

Targeted sampling for Silver Shiner (*Notropis photogenis*) in the Saugeen River, Ontario, 2021

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**Canadian Data Report of
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by

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ABSTRACT

Barnucz, J., Gáspárdy, R.C., Colm, J.E., and Drake, D.A.R. 2024. Targeted sampling for Silver Shiner (*Notropis photogenis*) in the Saugeen River, Ontario, 2021. Can. Data Rep. Fish. Aquat. Sci. 1359: vii + 28 p.

In July 2021, Fisheries and Oceans Canada conducted targeted sampling to better understand the distribution of Silver Shiner (*Notropis photogenis*; SARA-listed as Threatened) in the Saugeen River watershed, Ontario. Twenty-six sites (consisting of 78 seine hauls) were sampled in the Saugeen River (n = 18 sites) and North Saugeen River (n = 8 sites), with fishes collected using three passes of a 9.1 m bag seine. Twenty-two species (2,745 individuals) were captured, with *Notropis* sp., Rosyface Shiner (*Notropis rubellus*), Common Shiner (*Luxilus cornutus*), White Sucker (*Catostomus commersonii*) and *Luxilus* sp. being the most abundant species based on pooled abundance. Altogether, 105 Silver Shiner were captured (27 – 61 mm total length), with 101 captured from ten sites on the Saugeen River from Walkerton to Paisley and four captured from a single site on the North Saugeen near Lockerby. Fish community and habitat results are presented for both the Saugeen River and North Saugeen River. Results reaffirm the occurrence of Silver Shiner in the Saugeen watershed and may be useful to inform the spatial extent of critical habitat for the species.

RÉSUMÉ

Barnucz, J., Gáspárdy, R.C., Colm, J.E., and Drake, D.A.R. 2024. Targeted sampling for Silver Shiner (*Notropis photogenis*) in the Saugeen River, Ontario, 2021. Can. Data Rep. Fish. Aquat. Sci. 1359: vii + 28 p.

En juillet 2021, Pêches et Océans Canada a procédé à un échantillonnage ciblé pour mieux comprendre la répartition du méné miroir (*Notropis photogenis*; une espèce inscrite sur la liste des espèces menacées de la LEP) dans le bassin hydrographique de la rivière Saugeen, en Ontario. On a échantillonné 26 sites (total de 78 coups de senne) dans la rivière Saugeen (n = 18 sites) et la rivière North Saugeen (n = 8 sites); pour chaque site, on a hâlé une senne avec poche de 9,1 mètres à trois reprises afin de capturer des poissons. On a capturé 22 espèces (2 745 individus) et on a déterminé que les plus abondantes étaient *Notropis* sp., la tête rose (*Notropis rubellus*), le méné à nageoires rouges (*Luxilus cornutus*), le meunier noir (*Catostomus commersoni*) et *Luxilus* sp., d'après une analyse groupée de l'abondance. Au total, on a capturé 105 ménés miroirs (longueur totale entre 27 et 61 mm); 101 individus provenaient de dix sites de la rivière Saugeen situés entre Walkerton et Paisley, et 4 individus étaient issus d'un seul site de la rivière North Saugeen situé près de Lockerby. Les résultats relatifs à la communauté de poissons et à l'habitat sont présentés pour les rivières Saugeen et North Saugeen. Ils confirment la présence du méné miroir dans le bassin hydrographique de la rivière Saugeen et pourraient servir à déterminer l'étendue spatiale de l'habitat essentiel de l'espèce.

INTRODUCTION

Fisheries and Oceans Canada (DFO) has the responsibility to provide for the protection and recovery of fishes listed under the *Species at Risk Act* (SARA). To inform scientific aspects of the recovery process, DFO regularly conducts field sampling to satisfy research objectives for SARA-listed fishes, such as evaluating the distribution and abundance of species, determining species-habitat relationships, and better understanding the influence of threats and recovery actions. DFO data reports are published to support the Species at Risk Program by providing an overview of field activities and to provide a medium for archiving data associated with sampling SARA-listed fishes and their habitat.

This data report summarizes targeted sampling by DFO in 2021 to better understand the distribution of Silver Shiner (*Notropis photogenis*) in the Saugeen River watershed, Ontario. Silver Shiner is designated as Threatened under Schedule 1 of SARA in Canada due to its limited distribution and potential loss of habitat (COSEWIC 2011; Glass et al. 2016; DFO 2020). Silver Shiner distribution in Canada is limited to southern Ontario. Historically, this species was found in four watersheds in southwestern Ontario: Grand River, Thames River, Bronte Creek, and Sixteen Mile Creek (COSEWIC 2011). Recently, Gáspárdy et al. (2021) captured six Silver Shiner in the Saugeen River between Walkerton and Paisley, Ontario, and two Silver Shiner from the North Saugeen River east of Paisley, prompting further targeted sampling to better understand its distribution in the watershed.

In this study, a repeat sampling approach with a bag seine was used to collect fishes from 26 sites from the Saugeen River watershed. The primary objective was to determine the occurrence of Silver Shiner in the main branch of the Saugeen River from Walkerton to Paisley, and in the North Saugeen from Chesley to Lockerby. Results from this study will be used to inform assessments of Silver Shiner by COSEWIC, to inform the spatial extent of critical habitat, and to assist in the recovery of this species as part of the Canadian species at risk recovery planning process.

METHODS

STUDY SYSTEM AND SITE SELECTION

In July 2021, DFO visited the Saugeen River between Walkerton and Paisley (Figure 1a, Figure 1b) and the North Saugeen River between Chesley and Lockerby (Figure 1c). The initial goal was to sample 10 reaches (i.e., riffle-run-pool sequences) throughout both river sections. Sites along the Saugeen River were accessed from public lands or by canoe from public canoe launches, while sites along the North Saugeen River were accessed from public lands and road allowances. Generally, the approach was to ensure that the selected sites were equidistant within the river sections. Within a sampling reach, only pool and run habitats (sites) were sampled, given the preference for these habitats by Silver Shiner (Glass et al. 2016). Once a pool and run were selected, crews sampled the deepest areas within the pool and run habitat, but were limited to sampling wadeable areas (i.e., water depth < 1.5 m). In addition, efforts were made to re-sample sites from Gáspárdy et al. (2021) where Silver Shiner were captured (Figure 1a, Figure 1b, Figure 1c). In total, twenty-six sites from thirteen river reaches were sampled across both river sections, including nine river reaches in the Saugeen River section (18 sites) and four river reaches in the North Saugeen River section (eight sites) (Figure 1a, Figure 1b, Figure 1c).

FISH COMMUNITY SAMPLING

Seining Surveys

All sites, which encompassed either pool or run habitat, were sampled using wadeable seining. Dextrase et al. (2014) recommends seining as an effective gear for collecting Silver Shiner, though seining can be difficult in larger rivers as depth and/or flow increase. Sites were sampled with a 9.1 m wide x 1.8 m tall bag seine with a 1.8 m x 1.8 m x 1.8 m bag. The entire seine was constructed of 3 mm heavy delta mesh and was mounted on two 2.4 m wooden poles. Crews conducted three successive seine hauls in a downstream direction covering the same aquatic habitat at each site (Barnucz and Drake 2021; Gáspárdy et al. 2021). Effort was made to seine the entire area of habitat within each sampling site, though depth limitations effectively reduced sample coverage in many areas.

Enumeration of Fishes

Fishes were processed separately by haul at each site. Captured fishes were identified to the lowest practical taxonomic resolution (typically species), enumerated, and the minimum and maximum total length (mm) was recorded, per species, for each seine haul. In addition, individual total lengths (mm) and weights (g) were taken for all Silver Shiner captured. Not all Silver Shiner specimens were weighed as the scale did not always perform well due to environmental conditions at the site (e.g., wind, rain). Both photo and physical vouchers were taken for a subset of captured fishes to confirm species identity; specimens that could not be identified to species *in situ* and other sampling mortalities were retained for laboratory identification. Physical vouchers were preserved in 10% buffered Formalin and transferred to 70% ethanol after a minimum of 72 hours. Species identification was confirmed in the laboratory based on Holm et al. (2019a,b) and Holm and Burrige (2019). Small individuals that resembled Silver Shiner or similar species in the *Notropis* genus (Rosyface Shiner and Emerald Shiner [*N. atherinoides*]) were retained and reviewed in the laboratory to confirm species identity using meristics summarized in Jenkins and Burkhead (1993). Verification between Rosyface Shiner and Silver Shiner was determined based on differences between pelvic and pectoral fin ray counts, with Silver Shiner typically having 9 pelvic fin rays and 15 to 16 pectoral fin rays and Rosyface Shiner typically having 8 pelvic fin rays and 13 to 14 pectoral fin rays. *Notropis* specimens that were too small to identify or in poor condition, were identified as *Notropis* sp. The morphological traits used to assess Silver Shiner and Rosyface Shiner physical vouchers in the lab are summarized in Appendix 1.

HABITAT SAMPLING

Habitat sampling methods followed Gáspárdy et al. (2021) and Barnucz and Drake (2021). Habitat variables were measured at the midpoint of the site after fishes were processed and released and included various physical site and water chemistry parameters. Stream width (measured from bank to bank, perpendicular to the stream channel), sampled site width, and sampled site length were measured with a Nikon Laser 1200S waterproof laser range finder. Sampling area (m²) was calculated by multiplying sampling width and length. Stream depth was derived by obtaining the mean of three representative depth measurements within the site using a metre stick. Mean water velocity (m/s) was obtained by three representative measurements using an OTT MF Pro™ water flow meter placed at approximately 50% of the stream depth. Surface water temperature, conductivity, turbidity, and dissolved oxygen was measured using a YSI EXO2 multiparameter sonde. Turbidity was also measured using a 120 cm Fieldmaster turbidity tube. Air temperature was measured using a Kestrel 3000 Wind Meter. Substrate composition was assessed using a visual classification based on median particle diameters:

clay (0 – 0.002 mm), silt (0.002 – 0.02 mm), sand (0.02 – 2 mm), gravel (2 – 40 mm), cobble (40 – 256 mm), boulder (> 256 mm excluding bedrock), rubble (broken concrete or rip rap), and concrete (river or lake bottom consisting of a uniform man-made concrete surface). Substrate assessments were made over the entire sampled area and recorded as percent composition of each particle class. Site location (latitude, longitude) was determined using a Garmin Montana 600 handheld GPS unit. Aquatic macrophytes and riparian vegetation were described using a visual assessment. The coverage of four aquatic macrophyte classes (submerged, emergent, floating, open water) within the sampled area were recorded as a percentage. Similarly, the percent coverage was recorded for each riparian vegetation class (herbaceous, coniferous, deciduous, shrubs or none) immediately adjacent to each site.

SAMPLING PERMITS AND DATA ARCHIVING

Sampling for this project was conducted under SARA Permit Number 21-PCAA-00034. Seining was conducted following animal use Standard Operating Protocol GWACC-116, 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 code “2021-SSSR” 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, results may be updated as part of ongoing data verification procedures. Data associated with this report may be obtained by contacting the Great Lakes Laboratory for Fisheries and Aquatic Sciences.

RESULTS

FISH ASSEMBLAGE SAMPLING

Twenty-six sites, consisting of 78 seine hauls from 13 river reaches, were sampled in the Saugeen River and North Saugeen River (Figure 1a, Figure 1b, Figure 1c, Table 1). Seining area for each site is summarized in Appendix 2. A total of 2,745 fishes representing 22 species were captured across all sites from both waterbodies (Table 2, Appendix 3). Based on pooled catch data, the most abundant species across both waterbodies were *Notropis* sp. (25.7% of pooled catch), Rosyface Shiner (*Notropis rubellus*; 21.6%), Common Shiner (*Luxilus cornutus*; 11.0%), White Sucker (*Catostomus commersonii*; 5.6%), and *Luxilus* sp. (5.5%) (Table 2, Figure 2a, Figure 2b, Appendix 3). Of the 2,745 fishes captured, 1,252 fishes were kept as physical vouchers for lab verification with *Notropis* sp. and Rosyface Shiner consisting of 66% of the total fishes kept (Appendix 4). Photos of common fish species captured during this project are presented in Appendix 5.

Saugeen River

A total of 1,727 fishes representing 20 species were captured from the Saugeen River (18 sites) (Table 2, Appendix 3). The most abundant fishes in the Saugeen River were *Notropis* sp. (25.1%), Rosyface Shiner (21%), Common Shiner (12.3%), Golden Redhorse (*Moxostoma erythrurum*; 8.6%), and White Sucker (7.4%) (Table 2, Figure 2a). Silver Shiner was collected at 56% of sites (n = 10) from the Saugeen River (Table 3, Figure 2a, Appendix 3).

North Saugeen River

A total of 1,018 fishes representing 16 species were captured from the North Saugeen River (eight sites) (Table 2, Appendix 3). The most abundant fishes in the North Saugeen River

were *Notropis* sp. (26.7%), Rosyface Shiner (22.6%), *Luxilus* sp. (12.1%), Common Shiner (8.8%), and Creek Chub (*Semotilus atromaculatus*; 6.7%) (Table 2, Figure 2b). Silver Shiner was collected at 13% of sites (n = 1) from the North Saugeen River (Table 3, Figure 2b, Appendix 3).

Silver Shiner Sampling Results

Based on pooled catch data, 105 Silver Shiner were detected from 11 of 26 sampling sites across both waterbodies, including 101 specimens from the Saugeen River and four specimens from the North Saugeen River (Table 3, Appendix 3). Captured Silver Shiner ranged from 27 – 61 mm TL (mean: 45.3 mm) (Table 3, Figure 4). Seventy Silver Shiner were effectively weighed for this project, with weights ranging from 0.1 – 1.3 g (mean: 0.6 g) (Table 3, Figure 5). Due to the small size of many captured Silver Shiner (mean: 45.3 mm TL), 76 of 105 specimens were kept as physical vouchers for lab verification (Appendix 4).

HABITAT SAMPLING

Saugeen River

Habitat data for Saugeen River sites are summarized as follows: lotic habitat data are presented in Table 4a, site dimensions and hydrology in Table 5a, aquatic and riparian vegetation coverage in Table 5a, and substrate data in Table 6a. The water temperature of sampling sites in the Saugeen River ranged from 22.28 – 26.32°C (mean: 24.25°C), conductivity ranged from 540 – 603.0 µS (mean: 572.9 µS), dissolved oxygen ranged from 7.31 – 9.68 mg/L (mean: 8.62 mg/L), pH ranged from 8.89 – 9.91 (mean: 9.06), turbidity tube ranged from 0.61 – 1.09 m (mean: 0.81 m), and turbidity ranged from 3.88 – 9.69 NTU (mean: 6.60 NTU). The mean depth at each site ranged from 0.17 – 1.25 m (grand mean: 0.73 m), and the mean water velocity at each site ranged from 0.00 – 0.90 m/s (grand mean: 0.32 m/s). Aquatic macrophytes were absent from all 18 Saugeen River sites (open water was recorded as 100% coverage for all sites). Herbaceous riparian vegetation cover ranged from 5 – 95% (mean: 52%). The percent cover of 'no riparian vegetation' ranged from 5 – 90% (mean: 19%), shrub riparian vegetation cover ranged from 0 – 90% (mean: 14%), deciduous riparian vegetation cover ranged from 0 – 45% (mean: 12%), and coniferous riparian vegetation cover ranged from 0 – 50% (mean: 4%). The dominant riparian vegetation cover was herbaceous, which was dominant at 13 of 18 sites. Cobble substrate ranged from 5 – 90% coverage (mean: 45%), gravel substrate ranged from 0 – 90% (mean: 19%), sand substrate ranged from 0 – 90% (mean: 17%), boulder substrate ranged from 0 – 50% (mean: 7%), bedrock substrate ranged from 0 – 50% (mean: 3%), silt substrate ranged from 0 – 50% (mean: 7%), and, clay substrate ranged from 0 – 15% (mean: 1%). One of 18 sites had 5% organic substrate. The overall dominant substrate was cobble, which was dominant at 10 of 18 sites. Site photos are provided in Appendix 6 as examples of aquatic habitat where Silver Shiner was captured.

North Saugeen River

Habitat data for North Saugeen River sites are summarized as follows: lotic habitat data are presented in Table 4b, aquatic and riparian vegetation coverage in Table 5b, and substrate data in Table 6b. The water temperature of sampling sites in the North Saugeen River ranged from 21.77 – 26.42°C (mean: 23.17°C), conductivity ranged from 388.0 – 404.4 µS (mean: 395.1 µS), dissolved oxygen ranged from 7.75 – 10.33 mg/L (mean: 8.85 mg/L), pH ranged from 8.85 – 9.31 (mean: 9.07), turbidity tube ranged from 0.31 – 0.64 m (mean: 0.43 m), and turbidity ranged from 13.45 – 105.42 NTU (mean: 28.93 NTU). The mean depth at each site ranged from 0.22 – 0.72 m (grand mean: 0.43m) while the mean water velocity ranged from 0.00 – 0.84 m/s (grand mean: 0.33 m/s). Aquatic macrophytes were sparse at North Saugeen River sites, as

open water was the dominant class recorded at all eight sites and ranged in coverage from 95 – 100% (mean: 98%) and emergent macrophytes ranged from 0 – 5% (mean: 2%). Herbaceous riparian vegetation cover ranged from 0 – 100% (mean: 58%), the percent coverage of ‘no riparian vegetation’ ranged from 0 – 100% (mean: 38%), coniferous riparian vegetation cover ranged from 0 – 20% (mean: 3%), and deciduous riparian vegetation cover ranged from 0 – 15% (mean: 2%). The dominant riparian vegetation cover was herbaceous, which was dominant at five of eight sites. Cobble substrate ranged from 0 – 80% coverage (mean: 24%), concrete ranged from 0 – 60% (mean: 16%), gravel substrate ranged from 0 – 50% (mean: 15%), silt substrate ranged from 0 – 80% (mean: 14%), boulder substrate ranged from 0 – 40% (mean: 14%), sand substrate ranged from 0 – 30% (mean: 13%), hardpan substrate ranged from 0 – 20% (mean: 3%), and organic substrate ranged from 0 – 10% (mean: 3%). The dominant substrate across all sites was variable with cobble, concrete, and gravel being the dominant substrate at two sites each. The two sites with concrete as the dominant substrate both contained box culverts. Site photos are provided in Appendix 6 as visual examples of aquatic habitat where Silver Shiner was captured.

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Table 1. Sampling locations and sampling effort in the Saugeen River (a), and North Saugeen River (b), 2021.

a) Saugeen River

Site ID	Field number	Date	Latitude	Longitude	Sampling effort (seine hauls)	Site Identifier (Pool/Run)
1	2021-SSSR-210721-003A	July 21, 2021	44.13544	-81.15564	3	Pool
2	2021-SSSR-210721-004A	July 21, 2021	44.13526	-81.15583	3	Run
3	2021-SSSR-060721-001A	July 6, 2021	44.14669	-81.17172	3	Pool
4	2021-SSSR-060721-002A	July 6, 2021	44.14915	-81.17126	3	Run
5	2021-SSSR-060721-004A	July 6, 2021	44.18364	-81.19571	3	Run
6	2021-SSSR-060721-003A	July 6, 2021	44.18375	-81.19625	3	Pool
7	2021-SSSR-060721-006A	July 6, 2021	44.20264	-81.19261	3	Run
8	2021-SSSR-060721-005A	July 6, 2021	44.20237	-81.19317	3	Pool
9*	2021-SSSR-070721-002A	July 7, 2021	44.22689	-81.16563	3	Run
10*	2021-SSSR-070721-001A	July 7, 2021	44.22721	-81.16547	3	Pool
11	2021-SSSR-050721-001A	July 5, 2021	44.24945	-81.19192	3	Run
12	2021-SSSR-050721-002A	July 5, 2021	44.24908	-81.19511	3	Pool
13	2021-SSSR-050721-003A	July 5, 2021	44.25246	-81.20606	3	Run
14	2021-SSSR-050721-004A	July 5, 2021	44.25256	-81.20618	3	Pool
15	2021-SSSR-200721-001A	July 20, 2021	44.27116	-81.21899	3	Run
16	2021-SSSR-200721-002A	July 20, 2021	44.27104	-81.21960	3	Pool
17	2021-SSSR-200721-003A	July 20, 2021	44.29471	-81.24984	3	Pool
18	2021-SSSR-200721-004A	July 20, 2021	44.29476	-81.24959	3	Run

b) North Saugeen River

Site ID	Field number	Date	Latitude	Longitude	Sampling effort (seine hauls)	Site Identifier (Pool/Run)
19	2021-SSSR-210721-002A	July 21, 2021	44.29710	-81.17314	3	Pool
20	2021-SSSR-210721-001A	July 21, 2021	44.29710	-81.17326	3	Run
21*	2021-SSSR-130721-001A	July 13, 2021	44.30402	-81.21525	3	Pool
22*	2021-SSSR-130721-002A	July 13, 2021	44.30419	-81.21527	3	Run
23	2021-SSSR-120721-002A	July 12, 2021	44.31869	-81.24320	3	Pool
24	2021-SSSR-120721-001A	July 12, 2021	44.31867	-81.24351	3	Run
25	2021-SSSR-130721-003A	July 13, 2021	44.31754	-81.24532	3	Run
26	2021-SSSR-190721-001A	July 19, 2021	44.31790	-81.24530	3	Run

*2019 Silver Shiner re-sampled sites (Gáspárdy et al. 2021)

Table 2. Total fishes captured by seine net in the Saugeen River (n = 18 sites) and the North Saugeen River (n = 8 sites) in 2021. Species count excludes genus level identifications and hybrids of species already accounted for.

Common name	Scientific name	Saugeen River	North Saugeen River	Total
Rock Bass	<i>Ambloplites rupestris</i>	0	2	2
Black Bullhead	<i>Ameiurus melas</i>	0	5	5
Central Stoneroller	<i>Campostoma anomalum</i>	13	0	13
White Sucker	<i>Catostomus commersonii</i>	128	26	154
Rainbow Darter	<i>Etheostoma caeruleum</i>	19	3	22
Johnny Darter	<i>Etheostoma nigrum</i>	27	1	28
Northern Hogsucker	<i>Hypentelium nigricans</i>	43	3	46
Striped Shiner	<i>Luxilus chrysocephalus</i>	39	25	64
Common Shiner	<i>Luxilus cornutus</i>	213	90	303
Common Shiner X Rosyface Shiner hybrid	<i>Luxilus cornutus X Notropis rubellus</i>	1	0	1
<i>Luxilus sp.</i>	<i>Luxilus sp.</i>	29	123	152
Smallmouth Bass	<i>Micropterus dolomieu</i>	44	15	59
Silver Redhorse	<i>Moxostoma anisurum</i>	1	0	1
Golden Redhorse	<i>Moxostoma erythrurum</i>	148	0	148
River Chub	<i>Nocomis micropogon</i>	53	60	113
Silver Shiner*	<i>Notropis photogenis*</i>	101	4	105
Rosyface Shiner	<i>Notropis rubellus</i>	362	230	592
<i>Notropis sp.</i>	<i>Notropis sp.</i>	434	272	706
Mimic Shiner	<i>Notropis volucellus</i>	7	0	7
Rainbow Trout	<i>Oncorhynchus mykiss</i>	15	0	15
Chinook Salmon	<i>Oncorhynchus tshawytscha</i>	5	0	5
Blackside Darter	<i>Percina maculata</i>	21	2	23
Bluntnose Minnow	<i>Pimephales notatus</i>	3	36	39
Longnose Dace	<i>Rhinichthys cataractae</i>	10	53	63
Creek Chub	<i>Semotilus atromaculatus</i>	11	68	79
	Total individuals	1727	1018	2745
	Number of species	20	16	22

* SARA-listed species

Table 3. Total length (TL; mm) and mass (g) of Silver Shiner (*Notropis photogenis*) captured in the Saugeen River and North Saugeen Rivers, by seine haul (first, second, or third haul) in 2021. An asterisk (*) indicates weight not taken in the field.

Site ID	Waterbody name	Haul	TL	Mass
3	Saugeen River	1	41	*
7	Saugeen River	1	40	*
7	Saugeen River	1	40	*
7	Saugeen River	1	41	*
7	Saugeen River	1	41	*
7	Saugeen River	2	44	*
7	Saugeen River	3	42	*
7	Saugeen River	3	41	*
7	Saugeen River	3	43	*
7	Saugeen River	3	42	*
7	Saugeen River	3	42	*
7	Saugeen River	3	43	*
7	Saugeen River	3	42	*
7	Saugeen River	3	42	*
7	Saugeen River	3	43	*
8	Saugeen River	1	38	*
8	Saugeen River	1	39	*
8	Saugeen River	1	39	*
8	Saugeen River	2	40	*
8	Saugeen River	2	43	*
8	Saugeen River	2	35	*
8	Saugeen River	2	40	*
8	Saugeen River	2	41	*
8	Saugeen River	3	41	*
8	Saugeen River	3	36	*
8	Saugeen River	3	42	*
8	Saugeen River	3	41	*
8	Saugeen River	3	36	*
9	Saugeen River	2	27	*
9	Saugeen River	2	34	*
10	Saugeen River	1	46	0.3
10	Saugeen River	1	49	0.4
10	Saugeen River	1	45	0.2
10	Saugeen River	1	46	0.2
10	Saugeen River	1	47	0.3
10	Saugeen River	1	43	0.2
10	Saugeen River	1	32	0.1
10	Saugeen River	1	45	0.2
10	Saugeen River	1	44	0.3
10	Saugeen River	1	50	0.3

Site ID	Waterbody name	Haul	TL	Mass
10	Saugeen River	1	45	0.2
10	Saugeen River	2	36	0.1
10	Saugeen River	2	34	0.1
10	Saugeen River	2	35	0.1
10	Saugeen River	2	48	0.3
10	Saugeen River	2	36	0.1
10	Saugeen River	3	33	0.1
10	Saugeen River	3	45	0.2
10	Saugeen River	3	39	0.2
10	Saugeen River	3	48	0.3
11	Saugeen River	2	45	*
15	Saugeen River	1	57	1.1
15	Saugeen River	1	57	1.1
15	Saugeen River	2	48	0.6
15	Saugeen River	2	42	0.5
16	Saugeen River	2	45	0.6
16	Saugeen River	2	53	0.7
16	Saugeen River	2	52	0.5
16	Saugeen River	2	57	0.9
16	Saugeen River	2	56	1.1
16	Saugeen River	3	58	0.9
16	Saugeen River	3	57	1.1
16	Saugeen River	3	59	1.2
16	Saugeen River	3	61	1.1
16	Saugeen River	3	55	0.8
16	Saugeen River	3	51	0.7
17	Saugeen River	2	52	0.8
17	Saugeen River	2	44	0.5
17	Saugeen River	2	45	0.5
17	Saugeen River	2	50	0.8
17	Saugeen River	2	41	0.3
17	Saugeen River	2	48	0.5
17	Saugeen River	3	53	1.1
17	Saugeen River	3	50	1.0
17	Saugeen River	3	57	1.1
17	Saugeen River	3	52	0.9
17	Saugeen River	3	48	0.5
17	Saugeen River	3	46	0.7
17	Saugeen River	3	54	1.0
17	Saugeen River	3	48	0.6
17	Saugeen River	3	46	0.6
17	Saugeen River	3	46	0.5
17	Saugeen River	3	56	1.3
18	Saugeen River	1	38	0.4

Site ID	Waterbody name	Haul	TL	Mass
18	Saugeen River	2	57	1.2
18	Saugeen River	2	46	0.6
18	Saugeen River	2	46	0.6
18	Saugeen River	2	51	0.8
18	Saugeen River	2	46	0.6
18	Saugeen River	3	40	0.4
18	Saugeen River	3	51	0.9
18	Saugeen River	3	52	0.9
18	Saugeen River	3	47	0.7
18	Saugeen River	3	58	1.2
18	Saugeen River	3	57	1.2
18	Saugeen River	3	40	0.4
18	Saugeen River	3	47	0.6
18	Saugeen River	3	37	0.4
18	Saugeen River	3	46	0.6
18	Saugeen River	3	36	0.3
18	Saugeen River	3	50	0.8
25	North Saugeen River	1	44	*
25	North Saugeen River	1	45	*
25	North Saugeen River	1	46	*
25	North Saugeen River	1	44	*
	Minimum		27	0.1
	Mean		45.3	0.6
	Maximum		61	1.3
	Count		105	70

Table 4. Lotic habitat data from the Saugeen River (a) and North Saugeen River (b) in 2021.

a) Saugeen River

Site ID	Water temp. (°C)	Conductivity (µS/cm)	Dissolved oxygen (mg/L)	pH	Turbidity tube (m)	Turbidity (NTU)	Mean depth (m)	Mean water velocity (m/sec)
1	22.28	556.0	9.63	8.90	0.86	4.02	0.51	0.24
2	22.28	556.0	9.68	8.89	0.87	3.88	0.74	0.39
3	23.39	569.0	8.00	9.01	0.84	6.45	0.69	0.30
4	23.50	573.0	8.24	9.00	0.91	5.44	0.89	0.60
5	25.56	595.0	9.33	9.07	0.83	5.69	0.59	0.67
6	25.77	596.0	9.36	9.11	1.09	4.40	0.70	0.00
7	26.32	603.0	9.32	9.17	0.85	4.76	0.75	0.65
8	25.93	599.0	9.10	9.91	1.06	4.70	0.82	0.54
9*	24.03	584.0	7.50	9.06	0.90	8.92	0.98	0.47
10*	24.12	586.0	7.31	9.04	0.61	7.97	0.53	0.35
11	24.31	572.0	8.25	9.00	0.63	6.47	0.33	0.37
12	24.76	570.0	8.45	9.02	0.65	7.50	0.49	0.14
13	25.10	575.0	8.50	9.06	0.77	7.45	0.99	0.26
14	25.19	576.0	8.56	9.04	0.79	6.55	0.90	0.36
15	22.57	540.0	7.78	8.93	0.76	8.36	0.65	0.26
16	22.94	545.0	7.98	8.92	0.72	7.39	0.93	0.02
17	23.99	556.0	9.01	9.01	0.68	9.16	0.67	0.17
18	24.44	561.0	9.21	9.00	0.68	9.69	0.91	0.05
Min.	22.28	540.0	7.31	8.89	0.61	3.88	0.17	0.00
Mean	24.25	572.9	8.62	9.06	0.81	6.60	0.73	0.32
Max.	26.32	603.0	9.68	9.91	1.09	9.69	1.25	0.90

b) North Saugeen River

Site ID	Water temp. (°C)	Conductivity (µS/cm)	Dissolved oxygen (mg/L)	pH	Turbidity tube (m)	Turbidity (NTU)	Mean depth (m)	Mean water velocity (m/sec)
19	22.49	391.5	9.03	8.86	0.44	14.25	0.34	0.21
20	21.94	388.0	8.65	8.85	0.41	16.16	0.27	0.48
21*	21.77	392.5	7.76	9.06	0.35	21.03	0.34	0.15
22*	21.77	392.4	7.75	9.04	0.35	20.68	0.37	0.54
23	24.75	404.4	9.99	9.26	0.46	105.42	0.47	0.00
24	23.80	397.5	10.33	9.31	0.64	15.33	0.72	0.28
25	22.40	391.3	7.76	9.08	0.31	25.10	0.55	0.15
26	26.42	403.5	9.55	**	0.45	13.45	0.36	0.84
Min.	21.77	388.0	7.75	8.85	0.31	13.45	0.22	0.00
Mean	23.17	395.1	8.85	9.07	0.43	28.93	0.43	0.33
Max.	26.42	404.4	10.33	9.31	0.64	105.42	0.72	0.84

*2019 Silver Shiner re-sampled sites (Gáspárdy et al. 2021); ** erroneous measurement

Table 5. Aquatic and riparian vegetation coverage from sampling sites in the Saugeen River (a) and North Saugeen River (b) in 2021. Values represent the percent coverage of both aquatic vegetation and riparian vegetation classes.

a) Saugeen River

Site ID	Aquatic vegetation						Riparian vegetation					
	Emergent	Floating	Submerged	Open water	Dominant class	Dominant sp.	Deciduous	Coniferous	Herbaceous	Shrubs	None	Dominant class
1	0	0	0	100	Open water	-	20	0	70	5	5	Herbaceous
2	0	0	0	100	Open water	-	20	0	60	0	20	Herbaceous
3	0	0	0	100	Open water	-	35	5	50	0	10	Herbaceous
4	0	0	0	100	Open water	-	5	0	40	40	15	Herbaceous
5	0	0	0	100	Open water	-	0	0	10	70	20	Shrubs
6	0	0	0	100	Open water	-	0	0	5	15	80	None
7	0	0	0	100	Open water	-	30	0	60	0	10	Herbaceous
8	0	0	0	100	Open water	-	20	0	70	0	10	Herbaceous
9*	0	0	0	100	Open water	-	0	0	90	0	10	Herbaceous
10*	0	0	0	100	Open water	-	0	20	75	0	5	Herbaceous
11	0	0	0	100	Open water	-	0	0	95	0	5	Herbaceous
12	0	0	0	100	Open water	-	45	0	50	0	5	Herbaceous
13	0	0	0	100	Open water	-	30	50	10	0	10	Coniferous
14	0	0	0	100	Open water	-	5	0	90	0	5	Herbaceous
15	0	0	0	100	Open water	-	0	0	5	90	5	Shrubs
16	0	0	0	100	Open water	-	0	0	5	5	90	None
17	0	0	0	100	Open water	-	0	0	60	20	20	Herbaceous
18	0	0	0	100	Open water	-	0	0	85	5	10	Herbaceous
Min.	0	0	0	100	-	-	0	0	5	0	5	-
Mean	0	0	0	100	Open water	-	12	4	52	14	19	Herbaceous
Max.	0	0	0	100	-	-	45	50	95	90	90	-

b) North Saugeen River

Site ID	Aquatic vegetation						Riparian vegetation					
	Emergent	Floating	Submerged	Open water	Dominant class	Dominant sp.	Deciduous	Coniferous	Herbaceous	Shrubs	None	Dominant class
19	5	0	0	95	Open water	<i>Scirpus sp.</i>	15	0	80	0	5	Herbaceous
20	0	0	0	100	Open water	-	0	0	15	0	85	None
21*	0	0	0	100	Open water	-	0	0	20	0	80	None
22*	0	0	0	100	Open water	-	0	0	0	0	100	None
23	5	0	0	95	Open water	<i>Sagittaria sp.</i>	0	0	70	0	30	Herbaceous
24	0	0	0	100	Open water	-	0	20	80	0	0	Herbaceous
25	5	0	0	95	Open water	<i>Sagittaria sp.</i>	0	0	100	0	0	Herbaceous
26	0	0	0	100	Open water	-	0	0	95	0	5	Herbaceous
Min.	0	0	0	95	-	-	0	0	0	0	0	-
Mean	2	0	0	98	Open water	-	2	3	58	0	38	Herbaceous
Max.	5	0	0	100	-	-	15	20	100	0	100	-

*2019 Silver Shiner re-sampled sites (Gáspárdy et al. 2021)

Table 6. Substrate results from sampling sites in the Saugeen River (a) and North Saugeen River (b), 2021. Values represent the percent coverage of each substrate class.

a) Saugeen River

Site ID	Organic	Clay	Silt	Sand	Gravel	Cobble	Boulder	Bedrock	Hardpan	Rubble	Concrete	Dominant class	Notes
1	0	0	0	40	40	20	0	0	0	0	0	Gravel	-
2	0	0	0	0	5	40	5	50	0	0	0	Bedrock	-
3	0	0	5	15	35	40	5	0	0	0	0	Cobble	-
4	0	0	0	0	5	45	50	0	0	0	0	Boulder	-
5	0	0	0	0	20	75	5	0	0	0	0	Cobble	-
6	5	0	50	30	10	5	0	0	0	0	0	Silt	-
7	0	0	0	0	10	90	0	0	0	0	0	Cobble	-
8	0	0	5	30	60	5	0	0	0	0	0	Gravel	-
9*	0	0	0	5	20	70	5	0	0	0	0	Cobble	-
10*	0	0	5	50	15	25	5	0	0	0	0	Sand	-
11	0	0	0	5	40	50	5	0	0	0	0	Cobble	-
12	0	5	10	40	35	10	0	0	0	0	0	Sand	-
13	0	0	0	90	0	10	0	0	0	0	0	Sand	-
14	0	0	0	0	0	75	25	0	0	0	0	Cobble	-
15	0	0	5	0	5	85	5	0	0	0	0	Cobble	-
16	0	0	5	0	10	80	5	0	0	0	0	Cobble	-
17	0	15	5	5	30	35	10	0	0	0	0	Cobble	-
18	0	0	35	0	10	50	5	0	0	0	0	Cobble	-
Min.	0	0	0	0	0	5	0	0	0	0	0	-	-
Mean	0	1	7	17	19	45	7	3	0	0	0	Cobble	-
Max.	5	15	50	90	60	90	50	50	0	0	0	-	-

b) North Saugeen River

Site ID	Organic	Clay	Silt	Sand	Gravel	Cobble	Boulder	Bedrock	Hardpan	Rubble	Concrete	Dominant class	Notes
19	0	0	5	10	10	65	10	0	0	0	0	Cobble	-
20	0	0	0	0	0	80	20	0	0	0	0	Cobble	-
21*	5	0	5	30	0	0	5	0	0	0	55	Concrete	box culvert
22*	0	0	0	5	10	0	25	0	0	0	60	Concrete	box culvert
23	10	0	80	10	0	0	0	0	0	0	0	Silt	-
24	0	0	0	5	10	10	40	0	20	0	15	Boulder	-
25	5	0	20	30	40	0	5	0	0	0	0	Gravel	-
26	0	0	0	10	50	35	5	0	0	0	0	Gravel	-
Min.	0	0	0	0	0	0	0	0	0	0	0	-	-
Mean	3	0	14	13	15	24	14	0	3	0	16	Cobble	-
Max.	10	0	80	30	50	80	40	0	20	0	60	-	-

*2019 Silver Shiner re-sampled sites (Gáspárdy et al. 2021)

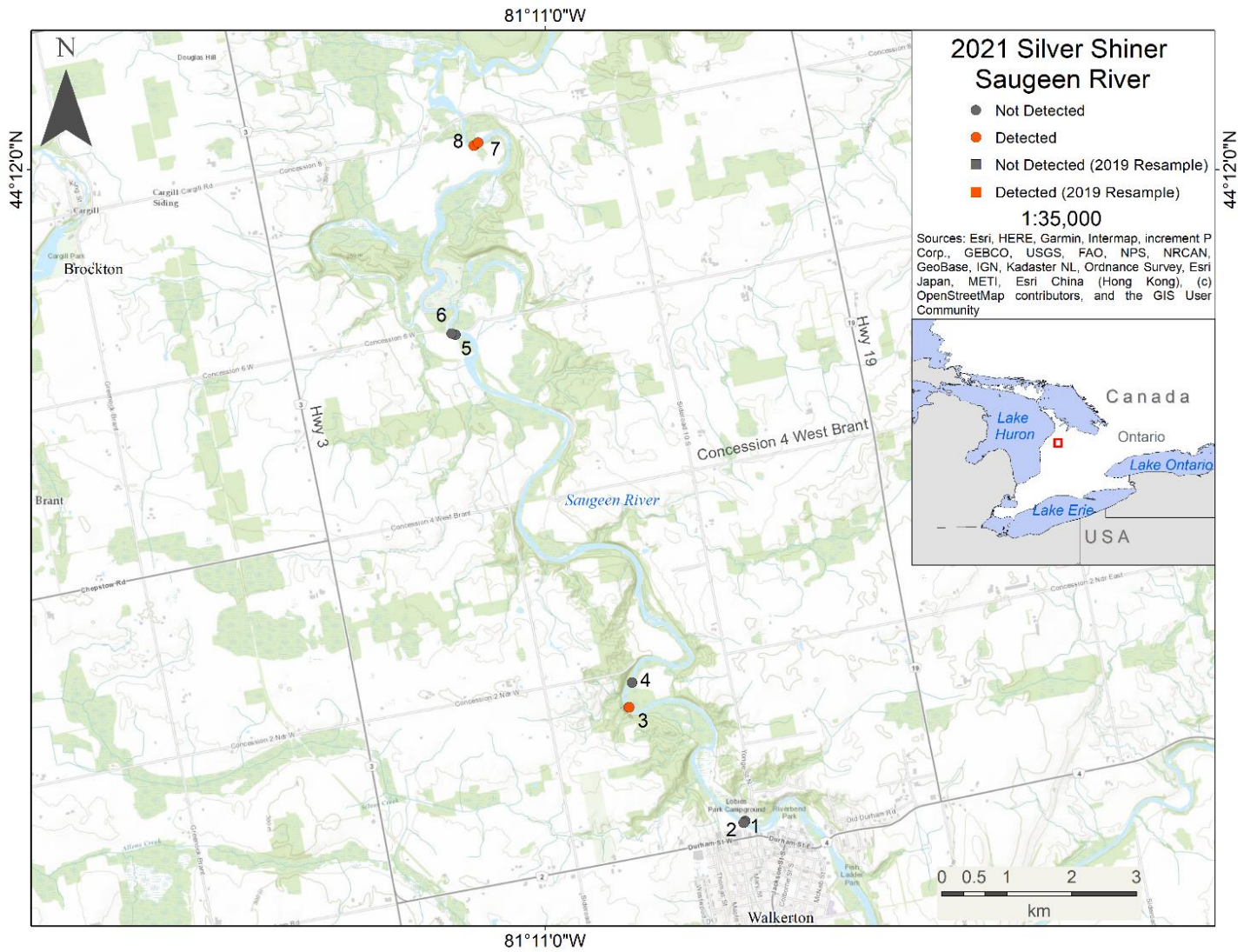


Figure 1a. Sampling locations for Silver Shiner (*Notropis photogenis*) in the Saugeen River between Walkerton and Brockton, Ontario (2021).

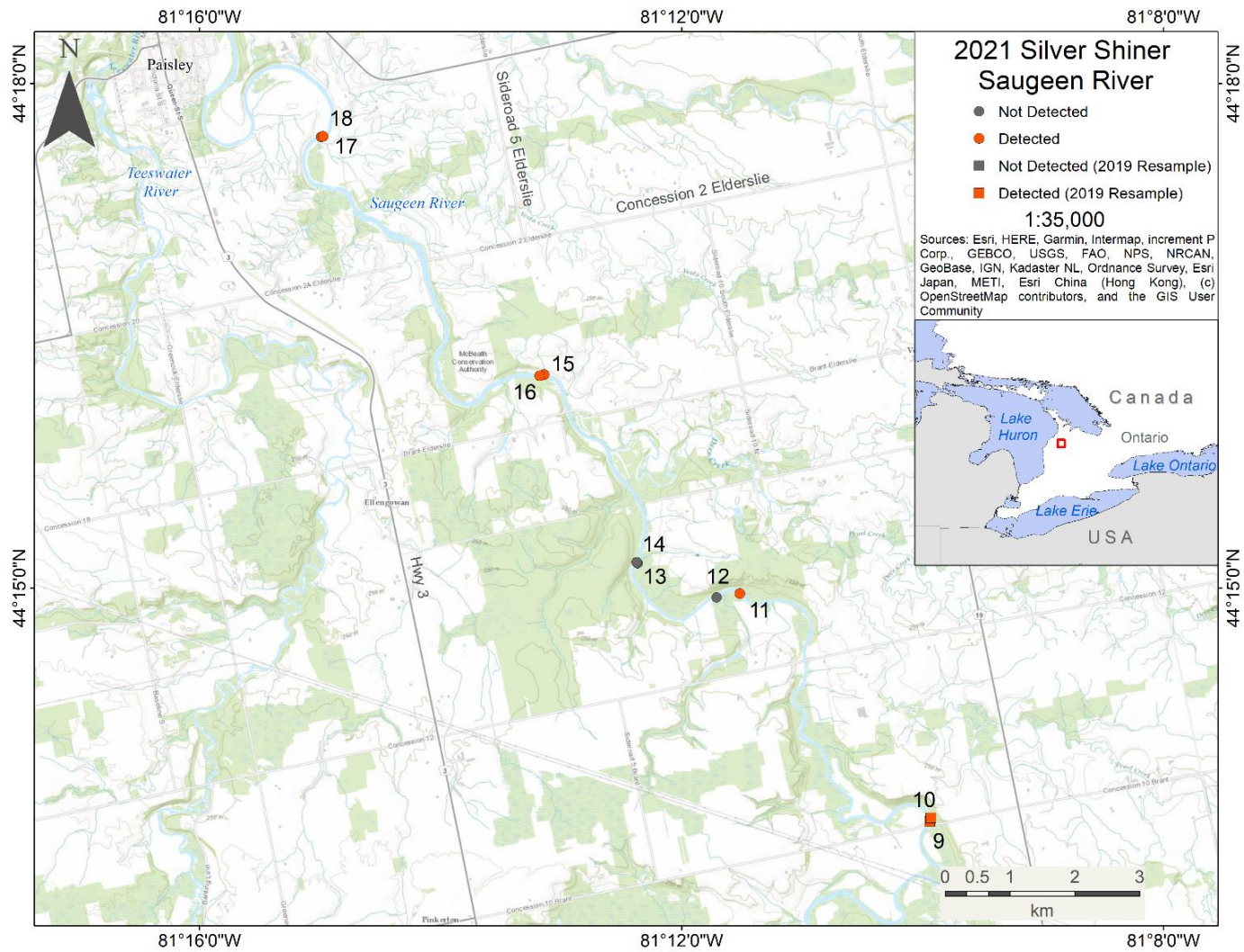


Figure 1b. Sampling locations for Silver Shiner (*Notropis photogenis*) in the Saugeen River between Brockton and Paisley, Ontario (2021)

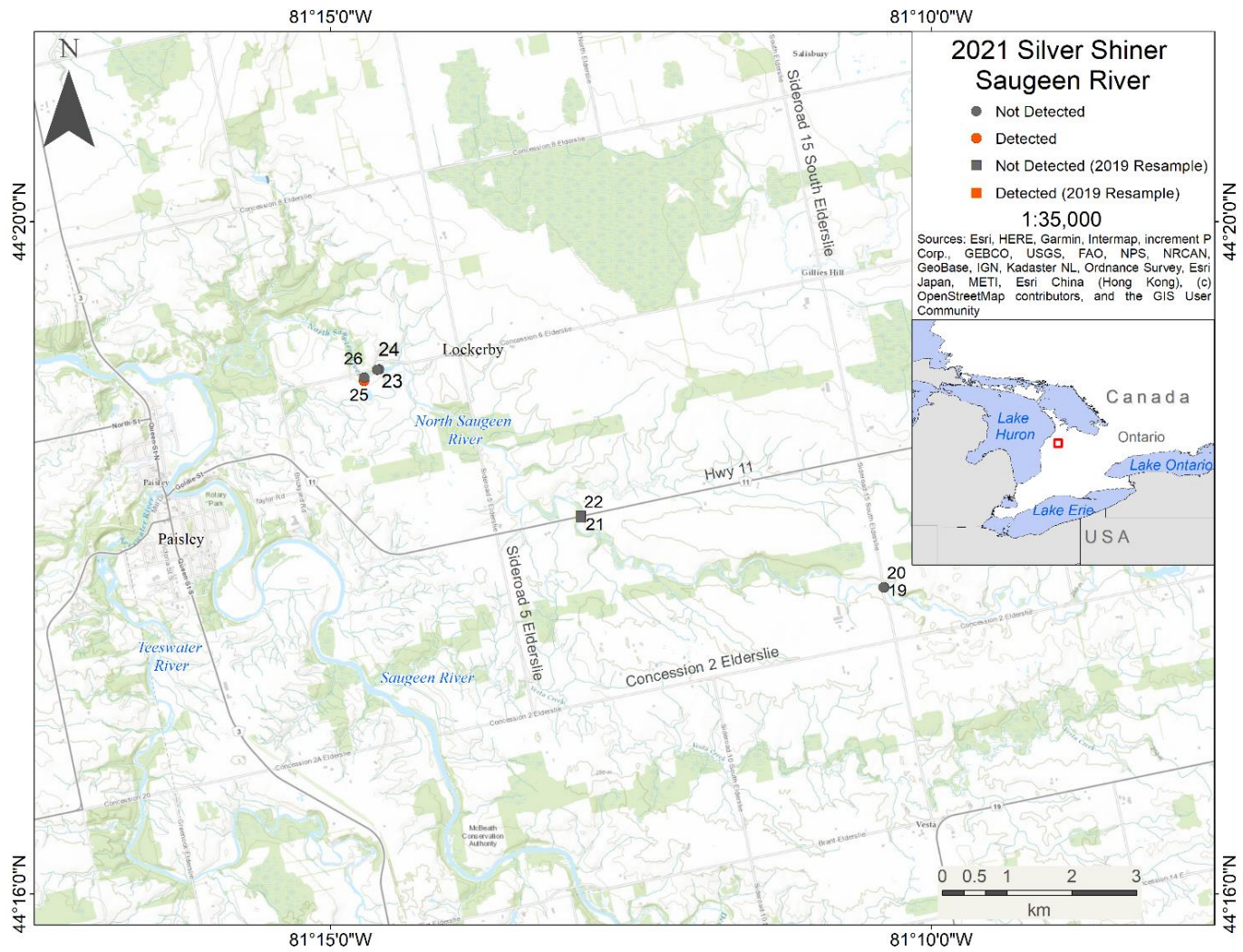


Figure 1c. Sampling locations for Silver Shiner (*Notropis photogenis*) in the North Saugeen River (2021).

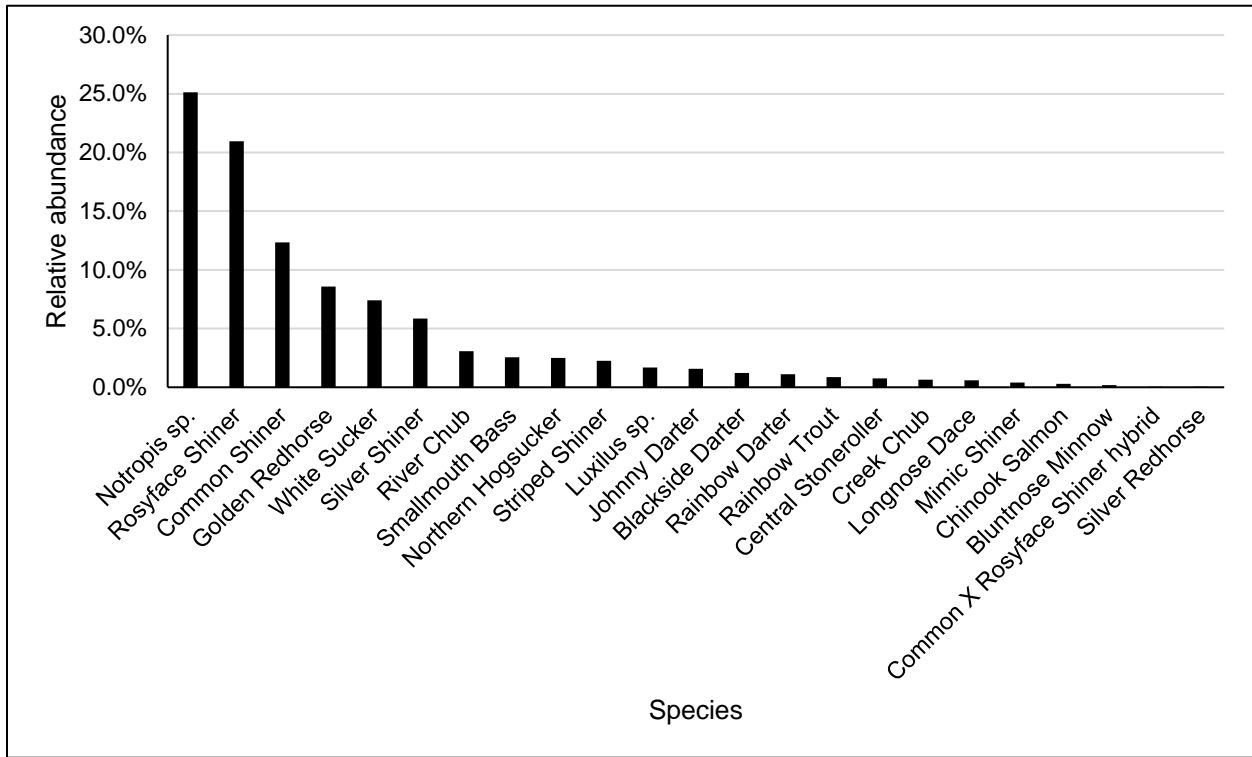


Figure 2a. Relative abundance of fishes captured in the Saugeen River during 2021 sampling (pooled relative abundance; n = 18 sites).

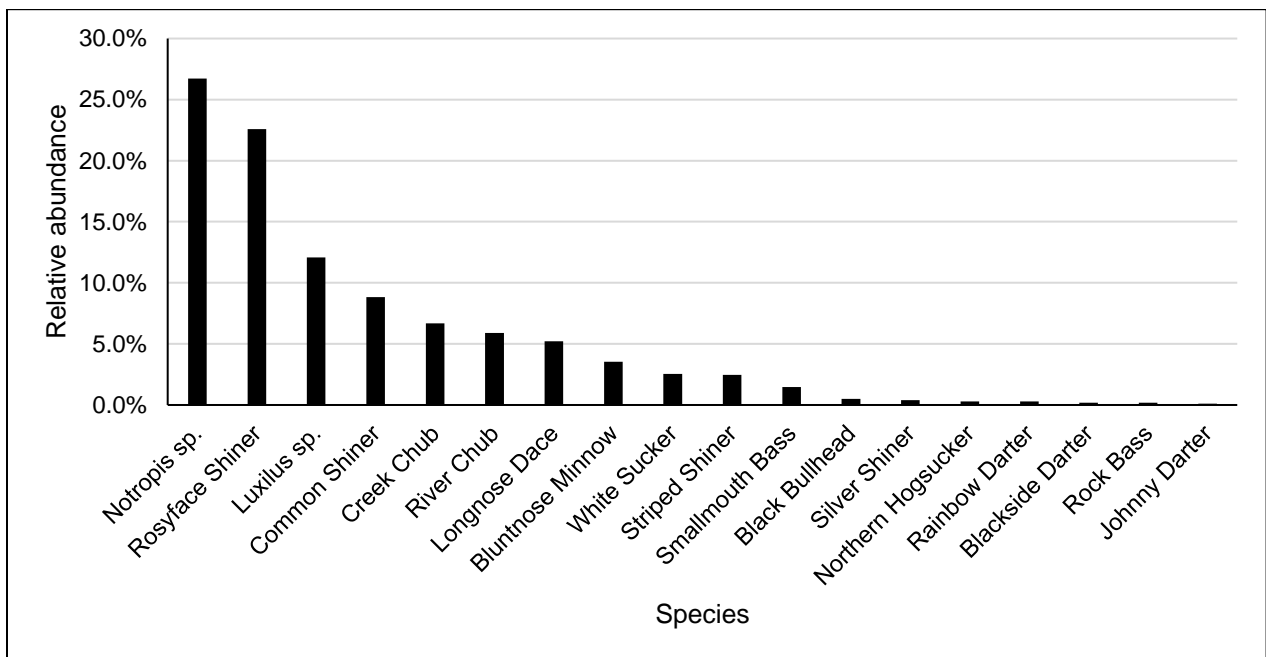


Figure 2b. Relative abundance of fishes captured in the North Saugeen River during 2021 sampling (pooled relative abundance; n = 8 sites).

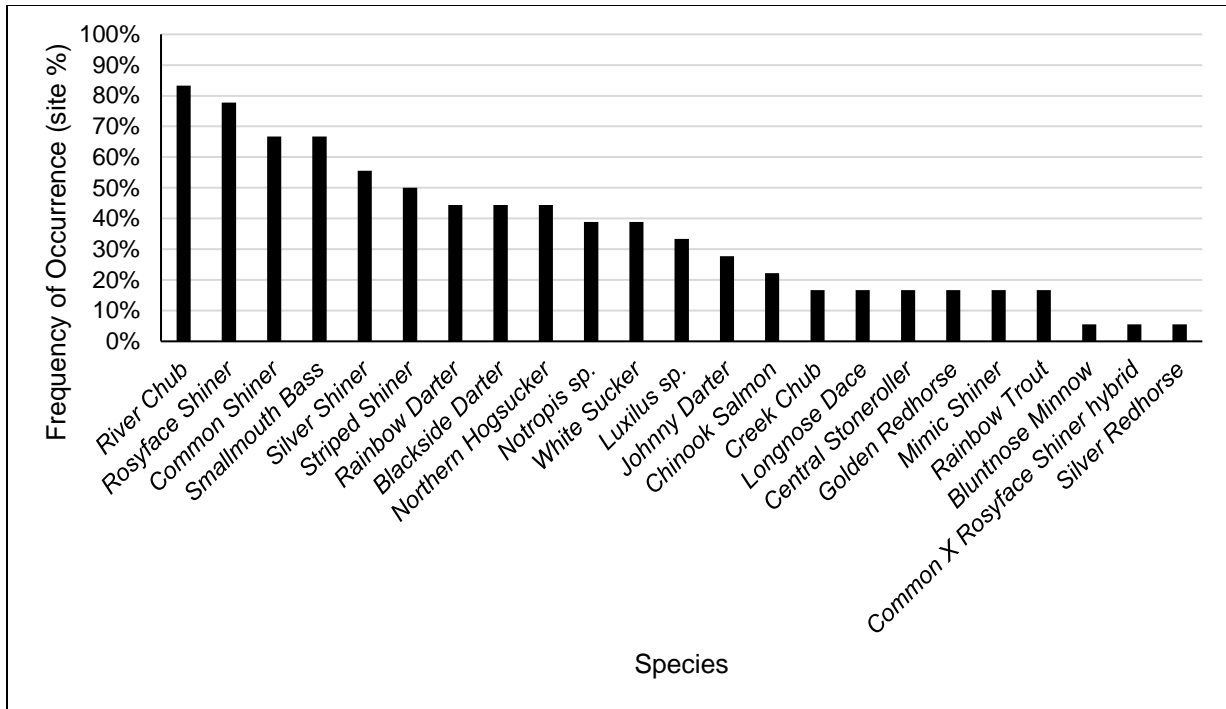


Figure 3a. Frequency of occurrence of fishes as percentage of sites at which each species was detected in the Saugeen River during 2021 sampling. Species are listed in order of most- to least-frequently occurring species (n = 18 sites).

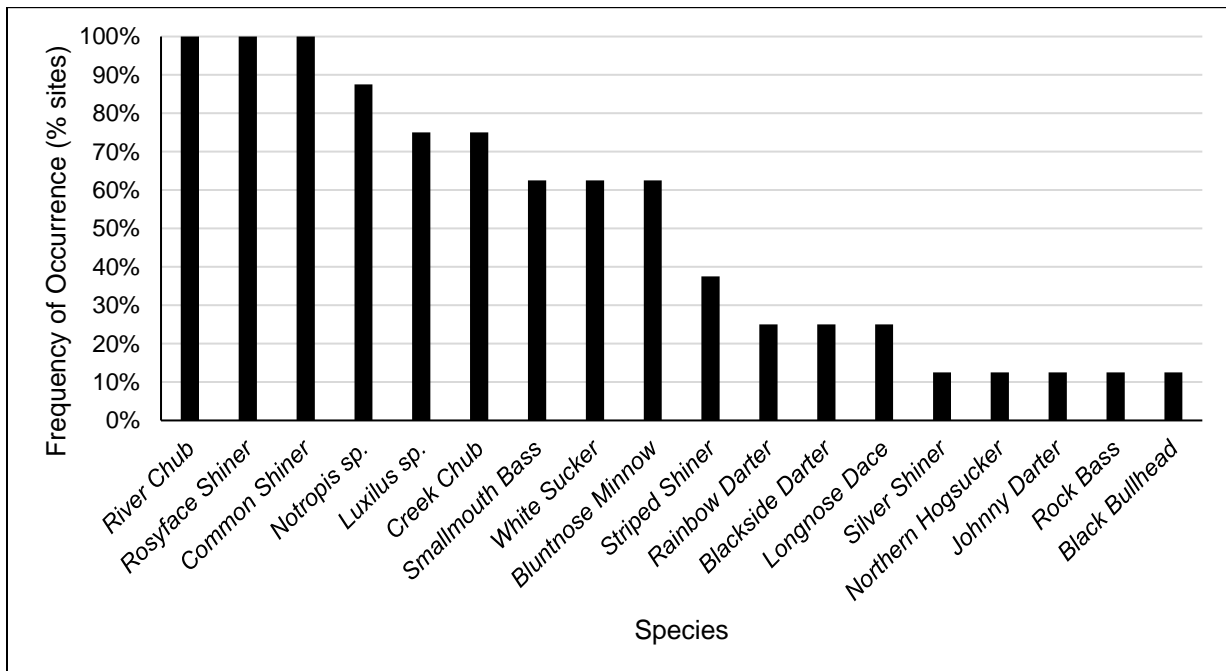


Figure 3b. Frequency of occurrence of fishes as percentage of sites at which each species was detected in the North Saugeen River during 2021 sampling. In order of most frequently occurring species (n = 8 sites).

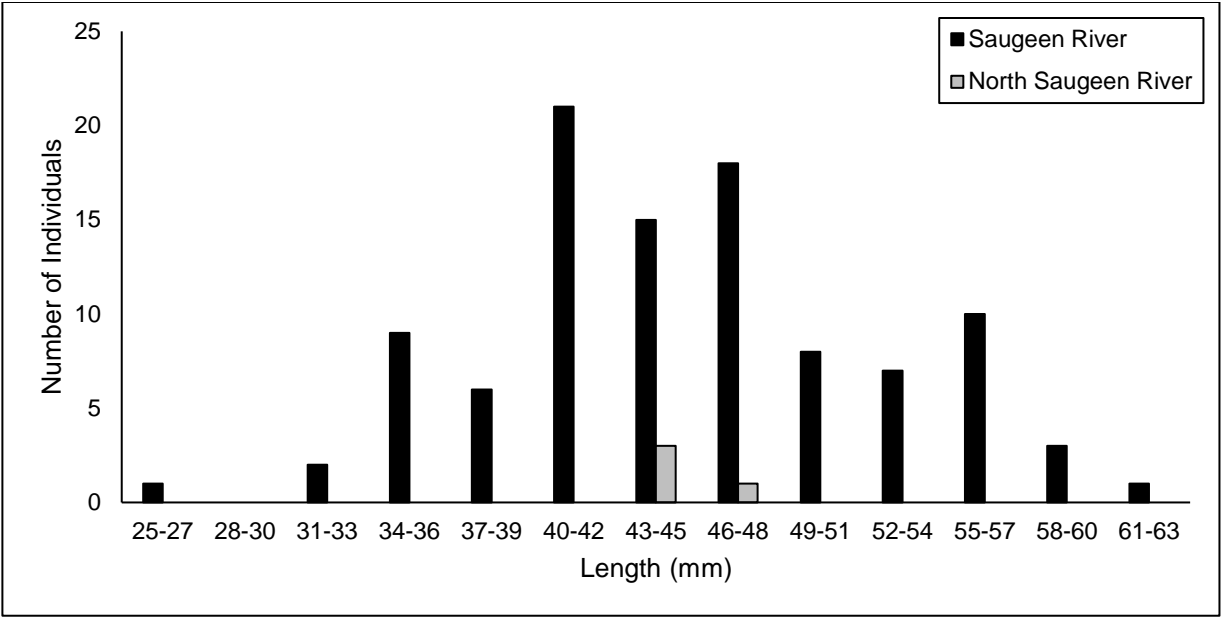


Figure 4. Length-frequency of captured Silver Shiner (*Notropis photogenis*) from the Saugeen River and North Saugeen River in 2021.

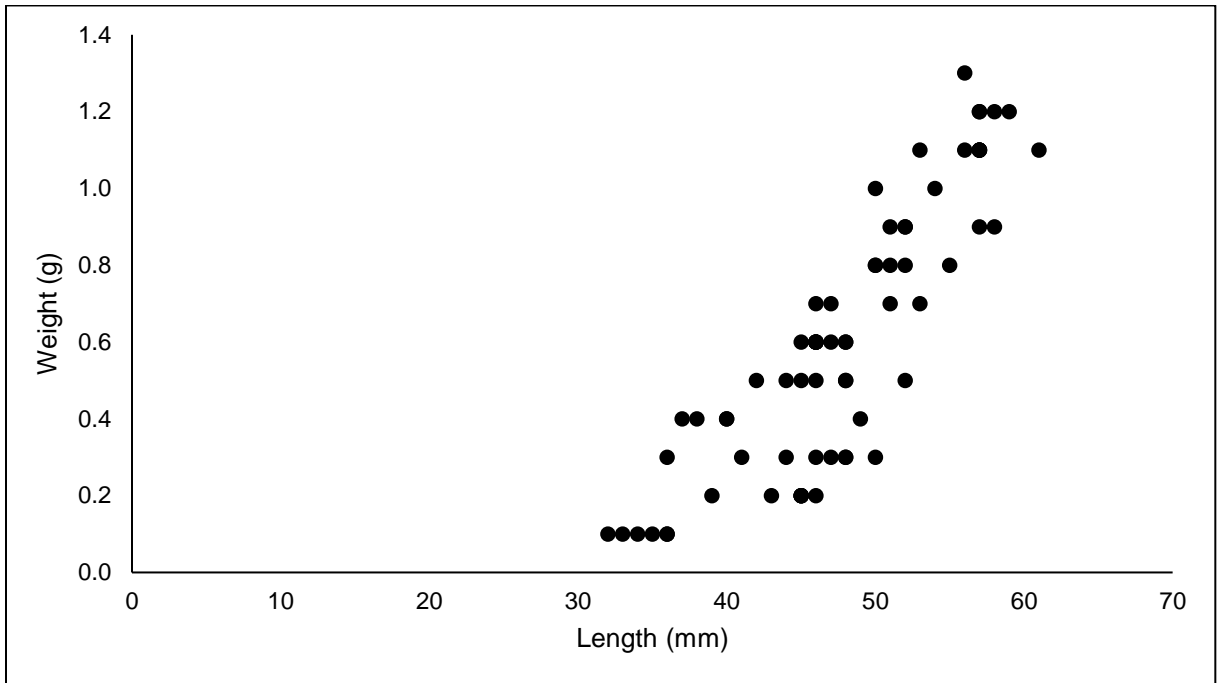


Figure 5. Total length (mm) and weight (g) of Silver Shiner (*Notropis photogenis*) captured from the Saugeen River in 2021.

Appendix 1. Summary of meristic differences between Silver Shiner (*Notropis photogenis*), Rosyface Shiner (*Notropis rubellus*), and Emerald Shiner (*Notropis atherinoides*) used in laboratory analysis of captured specimens, modified from Jenkins and Burkhead (1993).

Species	Morphological differences
Silver Shiner (<i>Notropis photogenis</i>)	Somewhat pointed snout or slightly rounded snout; dorsal fin origin above or slightly posterior to the posterior insertion of the pelvic fin; lateral line scales (36)39 – 41; scale rows above lateral line 5; pre-dorsal scales less than 22; dorsal rays 8; anal rays (9)10 – 11(13); pelvic rays (8)9(10); pectoral rays 15 – 17.
Rosyface Shiner (<i>Notropis rubellus</i>)	Somewhat pointed snout; dorsal fin origin moderately or much posterior to pelvic fin base; lateral line scales (38)39 – 41; scale rows above lateral line 6 – 7; pre-dorsal scales (21)22 – 26(30); dorsal rays 8; anal rays (9)10(11); pelvic rays 8; pectoral rays 13 – 14.
Emerald Shiner (<i>Notropis atherinoides</i>)	Slightly pointed snout; dorsal fin origin moderately or much posterior to pelvic fin base; lateral line scales 35 – 43; dorsal rays 8; anal rays (9)10 – 11(13); pelvic rays 8(9); pectoral rays (13)14 – 17(16).

Appendix 2. Seining area and river dimensions for each sampling site in the a) Saugeen River, and b) North Saugeen River in 2021.

a) Saugeen River

Site ID	Field number	Stream width (m)	Distance from shore (m)	Seined site width (m)	Seined site length (m)	Seined area (m ³)
1	2021-SSSR-210721-003A	59	0	8	15	120
2	2021-SSSR-210721-004A	59	15	8	12	96
3	2021-SSSR-060721-001A	35	3	8	20	160
4	2021-SSSR-060721-002A	37	0	6	30	180
5	2021-SSSR-060721-004A	55	24	8	12	96
6	2021-SSSR-060721-003A	35	0	8	15	120
7	2021-SSSR-060721-006A	40	5	8	20	160
8	2021-SSSR-060721-005A	42	10	8	20	160
9	2021-SSSR-070721-002A	40	10	6	20	120
10	2021-SSSR-070721-001A	40	2	8	20	160
11	2021-SSSR-050721-001A	43	2	8	19	152
12	2021-SSSR-050721-002A	39	0	8	10	80
13	2021-SSSR-050721-003A	64	15	8	8	64
14	2021-SSSR-050721-004A	64	6	8	8	64
15	2021-SSSR-200721-001A	45	1	8	12	96
16	2021-SSSR-200721-002A	50	0	8	8	64
17	2021-SSSR-200721-003A	38	0	8	10	80
18	2021-SSSR-200721-004A	40	0	8	10	80
	Min	35	0	6	8	64
	Mean	46	5	8	15	114
	Max	64	24	8	30	180

b) North Saugeen River

Site ID	Field number	Stream width (m)	Distance from shore (m)	Seined site width (m)	Seined site length (m)	Seined area (m ³)
19	2021-SSSR-210721-002A	30	0	6	8	48
20	2021-SSSR-210721-001A	25	1	8	10	80
21	2021-SSSR-130721-001A	25	0	8	13	100
22	2021-SSSR-130721-002A	22	0	8	18	144
23	2021-SSSR-120721-002A	24	0	8	18	142
24	2021-SSSR-120721-001A	23	1	8	12	96
25	2021-SSSR-130721-003A	10	0	8	19	152
26	2021-SSSR-190721-001A	23	2	8	12	96
	Min	10	0	6	8	48
	Mean	23	1	8	14	107
	Max	30	2	8	19	152

Appendix 3. Species count data for fishes captured (per seine haul) at each sampling site in the a) Saugeen River, and b) North Saugeen River in 2021.

a) Saugeen River

Site ID	Haul	<i>Campostoma anomalum</i>	<i>Catostomus commersonii</i>	<i>Etheostoma caeruleum</i>	<i>Etheostoma nigrum</i>	<i>Hypentelium nigricans</i>	<i>Luxilus chrysocephalus</i>	<i>Luxilus cornutus</i>	<i>Luxilus cornutus X Notropis rubellus</i>	<i>Luxilus sp.</i>	<i>Micropterus dolomieu</i>	<i>Moxostoma anisurum</i>	<i>Moxostoma erythrurum</i>	<i>Nocomis micropogon</i>	<i>Notropis photogenis</i>	<i>Notropis rubellus</i>	<i>Notropis sp.</i>	<i>Notropis volucellus</i>	<i>Oncorhynchus mykiss</i>	<i>Oncorhynchus tshawytscha</i>	<i>Percina maculata</i>	<i>Pimephales notatus</i>	<i>Rhinichthys cataractae</i>	<i>Semotilus atromaculatus</i>	Total fishes	Total species	
1	1	0	0	0	0	0	0	2	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	4	2	
1	2	0	0	0	0	0	0	0	0	0	0	0	0	1	0	7	0	0	0	0	0	0	0	0	8	2	
1	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	1	0	0	0	0	0	0	0	4	1	
2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	3	1	
2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	
2	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
3	1	0	2	0	0	1	0	29	0	0	2	0	0	3	1	0	0	0	0	0	0	0	0	4	42	7	
3	2	0	0	0	0	1	0	14	0	0	2	0	0	3	0	1	0	0	0	0	0	0	0	0	21	5	
3	3	0	2	0	0	4	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11	3	
4	1	0	0	1	0	0	0	5	0	0	0	0	0	0	0	23	0	0	2	1	0	0	1	0	33	6	
4	2	0	0	0	0	0	0	2	0	0	1	0	0	2	0	0	0	0	4	0	0	0	2	0	11	5	
4	3	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1	0	5	0	0	0	3	0	11	4	
5	1	3	1	0	0	1	0	29	0	0	0	0	0	1	0	53	90	3	2	0	0	0	1	0	184	9	
5	2	1	0	1	0	0	0	4	0	0	0	0	0	1	0	14	0	2	0	1	0	0	0	0	24	7	
5	3	0	0	2	1	0	1	9	0	1	1	0	0	3	0	12	57	0	0	0	0	0	0	0	87	7	
6	1	0	1	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	1	0	0	0	0	0	4	3	
6	2	8	95	0	7	0	0	0	0	0	6	0	0	0	0	0	0	0	1	0	0	0	0	0	117	5	
6	3	0	8	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	10	2	
7	1	0	0	0	0	0	1	1	0	0	0	0	0	0	4	6	0	0	0	0	0	0	0	0	12	4	
7	2	0	0	5	0	0	0	6	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	13	4	
7	3	0	0	0	0	0	0	3	0	0	0	0	0	0	9	1	0	0	0	1	0	0	0	0	14	4	
8	1	0	0	0	1	0	0	0	0	0	0	0	0	0	3	2	35	0	0	0	1	0	0	0	42	4	
8	2	0	0	3	0	0	0	0	0	2	3	0	0	4	5	0	103	0	0	0	7	0	0	1	128	6	
8	3	0	1	1	1	0	0	0	0	0	3	0	0	0	5	0	25	0	0	0	1	0	0	0	37	6	
9	1	0	0	0	0	0	2	1	0	10	0	0	0	0	0	6	82	0	0	0	0	0	0	0	101	3	
9	2	0	0	0	0	0	0	1	0	0	0	0	0	0	2	3	0	0	0	0	1	0	0	0	7	4	
9	3	0	0	0	0	0	1	0	0	1	1	0	0	2	0	4	0	0	0	0	0	0	0	0	9	4	
10	1	0	0	0	0	0	1	0	0	1	1	0	0	2	11	0	0	0	0	0	0	0	0	0	16	4	

Site ID	Haul	<i>Campostoma anomalum</i>	<i>Catostomus commersonii</i>	<i>Etheostoma caeruleum</i>	<i>Etheostoma nigrum</i>	<i>Hypentelium nigricans</i>	<i>Luxilus chrysocephalus</i>	<i>Luxilus cornutus</i>	<i>Luxilus cornutus</i> X <i>Notropis rubellus</i>	<i>Luxilus</i> sp.	<i>Micropterus dolomieu</i>	<i>Moxostoma anisurum</i>	<i>Moxostoma erythrurum</i>	<i>Nocomis micropogon</i>	<i>Notropis photogenis</i>	<i>Notropis rubellus</i>	<i>Notropis</i> sp.	<i>Notropis volucellus</i>	<i>Oncorhynchus mykiss</i>	<i>Oncorhynchus tshawytscha</i>	<i>Percina maculata</i>	<i>Pimephales notatus</i>	<i>Rhinichthys cataractae</i>	<i>Semotilus atromaculatus</i>	Total fishes	Total species	
10	2	0	0	0	0	1	0	0	0	0	0	0	0	1	5	0	0	0	0	0	0	0	0	0	7	3	
10	3	0	0	0	0	1	0	0	0	0	0	0	0	8	4	0	0	0	0	0	0	0	0	0	13	3	
11	1	0	0	2	0	0	3	26	0	0	0	0	0	2	0	12	0	0	0	1	0	0	2	0	48	7	
11	2	0	0	1	0	1	1	14	0	0	0	0	0	0	1	10	0	1	0	1	0	0	0	0	30	8	
11	3	0	0	0	0	1	0	1	0	0	1	0	0	0	0	4	0	0	0	0	0	0	1	0	8	5	
12	1	0	0	0	0	5	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	6	2	
12	2	0	1	1	0	2	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	5	4	
12	3	0	0	0	0	2	0	0	0	0	3	0	0	3	0	0	0	0	0	0	1	0	0	0	9	4	
13	1	0	0	0	0	0	0	3	1	0	0	0	0	1	0	123	12	0	0	0	0	0	0	0	140	3	
13	2	0	0	0	0	0	0	6	0	0	0	0	0	5	0	20	11	0	0	0	0	0	0	0	42	3	
13	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	16	0	0	0	0	0	0	0	20	1	
14	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
14	2	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	
14	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1	
15	1	0	1	0	0	0	7	5	0	0	0	0	0	0	2	1	0	0	0	0	1	0	0	1	18	7	
15	2	0	3	0	0	0	3	10	0	2	0	0	0	3	2	0	0	0	0	0	0	0	0	1	24	6	
15	3	0	0	0	2	2	2	2	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	4	14	7	
16	1	0	0	0	0	0	6	9	0	0	1	0	0	0	0	4	0	0	0	0	0	0	0	0	20	4	
16	2	0	0	0	0	0	0	9	0	0	2	0	0	3	5	1	0	0	0	0	1	0	0	0	21	6	
16	3	0	0	0	0	0	0	0	0	3	0	0	0	0	6	2	0	0	0	0	2	0	0	0	13	4	
17	1	0	4	0	0	12	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	18	4	
17	2	0	9	1	0	4	4	3	0	12	2	0	20	1	6	26	0	0	0	0	1	0	0	0	89	11	
17	3	0	0	0	0	3	2	4	0	0	1	0	3	1	11	6	0	0	0	0	0	0	0	0	31	8	
18	1	0	0	0	2	0	0	7	0	0	1	0	5	0	1	3	0	1	0	0	2	0	0	0	22	8	
18	2	0	0	0	1	2	5	2	0	0	3	0	104	2	5	1	0	0	0	0	0	3	0	0	128	10	
18	3	1	0	0	12	0	0	0	0	0	0	1	14	0	12	4	0	0	0	0	1	0	0	0	45	7	
Total		13	128	19	27	43	39	213	1	29	44	1	148	53	101	362	434	7	15	5	21	3	10	11	1727	20	

b) North Saugeen River

Site ID	Haul	<i>Ambloplites rupestris</i>	<i>Ameiurus melas</i>	<i>Catostomus commersonii</i>	<i>Etheostoma caeruleum</i>	<i>Etheostoma nigrum</i>	<i>Hypentelium nigricans</i>	<i>Luxilus chrysocephalus</i>	<i>Luxilus cornutus</i>	<i>Luxilus</i> sp.	<i>Micropterus dolomieu</i>	<i>Nocomis micropogon</i>	<i>Notropis photogenis</i>	<i>Notropis rubellus</i>	<i>Notropis</i> sp.	<i>Percina maculata</i>	<i>Pimephales notatus</i>	<i>Rhinichthys cataractae</i>	<i>Semotilus atromaculatus</i>	Total fishes	Total species
19	1	0	0	0	0	0	0	0	4	4	0	4	0	29	90	0	0	0	7	138	4
19	2	0	0	0	0	0	0	0	9	1	2	2	0	10	36	0	0	0	7	67	5
19	3	0	0	0	0	0	0	0	1	1	0	1	0	8	1	0	0	0	3	15	4
20	1	0	0	0	0	0	0	0	6	0	0	0	0	12	2	0	0	0	0	20	2
20	2	0	0	0	0	0	0	0	10	0	0	2	0	3	0	0	0	1	0	16	4
20	3	0	0	0	0	0	0	0	5	0	0	2	0	1	0	0	0	0	0	8	3
21	1	0	0	3	0	0	0	0	12	15	1	13	0	4	21	0	2	0	19	90	7
21	2	1	0	1	0	0	0	0	8	0	0	12	0	1	0	0	2	0	10	35	7
21	3	1	0	1	0	0	0	0	2	0	0	4	0	0	0	0	2	0	2	12	6
22	1	0	0	0	0	0	0	2	5	3	0	3	0	1	11	0	0	0	2	27	5
22	2	0	0	1	0	0	0	1	2	1	0	1	0	6	0	0	1	0	0	13	6
22	3	0	0	0	0	0	0	0	0	0	0	0	0	5	1	0	0	0	0	6	1
23	1	0	0	0	0	1	0	0	0	49	1	0	0	2	2	1	1	0	2	59	6
23	2	0	4	6	0	0	0	0	0	4	2	2	0	0	0	0	7	0	10	35	6
23	3	0	1	2	1	0	0	0	1	0	1	0	0	0	0	0	1	0	0	7	6
24	1	0	0	0	0	0	0	2	0	0	0	0	0	1	0	0	0	0	0	3	2
24	2	0	0	0	0	0	0	0	2	0	0	6	0	2	0	0	0	0	0	10	3
24	3	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	2	2
25	1	0	0	2	0	0	0	0	0	18	1	0	4	3	36	0	18	0	0	82	5
25	2	0	0	7	0	0	1	0	1	5	2	0	0	0	0	1	0	0	3	20	6
25	3	0	0	2	0	0	2	0	1	9	1	1	0	2	4	0	0	0	2	24	7
26	1	0	0	0	1	0	0	13	6	4	1	1	0	45	16	0	0	44	0	131	7
26	2	0	0	1	1	0	0	5	8	4	1	4	0	44	30	0	2	7	1	108	10
26	3	0	0	0	0	0	0	2	6	5	2	2	0	50	22	0	0	1	0	90	6
Total		2	5	26	3	1	3	25	90	123	15	60	4	230	272	2	36	53	68	1018	16

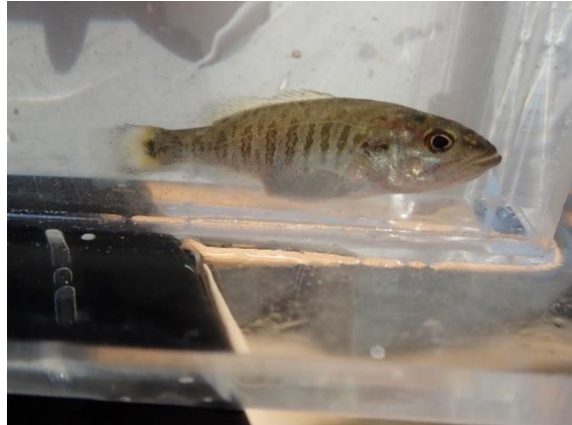
Appendix 4. Pooled totals of fishes captured and kept as physical vouchers from the Saugeen River and North Saugeen River, 2021, shown in order of most to least abundant.

Species	Total captured	Total kept	Proportion kept (%)	Proportion kept (%) of all fish vouchers
<i>Notropis</i> sp.	706	540	76.5	43.1
<i>Notropis rubellus</i>	592	281	47.5	22.4
<i>Luxilus cornutus</i>	303	23	7.6	1.8
<i>Catostomus commersonii</i>	154	7	4.5	0.6
<i>Luxilus</i> sp.	152	31	20.4	2.5
<i>Moxostoma erythrurum</i>	148	148	100.0	11.8
<i>Nocomis micropogon</i>	113	27	23.9	2.2
<i>Notropis photogenis</i>	105	76	72.4	6.1
<i>Semotilus atromaculatus</i>	79	12	15.2	1.0
<i>Luxilus chrysocephalus</i>	64	38	59.4	3.0
<i>Rhinichthys cataractae</i>	63	5	7.9	0.4
<i>Micropterus dolomieu</i>	59	14	23.7	1.1
<i>Hypentelium nigricans</i>	46	12	26.1	1.0
<i>Pimephales notatus</i>	39	5	12.8	0.4
<i>Etheostoma nigrum</i>	28	7	25.0	0.6
<i>Percina maculata</i>	23	11	47.8	0.9
<i>Etheostoma caeruleum</i>	22	7	31.8	0.6
<i>Oncorhynchus mykiss</i>	15	0	0.0	0.0
<i>Campostoma anomalum</i>	13	1	7.7	0.1
<i>Notropis volucellus</i>	7	2	28.6	0.2
<i>Ameiurus melas</i>	5	0	0.0	0.0
<i>Oncorhynchus tshawytscha</i>	5	3	60.0	0.2
<i>Ambloplites rupestris</i>	2	0	0.0	0.0
<i>Luxilus cornutus</i> X <i>Notropis rubellus</i>	1	1	100.0	0.1
<i>Moxostoma anisurum</i>	1	1	100.0	0.1
Total	2745	1252	45.6	

Appendix 5. Photos of common fish species collected during 2021 sampling in the Saugeen River and North Saugeen River.



Rosyface Shiner, Site 4, Saugeen River
Field Number: 2021-SSSR-060721-002A



Smallmouth Bass, Site 5, Saugeen River
Field Number: 2021-SSSR-060721-004A



Common Shiner, Site 24, North Saugeen River
Field Number: 2021-SSSR-120721-001A



River Chub, Site 22, North Saugeen River
Field Number: 2021-SSSR-130721-002A



White Sucker, Site 22, North Saugeen River
Field Number: 2021-SSSR-130721-002A



Striped Shiner, Site 5, Saugeen River
Field Number: 2021-SSSR-060721-004A

Appendix 6. Photos of a subset of sampling sites where Silver Shiner (*Notropis photogenis*) was detected in the Saugeen River and North Saugeen River during 2021 sampling.



Site 16, Saugeen River
Field Number 2021-SSSR-200721-002A



Site 7, Saugeen River
Field Number 2021-SSSR-060721-006A



Site 18, Saugeen River
Field Number: 2021-SSSR-200721-004A



Site 3, Saugeen River
Field Number: 2021-SSSR-060721-001A



Site 11, Saugeen River
Field Number: 2021-SSSR-050721-001A



Site 25, North Saugeen River
Field Number: 2021-SSSR-130721-003A