4	10	0	0	0	0	1	0	3	0	0	6	0	0	2	1	0	1	0	0	0	0	0	0	0	0	0	*1*	0	0	0	0	0	0
2015-GLAP-NR-231015-102A	2	9	2	8	0	0	0	0	0	0	1	0	0	71	0	0	1	0	1	3	0	0	0	0	0	0	0	0	0	*0*	0	0	0	0	0	0
2015-GLAP-NR-231015-102A	3	4	2	0	0	0	0	0	1	0	5	0	0	1	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	*1*	0	0	0	0	0	0
2016-GLAP-NR-100616-102A	1	5	0	0	0	0	0	6	0	0	2	0	0	14	0	0	0	2	15	0	10	0	0	0	0	0	0	0	0	*4*	0	0	0	0	0	0
2016-GLAP-NR-100616-102A	2	1	1	0	0	0	0	8	0	0	1	0	0	2	0	0	0	1	2	0	28	0	0	0	0	0	0	0	0	*3*	0	0	0	0	0	0
2016-GLAP-NR-100616-102A	3	0	0	0	0	0	0	0	0	1	1	0	0	48	0	0	0	0	6	0	14	0	0	0	0	0	0	0	0	*3*	0	0	0	0	0	0
2016-GLAP-NR-040816-102A	1	2	2	0	0	0	0	4	0	3	3	1	0	0	1	0	0	0	0	0	29	0	0	0	0	0	0	0	0	*0*	0	0	0	0	0	0
2016-GLAP-NR-040816-102A	2	1	0	0	0	0	0	1	0	3	1	0	0	0	0	0	0	0	0	0	23	0	0	0	0	0	0	0	0	*0*	0	0	0	0	0	0
2016-GLAP-NR-040816-102A	3	0	1	0	0	0	0	0	0	2	1	0	1	0	0	0	0	0	0	0	10	0	0	0	0	0	0	0	0	*1*	0	0	0	0	0	0
2016-GLAP-NR311016-102A	1	5	5	1	0	0	0	1	0	1	1	0	0	0	0	0	1	0	0	0	8	0	0	0	0	0	0	0	0	*0*	0	0	0	0	0	0
2016-GLAP-NR311016-102A	2	5	12	14	0	0	0	0	0	2	10	0	0	0	2	0	1	0	1	0	23	0	0	0	0	0	0	0	0	*0*	0	0	0	0	0	0
2016-GLAP-NR311016-102A	3	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11	0	0	0	0	0	0	0	0	*0*	0	0	0	0	0	0
2017-GLAP-NR-300617-102A	1	5	0	0	1	1	0	1	0	2	0	0	0	0	0	0	0	6	4	0	10	0	0	0	0	0	0	0	0	*4*	0	0	0	0	0	0
2017-GLAP-NR-300617-102A	2	4	0	0	0	0	0	0	0	3	1	0	0	3	0	0	0	3	1	0	16	0	0	0	0	0	0	0	0	*6*	0	0	0	0	0	0
2017-GLAP-NR-300617-102A	3	1	0	0	0	1	0	1	0	5	0	0	0	1	1	0	0	1	1	0	4	0	0	0	0	0	0	0	0	*2*	0	0	0	0	0	0
2017-GLAP-NR-080817-102A	1	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	*0*	0	0	0	0	0	0
2017-GLAP-NR-080817-102A	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	*0*	0	0	0	0	0	0
2017-GLAP-NR-080817-102A	3	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	*0*	0	0	0	0	0	0
2017-GLAP-NR-161117-102A	1	1	0	0	0	0	0	0	0	1	0	0	0	5	2	0	0	0	0	0	1	0	0	0	0	0	0	0	0	*0*	0	0	0	0	0	0
2017-GLAP-NR-161117-102A	2	1	1	0	0	0	0	0	0	0	0	0	0	1	1	0	1	3	0	0	63	0	0	0	0	0	0	0	0	*0*	0	0	0	0	0	0
2017-GLAP-NR-161117-102A	3	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	1	0	9	0	0	0	0	0	0	0	0	*0*	0	0	0	0	0	0

Appendix 4. *Abiotic habitat measures; water quality, water depth, water velocity, sampling distance from shore.*

Station code	Year	Season	Depth (m) 1	Depth (m) 2	Depth (m) 3	Water velocity (m/s) 1	Water velocity (m/s) 2	Water velocity (m/s) 3	Air temperature (°C)	Water temperature (°C)	Conductivity (µS)	Dissolved oxygen (mg/L)	pH	Turbidity (ntu)	Approx. distance from shore (m)
GLAP-NR-011	2015	SPRING	1.2	1.2	1.3	0.29	0.16	0.24	29.2	16.1	232.7	11.39	8.54	0.94	30
GLAP-NR-011	2016	SPRING	1.4	1.6	1.4	0.3	0.18	0.22	23.5	13.2	285	2.16	8.96	0.68	32
GLAP-NR-011	2017	SPRING	1.7	2.1	1.4	0.21	0.06	0.03	26.6	22.35	265	10.49	8.69	0.75	40
GLAP-NR-011	2015	SUMMER	1.3	1.8	1.1	0.19	0.08	0.24	25	22.8	268.8	8.32	8.52	1	49
GLAP-NR-011	2016	SUMMER	1.7	1.8	1.4	0.15	0.28	0.15	26.1	25.38	564.3	7.29	9.12	1.9	31
GLAP-NR-011	2017	SUMMER	1.8	1.9	1.9	0.14	0.15	0.1	19.1	21.81	270.9	8.55	8.6	1.58	27
GLAP-NR-011	2015	FALL	0.9	1	1.2	0.18	0.09	0.15	19.6	14.8	446.2	9.76	8.61	0.51	25
GLAP-NR-011	2016	FALL	2.1	1.7	1.8	0.28	0.21	0.27	22.5	18.3	256.1	8.79	9.38	0.6	36
GLAP-NR-011	2017	FALL	2.1	1.7	1.4	0.23	0.04	0.11	2.1	7.5	192.5	11.54	8.8	7.13	25
GLAP-NR-012	2015	SPRING	1.3	1.3	2.5	0.24	0.14	0.08	29.2	16.7	235.6	11.48	8.55	1.03	20
GLAP-NR-012	2016	SPRING	1.4	1.6	1.9	0.22	0.16	0.15	27.3	14.3	296	2.11	9.21	1.54	31
GLAP-NR-012	2017	SPRING	1.4	1.8	1.6	0.03	0.02	0.05	24.6	21.51	261.1	8.99	8.41	0.9	35
GLAP-NR-012	2015	SUMMER	1.1	0.9	1.2	0.24	0.08	0.14	25	23.16	270	8.96	8.58	0.85	20
GLAP-NR-012	2016	SUMMER	1.4	1.7	2	0.15	0.02	0.05	24.6	25.04	561.4	7.54	9.85	1.57	31
GLAP-NR-012	2017	SUMMER	1.9	2	2.4	0.1	0.01	0.09	19.1	21.56	270.1	8.45	8.54	1.06	35
GLAP-NR-012	2015	FALL	1.2	1	1.1	0.15	0.02	0.06	18.8	14.84	445.7	10.71	8.73	1.17	40
GLAP-NR-012	2016	FALL	1.8	1.4	1.6	0.27	0.01	0.14	22.5	20.17	310	9.72	9.29	2.65	33
GLAP-NR-012	2017	FALL	1.4	1.6	2.1	0.01	0.05	0.11	2.1	7.25	197.7	12	9.05	14.36	15
GLAP-NR-021	2015	SPRING	0.9	1.2	1.7	0.16	0.41	0.07	21	15.5	230	11.23	8.53	0.71	126
GLAP-NR-021	2016	SPRING	1.4	1.6	1.8	0.1	0.23	0.18	26.4	14.1	285	2.15	9.04	0.52	120
GLAP-NR-021	2017	SPRING	1.7	1.8	1.5	0.03	0.1	0.13	21.9	21.28	260.6	9.04	8.44	1.28	140
GLAP-NR-021	2015	SUMMER	1.4	1.3	1.3	0.05	0.12	0.11	23	22.9	270.5	8.08	8.75	1.09	117
GLAP-NR-021	2016	SUMMER	1.2	1.3	1.7	0.06	0.04	0	25.6	25.45	572.7	7.31	9.19	4.17	121
GLAP-NR-021	2017	SUMMER	1.7	2.1	2.4	0.02	0.03	0.03	20.2	22.09	270.7	10.17	8.89	1.41	120
GLAP-NR-021	2015	FALL	1.3	0.9	1.3	0.05	0.01	0.05	16.8	15.98	462.7	9.74	8.6	2.49	110
GLAP-NR-021	2016	FALL	1.9	2	2.1	0.15	0.11	0.08	10.7	13.4	236.7	9.94	9.24	16.66	102
GLAP-NR-021	2017	FALL	1.7	1.5	1.9	0.08	0.09	0.06	3	7.38	191.1	11.68	8.78	2.73	120
GLAP-NR-022	2015	SPRING	1.7	1.3	1.2	0.19	0.33	0.31	29.5	15.84	231.6	10.96	8.5	0.61	85
GLAP-NR-022	2016	SPRING	1.2	1.4	1.2	0.23	0.21	0.33	27.5	15.9	283	2.15	9.22	0.5	54
GLAP-NR-022	2017	SPRING	1.3	1.6	2	0.03	0.24	0.29	23.4	21.18	260.9	8.62	8.3	1.3	60
GLAP-NR-022	2015	SUMMER	1	1.2	1.8	0.01	0.07	0.11	24	22.9	270.4	8.18	8.49	1.07	52
GLAP-NR-022	2016	SUMMER	1.1	1.7	1.8	0	0.05	0.19	25.3	25.08	559.1	7.27	9.28	2.13	63
GLAP-NR-022	2017	SUMMER	1.9	2.3	2.1	0.01	0.05	0.06	19.2	21.7	270.8	8.38	8.55	2.86	80
GLAP-NR-022	2015	FALL	0.8	1.1	1.6	0.01	0.06	0.22	16.7	15.68	459.4	9.27	8.83	0.61	65
GLAP-NR-022	2016	FALL	1.7	1.8	1.5	0.03	0.07	0.29	7.3	11.92	222.6	11.19	9.29	1.08	60

Station code	Year	Season	Depth (m) 1	Depth (m) 2	Depth (m) 3	Water velocity (m/s) 1	Water velocity (m/s) 2	Water velocity (m/s) 3	Air temperature (°C)	Water temperature (°C)	Conductivity (µS)	Dissolved oxygen (mg/L)	pH	Turbidity (ntu)	Approx. distance from shore (m)
GLAP-NR-022	2017	FALL	1.5	1.8	1.6	0.01	0.13	0.16	3	7.31	190.6	11.78	8.78	2.74	50
GLAP-NR-031	2015	SPRING	3.2	1.4	0.5	0.71	0.68	0.04	19.7	15.3	229.7	10.41	8.32	1.75	26
GLAP-NR-031	2016	SPRING	1.4	1.7	1.1	0.3	0.33	0.12	28.1	14.39	286	2.09	8.83	1.94	28
GLAP-NR-031	2017	SPRING	1.3	1.6	1.4	0.34	0.43	0.02	-	21.44	260.9	8.39	8.26	2.46	25
GLAP-NR-031	2015	SUMMER	1.8	1.5	1	0.51	0.29	0.03	28.2	23.12	271.2	8.73	8.54	2.04	33
GLAP-NR-031	2016	SUMMER	1.9	1.4	1.5	0.32	0.27	0.03	23.4	25	561.8	7.21	8.95	4.34	26
GLAP-NR-031	2017	SUMMER	1.4	1.7	1.5	0.07	0.04	0.03	18.3	21.83	272.8	8.01	8.53	2.72	21
GLAP-NR-031	2015	FALL	1.2	0.5	0.5	0.03	0.09	0.31	12.4	15.12	454.1	9.86	8.63	2.13	25
GLAP-NR-031	2016	FALL	1.2	1.4	2.1	0.18	0.31	0.11	9	13.17	228.9	10.42	9.46	1.47	26
GLAP-NR-031	2017	FALL	1.5	1.5	2.2	0.18	0.38	0.24	5	7.07	189.3	11.51	8.77	9.9	35
GLAP-NR-032	2015	SPRING	0.5	1	1.2	0.04	0.27	0.5	28.1	15.9	233.5	10.71	8.42	2.93	26
GLAP-NR-032	2016	SPRING	1.1	1.4	1.8	0.12	0.34	0.38	26.3	14.35	288	2.08	8.85	2.11	29
GLAP-NR-032	2017	SPRING	1.4	1.6	1.7	0.02	0.2	0.49	23.6	21.48	261.1	8.53	8.3	3.54	30
GLAP-NR-032	2015	SUMMER	1	1.6	1.1	0.03	0.05	0.33	25.8	23.2	271.7	8.61	8.56	2.64	31
GLAP-NR-032	2016	SUMMER	1.5	1.7	1.4	0.03	0.05	0.21	22.2	24.96	561.3	7.38	9.11	4.02	24
GLAP-NR-032	2017	SUMMER	1.5	1.6	1.7	0.03	0.01	0.03	18.3	21.74	272.1	8.21	8.54	3.35	30
GLAP-NR-032	2015	FALL	0.9	1.5	1.2	0.17	0.33	0.03	15.7	15.13	449.9	9.64	8.56	2.19	19
GLAP-NR-032	2016	FALL	2.1	1.7	1.2	0.11	0.05	0.3	9	13.08	225.3	10.72	9.61	1.71	29
GLAP-NR-032	2017	FALL	2.2	1.8	1.3	0.24	0.4	0.27	5	7.13	189.5	11.68	8.94	8.93	30
GLAP-NR-041	2015	SPRING	1.6	1.3	2.4	0.44	0.51	0.26	21.2	14.9	225.2	10.81	8.41	1.41	17
GLAP-NR-041	2016	SPRING	1.9	1.8	1.6	0.53	0.23	0.5	19.3	18.36	469.2	9.26	8.68	1.61	17
GLAP-NR-041	2017	SPRING	-	-	-	-	-	-	-	-	-	-	-	-	-
GLAP-NR-041	2015	SUMMER	1.1	1.7	1.3	0.08	0.1	0.07	17.3	23.19	272.1	9.1	8.68	4.98	16
GLAP-NR-041	2016	SUMMER	1.8	1.5	1.7	0.12	0.28	0.25	24.8	24.91	552.6	8	9.32	0.92	17
GLAP-NR-041	2017	SUMMER	1.5	1.8	2.2	0.23	0.38	0.47	25.6	22.96	271.5	8.32	8.43	0.49	17
GLAP-NR-041	2015	FALL	1	1.2	1.1	0.28	0.2	0.18	16.2	16.33	463.7	9.32	8.58	0.18	16
GLAP-NR-041	2016	FALL	1.2	1.5	1.7	0.3	0.39	0.5	16.3	14.76	227.8	9.44	9.14	0.65	15
GLAP-NR-041	2017	FALL	1.6	1.7	1.7	0.29	0.3	0.39	7.4	10.56	201.7	10.62	8.64	1.5	14
GLAP-NR-042	2015	SPRING	2.4	3.8	3	0.26	0.49	0.73	23.4	14.8	225	10.73	8.38	2.1	19
GLAP-NR-042	2016	SPRING	1.6	2.4	1.9	0.5	0.49	0.42	19.3	18.5	470.3	9.27	8.8	1.66	15
GLAP-NR-042	2017	SPRING	-	-	-	-	-	-	-	-	-	-	-	-	-
GLAP-NR-042	2015	SUMMER	1.3	2.6	0.7	0.07	0.31	0.02	23.3	22.9	272.1	8.5	8.6	0.95	20
GLAP-NR-042	2016	SUMMER	1.7	2.3	1.4	0.25	0.23	0.04	24.5	25.01	552	8.22	9.73	1.29	10
GLAP-NR-042	2017	SUMMER	2.2	3	-	0.47	0.46	0.13	26.6	22.99	271.6	8.35	8.43	0.75	15
GLAP-NR-042	2015	FALL	1.1	2.3	1.1	0.18	0.22	0.09	14.9	16.5	464	9.9	8.76	1.79	12
GLAP-NR-042	2016	FALL	1.7	2.8	2.1	0.5	0.68	0.26	15.7	14.72	227.6	9.39	9.02	0.83	15
GLAP-NR-042	2017	FALL	1.7	1.7	1.7	0.39	0.05	0.04	7.4	10.44	201.1	10.69	8.63	1.95	8

Station code	Year	Season	Depth (m) 1	Depth (m) 2	Depth (m) 3	Water velocity (m/s) 1	Water velocity (m/s) 2	Water velocity (m/s) 3	Air temperature (°C)	Water temperature (°C)	Conductivity (µS)	Dissolved oxygen (mg/L)	pH	Turbidity (ntu)	Approx. distance from shore (m)
GLAP-NR-051	2015	SPRING	3.3	2.7	2	0.63	0.93	0.42	27	15.4	231.8	10.6	8.36	4.72	28
GLAP-NR-051	2016	SPRING	2.4	2	1.8	0.43	0.59	0.51	24.3	17.63	473.5	9.42	8.9	4.91	3
GLAP-NR-051	2017	SPRING	-	-	-	-	-	-	-	-	-	-	-	-	-
GLAP-NR-051	2015	SUMMER	2	1.8	1.3	0.35	0.28	0.12	22.8	23.1	271.7	8.53	8.57	2.94	15
GLAP-NR-051	2016	SUMMER	2.1	2.3	1.5	0.29	0.3	0.06	26.9	25.15	557.8	7.63	9.33	2.3	5
GLAP-NR-051	2017	SUMMER	2.3	1.8	1.9	0.28	0.44	0.17	26.6	23.7	276	8.74	8.52	1.35	5
GLAP-NR-051	2015	FALL	1.8	1.1	0.9	0.31	0.48	0.32	17.8	15.18	448.3	9.92	8.53	2.83	5
GLAP-NR-051	2016	FALL	2	1.6	1.7	0.33	0.25	0.26	7.5	13.35	233.3	9.74	9.34	4.42	10
GLAP-NR-051	2017	FALL	2.1	2.1	1.7	0.32	0.55	0.1	7.4	12.57	263	9.49	8.62	44.53	20
GLAP-NR-052	2015	SPRING	2	2.9	2.4	0.42	0.7	0.52	24.8	15.3	231.7	10.36	8.31	4.46	42
GLAP-NR-052	2016	SPRING	1.8	1.5	1.7	0.51	0.55	0.46	24.5	17.43	471.8	9.51	8.86	4.16	26
GLAP-NR-052	2017	SPRING	1.5	1.8	1.6	0.2	0.49	0.24	28.4	21.81	261.5	9.09	8.45	2.29	35
GLAP-NR-052	2015	SUMMER	1.3	1	1	0.12	0.22	0.11	23.4	23.03	271.3	8.46	8.56	2.21	30
GLAP-NR-052	2016	SUMMER	1.5	1.7	1.4	0.06	0.21	0.07	26.9	25.04	556.6	7.59	9.7	2.19	25
GLAP-NR-052	2017	SUMMER	1.9	1.5	1.7	0.17	0.23	0.21	26.6	23.62	276	8.57	8.46	1.22	30
GLAP-NR-052	2015	FALL	0.9	0.7	1.1	0.32	0.41	0.24	17.3	15.15	448.3	9.75	9	2.25	29
GLAP-NR-052	2016	FALL	1.7	1.5	1.8	0.26	0.23	0.07	7.6	10.68	231	10.69	9.75	4.9	27
GLAP-NR-052	2017	FALL	1.7	2.2	2	0.1	0.33	0.09	7.4	12.48	260.8	8.59	8.94	141.2	33
GLAP-NR-061	2015	SPRING	2.2	1.7	1	0.32	0.19	0.1	20	15.02	226.3	10.45	8.3	0.89	49
GLAP-NR-061	2016	SPRING	1.9	1.5	1.4	0.3	0.16	0.02	24.8	13.81	287	2.22	8.88	0.44	46
GLAP-NR-061	2017	SPRING	-	-	-	-	-	-	-	-	-	-	-	-	-
GLAP-NR-061	2015	SUMMER	1.8	2.1	1.6	0.16	0.1	0.03	23.2	22.9	272	8.67	9.09	0.71	60
GLAP-NR-061	2016	SUMMER	1.4	1.6	1.3	0.04	0.07	0.02	27.3	24.93	551.6	8.07	9.05	3.06	50
GLAP-NR-061	2017	SUMMER	2.1	2.2	1.8	0.04	0.03	0	28.5	23.59	273.7	9.52	8.7	0.29	100
GLAP-NR-061	2015	FALL	1.4	1.3	1	0.09	0.14	0.01	18.2	16.41	459.2	10.45	8.51	0.24	60
GLAP-NR-061	2016	FALL	1.4	1.6	1.5	0.25	0.06	0.04	13.8	14.58	227.1	9.46	9.35	0.81	48
GLAP-NR-061	2017	FALL	2	1.9	2.2	0.13	0.11	0.12	-	10.54	201.8	10.48	8.59	1.34	62
GLAP-NR-062	2015	SPRING	1	1.7	4.9	0.1	0.06	0.45	18.2	15.12	227	10.22	8.2	1.35	137
GLAP-NR-062	2016	SPRING	1.4	1.7	3.5	0.02	0.16	0.41	24.2	12.6	293	2.18	8.81	0.51	135
GLAP-NR-062	2017	SPRING	-	-	-	-	-	-	-	-	-	-	-	-	-
GLAP-NR-062	2015	SUMMER	1.6	2.4	3.5	0.03	0.17	0.12	23.4	22.81	271.9	8.37	8.6	0.83	159
GLAP-NR-062	2016	SUMMER	1.3	1.4	3.3	0.02	0.06	0.14	25.9	24.76	551.1	7.74	9.36	2.73	125
GLAP-NR-062	2017	SUMMER	1.8	1.7	2.4	0	0.07	0.1	29.1	23.39	274	8.37	8.47	0.57	120
GLAP-NR-062	2015	FALL	1	1.8	1.6	0.01	0.12	0.14	16.1	15.96	456.3	9.61	8.43	0.35	142
GLAP-NR-062	2016	FALL	1.5	1.8	2.3	0.04	0.1	0.09	11.7	11.93	222.6	10.31	9.58	0.83	130
GLAP-NR-062	2017	FALL	2.2	2.2	1.9	0.12	0.01	0.1	-	10.17	200.1	10.47	8.61	1.61	156
GLAP-NR-071	2015	SPRING	2	1.9	1.7	0.15	0.23	0.36	22.8	17.15	244.8	10.7	8.29	2.14	15

Station code	Year	Season	Depth (m) 1	Depth (m) 2	Depth (m) 3	Water velocity (m/s) 1	Water velocity (m/s) 2	Water velocity (m/s) 3	Air temperature (°C)	Water temperature (°C)	Conductivity (µS)	Dissolved oxygen (mg/L)	pH	Turbidity (ntu)	Approx. distance from shore (m)
GLAP-NR-071	2016	SPRING	1.6	1.8	1.7	0.17	0.05	0.4	13.8	17.65	465.5	9.83	9.17	2.81	10
GLAP-NR-071	2017	SPRING	2.3	2.1	2.4	0.02	0.18	0.14	23.3	20.93	260	9.68	8.27	4.17	20
GLAP-NR-071	2015	SUMMER	1.8	1.4	1.6	0.02	0.09	0.21	25.3	23.4	275	8.85	8.48	2.16	15
GLAP-NR-071	2016	SUMMER	1.8	2.3	2.1	0.03	0.05	0.27	27	24.78	554.7	8.9	9.11	1.66	16
GLAP-NR-071	2017	SUMMER	2.3	2.4	2	0.03	0.15	0.34	25.1	23.97	281.4	9.07	8.42	3.5	-
GLAP-NR-071	2015	FALL	1.2	1.5	1	0.17	0.18	0.55	18.2	15.94	458.8	10.34	8.53	3.14	10
GLAP-NR-071	2016	FALL	1.7	1.8	2.4	0.02	0.07	0.13	23.5	18.1	253.3	9.7	9.23	2.39	15
GLAP-NR-071	2017	FALL	2.1	2.2	2.4	0.06	0.02	0.01	8.4	12.13	213.1	11.1	8.85	10.5	10
GLAP-NR-072	2015	SPRING	1.7	1.5	2.1	0.36	0.37	0.27	22.8	17.11	244.5	10.63	8.2	10.7	10
GLAP-NR-072	2016	SPRING	1.7	2.4	1.8	0.4	0.66	0.1	12.8	17.6	466.8	9.8	9.52	2.93	10
GLAP-NR-072	2017	SPRING	2.4	2.4	2	0.14	0.16	0.06	21.7	20.8	260.4	9.55	8.24	5.29	5
GLAP-NR-072	2015	SUMMER	1.6	1.9	1.1	0.21	0.23	0.02	26	23.4	274.9	8.71	8.59	1.11	11
GLAP-NR-072	2016	SUMMER	2.1	2.3	1.9	0.27	0.43	0.01	27	24.77	554.7	8.85	9.59	2.08	15
GLAP-NR-072	2017	SUMMER	2	2.4	1.9	0.34	0.34	0.02	24.2	23.86	279.5	8.86	8.48	1.77	10
GLAP-NR-072	2015	FALL	1	1.6	0.5	0.55	0.26	0.06	18.6	15.92	459	10.22	8.97	1.95	13
GLAP-NR-072	2016	FALL	2.4	1.7	2.2	0.13	0.23	0.02	23.5	18.04	250.6	9.6	9.28	2.79	10
GLAP-NR-072	2017	FALL	2.4	1.9	2.3	0.01	0.01	0	8.4	12.19	213.7	11.14	8.76	9.57	10
GLAP-NR-081	2015	SPRING	1	0.9	0.7	0.04	0.1	0.12	19.6	17.5	246.4	11.04	8.43	1.7	45
GLAP-NR-081	2016	SPRING	1.7	1.6	1.4	0.14	0.1	0.1	20.7	17.6	463.3	10.79	8.74	2.88	48
GLAP-NR-081	2017	SPRING	1.7	1.9	2	0.14	0.01	0.01	18.9	21.14	260.3	10.93	8.57	2.61	45
GLAP-NR-081	2015	SUMMER	1.1	1.3	0.9	0.07	0.03	0.13	21.6	22.8	272.4	9	8.44	1.31	45
GLAP-NR-081	2016	SUMMER	1.3	2	2	0.07	0.04	0.02	24.8	24.82	556.5	8.65	9.18	1.52	54
GLAP-NR-081	2017	SUMMER	1.7	1.6	1.8	0.08	0.12	0.01	29.5	24.22	280.7	9.35	8.48	1.39	50
GLAP-NR-081	2015	FALL	0.8	0.7	0.5	0.03	0.02	0.01	14.8	15.05	448.4	10.44	8.57	6.46	53
GLAP-NR-081	2016	FALL	1.9	2	1.7	0.03	0.06	0.04	5.2	12.92	227.1	10.81	9.2	1.95	62
GLAP-NR-081	2017	FALL	1.9	2.2	2.3	0.02	0.01	0.05	5.8	11.98	210.6	11.5	8.91	6.03	52
GLAP-NR-082	2015	SPRING	0.7	1.1	1.3	0.12	0.13	0.26	18.7	17.32	245.5	10.61	8.37	1.96	20
GLAP-NR-082	2016	SPRING	1.4	2.1	1.7	0.1	0.08	0.12	20.7	17.36	461.7	10.18	8.76	2.18	20
GLAP-NR-082	2017	SPRING	2	2.5	2.7	0.01	0.05	0.1	18.9	20.77	259.3	10	8.33	5.43	19
GLAP-NR-082	2015	SUMMER	0.9	1.6	1.3	0.13	0.03	0.24	21.8	23	273.2	9.21	8.42	1.87	20
GLAP-NR-082	2016	SUMMER	2	1.7	1.8	0.02	0.12	0.32	24.8	25.19	555.8	8.93	9.75	1.44	21
GLAP-NR-082	2017	SUMMER	1.8	1.9	2.2	0.01	0.1	0.29	27.5	23.91	279.4	9.08	8.41	0.91	-
GLAP-NR-082	2015	FALL	0.5	1.5	1.7	0.01	0.12	0.3	15.4	15.03	447.3	10.64	8.73	5.56	17
GLAP-NR-082	2016	FALL	1.7	1.9	2.4	0.04	0.17	0.34	5.2	13.02	219.5	11.93	9.44	2.13	10
GLAP-NR-082	2017	FALL	2.3	2.2	1.9	0.05	0.16	0.15	5.8	12.02	210.7	11.47	8.74	7.23	25
GLAP-NR-091	2015	SPRING	1.6	1.1	1.9	0.02	0.03	0.17	19.4	17	244.6	10.39	8.47	1.47	15
GLAP-NR-091	2016	SPRING	2.3	1.9	2	0.1	0.09	0.14	24.5	17.26	460.7	10.08	8.64	2.22	10

Station code	Year	Season	Depth (m) 1	Depth (m) 2	Depth (m) 3	Water velocity (m/s) 1	Water velocity (m/s) 2	Water velocity (m/s) 3	Air temperature (°C)	Water temperature (°C)	Conductivity (µS)	Dissolved oxygen (mg/L)	pH	Turbidity (ntu)	Approx. distance from shore (m)
GLAP-NR-091	2017	SPRING	2.1	2.1	2	0.12	0	0.47	22.2	20.43	258.5	9.46	8.21	3.32	20
GLAP-NR-091	2015	SUMMER	1.4	1.3	1.8	0.25	0.05	0.04	29.2	23.7	276.2	9.12	8.57	1.04	-
GLAP-NR-091	2016	SUMMER	2.1	1.8	1.9	0	0.02	0.13	28.4	25.97	563.8	8.96	8.86	0.84	15
GLAP-NR-091	2017	SUMMER	1.9	2.1	2.8	0.05	0.07	0.09	30.7	24.12	280.1	9.38	8.45	0.91	15
GLAP-NR-091	2015	FALL	1.3	0.9	1.6	0.07	0.02	0.04	16.9	14.3	441	11.14	8.37	5.82	13
GLAP-NR-091	2016	FALL	1.5	1.4	1.6	0.04	0.03	0.11	7.8	13.12	224.4	11.28	9.14	1.51	10
GLAP-NR-091	2017	FALL	2	1.9	1.8	0.31	0.1	0.24	7.9	10.11	201.3	11.97	8.69	3.6	10
GLAP-NR-092	2015	SPRING	1	1.9	2	0.02	0.27	0.07	24.8	17.4	246.4	10.28	8.31	1.56	10
GLAP-NR-092	2016	SPRING	2	2.2	1.9	0.14	0.23	0.14	17.5	17.22	460.9	9.92	8.75	2.31	12
GLAP-NR-092	2017	SPRING	2	2.2	1.9	0.47	0.06	0.01	22.2	20.41	258.3	9.5	8.19	3.38	10
GLAP-NR-092	2015	SUMMER	1.8	1.4	1.2	0.04	0.05	0.11	29	23.9	278.1	8.84	8.91	0.98	15
GLAP-NR-092	2016	SUMMER	1.9	1.8	1.7	0.13	0.22	0.01	28.4	25.59	563.3	8.26	8.75	0.94	5
GLAP-NR-092	2017	SUMMER	2.8	2.7	1.9	0.09	0.35	0.11	30.2	24.14	280.1	9.17	8.4	1.61	10
GLAP-NR-092	2015	FALL	1.6	1.5	1.1	0.04	0.34	0.02	16.6	14.05	439.3	10.62	8.23	2.68	15
GLAP-NR-092	2016	FALL	1.6	1.7	1.5	0.11	0.13	0.04	7.8	13.3	225.9	11.56	9.18	1.04	10
GLAP-NR-092	2017	FALL	1.8	1.7	1.5	0.24	0.47	0.18	7.8	10.07	201.2	11.77	8.85	5.29	10
GLAP-NR-101	2015	SPRING	2.2	1.7	1.2	0.41	0.1	0.44	24.6	17.4	246.3	10.33	8.25	1.71	10
GLAP-NR-101	2016	SPRING	2.3	2.1	1.7	0.54	0.08	0.19	17.6	17.26	461.6	10.23	8.79	2.99	10
GLAP-NR-101	2017	SPRING	2.7	2.1	1.9	0.47	0.1	0.15	21.8	20.48	257.4	9.46	8.26	2.92	10
GLAP-NR-101	2015	SUMMER	2.3	1.4	1.2	0.19	0.15	0.02	26.2	22.5	270.8	8.94	8.47	1.46	10
GLAP-NR-101	2016	SUMMER	2	1.6	1.7	0.14	0.03	0.08	29.1	25.39	561.3	8.9	9	1.58	10
GLAP-NR-101	2017	SUMMER	2.4	1.9	1.7	0.22	0.09	0.1	26.8	23.89	278.5	9.22	8.41	1.28	-
GLAP-NR-101	2015	FALL	1.9	1.5	1.2	0.18	0.07	0.1	10.3	13.6	434.1	10.77	8.54	5.71	10
GLAP-NR-101	2016	FALL	2	2.1	1.8	0.25	0.2	0	6.6	12.02	222.2	11.19	9.73	2.2	7
GLAP-NR-101	2017	FALL	1.7	2.3	1.5	0.26	0.8	0.74	8.7	10.27	201.9	12.18	8.77	3.05	10
GLAP-NR-102	2015	SPRING	2.1	1.7	1.2	0.44	0.24	0.09	24.6	17.41	246.6	10.19	8.23	2.3	10
GLAP-NR-102	2016	SPRING	1.7	2	2.1	0.19	0.19	0.21	17.5	17.06	459.8	9.95	9.24	2.26	5
GLAP-NR-102	2017	SPRING	1.9	2.1	2.3	0.15	0.14	0.02	21.8	20.47	257.3	9.52	8.31	2.83	10
GLAP-NR-102	2015	SUMMER	1.2	1.1	1.9	0.02	0.06	0.04	26.2	22.5	270.8	8.88	8.45	1.18	10
GLAP-NR-102	2016	SUMMER	1.7	1.6	1.5	0.08	0.06	0.01	29.1	25.08	559.6	8.61	9.14	1.24	8
GLAP-NR-102	2017	SUMMER	1.7	1.7	-	0.1	0.06	0	29.6	23.96	278.8	9.14	8.44	2.51	10
GLAP-NR-102	2015	FALL	1.2	1.3	1.4	0.1	0.02	0.02	10.3	13.59	434	10.83	8.69	2.73	5
GLAP-NR-102	2016	FALL	1.8	2.2	1.7	0	0.23	0.01	6.6	10.95	220.5	11.77	10.27	1.61	11
GLAP-NR-102	2017	FALL	1.5	1.8	1.2	0.74	0.08	0.38	8.6	10.27	201.8	12.32	8.84	8.84	10

Appendix 5. *Substrate type by percent composition observed during each sampling event.*

Station code	Year	Season	Dominant substrate type	Organic	Clay	Silt	Sand	Gravel	Cobble	Boulder	Bedrock	Hardpan	Rubble	Concrete	Unknown	No data
GLAP-NR-011	2015	SPRING	Clay	5	85	0	10	0	0	0	0	0	0	0	-	-
GLAP-NR-011	2016	SPRING	Silt	10	0	50	40	0	0	0	0	0	0	0	-	-
GLAP-NR-011	2017	SPRING	Sand	0	10	30	40	0	0	20	0	0	0	0	-	-
GLAP-NR-011	2015	SUMMER	Clay	15	50	15	10	0	5	5	0	0	0	0	-	-
GLAP-NR-011	2016	SUMMER	Silt	15	0	60	15	5	5	0	0	0	0	0	-	-
GLAP-NR-011	2017	SUMMER	Silt	5	0	60	10	10	10	5	0	0	0	0	-	-
GLAP-NR-011	2015	FALL	Silt	0	30	50	5	5	5	5	0	0	0	0	-	-
GLAP-NR-011	2016	FALL	Silt	15	0	45	25	0	0	15	0	0	0	0	-	-
GLAP-NR-011	2017	FALL	Sand	0	0	20	65	5	10	0	0	0	0	0	-	-
GLAP-NR-012	2015	SPRING	Clay	0	90	0	10	0	0	0	0	0	0	0	-	-
GLAP-NR-012	2016	SPRING	Sand	5	0	10	55	0	30	0	0	0	0	0	-	-
GLAP-NR-012	2017	SPRING	Silt	5	0	40	20	0	10	25	0	0	0	0	-	-
GLAP-NR-012	2015	SUMMER	Sand	20	5	5	50	0	20	0	0	0	0	0	-	-
GLAP-NR-012	2016	SUMMER	Sand	0	10	25	35	15	10	5	0	0	0	0	-	-
GLAP-NR-012	2017	SUMMER	Silt	35	0	60	5	0	0	0	0	0	0	0	-	-
GLAP-NR-012	2015	FALL	Silt	0	25	55	5	5	10	0	0	0	0	0	-	-
GLAP-NR-012	2016	FALL	Silt	10	0	60	20	0	0	10	0	0	0	0	-	-
GLAP-NR-012	2017	FALL	Cobble	0	0	10	20	10	60	0	0	0	0	0	-	-
GLAP-NR-021	2015	SPRING	Clay	0	50	30	20	0	0	0	0	0	0	0	-	-
GLAP-NR-021	2016	SPRING	Silt	10	0	55	30	0	0	5	0	0	0	0	-	-
GLAP-NR-021	2017	SPRING	Silt	10	10	40	40	0	0	0	0	0	0	0	-	-
GLAP-NR-021	2015	SUMMER	Clay	10	50	10	30	0	0	0	0	0	0	0	-	-
GLAP-NR-021	2016	SUMMER	Silt	20	0	60	20	0	0	0	0	0	0	0	-	-
GLAP-NR-021	2017	SUMMER	Silt	10	0	70	20	0	0	0	0	0	0	0	-	-
GLAP-NR-021	2015	FALL	Silt	0	30	60	10	0	0	0	0	0	0	0	-	-
GLAP-NR-021	2016	FALL	Silt	0	10	50	40	0	0	0	0	0	0	0	-	-
GLAP-NR-021	2017	FALL	Sand	5	0	40	50	0	5	0	0	0	0	0	-	-
GLAP-NR-022	2015	SPRING	Sand	0	20	30	50	0	0	0	0	0	0	0	-	-
GLAP-NR-022	2016	SPRING	Sand	5	0	40	50	0	0	5	0	0	0	0	-	-
GLAP-NR-022	2017	SPRING	Sand	0	30	30	35	0	0	5	0	0	0	0	-	-
GLAP-NR-022	2015	SUMMER	Clay	10	50	20	15	0	0	5	0	0	0	0	-	-
GLAP-NR-022	2016	SUMMER	Silt	10	25	55	5	5	0	0	0	0	0	0	-	-
GLAP-NR-022	2017	SUMMER	Silt	0	0	65	30	0	0	5	0	0	0	0	-	-
GLAP-NR-022	2015	FALL	Clay	0	35	30	15	15	0	5	0	0	0	0	-	-
GLAP-NR-022	2016	FALL	Silt	0	0	60	40	0	0	0	0	0	0	0	-	-
GLAP-NR-022	2017	FALL	Sand	0	0	40	50	0	10	0	0	0	0	0	-	-
GLAP-NR-031	2015	SPRING	Silt	0	20	45	35	0	0	0	0	0	0	0	-	-
GLAP-NR-031	2016	SPRING	Gravel	0	10	10	20	50	10	0	0	0	0	0	-	-
GLAP-NR-031	2017	SPRING	Cobble	0	0	10	30	20	30	10	0	0	0	0	-	-
GLAP-NR-031	2015	SUMMER	Sand	10	0	30	50	10	0	0	0	0	0	0	-	-
GLAP-NR-031	2016	SUMMER	Silt	10	0	40	30	5	15	0	0	0	0	0	-	-
GLAP-NR-031	2017	SUMMER	Silt	0	5	75	10	5	5	0	0	0	0	0	-	-
GLAP-NR-031	2015	FALL	Silt	0	20	60	10	10	0	0	0	0	0	0	-	-
GLAP-NR-031	2016	FALL	Silt	0	0	45	20	15	20	0	0	0	0	0	-	-
GLAP-NR-031	2017	FALL	Sand	5	0	10	65	10	10	0	0	0	0	0	-	-
GLAP-NR-032	2015	SPRING	Clay	0	50	20	30	0	0	0	0	0	0	0	-	-
GLAP-NR-032	2016	SPRING	Silt	5	0	70	10	0	0	5	0	0	0	0	-	10
GLAP-NR-032	2017	SPRING	Sand	0	10	35	50	0	0	5	0	0	0	0	-	-
GLAP-NR-032	2015	SUMMER	Sand	10	30	20	40	0	0	0	0	0	0	0	-	-
GLAP-NR-032	2016	SUMMER	Sand	10	0	25	60	5	0	0	0	0	0	0	-	-
GLAP-NR-032	2017	SUMMER	Silt	0	0	60	30	10	0	0	0	0	0	0	-	-

Station code	Year	Season	Dominant substrate type	Organic	Clay	Silt	Sand	Gravel	Cobble	Boulder	Bedrock	Hardpan	Rubble	Concrete	Unknown	No data
GLAP-NR-032	2015	FALL	Sand	0	0	30	55	15	0	0	0	0	0	0	-	-
GLAP-NR-032	2016	FALL	Silt	0	0	60	25	10	5	0	0	0	0	0	-	-
GLAP-NR-032	2017	FALL	Sand	0	0	30	60	5	5	0	0	0	0	0	-	-
GLAP-NR-041	2015	SPRING	Sand	0	0	0	80	20	0	0	0	0	0	0	-	-
GLAP-NR-041	2016	SPRING	Cobble	0	5	5	15	30	40	5	0	0	0	0	-	-
GLAP-NR-041	2017	SPRING	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GLAP-NR-041	2015	SUMMER	Sand	10	0	0	40	0	30	20	0	0	0	0	-	-
GLAP-NR-041	2016	SUMMER	Cobble	0	0	5	10	30	50	5	0	0	0	0	-	-
GLAP-NR-041	2017	SUMMER	Cobble	0	0	0	10	35	50	5	0	0	0	0	-	-
GLAP-NR-041	2015	FALL	Sand	0	0	20	30	20	20	10	0	0	0	0	-	-
GLAP-NR-041	2016	FALL	Cobble	0	0	15	15	20	45	5	0	0	0	0	-	-
GLAP-NR-041	2017	FALL	Cobble	0	0	5	20	20	55	0	0	0	0	0	-	-
GLAP-NR-042	2015	SPRING	Gravel	0	0	0	40	60	0	0	0	0	0	0	-	-
GLAP-NR-042	2016	SPRING	Gravel	0	0	0	25	60	10	5	0	0	0	0	-	-
GLAP-NR-042	2017	SPRING	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GLAP-NR-042	2015	SUMMER	Sand	20	0	0	50	20	10	0	0	0	0	0	-	-
GLAP-NR-042	2016	SUMMER	Silt	30	0	30	10	20	10	0	0	0	0	0	-	-
GLAP-NR-042	2017	SUMMER	Sand	0	0	0	60	20	20	0	0	0	0	0	-	-
GLAP-NR-042	2015	FALL	Sand	0	0	40	60	0	0	0	0	0	0	0	-	-
GLAP-NR-042	2016	FALL	Gravel	0	0	20	30	40	5	5	0	0	0	0	-	-
GLAP-NR-042	2017	FALL	Cobble	0	0	30	20	20	30	0	0	0	0	0	-	-
GLAP-NR-051	2015	SPRING	Gravel	0	0	0	20	75	5	0	0	0	0	0	-	-
GLAP-NR-051	2016	SPRING	Boulder	0	0	5	0	25	25	45	0	0	0	0	-	-
GLAP-NR-051	2017	SPRING	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GLAP-NR-051	2015	SUMMER	Sand	5	10	5	30	15	20	15	0	0	0	0	-	-
GLAP-NR-051	2016	SUMMER	Cobble	10	0	10	20	10	30	20	0	0	0	0	-	-
GLAP-NR-051	2017	SUMMER	Cobble	0	0	5	10	30	50	5	0	0	0	0	-	-
GLAP-NR-051	2015	FALL	Silt	0	0	30	10	15	25	20	0	0	0	0	-	-
GLAP-NR-051	2016	FALL	Cobble	0	20	10	30	0	30	10	0	0	0	0	-	-
GLAP-NR-051	2017	FALL	Cobble	0	0	0	30	20	40	10	0	0	0	0	-	-
GLAP-NR-052	2015	SPRING	Sand	0	0	20	70	10	0	0	0	0	0	0	-	-
GLAP-NR-052	2016	SPRING	Gravel	0	0	5	25	50	0	20	0	0	0	0	-	-
GLAP-NR-052	2017	SPRING	Cobble	0	0	0	35	10	50	5	0	0	0	0	-	-
GLAP-NR-052	2015	SUMMER	Sand	5	10	10	35	10	10	20	0	0	0	0	-	-
GLAP-NR-052	2016	SUMMER	Sand	5	0	10	55	10	15	5	0	0	0	0	-	-
GLAP-NR-052	2017	SUMMER	Cobble	0	0	10	15	15	50	10	0	0	0	0	-	-
GLAP-NR-052	2015	FALL	Silt	0	0	45	25	10	10	10	0	0	0	0	-	-
GLAP-NR-052	2016	FALL	Cobble	0	0	0	20	20	50	10	0	0	0	0	-	-
GLAP-NR-052	2017	FALL	Cobble	0	0	5	25	20	50	0	0	0	0	0	-	-
GLAP-NR-061	2015	SPRING	Clay	0	50	30	20	0	0	0	0	0	0	0	-	-
GLAP-NR-061	2016	SPRING	Sand	5	0	15	80	0	0	0	0	0	0	0	-	-
GLAP-NR-061	2017	SPRING	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GLAP-NR-061	2015	SUMMER	Clay	10	50	35	5	0	0	0	0	0	0	0	-	-
GLAP-NR-061	2016	SUMMER	Silt	10	0	75	10	5	0	0	0	0	0	0	-	-
GLAP-NR-061	2017	SUMMER	Silt	0	0	90	10	0	0	0	0	0	0	0	-	-
GLAP-NR-061	2015	FALL	Silt	0	30	70	0	0	0	0	0	0	0	0	-	-
GLAP-NR-061	2016	FALL	Silt	5	5	80	10	0	0	0	0	0	0	0	-	-
GLAP-NR-061	2017	FALL	Sand	10	0	40	50	0	0	0	0	0	0	0	-	-
GLAP-NR-062	2015	SPRING	Clay	0	80	15	5	0	0	0	0	0	0	0	-	-
GLAP-NR-062	2016	SPRING	Silt	5	5	80	10	0	0	0	0	0	0	0	-	-
GLAP-NR-062	2017	SPRING	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GLAP-NR-062	2015	SUMMER	Clay	10	50	20	20	0	0	0	0	0	0	0	-	-
GLAP-NR-062	2016	SUMMER	Sand	0	0	5	90	5	0	0	0	0	0	0	-	-

Station code	Year	Season	Dominant substrate type	Organic	Clay	Silt	Sand	Gravel	Cobble	Boulder	Bedrock	Hardpan	Rubble	Concrete	Unknown	No data
GLAP-NR-062	2017	SUMMER	Sand	0	0	10	85	0	0	5	0	0	0	0	-	-
GLAP-NR-062	2015	FALL	Silt	0	30	60	0	0	5	5	0	0	0	0	-	-
GLAP-NR-062	2016	FALL	Silt	5	5	85	5	0	0	0	0	0	0	0	-	-
GLAP-NR-062	2017	FALL	Silt	20	0	60	20	0	0	0	0	0	0	0	-	-
GLAP-NR-071	2015	SPRING	Hardpan	0	15	0	10	10	0	10	0	55	0	0	-	-
GLAP-NR-071	2016	SPRING	Hardpan	5	0	20	10	15	20	5	0	25	0	0	-	-
GLAP-NR-071	2017	SPRING	Cobble	0	0	20	10	30	35	5	0	0	0	0	-	-
GLAP-NR-071	2015	SUMMER	Cobble	0	0	10	10	10	60	10	0	0	0	0	-	-
GLAP-NR-071	2016	SUMMER	Silt	5	10	40	0	15	20	5	0	5	0	0	-	-
GLAP-NR-071	2017	SUMMER	Gravel	0	0	10	10	45	30	5	0	0	0	0	-	-
GLAP-NR-071	2015	FALL	Hardpan	0	15	0	0	30	5	10	0	40	0	0	-	-
GLAP-NR-071	2016	FALL	Cobble	5	0	10	20	20	30	5	0	10	0	0	-	-
GLAP-NR-071	2017	FALL	Silt	10	0	40	20	15	10	5	0	0	0	0	-	-
GLAP-NR-072	2015	SPRING	Hardpan	0	10	0	0	20	5	10	0	55	0	0	-	-
GLAP-NR-072	2016	SPRING	Hardpan	5	0	5	0	15	20	5	0	50	0	0	-	-
GLAP-NR-072	2017	SPRING	Gravel	0	0	10	10	40	20	20	0	0	0	0	-	-
GLAP-NR-072	2015	SUMMER	Gravel	0	10	10	10	50	10	10	0	0	0	0	-	-
GLAP-NR-072	2016	SUMMER	Silt	0	0	40	0	20	25	5	0	10	0	0	-	-
GLAP-NR-072	2017	SUMMER	Cobble	0	0	20	20	15	40	5	0	0	0	0	-	-
GLAP-NR-072	2015	FALL	Hardpan	0	0	0	0	15	5	10	0	70	0	0	-	-
GLAP-NR-072	2016	FALL	Sand	0	0	20	30	20	20	10	0	0	0	0	-	-
GLAP-NR-072	2017	FALL	Silt	0	0	45	25	25	0	5	0	0	0	0	-	-
GLAP-NR-081	2015	SPRING	Silt	5	20	50	20	0	0	5	0	0	0	0	-	-
GLAP-NR-081	2016	SPRING	Silt	5	0	30	20	15	15	15	0	0	0	0	-	-
GLAP-NR-081	2017	SPRING	Sand	0	0	25	40	10	20	5	0	0	0	0	-	-
GLAP-NR-081	2015	SUMMER	Sand	10	40	10	40	0	0	0	0	0	0	0	-	-
GLAP-NR-081	2016	SUMMER	Sand	5	0	30	50	0	15	0	0	0	0	0	-	-
GLAP-NR-081	2017	SUMMER	Sand	0	0	10	55	20	10	5	0	0	0	0	-	-
GLAP-NR-081	2015	FALL	Sand	0	0	20	50	5	20	0	0	0	0	0	-	5
GLAP-NR-081	2016	FALL	Silt	0	0	40	20	10	20	10	0	0	0	0	-	-
GLAP-NR-081	2017	FALL	Silt	20	0	40	40	0	0	0	0	0	0	0	-	-
GLAP-NR-082	2015	SPRING	Clay	15	30	25	15	5	0	10	0	0	0	0	-	-
GLAP-NR-082	2016	SPRING	Silt	10	0	45	10	10	10	15	0	0	0	0	-	-
GLAP-NR-082	2017	SPRING	Silt	0	0	80	10	5	5	0	0	0	0	0	-	-
GLAP-NR-082	2015	SUMMER	Clay	5	45	10	25	5	5	5	0	0	0	0	-	-
GLAP-NR-082	2016	SUMMER	Silt	5	5	55	20	10	5	0	0	0	0	0	-	-
GLAP-NR-082	2017	SUMMER	Gravel	0	0	30	10	50	10	0	0	0	0	0	-	-
GLAP-NR-082	2015	FALL	Silt	0	0	55	20	10	15	0	0	0	0	0	-	-
GLAP-NR-082	2016	FALL	Silt	20	10	30	0	10	30	0	0	0	0	0	-	-
GLAP-NR-082	2017	FALL	Silt	30	0	60	10	0	0	0	0	0	0	0	-	-
GLAP-NR-091	2015	SPRING	Sand	5	0	10	50	10	15	10	0	0	0	0	-	-
GLAP-NR-091	2016	SPRING	Silt	0	0	30	20	10	30	10	0	0	0	0	-	-
GLAP-NR-091	2017	SPRING	Silt	0	10	65	10	10	5	0	0	0	0	0	-	-
GLAP-NR-091	2015	SUMMER	Sand	0	0	0	60	20	20	0	0	0	0	0	-	-
GLAP-NR-091	2016	SUMMER	Sand	0	0	15	50	25	10	0	0	0	0	0	-	-
GLAP-NR-091	2017	SUMMER	Cobble	0	0	30	10	20	35	5	0	0	0	0	-	-
GLAP-NR-091	2015	FALL	Silt	0	0	60	35	5	0	0	0	0	0	0	-	-
GLAP-NR-091	2016	FALL	Sand	0	0	30	50	0	20	0	0	0	0	0	-	-
GLAP-NR-091	2017	FALL	Cobble	0	0	30	30	0	40	0	0	0	0	0	-	-
GLAP-NR-092	2015	SPRING	Gravel	0	0	5	10	40	35	10	0	0	0	0	-	-
GLAP-NR-092	2016	SPRING	Sand	0	0	10	50	10	25	5	0	0	0	0	-	-
GLAP-NR-092	2017	SPRING	Cobble	0	0	5	20	30	45	0	0	0	0	0	-	-
GLAP-NR-092	2015	SUMMER	Sand	10	0	0	50	20	20	0	0	0	0	0	-	-

Station code	Year	Season	Dominant substrate type	Organic	Clay	Silt	Sand	Gravel	Cobble	Boulder	Bedrock	Hardpan	Rubble	Concrete	Unknown	No data
GLAP-NR-092	2016	SUMMER	Gravel	0	0	15	20	40	25	0	0	0	0	0	-	-
GLAP-NR-092	2017	SUMMER	Unknown	-	-	-	-	-	-	-	-	-	-	-	100	-
GLAP-NR-092	2015	FALL	Silt	0	0	50	30	20	0	0	0	0	0	0	-	-
GLAP-NR-092	2016	FALL	Cobble	0	0	20	20	0	60	0	0	0	0	0	-	-
GLAP-NR-092	2017	FALL	Cobble	0	0	5	25	25	45	0	0	0	0	0	-	-
GLAP-NR-101	2015	SPRING	Hardpan	0	0	5	15	25	15	0	10	30	0	0	-	-
GLAP-NR-101	2016	SPRING	Cobble	0	0	5	10	20	30	10	0	25	0	0	-	-
GLAP-NR-101	2017	SPRING	Hardpan	0	0	5	0	10	10	5	0	70	0	0	-	-
GLAP-NR-101	2015	SUMMER	Sand	10	0	20	60	0	5	5	0	0	0	0	-	-
GLAP-NR-101	2016	SUMMER	Cobble	0	0	10	0	25	55	10	0	0	0	0	-	-
GLAP-NR-101	2017	SUMMER	Cobble	0	0	5	5	15	65	10	0	0	0	0	-	-
GLAP-NR-101	2015	FALL	Cobble	0	0	0	15	10	60	5	0	10	0	0	-	-
GLAP-NR-101	2016	FALL	Cobble	0	0	5	10	15	50	15	0	5	0	0	-	-
GLAP-NR-101	2017	FALL	Cobble	0	0	5	10	0	70	0	0	15	0	0	-	-
GLAP-NR-102	2015	SPRING	Cobble	0	10	5	5	15	30	5	0	30	0	0	-	-
GLAP-NR-102	2016	SPRING	Cobble	0	0	5	15	20	35	15	0	10	0	0	-	-
GLAP-NR-102	2017	SPRING	Hardpan	0	0	10	0	10	10	0	0	70	0	0	-	-
GLAP-NR-102	2015	SUMMER	Sand	5	0	20	40	0	25	10	0	0	0	0	-	-
GLAP-NR-102	2016	SUMMER	Cobble	0	0	15	0	5	75	5	0	0	0	0	-	-
GLAP-NR-102	2017	SUMMER	Cobble	0	0	5	5	20	60	10	0	0	0	0	-	-
GLAP-NR-102	2015	FALL	Cobble	0	0	0	10	10	65	5	0	10	0	0	-	-
GLAP-NR-102	2016	FALL	Cobble	0	0	10	10	10	60	5	0	5	0	0	-	-
GLAP-NR-102	2017	FALL	Cobble	0	0	0	0	5	60	10	0	25	0	0	-	-

Appendix 6. *Aquatic and Riparian vegetation recorded during each sampling event measured in percent composition of each category of vegetation. Species of aquatic vegetation present were recorded, noting dominant species.*

Station code	Year	Season	Dominant aquatic vegetation type	Emergent	Floating	Submerged	Open water	Unknown	No data	Dominant vegetation species	Other vegetation species present	Dominant riparian vegetation type	Deciduous	Coniferous	Herbaceous	Shrubs	None	Unknown	No data
GLAP-NR-011	2015	SPRING	Open Water	0	0	10	90	-	-	-	-	None	20	0	10	10	60	-	-
GLAP-NR-011	2016	SPRING	Open Water	0	0	10	90	-	-	-	-	None	50	0	5	0	90	-	-
GLAP-NR-011	2017	SPRING	Submerged	0	0	95	5	-	-	*Stuckenia pectinatus*	*Potomegeton crispus*	None	5	0	5	0	90	-	-
GLAP-NR-011	2015	SUMMER	Submerged	0	0	90	10	-	-	*Stuckenia pectinatus*	*Vallisneria americana*	None	10	0	5	0	85	-	-
GLAP-NR-011	2016	SUMMER	Submerged	0	0	60	40	-	-	*Vallisneria americana*	*Elodea canadensis*, *Myriophyllum* sp.	None	5	0	5	0	90	-	-
GLAP-NR-011	2017	SUMMER	Submerged	0	0	90	10	-	-	*Vallisneria americana*	-	None	10	0	30	0	60	-	-
GLAP-NR-011	2015	FALL	Submerged	0	0	60	40	-	-	*Vallisneria americana*	-	None	0	0	10	5	85	-	-
GLAP-NR-011	2016	FALL	Open Water	0	0	25	75	-	-	*Vallisneria americana*	-	None	10	0	5	0	85	-	-
GLAP-NR-011	2017	FALL	Open Water	0	0	5	95	-	-	-	-	None	5	0	0	0	95	-	-
GLAP-NR-012	2015	SPRING	Open Water	0	0	0	100	-	-	n/a	-	Herbaceous	25	0	30	20	25	-	-
GLAP-NR-012	2016	SPRING	Open Water	0	0	15	85	-	-	-	-	None	20	0	10	0	70	-	-
GLAP-NR-012	2017	SPRING	Submerged	0	0	80	20	-	-	*Stuckenia pectinatus*	*Vallisneria americana*, *Potamogeton crispus*	None	30	0	20	0	50	-	-
GLAP-NR-012	2015	SUMMER	Submerged	0	0	90	10	-	-	*Stuckenia pectinatus*	*Vallisneria americana*, *Myriophyllum* sp.	None	20	0	20	0	60	-	-
GLAP-NR-012	2016	SUMMER	Submerged	0	0	90	10	-	-	*Vallisneria americana*	*Myriophyllum* sp.	None	20	0	20	10	50	-	-
GLAP-NR-012	2017	SUMMER	Submerged	0	0	95	5	-	-	*Vallisneria americana*	*Ceratophyllum demersum*, *Myriophyllum* sp.	None	20	0	20	0	60	-	-
GLAP-NR-012	2015	FALL	Submerged	0	0	60	40	-	-	*Vallisneria americana*		Deciduous	70	0	30	0	0	-	-
GLAP-NR-012	2016	FALL	Submerged	0	0	90	10	-	-	*Vallisneria americana*	*Myriophyllum* sp., *Elodea canadensis*	None	40	0	10	0	50	-	-
GLAP-NR-012	2017	FALL	Open Water	0	0	5	95	-	-	*Myriophyllum* sp.	-	None	5	0	5	0	90	-	-
GLAP-NR-021	2015	SPRING	Open Water	0	0	0	100	-	-	n/a	-	Deciduous	60	0	0	40	0	-	-
GLAP-NR-021	2016	SPRING	Open Water	0	0	10	90	-	-	-	-	Deciduous	70	0	10	10	10	-	-
GLAP-NR-021	2017	SPRING	Open Water	0	0	40	60	-	-	*Stuckenia pectinatus*	*Ceratophyllum demersum*	Deciduous	50	0	30	0	20	-	-
GLAP-NR-021	2015	SUMMER	Submerged	0	0	60	40	-	-	*Myriophyllum* sp.	*Vallisneria americana*, *Stuckenia pectinatus*	Deciduous	40	0	20	20	20	-	-
GLAP-NR-021	2016	SUMMER	Submerged	0	0	95	5	-	-	*Vallisneria americana*	*Myriophyllum* sp., *Ceratophyllum demersum*	Herbaceous	30	0	55	10	5	-	-
GLAP-NR-021	2017	SUMMER	Submerged	0	0	95	5	-	-	*Ceratophyllum demersum*	*Vallisneria americana*	Shrubs	30	0	20	50	0	-	-
GLAP-NR-021	2015	FALL	Submerged	0	0	80	20	-	-	*Vallisneria americana*	-	Deciduous	60	0	10	30	0	-	-
GLAP-NR-021	2016	FALL	Submerged	0	0	90	10	-	-	*Vallisneria americana*	-	Herbaceous	20	0	70	10	0	-	-
GLAP-NR-021	2017	FALL	Open Water	0	0	15	85	-	-	*Ceratophyllum demersum*	-	None	20	0	0	30	50	-	-
GLAP-NR-022	2015	SPRING	Open Water	0	0	0	100	-	-	n/a	-	Deciduous	40	0	30	30	0	-	-

Station code	Year	Season	Dominant aquatic vegetation type	Emergent	Floating	Submerged	Open water	Unknown	No data	Dominant vegetation species	Other vegetation species present	Dominant riparian vegetation type	Deciduous	Coniferous	Herbaceous	Shrubs	None	Unknown	No data
GLAP-NR-022	2016	SPRING	Open Water	0	0	10	90	-	-	-	-	Deciduous	50	0	10	0	40	-	-
GLAP-NR-022	2017	SPRING	Open Water	0	0	20	80	-	-	*Stuckenia pectinatus*	-	Deciduous	85	0	10	0	5	-	-
GLAP-NR-022	2015	SUMMER	Submerged	0	0	60	40	-	-	*Stuckenia pectinatus*	*Vallisneria americana*, *Myriophyllum* sp., *Elodea canadensis*	Deciduous	40	0	20	20	20	-	-
GLAP-NR-022	2016	SUMMER	Submerged	0	0	95	5	-	-	*Vallisneria americana*	*Myriophyllum* sp., *Elodea canadensis*	Deciduous	50	0	25	15	10	-	-
GLAP-NR-022	2017	SUMMER	Submerged	0	0	85	15	-	-	*Ceratophyllum demersum*	*Vallisneria americana*, *Myriophyllum* sp.	Shrubs	25	0	20	50	5	-	-
GLAP-NR-022	2015	FALL	Submerged	0	0	70	30	-	-	*Vallisneria americana*	-	Shrubs	40	0	20	40	0	-	-
GLAP-NR-022	2016	FALL	Submerged	0	0	70	30	-	-	*Vallisneria americana*	*Ceratophyllum demersum*	Herbaceous	30	0	40	30	0	-	-
GLAP-NR-022	2017	FALL	Open Water	0	0	20	80	-	-	*Vallisneria americana*	*Ceratophyllum demersum*, *Myriophyllum* sp.	None	20	0	0	40	40	-	-
GLAP-NR-031	2015	SPRING	Open Water	0	0	0	100	-	-	n/a	-	Deciduous	80	0	0	20	0	-	-
GLAP-NR-031	2016	SPRING	Open Water	0	0	15	85	-	-	-	-	Deciduous	50	0	20	0	30	-	-
GLAP-NR-031	2017	SPRING	Submerged	0	0	85	15	-	-	*Stuckenia pectinatus*	*Vallisneria americana*	Deciduous	70	0	5	0	25	-	-
GLAP-NR-031	2015	SUMMER	Submerged	0	0	95	5	-	-	*Vallisneria americana*	*Stuckenia pectinatus*, *Myriophyllum* sp.	Deciduous	70	0	25	5	0	-	-
GLAP-NR-031	2016	SUMMER	Submerged	0	0	60	40	-	-	*Vallisneria americana*	*Potomogeton richarsonii*, *Myriophyllum* sp.	Deciduous	60	0	30	0	10	-	-
GLAP-NR-031	2017	SUMMER	Submerged	0	0	90	10	-	-	*Vallisneria americana*	*Myriophyllum* sp.	Deciduous	65	0	20	0	15	-	-
GLAP-NR-031	2015	FALL	Submerged	0	0	80	20	-	-	*Vallisneria americana*	-	Herbaceous	30	0	70	0	0	-	-
GLAP-NR-031	2016	FALL	Submerged	0	0	90	10	-	-	*Vallisneria americana*	-	None	10	0	20	10	60	-	-
GLAP-NR-031	2017	FALL	Open Water	0	0	5	95	-	-	*Vallisneria americana*	-	None	40	0	10	0	50	-	-
GLAP-NR-032	2015	SPRING	Open Water	0	0	0	100	-	-	n/a	-	Deciduous	70	0	0	30	0	-	-
GLAP-NR-032	2016	SPRING	Open Water	0	0	5	95	-	-	-	-	None	20	0	10	0	70	-	-
GLAP-NR-032	2017	SPRING	Submerged	0	0	80	20	-	-	*Stuckenia pectinatus*	-	Deciduous	60	0	30	0	10	-	-
GLAP-NR-032	2015	SUMMER	Submerged	0	0	70	30	-	-	*Vallisneria americana*	*Stuckenia pectinatus*	Deciduous	70	0	0	30	0	-	-
GLAP-NR-032	2016	SUMMER	Submerged	0	0	70	30	-	-	*Vallisneria americana*	*Myriophyllum* sp.	None	20	0	30	10	40	-	-
GLAP-NR-032	2017	SUMMER	Submerged	0	0	95	5	-	-	*Vallisneria americana*	*Potamogeton natans*, *Myriophyllum* sp.	Deciduous	40	0	30	0	30	-	-
GLAP-NR-032	2015	FALL	Submerged	0	0	90	10	-	-	*Vallisneria americana*	-	Herbaceous	45	0	55	0	0	-	-
GLAP-NR-032	2016	FALL	Submerged	0	0	80	20	-	-	*Vallisneria americana*	-	None	20	0	20	10	50	-	-
GLAP-NR-032	2017	FALL	Open Water	0	0	5	95	-	-	*Vallisneria americana*	-	None	10	0	5	0	85	-	-
GLAP-NR-041	2015	SPRING	Open Water	0	0	0	100	-	-	n/a	-	Deciduous	80	0	20	0	0	-	-
GLAP-NR-041	2016	SPRING	Open Water	0	0	0	100	-	-	n/a	-	Deciduous	80	0	20	0	0	-	-
GLAP-NR-041	2017	SPRING	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GLAP-NR-041	2015	SUMMER	Open Water	30	0	30	40	-	-	*Vallisneria americana*	reeds	Herbaceous	40	0	50	0	10	-	-
GLAP-NR-041	2016	SUMMER	Submerged	15	0	65	20	-	-	*Vallisneria americana*	-	None	40	0	20	0	40	-	-
GLAP-NR-041	2017	SUMMER	Submerged	5	0	65	30	-	-	*Vallisneria americana*	reeds, *Poaceae*	Deciduous	70	0	20	0	10	-	-

Station code	Year	Season	Dominant aquatic vegetation type	Emergent	Floating	Submerged	Open water	Unknown	No data	Dominant vegetation species	Other vegetation species present	Dominant riparian vegetation type	Deciduous	Coniferous	Herbaceous	Shrubs	None	Unknown	No data
GLAP-NR-041	2015	FALL	Submerged	0	0	70	30	-	-	*Vallisneria americana*	-	Deciduous	80	0	15	5	0	-	-
GLAP-NR-041	2016	FALL	Submerged	20	0	60	20	-	-	*Vallisneria americana*	reeds	None	10	0	40	0	50	-	-
GLAP-NR-041	2017	FALL	Open Water	5	0	5	90	-	-	-	-	Deciduous	30	0	30	0	40	-	-
GLAP-NR-042	2015	SPRING	Open Water	0	0	0	100	-	-	n/a	-	Deciduous	80	0	20	0	0	-	-
GLAP-NR-042	2016	SPRING	Open Water	5	0	0	95	-	-	-	-	Deciduous	80	0	20	0	0	-	-
GLAP-NR-042	2017	SPRING	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GLAP-NR-042	2015	SUMMER	Open Water	10	0	40	50	-	-	*Vallisneria americana*	reeds, *Phragmites australis*	Herbaceous	40	0	50	0	10	-	-
GLAP-NR-042	2016	SUMMER	Submerged	5	0	50	45	-	-	*Vallisneria americana*	*Phragmites australis*, *Typha* sp.	None	30	0	10	0	60	-	-
GLAP-NR-042	2017	SUMMER	Submerged	5	0	80	15	-	-	*Vallisneria americana*	*Phragmites australis*	Herbaceous	40	0	40	10	10	-	-
GLAP-NR-042	2015	FALL	Submerged	0	0	90	10	-	-	*Vallisneria americana*	-	Deciduous	60	0	30	10	0	-	-
GLAP-NR-042	2016	FALL	Submerged	10	0	50	40	-	-	*Vallisneria americana*	reeds, *Phragmites australis*	None	10	0	10	0	80	-	-
GLAP-NR-042	2017	FALL	Open Water	5	0	10	85	-	-	*Vallisneria americana*	-	Deciduous	50	0	20	0	30	-	-
GLAP-NR-051	2015	SPRING	Open Water	0	0	0	100	-	-	n/a	-	Deciduous	70	0	10	20	0	-	-
GLAP-NR-051	2016	SPRING	Open Water	0	0	0	100	-	-	n/a	-	Herbaceous	35	0	60	0	5	-	-
GLAP-NR-051	2017	SPRING	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GLAP-NR-051	2015	SUMMER	Submerged	0	0	50	50	-	-	*Vallisneria americana*	*Potomogeton richarsonii*, *Stuckenia pectinatus*	Herbaceous	25	0	50	0	25	-	-
GLAP-NR-051	2016	SUMMER	Open Water	0	0	40	60	-	-	*Potamogeton richardsonii*	*Vallisneria americana*	Herbaceous	30	0	35	5	30	-	-
GLAP-NR-051	2017	SUMMER	Submerged	0	0	55	45	-	-	*Vallisneria americana*	*Potomogeton richarsonii*	Herbaceous	25	0	40	5	30	-	-
GLAP-NR-051	2015	FALL	Open Water	0	0	20	80	-	-	-	-	Herbaceous	40	0	60	0	0	-	-
GLAP-NR-051	2016	FALL	Open Water	0	0	10	90	-	-	*Vallisneria americana*	-	None	20	0	30	0	50	-	-
GLAP-NR-051	2017	FALL	Open Water	0	0	10	90	-	-	*Vallisneria americana*	-	Deciduous	40	0	30	0	30	-	-
GLAP-NR-052	2015	SPRING	Open Water	0	0	0	100	-	-	n/a	-	Deciduous	80	0	10	10	0	-	-
GLAP-NR-052	2016	SPRING	Open Water	0	0	0	100	-	-	n/a	-	Herbaceous	35	0	60	0	5	-	-
GLAP-NR-052	2017	SPRING	Submerged	0	0	65	35	-	-	*Stuckenia pectinatus*	*Vallisneria americana*	Deciduous	45	0	10	15	30	-	-
GLAP-NR-052	2015	SUMMER	Submerged	0	0	60	40	-	-	*Vallisneria americana*	*Potomogeton richarsonii*, *Stuckenia pectinatus*	None	25	0	25	0	50	-	-
GLAP-NR-052	2016	SUMMER	Submerged	0	0	60	40	-	-	*Potamogeton richardsonii*	*Vallisneria americana*	Herbaceous	30	0	40	0	30	-	-
GLAP-NR-052	2017	SUMMER	Submerged	0	0	70	30	-	-	-	-	Herbaceous	30	0	35	5	30	-	-
GLAP-NR-052	2015	FALL	Open Water	0	0	40	60	-	-	-	-	Herbaceous	40	0	60	0	0	-	-
GLAP-NR-052	2016	FALL	Open Water	0	0	30	70	-	-	*Vallisneria americana*	-	None	40	0	10	0	50	-	-
GLAP-NR-052	2017	FALL	Open Water	0	0	5	95	-	-	*Vallisneria americana*	-	Deciduous	60	0	40	0	0	-	-
GLAP-NR-061	2015	SPRING	Open Water	0	0	10	90	-	-	-	-	Deciduous	90	0	10	0	0	-	-
GLAP-NR-061	2016	SPRING	Open Water	0	0	10	90	-	-	-	-	Deciduous	70	5	15	0	10	-	-
GLAP-NR-061	2017	SPRING	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GLAP-NR-061	2015	SUMMER	Submerged	0	0	90	10	-	-	*Vallisneria americana*	-	Herbaceous	30	0	60	0	10	-	-

Station code	Year	Season	Dominant aquatic vegetation type	Emergent	Floating	Submerged	Open water	Unknown	No data	Dominant vegetation species	Other vegetation species present	Dominant riparian vegetation type	Deciduous	Coniferous	Herbaceous	Shrubs	None	Unknown	No data
GLAP-NR-061	2016	SUMMER	Submerged	0	0	90	10	-	-	*Vallisneria americana*	-	Deciduous	50	0	30	0	20	-	-
GLAP-NR-061	2017	SUMMER	Submerged	0	0	95	5	-	-	*Stuckenia pectinatus*	*Vallisneria americana*	Herbaceous	40	0	50	5	5	-	-
GLAP-NR-061	2015	FALL	Submerged	0	0	70	30	-	-	*Vallisneria americana*		Deciduous	80	0	15	5	0	-	-
GLAP-NR-061	2016	FALL	Submerged	0	0	60	40	-	-	*Ceratophyllum demersum*	*Vallisneria americana*	Herbaceous	20	0	50	0	30	-	-
GLAP-NR-061	2017	FALL	Open Water	0	0	5	95	-	-	*Vallisneria americana*	*Myriophyllum* sp.	Herbaceous	30	0	40	0	30	-	-
GLAP-NR-062	2015	SPRING	Open Water	0	0	15	85	-	-	-	-	Deciduous	90	0	10	0	0	-	-
GLAP-NR-062	2016	SPRING	Open Water	0	0	15	85	-	-	-	-	Deciduous	70	0	15	0	15	-	-
GLAP-NR-062	2017	SPRING	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GLAP-NR-062	2015	SUMMER	Submerged	0	0	55	45	-	-	*Vallisneria americana*	*Myriophyllum* sp.	Herbaceous	20	0	60	0	20	-	-
GLAP-NR-062	2016	SUMMER	Submerged	0	0	90	10	-	-	*Vallisneria americana*		Deciduous	50	0	20	0	30	-	-
GLAP-NR-062	2017	SUMMER	Submerged	0	0	80	20	-	-	*Vallisneria americana*	*Stuckenia pectinatus*, *Myriophyllum* sp.	Deciduous	60	0	25	10	5	-	-
GLAP-NR-062	2015	FALL	Open Water	0	0	40	60	-	-	*Vallisneria americana*	-	Deciduous	80	0	10	10	0	-	-
GLAP-NR-062	2016	FALL	Submerged	0	0	80	20	-	-	*Vallisneria americana*	*Ceratophyllum demersum*	Herbaceous	30	0	40	0	30	-	-
GLAP-NR-062	2017	FALL	Open Water	0	0	5	95	-	-	*Vallisneria americana*	-	Deciduous	40	0	20	20	20	-	-
GLAP-NR-071	2015	SPRING	Open Water	0	0	20	80	-	-	-	-	Deciduous	60	0	5	5	30	-	-
GLAP-NR-071	2016	SPRING	Open Water	0	0	5	95	-	-	-	-	None	20	0	0	0	80	-	-
GLAP-NR-071	2017	SPRING	Submerged	0	0	60	40	-	-	*Potamogeton crispus*	-	Deciduous	40	0	40	0	20	-	-
GLAP-NR-071	2015	SUMMER	Submerged	0	0	60	40	-	-	*Vallisneria americana*	-	Deciduous	50	0	10	0	40	-	-
GLAP-NR-071	2016	SUMMER	Submerged	0	0	80	20	-	-	*Vallisneria americana*	*Stuckenia pectinatus*, *Elodea canadensis*	None	40	0	0	0	60	-	-
GLAP-NR-071	2017	SUMMER	Not recorded	-	-	-	-	-	100	-	-	None	-	-	-	-	40	-	60
GLAP-NR-071	2015	FALL	Submerged	0	0	50	50	-	-	-	-	Deciduous	90	0	0	10	0	-	-
GLAP-NR-071	2016	FALL	Open Water	0	0	15	85	-	-	*Vallisneria americana*	-	None	15	0	5	0	80	-	-
GLAP-NR-071	2017	FALL	Open Water	0	0	0	100	-	-	n/a	-	Deciduous	50	0	50	0	0	-	-
GLAP-NR-072	2015	SPRING	Open Water	0	0	30	70	-	-	-	-	Deciduous	50	0	5	5	40	-	-
GLAP-NR-072	2016	SPRING	Open Water	0	0	5	95	-	-	-	-	None	10	0	5	0	85	-	-
GLAP-NR-072	2017	SPRING	Submerged	0	0	60	40	-	-	*Potamogeton crispus*	*Stuckenia pectinatus*	Deciduous	45	0	15	0	40	-	-
GLAP-NR-072	2015	SUMMER	Submerged	0	0	50	50	-	-	*Vallisneria americana*	-	None	5	0	5	0	90	-	-
GLAP-NR-072	2016	SUMMER	Submerged	0	0	85	15	-	-	*Vallisneria americana*	*Stuckenia pectinatus*	None	45	0	5	0	50	-	-
GLAP-NR-072	2017	SUMMER	Not recorded	-	-	-	-	-	100	-	-	Deciduous	80	0	0	0	20	-	-
GLAP-NR-072	2015	FALL	Open Water	0	0	40	60	-	-	-	-	Deciduous	90	0	0	10	0	-	-
GLAP-NR-072	2016	FALL	Open Water	0	0	20	80	-	-	*Vallisneria americana*	-	None	20	0	5	0	75	-	-
GLAP-NR-072	2017	FALL	Open Water	0	0	0	100	-	-	n/a	-	Herbaceous	50	0	50	0	0	-	-
GLAP-NR-081	2015	SPRING	Submerged	0	0	90	10	-	-	*Stuckenia pectinatus*	-	Deciduous	90	0	5	5	0	-	-
GLAP-NR-081	2016	SPRING	Submerged	0	0	70	30	-	-	*Stuckenia pectinatus*	-	Deciduous	90	0	0	0	10	-	-

Station code	Year	Season	Dominant aquatic vegetation type	Emergent	Floating	Submerged	Open water	Unknown	No data	Dominant vegetation species	Other vegetation species present	Dominant riparian vegetation type	Deciduous	Coniferous	Herbaceous	Shrubs	None	Unknown	No data
GLAP-NR-081	2017	SPRING	Submerged	0	0	60	40	-	-	*Potamogeton crispus*	*Stuckenia pectinatus*	Deciduous	60	0	40	0	0	-	-
GLAP-NR-081	2015	SUMMER	Submerged	0	0	80	20	-	-	*Vallisneria americana*	*Stuckenia pectinatus*	Deciduous	90	0	10	0	0	-	-
GLAP-NR-081	2016	SUMMER	Submerged	0	0	95	5	-	-	*Vallisneria americana*	*Stuckenia pectinatus*, *Elodea canadensis*	Deciduous	90	0	5	0	5	-	-
GLAP-NR-081	2017	SUMMER	Open Water	0	0	30	70	-	-	*Vallisneria americana*	*Stuckenia pectinatus*, *Myriophyllum* sp.	Deciduous	90	0	5	5	0	-	-
GLAP-NR-081	2015	FALL	Submerged	0	0	80	20	-	-	*Vallisneria americana*	-	Deciduous	70	0	20	5	5	-	-
GLAP-NR-081	2016	FALL	Submerged	0	0	60	40	-	-	*Vallisneria americana*	-	None	15	0	5	0	80	-	-
GLAP-NR-081	2017	FALL	Submerged	0	0	60	40	-	-	*Myriophyllum* sp.	-	Deciduous	80	0	10	10	0	-	-
GLAP-NR-082	2015	SPRING	Submerged	0	0	75	25	-	-	*Stuckenia pectinatus*	-	Deciduous	80	0	10	10	0	-	-
GLAP-NR-082	2016	SPRING	Open Water	0	0	30	70	-	-	*Stuckenia pectinatus*	-	Deciduous	90	0	0	0	10	-	-
GLAP-NR-082	2017	SPRING	Submerged	0	0	70	30	-	-	*Potamogeton crispus*	*Stuckenia pectinatus*, *Elodea canadensis*	Deciduous	50	0	50	0	0	-	-
GLAP-NR-082	2015	SUMMER	Submerged	0	0	60	40	-	-	*Vallisneria americana*	*Stuckenia pectinatus*	Deciduous	85	0	10	0	5	-	-
GLAP-NR-082	2016	SUMMER	Submerged	0	0	90	10	-	-	*Vallisneria americana*	*Stuckenia pectinatus*, *Elodea canadensis*	Deciduous	90	0	5	0	5	-	-
GLAP-NR-082	2017	SUMMER	Not recorded	-	-	-	-	-	100	*Vallisneria americana*	-	No Data	-	-	-	-	-	-	100
GLAP-NR-082	2015	FALL	Submerged	0	0	60	40	-	-	*Vallisneria americana*	-	Deciduous	50	0	30	10	10	-	-
GLAP-NR-082	2016	FALL	Open Water	0	0	40	60	-	-	*Vallisneria americana*	-	None	10	0	10	0	80	-	-
GLAP-NR-082	2017	FALL	Submerged	0	0	60	40	-	-	*Myriophyllum* sp.	-	Deciduous	80	0	10	10	0	-	-
GLAP-NR-091	2015	SPRING	Submerged	0	0	60	40	-	-	*Stuckenia pectinatus*	filamentous algae	Deciduous	70	0	15	15	0	-	-
GLAP-NR-091	2016	SPRING	Submerged	0	0	60	40	-	-	*Elodea canadensis*	*Stuckenia pectinatus*	Deciduous	70	0	20	0	10	-	-
GLAP-NR-091	2017	SPRING	Submerged	0	0	80	20	-	-	*Potamogeton crispus*	*Stuckenia pectinatus*, *Elodea canadensis*	Deciduous	70	0	30	0	0	-	-
GLAP-NR-091	2015	SUMMER	Submerged	0	0	55	45	-	-	*Vallisneria americana*	*Stuckenia pectinatus*	Deciduous	40	0	25	25	10	-	-
GLAP-NR-091	2016	SUMMER	Submerged	0	0	70	30	-	-	*Vallisneria americana*	-	Deciduous	40	0	15	10	35	-	-
GLAP-NR-091	2017	SUMMER	Open Water	0	0	40	60	-	-	*Vallisneria americana*	*Myriophyllum* sp.	Deciduous	95	0	5	0	0	-	-
GLAP-NR-091	2015	FALL	Open Water	0	0	40	60	-	-	*Vallisneria americana*	-	Deciduous	80	0	10	10	0	-	-
GLAP-NR-091	2016	FALL	Open Water	0	0	40	60	-	-	*Vallisneria americana*	-	None	5	0	5	0	90	-	-
GLAP-NR-091	2017	FALL	Open Water	0	0	5	95	-	-	*Myriophyllum* sp.	-	None	20	0	20	10	50	-	-
GLAP-NR-092	2015	SPRING	Open Water	0	0	30	70	-	-	-	-	Deciduous	40	0	20	30	10	-	-
GLAP-NR-092	2016	SPRING	Submerged	0	0	70	30	-	-	*Elodea canadensis*	*Stuckenia pectinatus*	Deciduous	85	0	5	0	10	-	-
GLAP-NR-092	2017	SPRING	Submerged	0	0	90	10	-	-	*Potamogeton crispus*	*Stuckenia pectinatus*, *Elodea canadensis*	Deciduous	60	0	40	0	0	-	-
GLAP-NR-092	2015	SUMMER	Submerged	0	0	60	40	-	-	*Vallisneria americana*	*Stuckenia pectinatus*	Herbaceous	10	0	50	15	25	-	-
GLAP-NR-092	2016	SUMMER	Submerged	0	0	90	10	-	-	*Vallisneria americana*	-	Deciduous	55	0	10	10	25	-	-
GLAP-NR-092	2017	SUMMER	Open Water	0	0	10	90	-	-	*Stuckenia pectinatus*	*Myriophyllum* sp.	Deciduous	70	0	20	0	10	-	-
GLAP-NR-092	2015	FALL	Open Water	0	0	40	60	-	-	*Vallisneria americana*	-	Deciduous	60	0	25	15	0	-	-
GLAP-NR-092	2016	FALL	Open Water	0	0	40	60	-	-	*Vallisneria americana*	-	None	5	0	0	0	95	-	-

Station code	Year	Season	Dominant aquatic vegetation type	Emergent	Floating	Submerged	Open water	Unknown	No data	Dominant vegetation species	Other vegetation species present	Dominant riparian vegetation type	Deciduous	Coniferous	Herbaceous	Shrubs	None	Unknown	No data
GLAP-NR-092	2017	FALL	Open Water	0	0	5	95	-	-	*Myriophyllum* sp.	-	None	20	0	20	0	80	-	-
GLAP-NR-101	2015	SPRING	Open Water	0	0	10	90	-	-	-	-	None	20	0	10	10	60	-	-
GLAP-NR-101	2016	SPRING	Open Water	0	0	10	90	-	-	*Stuckenia pectinatus*	-	None	5	0	0	0	95	-	-
GLAP-NR-101	2017	SPRING	Open Water	0	0	10	90	-	-	*Stuckenia pectinatus*	-	Deciduous	60	0	20	0	20	-	-
GLAP-NR-101	2015	SUMMER	Submerged	0	0	60	40	-	-	*Vallisneria americana*	*Stuckenia pectinatus*	None	20	0	10	0	70	-	-
GLAP-NR-101	2016	SUMMER	Open Water	0	0	30	70	-	-	*Vallisneria americana*		None	20	0	0	0	80	-	-
GLAP-NR-101	2017	SUMMER	Open Water	0	0	20	80	-	-	*Vallisneria americana*	*Stuckenia pectinatus*, *Myriophyllum* sp.	None	10	0	10	10	70	-	-
GLAP-NR-101	2015	FALL	Open Water	0	0	10	90	-	-	*Vallisneria americana*	-	None	5	0	0	5	90	-	-
GLAP-NR-101	2016	FALL	Open Water	0	0	10	90	-	-	*Ceratophyllum demersum*	*Vallisneria americana*	None	0	0	0	0	100	-	-
GLAP-NR-101	2017	FALL	Open Water	0	0	5	95	-	-	*Myriophyllum* sp.	*Vallisneria americana*, *Myriophyllum* sp.	None	15	0	10	10	65	-	-
GLAP-NR-102	2015	SPRING	Open Water	0	0	5	95	-	-	-	-	None	20	0	20	10	50	-	-
GLAP-NR-102	2016	SPRING	Open Water	0	0	5	95	-	-	*Stuckenia pectinatus*	-	None	5	0	10	0	85	-	-
GLAP-NR-102	2017	SPRING	Open Water	0	0	10	90	-	-	*Stuckenia pectinatus*	-	None	40	0	20	0	40	-	-
GLAP-NR-102	2015	SUMMER	Open Water	0	0	40	60	-	-	*Vallisneria americana*	*Stuckenia pectinatus*	None	20	0	10	0	70	-	-
GLAP-NR-102	2016	SUMMER	Open Water	0	0	30	70	-	-	*Vallisneria americana*	-	None	20	0	0	0	80	-	-
GLAP-NR-102	2017	SUMMER	Open Water	0	0	30	70	-	-	*Vallisneria americana*	*Stuckena pectinatus*, *Myriophyllum* sp.	None	10	0	5	5	80	-	-
GLAP-NR-102	2015	FALL	Open Water	0	0	10	90	-	-	*Vallisneria americana*	-	None	5	0	5	0	90	-	-
GLAP-NR-102	2016	FALL	Open Water	0	0	10	90	-	-	*Ceratophyllum demersum*	*Vallisneria americana*	None	0	0	0	0	100	-	-
GLAP-NR-102	2017	FALL	Open Water	0	0	5	95	-	-	*Vallisneria americana*	-	None	10	0	10	10	70	-	-

APPENDIX 4: ANALYSIS EXPECTED VS. OBSERVED NIAGARA RIVER FISHES

Overview: The following tables are taken from: Drake et al. (in prep), "Fish Community Assessment of the Upper and Lower Niagara River in Relation to Beneficial Use Impairment Delisting Criteria". Results are considered preliminary until peer review is complete.

Table 1. Expected species assessment for the lower Niagara River. Columns include: 1) species common name, 2) whether the species is present in the Lake Ontario drainage, based on Roth et al. 2012, 3) whether the species is expected in the lower Niagara River, 4) rationale if not expected (e.g., habitat requirements would not be met in unimpaired state; geographic proximity of species to Niagara River), 5) whether the species has been detected by recent sampling in the lower Niagara River, 6) the method of detection, and 7-10), the data source of detection. All DFO detections are based on Gáspárdy et al. 2020 (DFO data report of GLAP sampling).

Species	Present in Lake Ontario	Expected in lower Niagara	Rationale if not expected	Detected in lower Niagara in recent sampling?	If detected, which method?	Data Source (1)	Years observed (1)	Data Source (2)	Years observed (2)
Alewife	1	1		1	Electrofishing (1, 2); fyke net (2)	DFO	2015-2017	USFWS	2012, 2014-2017
American Eel	1	1		1	Electrofishing, fyke net, mini fyke	USFWS	2013-2019	MNRF	
Banded Killifish	1	1		1	Electrofishing (1, 2); Fyke net (2)	DFO	2015-2017	USFWS	2014-2018
Black Bullhead	1	1		1	Electrofishing	DFO	2015-2017		
Black Crappie	1	1		1	Electrofishing (1, 2); Fyke net (2)	DFO	2015-2017	USFWS	2014, 2016
Bluegill	1	1		1	Electrofishing (1, 2); Fyke net (2)	DFO	2015-2017	USFWS	2013-2019
Bluntnose Minnow	1	1		1	Electrofishing (1, 2); Fyke net (2)	DFO	2015-2017	USFWS	2014-2018

Species	Present in Lake Ontario	Expected in lower Niagara	Rationale if not expected	Detected in lower Niagara in recent sampling?	If detected, which method?	Data Source (1)	Years observed (1)	Data Source (2)	Years observed (2)
Bowfin	1	1		1	Electrofishing (1, 2); Fyke net (2)	DFO	2015-2017	USFWS	2016-2018
Brook Silverside	1	1		1	Electrofishing (1, 2)	DFO	2015-2017	USFWS	2012, 2016-2017
Brook Stickleback	1	1		1	Fyke net, seine net	USFWS	2011		
Brown Bullhead	1	1		1	Electrofishing (1, 2); fyke net (2)	DFO	2015-2017	USFWS	2012-2019
Brown Trout	1	1		1	Electrofishing (1, 2)	DFO	2015	USFWS	2015
Central Mudminnow	1	1		1	Electrofishing	USFWS	2015	NYSDEC	
Channel Catfish	1	1		1	Setlines	USFWS	2016	NYSDEC	
Chinook Salmon	1	1		1	Electrofishing (1, 2)	DFO	2015-2017	USFWS	2012-2013, 2016
Coho Salmon	1	1		1	Electrofishing (1, 2)	DFO	2015-2017	USFWS	2012-2013
Common Carp	1	1		1	Electrofishing (1, 2); fyke net (2)	DFO	2015-2017	USFWS	2013, 2015-2019
Common Shiner	1	1		1	Electrofishing	DFO	2015-2017		
Creek Chub	1	1		1	Electrofishing (1, 2)	MNRF	2004	USFWS	2018
Emerald Shiner	1	1		1	Electrofishing (1, 2); bottom	DFO	2015-2017	USFWS	2012-2018

Species	Present in Lake Ontario	Expected in lower Niagara	Rationale if not expected	Detected in lower Niagara in recent sampling?	If detected, which method?	Data Source (1)	Years observed (1)	Data Source (2)	Years observed (2)
					trawl, fyke net (2)				
Fathead Minnow	1	1		1	Electrofishing	MNRF	2004		
Freshwater Drum	1	1		1	Electrofishing (1, 2)	DFO	2015-2017	USFWS	2013-2016, 2018-2019
Gizzard Shad	1	1		1	Electrofishing (1, 2); Fyke net (2)	DFO	2015-2017	USFWS	2013-2019
Golden Redhorse	1	1		1	Electrofishing (1, 2); Fyke net (2)	DFO	2015-2017	USFWS	2013-2019
Golden Shiner	1	1		1	Electrofishing (1, 2)	MNRF	2015	USFWS	2013, 2015-2018
Goldfish	1	1		1	Electrofishing (1, 2); Fyke net (2)	MNRF	2015	USFWS	2017
Greater Redhorse	1	1		1	Electrofishing (1, 2); Fyke net (2)	DFO	2015-2017	USFWS	2012-2019
Green Sunfish	1	1		1	Electrofishing (1, 2); Fyke net, mini fyke (2)	DFO	2015-2017	USFWS	2014, 2016, 2017, 2019
Hornyhead Chub	1	1		1	Electrofishing (1, 2)	DFO	2015-2017	USFWS	2012-2013, 2016-2017

Species	Present in Lake Ontario	Expected in lower Niagara	Rationale if not expected	Detected in lower Niagara in recent sampling?	If detected, which method?	Data Source (1)	Years observed (1)	Data Source (2)	Years observed (2)
Johnny Darter	1	1		1	Electrofishing	DFO	2015-2017		
Lake Sturgeon	1	1		1	Fyke net, seine net, setlines	USFWS	2010-2019	NYSDEC	not specified *
Lake Trout	1	1		1	Electrofishing	DFO	2015-2017		
Largemouth Bass	1	1		1	Electrofishing (1, 2); Fyke net, mini fyke (2)	DFO	2015-2017	USFWS	2012-2019
Logperch	1	1		1	Electrofishing (1, 2); fyke net (2)	DFO	2015-2017	USFWS	2014-2018
Longnose Gar	1	1		1	Electrofishing (1, 2)	DFO	2015-2017	USFWS	2013, 2018
Mimic Shiner	1	1		1	Electrofishing (1, 2); fyke net (2)	DFO	2015-2017	USFWS	2017-2018
Mottled Sculpin	1	1		1	Electrofishing	DFO	2015-2017		
Muskellunge	1	1		1	Electrofishing (1, 2)	DFO	2015-2017	USFWS	2013-2014, 2017-2018
Northern Hogsucker	1	1		1	Electrofishing (1, 2)	DFO	2015-2017	USFWS	2014*
Northern Pike	1	1		1	Electrofishing (1, 2); Fyke net	DFO	2015-2017	USFWS	2012-2019
Pumpkinseed	1	1		1	Electrofishing (1, 2); Fyke net (2)	DFO	2015-2017	USFWS	2014, 2016-2017, 2019

Species	Present in Lake Ontario	Expected in lower Niagara	Rationale if not expected	Detected in lower Niagara in recent sampling?	If detected, which method?	Data Source (1)	Years observed (1)	Data Source (2)	Years observed (2)
Quillback	1	1		1	Electrofishing (1, 2)	DFO	2015-2017	USFWS	2016, 2019
Rainbow Darter	1	1		1	Efishing-nonstandard survey	MNRF	2004		
Rainbow Smelt	1	1		1	Electrofishing (1, 2); bottom trawl, fyke net (2)	DFO	2015-2017	USFWS	2012, 2014-2015
Rainbow Trout	1	1		1	Electrofishing (1, 2); Fyke net (2)	DFO	2015-2017	USFWS	2013-2015, 2018
River Chub	1	1		1	Electrofishing	MNRF	2004		
Rock Bass	1	1		1	Electrofishing (1, 2); Fyke net, mini fyke (2)	DFO	2015-2017	USFWS	2012-2019
Rosyface Shiner	1	1		1	Electrofishing	MNRF	2004		
Round Goby	1	1		1	Electrofishing (1, 2); Bottom trawl, fyke net, gill net, mini fyke (2)	MNRF	2015	USFWS	2012-2019
Rudd	1	1		1	Electrofishing (1, 2); Fyke net (2)	DFO	2015-2017	USFWS	2014-2017, 2019
Sea Lamprey	1	1		1	Electrofishing	DFO	2015-2017		
Shorthead Redhorse	1	1		1	Electrofishing, fyke net	USFWS	2014-2018		

Species	Present in Lake Ontario	Expected in lower Niagara	Rationale if not expected	Detected in lower Niagara in recent sampling?	If detected, which method?	Data Source (1)	Years observed (1)	Data Source (2)	Years observed (2)
Silver Redhorse	1	1		1	Electrofishing (1, 2); Fyke net (2)	DFO	2015-2017	USFWS	2013-2017
Smallmouth Bass	1	1		1	Electrofishing (1, 2); gill net, fyke net, mini fyke	DFO	2015-2017	USFWS	2012-2019
Spotfin Shiner	1	1		1	Electrofishing (1); Fyke net (2)	DFO	2015-2017	USFWS	2017*
Spottail Shiner	1	1		1	Electrofishing (1, 2); Fyke net (2)	DFO	2015-2017	USFWS	2012-2018
Striped Shiner	1	1		1	Electrofishing	DFO	2015-2017		
Trout Perch	1	1		1	Electrofishing	MNRF	2004		
Walleye	1	1		1	Electrofishing (1, 2); Fyke net (2)	DFO	2015-2017	USFWS	2013-2018
White Bass	1	1		1	Electrofishing	DFO	2015-2017		
White Crappie	1	1		1	Fyke net, seine net (1)	USFWS	2014	NYSDEC	
White Perch	1	1		1	Electrofishing (1, 2); Fyke net (2)	DFO	2015-2017	USFWS	2012, 2014-2019
White Sucker	1	1		1	Electrofishing (1, 2); Fyke net, mini fyke (2)	DFO	2015-2017	USFWS	2012-2019
Yellow Bullhead	1	1		1	Electrofishing	DFO	2015-2017		

Species	Present in Lake Ontario	Expected in lower Niagara	Rationale if not expected	Detected in lower Niagara in recent sampling?	If detected, which method?	Data Source (1)	Years observed (1)	Data Source (2)	Years observed (2)
Yellow Perch	1	1		1	Electrofishing (1, 2); Fyke net (2)	DFO	2015-2017	USFWS	2012-2019
Brindled Madtom	1	1		0		ADrake			
Silver Lamprey	1	1		0		USFWS		NYSDEC	
Grass Pickerel	1	0	Habitat requirements not met when unimpaired	1	Fyke net, seine net (1)	USFWS	2011	NYSDEC	
Lake Whitefish	1	0	Habitat requirements, life history, geographic proximity	1	Bongo nets, larval fish	USFWS	2016		
Black Redhorse	1	0	Geographic proximity; Habitat requirements not met when unimpaired	1	Electrofishing	USFWS	2014-2015		
American Brook Lamprey	1	0	Geographic proximity to LNR	0		USFWS			
Bigmouth Shiner	1	0	Habitat requirements not met	0		ADrake			

Species	Present in Lake Ontario	Expected in lower Niagara	Rationale if not expected	Detected in lower Niagara in recent sampling?	If detected, which method?	Data Source (1)	Years observed (1)	Data Source (2)	Years observed (2)
			when unimpaired						
Blackchin Shiner	1	0	Habitat requirements not met when unimpaired	0		USFWS		NYSDEC	
Blacknose Shiner	1	0	Habitat requirements not met when unimpaired	0		USFWS		NYSDEC	
Blackside Darter	1	0	Habitat requirements not met when unimpaired	0		ADrake			
Blueback Herring	1	0	Geographic proximity	0		ADrake			
Bluespotted Sunfish	1	0	Geographic proximity	0		ADrake			
Brassy Minnow	1	0	Habitat requirements not met when unimpaired	0		ADrake			
Bridle Shiner	1	0	Geographic proximity	0		ADrake			
Brook Trout	1	0	Habitat requirements not met	0		ADrake			

Species	Present in Lake Ontario	Expected in lower Niagara	Rationale if not expected	Detected in lower Niagara in recent sampling?	If detected, which method?	Data Source (1)	Years observed (1)	Data Source (2)	Years observed (2)
			when unimpaired						
Burbot	1	0	Habitat requirements not met when unimpaired	0		USFWS			
Central Stoneroller	1	0	Habitat requirements not met when unimpaired	0		ADrake			
Channel Darter	1	0	Geographic proximity; Habitat requirements not met when unimpaired	0		ADrake			
Cisco	1	0	Rarity	0		USFWS			
Creek Chubsucker	1	0	Rarity	0		ADrake			
Cutlip Minnow	1	0	Geographic proximity; rarity	0		ADrake			
Deepwater Sculpin	1	0	Habitat requirements not met when unimpaired	0		ADrake			

Species	Present in Lake Ontario	Expected in lower Niagara	Rationale if not expected	Detected in lower Niagara in recent sampling?	If detected, which method?	Data Source (1)	Years observed (1)	Data Source (2)	Years observed (2)
Eastern Blacknose Dace	1	0	Geographic proximity; rarity	0		ADrake			
Eastern Silvery Minnow	1	0	Geographic proximity; rarity	0		ADrake			
Fallfish	1	0	Geographic proximity	0		ADrake			
Fantail Darter	1	0	Habitat requirements not met when unimpaired	0		USFWS		NYSDEC	
Finescale Dace	1	0	Habitat requirements not met when unimpaired	0		ADrake			
Greenside Darter	1	0	Habitat requirements not met when unimpaired	0		ADrake			
Iowa Darter	1	0	Habitat requirements not met when unimpaired	0		ADrake			
Lake Chub	1	0	Habitat requirements not met	0		ADrake			

Species	Present in Lake Ontario	Expected in lower Niagara	Rationale if not expected	Detected in lower Niagara in recent sampling?	If detected, which method?	Data Source (1)	Years observed (1)	Data Source (2)	Years observed (2)
			when unimpaired						
Lake Chubsucker	1	0	Geographic proximity; rarity; habitat requirements not met when unimpaired	0		ADrake			
Least Darter	1	0	Habitat requirements not met when unimpaired	0		ADrake			
Longear Sunfish	1	0	Rarity	0		USFWS		NYSDEC	
Longnose Dace	1	0	Habitat requirements not met when unimpaired	0		USFWS			
Longnose Sucker	1	0	Rarity	0		USFWS		NYSDEC	
Margined Madtom	1	0	Geographic proximity; rarity	0		ADrake			
Mooneye	1	0	Rarity	0		USFWS			
Ninespine Stickleback	1	0	Rarity	0		USFWS		NYSDEC	

Species	Present in Lake Ontario	Expected in lower Niagara	Rationale if not expected	Detected in lower Niagara in recent sampling?	If detected, which method?	Data Source (1)	Years observed (1)	Data Source (2)	Years observed (2)
Northern Redbelly Dace	1	0	Habitat requirements not met when unimpaired	0		ADrake			
Pearl Dace	1	0	Habitat requirements not met when unimpaired	0		ADrake			
Pink Salmon	1	0	Geographic proximity	0		USFWS		NYSDEC	
Pirate Perch	1	0	Geographic proximity	0		ADrake			
Pugnose Shiner	1	0	Habitat requirements not met when unimpaired	0		ADrake			
Redfin Shiner	1	0	Geographic proximity	0		ADrake			
Redside Dace	1	0	Geographic proximity; habitat requirements not met when unimpaired	0		ADrake			
River Redhorse	1	0	Rarity	0		USFWS			

Species	Present in Lake Ontario	Expected in lower Niagara	Rationale if not expected	Detected in lower Niagara in recent sampling?	If detected, which method?	Data Source (1)	Years observed (1)	Data Source (2)	Years observed (2)
Round Whitefish	1	0	Unknown	0		USFWS			
Sand Shiner	1	0	Habitat requirements not met when unimpaired	0		USFWS		NYSDEC	
Satinfin Shiner	1	0	Geographic proximity; Habitat requirements not met when unimpaired	0		ADrake			
Silver Shiner	1	0	Habitat requirements not met when unimpaired	0		ADrake			
Swallowtail Shiner	1	0	Geographic proximity	0		ADrake			
Slimy Sculpin	1	0	Rarity	0		USFWS		NYSDEC	
Stonecat	1	0	Rarity; habitat requirements not met when unimpaired	0		USFWS		NYSDEC	
Tadpole Madtom	1	0	Habitat requirements not met	0		ADrake			

Species	Present in Lake Ontario	Expected in lower Niagara	Rationale if not expected	Detected in lower Niagara in recent sampling?	If detected, which method?	Data Source (1)	Years observed (1)	Data Source (2)	Years observed (2)
			when unimpaired						
Tesselated Darter	1	0	Habitat requirements not met when unimpaired	0		ADrake			
Threespine Stickleback	1	0	Rarity	0		USFWS		NYSDEC	
Tongetied Minnow	1	0	Rarity	0		ADrake			
Western Blacknose Dace	1	0	Habitat requirements not met when unimpaired	0		ADrake			
Totals	123	67		68					
	# spp. Present in Lake Ontario drainage		123						
	# spp. expected in LNR		67						
	# spp. observed in LNR		69 (65 detected that were expected; 97% compositional similarity)						

Interpretation of Table 1 is as follows. The Lake Ontario species pool contains 123 fish species. Of these, 67 would be expected to be found in the lower Niagara River. A large number of Lake Ontario species are not expected in the lower Niagara River due to factors such as rarity (e.g., they are found infrequently in Lake Ontario), geographic proximity (e.g., they are found in parts of the Lake Ontario drainage that are geographically separated from the Niagara River), or habitat factors (e.g., in an unimpaired state, these species would be unlikely to exist in the Niagara River due to underlying species habitat requirements). Altogether, 65 species were detected by fisheries sampling programs that were expected to be found (97% compositional similarity). Further, an additional three species (Lake Whitefish, Grass Pickerel, Black Redhorse) were detected that were not expected to be found, indicating that some unexpected species are occupying the lower Niagara River on sporadically. The missing species (Silver Lamprey, Brindled Madtom) likely represent insufficient search effort (Silver Lamprey) or sampling challenges (e.g., trawling required for Brindled Madtom), rather than fish community impairment.

Table 2. Expected species assessment for the upper Niagara River. Columns include: 1) species common name, 2) whether the species is present in the Lake Erie drainage based on Roth et al. 2012, 3) whether the species is expected in the upper Niagara River, 4) rationale if not expected (e.g., habitat requirements for this species would not be met in unimpaired state; geographic proximity of this species to the upper Niagara River), 5) whether the species has been detected by recent sampling in the upper Niagara River, 6) the method of detection, and 7-10), the data source of detection. All DFO detections are based on Gáspárdy et al. 2020 (DFO data report of GLAP sampling).

Species	Present in Lake Erie	Expected in upper Niagara	Rationale if not expected	Detected in upper Niagara since 2010?	If observed, which method?	Data Source (1)	Years observed (1)	Data Source (2)	Years observed (2)
Alewife	1	1		1	Electrofishing (1); Gill Net, Electrofishing, Fyke Net (2)	DFO	2015-2017	USFWS	2012-2013, 2015-2018
American Brook Lamprey	1	1		1	Electrofishing (1, 2)	DFO	2015-2017	USFWS	2018
Banded Killifish	1	1		1	Electrofishing (1, 2); Fyke net, juvenile seine (2)	DFO	2015-2017	USFWS	2012-2019
Black Bullhead	1	1		1	Electrofishing	DFO	2015-2017		
Black Crappie	1	1		1	Electrofishing (1, 2); Fyke net, juvenile seine, mini fyke (2)	DFO	2015-2017	USFWS	2012, 2014-2016, 2018-2019
Blackchin Shiner	1	1		1	Electrofishing, juvenile seine (1); fyke net, seine net (2)	USFWS	2017, 2018, 2019	NYSDEC	2001, 2011, 2019
Blacknose Shiner	1	1		1	Electrofishing (1); fyke net, seine net (2)	USFWS	2012, 2013	NYSDEC	2000-2019

Bluegill	1	1		1	Electrofishing (1, 2); Fyke net, juvenile seine, mini fyke (2)	DFO	2015-2017	USFWS	2012-2019
Bluntnose Minnow	1	1		1	Electrofishing (1, 2); Fyke net, juvenile seine, mini fyke (2)	DFO	2015-2017	USFWS	2012-2019
Bowfin	1	1		1	Electrofishing (1, 2); Fyke net, juvenile seine, mini fyke (2)	DFO	2015-2017	USFWS	2015-2019
Brook Silverside	1	1		1	Electrofishing (1); fyke net, juvenile seine (2)	DFO	2015-2017	USFWS	2014-2018
Brook Stickleback	1	1		1	Net (seine, fyke) (1, 2)	USFWS	2019	NYSDEC	1998, 2000, 2019
Brown Bullhead	1	1		1	Electrofishing (1, 2); Fyke net, juvenile seine, mini fyke (2)	DFO	2015-2017	USFWS	2012-2019
Brown Trout	1	1		1	Electrofishing (1, 2)	DFO	2015-2017	USFWS	2015
Central Mudminnow	1	1		1	Electrofishing (1); juvenile seine (2)	DFO	2015-2017	USFWS	2017, 2019
Channel Catfish	1	1		1	Electrofishing (1); Fyke net (2)	DFO	2015-2017	USFWS	2015
Coho Salmon	1	1		1	Electrofishing (2)	Work Group		USFWS	2012
Common Carp	1	1		1	Electrofishing (1, 2); Fyke net, mini fyke (2)	DFO	2015-2017	USFWS	2012-2019

Common Shiner	1	1		1	Electrofishing (1, 2); Fyke net, juvenile seine (2)	DFO	2015-2017	USFWS	2012-2016, 2018
Creek Chub	1	1		1	Electrofishing (1, 2); Fyke net, juvenile seine (2)	DFO	2015-2017	USFWS	2014-2015, 2018
Emerald Shiner	1	1		1	Electrofishing (1, 2); Fyke net, juvenile seine (2)	DFO	2015-2017	USFWS	2012-2019
Fantail Darter	1	1		1	Electrofishing	DFO	2015-2017		
Fathead Minnow	1	1		1	Electrofishing (1, 2); Fyke net (2)	DFO	2015-2017	USFWS	2013, 2016
Freshwater Drum	1	1		1	Electrofishing (1, 2); Gill net (2)	DFO	2015-2017	USFWS	2014-2018
Gizzard Shad	1	1		1	Electrofishing (1, 2); Gill net (2)	DFO	2015-2017	USFWS	2014-2018
Golden Redhorse	1	1		1	Electrofishing (1, 2); Fyke net, mini fyke (2)	DFO	2015-2017	USFWS	2013-2019
Golden Shiner	1	1		1	Electrofising (1, 2); Fyke net, juvenile seine, mini fyke (2)	MNRF	2015	USFWS	2012-2019
Goldfish	1	1		1	Electrofising (1, 2); Fyke net, juvenile seine, mini fyke (2)	MNRF	2015	USFWS	2012-2019
Grass Pickerel	1	1		1	Electrofishing	DFO	2015-2017		
Greater Redhorse	1	1		1	Electrofising (1, 2); Fyke net, juvenile seine, mini fyke (2)	DFO	2015-2017	USFWS	2012-2019
Green Sunfish	1	1		1	Electrofising (1, 2); Fyke net, juvenile seine, mini fyke (2)	DFO	2015-2017	USFWS	2013-2014, 2017-2019

Hornyhead Chub	1	1		1	Electrofishing (1, 2)	DFO	2015-2017	USFWS	2012-2014, 2016-2017
Iowa Darter	1	1		1	Electrofishing (2)	USFWS	2016		
Johnny Darter	1	1		1	Electrofishing (1); Fyke net, juvenile seine (2)	DFO	2015-2017	USFWS	2014-2015, 2017
Lake Sturgeon	1	1		1	Visual observations/public reports (2)	USFWS		NYSDEC	
Lake Trout	1	1		1	Electrofishing - boat	MOE			
Largemouth Bass	1	1		1	Electrofishing (1, 2); Fyke net, juvenile seine, mini fyke (2)	DFO	2015-2017	USFWS	2013-2019
Logperch	1	1		1	Electrofishing (1, 2); Gill net, fyke net, juvenile seine, mini fyke (2)	DFO	2015-2017	USFWS	2013, 2015-2019
Longnose Gar	1	1		1	Electrofishing (1); fyke net, seine net (2)	USFWS	2018	NYSDEC	2010
Mimic Shiner	1	1		1	Electrofishing (1); Fyke net, juvenile seine (2)	DFO	2015-2017	USFWS	2014, 2017-2018
Mottled Sculpin	1	1		1	Electrofishing	DFO	2015-2017		
Muskellunge	1	1		1	Electrofishing (1, 2); juvenile seine	DFO	2015-2017	USFWS	2012-2016, 2018-2019
Northern Hog Sucker	1	1		1	Electrofishing (1, 2); Fyke net (2)	DFO	2015-2017	USFWS	2012, 2014-2019

Northern Pike	1	1		1	Electrofishing (1, 2); Fyke net, mini fyke (2)	DFO	2015-2017	USFWS	2012-2019
Orangespotted Sunfish	1	1		1	Electrofishing	DFO	2015-2017		
Pumpkinseed	1	1		1	Electrofishing (1, 2); Fyke net, juvenile seine, mini fyke (2)	DFO	2015-2017	USFWS	2012-2019
Quillback	1	1		1	Electrofishing (1, 2)	DFO	2015-2017	USFWS	2018
Rainbow Darter	1	1		1	Electrofishing	DFO	2015-2017		
Rainbow Smelt	1	1		1	Electrofishing (1, 2); Fyke net (2)	DFO	2015-2017	USFWS	2012, 2014-2015, 2018
Rainbow Trout	1	1		1	Electrofishing (1, 2)	DFO	2015-2017	USFWS	2017
Rock Bass	1	1		1	Electrofishing (1, 2); Fyke net, juvenile seine, mini fyke (2)	DFO	2015-2017	USFWS	2012-2019
Round Goby	1	1		1	Electrofishing (1, 2); Gill net, fyke net, juvenile seine, mini fyke (2)	MNRF		USFWS	2012-2019
Rudd	1	1		1	Electrofishing (1, 2); Fyke net, juvenile seine, mini fyke (2)	DFO	2015-2017	USFWS	2012-2019
Sand Shiner	1	1		1	Electrofishing	MNRF	2013		
Sea Lamprey	1	1		1	Electrofishing	MNRF	2013		

Shorthead Redhorse	1	1		1	Electrofishing (1, 2); Fyke net (2)	MNRF	2004	USFWS	2012-2019
Silver Redhorse	1	1		1	Electrofishing (1); visual observation (2)	USFWS	2014, 2015, 2016, 2018	NYSDEC	2005
Smallmouth Bass	1	1		1	Electrofishing (1, 2); Gill net, fyke net, juvenile seine, mini fyke (2)	DFO	2015-2017	USFWS	2012-2019
Spotfin Shiner	1	1		1	Electrofishing (1, 2); Fyke net, juvenile seine (2)	DFO	2015-2017	USFWS	2013, 2016-2018
Spottail Shiner	1	1		1	Electrofishing (1, 2); Gill net, fyke net, juvenile seine, mini fyke (2)	DFO	2015-2017	USFWS	2012-2019
Striped Shiner	1	1		1	Electrofishing (1, 2); Fyke net, juvenile seine (2)	DFO	2015-2017	USFWS	2015-2018
Tadpole Madtom	1	1		1	Electrofishing, juvenile seine	USFWS	2017-2019		
Trout Perch	1	1		1	Electrofishing (1, 2)	DFO	2015-2017	USFWS	2014
Walleye	1	1		1	Electrofishing (1, 2)	DFO	2015-2017	USFWS	2014, 2016-2018
White Bass	1	1		1	Electrofishing (1, 2); fyke net (2)	DFO	2015-2017	USFWS	2014-2018
White Crappie	1	1		1	Electrofishing (1); Fyke net, juvenile seine (2)	DFO	2015-2017	USFWS	2014, 2017-2019
White Perch	1	1		1	Electrofishing (1, 2); fyke net, mini fyke (2)	DFO	2015-2017	USFWS	2013-2019

White Sucker	1	1		1	Electrofishing (1, 2); Fyke net, juvenile seine, mini fyke (2)	DFO	2015-2017	USFWS	2012-2019
Yellow Bullhead	1	1		1	Electrofishing (1, 2); fyke net, mini fyke (2)	DFO	2015-2017	USFWS	2015, 2017-2019
Yellow Perch	1	1		1	Electrofishing (1, 2); Gill net, fyke net, mini fyke (2)	DFO	2015-2017	USFWS	2012-2019
Blackside Darter	1	1		0		ADrake			
Brindled Madtom	1	1		0		ADrake			
Silver Lamprey	1	1		0		USFWS			
Tubenose Goby	1	1		0		USFWS		NYSDEC	
River Chub	1	0	Habitat requirements not met when unimpaired	1	Electrofishing (1); fyke net, seine net (2)	USFWS	2013	NYSDEC	2000, 2007
Stonecat	1	0	Rarity	1	Fyke net, seine net (2)	USFWS		NYSDEC	1998
Bigmouth Shiner	1	0	Geographic proximity	1	Electrofishing (2)	USFWS	2015		
Black Redhorse	1	0	Habitat requirements not met when unimpaired	1	Electrofishing, fyke net (2)	USFWS	2013-2015, 2017		
Central (Common) Stoneroller	1	0	Habitat requirements not met when unimpaired	1	Electrofishing	USFWS	2018		

Lake Whitefish	1	0	Rarity	1	Visual observation (2)	USFWS		NYSDEC	2017
Ghost Shiner	1	0		0		ADrake			
Greenside Darter	1	0		0		ADrake			
Bigmouth Buffalo	1	0	Geographic proximity	0		USFWS			
Banded Darter	1	0	Geographic proximity	0		ADrake	N/A		
Bigeye Chub	1	0	Geographic proximity	0		ADrake			
Black Buffalo	1	0	Rarity	0		USFWS	N/A	NYSDEC	N/A
Blackstripe Topminnow	1	0	Geographic proximity; habitat requirements not met when unimpaired	0		ADrake			
Brassy Minnow	1	0	Habitat requirements not met when unimpaired	0		ADrake			
Brook Trout	1	0	Habitat requirements not met when unimpaired	0		ADrake			
Burbot	1	0	Habitat requirements not met when unimpaired	0		USFWS		NYSDEC	
Channel Darter	1	0	Geographic proximity, rarity	0		ADrake			

Chinook Salmon	1	0	Rarity	0		Work Group			
Cisco	1	0	Extirpated	0		Work Group			
Creek Chubsucker	1	0	Geographic proximity, rarity, habitat requirements not met when unimpaired	0		ADrake			
Deepwater Sculpin	1	0	Habitat requirements not met when unimpaired	0		ADrake			
Eastern Sand Darter	1	0	Geographic proximity, rarity, habitat requirements not met when unimpaired	0		ADrake			
Finescale Dace	1	0	Habitat requirements not met when unimpaired	0		ADrake			
Flathead Catfish	1	0	Geographic proximity, rarity	0		ADrake			
Lake Chubsucker	1	0	Geographic proximity, rarity, habitat requirements not met when unimpaired	0		ADrake			
Least Darter	1	0	Geographic proximity,	0		ADrake			

			habitat requirements not met when unimpaired						
Longear Sunfish	1	0	Rarity	0		USFWS		NYSDE C	
Longnose Dace	1	0	Habitat requirements not met when unimpaired	0		USFWS		NYSDE C	
Longnose Sucker	1	0	Rarity	0		USFWS		NYSDE C	
Mooneye	1	0	Rarity	0		USFWS		NYSDE C	
Ninespine Stickleback	1	0	Rarity	0		USFWS		NYSDE C	
Northern Brook Lamprey	1	0	Geographic proximity	0		ADrake			
Northern Madtom	1	0	Geographic proximity, rarity	0		ADrake			
Northern Redbelly Dace	1	0	Habitat requirements not met when unimpaired	0		ADrake			
Orangethroat Darter	1	0	Geographic proximity	0		ADrake			
Pearl Dace	1	0	Habitat requirements not met when unimpaired	0		ADrake			
Pink Salmon	1	0	Rarity	0		Work Group			

Pirate Perch	1	0	Geographic proximity	0		ADrake			
Pugnose Shiner	1	0	Rarity	0		ADrake			
Pugnow Minnow	1	0	Rarity, geographic proximity	0		ADrake			
Redear Sunfish	1	0	Geographic proximity	0		ADrake			
Redfin Shiner	1	0	Geographic proximity, habitat requirements not met when unimpaired	0		ADrake			
Redside Dace	1	0	Habitat requirements not met when unimpaired	0		ADrake			
River Carpsucker	1	0	Geographic proximity	0		ADrake			
River Darter	1	0	Geographic proximity, rarity	0		ADrake			
River Redhorse	1	0	Rarity	0		USFWS		NYSDE C	
Rosyface Shiner	1	0	Rarity	0		USFWS		NYSDE C	
Sauger	1	0	Geographic proximity, rarity	0		ADrake			
Silver Chub	1	0	Rarity	0		ADrake			
Silver Shiner	1	0	Habitat requirements	0		ADrake			

			not met when unimpaired						
Silverjaw Shiner	1	0	Geographic proximity	0		ADrake			
Slimy Sculpin	1	0	Rarity	0		USFWS		NYSDE C	
Southern Redbelly Dace	1	0	Habitat requirements not met when unimpaired	0		ADrake			
Spotted Gar	1	0	Geographic proximity, rarity	0		ADrake			
Spotted Sucker	1	0	Geographic proximity	0		ADrake			
Suckermouth Minnow	1	0	Geographic proximity	0		ADrake			
Threespine Stickleback	1	0	Rarity	0		USFWS		NYSDE C	
Warmouth	1	0	Geographic proximity	0		ADrake			
Western Blacknose Dace	1	0	Habitat requirements not met when unimpaired	0		ADrake			
Western Mosquitofish	1	0	Habitat requirements not met when unimpaired	0		ADrake			
Totals	134	74		76					
Total Lake Erie species pool	134								

Species expected in upper river	74								
Species detected in upper river	76 (but of 74 expected, 70 were observed = 95% compositional similarity)								

Interpretation of Table 2 is as follows. The Lake Erie species pool contains 134 fish species. Of these, 74 are expected to be found in the upper Niagara River. A large number of Lake Erie species are not expected in the upper Niagara River due to factors such as rarity (e.g., they are found infrequently in Lake Erie), geographic proximity (e.g., they are found in parts of the Lake Erie drainage that are geographically separated from the Niagara River), or habitat factors (e.g., in an unimpaired state, these species would be unlikely to exist in the Niagara River due to underlying species habitat requirements). Altogether, 70 species were detected by fisheries sampling programs that were expected to be found (95% compositional similarity). Further, an additional six species (Lake Whitefish, Black Redhorse, River Chub, Stonecat, Bigmouth Buffalo, Central Stoneroller) were detected that were not expected to be found, indicating that some unexpected species are occupying the upper Niagara River sporadically. The missing species (Silver Lamprey, Brindled Madtom, Blackside Darter, Tubenose Goby) likely represent insufficient search effort (Silver Lamprey) or the need for specialized sampling that is difficult to implement in the river (e.g., trawling required for Brindled Madtom, Silver Lamprey, Tubenose Goby, Blackside Darter), rather than fish community impairment.

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APPENDIX 5: LONG-TERM WILDLIFE MONITORING PLAN FOR THE NIAGARA RIVER (ON) AREA OF CONCERN

Wildlife Monitoring Plan for the Niagara River (Ontario) Area of Concern

BIRDS CANADA OISEAUX CANADA

2022
FINAL DRAFT FOR REVIEW

Suggested citation: Bichel, A. 2022. Wildlife Monitoring Plan for the Niagara River (Ontario) Area of Concern. Birds Canada. Pp. 14

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First and foremost, we would like to acknowledge that the Niagara River is the traditional territory of the Mississaugas of the Credit First Nation, Haudenosaunee, Attiwonderonk, Wenrohronon, and Anishinabewaki peoples. This territory is covered by the Niagara Purchase Treaty 381.

Birds Canada understands that Indigenous voices, knowledge, and ongoing work on the land are critical for wild birds to thrive in sustainable ecosystems. We support the needs, aspirations, and rights of Indigenous peoples to care for the land.

The Niagara Peninsula Conservation Authority, responsible for coordinating the Niagara River Remedial Action Plan (NRRAP) with several partners, is committed to including Indigenous perspectives and voices on the decisions and actions aimed at restoring, protecting, and enhancing the Niagara River ecosystem. The NRRAP Council consists of representatives from various key groups involved in improving the Niagara River including the Mississaugas of the Credit First Nation and Métis Nation of Ontario. Additional efforts continue to be made to engage with the Haudenosaunee Confederacy, Six Nations of the Grand River, and other local Indigenous peoples in key decisions through letters, emails, meeting invitations, and broader outreach in the spirit of reconciliation toward shared stewardship of the Niagara River ecosystem.

This report was made possible thanks to funding from Environment and Climate Change Canada with additional support from staff at the Ontario Ministry of the Environment, Conservation and Parks, Niagara Peninsula Conservation Authority, and Niagara Parks Commission as part of the Niagara River Remedial Action Plan (RAP) initiative. The collaborative process in which this report was written, speaks to the commitment that the RAP team has to transparency, relationship building, and long-term results for the Niagara River.

We gratefully acknowledge the involvement of several local volunteers that have provided valuable time to collect data to shape the creation of this monitoring plan. Their passion and commitment to the environment will ensure the Niagara River continues to be cared for into the future.

Table of Contents

Introduction

The Niagara River is a binational connecting waterway that flows 58 km from Lake Erie to Lake Ontario. In addition to being a major tourist destination, it provides drinking water, recreational fishing, employment, and electrical power to millions of people[1]. The river is bordered by urban areas, industrial developments, and agricultural lands, with parkland areas and remnant natural areas being interspersed. For a 15 km stretch downstream from the falls, the river flows through a 100 m deep and 1 km wide gorge. The riverine habitats are quite varied, ranging from large lake-like areas, exposed boulder beds, rapids, falls, whirlpools, and stretches with swift currents. Within the gorge, the cliff rim, cliff face, and talus slope communities support one of the highest concentrations of rare plant species in Ontario.

The Niagara River corridor was the first binational Important Bird and Biodiversity Area (IBA) designated in 1996, recognizing it as one of the world's most important sites for birds, known for its concentrations of gulls and waterfowl[1]. In fact, the Niagara River corridor supports approx. 25% of the global population of Bonaparte's Gulls which depend on the river in the fall and winter months during their migration. Peaks of up to 30,000 have been seen in a day in the last 10 years. Other birds that use the IBA in significant numbers (over 1% of their populations) are Canvasbacks, Greater Scaup, Herring Gulls, and Red-breasted Mergansers. The IBA is known to be rich with diversity as well. For instance, there are 44 species at risk assessed by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), and 109 on the Species at Risk in Ontario list, including vascular plants, birds, amphibians, fish, and insects. In addition to being named an IBA, the American side of the river was designated as a Ramsar Wetland of International Importance in 2019 to acknowledge its contribution to the global natural environment. A local group of Canadian stakeholders are seeking the same designation for the Canadian side of the Niagara River corridor—if successful, it will be there first transboundary Ramsar site in North America.

Despite these tremendous environmental contributions, Canada and the United Sates listed the Niagara River as one of 43 Great Lakes Areas of Concern (AOC) in 1987 due to legacy pollution problems that impaired local beneficial uses. As such, a Remedial Action Plan (RAP) was developed by Canada, Ontario and local partners to restore water quality and ecosystem health of the Niagara River. The RAP is aimed at completing actions to restore the designated beneficial use impairments (BUIs) present on the Canadian side of the AOC. This includes the *Degradation of Fish and Wildlife Populations BUI*, which is an environmental indicator intended to understand the condition of and impacts to the Niagara River's fish and wildlife communities related to historic pollution or habitat conditions due to issues occurring within the geographic scope of the Niagara River AOC. Each BUI has its own specific delisting criteria that guide monitoring and implementation of remedial efforts of RAP partners.[2]

For the Niagara River (ON) AOC, the *Degradation of Fish and Wildlife Populations* BUI is divided into two separate components (i.e., fish populations and wildlife populations). The wildlife portion of the BUI is focused on aquatic wildlife species that spend most (or all) of their lives near water and rely on the Niagara River for breeding and feeding, such as colonial waterbirds, marsh-dependent birds, and amphibians. There are three delisting criteria[2] that need to be met to indicate the BUI is no longer impaired. Two criteria are focused on the extent and potential for population-level effects of contaminants in colonial waterbirds, while a third calls for the completion (and commitment for implementation) of a long-term monitoring plan for marsh birds and amphibians at select sites along the Niagara River. While the monitoring plan is an important component of the Niagara River RAP, it will be implemented by local partners and volunteers beyond the life of Niagara River RAP.

This monitoring plan will be implemented by the Niagara Parks Commission indefinitely through its Environmental Stewardship Plan and Urban Forestry Plan. This monitoring directly contributes to the monitoring and evaluation components of both of these plans and will be reviewed and updated every 5 years to ensure it remains relevant and realistic, and will be reported to the Commission annually. This monitoring will also be critical for measuring success of restored project areas and identifying any concerns at all of the sites so that NPC can implement appropriate mitigation measures. Using these monitoring tools, NPC will hopefully expand this program to other areas of its property.

Objective

The purpose of this plan is to guide future, long-term monitoring efforts implemented by partners and volunteers related to breeding birds and amphibians and their habitats at specific Niagara River locations.

The goals of this monitoring plan are to:

- fulfill the requirements of the Niagara River (ON) Delisting Strategy, specifically criterion 3B-1[a]
- support the vision and actions noted in the Niagara Parks' Environmental Stewardship Plan[3] and Urban Forestry Plan[4]
- guide the implementation of repeatable, annual surveys using established methodology that will help partners monitor species presence/absence over time at select sites along the Niagara River
- create opportunities for local stewardship through the addition of citizen science activities.

Key Considerations & Limitations

In developing the monitoring plan, several key considerations and limitations were identified and addressed:

- There were 20 Marsh Monitoring sites in the Niagara River watershed; however, the geographic scope of the AOC was updated after the 2012 Canada-U.S. Great Lakes Water Quality Agreement placed the emphasis of the Areas of Concern program on the "Waters of the Great Lakes", and thus the Niagara River AOC/RAP only includes the river proper (with the intention that other local, provincial and federal programs will manage environmental matters that are beyond the AOC)[2]
- The Niagara River is a connecting channel with fast flowing waters without the typical marsh-type habitats used for the Marsh Monitoring Program (MMP)
- Only 1 historical MMP site (Gonder's Flats) could be used for long-term data analysis and more sites needed to be selected for monitoring purposes.
- Given the unique conditions of the Niagara River, there are few suitable references sites in other parts of the Great Lakes system for data comparison (that are not also considered AOCs); therefore, this plan is limited to monitoring conditions of Niagara River sites over time
- The IBA survey protocol in this plan assesses only species presence/absence and abundance, not breeding behaviour or how exactly bird species are using the river
- A total of 7 coastal wetland habitat sites in the Upper Niagara River have been constructed by Niagara Parks Commission from 2016-2022 to further support fish and wildlife habitat but they are not yet fully established

[a] Degradation of Wildlife Populations Criterion 3B-1: a monitoring plan is developed and there is a commitment confirmed by local partners for long-term implementation at suitable wetland sites along the upper Niagara River

- These 7 constructed/restored wetlands were primarily intended to capture sediment and seed flowing into the river from local tributaries, reduce erosion, and promote the establishment of new habitat for all aquatic and riparian organisms, including fish and wildlife species.
- No further short-term remedial actions are required to improve these sites as they need time to establish (10+ years)
- Niagara Parks Commission (NPC) was interested in establishing a monitoring plan to support long-term adaptive management of its natural and restored areas as identified in the NPC's Environmental Stewardship Strategy[3] and Urban Forest Management Strategy[4]

Other relevant information

- In 2010, Birds Canada completed a report that assessed AOC wetland quality in the Niagara River watershed (by integrating Monitoring Program data with limnological and aquatic macroinvertebrate data) and long-term volunteer monitoring within the Niagara River AOC[5]. This report included data for 15 sites for amphibians and 7 sites for bird surveys across the watershed with 1 site (Gonder's Flats) located within the Niagara River proper.
- Several Birds Canada Citizen Science projects (e.g., IBA gull census, Christmas Bird Count, Great Backyard Bird Counts, Ontario Breeding Bird Atlas), and other Citizen Science collections (e.g., iNaturalist, and eBird) are managed that support data collection along the Niagara River.

For more detailed information, refer to Niagara River Remedial Action Plan Wildlife Populations BUI: Preliminary and Background Report – Birds and Amphibians in the Niagara River Area of Concern (AOC) by Birds Canada[6].

Marsh Monitoring Program (Tozer, 2020)[7]

The Great Lakes Marsh Monitoring Program (GLMMP) was launched bi-nationally in 1995 by Birds Canada in partnership with Environment and Climate Change Canada and the United States Environmental Protection Agency. In 25 years, more than 1800 Citizen Scientists have volunteered 150,000 hours worth $3 million in-kind to collect information on birds, frogs, and their habitats at 6500 unique survey locations (stations). This impressive effort allows Birds Canada and partners to achieve many important outcomes, including:

1. Assess populations of marsh birds and frogs at scales ranging from individual marshes to the entire Great Lakes basin;
2. Investigate associations between marsh birds and frogs and their habitat;
3. Contribute to conservation management and planning; and
4. Increase public awareness of the importance of wetland conservation.

Monitoring Site Selection & Description

To support consistent data collection and comparison, the use of existing Marsh Monitoring Protocol was preferred; however, there are specific requirements for a location to be considered an MMP site. In 2020, staff from the Niagara Peninsula Conservation Authority (NPCA), NPC, and Birds Canada conducted preliminary monitoring and verification of site suitability along the Upper Niagara River. The preliminary studies noted no amphibians or breeding marsh birds, likely due to the unique conditions of a connecting channel (i.e., fast water flows) which does not provide suitable habitat required for these target species. Constructed/restored coastal wetland sites, while vegetated, did not meet the MMP Protocol site criteria[8].

Because of the lack of suitable MMP sites along the Niagara River, there was a need to identify other potential sites that could be used for long-term monitoring purposes. Through four separate site visits in 2020, it was determined that two sites were appropriate for MMP surveys, and four additional sites were appropriate for bird monitoring (**Fig. 1**). These four sites did not meet the requirements for MMP surveys due to a lack of emergent vegetation, small size, and fast-moving and deep water (not consistent with the definition of a marsh). Therefore, the monitoring plan proposes different monitoring surveys at each location (**Table 1**).

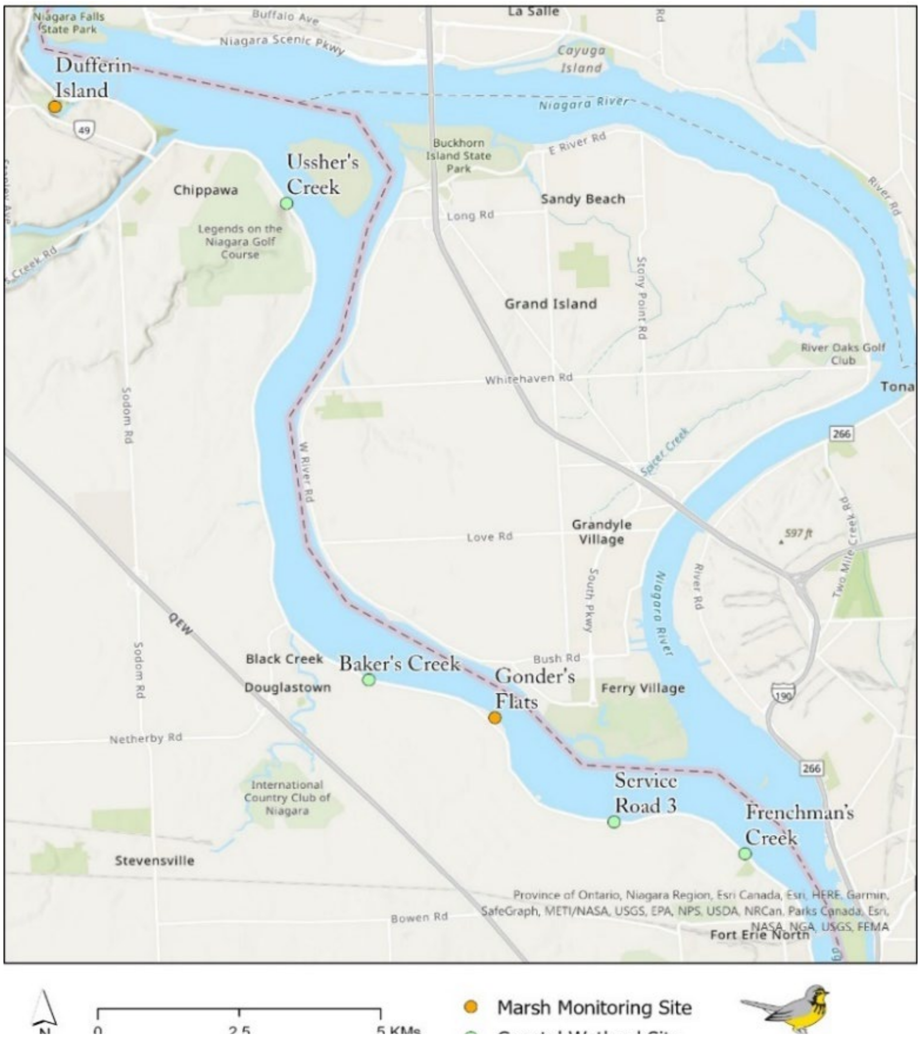

Figure 1: Overview map of survey sites to be used for the Wildlife Monitoring Plan for the Niagara River (Ontario) AOC.

Table 1: Detailed information about all survey sites for the Wildlife Populations Monitoring Plan, including overview of survey type.

Site name	Description	Survey type	Coordinates (UTM)	Approx. size (ha)
Dufferin Islands	• Newly established MMP site, surveyed for 1 year for both amphibians and frogs. • Consists of only cattails for emergent vegetation, along with trees, shrubs, and some open water. • While site is not on the river, it has influence from Niagara River water • eBird records show at least 150 species of birds have been observed at that site (only 69 potentially breed in the area).	MMP IBA habitat	43.06826 -79.07244	8
Gonder's Flats	• Only existing Marsh Monitoring Program site along the current AOC boundaries. • Coastal wetland consists of emergent vegetation including cattails, constructed/ restored in 2018/19 • Area south of the river shoreline has degraded wetland features to be restored/enhanced in 2022 • Presence of invasive *Phragmites* and some trees and shrubs • Site surveyed through MMP for 12 years (amphibians) and 1 year (birds) • 3 amphibian species and 30 bird species recorded with MMP, eBird records show 66 species of birds observed	MMP IBA habitat	42.965944 -78.980334	1
Ussher's Creek	• Constructed/Restored coastal wetland (2018/19) • Site contains boulders & anchored trees • Emergent vegetation beginning to establish as of 2021	IBA, habitat	43.052201 -79.023206	0.35
Baker's Creek	• Constructed/Restored coastal wetland (2021) • Site contains boulders & anchored trees • Some vegetation present as of 2021	IBA, habitat	42.973045 -79.008367	0.36
Service Road 3	• Emergent vegetation naturally present, primarily consisting of bullrushes (2021) • Enhanced coastal wetland downstream of the natural wetland area (2022)	IBA, habitat	42.94828 -78.95505	0.12
Frenchman's Creek	• Constructed/Restored coastal wetland (2021) • Site contains boulders and anchored trees, no aquatic vegetation present as of 2021	IBA, habitat	42.942883 -78.927453	0.2

Marsh Monitoring Program Surveys: Dufferin Islands & Gonder's Flats

Due to their site characteristics, Dufferin Islands and Gonder's Flats (**Fig. 2**) were identified as ideal locations for MMP surveys. The MMP includes specific, consistent surveying protocols that need to be followed by data collectors. This document is meant for guidance and only highlights key information; it does not provide enough detail to carry out Marsh Monitoring Protocol surveys. For more details on conducting the surveys, please refer to the MMP Protocols for Amphibians[9] and/or Marsh Birds[10].

Habitat surveys are an important part of the MMP Protocol and are pivotal to making connections between the birds and amphibians that use the marsh, a major goal of the program. As part of the MMP protocol, a habitat survey will be completed once per year by the person conducting marsh bird survey using the MMP form and submitted to Birds Canada.

Figure 2. Aerial views of Dufferin Islands (left) and Gonder's Flats MMP sites with 100 m monitoring sample area shown (yellow dotted lined).

Summary of the monitoring requirements for amphibian, marsh bird, and habitat surveys to be conducted annually at the MMP sites

Amphibian Survey	
Annual timing	Spring and early summer
Frequency	3 times per year, surveys at least 15 days apart
Daily timing	Begin survey 30 min after sunset and end before midnight Timing of survey same for all survey days (morning or evening) Day chosen based on a minimum temperature and low wind
What to expect	• Fill out route and weather information • 3-minute listening period and recording frogs heard • After the survey, results summarized on form • Data submitted to Birds Canada after all 3 site visits
Additional info	Survey can be done by beginners willing to learn the calls of around up to 13 frogs (depending on where you live).
Marsh Bird Survey	
Annual timing	Between May 20 and July 5
Frequency	2 times per year, surveys at least 10 days apart
Daily timing	Begin survey 30 min before sunrise and end before 10 am <u>OR</u> in the evening, no earlier than 4 hours before sunset ending before dark Timing of survey same for both survey days (morning or evening) Day chosen should have fair weather (good visibility, warm temperatures, low wind and no precipitation)
What to expect	• Fill out route and weather information • 15-minute survey: (5 min silent observation, 5 min call playback of five focal species, 5 min silent observation) • After the survey, results summarized on form • Data submitted to Birds Canada after both survey days completed.
Additional info	• Require more experience and training than amphibian surveys but expert birder not necessary • Volunteers should be able to confidently identify 50 birds by sight/sound
Habitat Survey (as part of MMP)	
Annual timing	May (amphibians); July (marsh birds)
Frequency	At least 1 time per year
Daily timing	Should be done at the same time as the first bird survey
What to expect	• Requires 10 min per site maximum • Fill out site information (within a semi circle of survey area) • Record emergent vegetation observed, weather conditions, etc. • Data submitted to Birds Canada with amphibian/marsh bird surveys
Additional details	• More info about the habitat assessment on the MMP Habitat description form and the MMP Getting Started Guide[8] • Refer to the Marsh Habitat and Vegetation Guide[11] for info on emergent vegetation if needed

Important Bird and Biodiversity Area Protocol Surveys (all sites)

Since 2016, there have been significant efforts to construct/restore 7 coastal wetlands in the Upper Niagara River. These sites were specifically designed to improve fish habitat, not marsh birds or amphibians; but they can also provide important habitat to birds and other wildlife as they become established. While these locations do not meet MMP site criteria due to their current lack of emergent vegetation, small size, and fast flowing waters, there were four additional locations (Usshers's Creek, Bakers Creek, Service Road 3, and Frenchman's Creek) that were noted[3] as ideal candidates for bird monitoring using the IBA Protocol[12] on eBird Canada. No amphibian surveys will be done at the restored coastal wetland sites as they do not have appropriate habitat and therefore not an effective use of volunteer or staff time.

The IBA survey provided in the chart below is simple, adapted to be consistent with MMP where appropriate, supports the use of digital tools, and can easily be conducted at all sites in one day. All eBird checklists submitted using the IBA Canada Protocol can be reliably combined later (since this is a coordinated survey); therefore, it is recommended that multiple people go to different locations at the same time to reduce the risk of double counting birds that have moved along the river and spreading the workload between volunteers/staff members.

Each location listed in Table 1 should be monitored using this survey protocol to maintain consistent datasets consistent for all sites.

Long-term "non-MMP" Habitat Monitoring

While this plan is specifically focused on monitoring amphibians and marsh birds for the purpose of the wildlife component of the Niagara River RAP's *Degradation of Fish and Wildlife Populations* BUI, there is an important linkage to habitat. Monitoring habitat is important to Niagara Parks as it will help inform potential adaptive management actions to proactively to address the presence of invasive species and/or lack of established vegetation. The non-MMP monitoring is also to track and communicate progress on the establishment of the constructed/restored coastal wetlands sites over time, beyond the life of the Niagara River RAP. If sites develop into suitable marsh habitat, they could be incorporated into the MMP protocol.

Habitat surveys are an important part of the MMP protocol which is not suitable for application to the restored coastal wetland sites. Furthermore, preliminary monitoring in 2021 showed that the MMP protocol, to be conducted in May or July, did not capture some of the emergent vegetation present at these constructed/restored sites later in the summer. Therefore, it is recommended that additional habitat surveys be conducted (using a tailored version of other habitat surveys) at all sites annually at the beginning to mid-September.

The NPCA and NPC will work collaboratively to develop a digital application that will enable the collection and analysis of data.

The purpose of the non-MMP habitat monitoring is to observe the change or establishment of aquatic/emergent vegetation species and densities over time as all sites establish with the goal of eventually supporting fish and wildlife species. As sites become established, they may become suitable as MMP program sites. In 2032, using the MMP Protocol, the NPC should conduct a re-assessment of sites to determine if they fit the context of the MMP program.

Note: only the habitat data conducted Dufferin Islands and Gonder's Flats as part of the MMP protocol (previous sections) need to be submitted to Birds Canada.

Summary of the monitoring requirements for amphibian, marsh bird, and habitat surveys to be conducted annually at the non-MMP sites:

IBA Survey for all sites	
Annual timing	Between May 20 and July 5
Frequency	2 times per year, surveys at least 10 days apart
Daily timing	• Begin survey 30 min before sunrise and end before 10 am OR in the evening, no earlier than 4 hours before sunset ending before dark • Timing of survey same for both survey days (morning or evening) • Day chosen should have fair weather (good visibility, min. 16°C, low wind and no precipitation)
What to expect	• Watch and listen for 15 min at each site • Using eBird checklist, record all bird species seen or heard during time • When checklist completed, choose IBA Canada (protocol) for the 'Observation Type' dropdown and submit
Additional info	• Requires binoculars, a timer, and smartphone with eBird installed (but pen/paper checklist is sufficient) • Volunteers should confidently identify 50 birds by sight/sound • For sites where MMP is also being done, 2 people should be present to conduct the surveys simultaneously • Steps are slightly different whether you are using the app or computer. Refer to the IBA Canada Protocol for more details[12].
Non-MMP Sites Habitat Monitoring	
Annual timing	Annually
Frequency	1 time beginning to mid-September
What to expect	• Complete 1 non-MMP habitat survey per site • 1 photo to be taken per site at identified GPS location • Upload survey information upon completion
Additional info	Survey can be completed by individuals with beginner level plant identification using the suggested aquatic plant identification pdf[11]

Roles and Responsibilities for Implementation

The development of this monitoring plan was a collaborative effort between Niagara River RAP partners (Birds Canada, NPCA, and Niagara Parks). Implementation of this plan will be the responsibility of these three organizations, but with specific roles and responsibilities, as outlined below. Additional organizations with an interest may participate in the future. If so, this section of the monitoring plan should be updated accordingly.

Volunteer coordination

One volunteer who is comfortable with birds and amphibians, or two volunteers each comfortable with either, are needed for MMP surveys. As of 2021, volunteers are assigned to the two MMP sites and NPCA staff (RAP Assistant) have conducted habitat surveys. The three organizations will support volunteer coordination as follows:

- Niagara Parks will recruit and coordinate volunteers and/or staff to carry out MMP, IBA, and non-MMP habitat surveys.

- NPCA will support the recruitment and coordination of volunteers and/or staff to carry out MMP, IBA, and non-MMP habitat surveys—as needed.
- Birds Canada suggest volunteer contacts for assisting in survey work, as needed.
- Birds Canada will supply informational resources (vegetation guides, forms, printed handbooks) to those carrying out the MMP or IBA surveys, as needed.

Data analysis

Data analysis for MMP and IBA surveys should be conducted toward the end of each year, after data (MMP and eBird) is entered in to the Birds Canada data 'warehouse' called NatureCounts (occurs 1-2 times per year). The results should be analysed separately (on a site-by-site basis) and as a whole (the river). The three organizations will support data analysis as follows:

- Birds Canada staff will guide NPC and NPCA staff on how to organize, analyze, compare and share data in the first year of monitoring (2022)
- Once data are available each year, Birds Canada will query NatureCounts to collect relevant MMP and IBA Protocol survey data for all sites and send to Niagara Parks and NPCA
- Niagara Parks will review and analyse MMP and IBA data (presence/absence species, abundance, composition), annually
- NPCA will support the review and analysis of MMP, IBA, as needed.
- NPC and NPCA will work collaboratively to develop a digital application that will enable the collection and analysis of non-MMP habitat data to track trends in establishment of vegetation and help inform adaptive management needs (e.g., invasive species control)

In addition, volunteers or staff conducting surveys will:

- Submit their MMP data (including annual habitat survey) to Birds Canada upon completion of surveys.
- Submit their IBA data using eBird checklists, either using the app in the field (on a smartphone) or the website later
- Submit their "non-MMP" habitat assessment data (for all sites) as per the preferred Niagara Parks/NPCA method, to be determined.

Tracking and Reporting Progress

Tracking and reporting findings from the data analysis is important for adaptive management to be conducted by Niagara Parks staff. Using a proactive approach to identifying potential threats (invasive species) or species-at-risk can help natural resource managers take early corrective or protective actions to best manage the site.

- NPC to develop appropriate key performance indicators aligned with the Environmental Stewardship Plan[3]
- NPC will share relevant progress and results related to monitoring through existing processes and communication methods.

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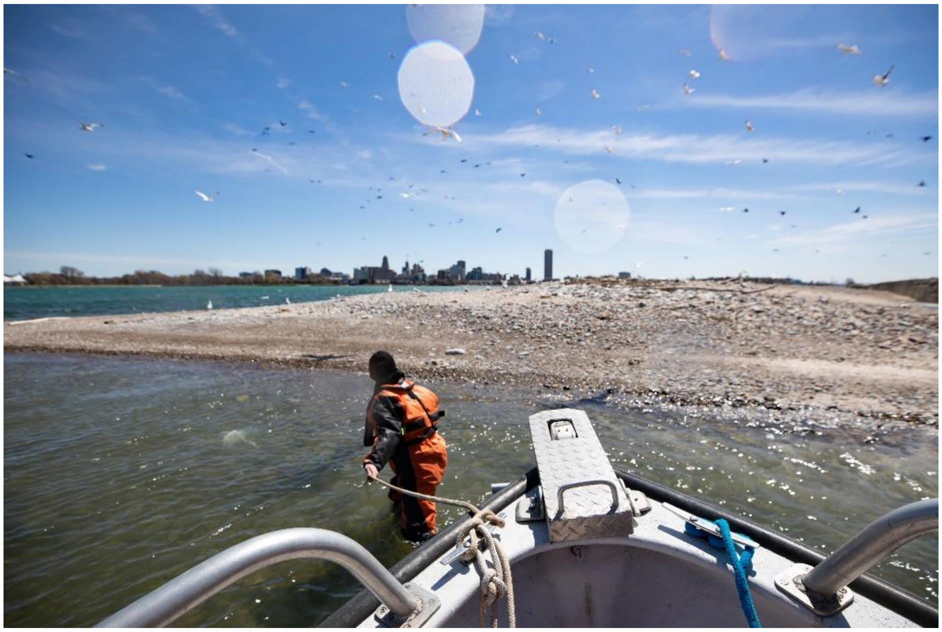
APPENDIX 6: COLONIAL WATERBIRD POPULATIONS AND CURRENT TRENDS REPORT 2020

Degradation of Fish and Wildlife Populations in the Niagara River (Ontario) AOC - Colonial Waterbird Populations and Current Trends



Environment and Climate Change Canada – Ecotoxicology & Wildlife Health Division

K.D. Hughes, D. Crump, K. Williams, S.R. de Solla & P.A. Martin

Updated November 2020

Environment and Climate Change Canada / Environnement et Changement climatique Canada

Photo credit (boat): Scott Gable

Suggested citation: Hughes, K.D., D. Crump, K. Williams, S.R. de Solla, and P.A. Martin. 2020. *Degradation of fish and wildlife populations in the Niagara River (Ontario) AOC – colonial waterbird populations and current trends.* Environment and Climate Change Canada – Ecotoxicology and Wildlife Health Division report. November 2020. 21 pp.

TABLE OF CONTENTS

PURPOSE

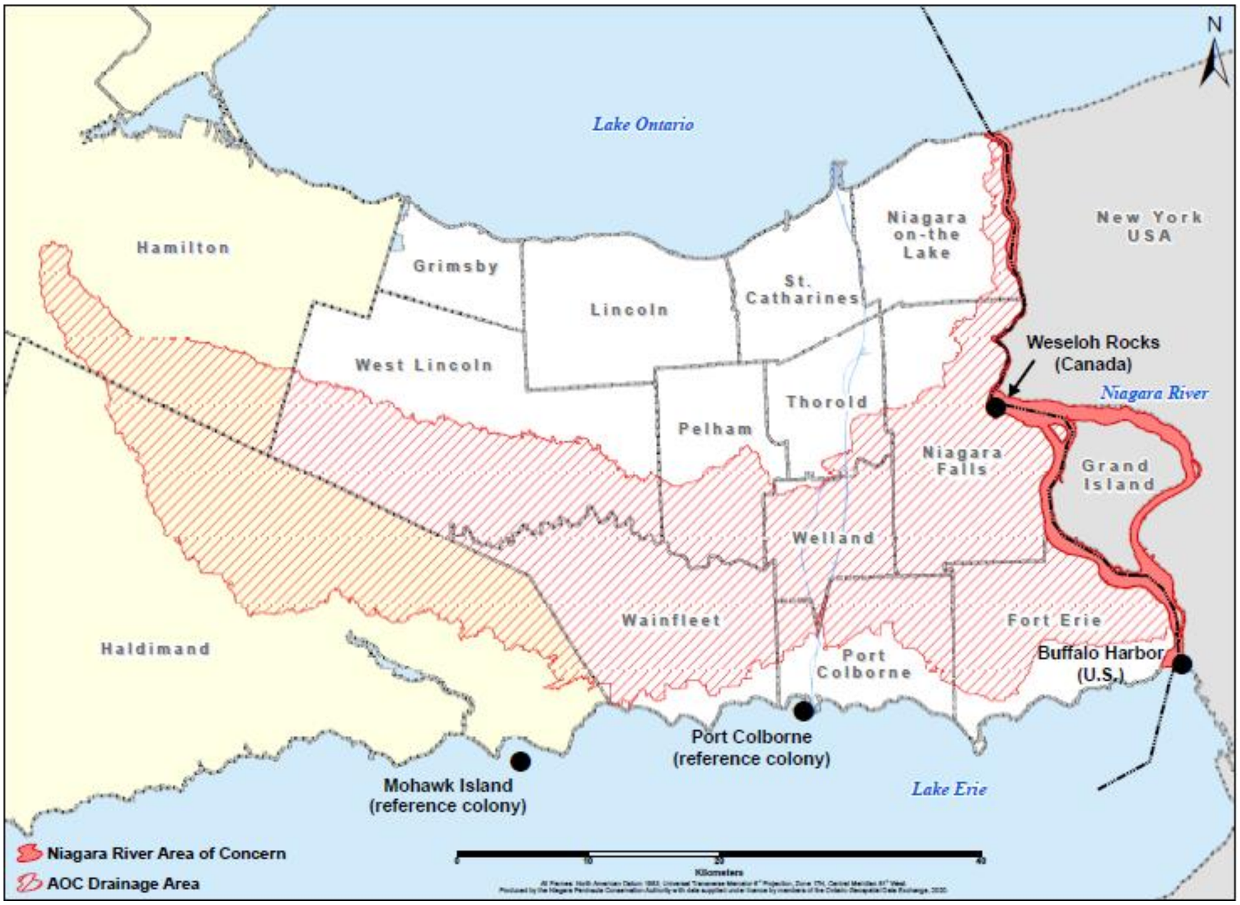
This summary provides updated trends for the assessment of colonial waterbird populations in the Niagara River (Ontario) Area of Concern (AOC). Two colonial waterbird species that breed and forage within the Niagara River AOC were selected for assessment purposes. The Herring Gull (*Larus argentatus*) is a long-lived, primarily fish-eating colonial waterbird that, from the time it reaches breeding age, is a year-round resident in the Great Lakes basin. The Herring Gull has been used as an avian sentinel species in the Great Lakes for decades. A second aquatic-feeding colonial waterbird species, the Double-crested Cormorant (*Phalacrocorax auritus*), was also selected for assessment. This species feeds almost exclusively on fish compared to Herring Gulls that are opportunistic feeders and will consume terrestrial prey if fish are not readily available. This close connection to the aquatic environment is vital for assessment of local conditions in the AOC.

Delisting criteria for the *Degradation of Fish and Wildlife Populations* Beneficial Use Impairment (BUI 3) were updated by the Niagara River Remedial Action Plan (RAP) team in 2020 as part of their Delisting Strategy (Green et al., in prep). For the Niagara River (Ontario) AOC, the wildlife portion of this BUI will no longer be considered impaired when:

> **Criterion 1.** a monitoring plan is developed and there is a commitment confirmed by local partners for long-term implementation at suitable wetland sites along the upper Niagara River;
>
> **Criterion 2.** breeding colonial waterbird populations within the Niagara River AOC are the same as (or better than) suitable reference sites;
>
> **Criterion 3a.** temporal trends in contaminant concentrations in eggs, tissues, or whole-body burden of sentinel species in the Niagara River AOC are stable or declining; <u>AND</u>
>
> **Criterion 3b.** spatial comparisons show that contaminant concentrations in eggs, tissues, or whole-body burden of sentinel species in the Niagara River AOC are the same as (or better than) other suitable reference sites; <u>OR</u>
>
> **Criterion 3c.** if the contaminant concentrations in 3a or 3b are not met, then they must not exceed established thresholds associated with potential population-level effects (i.e., reproductive impacts).

This colonial waterbird study was conducted to assess delisting criteria #2 and 3 and not criterion 1 which will be assessed separately by the RAP team. With respect to criterion #2, one approach for assessing the health of breeding colonial waterbird populations is through artificial incubation of eggs under controlled conditions in the laboratory. This method is valuable for assessing the importance of intrinsic factors such as contaminants that may induce embryonic mortality at this critical developmental stage and thereby impact bird populations. This was examined in the current study using cormorant eggs. Population trends of nesting colonial waterbirds in the AOC were also assessed previously based on nest count surveys conducted until 2017 on the Canadian side of the Niagara River (Hughes *et al.* 2014, 2017). Since then, no surveys have been conducted and therefore no additional nest count data are available to supplement those trends.

Figure 1. Map of the Niagara River Area of Concern and its watershed. Nesting locations of colonial waterbirds are shown at Weseloh Rocks where annual collections of Herring Gull eggs were conducted from 1979 to 2015 and Buffalo Harbor where collections of colonial waterbird eggs were conducted in 2018 and 2019 for the current study. Nesting locations at Mohawk Island and Port Colborne in the eastern basin of Lake Erie used as reference sites in this study are also shown (map credit: T. Gaade, Niagara Peninsula Conservation Authority).



For delisting criteria #3a and 3b, annual assessments of contaminants in eggs of Herring Gulls nesting on the Canadian side of the Niagara River have been conducted at Weseloh Rocks since 1979 (Figure 1; note criterion #3c only applies should criteria #3a and 3b fail). This site comprises several small islands and rocks and is one of a few Canadian nesting sites situated at the top of Niagara Falls. However due to high water levels on the Niagara River and elsewhere on the Great Lakes, it has not been possible to access this site and collect gull eggs for contaminant analysis since 2015. High water levels at this site have also reduced nesting habitat available for Herring Gulls (as ground-nesters) compared to earlier years. In order to assess the current status of wildlife populations BUI 3 for colonial waterbirds, an alternate site was selected on the Niagara River. This site is situated approximately 25 kilometres upstream at the North Breakwall outside of Buffalo Harbor (Figure 1). Nesting colonies of both Herring Gulls and Double-crested Cormorants are established at this site and cormorant eggs are laid in ground nests (vs trees) making them easily accessible for collection. While this site is within the Niagara River AOC boundary in the state of New York in the United States, these results will be used to assess the status of BUI 3 in the Niagara River AOC in Ontario. The North Breakwall site is approximately 1.2 kilometres from the entrance lighthouse that marks the boundary of another Great Lakes AOC (Buffalo River). The daily foraging ranges of nesting gulls and cormorants at the North Breakwall site would include areas where prey (fish) is abundant particularly in the Upper Niagara River and downstream; hence contaminant burdens acquired are likely reflective of environmental conditions within this binational AOC. It is possible that these birds may spend some time foraging beyond the Niagara River and outside of the AOC including at Buffalo Harbor and Lake Erie.

Gull and cormorant eggs were collected from the Buffalo Harbor site in the Niagara River AOC and appropriate reference sites in eastern Lake Erie in 2018 and 2019. There were two components to this BUI 3 colonial waterbird populations assessment: 1) artificial incubation of cormorant eggs to assess embryonic viability and deformity frequencies in the laboratory and 2) contaminant analysis of gull and cormorant eggs to examine spatial trends in the AOC, assess burdens against thresholds associated with population-level effects, and update temporal trends last measured in eggs from the AOC at Weseloh Rocks in 2015. The results of this study will be examined against delisting criteria #2 and 3 to assess the current status of this BUI using these sentinel species.

METHODS

For the artificial incubation component of this study, Double-crested Cormorant eggs were collected from the North Breakwall site (42.8843°, -78.9009°) - hereafter referred to as "Buffalo Harbor" - in 2018 and 2019 (Figure 1). Mohawk Island (42.8338°, -79.5228°), situated in the eastern basin of Lake Erie, was selected as the reference site for this component of the study (Figure 1). For analysis of contaminants, eggs of both cormorants and gulls were collected from Buffalo Harbor in the two years. Port Colborne (42.8683°, -79.2568°) is also in the eastern basin of Lake Erie and this nesting site has been monitored annually for contaminants in Herring Gulls since 1974 (Figure 1). Thus, Port Colborne was selected as the reference site for the contaminant burden component of this study and is where Herring Gull and cormorant eggs were collected in the two study years. Herring Gull eggs were also collected from Mohawk Island in 2018 for contaminant analysis and these data are provided for comparison.

Artificial Incubation of Double-crested Cormorant Eggs:

In early May of 2018 and 2019, unincubated cormorant eggs were collected in the field from nests containing a single egg, transported to the National Wildlife Research Centre (NWRC) in Ottawa in insulated coolers with foam inserts, and set in a Petersime incubator (model# MX-1) at 37°C, 58% humidity and turned every two hours. Numbers of eggs collected for artificial incubation from each site ranged from 13–30 in the two study years. Just prior to the pipping stage of development (i.e., embryonic day 26–27), embryos were removed from their shells and euthanized by decapitation. Each embryo was examined for physical deformities. Embryonic viability was determined as the number of viable embryos that survived to the designated embryonic day (i.e., just prior to pipping) divided by the total number of fertile eggs. Eggs that were nonviable were staged if possible (e.g., infertile; early, mid or late embryo death). Individual embryos were weighed and head-bill length, tarsus length, and liver mass were determined. As an index of contaminant exposure, a liver somatic index was calculated as liver mass divided by embryo mass. Body condition was estimated using residuals calculated from a linear regression of embryo mass on tarsus length in each of the two study years.

Contaminant Analyses:

For contaminant analysis, single Herring Gull and cormorant eggs were collected from 13 nests containing $\geq$ 3 eggs at each colony in the two years. After collection, the eggs were sent to NWRC where contents were placed in chemically-cleaned glass jars, homogenized, and frozen until chemical analysis. Eggs from each colony were pooled together as a single sample for chemical analysis in each study year.

Chemical analyses of eggs for organochlorine compounds and polybrominated diphenyl ethers (PBDEs) were conducted at NWRC. Prior to chemical analysis, thawed eggs were homogenized, lipids were removed, and chemicals of interest in the extracts were separated from remaining lipids and biogenic compounds by gel permeation chromatography. Purified sample extracts were then analyzed for organochlorine compounds and flame retardants (including PBDEs) using the capillary gas chromatograph coupled with a mass selective detector (GC-MSD). Organochlorine compounds measured included *p,p'*-DDE (dichlorodiphenyldichloroethylene), oxychlordane, *cis*-chlordane, *trans*-chlordane, *cis*-nonachlor, *trans*-nonachlor, hexachlorobenzene (HCB), dieldrin, heptachlor epoxide (HE), mirex, octachlorostyrene (OCS), and polychlorinated biphenyls (PCBs). Sum chlordane is based on the sum concentration of oxychlordane, *cis*-chlordane, *trans*-chlordane, *cis*-nonachlor, and *trans*-nonachlor. Sum PCBs are based on the sum concentration of 35 individual or co-eluting PCB congeners found above the limit of detection. Similarly, sum PBDEs are based on the sum concentration of 15 individual or co-eluting PBDE congeners found above the limit of detection. Certified internal standards were used for quantification and certified reference materials, blanks and duplicate samples were analyzed for quality assurance purposes. Concentrations of organochlorines and PBDEs are reported in µg/g on a wet weight basis. Method detection limits for organochlorine compounds and individual PBDE congeners ranged from 0.00001–0.004 µg/g.

Herring Gull eggs were analyzed in 2018 for non-*ortho s*ubstituted PCBs, polychlorinated dibenzo-*p*-dioxins, including 2,3,7,8-tetrachlorodibenzo-*p*-dioxin (TCDD), and polychlorinated dibenzofurans using gas chromatography high resolution mass spectrometry (GC/HRMS) at ALS Life Sciences in Burlington, Ontario. Reference materials, blanks, and duplicates were analyzed for quality assurance purposes.

Total mercury was quantified on a DMA-80 (Direct Mercury Analyzer) at NWRC on a dry weight basis and is reported in µg/g. Method detection limits ranged from 0.001–0.003 µg/g. Certified reference materials and duplicate samples were also analyzed to ensure correct calibration, accuracy, and reproducibility of test methods. Mercury concentrations are also reported on a wet weight basis using percent moisture content.

Stable Isotopes:

Stable isotope analyses of samples were conducted at the Ján Veizer Stable Isotope Laboratory at the University of Ottawa in Ontario. Following lipid-extraction, samples were weighed into tin capsules and loaded into an elemental analyser. The sample was flash combusted at ~1800^{o}C (Dumas combustion) and the resultant gas products were carried by helium through columns of oxidizing/reducing chemicals optimised for CO_2 and N_2. The gases were separated by a purge and trap adsorption column and sent to the Delta Advantage isotope ratio mass spectrometer coupled with Conflo IV. Samples were normalized to internal standards and calibrated to international standards. Stable isotope ratios are expressed in δ notation as the deviation from standards in parts per thousand (‰) according to the following relationship:

$$\delta X = (R_{sample} - R_{standard})/R_{standard} \times 1000$$

where X is ^{15}N or ^{13}C and R is the corresponding ratio $^{15}N/^{14}N$ or $^{13}C/^{12}C$. In this study, $\delta^{15}N$ signatures were compared to infer relative (and not absolute) trophic position at colonies.

Statistical Analysis:

Contaminants and biological endpoints were statistically analyzed using a Student's *t*-test for between colony comparisons. Data were log-transformed (log_{10}) to meet conditions of equal variance and normality for parametric analysis. If data failed these assumptions, comparisons were made using a Mann-Whitney U non-parametric test. Mercury concentrations in samples were statistically analyzed on a dry weight basis; however, concentrations are reported on a wet weight basis for comparison to a published protective level threshold. A Fisher exact test was used to test for a significant difference in embryonic viability and deformity frequencies between colonies combined for the two study years. All results were considered significant at $p<0.05$. Concentrations of 2,3,7,8-TCDD toxic equivalents (TEQs) were calculated for dioxin-like PCBs, furans, and dioxins and are based upon toxic equivalency factors developed by van den Berg *et al.* (1998) for birds. Dioxin-like PCBs include four non-*ortho* PCB congeners (77, 81, 126, and 169) and seven individual or co-eluting mono-*ortho* PCB congeners (105, 114, 118, 123, 156/157, 167, and 189). Total TEQ concentration is based on the sum concentration of TEQs calculated for the 4 non-*ortho* PCBs, 7 mono-*ortho* PCBs, and 17 dioxin and furan congeners.

RESULTS

A) Artificial Egg Incubation Study

Embryonic Viability and Deformities:

Embryonic viability was equal to 81% and 90% in Double-crested Cormorants from the Niagara River AOC colony at Buffalo Harbor in 2018 and 2019, respectively (Table 1). Embryonic viability was slightly lower overall in cormorants from the Lake Erie reference colony at Mohawk Island and equal to 85% in 2018 and 76% in 2019. Of 55 fertile eggs examined at Buffalo Harbor, five died in 2018 (embryonic day 23–27; i.e., late-stage deaths) and three died in 2019 (embryonic day 10 [1 embryo] and embryonic day 25 [2 embryos]). Of 30 fertile eggs examined at Mohawk Island, two died in 2018 (developmental stage not determined) and four died in 2019 (embryonic day 4–6 [2 embryos] and embryonic day 8–10 [2 embryos]. Deformed embryos were found in a single egg in each year at Buffalo Harbor (one with an exposed abdomen and one with gastroschisis) resulting in an overall incidence of embryonic deformities of 4% at the AOC colony (2 deformed embryos/55 fertile embryos). Embryonic deformities were not observed in incubated eggs from the reference colony (0 deformed embryos/30 fertile embryos). For both years combined, there was no significant difference in embryonic viability between the AOC colony

Table 1. Embryonic viability and incidence of embryonic deformities in artificially incubated Double-crested Cormorant eggs collected from the Niagara River AOC colony (Buffalo Harbor) and the reference colony in eastern Lake Erie (Mohawk Island) in 2018 and 2019.

Colony	AOC/ Ref	Year	Total No. Eggs	No. Infertile Eggs	No. Fertile Eggs	No. Viable Eggs	No. Dead Eggs	Embryonic Viability (%)	No. Deformities	Deformities (%)
Buffalo Harbor	AOC	2018	27	1	26	21	5	81%	1	4%
	AOC	2019	30	1	29	26	3	90%	1	3%
Overall	**AOC**		**57**	**2**	**55**	**47**	**8**	**85%**	**2**	**4%**
Mohawk I.	REF	2018	13	0	13	11	2	85%	0	0%
	REF	2019	21	4	17	13	4	76%	0	0%
Overall	**REF**		**34**	**4**	**30**	**24**	**6**	**80%**	**0**	**0%**

and the reference colony. Similarly, there was no significant difference in deformity frequencies of embryos between the two study colonies.

Liver Somatic Index and Body Condition of Embryos:

The liver somatic index was significantly higher in cormorant embryos from the reference colony at Mohawk Island compared to the Buffalo Harbor AOC colony in 2018 (Mann Whitney U=21.0, p=0.02; Figure 2a). There was no significant difference for this metric between the two study colonies in 2019. Body condition of embryos, estimated using body mass and tarsus length, was not significantly different between embryos from the two colonies in both study years (Figure 2b).

B) Contaminants in Eggs

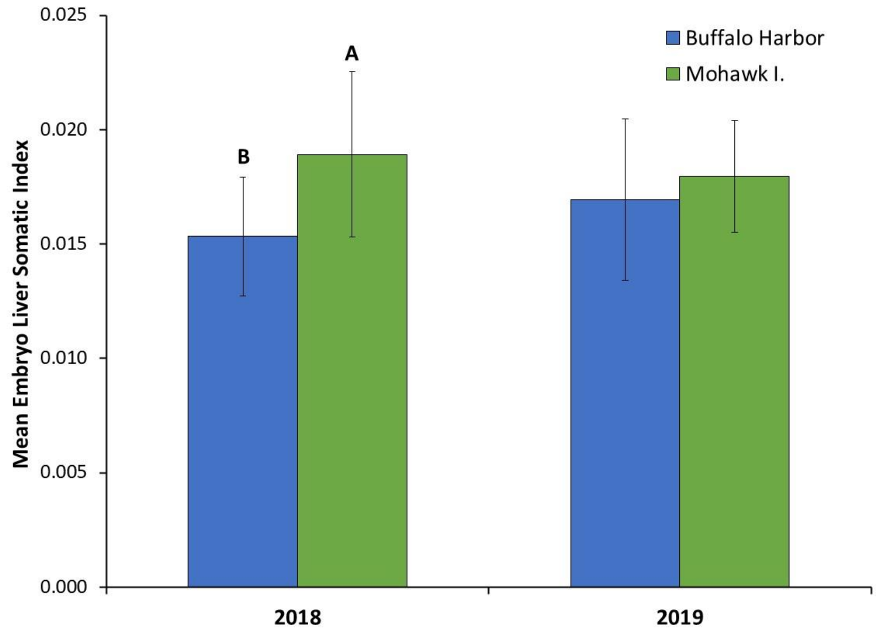
Spatial Trends:

Overall, there were no significant differences in mean concentrations of sum PCBs, other organochlorines, and sum PBDEs in Herring Gull eggs collected from the AOC colony in Buffalo Harbor and the upstream reference colony at Port Colborne in 2018 and 2019 (Table 2; based on analysis of single pooled samples in each year). Herring Gull eggs from Mohawk Island were not included in this comparison since data for 2018 only are available; however, concentrations at this colony were very similar to those at the other two gull colonies. Contaminant burdens were also largely comparable between cormorant eggs from Buffalo Harbor in the two study years and those from Port Colborne in 2019 (for which no statistical comparisons were conducted). Of all organochlorine compounds, sum PCBs were found at the highest concentrations in eggs with concentrations ranging from 1.35 µg/g in cormorant eggs from Buffalo Harbor in 2019 to 3.38 µg/g in gull eggs from Port Colborne in 2018. Concentrations of *p,p'*-DDE in all eggs were below 1 µg/g followed by sum PBDEs that were below 0.4 µg/g. Concentrations of remaining organochlorines were below 0.05 µg/g in all eggs. Percent lipid content was not significantly different between the two colonies in 2018 and 2019 with means in Herring Gull eggs of 7.6% and 6.8% at Buffalo Harbor and Port Colborne, respectively; percent lipid content was equal to 8.2% in gull eggs from Mohawk Island (2018). In cormorants, percent lipid content was relatively lower and equal to 4.1% in eggs from Buffalo Harbor (mean, 2018 and 2019) and 4.4% in eggs from Port Colborne. While contaminant burdens appeared to be higher in gulls compared to cormorants, this is related to differences in lipid content in eggs between the two species. Concentrations of these lipophilic compounds were much more similar between the two species when expressed on a lipid weight basis (data not shown).

In 2018, concentrations of non-*ortho* PCBs and 2,3,7,8-TCDD were not notably elevated in Herring Gull eggs from Buffalo Harbor compared to Port Colborne and Mohawk Island and frequently were within the range of burdens found at the two reference colonies (Table 3). Similarly, TEQs calculated for non-*ortho* PCBs and mono-*ortho* PCBs in eggs from Buffalo Harbor were within the range of concentrations at the two reference colonies or, in the case of TEQs for dioxins and furans, were lower compared to the reference colonies. Toxicity associated with non-*ortho* PCBs contributed approximately 82% to total TEQ concentrations while toxicity associated with dioxins and furans and mono-*ortho* PCBs were more similar (7–10% range). Cormorant eggs from Buffalo Harbor had the highest concentrations of PCB-77, PCB-81, and TEQs for dioxins and furans reported in 2018. In general, TEQ concentrations for dioxin-like

Figure 2. Liver somatic index (a) and body condition (b) in Double-crested Cormorant embryos in artificially incubated eggs collected from the Niagara River AOC colony (Buffalo Harbor) and the reference colony in eastern Lake Erie (Mohawk Island) in 2018 and 2019. Mean values (SD) are based on 6–23 individual embryos at each colony. Different uppercase letters indicate a significant difference in the mean estimate within a study year.

a) Liver somatic index



b) Body condition

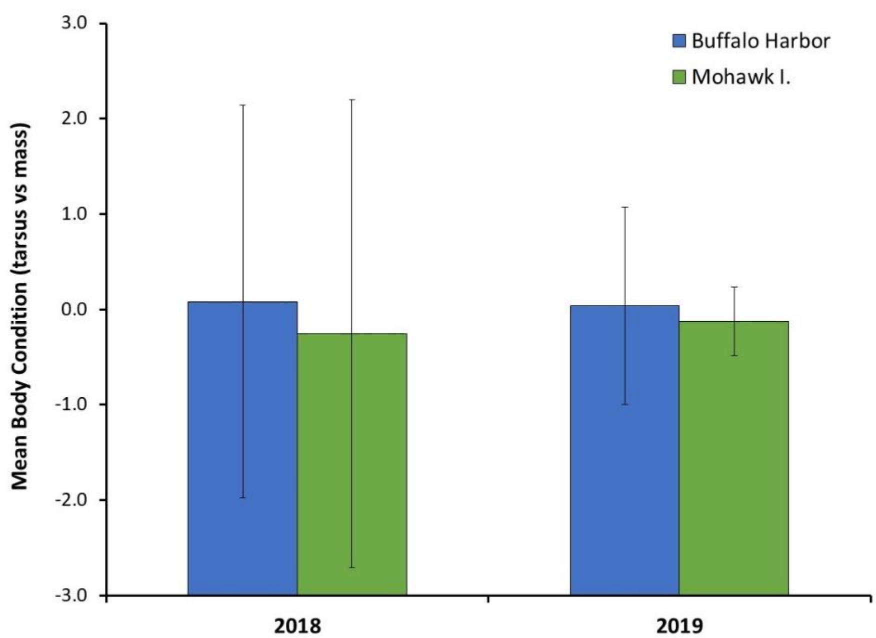


Table 2. Mean concentrations (SD) of organochlorines and sum PBDEs (µg/g, wet weight) in eggs of Herring Gulls (HERG) and Double-crested Cormorants (DCCO) collected from the Niagara River AOC colony (Buffalo Harbor) and two upstream reference colonies in eastern Lake Erie at Port Colborne and Mohawk Island in 2018 and/or 2019 where data are available. Sum PCBs are based on the sum concentration of 35 congeners and sum PBDEs are based on the sum concentration of 15 congeners. Each year comprises a single pooled sample consisting of 13 eggs.

Colony	**AOC/ REF**	**HERG/ DCCO**	**Sum PCBs**	***p,p'*-DDE**	**Sum Chlordane**	**OCS**	**HCB**	**Mirex**	**HE**	**Dieldrin**	**Sum PBDEs**
Buffalo Harbor 2018 & 2019	AOC	HERG	3.06 (0.04)	0.45 (0.005)	0.032 (0.004)	0.002 (0.001)	0.010 (0.002)	0.021 (0.004)	0.007 (0.001)	0.016 (0.004)	0.32 (0.02)
Port Colborne 2018 & 2019	REF	HERG	2.72 (0.93)	0.58 (0.17)	0.042 (0.010)	0.003 (0)	0.012 (0.001)	0.028 (0.006)	0.011 (0.001)	0.028 (0.003)	0.32 (0.09)
Mohawk I. 2018	REF	HERG	2.78	0.66	0.040	0.002	0.011	0.013	0.008	0.023	0.21
Buffalo Harbor 2018 & 2019	AOC	DCCO	1.64 (0.41)	0.71 (0.13)	0.015 (0.009)	0.001 (0.0001)	0.007 (0.003)	0.015 (0.003)	0.010 (0.006)	0.021 (0.009)	0.04 (0.02)
Port Colborne 2019	REF	DCCO	1.80	0.99	0.011	0.003	0.007	0.006	0.008	0.024	0.03

Table 3. Concentrations of non-*ortho* PCBs, 2,3,7,8-TCDD, and 2,3,7,8-TCDD toxic equivalents as TEQs (pg/g, wet weight) in eggs of Herring Gulls (HERG) and Double-crested Cormorants (DCCO) collected from the Niagara River AOC colony (Buffalo Harbor) and two upstream reference colonies in eastern Lake Erie at Port Colborne and Mohawk Island in 2018. TEQs associated with 4 non-*ortho* PCBs, 17 dioxins and furans (PCDD/Fs), and 7 mono-*ortho* PCBs (105, 114, 118, 123, 156/157, 167, and 189) and which together comprise total TEQs are also provided. Each sample represents a single pooled sample consisting of 13 eggs.

Colony	**AOC/ REF**	**HERG/ DCCO**	**PCB-77**	**PCB-81**	**PCB-126**	**PCB-169**	**2,3,7,8 – TCDD**	**TEQ – non-*ortho* PCBs**	**TEQ – PCDD/Fs**	**TEQ – mono-*ortho* PCBs**	**Total TEQs**
Buffalo Harbor	AOC	HERG	214	63.5	721	82.0	2.78	89.2	8.44	9.97	107.6
Port Colborne	REF	HERG	173	78.4	997	34.5	4.80	116.2	13.01	12.16	141.4
Mohawk I	REF	HERG	135	17.5	681	99.0	2.01	76.7	8.81	9.84	95.4
Buffalo Harbor	AOC	DCCO	259	115	772	76.8	3.51	101.7	13.93	8.73	124.4

PCBs and dioxins and furans in cormorant eggs were very similar to those in Herring Gull eggs with a total TEQ concentration in cormorant eggs that was within the range of those in gull eggs.

Spatial differences were found for mercury for which mean concentrations, on a dry weight basis, were significantly higher in Herring Gull eggs from Buffalo Harbor compared to the Port Colborne reference colony in 2018 and 2019 (t_2=8.58, p=0.01; Table 4). This was also found when concentrations were compared on a wet weight basis (t_2=6.48, p=0.02). Although no statistical analysis was conducted for cormorant eggs, mercury concentrations were similar between the two colonies since the concentration in eggs from Port Colborne in 2019 was within the range of that found in the two pooled samples from Buffalo Harbor in 2018 and 2019. Maximum mercury concentrations were 1.01 µg/g in cormorant eggs from Buffalo Harbor in 2018 on a dry weight basis and 0.18 µg/g in gull eggs from Buffalo Harbor in 2019 on a wet weight basis.

Table 4. Mean concentrations (SD) of total mercury and mean values (SD) for $\delta^{15}N$ and $\delta^{13}C$ in eggs of Herring Gulls (HERG) and Double-crested Cormorants (DCCO) collected from the Niagara River AOC colony (Buffalo Harbor) and two upstream reference colonies in eastern Lake Erie at Port Colborne and Mohawk Island in 2018 and/or 2019 where data are available. Mercury concentrations are in µg/g and reported as dry weight (dw) and wet weight (ww). Each year comprises a single pooled sample consisting of 13 eggs. Different uppercase letters indicate significant differences in mean concentrations between gull colonies at Buffalo Harbor and Port Colborne.

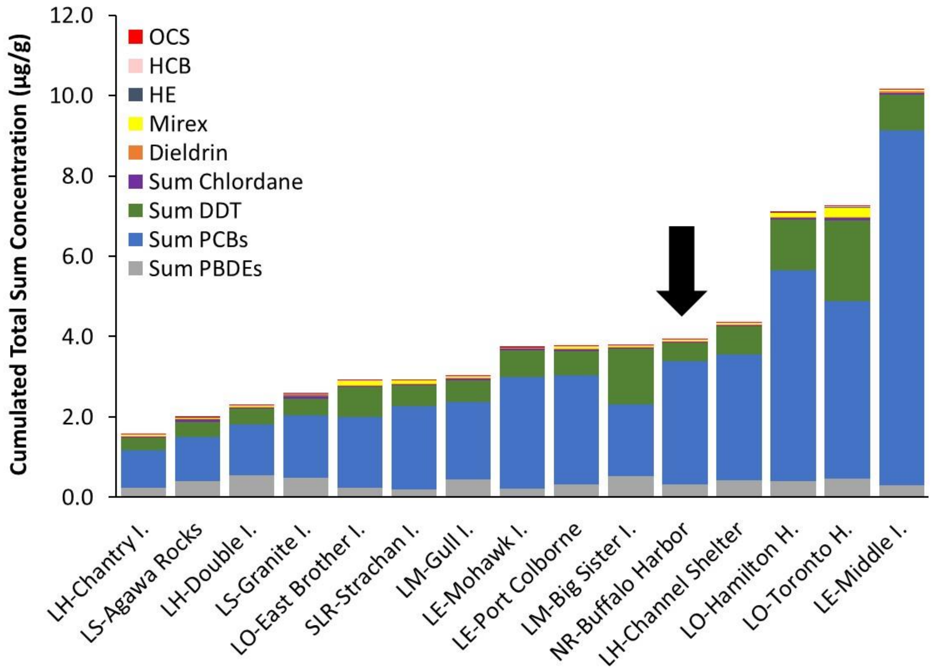
Colony	AOC/ REF	HERG/ DCCO	Mercury dw	Mercury ww	$\delta^{15}N$	$\delta^{13}C$
Buffalo Harbor 2018 & 2019	AOC	HERG	0.74 (0.02) **A**	0.17 (0.01) **A**	15.0 (0.2)	-22.1 (0.2)
Port Colborne 2018 & 2019	REF	HERG	0.62 (0.01) **B**	0.14 (0.002) **B**	14.5 (0.9)	-22.1 (0.1)
Mohawk I 2018	REF	HERG	0.51	0.12	13.8	-22.4
Buffalo Harbor 2018 & 2019	AOC	DCCO	0.85 (0.22)	0.14 (0.04)	16.9 (0.2)	-22.6 (0.1)
Port Colborne 2019	REF	DCCO	0.71	0.11	15.8	-23.4

Stable isotopes of nitrogen and carbon are used to provide information on trophic position and carbon source in the food web, respectively. No significant differences in mean $\delta^{15}N$ values and $\delta^{13}C$ values were found between Herring Gull eggs from Buffalo Harbor and Port Colborne (Table 4). This suggests that gulls were feeding at similar trophic levels with similar carbon sources at the two colonies. Comparing isotopic signatures between the two colonial waterbird species at study colonies, $\delta^{15}N$ values were relatively higher and $\delta^{13}C$ values were relatively lower in eggs of cormorants relative to gulls which is consistent with the more fish-based diet of cormorants compared to gulls which may feed on terrestrial food sources if available.

Spatial trends in contaminant burdens for gull and cormorant eggs from the Niagara River AOC colony in relation to other Great Lakes colonies are valuable for providing a broad perspective of spatial trends including those at other AOCs (Figures 3–6). Concentrations of cumulative total sum concentrations of

Figure 3. Cumulated total sum concentration (µg/g, wet weight) of mean sum PCBs, seven organochlorines, and sum PBDEs in eggs of Herring Gulls (a) and Double-crested Cormorants (b) from the Niagara River AOC colony (Buffalo Harbor) and other Great Lakes colonies in 2018 and 2019. Means are arranged in increasing order from lowest to highest concentrations. Colony locations are associated with the following lakes/rivers: LH=Lake Huron, LO=Lake Ontario, LE=Lake Erie, SLR=St. Lawrence River, NR=Niagara River, DR=Detroit River, LS=Lake Superior, and LM=Lake Michigan.

a) Herring Gull eggs



b) Double-crested Cormorant eggs

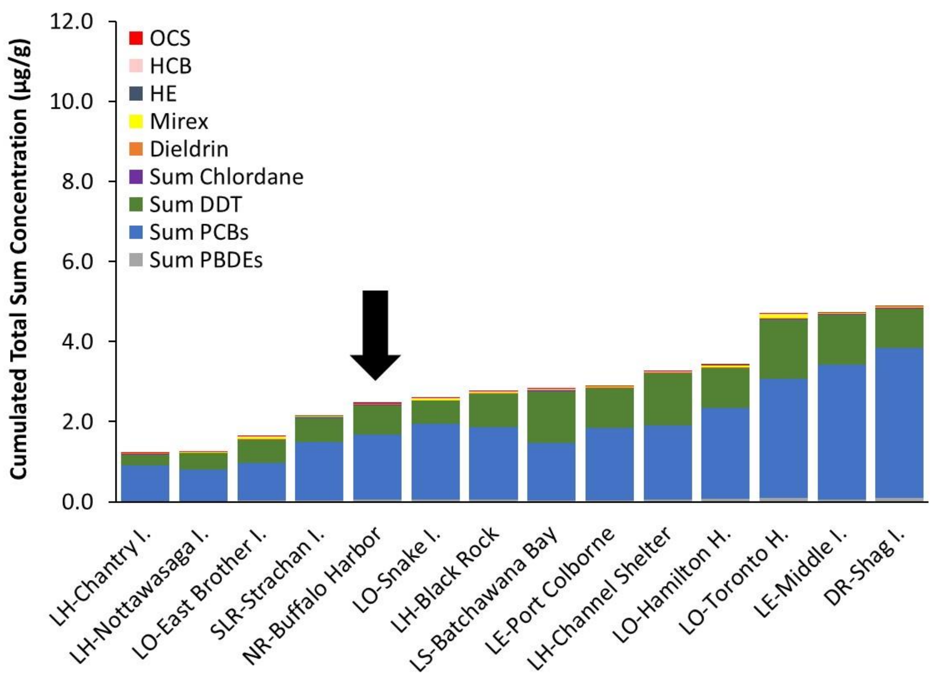
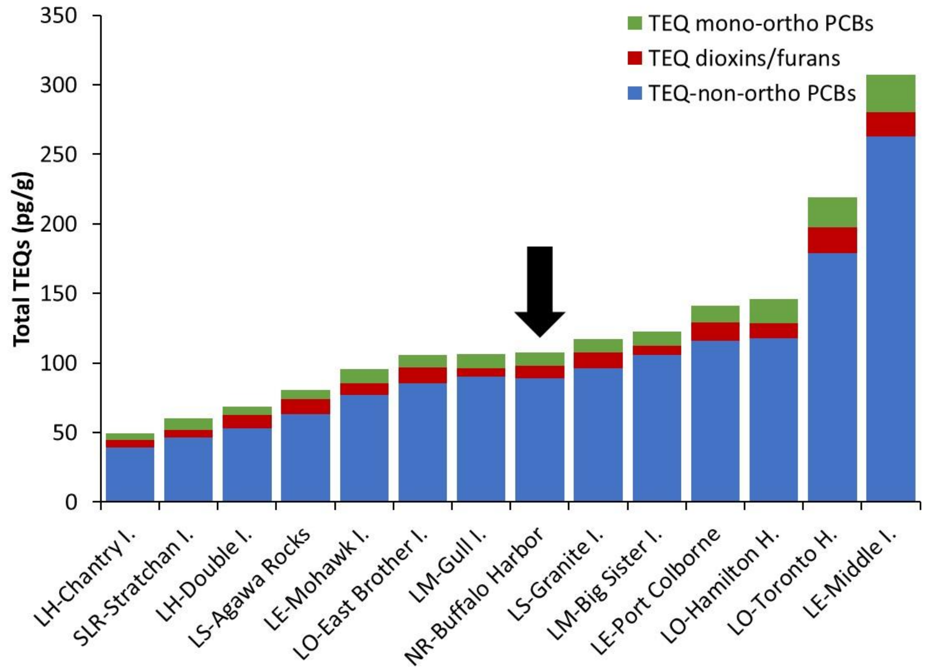


Figure 4. Total TEQ concentrations (pg/g, wet weight) in eggs of Herring Gulls (a) and Double-crested Cormorants (b) from the Niagara River AOC colony (Buffalo Harbor) and other Great Lakes colonies in 2018. The contributions of TEQ concentrations associated with mono-*ortho* PCBs, dioxins and furans, and non-*ortho* PCBs to the total TEQ concentration are shown. Concentrations are arranged in increasing order from lowest to highest. Colony locations are associated with the following lakes/rivers: LH=Lake Huron, LO=Lake Ontario, LE=Lake Erie, SLR=St. Lawrence River, NR=Niagara River, DR=Detroit River, LS=Lake Superior, and LM=Lake Michigan.

a) Herring Gull eggs



b) Double-crested Cormorant eggs

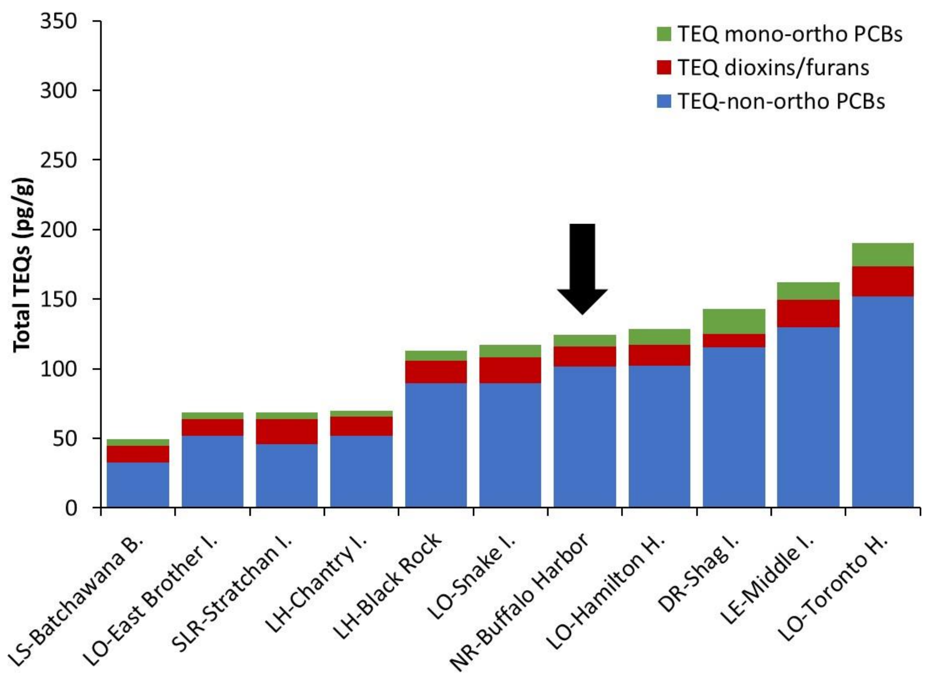
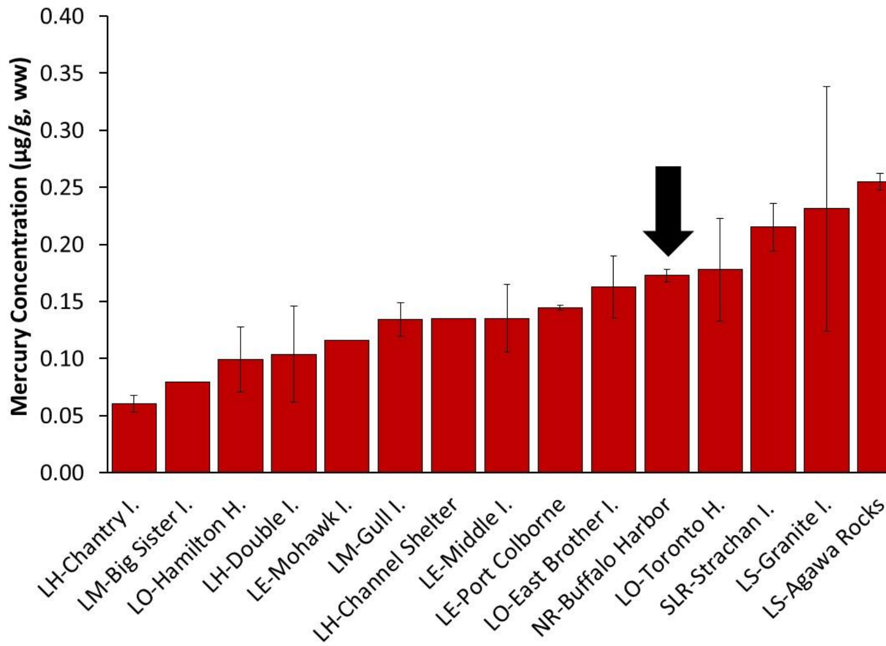


Figure 5. Mean total mercury concentrations (µg/g, wet weight) in eggs of Herring Gulls (a) and Double-crested Cormorants (b) from the Niagara River AOC colony (Buffalo Harbor) and other Great Lakes colonies in 2018 and 2019. Means (SD) are arranged in increasing order from lowest to highest concentrations. Colony locations are associated with the following lakes/rivers: LH=Lake Huron, LO=Lake Ontario, LE=Lake Erie, SLR=St. Lawrence River, NR=Niagara River, DR=Detroit River, LS=Lake Superior, and LM=Lake Michigan.

a) Herring Gull eggs



b) Double-crested Cormorant eggs

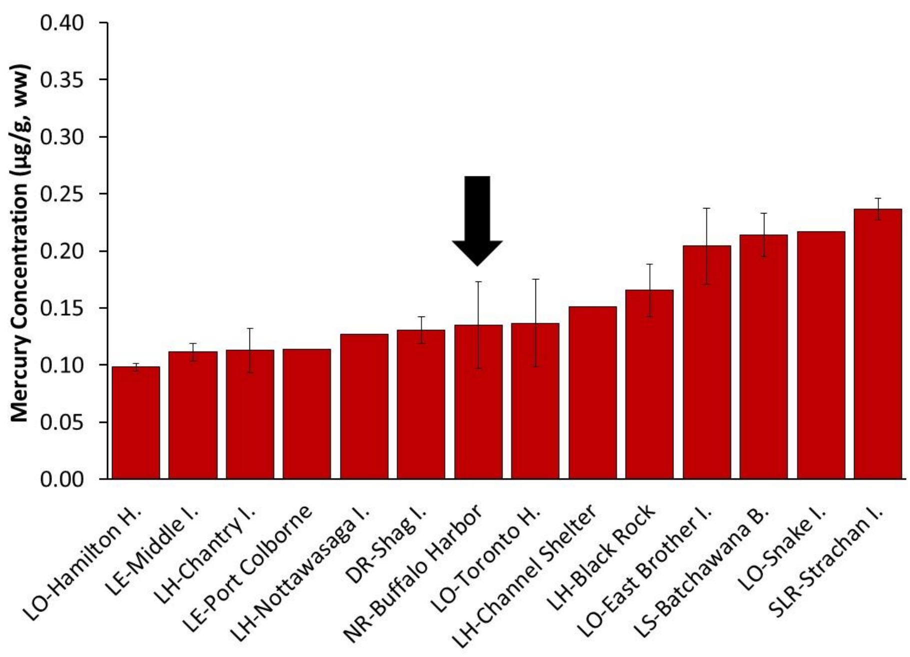
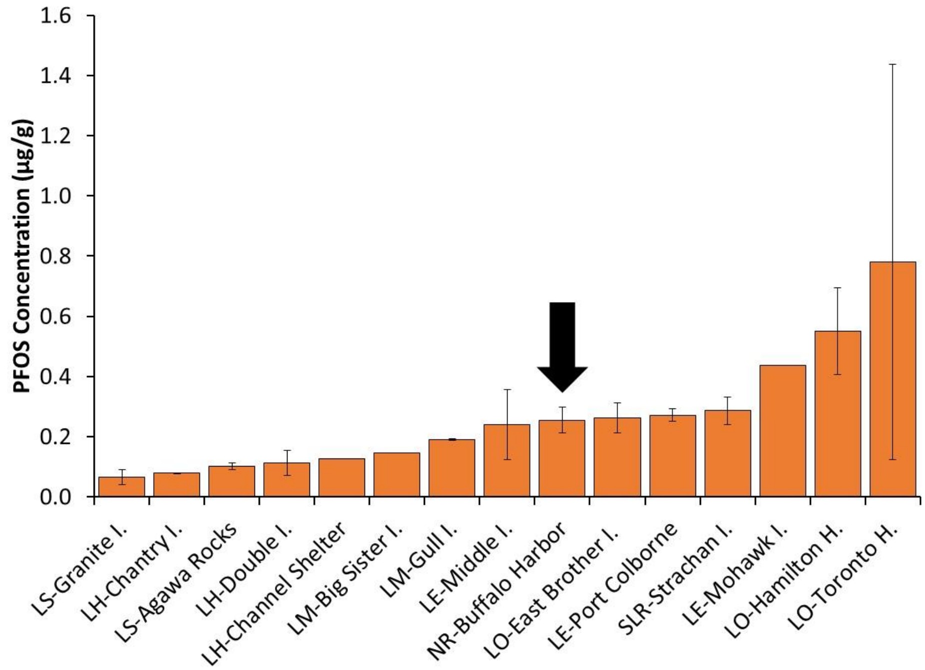
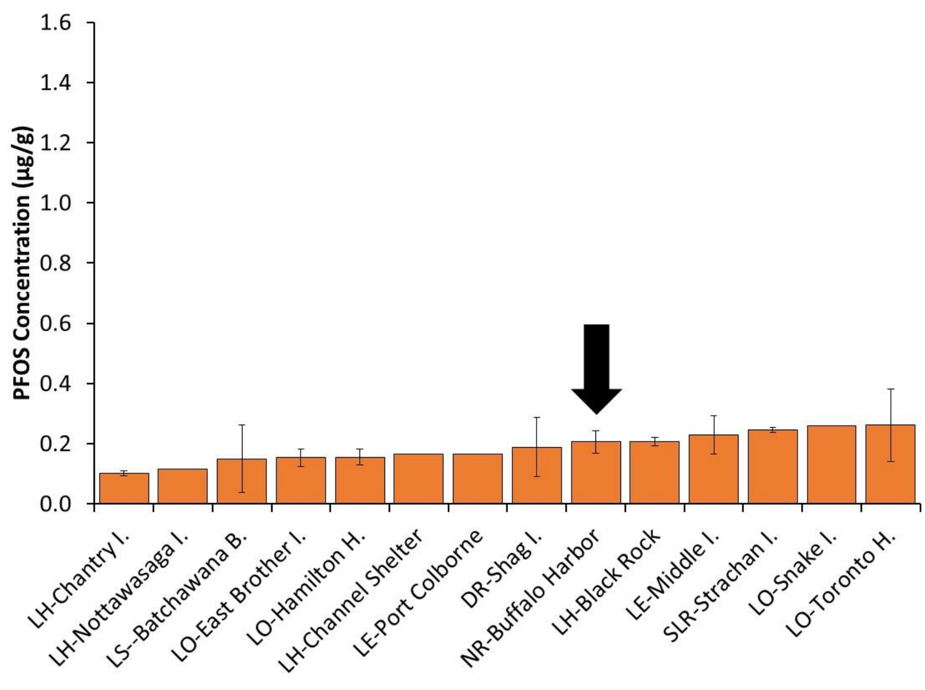


Figure 6. Mean PFOS concentrations (µg/g, wet weight) in eggs of Herring Gulls (a) and Double-crested Cormorants (b) from the Niagara River AOC colony (Buffalo Harbor) and and other Great Lakes colonies in 2018 and 2019. Means (SD) are arranged in increasing order from lowest to highest concentrations. Colony locations are associated with the following lakes/rivers: LH=Lake Huron, LO=Lake Ontario, LE=Lake Erie, SLR=St. Lawrence River, NR=Niagara River, DR=Detroit River, LS=Lake Superior, and LM=Lake Michigan.

a) Herring Gull eggs



b) Double-crested Cormorant eggs



organochlorines, total TEQs, and mercury in gull and cormorant eggs from the AOC colony at Buffalo Harbor were within the range of concentrations found at other Great Lakes colonies in 2018 and 2019 (where data are available). As a compound of concern globally, PFOS (perfluorooctane sulfonate) was also found in gull and cormorant eggs from Buffalo Harbor at mean concentrations that were within those found at other colonies on the Great Lakes.

Temporal Trends:

Long term collections and contaminant analysis of Herring Gull eggs from the Niagara River AOC allow for an assessment of temporal trends in exposure in gulls foraging within the AOC. As part of the Great Lakes Herring Gull Egg Monitoring Program, eggs have been collected annually from Weseloh Rocks on the Niagara River since 1979 and analyzed for a suite of contaminants (generally as a single pooled sample). Large declines in concentrations of several contaminants have been reported in eggs collected from this site until 2015 after which egg collections were no longer possible. Herring Gull eggs collected from Buffalo Harbor within the boundary of the Niagara River AOC in 2018 and 2019 can serve to supplement existing contaminant data for gulls foraging in this area.

Generally, contaminant burdens from the AOC colony in the two study years aligned well with concentrations found in Herring Gull eggs from Weseloh Rocks in the 2000s when declines had begun to plateau (Figure 7). Temporal trends indicate that concentrations of sum PCBs (based on the sum concentration of 26 PCB congeners common to all analyses), several organochlorines, and 2,3,7,8-TCDD declined significantly in Herring Gull eggs collected from Weseloh Rocks and Buffalo Harbor from the late 1970s/1980s to 2019 (range in r^2=0.13–0.89; p<0.04). These results are consistent with significant declines reported for these compounds in eggs from Weseloh Rocks only to 2015 (Hughes *et al.* 2017). Also consistent is the temporal pattern of no significant change in sum PBDE concentrations in eggs including Buffalo Harbor and those at Weseloh Rocks to 2015 only. However, there were temporal differences for two compounds between the two sets of analyses. No significant decline was found for OCS in eggs from Weseloh Rocks from 1987 to 2015; however, this relationship was significant when Buffalo Harbor eggs were included in the trend analysis. The opposite was true for mercury; while a significant decline in mercury concentrations was found at Weseloh Rocks from 1981 to 2015, this was no longer significant when Buffalo Harbor eggs were included in the analysis. Relatively higher mercury concentrations found in Buffalo Harbor eggs in 2018 and 2019 compared to three previous years and general variability from year-to-year in concentrations in eggs from Weseloh Rocks contributed to this change (Figure 7). Overall, these results indicate that exposure to these compounds has decreased or, in the case of mercury, remained stable in Herring Gulls foraging in the AOC.

DISCUSSION

Since 2016, logistical constraints associated with high water levels have precluded the ability to continue Herring Gull egg collections and perform annual contaminants monitoring at Weseloh Rocks in the Niagara River AOC. However, another colonial waterbird nesting site at Buffalo Harbor has proved valuable for continued contaminants monitoring thereby facilitating a current assessment of exposure in colonial waterbird populations foraging in the AOC. Concentrations of several contaminants in egg collections from Buffalo Harbor in 2018 and 2019 aligned well with trends reported in earlier years for

Figure 7. Temporal trends in concentrations of 12 contaminants in Herring Gull eggs collected annually from Weseloh Rocks in the Niagara River from the late 1970s/1980s (or 2000 for sum PBDEs) to 2015. Contaminant concentrations are also provided in Herring Gull eggs collected from the Buffalo Harbor colony in 2018 and 2019 (shown as patterned circles). Sum PCBs are based on 26 common PCB congeners quantified over time and white open circles represent estimated concentrations based on measured Aroclor 1254:1260 concentrations. Note that no data are available for Aroclor 1254:1260 in 2018 and 2019. Concentrations are based on analysis of a single pooled sample of eggs with the exception of 1979, 1981, and 1983–1986 when a mean concentration based on 10 or 11 eggs is shown. Concentrations, as wet weights, are in µg/g for all contaminants except 2,3,7,8-TCDD which is in pg/g. Exponential curves are provided where declines from late 1970s/1980s to 2019 were significant.

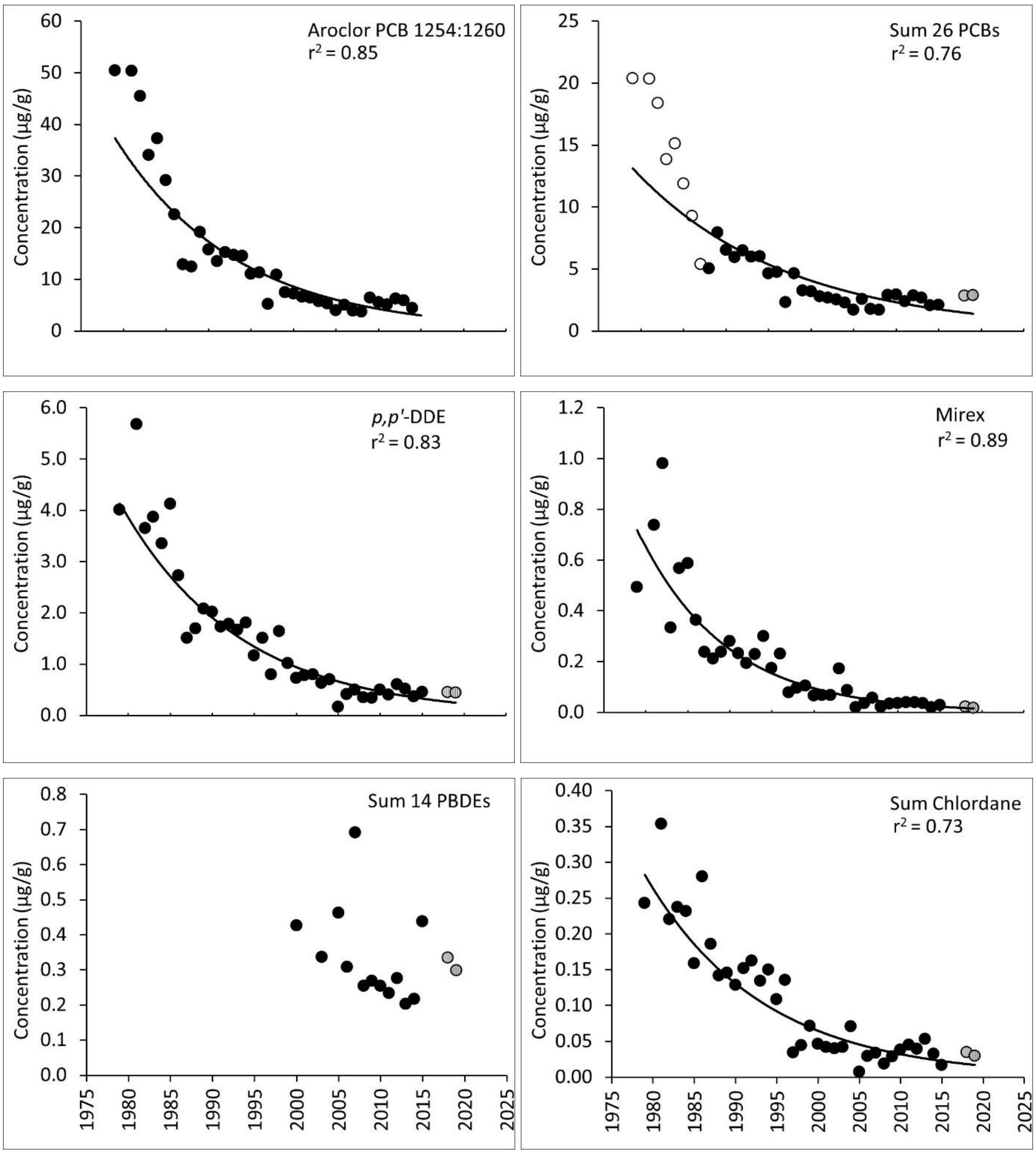
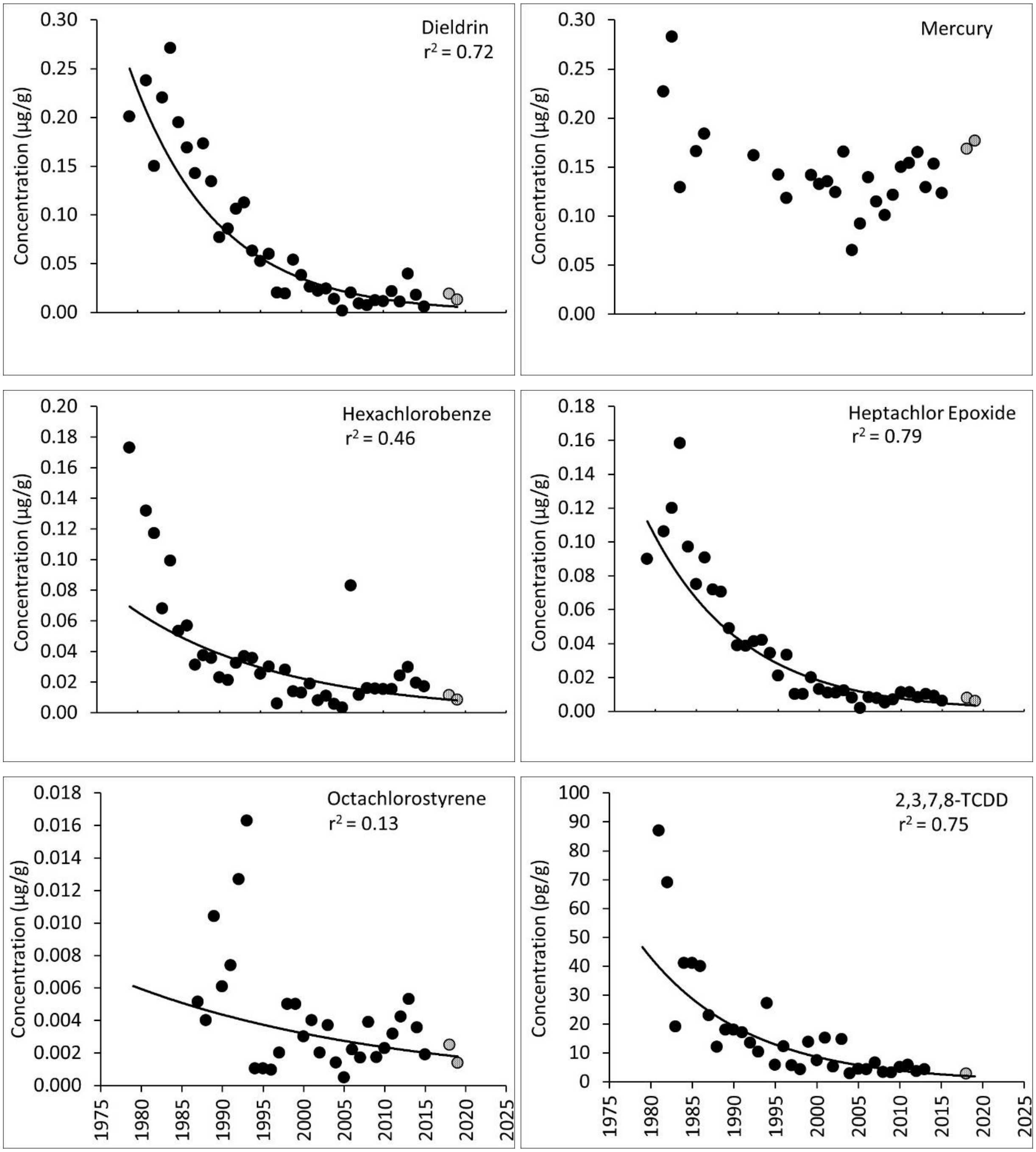


Figure 7 (continued).



egg collections from Weseloh Rocks. Significant declines were reported for most contaminants in gull eggs since 1979 or, in the case of sum PBDEs, no significant change was found in eggs since 2000.

Overall, concentrations of PCBs, *p,p'*-DDE, and PBDEs in gull and cormorant eggs from Buffalo Harbor were not sufficiently elevated to adversely impact hatching success of these species foraging in the Niagara River (Ontario) AOC based on the results of several studies examining concentrations associated with impacts on reproduction in colonial waterbirds (Pearce *et al.* 1979; Henny *et al.* 1984; Kubiak *et al.* 1989; Hoffman *et al.* 1996; Powell *et al.* 1998; McKernan *et al.* 2009). The total TEQ concentration in gull and cormorant eggs were also well below 1200–1300 pg TEQ/g at which high frequencies (6–10%) of embryonic deformities were found in cormorants at two Lake Michigan colonies in 1988 (Yamashita *et al.* 1993).

Mercury concentrations in gull eggs were considered stable, i.e., no significant change, when eggs from Buffalo Harbor in 2018 and 2019 were included in the temporal analysis. Higher mercury concentrations in gull eggs from Buffalo Harbor in these two years compared to earlier years in eggs from Weseloh Rocks may be associated with birds from this site foraging in areas where mercury exposure is relatively higher. Significantly higher mercury concentration in gull eggs from Buffalo Harbor compared to the upstream colony at Port Colborne also support this finding. Mercury levels also started increasing at some locations in both fish and gulls in Lake Erie, including Weseloh Rocks and nearby Port Colborne, starting in the mid 2000s to 2015 (the last year of the study; Blukacz-Richards *et al*. 2017). Hence, higher levels of mercury in Buffalo Harbor eggs collected in recent years relative to Weseloh Rocks eggs may, at least partially, reflect a general upward trend in mercury. This increase in exposure may be in part due to resuspension of contaminated sediment following dredging activities in the Detroit River that impacted downstream sites in Lake Erie and Lake Ontario (as reported for another set of legacy compounds in McGoldrick *et al.* 2018). Regardless of the cause of higher mercury in Buffalo Harbor, mercury concentrations in all eggs in this study were below the predicted threshold of 0.6 µg/g (wet weight) in eggs set to be protective against adverse reproductive effects for 95% of non-marine avian species (Shore *et al.* 2011). The maximum mercury concentration found in gull eggs from Buffalo Harbor in 2019 (0.18 µg/g) was one-third of the no-effect level threshold concentration. Mercury concentrations at the AOC colony were also within the range of those found at other Great Lakes colonies for both species. These data suggest that it is unlikely mercury concentrations would reduce reproduction and survival of breeding colonial waterbirds in the Niagara River AOC.

The results of the artificial incubation study suggest that egg viability is not impaired to an extent that would elicit population-level effects in the AOC. Egg viability was similar in cormorant eggs collected from Buffalo Harbor (85%) and the reference colony (80%) following artificial incubation in the two study years. Deformity frequencies of embryos did not differ significantly between the two study colonies. Body condition was similar in embryos between study colonies in both study years, while a significant difference was found for the liver somatic index in embryos in one of two years. Contaminant burdens in eggs, reported at concentrations below threshold levels associated with population level effects, also support these results.

CONCLUSIONS

The results of this study indicate that the *Wildlife Populations* BUI criteria #2 and #3 (see below) have been met and that there is no impairment of colonial waterbirds in the Niagara River (Ontario) AOC.

> **Criterion 2. Breeding colonial waterbird populations within the Niagara River AOC are the same as (or better than) suitable reference sites.**
>
> Egg viability was similar in cormorant eggs collected from Buffalo Harbor (85%) and the reference colony (80%) following artificial incubation in the two study years. Egg viability in cormorants was considered to be not impaired.
>
> **Criteria 3a and 3b. Temporal trends in contaminant concentrations in eggs, tissues, or whole-body burden of sentinel species in the Niagara River AOC are stable or declining; AND spatial comparisons show that contaminant concentrations in eggs, tissues, or whole-body burden of sentinel species in the Niagara River AOC are the same (or better than) other suitable reference sites.**
>
> Based on long-term collections of Herring Gull eggs from Weseloh Rocks, a colony within the Niagara River (Ontario) AOC, and recent egg collections from another colony within the AOC at Buffalo Harbor, temporal trends in contaminant levels indicate that concentrations have declined (e.g., PCBs) or are stable (i.e., mercury) between the late 1970s/early 1980s to 2019.
>
> Spatial comparisons indicate that, for the majority of contaminants, concentrations in eggs under the influence of the AOC are the same as those at the upstream reference site and outside of the influence of the AOC.
>
> **Criterion 3c. If the contaminant concentrations in 3a or 3b are not met, then they must not exceed established thresholds associated with potential population-level effects (i.e., reproductive impacts).**
>
> For mercury, significantly higher concentrations were found in gull eggs from the AOC colony compared to the reference colony; however, mercury burdens were well below those associated with population-level effects in colonial waterbirds.

Provided that delisting criterion 1 is also met (as assessed through a separate study), then it is recommended that the RAP Team proceed with changing the status of this BUI from ‘Impaired’ to ‘Not Impaired’.

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APPENDIX 7: OUTREACH AND ENGAGEMENT SUMMARY AND RESULTS

Overview

Ensuring that the broader Niagara River community is informed and involved in the RAP initiative is vital to the success of restoring the Niagara River AOC. While the Niagara River RAP Council is an important group to provide substantive input and direction as it is comprised of various community representatives (e.g., government agencies, Mississaugas of the Credit First Nation, Métis Nation of Ontario, non-government organizations, and area residents), there is still a desire and need to obtain broader public input on key recommendations such as BUI status changes.

The purpose of the outreach and engagement activities related to the *Degradation of Fish and Wildlife Populations* BUI was to: (1) inform people about the recent studies completed as well as the assessment report indicating all delisting criteria were met; and (2) engage and allow input on the results and recommendation to change the *Degradation of Fish & Wildlife Populations* BUI status from 'impaired' to 'not impaired'.

This section of the assessment report summarizes the outreach and engagement activities and associated results, including Indigenous engagement. Overall, people were aware of the assessment results and recommendation to re-designate the *Degradation of Fish and Wildlife Populations* BUI. Results from these discussions indicate support from the local RAP Council, U.S. agencies, Indigenous partners, municipal governments, and the public.

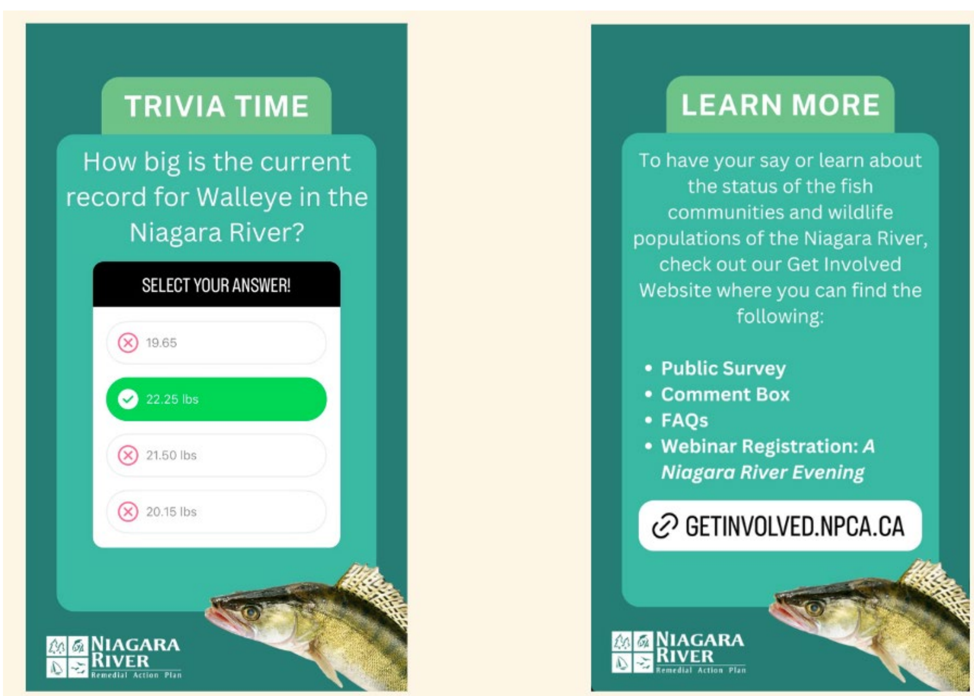
Outreach & Engagement Methods

After receiving support from the Niagara River RAP Council on March 27, 2024, the Niagara River RAP team prepared and implemented a comprehensive outreach and engagement plan using various traditional and digital methods (social media, website, e-newsletter, etc.), as outlined below:

- Project Website (getinvolved.npca.ca)
- E-newsletter (May 2024)
- Webinar
- Media release
- Individual meetings & presentations to other groups
    - NPCA Board of Directors & Public Advisory Committee
- Direct emails
    - Mississaugas of the Credit First Nation and Six Nations of the Grand River
    - Métis Nation of Ontario and Niagara Regional Métis Council
    - U.S. Environmental Protection Agency
    - New York State Department of Environmental Conservation
- Social media (Facebook, Instagram, X)
    - Information or event posts and interactive trivia

Paper copies of the report and digital materials were available for those with limited internet/computer access however no requests were received for this accommodation.

Examples Of Social Media Outreach



Results Of Outreach and Engagement

To understand the success of the outreach and engagement period, the RAP Coordinating Committee tracked and reviewed several metrics throughout the engagement period. Overall, results indicate that many people are aware and engaged with the information about the Niagara River *Degradation of Fish & Wildlife Populations* BUI Assessment Report (Fig. 1). Additional specific results on each outreach and engagement method are provided below.

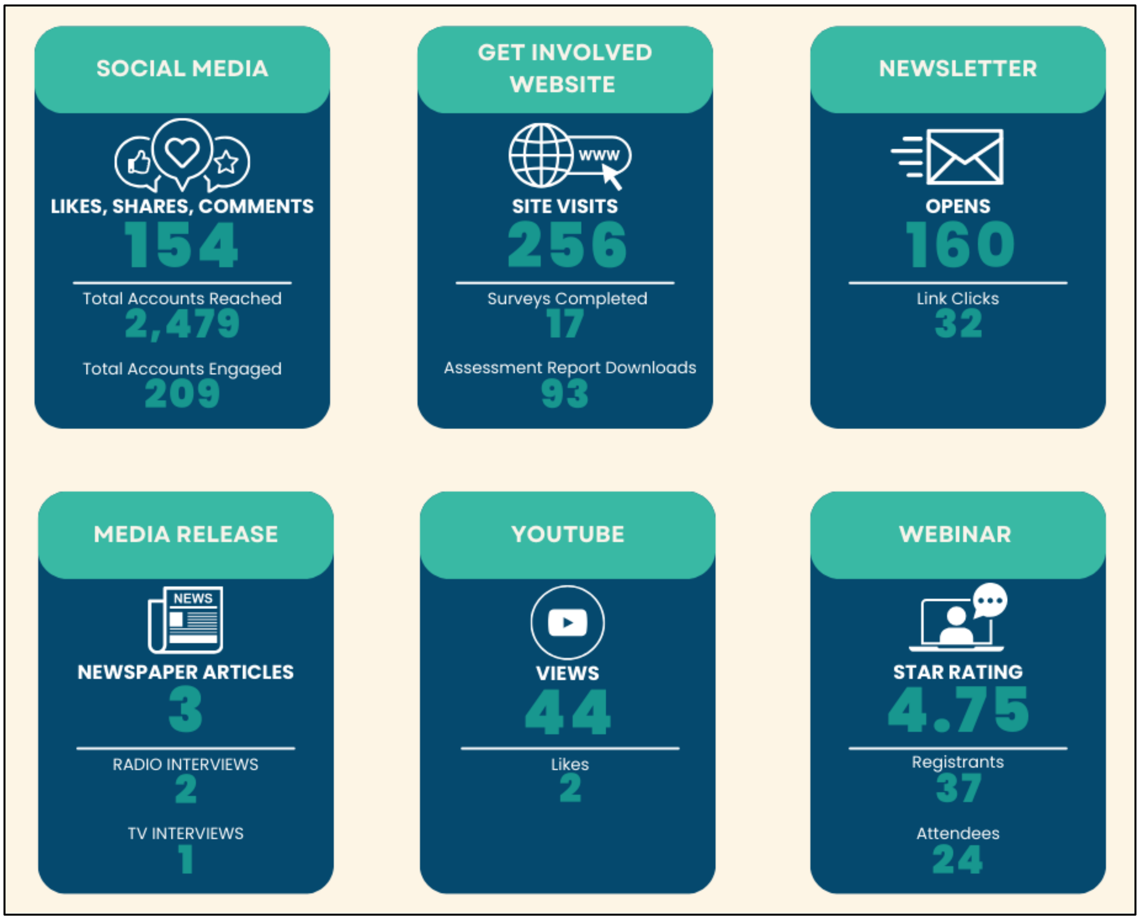


Figure 1. Infographic summarizing main engagement methods and the key results.

<u>Project Website and Survey</u>

Acting as a hub for relevant BUI Assessment information, there were several opportunities for visitors of the project website to learn about the *Degradation of Fish & Wildlife Populations* BUI resources as well as provide feedback on the recommendation to change the BUI status. The project website included several tools to support gathering input such as a survey, digital comment box, a question forum/FAQs, a recording of the webinar, and a copy of the BUI Assessment Report for further review. In total, the project received 256 visits resulting in 77 informed[5] visitors and 17 engaging with the content.

The digital survey was available on the website from April 30, 2024 – May 31, 2024 which consisted of 5 questions that aimed to obtain input and determine if there was support for the recommendation to change the BUI status from 'Impaired' to 'Not Impaired'. In total, 17 participants completed a survey. Results show that most participants (14 people or 82.4%) agree with the recommendation to change the status to 'Not Impaired'. For those who did not agree, there was an option to provide more information and reasons they did not agree. The reasons provided for not agreeing with the recommendation were either beyond the scope of the RAP and the BUI (i.e., the respondent expressed concern about the prevalence of Cyanobacteria and cyanotoxins in the Niagara River, "look at how greenish the straights of Niagara have become in the past few years"), and that the decision was rushed, "It is too soon, too early yet. I fear a letting down of our guarding against further degradation in the near future" and "give it a little more time to rejuvenate." **All participants that disagreed with the recommendation also stated that they <u>did not</u> read the entire assessment report.** All feedback was considered and did not result in any changes to the assessment report or its recommendation.

Participants were thanked for their feedback upon completing the survey and encouraged to contact staff by email or phone with additional questions. There were no inquiries related to the BUI. There were no submissions to the comment box or the question forum/FAQs during the engagement period.

<u>Webinar</u>

On May 14, 2024, the Niagara River RAP team hosted an online webinar: *A Niagara River Evening: Fish & Wildlife* which featured two key experts involved in science and monitoring that informed the BUI Assessment Report. Dr. Andrew Drake from the Department of Fisheries and Oceans Canada (DFO) spoke about the fish community study that was used in assessing the fish component of the BUI while Shane de Solla from Environment and Climate Change Canada (ECCC) presented the colonial waterbird study used in assessing the wildlife component. The webinar featured a moderated question-and-answer period.

Overall, the webinar was successful with 37 individuals pre-registered and 24 individuals attending live. During the Q&A period, both experts and the RAP Coordination Committee collaboratively answered 5 questions from the audience, with 3 being related to the other BUIs (i.e., habitat, fish consumption, benthos). A post-event survey was sent out to all attendees to evaluate the quality of the webinar for improvement purposes. Several positive comments were received, as well as an overall rating of 4.75/5 stars. The webinar was recorded and uploaded to

[5] As per the Get Involved project website definitions, a visitor is considered engaged "if they contribute or provide feedback to an active tool on your page", whereas a participant is informed "if they have taken the next step and sought to find out more information by clicking on something, generally a document, key date, etc."

YouTube and linked on the Get Involved Site, where it was viewed an additional 44 times during the engagement period and 66 times as of the present date (July 2025).

Media Coverage

A media release was sent to all local media contacts. The story was immediately picked up by several newspaper reporters, radio stations and tv outlets. The following list summarizes all the media coverage:

- Niagara This Week (shared with all local newspapers – Welland Tribune, St. Catharines Standard): https://www.niagarathisweek.com/news/on-path-to-recovery-niagara-river-coming-off-list-of-environmental-concern/article_24897974-dd0d-5282-9026-42ad9a85afd8.html
- Fort Erie Radio: https://npca.ca/newsroom/article/partnership-highlights-healthy-fish-and-wildlife-populations
- 610CKTB Radio: https://www.610cktb.com/news/positive-signs-of-improvement-for-niagara-river.html
- iHeart Radio Niagara In the Morning podcast: https://www.iheart.com/podcast/962-niagara-in-the-morning-wit-170201832/episode/natalie-green-manager-of-climate-174191456/
- YourTv (Cogeco): https://yourtv.tv/node/360693

While this substantial media coverage did generate positive attention towards the BUI Assessment Report and its recommendation, there was one incident of misinformation with the Niagara This Week article that highlighted the entire AOC as delisting, not just re-designating the specific BUI. The RAP team, with assistance from NPCA's communications staff, worked with the reporter to correct the information. No comments from the public were brought forward about this error.

Social Media

Throughout the engagement period, the NRRAP team curated a social media campaign that consisted of 10 posts and 5 interactive trivia stories[6] that were shared on the Niagara River RAP's existing social media platforms (Instagram, Facebook, X).

The 10 social media posts used a combination of text, graphics and images to inform viewers of the Niagara River D*egradation of Fish and Wildlife Populations* BUI assessment, share facts related to the fish communities and wildlife populations of the Niagara River, as well as communicate the call to action to participate in the BUI re-designation process. Existing metrics from each platform, specifically accounts reached and accounts engaged, were utilized to track the performance of the social media campaign. Accounts reached (also known as impressions)

[6] Due to technical limitations, stories could only be shared on Instagram and Facebook.

was used to track the number of individual/unique accounts that have seen the given content, while accounts engaged was used to track the number of individual/unique accounts that have interacted with the given content. Examples of interactions are likes, comments, shares, saves, and replies.

The social media results show that many users were aware of the information but did not always interact with posts or provide feedback (i.e. likes, comments). However, the social media campaign was successful nonetheless and was quantified by a performance analysis that compared the engagement period metrics to those of the previous 28-day period (Table 1). All platforms functioned above their regular traction, obtaining more accounts reached and engaged then normally expected.

Table 1. Summary of social media metrics from all posts that were used to gauge awareness and engagement throughout the engagement period. The values in brackets indicate the percent that each metric varied compared to the previous 28-days

Social Media Platform	Accounts Reached	Accounts Engaged
Instagram	649 (+335%)	35 (+95.4%)
Facebook	1,400 (+381%)	136 (+95%)
X (formerly Twitter)	430 (+204.5%)	38 (+57%)

Indigenous Engagement

There are two First Nations with Treaty Rights within the Niagara River watershed that were engaged in the assessment and re-designation process of the *Degradation of Fish and Wildlife Populations* BUI beyond involvement in the RAP Council: Mississaugas of the Credit First Nation (MCFN) and Six Nations of the Grand River Elected Council (SNGR).

Staff from the MCFN's Department of Consultation and Accommodation (DOCA) have participated in the Niagara River RAP Council since 2018. Even though staff participate on the RAP Council and its role in the decision-making process for recommending BUI status changes, and receive all draft materials in advance, the RAP Coordinating Committee wanted to ensure that MCFN staff had ample opportunity to review the documents and provide feedback. An email with all supporting information was sent directly to DOCA staff in April 2024 with an invitation to attend the webinar. Additionally, the information was shared and questions from DOCA staff answered during three regular quarterly meetings held between April 2024 and June 2025. DOCA staff confirmed verbally that there were no concerns or disagreement with changing the BUI status to 'Not Impaired'.

Although invited, staff with the SNGR have yet to participate in the RAP Council. To ensure active dialogue, CWA and MECP representatives for the RAP reach out to SNGR staff through meetings and emails throughout the year to share AOC information and invite participation in the RAP process. As part of those conversations, the BUI assessment report was discussed at a meeting with SNGR staff on April 26, 2024 and the report was shared on May 2, 2024 along with supporting material (e.g., dedicated webpage, video, invite to webinar). The summary slides presented outlined the remedial actions taken to address the BUI impairment, the assessment approach, and the results that show the BUI delisting criteria have been met. SNGR staff subsequently asked two questions on the assessment approach and findings (October 22, 2024) which the RAP Coordinating Committee and science experts who did the work for DFO and ECCC answered (December 4, 2024). There were no subsequent questions or concerns raised from SNGR with the assessment outcome or recommendation for changing the BUI status to Not Impaired.

The Métis Nation of Ontario has participated on the RAP's Council since 2019. Following a process that the MNO has established, the BUI Assessment Report was sent to a designated staff person at MNO via email on May 7, 2024 to request that MNO review the report, and offer to set up a meeting to discuss, if desired. The MNO staff consulted with the MNO Region 9 Council, which did not express any concern regarding the BUI Assessment report and did not request a meeting to discuss.

<u>Input from U.S. RAP Counterparts</u>

As a binational AOC, the BUI re-designation process includes reaching out to American federal and state agencies responsible for implementing a RAP on the U.S. side of the Niagara River AOC. On May 2, 2024, the RAP Coordinating Committee sent an email to representatives of both the U.S. Environmental Protection Agency and the New York State Department of Environmental Conservation requesting review and feedback on the BUI Assessment Report and recommendation to change the BUI status. The US EPA subsequently engaged the U.S. Fish and Wildlife Service in the review. In June 2024, the agencies voiced support of the recommendation to change the BUI status to not impaired and provided editorial comments on the report contents, which were considered and addressed by the RAP Coordinating Committee and captured in this current report.

Conclusion

In summary, the results of the outreach and engagement efforts show overall support for the BUI assessment report and the recommended change in status of the Niagara River RAP's *Degradation of Fish and Wildlife Populations* BUI to 'Not Impaired'. There are no concerns raised from local Indigenous communities, municipalities, U.S. agencies, RAP Council members or the public. The results of the engagement process indicate broad agreement with the recommendation to officially remove this impairment.

Acknowledgements

The Niagara River RAP gratefully acknowledges the contributions of other NPCA staff (Erika Navarro, Sofia Zavarella, and Rob Petrullo) for providing their expertise and assistance for this outreach and engagement initiative. Special thanks to Heather Frank and Sydney McIntyre (past RAP Coordinators) and Katy Sokoloski (RAP Outreach Assistant) for their support with social media graphics, data gathering, and everything in between.

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