Summary of Targeted Sampling for Eastern Sand Darter (*Ammocrypta pellucida*) in the Ausable River, Ontario: 2007 and 2017

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2025

Canadian Data Report of
Fisheries and Aquatic Sciences 3309

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Canadian Data Report of Fisheries and Aquatic Sciences

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Summary of Targeted Sampling for Eastern Sand Darter (*Ammocrypta pellucida*) in the Ausable River, Ontario: 2007 and 2017

by

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Cat. No. Fs97-13/3309E-PDF ISBN 978-0-660-77296-7 ISSN 1488-5395

Correct citation for this publication:

Lamothe, K.A., Dextrase, A.J., Barnucz, J., Gáspárdy, R.C., Jean, K., and Drake, D.A.R. 2025. Summary of Targeted Sampling for Eastern Sand Darter (*Ammocrypta pellucida*) in the Ausable River, Ontario: 2007 and 2017. Can. Data Rep. Fish. Aquat. Sci. 3309: vi + 24 p.

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Eastern Sand Darter (*Ammocrypta pellucida*) is a small-bodied freshwater fish species that has experienced several extirpations across its range in Canada. A record from 1928 indicates that Eastern Sand Darter historically occupied the Ausable River in the Lake Huron drainage, Ontario; however, there have been no recorded detections since, despite significant sampling effort. In an effort to confirm its absence in the Ausable River and allow comparisons with data collected in 2007, targeted fish and habitat sampling was performed in 2017. Sixty sites were sampled in total during the two years (2007: 24 sites; 2017: 36 sites). Across years, 7,532 fishes were captured, comprised of 42 species including five darter species. Eastern Sand Darter was not detected despite potentially suitable habitat at some sites. Bluntnose Minnow (*Pimephales notatus*) was the most abundant species captured in 2007 (n = 608), while Ghost Shiner (*Paranotropis buchanani*) was the most abundant species captured in 2017 (n = 1,783). The invasive Round Goby (*Neogobius melanostomus*) was captured in 2007 (n = 28) and 2017 (n = 194). Overall, the targeted sampling for Eastern Sand Darter in 2007 and 2017 will inform future research and potential recovery actions such as species reintroduction.

RÉSUMÉ

Lamothe, K.A., Dextrase, A.J., Barnucz, J., Gáspárdy, R.C., Jean, K., and Drake, D.A.R. 2025. Summary of Targeted Sampling for Eastern Sand Darter (*Ammocrypta pellucida*) in the Ausable River, Ontario: 2007 and 2017. Can. Data Rep. Fish. Aquat. Sci. 3309: vi + 24 p.

Le dard de sable (*Ammocrypta pellucida*) est une espèce de poisson d'eau douce de petite taille qui a connu des disparitions de populations dans son aire de répartition au Canada. Des données datant de 1928 indiquent que le dard de sable a déjà été présent dans la rivière Ausable, dans le bassin versant du lac Huron, en Ontario; toutefois, aucun individu n'y a été détecté depuis malgré un effort d'échantillonnage important. Afin de confirmer son absence dans la rivière Ausable et de permettre des comparaisons avec les données recueillies en 2007, un échantillonnage ciblé du poisson et de son habitat a été effectué en 2017. Soixante sites ont été échantillonnés au total les deux années (24 sites en 2007 et 36 sites en 2017). Au fil des ans, 7 532 poissons appartenant à 42 espèces ont été capturés, dont cinq espèces de dards. Le dard de sable n'a pas été détecté malgré la présence d'un habitat potentiellement convenable à certains sites. Le ventre-pourri (*Pimephales notatus*) a été l'espèce la plus capturée en 2007 (n = 608), tandis que c'est le méné fantôme (*Paranotropis buchanani*) qui l'a été en 2017 (n = 1 783). Le gobie à taches noires (*Neogobius melanostomus*), une espèce envahissante, a été capturé en 2007 (n = 28) et en 2017 (n = 194). Dans l'ensemble, l'échantillonnage ciblé du dard de sable effectué en 2007 et en 2017 éclairera les recherches futures et les mesures de rétablissement possibles, comme la réintroduction 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 2002). To inform scientific aspects of the recovery process, DFO regularly conducts field sampling to satisfy various research objectives for SARA-listed fishes, such as evaluating the distribution and abundance of species, determining species-habitat relationships, and gaining a better understanding of the influence of threats and recovery actions. Data reports are published to support the Species at Risk Program by providing an overview of field activities and providing a medium for archiving data associated with sampling SARA-listed fishes and their habitat.

Eastern Sand Darter (*Ammocrypta pellucida*) is a small, translucent, elongate fish that occurs in Canada within the provinces of Ontario and Quebec. It is a habitat specialist that exhibits a strong preference for large streams and rivers and nearshore areas of the Great Lakes that contain a high proportion of sand substrate (Dextrase 2013; Dextrase et al. 2014). The extent of occurrence of this species in Ontario has been reduced to approximately half of what it was in the 1970s (Fisheries and Oceans Canada 2012). At least three presumed extirpations have occurred in Ontario: Catfish Creek, Big Otter Creek, and the Ausable River.

The Ausable River is located on the northern edge of the Carolinian Zone in southwestern Ontario and drains into the southern portion of Lake Huron. A single Eastern Sand Darter record was reported in the river from a 1928 survey near the town of Ailsa Craig (Hubbs and Brown 1929). Subsequent fish sampling at this location and elsewhere in the watershed has been conducted; however, Eastern Sand Darter has not been detected, and as a result, the species is presumed to be extirpated (Fisheries and Oceans Canada 2012). Nevertheless, federal and provincial recovery documents support further investigation to confirm the extirpation of Eastern Sand Darter in the Ausable River (Fisheries and Oceans Canada 2012; Ontario Ministry of Natural Resources and Forestry 2014; Fisheries and Oceans Canada 2016).

The objective of this report is to document collaborative sampling efforts between DFO and the Ausable Bayfield Conservation Authority performed in 2017. Data collected in 2007 for Alan Dextrase's PhD thesis (Dextrase 2013) are presented for comparisons between years. Consult Barnucz et al. (2020) to compare with 2018 sampling in the Ausable River. The objectives of the surveys completed in 2007 and 2017 were to determine whether a remnant Eastern Sand Darter population exists or if suitable habitat is available to support the species. Overall, these data will be used to inform future recovery actions for the species, including decisions around reintroduction.

METHODS

SITE SELECTION

2007

The Ausable River was surveyed in 2007 as part of research conducted by Alan Dextrase with the Ontario Ministry of Natural Resources and Trent University on Eastern Sand Darter (Dextrase 2013). These data are included in this report as a comparison to the 2017 collections. A full description of the methods and results of the 2007 sampling can be found in Dextrase (2013). Briefly, a multi-scale approach was used for site selection that incorporated three spatial scales: the site, reach, and valley segment (Table 1). The Ausable River between 'The Cut' and Exeter was divided into two valley segments based on the Aquatic Landscape Inventory software (Stanfield and Kuyvenhoven 2002). Sampling effort was allocated in proportion to the

length of each valley segment, with nine reaches randomly selected in each: four in segment "AU2" and five in "AU6" (Table 1). Within each randomly selected reach, fish community and habitat sampling were performed at up to three sites on each wadable (i.e., < 1.2 m) erosional and depositional bar. In total, 24 sites were surveyed in 2007 (Figure 1).

2017

Sites were non-randomly selected in 2017 to target locations of potentially suitable habitat for Eastern Sand Darter that were based on a habitat modelling and prediction study (Dextrase et al. 2014) and a study that identified areas of sand-dominated habitats in the Ausable River (Killins et al. 2007). A total of 36 sampling sites were selected, all of which were upstream of 'The Cut' (Figure 1; Table 2). Wadable sites dominated by sand substrate (> 50% cover) were identified and targeted for seining by means of visual assessment by canoe or on foot along the river edge between the hamlets of Crediton and Sylvan (Figure 1). Sites downstream of the hamlet of Nairn to Poplar Hill Road were accessed by canoes launched at Nairn Road and taken out at Poplar Hill Road (Figure 1). All other seining sites were accessed by truck and on foot. Non-wadable sites with a high proportion of sand substrate were identified using a Humminbird™ 998 side-scan sonar and selected for sampling between 'The Cut' and Thomson Line (approximately 8 km; Figure 1).

FISH SAMPLING

2007

Sampling in the Ausable River occurred August 8–12. A 9.2-m bag seine was used, with wing dimensions of 1.8 m x 3.7 m (6.4-mm mesh) and bag dimensions of 1.8 m x 1.8 m x 1.8 m (3.2-mm mesh; Dextrase 2013). At each site, three consecutive repeat seine hauls were performed in a downstream direction, with a maximum haul length of 10 m. Fishes collected after each haul were held in separate temporary aquaria until all seine hauls were completed at a site (i.e., depletion sampling). Fishes were subsequently identified to the species level, counted, and released. Aggregated site-level fish capture data from 2007 are presented in Table 3.

2017

Sampling occurred August 15–September 28. A total of 36 sites were sampled; wadable sites were sampled using either a straight seine with a chain (n = 20 sites; length = 6 m; 3.2 mm mesh) or a bag seine (n = 2 sites; 1.8 m x 9.2 m; bag dimension: 1.8 m x 1.8 m x 1.8 m; 3.2 mm mesh), with a maximum haul length of 17 m. Non-wadable sites (n = 14) were sampled using a Gerken Siamese benthic trawl (Figure 1). All three gears were deployed in a downstream direction using a depletion design, where three hauls or tows were conducted in a repeated fashion over the site with fishes retained in separate temporary aquaria after each haul or tow. Approximately five minutes elapsed between hauls/tows.

Trawling was performed along 50-m downstream transects using a 5-m jon boat powered with a 20 hp outboard tiller engine. During surveys for potential sites, trawl hazards were marked with GPS coordinates using a Humminbird™ side-scan sonar unit. This unit allowed for the vessel operator to safely navigate the trawl around hazards during sampling. The Gerken Siamese trawl was deployed in a similar manner to Barnucz and Drake (2021). The trawl dimensions were 2.4 m wide by 4.3 m long, head rope to cod-end. Linked chain (6 mm) was attached to the foot rope of the trawl and the head rope was lined with small plastic floats. The weighted foot rope combined with the plastic floats helped maintain the trawl opening during sampling. The exterior of the trawl was constructed of 3.2-mm polyester square mesh with an 18-mm square mesh separation device sewn into the middle. The separation device was designed to sort and

protect small fishes from debris and larger fishes during sampling. The trawl also had two tow ropes and two trawl doors used to pull the net along the river bed. Site length (m), vessel speed (m/s), and location were monitored by GPS during sampling. Vessel speed was maintained at approximately 2 km/hr to maintain an effective trawl opening.

Fishes were identified to the species level, counted, and released once all hauls/tows were completed at the site. Aggregated site-level fish capture data from 2017 are presented in Table 4.

HABITAT SAMPLING

2007

Habitat variables were measured along three transects at each site in 2007, perpendicular to the direction of flow, after fishes were processed and released. Depth (cm), water velocity (m/s), and substrate size (mm) were recorded at 2-m intervals along each of the three transects, resulting in a total of 15 point measurements per site, which were subsequently averaged (Dextrase 2013). Water velocity was measured at both 60% of the river depth (60% depth) and 5 cm above the substrate (benthic). Substrate size was assessed using a modified pebble count (Wolman 1954). At each site, substrate was assessed based on mean and median particle size, and the proportion of pebble counts identified as clay/silt (< 0.063 mm), sand (0.063–2.00 mm), fine gravel (2.01–8.00 mm), and coarse (> 8.00 mm) were recorded (Dextrase 2013). As well, the proportion of each site estimated to consist of woody debris and boulders was recorded as 'other cover'. Dissolved oxygen (mg/L), conductivity (µS/cm), water velocity (m/s), and water temperature (°C) were measured at the midpoint of each site. Dissolved oxygen and water velocity measurements were taken in both the middle water column (60%) and 5 cm above the substrate (benthic). Water clarity (cm) was measured from a mid-column water sample using a turbidity tube. Full descriptions of the 2007 habitat sampling can be found in Dextrase (2013).

2017

Habitat variables measured in 2017 were recorded at the midpoint of the survey site after fishes were processed and released. Water temperature (°C), air temperature (°C), conductivity (µS/cm), pH, turbidity (NTU), and dissolved oxygen (mg/L) were measured at 50% depth at sites < 1.5 m deep and within 1 m of the water's surface at deeper sites. Water clarity (cm) was measured using a 120 cm Fieldmaster™ turbidity tube. Substrate composition was assessed by grabbing a handful of bed material within the center of the site and determining the percent composition based on median particle diameters: clay (< 0.002 mm), silt (0.002–0.02 mm), sand (0.02–2.00 mm), gravel (2–40 mm), cobble (40–256 mm), and boulder (> 256 mm; Bain 1999). The coverage of submerged, emergent, and floating macrophytes within the sampled area were recorded as a percentage along with the percent cover of open water. Similarly, the percent coverage was recorded for herbaceous, coniferous, deciduous, and shrubby riparian vegetation immediately adjacent to each site. Stream depth (m) was measured at three representative locations within the boundaries of the surveyed area and averaged. Stream width (m) was measured from bank to bank, perpendicular to the stream channel using a Nikon Laser 1200S waterproof laser range finder. Stream velocity (m/s) was measured using a Swoffer™ 2100 current velocity meter at three representative locations in the site, deployed at approximately 50% of the stream depth, and averaged.

SAMPLING PERMITS AND DATA ARCHIVING

Sampling in 2007 and 2017 was conducted under the authority of SARA Permit Numbers SECT-07-SCI-009 and 17-PCAA-00028, respectively. Seining was conducted under Standard

Operating Protocol GWACC-116, approved by the DFO and Environment and Climate Change Canada Animal Care Committee (operated under the approval of the Canadian Council on Animal Care). Data associated with the 2007 and 2017 collections are housed under the project codes “AUS07” and "2017-ESD-AR", respectively, 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 from the Open Government portal (Government of Canada 2021; Fish Biodiversity Database - Open Government Portal (canada.ca)).

RESULTS

FISH SAMPLING

2007

A total of 2,646 fishes were captured in 2007, comprising 33 species (Table 3). Bluntnose Minnow (*Pimephales notatus*) was the species captured in greatest abundance (n = 608 individuals) followed by Rosyface Shiner (*Notropis rubellus*; n = 328) and Johnny Darter (*Etheostoma nigrum*; n = 289; Figure 2). No Eastern Sand Darter were captured. Fewer than 10 individuals were captured for 11 species. Twenty-eight Round Goby (*Neogobius melanostomus*) were captured (Table 3). Bluntnose Minnow, Common Carp (*Cyprinus carpio*), Longnose Dace (*Rhinichthys cataractae*), Quillback (*Carpiodes cyprinus*), Redfin Shiner (*Lythrurus umbratilis*), Silver Redhorse (*Moxostoma anisurum*), and White Crappie (*Pomoxis annularis*) were captured in 2007 (Table 3) but not in 2017 (Table 4).

2017

A total of 4,886 fishes were captured in 2017, comprising 34 species (Table 4). Ghost Shiner (*Paranotropis buchanani*) was captured in the greatest abundance (n = 1,783 individuals), followed by Rosyface Shiner (n = 669) and Mimic Shiner (*Paranotropis volucellus*; n = 638; Figure 2). No Eastern Sand Darter were captured. Round Goby was the sixth most abundant species captured (n = 194). Bluegill (*Lepomis macrochirus*), Central Stoneroller (*Campostoma anomalum*), Creek Chub (*Semotilus atromaculatus*), Fathead Minnow (*Pimephales promelas*), Greater Redhorse (*Moxostoma valenciennesi*), Northern Pike (*Esox lucius*), Pumpkinseed (*Lepomis gibbosus*), Rainbow Darter (*Etheostoma caeruleum*), and Shorthead Redhorse (*Moxostoma macrolepidotum*) were captured in 2017 (Table 4), but not in 2007 (Table 3). Across gear types, fewer than 10 individuals were captured for 10 species. A total of 2,566 fishes were captured using a straight seine, 2,285 fishes using a Siamese trawl, and 35 fishes using a bag seine.

HABITAT SAMPLING

2007

Mean water temperature during the survey period was 24.4 °C (range: 21.9–26.4 °C). Conductivity at the surveyed locations ranged from 444 to 597 µS/cm and water clarity ranged from 14 to 106 cm (Table 5). Dissolved oxygen at 60% depth and near the river bottom were correlated (r = 0.98), ranging from 4.44 to 7.82 mg/L and 4.32 to 7.59 mg/L, respectively (Table 5). Average depth at the surveyed locations ranged from 0.09 to 0.91 m (Table 5). Average water velocity at 60% depth and near the river bottom were correlated (r = 0.73), ranging from 0.00 to 0.55 m/s and 0.00 to 0.49 m/s, respectively (Table 5). The proportion of a site estimated

to consist of woody debris and boulders ranged from 0.00 to 0.25 (Table 5). Median substrate size across all sites was 4.04 mm (mean = 10.57 mm; range of means: 0.16–82.00 mm; Table 6). Fine gravel and sand were the dominant substrates at the surveyed sites, with a mean proportional cover across sites of 0.42 and 0.26, respectively (Table 6). The riparian zone at each site was greater than 50 m (Dextrase 2013).

2017

Mean air temperature and water temperature during the survey period was 23.5 °C (range: 14.4–30.5 °C) and 22.27 °C (range: 19.30–25.03 °C), respectively. Conductivity ranged from 436.5 to 639.6 µS/cm, dissolved oxygen ranged from 5.22 to 9.03 mg/L, and pH ranged from 8.14 to 8.55 (Table 7). Mean water clarity measured using the turbidity tube was 24 cm (range: 8–56 cm) and mean turbidity was 28.07 NTU (range: 6.39–114.70 NTU). Average water velocity ranged from 0.00 to 0.34 m/s and average depth ranged from 0.21 to 2.43 m (Table 7). The substrate at survey sites was primarily composed of gravel (mean composition: 0.33; range: 0.00–0.85) and sand (mean: 0.27; range: 0.00–1.00; Table 8), with minimal aquatic vegetation occurring at each site (Table 9). Riparian vegetation was dominated by herbaceous plants (Table 10).

ACKNOWLEDGEMENTS

We publish this work in memory of Alan Dextrase, who was the leading authority on Eastern Sand Darter in Canada. We thank Greg Lunn who assisted Alan Dextrase in the sampling of the Ausable River in 2007. We also thank Davin Heinbuck, Mari Veliz, Dan Bittman, Kurtis Smith, Sara Smith, and Noel Soogrim for performing the field sampling, logistics planning, or laboratory processing in 2017. Finally, we thank Julia Colm for providing the map in this report. Funding for these projects was provided by the Species at Risk Program at Fisheries and Oceans Canada, the Ontario Ministry of Natural Resources and Forestry, the Ausable Bayfield Conservation Authority, Trent University, and the Endangered Species Recovery Fund of World Wildlife Fund Canada and Environment and Climate Change Canada.

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***Table 1**. Site information for locations surveyed in the Ausable River in 2007. Abbreviations: d/s = downstream; u/s = upstream.*

Valley Segment	Reach	Site	Date	Latitude	Longitude	Sample area (m^2)	Narrative Locality Description
AU2	AU1	AU1-1d	8-Aug-07	43.18237	-81.8150	92	1 km u/s of Kennedy Rd.
AU2	AU1	AU1-1m	8-Aug-07	43.18209	-81.8151	92	1 km u/s of Kennedy Rd.
AU2	AU1	AU1-1u	8-Aug-07	43.18204	-81.8151	83	1 km u/s of Kennedy Rd.
AU2	AU1	AU1-2m	8-Aug-07	43.18347	-81.8152	92	1 km u/s of Kennedy Rd.
AU2	AU1	AU1-2u	8-Aug-07	43.18321	-81.8149	70	1 km u/s of Kennedy Rd.
AU2	AU2	AU2-1d	8-Aug-07	43.17595	-81.8073	40	2 km u/s of Kennedy Rd.
AU2	AU2	AU2-1m	8-Aug-07	43.17590	-81.8077	92	2 km u/s of Kennedy Rd.
AU2	AU2	AU2-1u	8-Aug-07	43.17546	-81.8080	43	2 km u/s of Kennedy Rd.
AU2	AU3	AU3-1m	9-Aug-07	43.14213	-81.8054	38	1 km u/s of Sylvan (Hwy 7) Bridge
AU2	AU3	AU3-1u	9-Aug-07	43.14158	-81.8059	70	1 km u/s of Sylvan (Hwy 7) Bridge
AU2	AU4	AU4-1d	9-Aug-07	43.13418	-81.8053	60	2 km u/s of Sylvan (Hwy 7) Bridge
AU2	AU4	AU4-1m	9-Aug-07	43.13364	-81.8055	33	2 km u/s of Sylvan (Hwy 7) Bridge
AU6	AU5	AU5-1d	10-Aug-07	43.14974	-81.5456	67	140 m u/s of Hwy 7 Bridge (Elginfield Rd. at Ailsa Craig)
AU6	AU5	AU5-1m	10-Aug-07	43.15030	-81.5453	92	140 m u/s of Hwy 7 Bridge (Elginfield Rd. at Ailsa Craig)
AU6	AU5	AU5-1u	10-Aug-07	43.15055	-81.5441	50	140 m u/s of Hwy 7 Bridge (Elginfield Rd. at Ailsa Craig)
AU6	AU6	AU6-1d	10-Aug-07	43.29821	-81.5280	92	~400 m d/s of Crediton Rd. Bridge
AU6	AU6	AU6-1u	10-Aug-07	43.29806	-81.5269	60	~400 m d/s of Crediton Rd. Bridge
AU6	AU7	AU7-1d	11-Aug-07	43.27752	-81.5193	30	1.5 km d/s of South Rd. Bridge - Hay Swamp
AU6	AU7	AU7-1m	11-Aug-07	43.27768	-81.5189	30	1.5 km d/s of South Rd. Bridge - Hay Swamp
AU6	AU7	AU7-1u	11-Aug-07	43.27790	-81.5192	40	1.5 km d/s of South Rd. Bridge - Hay Swamp
AU6	AU8	AU8-1m	12-Aug-07	43.32046	-81.5337	63	~200 m u/s of Kirkton Rd.
AU6	AU8	AU8-1u	12-Aug-07	43.32055	-81.5334	80	~200 m u/s of Kirkton Rd.
AU6	AU9	AU9-1d	12-Aug-07	43.32696	-81.5353	20	~3 km u/s of Kirkton Rd.
AU6	AU9	AU9-1u	12-Aug-07	43.32705	-81.5351	25	~3 km u/s of Kirkton Rd.

***Table 2**. Site information for locations surveyed in the Ausable River in 2017. Abbreviations: BS = bag seine; ST = Siamese trawl; SS = straight seine; d/s = downstream; u/s = upstream.*

Site	Field no.	Date	Latitude	Longitude	Gear	Sample area (m^2)	Narrative Locality Description
2017-ESD-1	2017-ESD-AR-150817-001A	15-Aug-17	43.14586	-81.80720	ST	100	450 m u/s of Elginfield Rd.
2017-ESD-2	2017-ESD-AR-150817-002A	15-Aug-17	43.14831	-81.80760	ST	100	350 m u/s of Elginfield Rd.
2017-ESD-3	2017-ESD-AR-150817-003A	15-Aug-17	43.14872	-81.80752	ST	100	250 m u/s of Elginfield Rd.
2017-ESD-4	2017-ESD-AR-150817-004A	15-Aug-17	43.15147	-81.81010	ST	100	145 m d/s of Elginfield Rd.
2017-ESD-5	2017-ESD-AR-150817-005A	15-Aug-17	43.15366	-81.81187	ST	100	400 m d/s of Elginfield Rd.
2017-ESD-6	2017-ESD-AR-150817-006A	15-Aug-17	43.15476	-81.81606	ST	100	800 m d/s of Elginfield Rd.
2017-ESD-7	2017-ESD-AR-150817-007A	15-Aug-17	43.15397	-81.81612	ST	100	750 m d/s of Elginfield Rd.
2017-ESD-8	2017-ESD-AR-160817-001A	16-Aug-17	43.15625	-81.81515	ST	100	1 km d/s of Elginfield Rd.
2017-ESD-9	2017-ESD-AR-160817-002A	16-Aug-17	43.16440	-81.81184	ST	100	2 km d/s Elginfield Rd.
2017-ESD-10	2017-ESD-AR-160817-003A	16-Aug-17	43.16782	-81.80742	ST	100	2.9 km d/s Elginfield Rd.
2017-ESD-11	2017-ESD-AR-160817-004A	16-Aug-17	43.16805	-81.80845	ST	100	3 km d/s Elginfield Rd.
2017-ESD-12	2017-ESD-AR-160817-005A	16-Aug-17	43.17323	-81.81013	ST	100	4 km d/s Elginfield Rd.
2017-ESD-13	2017-ESD-AR-160817-006A	16-Aug-17	43.18089	-81.81515	ST	100	5.25 km d/s Elginfield Rd.
2017-ESD-14	2017-ESD-AR-160817-007A	16-Aug-17	43.18422	-81.81591	ST	100	5.6 km d/s Elginfield Rd.
2017-ESD-15	2017-ESD-AR-260917-001A	26-Sep-17	43.10416	-81.57187	SS	48	560 m d/s Nairn Rd.
2017-ESD-16	2017-ESD-AR-260917-002A	26-Sep-17	43.10700	-81.58525	SS	96	2.25 km d/s Nairn Rd.
2017-ESD-17	2017-ESD-AR-260917-003A	26-Sep-17	43.10433	-81.58728	SS	54	3.5 km d/s Nairn Rd.
2017-ESD-18	2017-ESD-AR-260917-004A	26-Sep-17	43.10784	-81.58891	SS	60	4 km d/s Nairn Rd.
2017-ESD-19	2017-ESD-AR-260917-005A	26-Sep-17	43.09264	-81.60561	SS	60	8.95 km d/s of Nairn Rd., d/s of Coldstream Rd.
2017-ESD-20	2017-ESD-AR-260917-006A	26-Sep-17	43.07858	-81.61160	SS	90	250 m u/s Poplar Hill Rd.
2017-ESD-21	2017-ESD-AR-270917-001A	27-Sep-17	43.16335	-81.52853	SS	90	250 m d/s W Corner Dr.
2017-ESD-22	2017-ESD-AR-270917-002A	27-Sep-17	43.16388	-81.52832	SS	40	200 m d/s W Corner Dr.
2017-ESD-23	2017-ESD-AR-270917-003A	27-Sep-17	43.20784	-81.51791	SS	68	150 m d/s McGillvray Dr.
2017-ESD-24	2017-ESD-AR-270917-004A	27-Sep-17	43.20859	-81.51829	SS	60	70 m d/s McGillvray Dr.
2017-ESD-25	2017-ESD-AR-270917-005A	27-Sep-17	43.24495	-81.52693	BS	60	30 m d/s Adare Rd.
2017-ESD-26	2017-ESD-AR-270917-006A	27-Sep-17	43.24531	-81.52675	BS	78	Pool immediately u/s of Adare Rd.
2017-ESD-27	2017-ESD-AR-270917-007A	27-Sep-17	43.28203	-81.52285	SS	60	84 m d/s from old bridge, Crediton; 2.15 km d/s Victoria Ave E.

Site	Field no.	Date	Latitude	Longitude	Gear	Sample area (m^2)	Narrative Locality Description
2017-ESD-28	2017-ESD-AR-270917-008A	27-Sep-17	43.28222	-81.52281	SS	60	60 m d/s old bridge, Crediton; 2 km d/s Victoria Ave E.
2017-ESD-29	2017-ESD-AR-280917-001A	28-Sep-17	43.07325	-81.71088	SS	36	At end of Island Rd., riffle immediately d/s of concrete
2017-ESD-30	2017-ESD-AR-280917-002A	28-Sep-17	43.07324	-81.71071	SS	36	At end of Island Rd., run along end of concrete
2017-ESD-31	2017-ESD-AR-280917-003A	28-Sep-17	43.06594	-81.67961	SS	40	130 m d/s Glasgow St.
2017-ESD-32	2017-ESD-AR-280917-004A	28-Sep-17	43.06606	-81.67979	SS	60	115 m d/s Glasgow St.
2017-ESD-33	2017-ESD-AR-280917-005A	28-Sep-17	43.07668	-81.79247	SS	60	120 m d/s Sylvan Rd.
2017-ESD-34	2017-ESD-AR-280917-006A	28-Sep-17	43.07721	-81.79360	SS	60	240 m d/s Sylvan Rd.
2017-ESD-35	2017-ESD-AR-280917-007A	28-Sep-17	43.14991	-81.80773	SS	60	160 m u/s Thomson Line
2017-ESD-36	2017-ESD-AR-280917-008A	28-Sep-17	43.14983	-81.80775	SS	36	170 m u/s Thomson Rd.

***Table 3**. Number of individuals captured per site per species in 2007.*

Site	*Ambloplites rupestris*	*Campostoma anomalum*	*Carpiodes cyprinus*	*Catostomus commersonii*	*Cyprinella spiloptera*	*Leuciscidae* sp.	*Cyprinus carpio*	*Dorosoma cepedianum*	*Esox lucius*	*Etheostoma blennioides*	*Etheostoma caeruleum*	*Etheostoma nigrum*	*Hypentelium nigricans*	*Ictalurus punctatus*	*Labidesthes sicculus*	*Lepomis gibbosus*	*Lepomis macrochirus*	*Lepomis peltastes*	*Luxilus chrysocephalus*	*Luxilus cornutus*	*Lythrurus umbratilis*	*Micropterus dolomieu*
AU1-1d	0	0	0	0	8	0	0	17	0	2	0	20	0	0	1	0	0	0	5	0	0	0
AU1-1m	1	0	0	0	9	0	0	8	0	4	0	28	0	1	0	0	0	0	2	0	0	0
AU1-1u	0	0	0	0	7	0	0	139	0	0	0	20	0	1	0	0	0	0	0	0	0	1
AU1-2m	0	0	0	0	9	0	0	36	0	0	0	14	0	0	0	0	0	0	0	0	0	2
AU1-2u	0	0	0	0	5	0	0	4	0	0	0	17	0	0	0	0	0	0	0	2	0	0
AU2-1d	0	0	1	0	4	1	0	11	0	4	0	22	1	1	0	0	0	0	0	4	0	3
AU2-1m	1	0	3	1	3	0	0	48	0	0	0	23	0	0	0	0	0	0	1	6	0	3
AU2-1u	0	0	0	0	3	1	0	18	0	2	0	20	0	0	0	0	0	0	0	29	0	1
AU3-1m	0	0	0	0	22	0	0	2	0	19	0	5	4	0	0	0	0	0	11	4	0	1
AU3-1u	0	0	0	0	7	0	0	0	0	0	0	22	1	3	0	0	0	0	1	0	0	4
AU4-1d	0	0	0	0	34	0	0	0	0	6	0	8	11	0	0	0	0	0	7	3	0	3
AU4-1m	0	0	0	0	22	0	0	0	0	10	0	0	1	0	0	0	0	0	6	1	0	1
AU5-1d	1	0	0	0	3	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	7	9
AU5-1m	4	0	0	0	7	0	0	0	0	1	0	1	2	0	0	0	0	5	1	0	0	6
AU5-1u	0	0	0	0	3	0	0	0	0	7	0	4	2	0	0	0	0	4	6	0	0	8
AU6-1d	0	0	0	0	0	0	0	1	0	1	0	8	0	0	0	0	0	0	0	0	0	0
AU6-1u	0	0	0	1	2	0	0	0	0	5	0	7	0	0	0	0	0	0	5	1	0	0
AU7-1d	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
AU7-1m	1	0	0	0	0	0	0	0	0	4	0	1	0	0	0	0	0	0	0	4	0	1
AU7-1u	2	0	0	5	1	0	0	0	0	2	0	2	0	0	0	0	0	1	7	4	0	0
AU8-1m	1	0	0	1	15	0	1	0	0	1	0	46	0	0	0	0	0	0	0	1	0	1
AU8-1u	0	0	0	5	8	0	0	0	0	0	0	10	0	0	0	0	0	1	1	0	4	0
AU9-1d	0	0	0	0	7	0	0	0	0	6	0	9	0	0	0	0	0	0	0	0	0	0
AU9-1u	1	0	0	0	5	0	0	0	0	4	0	1	0	0	0	0	0	0	0	2	0	0

***Table 3 cont'd**. Number of individuals captured per site per species in 2007.*

Site	*Moxostoma anisurum*	*Moxostoma erythrurum*	*Moxostoma macrolepidotum*	*Moxostoma* sp.	*Moxostoma valenciennesi*	*Neogobius melanostomus*	*Nocomis biguttatus*	*Nocomis micropogon*	*Notropis atherinoides*	*Paranotropis buchanani*	*Notropis rubellus*	*Noturus flavus*	*Paranotropis volucellus*	*Percina caprodes*	*Percina maculata*	*Percopsis omiscomaycus*	*Pimephales notatus*	*Pimephales promelas*	*Pomoxis annularis*	*Pomoxis nigromaculatus*	*Rhinichthys cataractae*	*Semotilus atromaculatus*
AU1-1d	0	0	0	1	0	1	0	0	0	0	7	0	4	1	3	2	6	0	0	0	0	0
AU1-1m	0	0	0	17	0	7	0	0	0	1	1	0	4	3	7	0	10	0	0	0	0	0
AU1-1u	3	0	0	9	0	5	0	0	6	0	10	0	5	0	1	1	16	0	0	0	0	0
AU1-2m	0	2	0	28	0	5	0	0	4	0	37	0	0	1	3	0	18	0	0	0	0	0
AU1-2u	0	0	0	2	0	2	0	0	0	0	0	0	10	0	3	0	7	0	0	0	0	0
AU2-1d	0	0	0	37	0	2	0	0	0	0	10	0	3	1	0	0	27	0	1	0	0	0
AU2-1m	0	0	0	5	0	5	0	0	0	0	16	0	1	3	1	0	13	0	0	0	0	0
AU2-1u	0	0	0	9	0	1	0	0	1	0	29	0	0	3	1	0	11	0	0	0	0	0
AU3-1m	0	0	0	5	0	0	0	16	0	0	4	1	2	2	1	0	12	0	0	0	0	0
AU3-1u	0	0	0	0	0	0	0	1	0	0	22	0	9	1	3	1	4	0	0	0	0	0
AU4-1d	0	1	0	2	0	0	0	9	0	0	121	0	19	3	2	0	10	0	0	0	0	0
AU4-1m	0	0	0	0	0	0	0	9	0	0	18	0	1	1	0	0	0	0	0	0	0	0
AU5-1d	1	0	0	1	0	0	0	0	0	0	1	0	25	1	3	0	2	0	0	0	0	0
AU5-1m	1	1	0	4	0	0	0	0	0	0	4	0	36	0	10	0	3	0	0	0	0	0
AU5-1u	1	0	0	0	0	0	0	0	0	0	20	0	39	0	4	0	16	0	0	0	0	0
AU6-1d	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	4	0	4	0	0	0
AU6-1u	0	0	0	0	0	0	1	1	0	0	8	0	4	0	1	0	0	0	23	0	0	0
AU7-1d	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	3	0
AU7-1m	0	0	0	0	0	0	5	0	0	0	2	0	11	0	0	0	1	0	0	0	0	0
AU7-1u	0	0	0	0	0	0	3	0	0	0	5	1	7	0	1	0	1	0	0	0	0	0
AU8-1m	0	0	0	34	0	0	0	0	0	0	0	0	48	0	4	0	328	0	0	0	0	0
AU8-1u	0	1	0	1	0	0	0	0	0	0	7	0	20	0	1	0	85	0	0	14	0	0
AU9-1d	0	0	0	0	0	0	0	0	0	0	0	0	2	0	4	0	20	0	0	0	0	0
AU9-1u	0	0	0	0	0	0	0	0	0	0	4	0	2	0	2	0	14	0	0	0	0	0

Table 4*. Number of individuals captured per site per species in 2017. Abbreviations: ST = Siamese trawl; SS = straight seine; BS = bag seine.*

Site	Gear	*Ambloplites rupestris*	*Campostoma anomalum*	*Carpiodes cyprinus*	*Catostomus commersonii*	*Cyprinella spiloptera*	*Leuciscidae* spp.	*Cyprinus carpio*	*Dorosoma cepedianum*	*Esox lucius*	*Etheostoma blennioides*	*Etheostoma caeruleum*	*Etheostoma nigrum*	*Hypentelium nigricans*	*Ictalurus punctatus*	*Labidesthes sicculus*	*Lepomis gibbosus*	*Lepomis macrochirus*	*Lepomis peltastes*	*Luxilus chrysocephalus*	*Luxilus cornutus*	*Lythrurus umbratilis*	*Micropterus dolomieu*
2017-ESD-1	ST	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
2017-ESD-2	ST	0	0	0	0	0	0	0	0	0	7	0	12	0	0	0	0	0	0	0	0	0	0
2017-ESD-3	ST	0	0	0	1	0	0	0	0	0	4	0	2	0	4	0	0	0	0	0	0	0	0
2017-ESD-4	ST	0	0	0	0	0	0	0	0	0	2	0	3	0	1	0	0	0	0	0	0	0	0
2017-ESD-5	ST	0	0	0	0	1	0	0	0	0	5	0	2	0	2	0	0	0	0	0	0	0	0
2017-ESD-6	ST	0	0	0	0	3	0	0	0	0	25	0	18	0	0	0	0	0	0	0	0	0	0
2017-ESD-7	ST	0	0	0	1	1	0	0	0	0	3	0	6	0	3	0	0	0	0	0	0	0	0
2017-ESD-8	ST	0	0	0	0	0	0	0	0	0	5	0	2	0	2	0	0	0	0	0	0	0	1
2017-ESD-9	ST	0	0	0	0	0	0	0	0	0	1	0	3	0	1	0	0	0	0	0	0	0	0
2017-ESD-10	ST	0	0	0	1	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0
2017-ESD-11	ST	0	0	0	1	0	28	0	1	0	6	0	12	1	0	1	0	0	0	0	0	0	0
2017-ESD-12	ST	0	0	0	0	5	0	0	0	0	2	0	4	0	0	0	0	0	0	0	0	0	1
2017-ESD-13	ST	0	0	0	4	1	0	0	0	0	0	0	4	0	17	0	0	0	0	0	0	0	0
2017-ESD-14	ST	0	0	0	0	0	0	0	0	0	2	0	4	0	0	0	0	0	0	0	0	0	1
2017-ESD-15	SS	3	0	0	3	10	0	0	0	0	2	0	7	0	0	0	0	0	0	0	1	0	5
2017-ESD-16	SS	0	0	0	0	10	1	0	0	0	3	0	0	0	0	0	0	0	0	2	7	0	6
2017-ESD-17	SS	0	0	0	0	5	0	0	0	0	3	0	2	0	0	0	0	0	0	1	0	0	1
2017-ESD-18	SS	0	0	0	0	3	0	0	0	0	14	0	1	0	0	0	0	0	0	4	0	0	2
2017-ESD-19	SS	0	0	0	0	1	0	0	0	0	5	0	1	0	0	0	0	0	0	4	3	0	2
2017-ESD-20	SS	0	0	0	0	31	0	0	0	0	14	0	21	0	0	0	0	0	0	4	2	0	2
2017-ESD-21	SS	2	0	0	0	12	0	0	0	0	12	2	0	2	0	0	0	0	0	5	0	0	5
2017-ESD-22	SS	0	0	0	0	0	0	0	0	0	0	2	0	9	0	0	0	0	0	0	4	0	1

Site	Gear	*Ambloplites rupestris*	*Campostoma anomalum*	*Carpiodes cyprinus*	*Catostomus commersonii*	*Cyprinella spiloptera*	*Leuciscidae* spp.	*Cyprinus carpio*	*Dorosoma cepedianum*	*Esox lucius*	*Etheostoma blennioides*	*Etheostoma caeruleum*	*Etheostoma nigrum*	*Hypentelium nigricans*	*Ictalurus punctatus*	*Labidesthes sicculus*	*Lepomis gibbosus*	*Lepomis macrochirus*	*Lepomis peltastes*	*Luxilus chrysocephalus*	*Luxilus cornutus*	*Lythrurus umbratilis*	*Micropterus dolomieu*
2017-ESD-23	SS	9	0	0	0	7	0	0	0	1	0	0	0	0	0	0	1	0	0	1	2	0	1
2017-ESD-24	SS	8	0	0	0	29	0	0	0	0	4	1	0	0	0	0	0	0	0	3	8	0	3
2017-ESD-25	BS	7	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	1	0	0	0	1
2017-ESD-26	BS	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11
2017-ESD-27	SS	0	1	0	0	2	0	0	0	0	1	0	0	0	0	0	0	0	0	37	55	0	0
2017-ESD-28	SS	7	0	0	0	1	0	0	0	0	8	0	3	0	0	0	0	0	0	1	36	0	0
2017-ESD-29	SS	0	0	0	0	18	0	0	0	0	43	0	21	0	0	0	0	0	0	0	7	0	1
2017-ESD-30	SS	0	2	0	0	10	1	0	0	0	14	0	0	2	0	0	0	0	0	8	4	0	0
2017-ESD-31	SS	0	0	0	0	8	2	0	0	0	32	0	19	2	1	0	0	1	0	2	9	0	0
2017-ESD-32	SS	1	0	0	0	10	0	0	0	0	27	0	1	3	0	0	0	0	0	2	3	0	0
2017-ESD-33	SS	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0	1
2017-ESD-34	SS	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
2017-ESD-35	SS	0	0	0	0	5	12	0	1	0	20	0	1	0	0	25	0	0	0	1	2	0	1
2017-ESD-36	SS	0	0	0	0	2	0	0	1	0	3	0	0	0	0	4	0	0	0	0	1	0	0

***Table 4 cont'd**. Number of individuals captured per site per species in 2017. Abbreviations: ST = Siamese trawl; SS = straight seine; BS = bag seine.*

Site	Gear	*Moxostoma anisurum*	*Moxostoma erythrurum*	*Moxostoma macrolepidotum*	*Moxostoma* spp.	*Moxostoma valenciennesi*	*Neogobius melanostomus*	*Nocomis biguttatus*	*Nocomis micropogon*	*Notropis atherinoides*	*Paranotropis buchanani*	*Notropis rubellus*	*Noturus flavus*	*Paranotropis volucellus*	*Percina caprodes*	*Percina maculata*	*Percopsis omiscomaycus*	*Pimephales notatus*	*Pimephales promelas*	*Pomoxis annularis*	*Pomoxis nigromaculatus*	*Rhinichthys cataractae*	*Semotilus atromaculatus*
2017-ESD-1	ST	0	0	0	0	0	0	0	0	0	79	0	0	6	1	0	0	0	0	0	0	0	0
2017-ESD-2	ST	0	1	0	0	0	2	0	0	0	55	0	0	12	0	1	0	0	6	0	0	0	0
2017-ESD-3	ST	0	2	0	0	0	2	0	0	0	169	0	0	1	0	0	0	0	2	0	0	0	0
2017-ESD-4	ST	0	0	0	0	0	9	0	0	0	204	0	0	1	0	0	0	0	0	0	0	0	0
2017-ESD-5	ST	0	1	0	0	0	8	0	1	1	134	0	0	4	2	0	1	0	0	0	0	0	0
2017-ESD-6	ST	0	0	0	0	0	15	0	1	4	93	0	0	8	1	0	0	0	2	0	0	0	0
2017-ESD-7	ST	0	0	0	0	0	12	0	0	0	188	0	0	2	2	0	1	0	0	0	0	0	0
2017-ESD-8	ST	0	0	0	0	0	21	0	0	0	151	0	1	1	1	1	0	0	1	0	0	0	0
2017-ESD-9	ST	0	0	0	0	0	7	0	0	0	86	0	0	7	0	1	0	0	4	0	0	0	0
2017-ESD-10	ST	0	0	0	0	1	8	0	0	0	42	0	0	2	0	0	0	0	1	0	0	0	0
2017-ESD-11	ST	0	15	0	0	10	17	0	0	0	114	0	0	7	3	1	1	0	2	0	0	0	0
2017-ESD-12	ST	0	3	0	5	0	11	0	0	2	54	0	0	2	0	1	0	0	20	0	0	0	0
2017-ESD-13	ST	0	0	0	0	0	7	0	0	0	254	0	0	1	1	2	4	0	1	0	0	0	0
2017-ESD-14	ST	0	3	0	0	0	70	0	0	2	73	0	0	4	1	0	0	0	2	0	0	0	0
2017-ESD-15	SS	0	0	0	0	0	0	0	0	0	0	48	0	7	0	6	0	0	0	0	0	0	0
2017-ESD-16	SS	0	0	1	0	0	0	0	0	1	1	46	0	3	0	0	0	0	1	0	0	0	0
2017-ESD-17	SS	0	0	0	0	0	0	0	0	0	0	19	0	0	0	0	0	0	0	0	0	0	0
2017-ESD-18	SS	0	0	0	0	0	0	0	0	0	1	112	0	26 5	1	5	0	0	0	0	0	0	0
2017-ESD-19	SS	0	0	0	0	0	0	0	0	0	0	46	0	1	0	5	0	0	2	0	0	0	0
2017-ESD-20	SS	0	1	0	0	0	0	0	0	0	0	93	0	88	1	1	0	0	9	0	0	0	0
2017-ESD-21	SS	0	0	0	0	0	0	6	1	0	0	51	1	6	1	0	0	0	0	0	0	0	0
2017-ESD-22	SS	0	0	0	0	0	0	10	3	0	0	41	0	0	2	1	0	0	0	0	0	0	0

Site	Gear	*Moxostoma anisurum*	*Moxostoma erythrurum*	*Moxostoma macrolepidotum*	*Moxostoma* spp.	*Moxostoma valenciennesi*	*Neogobius melanostomus*	*Nocomis biguttatus*	*Nocomis micropogon*	*Notropis atherinoides*	*Paranotropis buchanani*	*Notropis rubellus*	*Noturus flavus*	*Paranotropis volucellus*	*Percina caprodes*	*Percina maculata*	*Percopsis omiscomaycus*	*Pimephales notatus*	*Pimephales promelas*	*Pomoxis annularis*	*Pomoxis nigromaculatus*	*Rhinichthys cataractae*	*Semotilus atromaculatus*
2017-ESD-23	SS	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-ESD-24	SS	0	0	0	0	0	0	15	0	0	0	10	0	2	0	3	0	0	1	0	0	0	0
2017-ESD-25	BS	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
2017-ESD-26	BS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017-ESD-27	SS	0	0	0	0	0	0	31	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
2017-ESD-28	SS	0	0	0	0	0	0	5	0	0	0	13	0	1	0	0	0	0	0	0	0	0	0
2017-ESD-29	SS	0	0	0	0	0	0	1	1	10	3	37	1	27	0	11	0	0	75	0	0	0	0
2017-ESD-30	SS	0	0	0	0	0	0	0	7	1	0	32	0	2	1	0	0	0	0	0	0	0	0
2017-ESD-31	SS	0	0	1	0	0	0	0	9	0	0	43	1	47	1	12	0	0	63	0	0	0	1
2017-ESD-32	SS	0	0	1	0	0	0	0	4	0	0	6	1	9	0	5	0	0	32	0	0	0	0
2017-ESD-33	SS	0	0	0	0	0	0	0	0	5	35	36	0	57	0	0	0	0	5	0	0	0	0
2017-ESD-34	SS	0	0	0	0	0	0	0	0	1	0	36	0	3	0	0	0	0	1	0	0	0	0
2017-ESD-35	SS	0	1	0	0	1	2	0	1	25	32	0	0	59	1	0	0	0	4	0	0	0	0
2017-ESD-36	SS	0	0	0	0	0	3	0	1	7	15	0	1	3	0	0	0	0	1	0	0	0	0

***Table 5**. Habitat measurements recorded at sites sampled in the Ausable River in 2007. 'Other cover' indicates the proportion of a site estimated to consist of woody debris and boulders. DO = dissolved oxygen.*

Site	Water temp. (°C)	Conductivity (µS/cm)	Benthic DO (mg/L)	Middle water column DO (mg/L)	Water clarity (cm)	Mean stream depth (m)	Mean water velocity (benthic; m/s)	Mean water velocity (60% depth; m/s)	Other cover
AU1-1d	24.8	460	6.04	6.38	22	0.73	0.007	0.029	0.01
AU1-1m	24.8	461	5.80	6.14	21	0.73	0.000	0.005	0.01
AU1-1u	24.8	461	5.74	5.94	22	0.91	0.003	0.018	0.01
AU1-2m	24.4	459	5.59	5.94	19	0.90	0.000	0.001	0.01
AU1-2u	24.4	459	5.50	5.70	19	0.85	0.002	0.009	0.05
AU2-1d	26.2	447	6.46	6.93	15	0.68	0.000	0.000	0.01
AU2-1m	26.4	451	6.81	7.05	17	0.50	0.004	0.027	0.01
AU2-1u	26.1	454	6.29	6.80	14	0.72	0.003	0.011	0.01
AU3-1m	24.0	444	7.48	7.75	15	0.28	0.210	0.248	0.01
AU3-1u	24.4	446	7.33	7.43	15	0.65	0.023	0.063	0.01
AU4-1d	24.7	455	7.50	7.65	15	0.54	0.081	0.141	0.01
AU4-1m	24.7	452	7.56	7.61	19	0.22	0.490	0.545	0.01
AU5-1d	26.0	467	7.59	7.82	27	0.70	0.000	0.007	0.01
AU5-1m	25.1	471	7.14	7.46	28	0.48	0.023	0.056	0.01
AU5-1u	24.2	472	6.95	7.04	27	0.45	0.114	0.152	0.01
AU6-1d	23.6	549	4.51	4.94	45	0.17	0.098	0.129	0.25
AU6-1u	23.6	543	4.32	4.44	45	0.27	0.092	0.132	0.25
AU7-1d	23.7	597	6.31	6.38	34	0.09	0.360	0.360	0.00
AU7-1m	23.8	588	6.05	6.20	30	0.33	0.060	0.073	0.10
AU7-1u	23.9	585	5.91	6.20	29	0.45	0.032	0.053	0.05
AU8-1m	25.0	517	6.12	6.87	45	0.43	0.000	0.005	0.01
AU8-1u	21.9	532	5.02	5.18	45	0.73	0.000	0.007	0.01
AU9-1d	22.0	549	6.25	6.40	100	0.32	0.162	0.220	0.05
AU9-1u	22.0	549	6.01	6.06	106	0.27	0.127	0.187	0.05

***Table 6**. Proportional cover of clay/silt, sand, fine gravel, and coarse substrate at a site, and mean and median substrate size for sites sampled in the Ausable River in 2007.*

Site	Clay/silt	Sand	Fine gravel	Coarse	Mean substrate size (mm)	Median particle size (mm)
AU1-1d	0.20	0.07	0.67	0.07	4.01	4.00
AU1-1m	0.07	0.07	0.87	0.00	3.47	4.00
AU1-1u	0.36	0.07	0.50	0.07	2.94	3.50
AU1-2m	0.00	0.33	0.67	0.00	4.07	4.00
AU1-2u	0.42	0.25	0.25	0.08	2.51	1.50
AU2-1d	0.00	0.33	0.67	0.00	2.92	3.00
AU2-1m	0.20	0.13	0.53	0.13	4.24	4.00
AU2-1u	0.25	0.25	0.50	0.00	3.13	2.50
AU3-1m	0.17	0.00	0.00	0.83	10.17	10.00
AU3-1u	0.17	0.00	0.58	0.25	7.01	5.00
AU4-1d	0.00	0.44	0.33	0.22	4.88	4.00
AU4-1m	0.00	0.00	0.67	0.33	7.00	5.00
AU5-1d	0.00	0.00	0.18	0.82	32.50	31.00
AU5-1m	0.00	0.13	0.53	0.33	9.53	7.00
AU5-1u	0.00	0.00	0.33	0.67	38.13	17.00
AU6-1d	0.15	0.85	0.00	0.00	0.26	0.19
AU6-1u	0.00	1.00	0.00	0.00	0.68	0.38
AU7-1d	0.00	0.00	0.80	0.20	5.60	5.00
AU7-1m	0.00	0.00	0.50	0.50	82.00	11.00
AU7-1u	0.00	0.00	0.67	0.33	26.50	5.50
AU8-1m	0.09	0.91	0.00	0.00	0.54	0.38
AU8-1u	0.58	0.25	0.17	0.00	1.06	0.03
AU9-1d	0.00	1.00	0.00	0.00	0.16	0.19
AU9-1u	0.00	0.07	0.67	0.07	0.31	0.38

***Table 7**. Habitat measurements recorded at sites sampled in the Ausable River in 2017.*

Site	Air temp. (°C)	Water temp. (°C)	Conductivity (µS/cm)	Dissolved oxygen (mg/L)	pH	Water clarity (cm)	Turbidity (NTU)	Stream width (m)	Mean stream depth (m)	Mean stream velocity (m/s)
2017-ESD-1	26.6	22.30	469.0	7.01	8.28	8	33.59	8.0	1.27	0.05
2017-ESD-2	30.3	22.44	469.0	7.31	8.24	16	35.59	7.0	1.37	0.08
2017-ESD-3	30.3	22.94	476.5	7.44	8.28	17	32.13	8.0	1.23	0.04
2017-ESD-4	28.2	23.23	475.7	7.45	8.24	17	31.56	8.0	1.57	0.06
2017-ESD-5	26.8	23.53	475.2	7.44	8.24	14	31.22	10.0	1.40	0.02
2017-ESD-6	28.0	23.63	471.6	7.44	8.25	15	29.21	18.4	0.87	0.06
2017-ESD-7	25.3	23.78	478.1	7.46	8.25	18	28.52	15.0	1.05	0.09
2017-ESD-8	22.3	22.55	473.8	7.34	8.28	17	30.62	12.0	0.80	0.00
2017-ESD-9	22.4	22.48	474.3	7.02	8.26	18	30.52	2.0	1.00	0.02
2017-ESD-10	23.7	22.86	477.3	7.27	8.31	19	26.16	25.0	1.70	0.03
2017-ESD-11	25.0	22.74	476.2	7.19	8.34	15	29.72	24.5	0.60	0.02
2017-ESD-12	26.0	23.27	484.1	7.39	8.23	20	19.77	28.5	0.90	0.08
2017-ESD-13	26.6	23.59	492.1	7.21	8.21	20	21.07	25.9	2.43	0.04
2017-ESD-14	30.4	23.79	491.1	7.12	8.24	22	14.21	47.2	0.77	0.05
2017-ESD-15	22.0	21.80	490.1	6.46	8.25	32	14.52	18.0	0.46	0.00
2017-ESD-16	23.0	22.37	494.2	7.13	8.32	41	16.46	15.0	0.91	0.03
2017-ESD-17	25.1	22.25	492.2	6.80	8.39	31	15.18	14.0	0.81	0.00
2017-ESD-18	29.8	23.40	503.1	7.69	8.42	35	15.17	12.0	0.77	0.03
2017-ESD-19	30.3	24.52	503.0	9.03	8.48	35	12.42	18.0	0.85	0.00
2017-ESD-20	30.5	25.03	501.8	8.32	8.48	18	23.34	15.0	0.41	0.05
2017-ESD-21	21.7	22.31	534.0	5.22	8.18	48	7.77	15.0	0.28	0.34
2017-ESD-22	21.3	22.17	533.9	5.40	8.32	48	12.94	17.0	0.38	0.05
2017-ESD-23	23.8	23.52	619.7	7.58	8.36	-	11.94	10	0.50	0.09
2017-ESD-24	22.3	23.48	619.5	7.64	8.55	56	9.81	10	0.25	0.07
2017-ESD-25	23.3	21.95	618.5	6.44	8.43	-	10.04	15	0.57	0.02
2017-ESD-26	22.8	22.04	619.5	6.75	8.29	-	11.27	10.1	0.81	0.13

Site	Air temp. (°C)	Water temp. (°C)	Conductivity (µS/cm)	Dissolved oxygen (mg/L)	pH	Water clarity (cm)	Turbidity (NTU)	Stream width (m)	Mean stream depth (m)	Mean stream velocity (m/s)
2017-ESD-27	28.9	22.12	638.8	5.93	8.14	55	6.39	10	0.32	0.12
2017-ESD-28	21.5	22.28	639.6	6.57	8.17	-	13.51	9	0.44	0.19
2017-ESD-29	14.4	20.48	437.1	7.10	8.49	16	39.56	19	0.21	0.34
2017-ESD-30	15.1	20.45	436.5	7.11	8.51	14	41.53	6	0.25	0.24
2017-ESD-31	15.7	20.04	446.1	7.28	8.49	16	35.29	16	0.33	0.17
2017-ESD-32	16.9	20.00	455.9	7.26	8.47	16	33.51	17	0.36	0.19
2017-ESD-33	16.1	19.30	446.5	7.03	8.39	16	101.3	24	0.60	0.08
2017-ESD-34	14.6	19.78	451.8	7.16	8.31	15	34.24	15	0.51	0.22
2017-ESD-35	17.6	19.68	448.9	7.95	8.40	-	35.72	18.5	0.36	0.00
2017-ESD-36	17.1	19.77	446.1	7.99	8.42	-	114.7	18.5	0.69	0.01

***Table 8**. Proportional cover of substrate classes at sites sampled in the Ausable River in 2017.*

Site	Organic	Clay	Silt	Sand	Gravel	Cobble	Boulder	Bedrock	Hardpan	Dominant substrate
2017-ESD-1	0.00	0.00	0.00	0.80	0.20	0.00	0.00	0.00	0.00	Sand
2017-ESD-2	0.00	0.00	0.10	0.40	0.30	0.20	0.00	0.00	0.00	Sand
2017-ESD-3	0.00	0.00	0.20	0.30	0.40	0.10	0.00	0.00	0.00	Gravel
2017-ESD-4	0.00	0.00	0.10	0.40	0.50	0.00	0.00	0.00	0.00	Gravel
2017-ESD-5	0.00	0.00	0.00	0.60	0.10	0.30	0.00	0.00	0.00	Sand
2017-ESD-6	0.00	0.00	0.00	0.00	0.60	0.40	0.00	0.00	0.00	Gravel
2017-ESD-7	0.00	0.00	0.00	0.10	0.50	0.40	0.00	0.00	0.00	Gravel
2017-ESD-8	0.00	0.00	0.00	0.30	0.60	0.10	0.00	0.00	0.00	Gravel
2017-ESD-9	0.00	0.40	0.30	0.10	0.10	0.10	0.00	0.00	0.00	Clay
2017-ESD-10	0.00	0.40	0.10	0.50	0.00	0.00	0.00	0.00	0.00	Sand
2017-ESD-11	0.00	0.50	0.10	0.40	0.00	0.00	0.00	0.00	0.00	Clay
2017-ESD-12	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	Sand
2017-ESD-13	0.00	0.40	0.60	0.00	0.00	0.00	0.00	0.00	0.00	Silt
2017-ESD-14	0.00	0.00	0.00	0.30	0.70	0.00	0.00	0.00	0.00	Gravel
2017-ESD-15	0.10	0.00	0.20	0.40	0.30	0.00	0.00	0.00	0.00	Sand
2017-ESD-16	0.05	0.00	0.20	0.10	0.45	0.20	0.00	0.00	0.00	Gravel
2017-ESD-17	0.00	0.00	0.15	0.40	0.45	0.00	0.00	0.00	0.00	Gravel
2017-ESD-18	0.05	0.00	0.20	0.40	0.30	0.05	0.00	0.00	0.00	Sand
2017-ESD-19	0.00	0.00	0.05	0.10	0.85	0.00	0.00	0.00	0.00	Gravel
2017-ESD-20	0.00	0.00	0.00	0.20	0.60	0.20	0.00	0.00	0.00	Gravel
2017-ESD-21	0.00	0.05	0.00	0.05	0.25	0.60	0.05	0.00	0.00	Cobble
2017-ESD-22	0.00	0.00	0.00	0.05	0.85	0.10	0.00	0.00	0.00	Gravel
2017-ESD-23	0.00	0.00	0.00	0.00	0.00	0.30	0.70	0.00	0.00	Boulder
2017-ESD-24	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	Cobble
2017-ESD-25	0.00	0.00	0.05	0.05	0.35	0.45	0.10	0.00	0.00	Cobble
2017-ESD-26	0.00	0.00	0.05	0.00	0.00	0.70	0.30	0.00	0.00	Cobble
2017-ESD-27	0.00	0.00	0.00	0.05	0.10	0.85	0.00	0.00	0.00	Cobble
2017-ESD-28	0.00	0.00	0.00	0.55	0.30	0.05	0.05	0.00	0.05	Sand
2017-ESD-29	0.00	0.00	0.05	0.40	0.55	0.00	0.00	0.00	0.00	Gravel
2017-ESD-30	0.00	0.00	0.00	0.00	0.65	0.30	0.05	0.00	0.00	Gravel
2017-ESD-31	0.00	0.00	0.00	0.75	0.25	0.00	0.00	0.00	0.00	Sand
2017-ESD-32	0.00	0.00	0.00	0.40	0.50	0.10	0.00	0.00	0.00	Gravel
2017-ESD-33	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	Boulder
2017-ESD-34	0.00	0.00	0.00	0.10	0.10	0.20	0.60	0.00	0.00	Boulder
2017-ESD-35	0.00	0.00	0.10	0.50	0.40	0.00	0.00	0.00	0.00	Sand
2017-ESD-36	0.00	0.00	0.10	0.50	0.40	0.00	0.00	0.00	0.00	Sand

***Table 9**. Percent cover of aquatic vegetation at sites sampled in 2017.*

Site	Emergent	Floating	Submerged	Open Water	Dominant aquatic vegetation
2017-ESD-1	0	0	0	100	NA
2017-ESD-2	0	0	0	100	NA
2017-ESD-3	0	0	0	100	NA
2017-ESD-4	0	0	0	100	NA
2017-ESD-5	0	0	0	100	NA
2017-ESD-6	0	0	0	100	NA
2017-ESD-7	0	0	0	100	NA
2017-ESD-8	0	0	0	100	NA
2017-ESD-9	0	0	0	100	NA
2017-ESD-10	0	0	0	100	NA
2017-ESD-11	0	0	0	100	NA
2017-ESD-12	0	0	0	100	NA
2017-ESD-13	0	0	0	100	NA
2017-ESD-14	0	0	0	100	NA
2017-ESD-15	0	0	0	100	NA
2017-ESD-16	0	0	0	100	NA
2017-ESD-17	0	0	0	100	NA
2017-ESD-18	0	0	0	100	NA
2017-ESD-19	0	0	0	100	NA
2017-ESD-20	0	0	0	100	NA
2017-ESD-21	0	0	5	95	Algae
2017-ESD-22	0	0	5	95	Algae
2017-ESD-23	0	0	0	100	NA
2017-ESD-24	0	0	5	95	Algae
2017-ESD-25	0	0	5	95	Algae
2017-ESD-26	0	0	0	100	NA
2017-ESD-27	0	0	5	95	Algae
2017-ESD-28	0	0	10	90	Algae
2017-ESD-29	0	0	0	100	NA
2017-ESD-30	0	0	0	100	NA
2017-ESD-31	0	0	0	100	NA
2017-ESD-32	0	0	0	100	NA
2017-ESD-33	0	0	0	100	NA
2017-ESD-34	0	0	0	100	NA
2017-ESD-35	0	0	0	100	NA
2017-ESD-36	0	0	0	100	NA

***Table 10**. Percent cover of terrestrial vegetation in the riparian zone at sites sampled in 2017.*

Site	Deciduous	Coniferous	Herbaceous	Shrubs	None	Dominant riparian vegetation
2017-ESD-1	30	0	40	30	0	Herbaceous
2017-ESD-2	20	0	60	20	0	Herbaceous
2017-ESD-3	20	0	50	30	0	Herbaceous
2017-ESD-4	60	0	20	20	0	Deciduous
2017-ESD-5	40	0	40	20	0	Herbaceous
2017-ESD-6	30	0	10	60	0	Shrubs
2017-ESD-7	20	0	40	40	0	Herbaceous
2017-ESD-8	40	0	50	10	0	Herbaceous
2017-ESD-9	50	0	40	10	0	Deciduous
2017-ESD-10	20	0	40	40	0	Herbaceous
2017-ESD-11	10	0	40	40	10	Herbaceous
2017-ESD-12	40	0	40	20	0	Herbaceous
2017-ESD-13	30	0	50	20	0	Herbaceous
2017-ESD-14	40	0	40	20	0	Herbaceous
2017-ESD-15	40	0	40	0	20	Deciduous
2017-ESD-16	30	0	40	0	30	Herbaceous
2017-ESD-17	0	0	40	0	60	None
2017-ESD-18	10	0	60	0	30	Herbaceous
2017-ESD-19	10	0	30	0	60	None
2017-ESD-20	60	0	20	0	20	Deciduous
2017-ESD-21	0	0	0	95	5	Shrubs
2017-ESD-22	0	0	0	40	60	None
2017-ESD-23	0	0	50	50	0	Shrubs
2017-ESD-24	0	0	50	50	0	Herbaceous
2017-ESD-25	20	0	80	0	0	Herbaceous
2017-ESD-26	0	0	100	0	0	Herbaceous
2017-ESD-27	30	0	70	0	0	Herbaceous
2017-ESD-28	20	0	75	5	0	Herbaceous
2017-ESD-29	0	0	10	10	80	None
2017-ESD-30	0	0	5	5	90	None
2017-ESD-31	0	0	0	100	0	Shrubs
2017-ESD-32	0	0	0	100	0	Shrubs
2017-ESD-33	0	0	80	0	20	Herbaceous
2017-ESD-34	0	0	100	0	0	Herbaceous
2017-ESD-35	0	0	40	60	0	Shrubs
2017-ESD-36	0	0	0	100	0	Shrubs

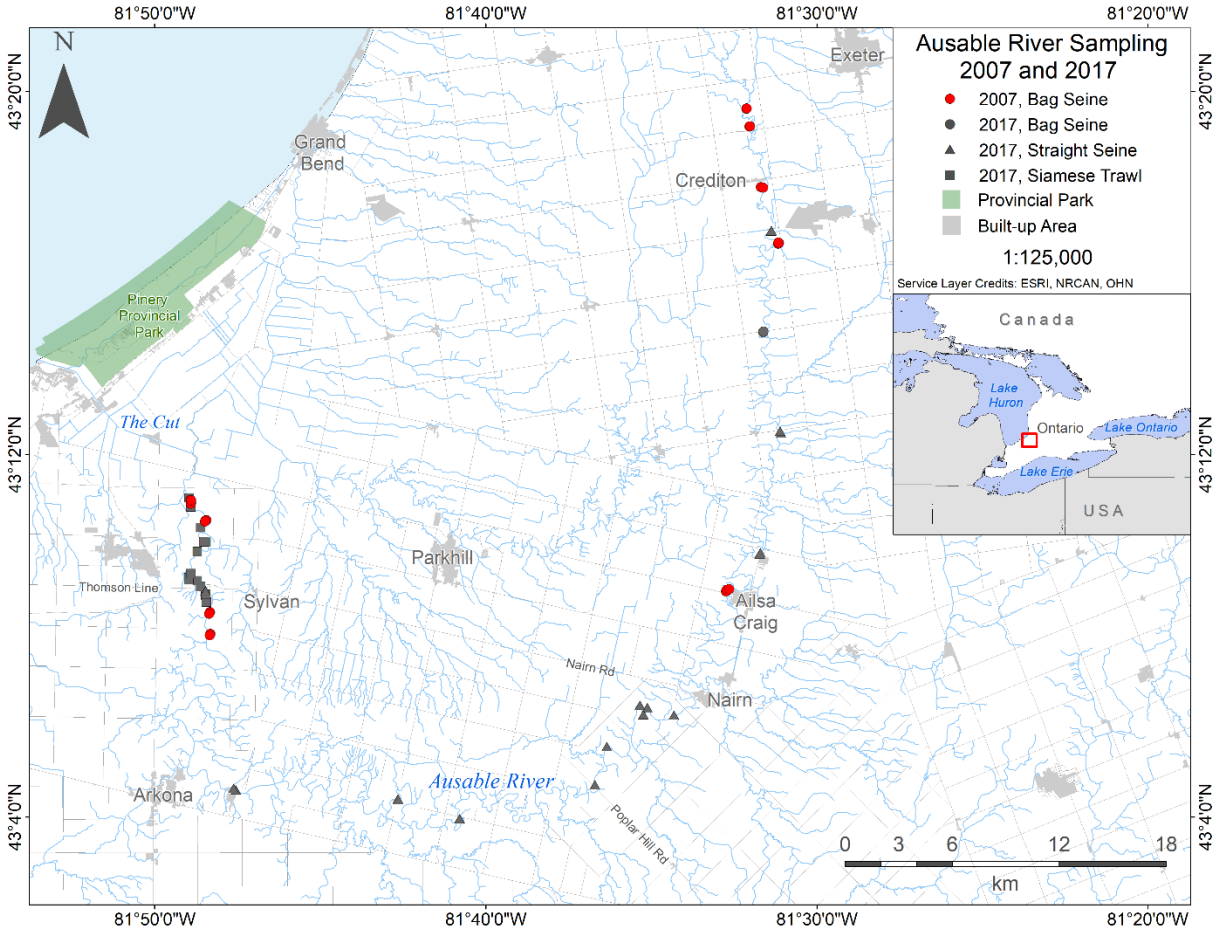

Figure 1*. Locations of fish and habitat sampling performed in the Ausable River in 2007 and 2017. Icon shape denotes sampling gear and colour denotes year.*

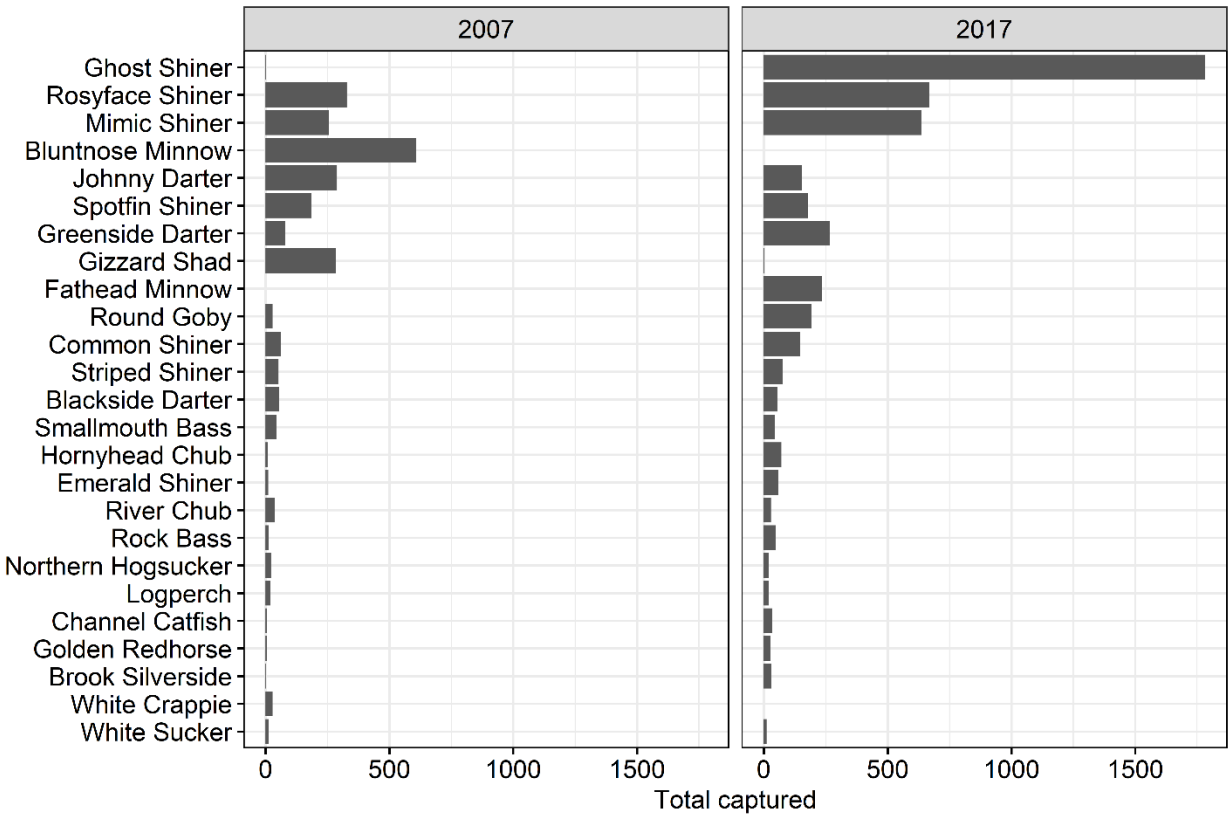

***Figure 2**. Total number of individuals captured per species in 2007 and 2017. Shown are species that had more than 25 individuals summed across years.*