

Targeted sampling for Pugnose Minnow (*Opsopoeodus emiliae*) in the Lake St. Clair drainage, Ontario, in 2010, 2013, and 2021

Robin C. Gáspárdy, Jason Barnucz, Julia E. Colm, and D. Andrew R. Drake

Great Lakes Laboratory for Fisheries and Aquatic Sciences
Ontario and Prairie Region
Fisheries and Oceans Canada
867 Lakeshore Road
Burlington, ON
L7S 1A1

2025

**Canadian Data Report of
Fisheries and Aquatic Sciences 1444**



Canadian Data Report of Fisheries and Aquatic Sciences

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

The correct citation appears above the abstract of each report. Each report is abstracted in the data base *Aquatic Sciences and Fisheries Abstracts*.

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

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

Rapport statistique canadien des sciences halieutiques et aquatiques

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

Le titre exact figure au haut du résumé de chaque rapport. Les rapports à l'industrie sont résumés dans la base de données *Résumés des sciences aquatiques et halieutiques*.

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

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

Canadian Data Report of
Fisheries and Aquatic Sciences 1444

2025

Targeted sampling for Pugnose Minnow (*Opsopoeodus emiliae*) in the Lake St. Clair
drainage, Ontario, in 2010, 2013, and 2021

by

Robin C. Gáspárdy, Jason Barnucz, Julia E. Colm, and D. Andrew R. Drake

Great Lakes Laboratory for Fisheries and Aquatic Sciences
Ontario and Prairie Region
Fisheries and Oceans Canada
867 Lakeshore Road
Burlington, ON
L7S 1A1

© His Majesty the King in Right of Canada, as represented by the Minister of the Department of Fisheries and Oceans, 2025.

Cat. No. Fs97-13/1444E-PDF ISBN 978-0-660-77746-7 ISSN 1488-5395

Correct citation for this publication:

Gáspárdy, R.C., Barnucz, J., Colm, J.E., and Drake, D.A.R. 2025. Targeted sampling for Pugnose Minnow (*Opsopoeodus emiliae*) in the Lake St. Clair drainage, Ontario, in 2010, 2013, and 2021. Can. Data Rep. Fish. Aquat. Sci. 1444: v + 63 p.

TABLE OF CONTENTS

LIST OF TABLES	iv
LIST OF FIGURES	iv
ABSTRACT	vi
RÉSUMÉ	vi
INTRODUCTION	1
METHODS	1
Site Selection And Fish Community Sampling.....	1
Habitat Sampling.....	4
Sampling Permits and Data Archiving.....	4
RESULTS	5
Fish Community Sampling.....	5
Habitat Sampling.....	7
ACKNOWLEDGEMENTS	8
REFERENCES	9
APPENDICES	33

LIST OF TABLES

Table 1. Summary of sampling effort (number of sites) and fishes captured by waterbody and sampling gear [either bag seine (SN) or surface trawl (TRL)] in each sampling year: a) 2010, b) 2013, and c) 2021. The total count of Pugnose Minnow (PNM) capture per waterbody and gear type is enumerated in the Total PNM column.	10
Table 2. Total abundance of each species captured in each sampling year, in order by taxonomic family. Species designation is labelled beside common name: SARA status (END – Endangered; THR – Threatened; SC – Special Concern), or invasive (I).	11
Table 3. Summary of detections of six species of at-risk fishes captured during targeted sampling for Pugnose Minnow in a) 2010, b) 2013, and c) 2021, including frequency of occurrence (FO) by sampling year and total length (mm; TL). Total individuals measured for total length presented where all captured individuals were not measured. SARA status: END – Endangered; THR – Threatened; SC – Special Concern.	13
Table 4. Summary of the physical characteristics of the habitat sampled in each sampling year and at the subset of sites where Pugnose Minnow was detected in 2010. Values presented represent the mean values across all sites sampled.	14

LIST OF FIGURES

Figure 1. Map of all sites sampled by DFO targeting Pugnose Minnow in 2010 (red), 2013 (blue), and 2021 (green) using seining (circles) and pelagic trawling (triangles). Contains information licensed under the Open Government License – Ontario.	15
Figure 2. Site map diagrams illustrating seining methods in wadeable habitat where a) all seine hauls covered the same area, or b) seine hauls conducted adjacent to preceding haul. Seining method was determined according to depth and habitat availability and specific sampling protocol by sampling year.	16
Figure 3. Rank abundance of each species captured across all sites sampled in each sampling year: a) 2010, b) 2013, and c) 2021. Invasive species (I) and species at risk SARA designation (SC = special concern, THR = Threatened) are labelled.	17
Figure 4. Map of subset of sites where Pugnose Minnow (SARA: Threatened) was detected, by sampling year and gear type. Map labels are matched to site codes in Appendix 1. Contains information licensed under the Open Government License – Ontario.	18
Figure 5. Digital voucher photograph of Pugnose Minnow (36 mm) captured by seine at site 2010-02 (PDAH-PNM-2010-270710-004B) in East Sydenham River on July 27, 2010.	19
Figure 6. Length-frequency of Pugnose Minnow captured in 2010. Total lengths were measured for 27 of 32 individuals captured.	19
Figure 7. Map of subset of sites where Pugnose Shiner (SARA: Threatened) was detected by sampling year and gear type. Map labels are matched to site codes in Appendix 1. Contains information licensed under the Open Government License – Ontario.	20
Figure 8. Digital voucher photograph of Pugnose Shiner (52 mm) captured by seine at site 2010-10 (PDAH-PNM-2010-030810-001A) in Little Bear Creek on August 3, 2010.	21
Figure 9. Length-frequency of Pugnose Shiner captured in 2010 and 2013. Total lengths were measured for 40 of 103 individuals captured.	21

Figure 10. Map of subset of sites where Blackstripe Topminnow (SARA: Special Concern) was detected, by sampling year and gear type. Map labels are matched to site codes in Appendix 1. Contains information licensed under the Open Government License – Ontario..... 22

Figure 11. Digital voucher photograph of Blackstripe Topminnow (66 mm) captured by seine at site 2021-02 (2021-EWOC-PNM-080921-002A) in East Otter Creek on September 8, 2021..... 23

Figure 12. Length-frequency of Blackstripe Topminnow captured in 2010, 2013, and 2021. Total lengths were measured for 362 of 469 individuals captured..... 23

Figure 13. Map of subset of sites where Spotted Sucker (SARA: Special Concern) was detected, by sampling year and gear type. Map labels are matched to site codes in Appendix 1. Contains information licensed under the Open Government License – Ontario..... 24

Figure 14. Digital voucher photograph of Spotted Sucker (138 mm) captured by seine at site 2010-02 (PDAH-PNM-2010-270710-004B) in the East Sydenham River on July 27, 2010. 25

Figure 15. Length-frequency of Spotted Sucker captured in 2010. 25

Figure 16. Map of subset of sites where Northern Sunfish (SARA: Special Concern) was detected. A total of eight Northern Sunfish were detected at six sites. Map labels are matched to site codes in Appendix 1. Contains information licensed under the Open Government License – Ontario. 26

Figure 17. Length-frequency of Northern Sunfish (SC) captured in 2010 and 2013. Total lengths were measured for all individuals..... 27

Figure 18. Map of subset of sites where Lake Chubsucker (SARA: Endangered) was detected, by sampling year and gear type. A total of two Lake Chubsucker were detected at one site. Map labels are matched to site codes in Appendix 1. Contains information licensed under the Open Government License – Ontario..... 28

Figure 19. Digital voucher photograph of juvenile Lake Chubsucker (43 mm) captured by seine at site 2013-18 (2013-PNM-LSCD-260913-001A) in Little Bear Creek on September 26, 2013..... 29

Figure 20. Map of subset of sites where Grass Pickerel (SARA: Special Concern) was detected. A total of three Grass Pickerel were detected at one site. Map labels are matched to site codes in Appendix 1. Contains information licensed under the Open Government License – Ontario. 30

Figure 21. Digital voucher photograph of Grass Pickerel (125 mm) captured by seine at site 2013-19 (2013-PNM-LSCD-260913-002A) in Little Bear Creek on September 26, 2013. 31

Figure 22. Site photos showing Little Bear Creek (PDAH-PNM-2010-260710-001A / 2010-08) and East Sydenham River (remaining) where Pugnose Minnow was detected in 2010..... 32

ABSTRACT

Gáspárdy, R.C., Barnucz, J., Colm, J.E., and Drake, D.A.R. 2025. Targeted sampling for Pugnose Minnow (*Opsopoeodus emiliae*) in the Lake St. Clair drainage, Ontario, in 2010, 2013, and 2021. Can. Data Rep. Fish. Aquat. Sci. 1444: v + 63 p.

Targeted sampling for Pugnose Minnow (*Opsopoeodus emiliae*), a species listed as Threatened under Canada's *Species at Risk Act* (SARA), was undertaken in the Lake St. Clair drainage, southwestern Ontario, in 2010, 2013, and 2021. A total of 100 sites (202 seine hauls and 112 trawl tows) were completed among 11 waterbodies, capturing 9,725 fishes representing 55 fish species. Sampling detected 32 Pugnose Minnow (25-41 mm total length) from the East Sydenham River and Little Bear Creek. Several other SARA-listed species were also detected from several waterbodies: Blackstripe Topminnow (*Fundulus notatus*; n = 469), Grass Pickerel (*Esox americanus vermiculatus*; n = 3), Lake Chubsucker (*Erimyzon sucetta*; n = 2), Pugnose Shiner (*Miniellus anogenus*; n = 103), Spotted Sucker (*Minytrema melanops*; n = 4), and Northern Sunfish (*Lepomis peltastes*; n = 8). Species catch and aquatic habitat data were recorded, as well as length and weight for a subset of SARA-listed species. This report presents the field methods and capture data as part of a broader effort to update the conservation status of Pugnose Minnow in Canada.

RÉSUMÉ

Gáspárdy, R.C., Barnucz, J., Colm, J.E., and Drake, D.A.R. 2025. Targeted sampling for Pugnose Minnow (*Opsopoeodus emiliae*) in the Lake St. Clair drainage, Ontario, in 2010, 2013, and 2021. Can. Data Rep. Fish. Aquat. Sci. 1444: v + 63 p.

Un échantillonnage ciblé du petit-bec (*Opsopoeodus emiliae*), une espèce inscrite comme menacée en vertu de *la Loi sur les espèces en péril* (LEP) du Canada, a été effectué dans le bassin hydrographique du lac Sainte-Claire, dans le sud-ouest de l'Ontario, en 2010, 2013 et 2021. On a échantillonné un total de 100 sites (202 traits de senne et 112 traits de chalut) dans 11 plans d'eau, ce qui a permis de capturer 9 725 poissons représentant 55 espèces de poissons différentes. L'échantillonnage a permis de détecter 32 petits-becs (longueur totale de 25 à 41 mm) dans la rivière East Sydenham et le ruisseau Little Bear. Plusieurs autres espèces inscrites sur la liste de la LEP ont également été détectées dans plusieurs plans d'eau : le fondule rayé (*Fundulus notatus*; n = 469), le brochet vermiculé (*Esox americanus vermiculatus*; n = 3), le sucet de lac (*Erimyzon sucetta*; n = 2), le méné camus (*Miniellus anogenus*; n = 103), le meunier tacheté (*Minytrema melanops*; n = 4) et le crapet du Nord (*Lepomis peltastes*; n = 8). Les données sur les prises et l'habitat aquatique ont été consignées, tout comme la longueur et le poids pour un sous-ensemble d'espèces inscrites en vertu de la LEP. Le présent rapport présente les méthodes de terrain et les données de capture dans le cadre d'un effort plus vaste visant à mettre à jour l'état de conservation du petit-bec au Canada.

INTRODUCTION

Fisheries and Oceans Canada (DFO) has the responsibility to provide for the protection and recovery of fishes and mussels listed under the *Species at Risk Act* (2002), hereinafter SARA. To inform scientific aspects of the recovery process, DFO regularly conducts field sampling to satisfy various research objectives for SARA-listed fishes and mussels, 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. DFO 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 mussels and their habitat.

Pugnose Minnow (*Opsopoeodus emiliae*) is a small, cryptic, leuciscid listed as Threatened under SARA (COSEWIC 2012; Fisheries and Oceans Canada 2022; Government of Canada 2024). The species has a small range in Canada, with historical collections limited to tributaries and coastal wetlands in the Lake St. Clair drainage, including the Detroit River and its tributary, the Canard River, and the St. Clair River. As part of a broader effort to better understand the distribution, habitat associations, and life history of this species, several targeted sampling initiatives for Pugnose Minnow were conducted by DFO between 2010 and 2021. This data report provides an overview of targeted fish and habitat sampling that occurred in 2010, 2013, and 2021 and presents the associated field data. These results will be used with other recent sampling efforts for this species from the St. Clair River, lower Sydenham River (Barnucz and Drake 2021b), and Canard River (Gáspárdy et al. 2020) to inform an update of the conservation status of Pugnose Minnow in Canada.

METHODS

SITE SELECTION AND FISH COMMUNITY SAMPLING

Overall, DFO conducted 100 sampling events within the St. Clair drainage across 2010, 2013, and 2021 (Figure 1). All sites had little to no flow; wadeable sites were sampled with targeted, multi-pass seine hauls, and non-wadeable sites were sampled with pelagic trawls. In general, sites were selected to be at or near historical detection locations of Pugnose Minnow (Mandrak et al. 2006; COSEWIC 2012), to target habitat that appeared suitable for the species within its historical range, and/or to fill in spatial coverage of sampled sites. Specific site selection criteria and fish collection methods are described below by sampling year. Site location, selection criteria, and sampling effort are described in Appendix 1 and Appendix 2.

2010 Sampling

In 2010, DFO conducted targeted sampling for Pugnose Minnow at 21 sites in the Sydenham River drainage. Project objectives were to obtain updated distribution, abundance, and habitat data in support of the COSEWIC Pugnose Minnow Assessment and Status Update Report (2012). Waterbodies sampled include: the East Sydenham River, North Sydenham River, Otter Creek, East Otter Creek, Indian Creek, Whitebread Drain/Grape Run Drain, Little Bear Creek, and Maxwell Creek (Table 1, Appendix 1). Sampling at 19 sites was conducted by two field crews between July 23rd and 26th, primarily at historical detection locations for Pugnose Minnow (n = 16 sites) or opportunistically at sites within the historical range (n = 3 sites). Coordinates for historical detection locations between 1935 and 2003 were obtained from the Canadian Distribution Database and DFO's Biodiversity Science Database [locations published in the COSEWIC Assessment and Status report (2012) and Mandrak et al. (2006)]. Handheld GPS and site descriptions (where available) were used to identify and access sites as near to the

historical records as possible via public lands or municipal road allowances, or by small vessel where safe navigation was feasible. Opportunistic sites were selected within the known historical range.

All sites were in wadeable habitats and sampled using 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 made of heavy delta mesh (5 mm mesh wings, 3 mm mesh bag) mounted on wooden poles. The specific seined area was selected using best judgement to resample the historical site and/or in pools or slow runs, and where water depth and access allowed. The seined area was variable based on site conditions and was inconsistently recorded in field notes. Three or five successive seine hauls over the same area were conducted in a downstream direction at all sites (Figure 2a). Fishes captured in the first three hauls were placed in separate bins of fresh water and processed following the third haul (see Fish Processing section for methods) to determine whether additional seine hauls were required. If a new species was detected in the third haul that was not present in the first or second, then two more seine hauls over the same area were conducted to a maximum of five seine hauls per site. Seine sampling concluded if there were no new species in the third haul or after the fifth haul was complete. Processed fishes were released at the site once all seining was completed.

Finally, the remaining two sites in Little Bear Creek were sampled on August 3rd, which did not follow the same selection and sampling criteria as above. These two sites were sampled with the express purpose of collecting genetic material from Pugnose Minnow and Pugnose Shiner (*Miniellus anogenus*). Site 2010-10 was sampled at the mouth of Little Bear Creek, where it meets the Chenail Ecarté (the Snye); this is within the historical range. Seven adjacent seine hauls were conducted in a downstream direction to cover more area (Figure 2b) and fishes were processed in one batch instead of by haul. The other site, 2010-11, was sampled at the exact location of site 2010-08, a historical detection location where Pugnose Minnow had been detected during the sampling effort on July 26th, described above. During the August 3rd resample of this site, only Pugnose Minnow or Pugnose Shiner were enumerated.

2013 Sampling

In 2013, DFO conducted targeted sampling for Pugnose Minnow at 57 sites in the St. Clair drainage. The objective was to spatially intensify sampling effort in pools and slow runs across these systems, to collect general fish community and aquatic habitat data, and to collect Pugnose Minnow distribution, abundance, and habitat data. Sampled waterbodies included: Big Creek, Little Bear Creek, Maxwell Creek, and Otter Creek (including East and West branches) (Figure 1). Multiple DFO crews (up to four crews per day) conducted sampling between July 9th and September 26th, 2013. Site selection focused on sampling at as many road crossings as possible/accessible across the selected waterbodies and on evenly distributing sites along the navigable sections of Little Bear Creek and Otter Creek. All trawling sites, and a few seining sites, were accessed using vessels where safe navigation was feasible, and the remaining seining sites were accessed from public lands and municipal road allowances.

Sampling was completed using three-pass seine netting in wadeable habitat (n = 29 sites) and three-pass pelagic trawling in non-wadeable habitat (n = 28 sites). A specific sampled area at each location targeted habitat with slow or no flow, though spatial coverage was the primary selection criteria. The seine net used in 2013 had the same dimensions as the seine used in 2010 (except that the entire net was made of 3 mm mesh), and three seine hauls were completed at each site. However, two seining methods were used for sampling in 2013. The first method was a repeated method where all three seine hauls were conducted over the same area within the site (Figure 2a). This sampling approach was used at sites where the entire pool habitat was small and could be covered in one seine haul or where deep-water (>1.25 m)

restricted sampling. The second method was a continuous method where three hauls were completed adjacent to each other (Figure 2b). This method was used to cover more area and fully sample a large pool, or when sampling was not limited by deep-water habitats. Total seined area was therefore variable based on available habitat and was recorded at each site (Appendix 1).

Trawling sites were sampled using a Mamou Trawl following methods described in Barnucz and Drake (2021b). The forward sections of the trawl were constructed of 38 mm high-density polyethylene stretched mesh, which runs from the head rope (float line) to 2 m back into the body of the trawl. The remainder of the trawl consisted of 4 mm polyester knotless mesh. During operation, the net was opened by a pair of floating doors (0.6 m long x 0.3 m wide). Sampling with the Mamou Trawl involved operating the vessel in a backwards direction, travelling downstream, with the trawl deployed off the bow of the vessel. Once fully deployed, the trawl was towed for a distance of 50 m or 100 m, depending on available habitat and room to manoeuvre the vessel. During the tow, the operator ensured that the trawl was fishing close to submerged aquatic vegetation. Target trawling boat speed was approximately 2 km/hr for all tows. Trawls were retrieved at the end of each transect over the bow of the boat. Trawling was repeated three times, in close succession, over the same fished area within each site.

2021 Sampling

In 2021, DFO sampled 22 sites in the Otter Creek watershed. The project objective was to understand the current distribution of Pugnose Minnow in the Otter Creek system and to resample previously sampled sites. A single field crew conducted all sampling between September 8th and October 7th, 2021. Sampling was focused within Otter Creek and its East and West branches. The primary site selection criteria was sites previously seined or trawled by DFO in 2010 and 2013 (regardless of previous Pugnose Minnow detection), as well as at any additional accessible road-crossings. Seining sites were generally accessed from public lands and municipal road allowances, or with permission from landowners to access private property. Trawling sites were accessed using vessels where safe navigation was feasible.

A combination of seining (n = 12 sites) and trawling (n = 10 sites) was employed (Table 1, Figure 1, Appendix 1). The seine net used for sampling in 2021 was identical to the seine used in 2013. Each seining site was sampled using three repeat seine hauls, hauled in a downstream direction, and covering the same seined area with each haul (Figure 2a). Total seined area was variable across sites based on habitat availability: seine hauls covered the entire pool area to a maximum width and/or length of about 10 m (the length of the seine net). Actual dimensions of each site were measured and recorded (Appendix 1).

Trawling sites were sampled using a Mamou Trawl in the same manner as in 2013, described above and in Barnucz and Drake (2021b). One trawling site was sampled with only one trawl tow because an unseen underwater hazard damaged the trawl.

Fish Processing

Captured fishes were placed into bins of fresh water and were processed separately per seine haul or trawl tow once three hauls or tows were completed. In 2010, per specific protocols described above, another two seine hauls were completed if a new species was identified in the third haul that was not detected in a previous haul. Fishes from these two additional hauls were also placed in separate bins and processed by haul. Captured fishes were identified to species level (where possible), enumerated per haul or tow, and the minimum and maximum total length (mm) per species at the site was recorded. In addition, individual total length and weight (g) were measured for a subset of SARA-listed fishes, where possible. At least one representative

specimen of each species from each site was retained as a voucher, either by digital photograph or as a preserved specimen. Additionally, specimens that could not be identified to species *in situ* and other sampling mortalities were retained for laboratory identification. Physical vouchers were preserved with 10% buffered Formalin in the field, transferred to 70% ethanol in the laboratory. Preserved specimen species identification was confirmed in the laboratory with regional field guides and taxonomic keys (Holm and Burrige 2019; Holm et al. 2019a, 2019b; Mandrak et al. 2022).

HABITAT SAMPLING

Habitat data were collected using similar methods in 2010, 2013, and 2021. Aquatic habitat sampling was conducted at the midpoint of the sampling sites, after fishes were processed and released. Site location (latitude, longitude) was determined using a handheld GPS unit. Stream width (m) was measured at the midpoint of the site perpendicular to the bank using a laser range finder.

Air temperature (°C) was measured using a portable Kestrel wind meter. Surface water temperature (°C), conductivity (µS/cm), turbidity (NTU), and dissolved oxygen (mg/L) were measured approximately 0.2 m beneath the water's surface using a multiparameter sonde. The sonde was deployed and allowed to stabilize for approximately one minute before measurements were recorded. Water clarity (m) was also measured using a turbidity tube. Channel depth (m) was measured in three representative locations within the boundaries of the site using a metre stick (seining sites) or a portable depth sounder (trawling sites).

Water velocity was measured using two different methods. The first method was to use a portable current velocity metre, measured in metres/second (m/s) in 2013 and 2021. The second method was to simply describe the current visually as none, slow, or fast in 2010, when a velocity meter was not available.

Substrate composition within the site was analyzed using two methods: for seining sites, substrate was assessed using a grab sample collected by hand at the midpoint of the site; for trawling sites, the substrate was assessed at the midpoint of the site using a Petit Ponar dredge. The percent composition of the substrate samples was 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), and boulder (>256 mm, excluding bedrock), bedrock (>4000 mm, solid un-weathered rock), hardpan (compacted layer of clay), rubble (broken man-made material), and organic (plant material) (Bain 1999). As the dredge does not effectively sample larger substrates (cobble, boulder), substrate measurements were effectively limited to the smaller substrate size classes, with larger substrate visually included (as described in Barnucz and Drake (2021a)).

Aquatic macrophytes were classified using a visual assessment in which the crew assessed the percent composition of the following vegetation classes within the sample area to a total of 100%: open water, emergent vegetation, submerged vegetation, and floating vegetation. The commonly occurring macrophyte taxa were recorded for each site. Riparian vegetation was assessed visually by determining the percent composition of riparian vegetation classes (deciduous, coniferous, herbaceous, shrubs, or none) occurring in the riparian zone directly adjacent to the sampling site (≥ 3 m from the water's edge).

SAMPLING PERMITS AND DATA ARCHIVING

Sampling for this project was conducted under *Species at Risk Act* Permit Numbers DFO-CA SECT-73 SARA C&A 10-015, DFO-CA SECT-73 SARA C&A 13-014, and 21-PCAA-00029. Fish sampling was conducted following animal use Standard Operating Protocols GWACC-113 and 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)(AUP#1017). Data associated with this report are housed in the Biodiversity Science database within the Great Lakes Laboratory for Fisheries and Aquatic Sciences (GLLFAS) under the project codes “PDAH-PNM-2010”, “2013-PNM-LSCD”, and “2021-EWOC-PNM”; 2010 and 2013 data are also online in the Fish Biodiversity Database (Fisheries and Oceans Canada 2021) on the Open Government Canada Open Data Portal. 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.

RESULTS

FISH COMMUNITY SAMPLING

Overall, 100 sites were sampled across 11 waterbodies and three sampling years, resulting in the capture of 9,725 fishes representing 55 species, including 32 Pugnose Minnow and six other SARA-listed species (Table 1, Figure 1): Blackstripe Topminnow (*Fundulus notatus*, Special Concern), Grass Pickerel (*Esox americanus vermiculatus*; Special Concern), Lake Chubsucker (*Erimyzon sucetta*; Endangered), Northern Sunfish (*Lepomis peltastes*; Special Concern), Pugnose Shiner (*Miniellus anogenus*; Threatened), and Spotted Sucker (*Minytrema melanops*; Special Concern) (Government of Canada 2022). Six invasive/non-native fishes were also detected: Alewife (*Alosa pseudoharengus*), Goldfish (*Carassius auratus*), Common Carp (*Cyprinus carpio*), Round Goby (*Neogobius melanostomus*), Tubenose Goby (*Proterorhinus semilunaris*), and White Perch (*Morone americana*) (Table 2). Sampling results are presented summarizing aggregate catch data across all waterbodies within each sampling year. Site-specific catch data are provided in Appendix 3. Fish count data includes all individuals captured; species detection and richness data do not include those individuals identified only to genus or family. Individual total lengths and weights of at-risk fishes are included in Appendix 4.

2010 Sampling

Twenty-one sites were sampled in 2010 across eight waterbodies: East Sydenham River ($n=5$ sites), North Sydenham River ($n=6$), Indian Creek ($n=1$), Little Bear Creek ($n=4$), Maxwell Creek ($n=2$), Otter Creek ($n=1$) and East Otter Creek ($n=1$), and Whitebread Drain/Grape Run ($n=1$). A total effort of 79 seine hauls resulted in the detection of 5,373 fishes representing 49 species (Table 1). Gizzard Shad (*Dorosoma cepedianum*), sunfish sp. (*Lepomis* sp.; mostly young-of-year), and Bluegill (*Lepomis macrochirus*) were the three most abundant species, representing 52.89% of the total catch (20.52%, 16.92%, and 15.46%, respectively) (Table 2, Figure 3a). Bluegill was the most frequently occurring species, detected at 85.7% of sites sampled, while Largemouth Bass (*Micropterus nigricans*) was the second-most frequently occurring species (81.0%) but occurred in low abundance, representing only 3.78% of the total catch (Appendix 3).

A total of 32 Pugnose Minnow were captured in 2010 from seven sites (frequency of occurrence [FO]=33.3%), representing only 0.58% of the total catch (Table 2, Figure 3a). Twenty-one Pugnose Minnow were captured from five sites in the East Sydenham River and 11 from two sites in Little Bear Creek (Table 1a, Figure 4). Pugnose Minnow ranged in total length from 25 to 41 mm, with a mean total length of 36.8 mm based on 27 individuals measured (Table 3a, Figure 5, Figure 6).

Other at-risk fish species captured in 2010 were Pugnose Shiner, Blackstripe Topminnow, Spotted Sucker, and Northern Sunfish (Table 3a). A total of 14 Pugnose Shiner (RA=0.3%) were captured in Little Bear Creek and Maxwell Creek across four sites (FO=19.0%) (Figure 7),

ranging in total length from 23 to 55 mm (mean 37.4 mm; $n = 14$ measured) (Figure 8, Figure 9). A total of 263 Blackstripe Topminnow were captured at 16 sites (FO=76.2%) (Figure 10), ranging in total length from 20 to 70 mm (mean 33.1 mm; $n = 168$ measured) (Figure 11, Figure 12). Blackstripe Topminnow was detected in all waterbodies sampled except Indian Creek. Four Spotted Sucker were captured in the North and East Sydenham at 14.3% of sites (Figure 13), ranging in total length from 101 to 162 mm (mean 133.3 mm) (Figure 14, Figure 15). Four Northern Sunfish (RA=0.1%) were captured from three sites across East Sydenham River and Otter Creek (FO=14.3%), ranging in total length from 71 to 166 mm (mean 106.8 mm) (Figure 16, Figure 17).

Invasive Round Goby ($n=399$, RA=7.4%), ranging in total length from 14-109 mm, was detected at 13 sites (FO=62%) across the East Sydenham River, Little Bear Creek, the North Sydenham River, and Otter Creek (Table 1, Appendix 3).

2013 Sampling

A total of 57 sites were sampled in 2013 across seven waterbodies (Big Creek, Chenail Ecarté/the Snye, Little Bear Creek, Maxwell Creek, Otter Creek, East Otter Creek, and West Otter Creek); 29 wadeable sites using the bag seine (87 hauls), and 28 non-wadeable sites using the surface trawl (84 tows). Sampling detected 2,827 fishes representing 43 species (Table 1, Figure 1). Round Goby, Ghost Shiner (*Paranotropis buchanani*), Golden Shiner (*Notemigonus crysoleucas*), and Brook Silverside (*Labidesthes sicculus*) were the most abundant species, representing a combined 48.9% of the total catch (14.4%, 12.3%, 11.1%, and 11.1%, respectively) (Table 2, Figure 3b). Bluegill was the most frequently occurring species, detected at 64.9% of sites, but in low abundance, representing only 5.8% of the total catch. Round Goby was the second-most frequently occurring species, detected at 43.9% of sites (Appendix 3).

No Pugnose Minnow were captured in 2013 (Table 1b). Other at-risk fish species captured in 2013 included Pugnose Shiner, Blackstripe Topminnow, Lake Chubsucker, Grass Pickerel, and Northern Sunfish (Table 2, Table 3b). A total of 89 Pugnose Shiner were captured in Little Bear Creek and West Otter Creek from three sites (FO=17.5%)(Figure 7), ranging from 27 to 59 mm in total length (mean 47.5 mm; $n = 26$ measured) (Figure 8, Figure 9). Eighty-four Blackstripe Topminnow (RA=3.0%) were captured in Big Creek, Little Bear Creek, and West Otter Creek from 13 sites (FO=22.8%) (Figure 10), ranging from 24 to 64 mm in total length (mean 33.7 mm, $n = 75$ measured) (Figure 11, Figure 12). Four Northern Sunfish (RA=0.1%) were captured from three sites in East and West Otter Creek (FO=5.3%), ranging 159 to 219 mm in total length (mean 195 mm) (Figure 16, Figure 17). Two juvenile Lake Chubsucker (RA=0.1%) were captured from one site in Little Bear Creek (FO=1.8%), and measured 43 and 53 mm in total length (Figure 18, Figure 19). Three Grass Pickerel (RA=0.1%) were captured from one site in Little Bear Creek (FO=1.8%), ranging from 106 to 139 mm in total length (mean 123.3 mm) (Figure 20, Figure 21).

Invasive Round Goby ($n=407$, RA=14.4%), ranging in total length from 10-114 mm, was detected at 25 sites (FO=43.9%) across Big Creek, the Chenail Ecarté/the Snye, Otter Creek, East Otter Creek, and Little Bear Creek (Table 1, Appendix 3).

2021 Sampling

A total of 22 sites were sampled in 2021 within Otter Creek, East Otter Creek, and West Otter Creek; 12 wadeable sites using the bag seine (36 hauls) and 10 non-wadeable sites using the surface trawl (28 tows). Sampling detected 1,347 fishes representing 29 species (Table 1). Bluegill, Gizzard Shad, and Ghost Shiner were the most abundant species in 2021, representing

a combined 58.1% of the total catch (24.3%, 20.3%, and 13.5%, respectively) (Table 2, Figure 3c). Ghost Shiner, Gizzard Shad, and Bluegill were also the most frequently occurring species, detected at 66.7%, 61.9%, and 57.1% of sites sampled, respectively (Appendix 3).

No Pugnose Minnow were captured in 2021 (Table 1c). The only other at-risk fish species captured in 2021 was Blackstripe Topminnow (Table 3c). A total of 122 Blackstripe Topminnow (RA=9.1%) were captured at 12 sites (FO=57.1%) in the main, East, and West branches of Otter Creek (Figure 10), ranging from 31 to 72 mm in total length (mean 43.6 mm; $n = 120$ measured) (Figure 11, Figure 12).

Invasive Round Goby ($n=31$, RA=2.3%), ranging in total length from 19-112 mm, was detected at seven sites (FO=31.8%) in the main, East, and West branches of Otter Creek (Table 1, Appendix 3).

HABITAT SAMPLING

Habitat results are presented in Table 4, summarizing habitat data across sites sampled within each sampling year. Site-specific habitat data are provided in Appendix 5, Appendix 6, and Appendix 7.

2010 Sampling

Across all sites sampled in 2010, the mean air temperature was 28.0°C (21.7-35.7°C), the mean water temperature was 26.56°C (21.60-30.32 °C), the mean conductivity was 475.0 µS/cm (105-623 µS/cm), the mean dissolved oxygen was 8.19 mg/L (3.30-12.60 mg/L), the mean pH was 7.81 (7.05-8.65), and the mean water clarity was 0.34 m (0.06->1.2 m). In 2010, only the maximum sampled water depth was recorded, and only at 14 of 21 sites; the mean maximum depth sampled was 1.03 m (0.42 – 1.60 m). Water velocity was not measured in 2010 and instead classified as none, slow, medium, or fast. Water velocity was classified as “none” at 75% of sites and “slow” at 25% of sites sampled. The dominant substrate type was clay (average 35% of substrate composition). The dominant aquatic vegetation type was open water at 60% of sites sampled, and the mean aquatic vegetation composition across sites was open water: 57%, submerged: 21%, floating: 15%, and emergent: 7%. Commonly occurring aquatic macrophyte taxa included Coontail (*Ceratophyllum demersum*), Pondweed sp. (*Potamogeton* sp.), Duckweed sp. (*Lemna* sp.), and Water Celery (*Vallisneria americana*). The dominant riparian vegetation type was herbaceous at 15 sites (71%) and deciduous at five sites (24%). The mean riparian vegetation composition across sites was herbaceous: 68%, and deciduous: 32%.

At sites where Pugnose Minnow was detected in 2010 ($n = 7$ sites), the mean air temperature was 29.0°C (25.4-33.7°C), the mean water temperature was 28.21°C (26.3-30.32°C), the mean conductivity was 511.4 µS/cm (481-543 µS/cm), the mean dissolved oxygen was 10.31 mg/L (6.50-12.60 mg/L), the mean pH was 7.73 (7.05-8.56), and the mean water clarity was 0.37 m (0.22-0.64 m). Water velocity was classified as “none” at 71% of sites where Pugnose Minnow was detected, and as “slow” at the remaining 29% of sites. Substrate, aquatic vegetation composition, and riparian vegetation composition were not recorded at one of the sites at which Pugnose Minnow was detected. The dominant substrate type was silt and sand; the mean substrate composition was silt: 38%, sand: 36%, organic: 17%, clay: 7%, and boulder: 3%. The mean aquatic vegetation composition across Pugnose Minnow sites was open water: 58%, submerged: 36%, and floating: 7%. Coontail and Water Celery were the only species of aquatic macrophytes described at three sites. The mean riparian vegetation composition was herbaceous: 73%, and deciduous: 28% (Table 4). Site photos of six of seven sites where Pugnose Minnow was detected are presented in Figure 22.

2013 Sampling

Across all sites sampled in 2013, the mean air temperature was 26.2°C (14.3-37.5°C), the mean water temperature was 20.24°C (13.80-26.13°C), the mean conductivity was 606.5 µS/cm (243.0-797.8 µS/cm), the mean dissolved oxygen was 6.32 mg/L (4.26-12.73 mg/L), the mean pH was 7.86 (7.54-8.50), the mean turbidity was 108.76 NTU (1.48-469.24 NTU), and the mean water clarity was 0.36 m (0.02->1.20 m). The grand mean water depth sampled was 0.82 m (mean 0.40-1.40 m), and the grand mean water velocity was 0.11 m/s (mean 0.00-0.38 m/s). The dominant substrate type was clay at 46% of sites, and silt at 33% of sites sampled. The mean substrate composition across sites was clay: 37%, silt: 29%, organic: 20%, sand: 11%, gravel: 1%, and cobble: 1%. The dominant aquatic vegetation type was open water at 54% of sites sampled, and the mean aquatic vegetation composition across sites was open water: 46%, submerged: 43%, emergent: 7%, and floating: 4%. Commonly occurring aquatic macrophyte taxa included Coontail (*Ceratophyllum demersum*), Pondweed sp. (*Potamogeton* sp.), and Duckweed sp. (*Lemna* sp.). The dominant riparian vegetation type was herbaceous at 75% of sites and deciduous at 23% of sites. The mean riparian vegetation composition across sites was herbaceous: 68%, deciduous: 26%, shrubs: 5%, and coniferous: 1%.

2021 Sampling

Across all sites sampled in 2021, the mean air temperature was 21.2°C (16.2-26.5°C), the mean water temperature was 19.08°C (16.78-21.78°C), the mean conductivity was 421.4 µS/cm (262.3-586.0 µS/cm), the mean dissolved oxygen was 5.46 mg/L (1.38-7.66 mg/L), the mean pH was 8.06 (7.69-8.37), the mean turbidity was 228.10 NTU (40.12-418.50 NTU), and the mean water clarity was 0.07 m (0.03-0.45 m). The grand mean water depth sampled was 0.99 m (site mean 0.26-2.27 m), and the grand mean water velocity was 0.06 m/s (site mean 0.00-0.15 m/s). The dominant substrate type was clay at 36% of sites, silt at 18%, sand at 18%, and gravel at 14% of sites. The mean substrate composition across sites was silt: 32%, clay: 31%, sand: 16%, gravel: 8%, organic: 6%, concrete: 3%, cobble: 2%, rubble: 2%, and boulder: 1%. The dominant aquatic vegetation type was open water at 91% of sites sampled, and the mean aquatic vegetation composition across sites was open water: 81%, floating: 8%, emergent: 7%, and submerged: 4%. Commonly occurring aquatic macrophyte taxa included Duckweed sp. (*Lemna* sp.), Coontail (*Ceratophyllum demersum*), and Common Reed (*Phragmites australis*). The dominant riparian vegetation type was herbaceous at 68% of sites, deciduous at 23% of sites, and none at 10% of sites. The mean riparian vegetation composition across sites was herbaceous: 66%, deciduous: 19%, none: 10%, shrubs: 4%, and coniferous: 1%.

ACKNOWLEDGEMENTS

We thank all those involved in field sampling, laboratory identification of fishes, and data management: David Marson, Jarrod Stackhouse, D. Alex Price, Ryan Kelly, Lisa Vollbrecht, Simon Gräfe, Thom Heiman, Mike Parna, Maria Zintchenko, Jordan Boudreau, Olivia Butty, Paul Finigan, Vince Frasca, Bill Glass, Danielle Hosick, Dustin Raab, Edyta Ratajczyk, Nick Wasilik, Grant Fortin, and Jet Taylor. We thank Amy Boyko and Paul Bzonek for their helpful reviews. Funding for this project was provided by DFO's Species at Risk Program.

REFERENCES

- Bain, M.B. 1999. Substrate. *In* Aquatic habitat assessment: common methods. *Edited by* M.B. Bain and N.J. Stevenson. American Fisheries Society, Bethesda, Maryland. pp. 95–104.
- Barnucz, J., and Drake, D. 2021a. Targeted Sampling for Northern Madtom (*Noturus stigmosus*) in the Lower East Sydenham River, Ontario, 2019. *Can. Data Rep. Fish. Aquat. Sci.* **1317**: vi + 15p.
- Barnucz, J., and Drake, D.A.R. 2021b. Targeted Sampling for Pugnose Minnow (*Opsopoeodus emiliae*) in the St. Clair River and Lower Sydenham River, Ontario, 2019. *Can. Data Rep. Fish. Aquat. Sci.* **1318**: viii + 44 p.
- COSEWIC. 2012. COSEWIC Assessment and Status Report on the Pugnose Minnow *Opsopoeodus emiliae* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. x + 29 pp. Available from www.registrelep-sararegistry.gc.ca/default_e.cfm.
- Fisheries and Oceans Canada. 2021. Fish Biodiversity Database on Open Government Canada - Open Data Portal. Fisheries and Oceans Canada. Available from <https://open.canada.ca/data/en/dataset/02bf1fca-2fda-11e9-a466-1860247f53e3>.
- Fisheries and Oceans Canada. 2022. Recovery Strategy and Action Plan for the Pugnose Minnow (*Opsopoeodus emiliae*) in Canada. *Species at Risk Act Recovery Strategy Series*. Fisheries and Oceans Canada, Ottawa.
- Gáspárdy, R.C., Barnucz, J., and Drake, D.A.R. 2020. Targeted sampling for Pugnose Minnow (*Opsopoeodus emiliae*) in the Canard River, Ontario, 2018. *Can. Data Rep. Fish. Aquat. Sci.* **1305**: v + 51 p.
- Government of Canada. 2022. Species at Risk Public Registry. Available from https://wildlife-species.canada.ca/species-risk-registry/sar/index/default_e.cfm.
- Government of Canada. 2024. Species at Risk Public Registry. Available from <https://www.canada.ca/en/environment-climate-change/services/species-risk-public-registry.html>.
- Holm, E., Barnucz, J., and BurrIDGE, M. 2019a. ROM & DFO Ontario Fish Species at Risk, Workshop Lab Manual. Royal Ontario Museum. 66 pp.
- Holm, E., and BurrIDGE, M. 2019. ROM Minnow Identification Workshop, Lab Manual. Royal Ontario Museum. 108 pp.
- Holm, E., BurrIDGE, M., and Wells, B. 2019b. ROM Ontario Fish Identification Workshop, Introductory Lab Manual. Royal Ontario Museum. 134 pp.
- Mandrak, N.E., Barnucz, J., Marson, D., and Velema, G.J. 2006. Targeted, wadeable sampling of fish species at risk in the Lake St. Clair watershed of southwestern Ontario, 2003. *Can. Manuscr. Rep. Fish. Aquat. Sci.* **2779**: v + 26 pp.
- Mandrak, N.E., Bouvier, L.D., Colm, J.E., Enders, E.C., Holm, E., and Drake, D.A.R. 2022. Voucher collection guidance for freshwater fishes in DFO's Ontario and Prairie , and Arctic regions. *Can. Manuscr. Rep. Fish. Aquat. Sci.* **3235**: iv + 30 p.

Table 1. Summary of sampling effort (number of sites) and fishes captured by waterbody and sampling gear [either bag seine (SN) or surface trawl (TRL)] in each sampling year: a) 2010, b) 2013, and c) 2021. The total count of Pugnose Minnow (PNM) capture per waterbody and gear type is enumerated in the Total PNM column.

a) 2010

Waterbody	Gear type	No. sites	Total fishes	No. species	Total PNM
East Sydenham River	SN	5	1803	32	21
North Sydenham River	SN	6	1876	26	0
Indian Creek	SN	1	31	10	0
Little Bear Creek	SN	4	1003	25	11
Maxwell Creek	SN	2	281	11	0
Otter Creek	SN	1	150	15	0
East Otter Creek	SN	1	51	11	0
Whitebread Drain/Grape Run Drain	SN	1	178	11	0
Combined		21	5373	49	32

b) 2013

Waterbody	Gear	No. sites	Total fishes	No. species	Total PNM
Big Creek	SN	11	676	19	0
Chenail Ecarté (The Snye)	TRL	1	71	15	0
Little Bear Creek	SN	5	202	21	0
Little Bear Creek	TRL	21	1055	33	0
Maxwell Creek	SN	5	68	6	0
Otter Creek	SN	1	49	6	0
Otter Creek	TRL	6	328	15	0
East Otter Creek	SN	4	286	8	0
West Otter Creek	SN	3	92	17	0
Combined		57	2827	43	0

c) 2021

Waterbody	Gear	No. sites	Total fishes	No. species	Total PNM
Otter Creek	TRL	6	631	17	0
East Otter Creek	SN	8	392	20	0
East Otter Creek	TRL	3	165	10	0
West Otter Creek	SN	4	109	14	0
West Otter Creek	TRL	1	50	6	0
Combined		22	1347	29	0

Table 2. Total abundance of each species captured in each sampling year, in order by taxonomic family. Species designation is labelled beside common name: SARA status (END – Endangered; THR – Threatened; SC – Special Concern), or invasive (I).

Scientific name	Common name	2010	2013	2021	Total
<i>Labidesthes sicculus</i>	Brook Silverside	124	314	10	448
<i>Carpiodes cyprinus</i>	Quillback	0	25	0	25
<i>Catostomus commersonii</i>	White Sucker	5	4	5	14
<i>Erimyzon sucetta</i>	Lake Chubsucker (END)	0	2	0	2
<i>Minytrema melanops</i>	Spotted Sucker (SC)	4	0	0	4
<i>Moxostoma macrolepidotum</i>	Shorthead Redhorse	1	0	0	1
<i>Ambloplites rupestris</i>	Rock Bass	132	34	2	168
<i>Lepomis</i> sp.	Sunfish sp.	758	5	1	764
<i>Lepomis cyanellus</i>	Green Sunfish	55	6	31	92
<i>Lepomis gibbosus</i>	Pumpkinseed	422	40	10	472
<i>Lepomis</i> hybrid	Sunfish hybrid	10	0	7	17
<i>Lepomis</i> hybrid (<i>cyanellus</i> X <i>gibbosus</i>)	Green Sunfish X Pumpkinseed	3	1	0	4
<i>Lepomis</i> hybrid (<i>cyanellus</i> X <i>macrochirus</i>)	Green Sunfish X Bluegill	1	0	0	1
<i>Lepomis macrochirus</i>	Bluegill	930	164	328	1422
<i>Lepomis peltastes</i>	Northern Sunfish (SC)	4	4	0	8
<i>Micropterus dolomieu</i>	Smallmouth Bass	1	0	0	1
<i>Micropterus nigricans</i>	Largemouth Bass	218	97	8	323
<i>Pomoxis</i> sp.	Crappie sp.	29	9	0	38
<i>Pomoxis annularis</i>	White Crappie	14	45	8	67
<i>Pomoxis nigromaculatus</i>	Black Crappie	30	20	44	94
<i>Clupeidae</i>	Herring family	0	1	0	1
<i>Alosa pseudoharengus</i>	Alewife (I)	2	16	0	18
<i>Dorosoma cepedianum</i>	Gizzard Shad	891	172	274	1337
<i>Carassius auratus</i>	Goldfish (I)	0	59	0	59
<i>Cyprinus carpio</i>	Common Carp (I)	1	1	0	2
<i>Esox americanus vermiculatus</i>	Grass Pickerel (SC)	0	3	0	3
<i>Esox lucius</i>	Northern Pike	9	15	3	27
<i>Umbra limi</i>	Central Mudminnow	14	20	7	41
<i>Fundulus diaphanus</i>	Banded Killifish	1	0	0	1
<i>Fundulus notatus</i>	Blackstripe Topminnow (SC)	263	84	122	469
<i>Gobiidae</i>	Goby family (I)	0	13	0	13
<i>Neogobius melanostomus</i>	Round Goby (I)	399	407	31	837
<i>Proterorhinus semilunaris</i>	Tubenose Goby (I)	9	19	0	28
<i>Ameiurus melas</i>	Black Bullhead	9	2	11	22
<i>Ameiurus natalis</i>	Yellow Bullhead	22	11	20	53
<i>Ameiurus nebulosus</i>	Brown Bullhead	4	3	3	10
<i>Ictalurus punctatus</i>	Channel Catfish	40	4	1	45
<i>Noturus gyrinus</i>	Tadpole Madtom	75	94	24	193
<i>Lepisosteus osseus</i>	Longnose Gar	1	2	0	3
<i>Cyprinella spiloptera</i>	Spotfin Shiner	13	5	0	18
<i>Hudsonius hudsonius</i>	Spottail Shiner	2	42	15	59
<i>Leuciscidae</i>	Minnow family	12	10	0	22
<i>Luxilus cornutus</i>	Common Shiner	4	0	0	4
<i>Lythrurus umbratilis</i>	Redfin Shiner	0	10	3	13
<i>Miniellus anogenus</i>	Pugnose Shiner (THR)	14	89	0	103
<i>Miniellus heterodon</i>	Blackchin Shiner	0	1	0	1
<i>Miniellus stramineus</i>	Sand Shiner	2	0	0	2
<i>Notemigonus crysoleucas</i>	Golden Shiner	24	315	1	340

Scientific name	Common name	2010	2013	2021	Total
<i>Notropis atherinoides</i>	Emerald Shiner	12	4	0	16
<i>Notropis heterolepis</i>	Blacknose Shiner	2	0	0	2
<i>Opsopoeodus emiliae</i>	Pugnose Minnow (THR)	32	0	0	32
<i>Paranotropis</i> sp.	Shiner sp.	1	25	0	26
<i>Paranotropis buchanani</i>	Ghost Shiner	68	347	182	597
<i>Paranotropis volucellus</i>	Mimic Shiner	40	3	0	43
<i>Pimephales notatus</i>	Bluntnose Minnow	529	142	73	744
<i>Semotilus atromaculatus</i>	Creek Chub	14	0	28	42
<i>Morone americana</i>	White Perch (I)	1	5	0	6
<i>Etheostoma blennioides</i>	Greenside Darter	1	0	0	1
<i>Etheostoma caeruleum</i>	Rainbow Darter	1	0	0	1
<i>Etheostoma nigrum</i>	Johnny Darter	82	90	68	240
<i>Perca flavescens</i>	Yellow Perch	2	26	3	31
<i>Percina caprodes</i>	Logperch	7	14	5	26
<i>Percina maculata</i>	Blackside Darter	22	2	20	44
<i>Percopsis omiscomaycus</i>	Trout-perch	0	1	0	1
<i>Aplodinotus grunniens</i>	Freshwater Drum	7	0	0	7
	Total fishes	5373	2827	1348	9548
	Total species	49	44	29	56

Table 3. Summary of detections of six species of at-risk fishes captured during targeted sampling for Pugnose Minnow in a) 2010, b) 2013, and c) 2021, including frequency of occurrence (FO) by sampling year and total length (mm; TL). Total individuals measured for total length presented where all captured individuals were not measured. SARA status: END – Endangered; THR – Threatened; SC – Special Concern.

a) 2010 (n = 21 sites)

Species	SARA status	Total captured	FO (% sites)	Individuals measured	Mean TL	Min. TL	Max. TL
Pugnose Minnow	THR	32	33.3	27	36.8	25	41
Pugnose Shiner	THR	14	19.0	14	37.4	23	55
Blackstripe Topminnow	SC	263	76.2	168	33.1	20	70
Northern Sunfish	SC	4	19.0	4	106.8	71	166
Spotted Sucker	SC	4	14.3	4	133.3	101	162

b) 2013 (n = 57 sites)

Species	SARA status	Total captured	FO (% sites)	Individuals measured	Mean TL	Min. TL	Max. TL
Pugnose Shiner	THR	89	17.5	26	47.5	27	59
Blackstripe Topminnow	SC	84	22.8	75	33.7	24	64
Lake Chubsucker	END	2	1.8	2	48.0	43	53
Northern Sunfish	SC	4	7.0	4	195.0	159	219
Grass Pickerel	SC	3	1.8	3	123.3	106	139

c) 2021 (n = 22 sites)

Species	SARA status	Total captured	FO (% sites)	Individuals measured	Mean TL	Min. TL	Max. TL
Blackstripe Topminnow	SC	122	57.1	120	43.6	31	72

Table 4. Summary of the physical characteristics of the habitat sampled in each sampling year and at the subset of sites where Pugnose Minnow was detected in 2010. Values presented represent the mean values across all sites sampled.

	2010	2013	2021	PNM Sites
Air temperature (°C)	28.0	26.2	21.2	29.0
Water temperature (°C)	26.56	20.24	19.08	28.21
Conductivity (µS/cm)	475.0	606.5	421.4	511.4
Dissolved oxygen (mg/L)	8.19	6.32	5.46	10.31
pH	7.81	7.86	8.06	7.73
Water clarity (m)	0.34	0.36	0.07	0.37
Turbidity (NTU)	*	108.76	228.10	*
Grand mean depth (m)	1.03	0.82	0.99	1.26
Grand mean water velocity (m/s)	none	0.11	0.06	none
Dominant substrate type	Clay	Clay, Silt, Organic	Clay, Silt	Silt, Sand
Organic (%)	13	20	6	17
Clay (%)	35	37	31	7
Silt (%)	22	29	32	38
Sand (%)	12	11	16	36
Gravel (%)	16	1	8	0
Cobble (%)	0	1	2	0
Boulder (%)	1	0	1	3
Bedrock (%)	0	0	0	0
Hardpan (%)	0	0	0	0
Rubble (%)	0	0	2	0
Concrete (%)	1	0	3	0
Dominant aquatic vegetation type	Open water	Open water	Open water	Open water
Emergent (%)	7	7	7	0
Floating (%)	15	4	8	7
Submerged (%)	21	43	4	36
Open water (%)	57	46	81	58
Dominant macrophyte species	Coontail	Coontail, Duckweed sp.	Duckweed sp., Coontail	Water celery, Coontail
Dominant riparian vegetation type	Herbaceous	Herbaceous	Herbaceous	Herbaceous
Deciduous (%)	32	26	19	28
Coniferous (%)	0	1	1	0
Herbaceous (%)	68	68	66	73
Shrubs (%)	0	5	4	0
None (%)	0	0	10	0

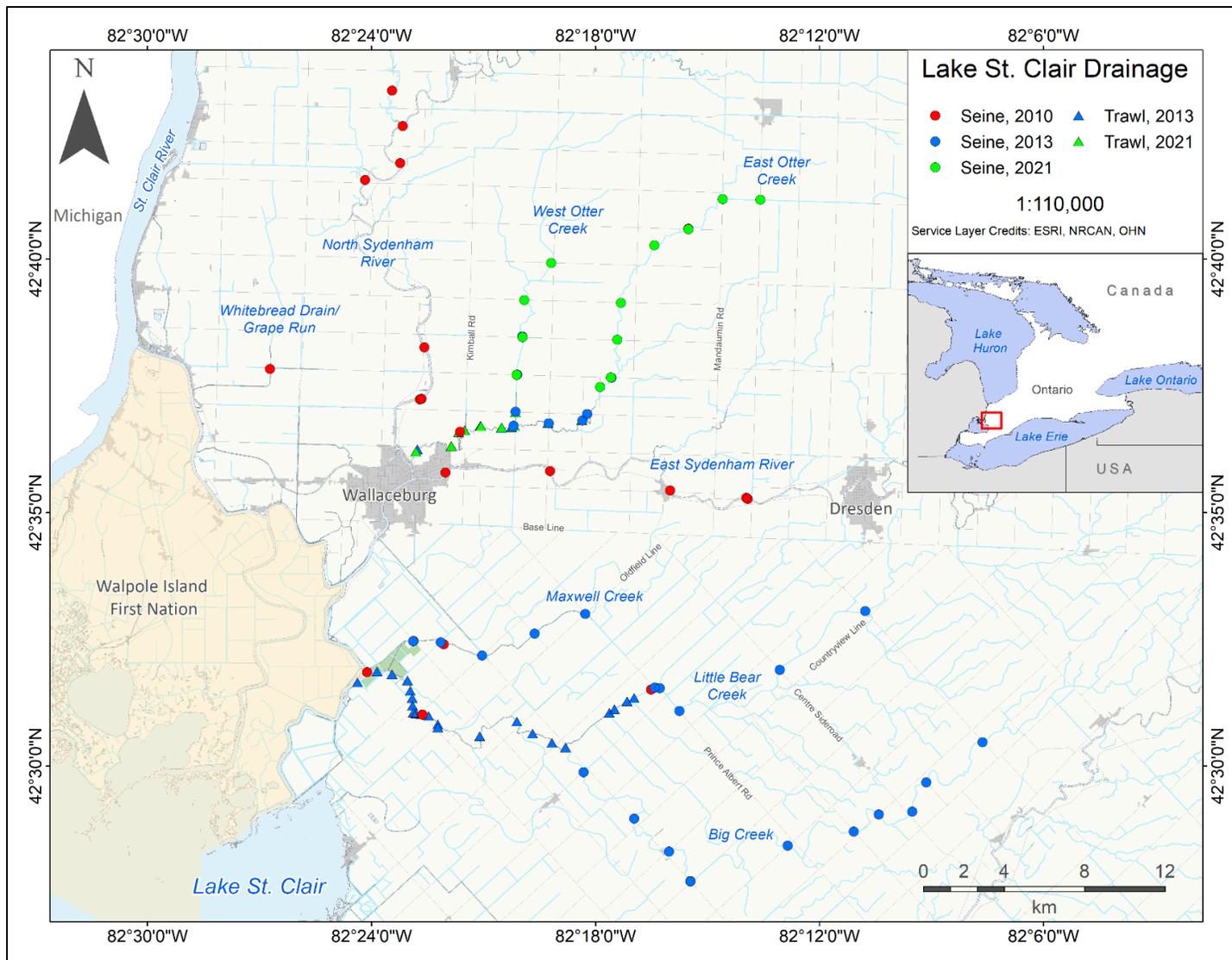
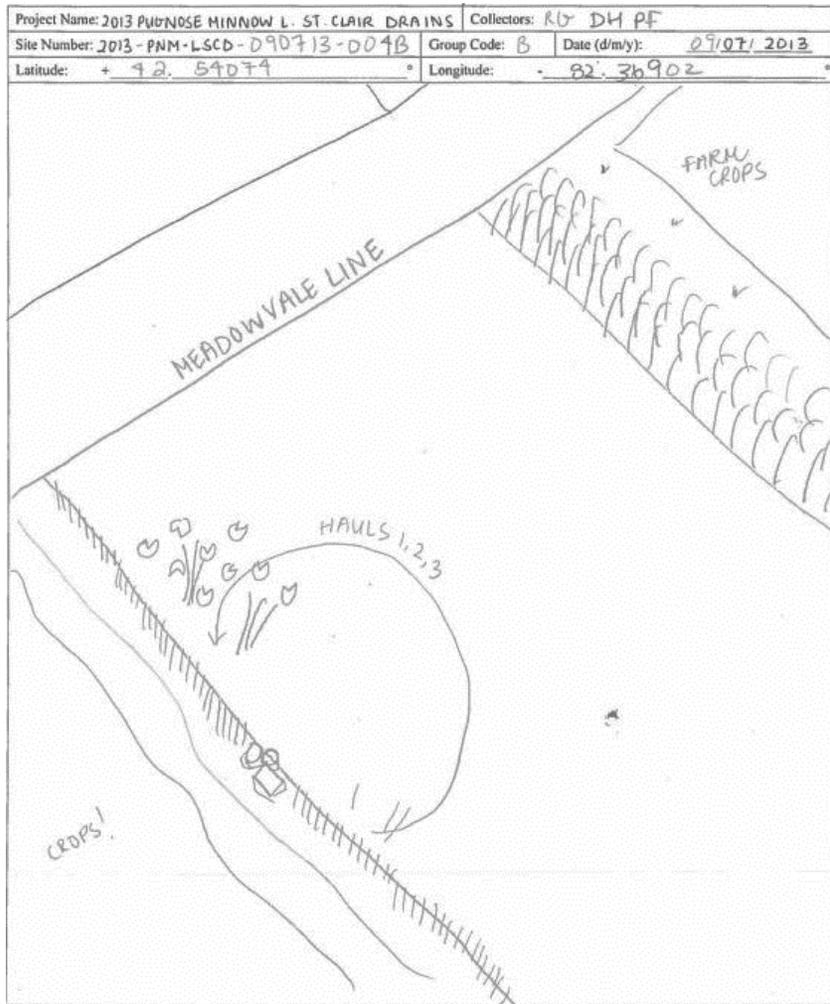
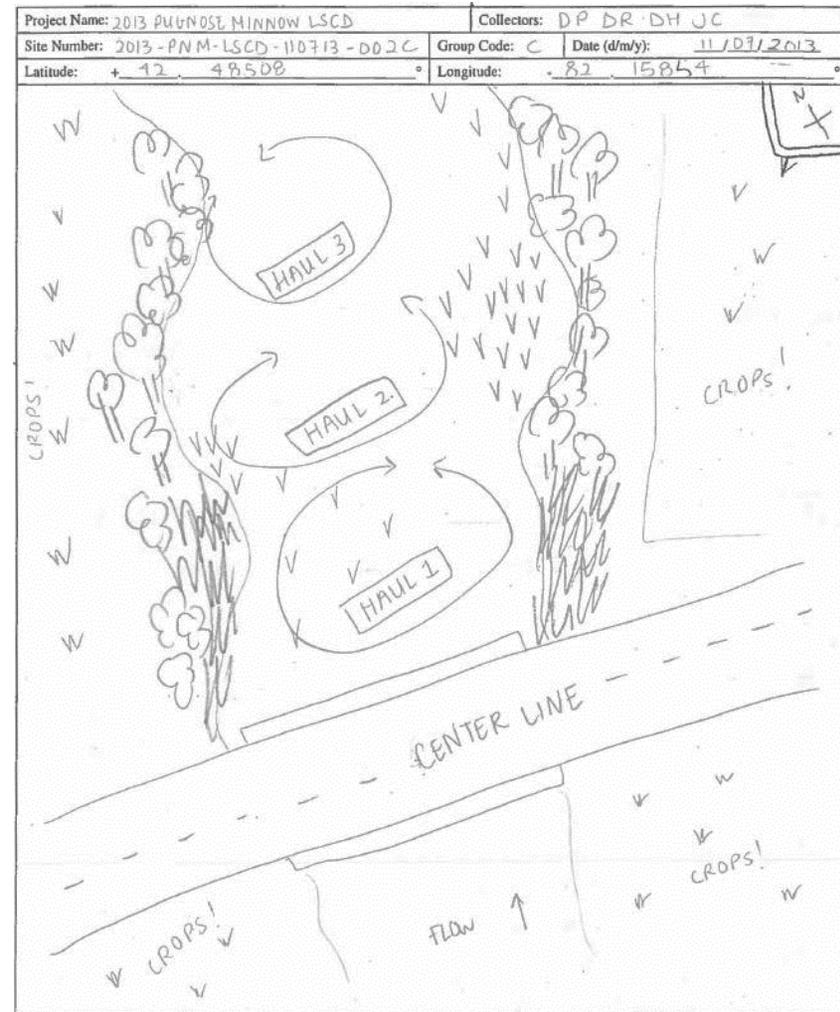


Figure 1. Map of all sites sampled by DFO targeting Pugnose Minnow in 2010 (red), 2013 (blue), and 2021 (green) using seining (circles) and pelagic trawling (triangles). Contains information licensed under the Open Government License – Ontario.

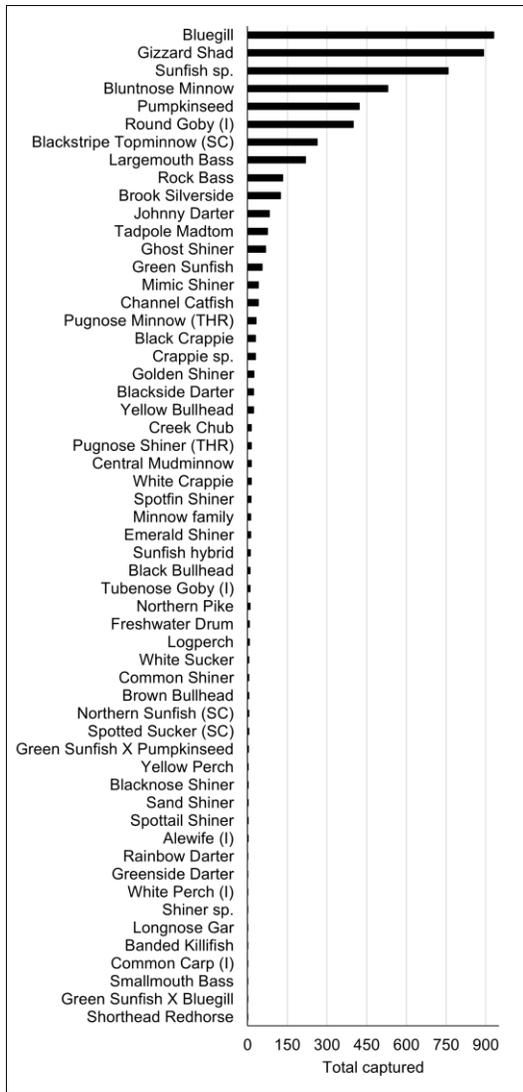


a)

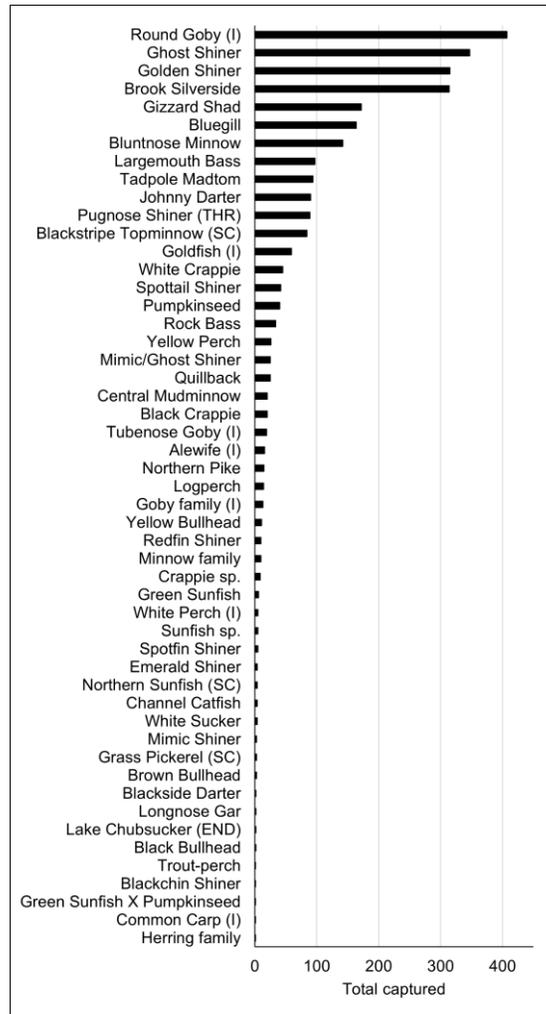


b)

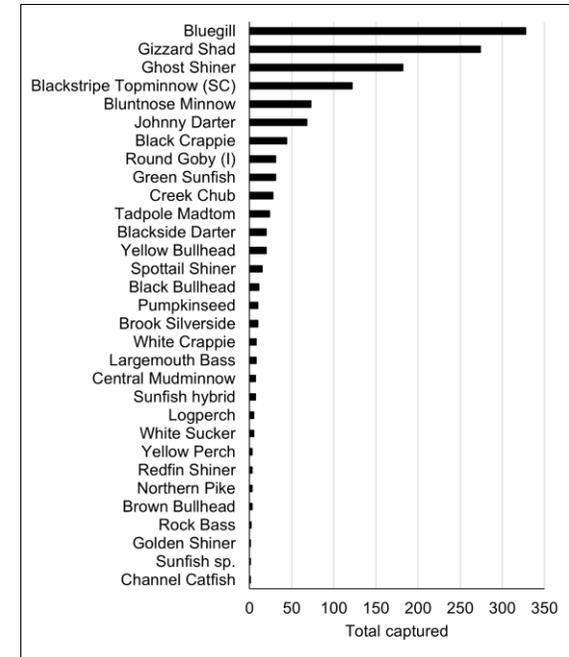
Figure 2. Site map diagrams illustrating seining methods in wadeable habitat where a) all seine hauls covered the same area, or b) seine hauls conducted adjacent to preceding haul. Seining method was determined according to depth and habitat availability and specific sampling protocol by sampling year.



a) 2010 (n = 21 sites)



b) 2013 (n = 57 sites)



c) 2021 (n = 22 sites)

Figure 3. Rank abundance of each species captured across all sites sampled in each sampling year: a) 2010, b) 2013, and c) 2021. Invasive species (I) and species at risk SARA designation (SC = special concern, THR = Threatened) are labelled.

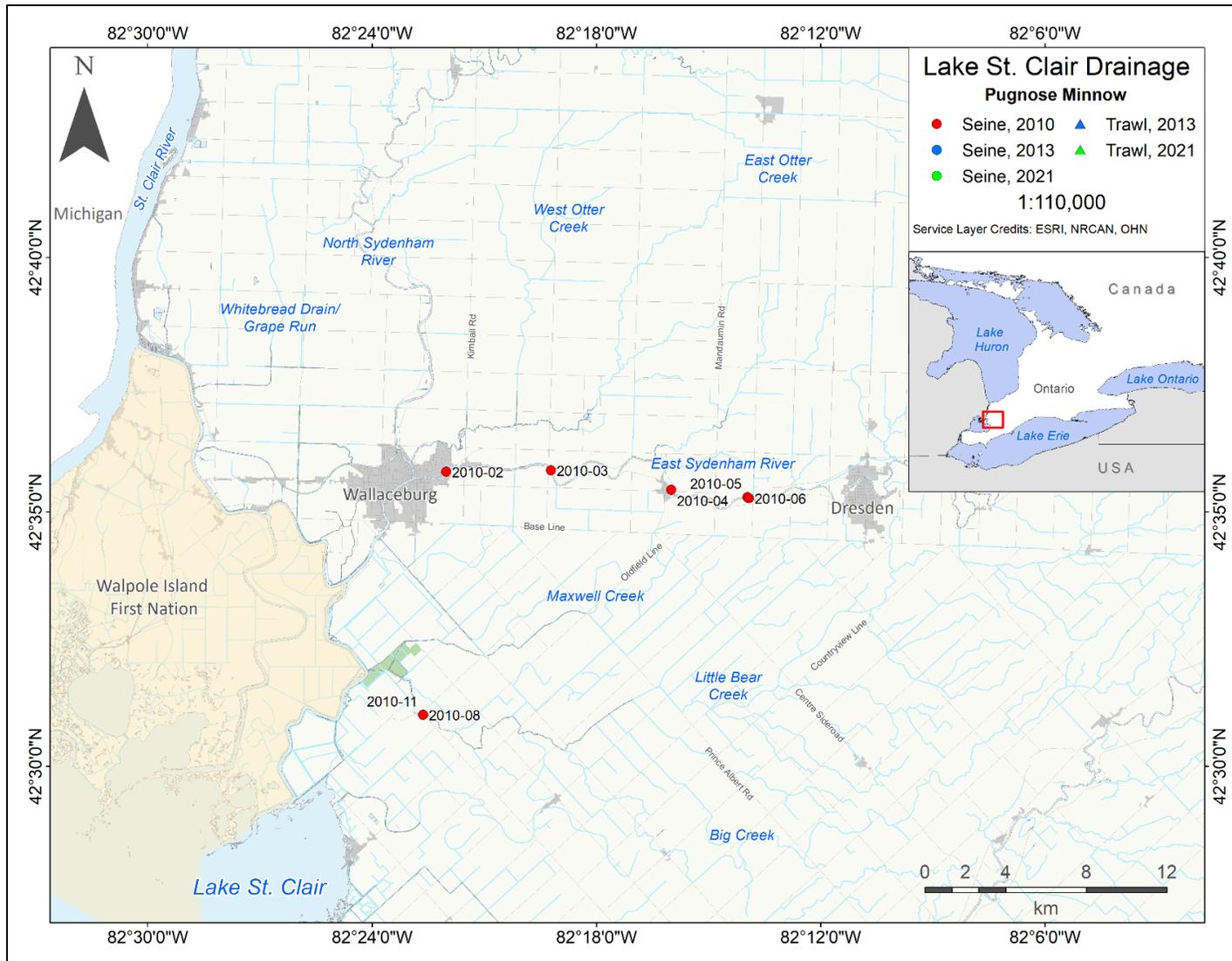


Figure 4. Map of subset of sites where Pugnose Minnow (SARA: Threatened) was detected, by sampling year and gear type. Map labels are matched to site codes in Appendix 1. Contains information licensed under the Open Government License – Ontario.



Figure 5. Digital voucher photograph of Pugnose Minnow (36 mm) captured by seine at site 2010-02 (PDAH-PNM-2010-270710-004B) in East Sydenham River on July 27, 2010.

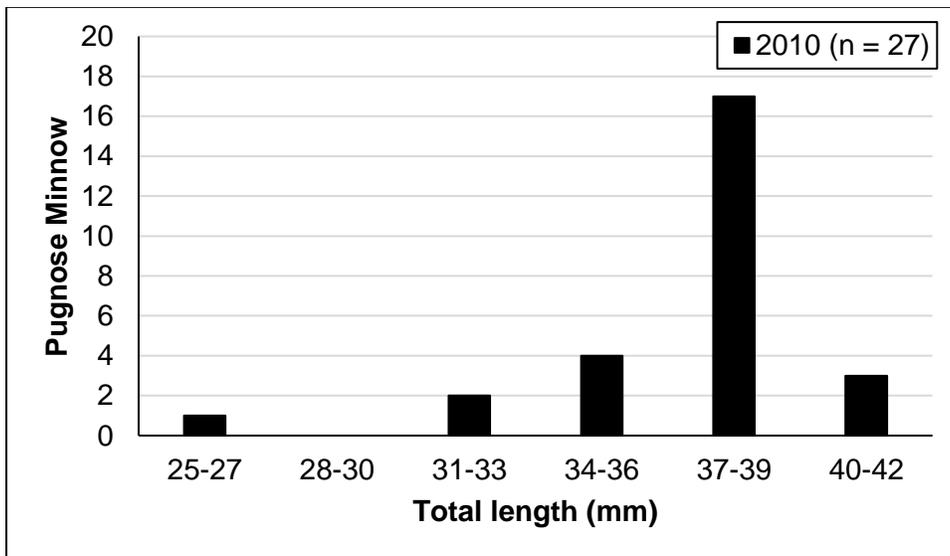


Figure 6. Length-frequency of Pugnose Minnow captured in 2010. Total lengths were measured for 27 of 32 individuals captured.

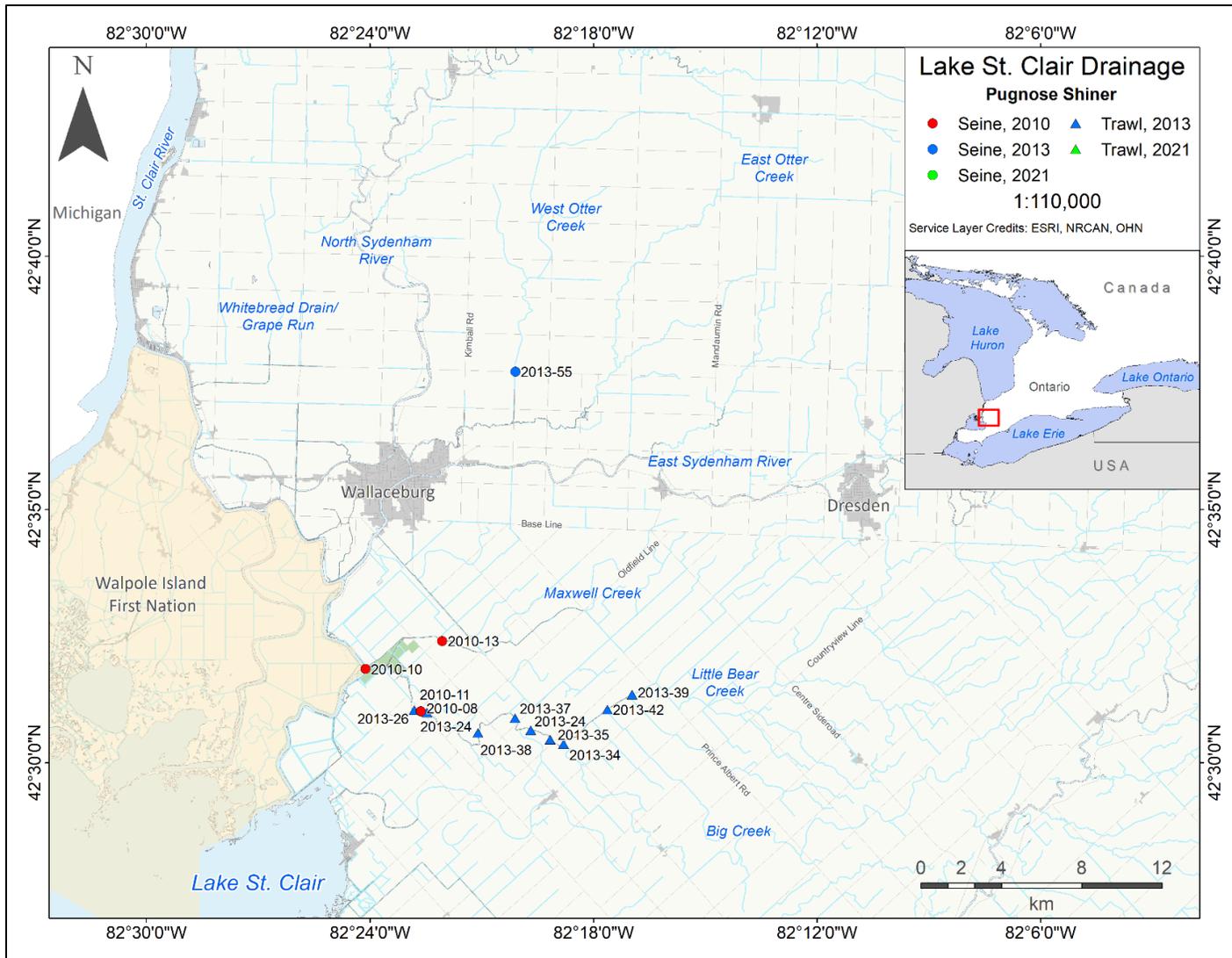


Figure 7. Map of subset of sites where Pugnose Shiner (SARA: Threatened) was detected by sampling year and gear type. Map labels are matched to site codes in Appendix 1. Contains information licensed under the Open Government License – Ontario.



Figure 8. Digital voucher photograph of Pugnose Shiner (52 mm) captured by seine at site 2010-10 (PDAH-PNM-2010-030810-001A) in Little Bear Creek on August 3, 2010.

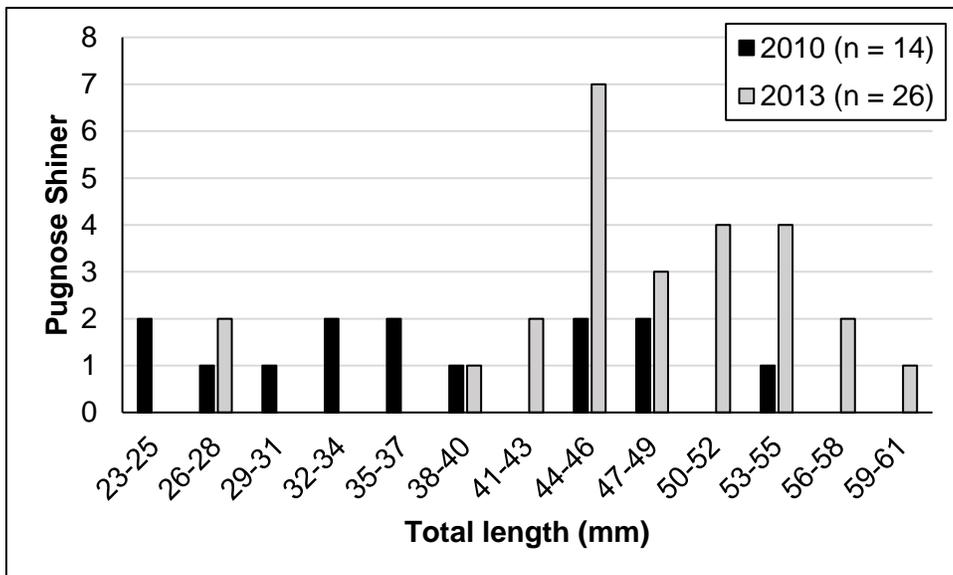


Figure 9. Length-frequency of Pugnose Shiner captured in 2010 and 2013. Total lengths were measured for 40 of 103 individuals captured.

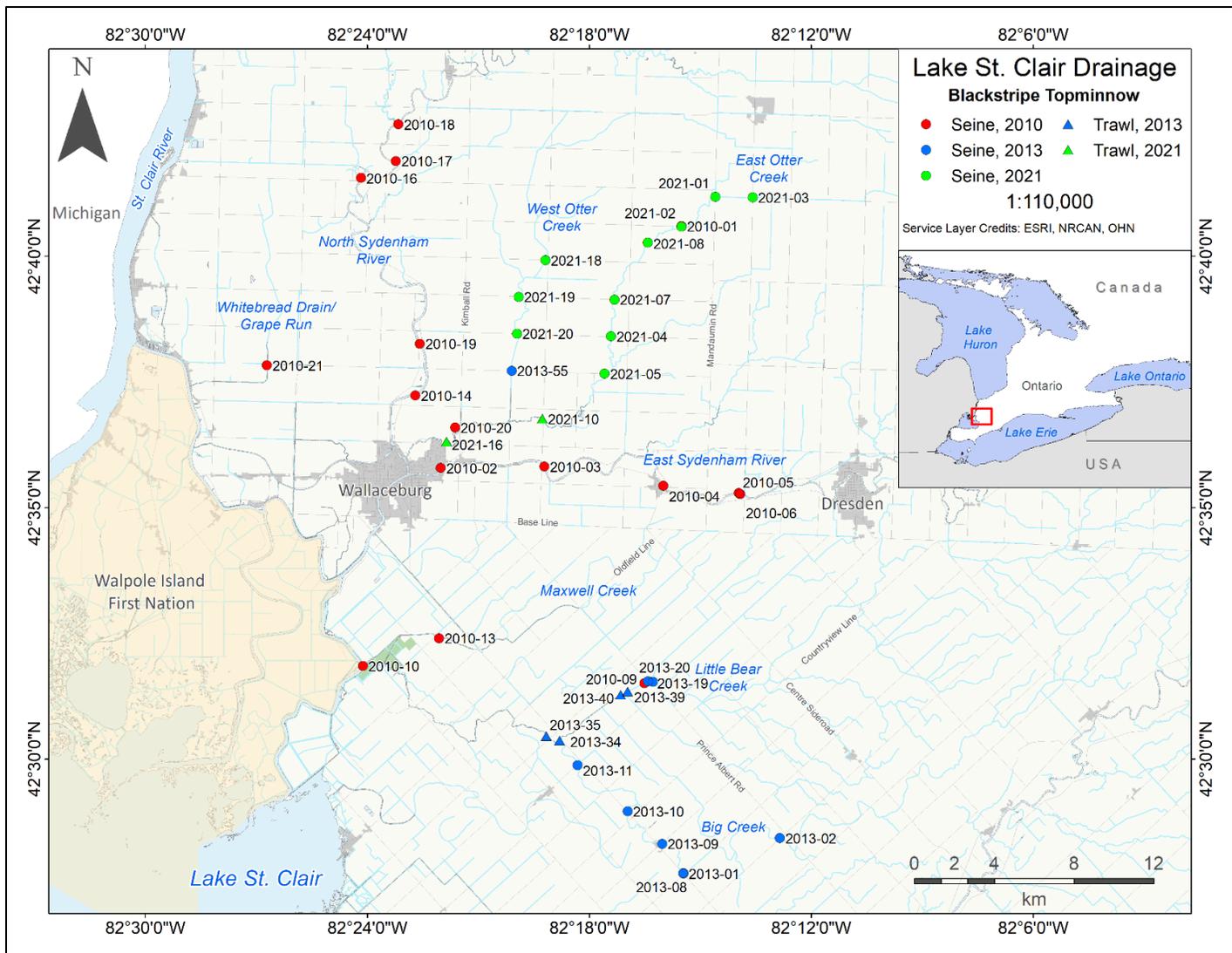


Figure 10. Map of subset of sites where Blackstripe Topminnow (SARA: Special Concern) was detected, by sampling year and gear type. Map labels are matched to site codes in Appendix 1. Contains information licensed under the Open Government License – Ontario.



Figure 11. Digital voucher photograph of Blackstripe Topminnow (66 mm) captured by seine at site 2021-02 (2021-EWOC-PNM-080921-002A) in East Otter Creek on September 8, 2021.

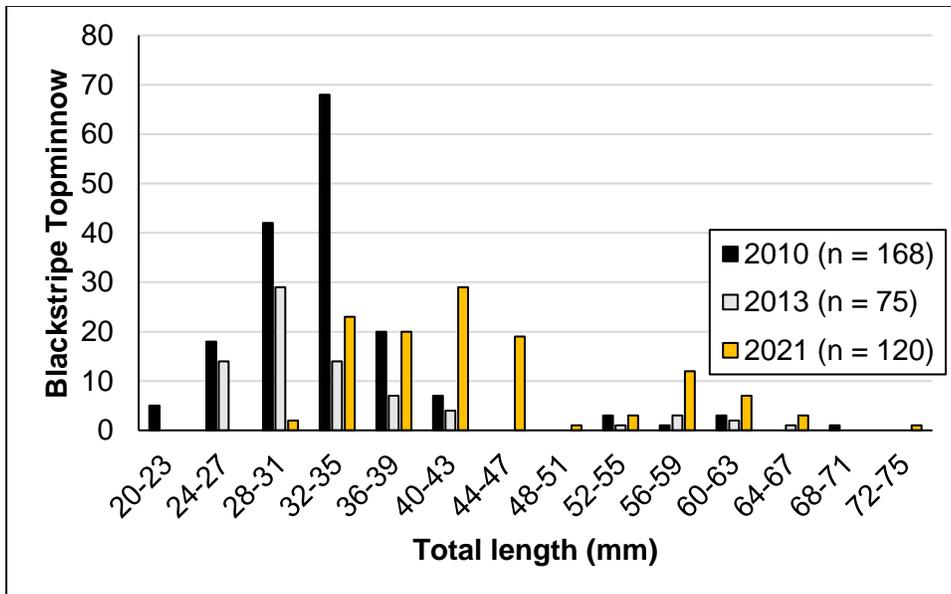


Figure 12. Length-frequency of Blackstripe Topminnow captured in 2010, 2013, and 2021. Total lengths were measured for 362 of 469 individuals captured.

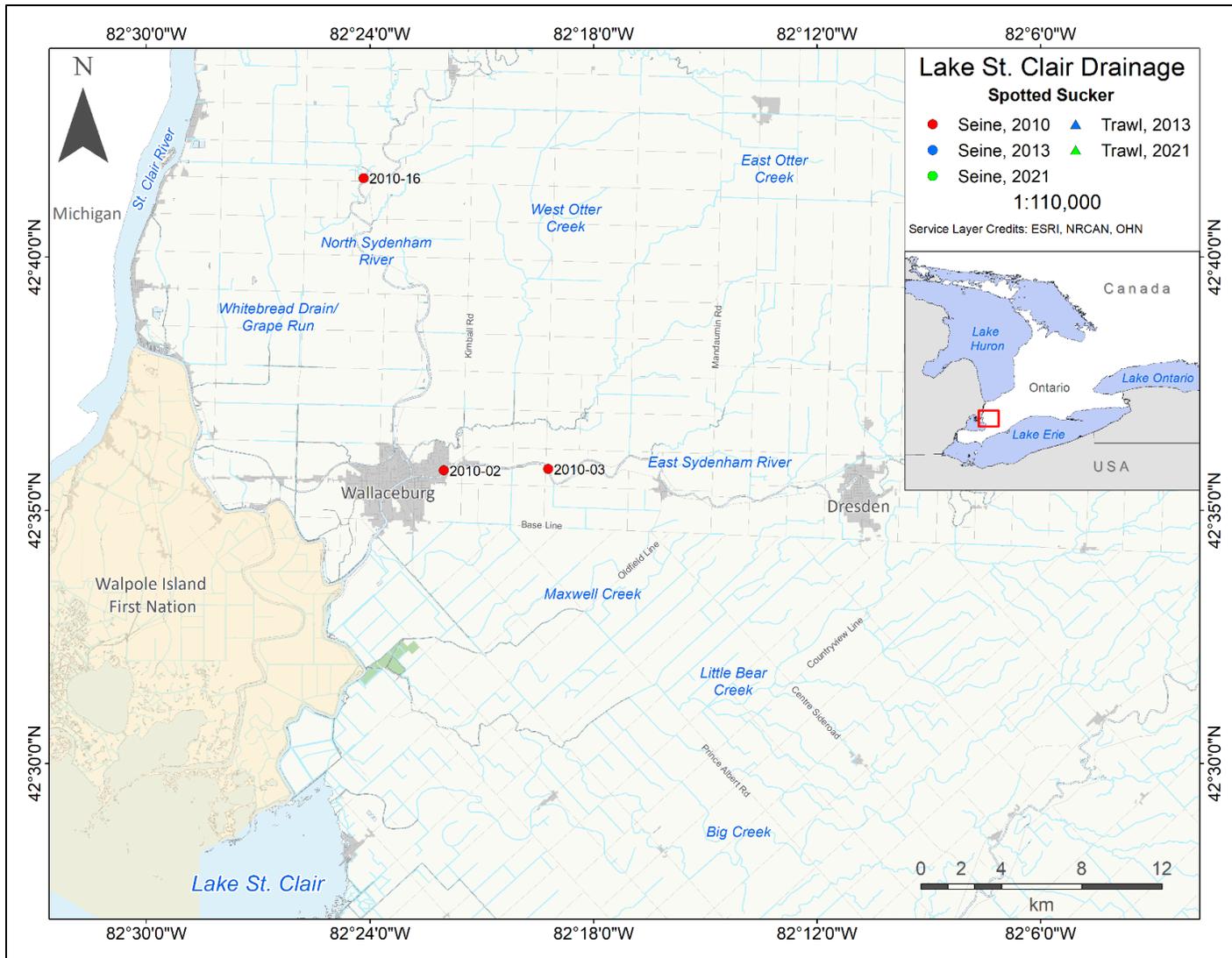


Figure 13. Map of subset of sites where Spotted Sucker (SARA: Special Concern) was detected, by sampling year and gear type. Map labels are matched to site codes in Appendix 1. Contains information licensed under the Open Government License – Ontario.



Figure 14. Digital voucher photograph of Spotted Sucker (138 mm) captured by seine at site 2010-02 (PDAH-PNM-2010-270710-004B) in the East Sydenham River on July 27, 2010.

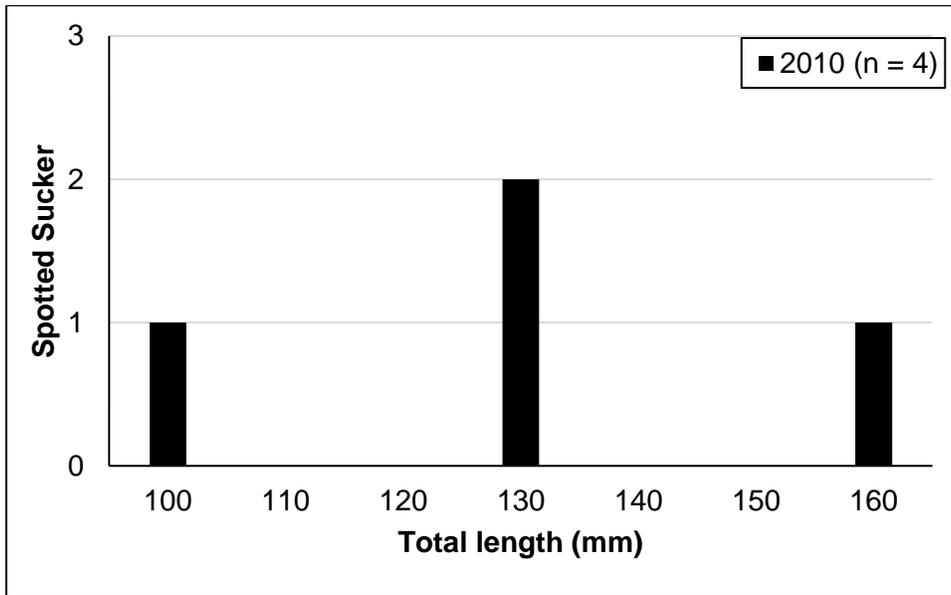


Figure 15. Length-frequency of Spotted Sucker captured in 2010.

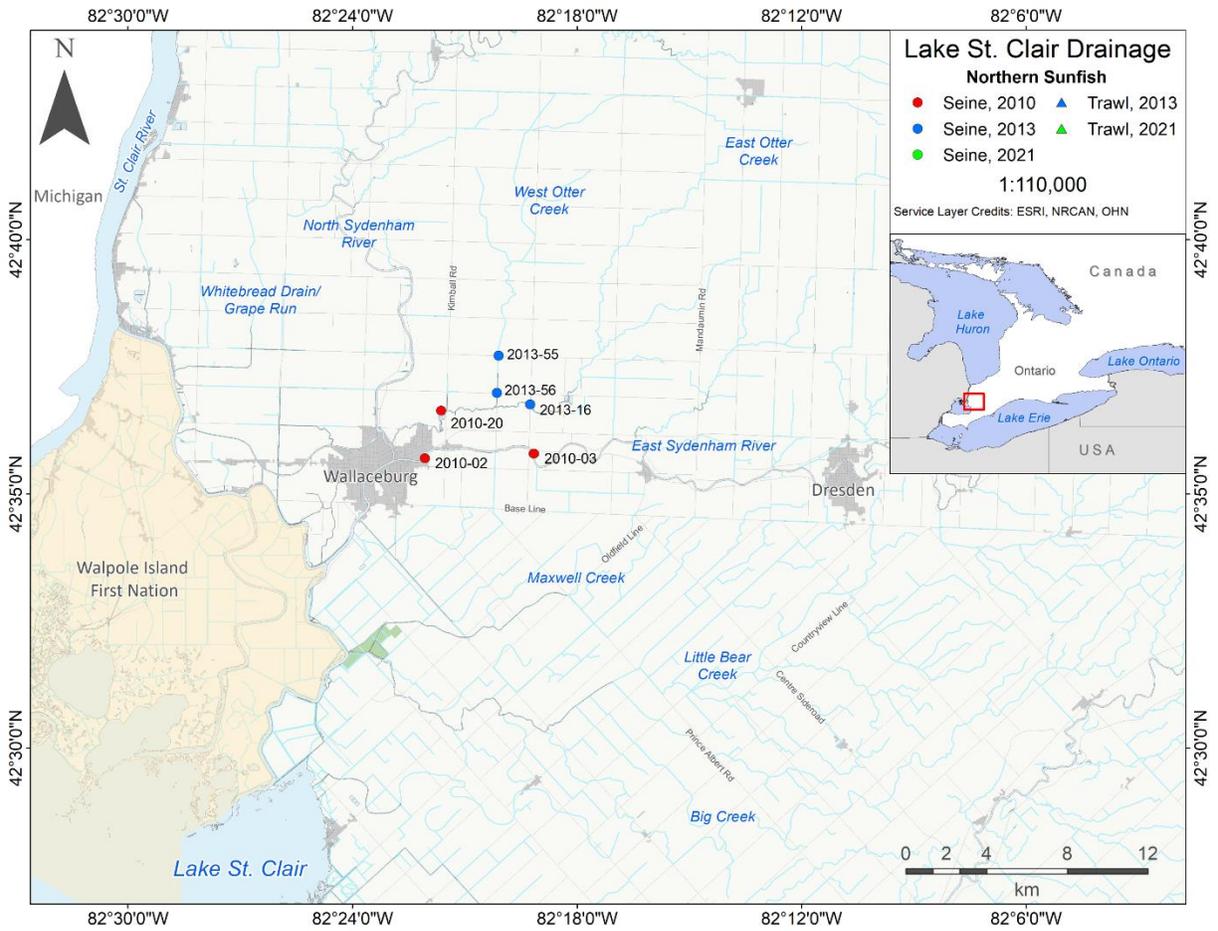


Figure 16. Map of subset of sites where Northern Sunfish (SARA: Special Concern) was detected. A total of eight Northern Sunfish were detected at six sites. Map labels are matched to site codes in Appendix 1. Contains information licensed under the Open Government License – Ontario.

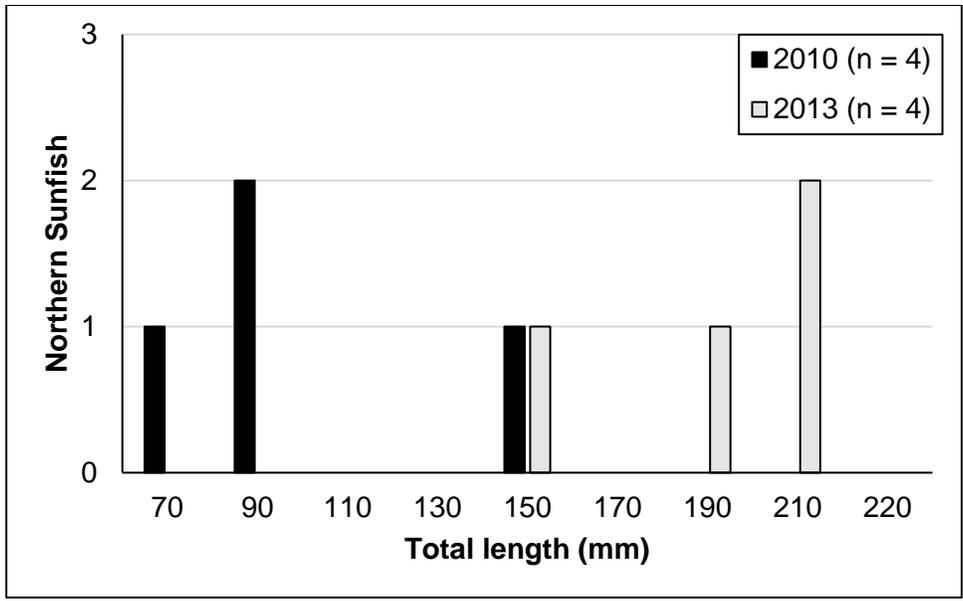


Figure 17. Length-frequency of Northern Sunfish (SC) captured in 2010 and 2013. Total lengths were measured for all individuals.

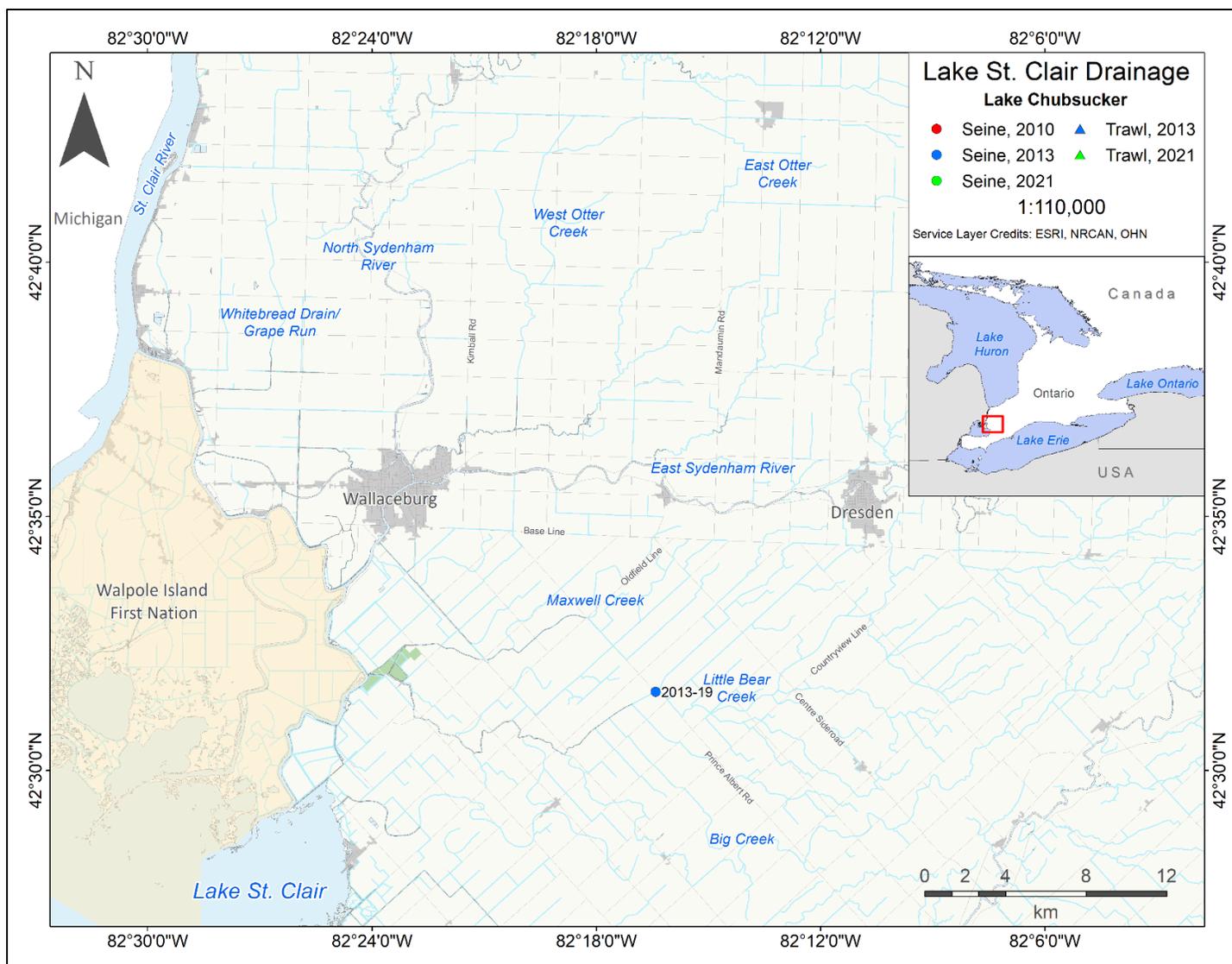


Figure 18. Map of subset of sites where Lake Chubsucker (SARA: Endangered) was detected, by sampling year and gear type. A total of two Lake Chubsucker were detected at one site. Map labels are matched to site codes in Appendix 1. Contains information licensed under the Open Government License – Ontario.



Figure 19. Digital voucher photograph of juvenile Lake Chubsucker (43 mm) captured by seine at site 2013-18 (2013-PNM-LSCD-260913-001A) in Little Bear Creek on September 26, 2013.

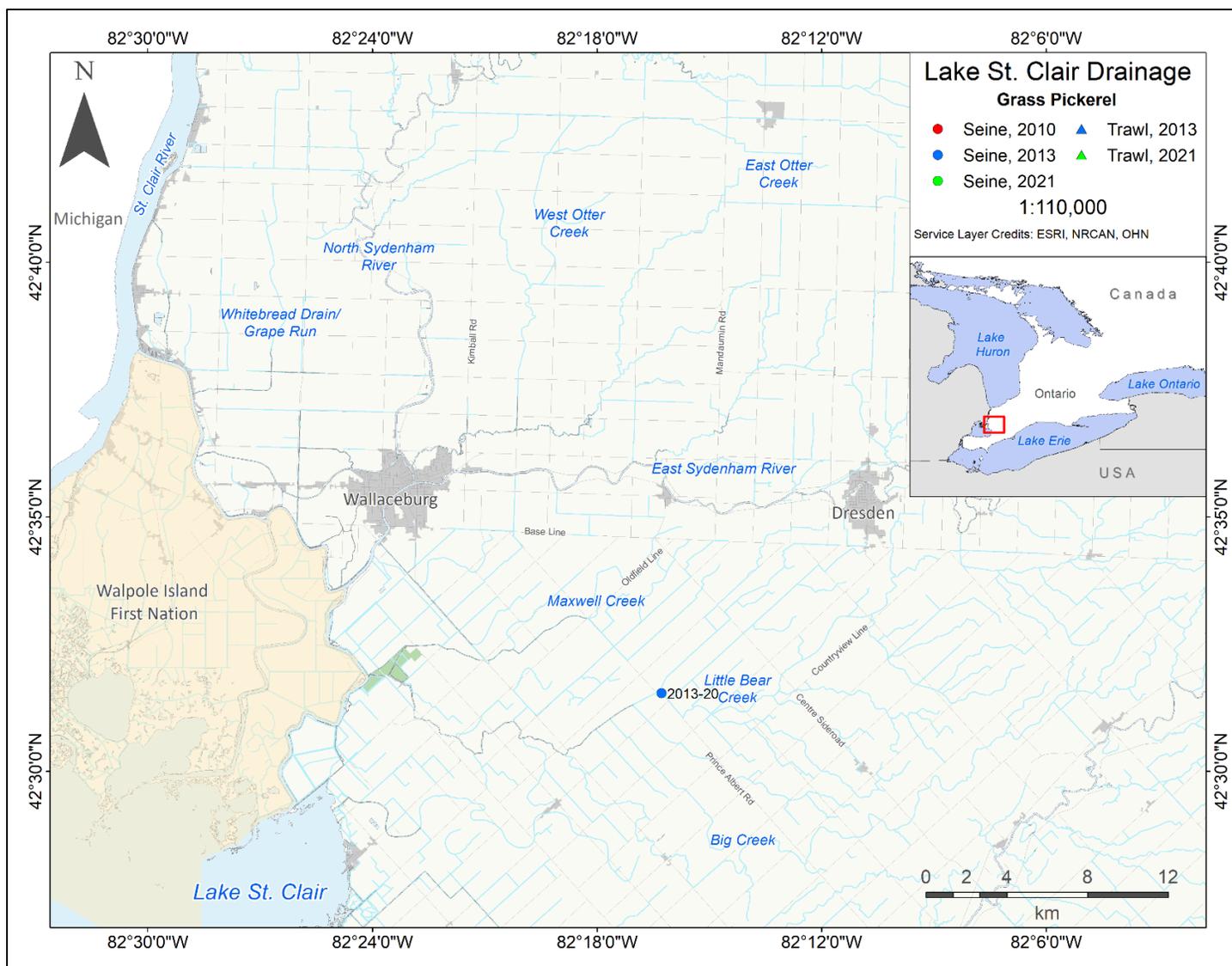


Figure 20. Map of subset of sites where Grass Pickerel (SARA: Special Concern) was detected. A total of three Grass Pickerel were detected at one site. Map labels are matched to site codes in Appendix 1. Contains information licensed under the Open Government License – Ontario.



Figure 21. Digital voucher photograph of Grass Pickerel (125 mm) captured by seine at site 2013-19 (2013-PNM-LSCD-260913-002A) in Little Bear Creek on September 26, 2013.



PDAH-PNM-2010-260710-001A (n = 9), 2010-08



PDAH-PNM-2010-270710-004B (n = 9), 2010-02



PDAH-PNM-2010-270710-005B (n = 1), 2010-03



PDAH-PNM-2010-280710-001B (n = 5), 2010-04



PDAH-PNM-2010-280710-002B (n = 2), 2010-05



PDAH-PNM-2010-280710-003B (n = 4), 2010-06

Figure 22. Site photos showing Little Bear Creek (PDAH-PNM-2010-260710-001A / 2010-08) and East Sydenham River (remaining) where Pugnose Minnow was detected in 2010.

APPENDICES

Appendix 1. Site-specific location and site selection criteria data for all targeted sampling for Pugnose Minnow in 2010, 2013, and 2021. Sites were selected to resample historical Pugnose Minnow detection sites (H+), to resample (R) sites previously sampled by DFO whether PNM were detected (+) or not (-), or to fill in geographic gaps in sampling effort (G).

Map Label	Latitude	Longitude	Waterbody	Date	Field number	Selection	Historical and/or resample site ID
2010-01	42.67655	-82.25838	East Otter Creek	27-Jul-10	PDAH-PNM-2010-270710-002A	H+	DFO2003 (EOC091903-01SN)
2010-02	42.59656	-82.36681	East Sydenham River	27-Jul-10	PDAH-PNM-2010-270710-004B	H+	ROM 1997 (ROM70974)
2010-03	42.59697	-82.32011	East Sydenham River	27-Jul-10	PDAH-PNM-2010-270710-005B	H+	ROM 1997 (ROM70975)
2010-04	42.59062	-82.26654	East Sydenham River	28-Jul-10	PDAH-PNM-2010-280710-001B	H+	ROM1997 (ROMRMC70780)
2010-05	42.58826	-82.23259	East Sydenham River	28-Jul-10	PDAH-PNM-2010-280710-002B	H+	DFO2003 (SYD091603-3BPEF)
2010-06	42.58783	-82.23190	East Sydenham River	28-Jul-10	PDAH-PNM-2010-280710-003B	H+	DFO2003 (SYD061603-3SN)
2010-07	42.72186	-82.39070	Indian Creek	27-Jul-10	PDAH-PNM-2010-270710-004A	G	-
2010-08	42.51696	-82.37710	Little Bear Creek	26-Jul-10	PDAH-PNM-2010-260710-001A	H+	DFO2003 (LBC091703-3SN)
2010-09	42.52519	-82.27513	Little Bear Creek	29-Jul-10	PDAH-PNM-2010-290710-001B	H+	ROM1996 (ROMRMC70289)
2010-10	42.53094	-82.40185	Little Bear Creek	03-Aug-10	PDAH-PNM-2010-030810-001A	G	-
2010-11	42.51697	-82.37707	Little Bear Creek	03-Aug-10	PDAH-PNM-2010-030810-002A	R+	PDAH-PNM-2010-260710-001A
2010-12	42.54118	-82.38111	Maxwell Creek	27-Jul-10	PDAH-PNM-2010-270710-003A	H+	DFO2003 (MAX091803-3SN)
2010-13	42.54011	-82.36755	Maxwell Creek	29-Jul-10	PDAH-PNM-2010-290710-002B	H+	ROM1996 (ROMRMC70291) & ROM1982 (ROMRMC42359)
2010-14	42.62055	-82.37823	North Sydenham River	26-Jul-10	PDAH-PNM-2010-260710-002A	H+	DFO2003 (SYD091103-2BPEF)
2010-15	42.62074	-82.37754	North Sydenham River	27-Jul-10	PDAH-PNM-2010-270710-001A	H+	DFO2010 (PDAH-PNM-2010-260710-002A)* ROM1978 (ROMRMC45298), ROM1979 (ROMN791207)
2010-16	42.69259	-82.40275	North Sydenham River	28-Jul-10	PDAH-PNM-2010-280710-001A	H+	ROM1972 (ROMN720199, CMNFI72-0199.3)
2010-17	42.69813	-82.38702	North Sydenham River	28-Jul-10	PDAH-PNM-2010-280710-002A	H+	
2010-18	42.71022	-82.38589	North Sydenham River	28-Jul-10	PDAH-PNM-2010-280710-003A	G	-
2010-19	42.63768	-82.37621	North Sydenham River	29-Jul-10	PDAH-PNM-2010-290710-002A	H+	ROM1979 (ROMN791051)
2010-20	42.60996	-82.36037	Otter Creek	29-Jul-10	PDAH-PNM-2010-290710-001A	G	-
2010-21	42.63055	-82.44512	Whitebread Drain/Grape Run Drain	27-Jul-10	PDAH-PNM-2010-270710-003B	H+	DFO2003 (WBGR090903-1SN)
2013-01	42.46210	-82.25752	Big Creek	10-Jul-13	2013-PNM-LSCD-100713-001C	G	-
2013-02	42.47381	-82.21407	Big Creek	10-Jul-13	2013-PNM-LSCD-100713-003C	G	-
2013-03	42.47845	-82.18457	Big Creek	10-Jul-13	2013-PNM-LSCD-100713-004C	G	-
2013-04	42.48412	-82.17350	Big Creek	11-Jul-13	2013-PNM-LSCD-110713-001C	G	-
2013-05	42.48508	-82.15854	Big Creek	11-Jul-13	2013-PNM-LSCD-110713-002C	G	-
2013-06	42.49467	-82.15218	Big Creek	11-Jul-13	2013-PNM-LSCD-110713-003C	G	-
2013-07	42.50793	-82.12717	Big Creek	11-Jul-13	2013-PNM-LSCD-110713-004C	G	-
2013-08	42.46215	-82.25750	Big Creek	07-Aug-13	2013-PNM-LSCD-070813-001A	G	DFO2013 (2013-PNM-LSCD-100713-001C) *
2013-09	42.47194	-82.26710	Big Creek	07-Aug-13	2013-PNM-LSCD-070813-002A	G	-
2013-10	42.48268	-82.28267	Big Creek	07-Aug-13	2013-PNM-LSCD-070813-003A	G	-
2013-11	42.49797	-82.30527	Big Creek	07-Aug-13	2013-PNM-LSCD-070813-004A	G	-
2013-12	42.52747	-82.40609	Chenail Ecarté	09-Jul-13	2013-PNM-LSCD-090713-001A	G	-

Map Label	Latitude	Longitude	Waterbody	Date	Field number	Selection	Historical and/or resample site ID
			(The Snye)				
2013-13	42.62768	-82.29279	East Otter Creek	09-Jul-13	2013-PNM-LSCD-090713-003C	G	-
2013-14	42.61574	-82.30362	East Otter Creek	09-Jul-13	2013-PNM-LSCD-090713-004C	G	-
2013-15	42.61362	-82.30569	East Otter Creek	07-Aug-13	2013-PNM-LSCD-070813-005A	G	-
2013-16	42.61274	-82.32082	East Otter Creek	07-Aug-13	2013-PNM-LSCD-070813-006A	G	-
2013-17	42.55100	-82.17950	Little Bear Creek	10-Jul-13	2013-PNM-LSCD-100713-001B	G	-
2013-18	42.53170	-82.21759	Little Bear Creek	10-Jul-13	2013-PNM-LSCD-100713-002B	G	-
2013-19	42.52587	-82.27351	Little Bear Creek	26-Sep-13	2013-PNM-LSCD-260913-001A	H+	150m u/s of ROM1996 (ROMRMC70289)
2013-20	42.52566	-82.27116	Little Bear Creek	26-Sep-13	2013-PNM-LSCD-260913-002A	G	-
2013-21	42.51818	-82.26241	Little Bear Creek	26-Sep-13	2013-PNM-LSCD-260913-003A	G	-
2013-22	42.51271	-82.37023	Little Bear Creek	09-Jul-13	2013-PNM-LSCD-090713-002A	G	-
2013-23	42.51368	-82.37021	Little Bear Creek	09-Jul-13	2013-PNM-LSCD-090713-003A	G	-
2013-24	42.51645	-82.37436	Little Bear Creek	09-Jul-13	2013-PNM-LSCD-090713-004A	G	-
2013-25	42.51716	-82.37759	Little Bear Creek	09-Jul-13	2013-PNM-LSCD-090713-005A	H+	DFO2003 (LBC091703-3SN) & DFO2010 (PDAH-PNM-2010-260710-001A)
2013-26	42.51731	-82.38004	Little Bear Creek	09-Jul-13	2013-PNM-LSCD-090713-006A	G	-
2013-27	42.51764	-82.38118	Little Bear Creek	10-Jul-13	2013-PNM-LSCD-100713-001A	G	-
2013-28	42.51986	-82.38152	Little Bear Creek	10-Jul-13	2013-PNM-LSCD-100713-002A	G	-
2013-29	42.52229	-82.38164	Little Bear Creek	10-Jul-13	2013-PNM-LSCD-100713-003A	G	-
2013-30	42.52471	-82.38255	Little Bear Creek	10-Jul-13	2013-PNM-LSCD-100713-004A	G	-
2013-31	42.52813	-82.38374	Little Bear Creek	10-Jul-13	2013-PNM-LSCD-100713-005A	G	-
2013-32	42.53019	-82.39069	Little Bear Creek	10-Jul-13	2013-PNM-LSCD-100713-006A	G	-
2013-33	42.53114	-82.39729	Little Bear Creek	10-Jul-13	2013-PNM-LSCD-100713-007A	G	-
2013-34	42.50616	-82.31321	Little Bear Creek	11-Jul-13	2013-PNM-LSCD-110713-001B	G	-
2013-35	42.50766	-82.31924	Little Bear Creek	11-Jul-13	2013-PNM-LSCD-110713-002B	G	-
2013-36	42.51068	-82.32788	Little Bear Creek	11-Jul-13	2013-PNM-LSCD-110713-003B	G	-
2013-37	42.51465	-82.33497	Little Bear Creek	11-Jul-13	2013-PNM-LSCD-110713-004B	G	-
2013-38	42.50986	-82.35154	Little Bear Creek	11-Jul-13	2013-PNM-LSCD-110713-005B	G	-
2013-39	42.52243	-82.28261	Little Bear Creek	25-Sep-13	2013-PNM-LSCD-250913-001A	H+	680m d/s of ROM1996 (ROMRMC70289)
2013-40	42.52131	-82.28577	Little Bear Creek	25-Sep-13	2013-PNM-LSCD-250913-002A	G	-
2013-41	42.51876	-82.29140	Little Bear Creek	25-Sep-13	2013-PNM-LSCD-250913-003A	G	-
2013-42	42.51754	-82.29366	Little Bear Creek	25-Sep-13	2013-PNM-LSCD-250913-004A	G	-
2013-43	42.55008	-82.30450	Maxwell Creek	09-Jul-13	2013-PNM-LSCD-090713-001B	G	-
2013-44	42.54361	-82.32705	Maxwell Creek	09-Jul-13	2013-PNM-LSCD-090713-002B	G	-
2013-45	42.53637	-82.35049	Maxwell Creek	09-Jul-13	2013-PNM-LSCD-090713-003B	G	-
2013-46	42.54074	-82.36902	Maxwell Creek	09-Jul-13	2013-PNM-LSCD-090713-004B	H+	ROM1996 (ROMRMC70291) & ROM1982 (ROMRMC42359)
2013-47	42.54113	-82.38131	Maxwell Creek	09-Jul-13	2013-PNM-LSCD-090713-005B	H+	DFO2003 (MAX091803-3SN)
2013-48	42.61184	-82.33643	Otter Creek	09-Jul-13	2013-PNM-LSCD-090713-005C	G	-
2013-49	42.61143	-82.33737	Otter Creek	11-Jul-13	2013-PNM-LSCD-110713-001A	G	-
2013-50	42.61103	-82.34197	Otter Creek	11-Jul-13	2013-PNM-LSCD-110713-002A	G	-
2013-51	42.61178	-82.35128	Otter Creek	11-Jul-13	2013-PNM-LSCD-110713-003A	G	-
2013-52	42.61045	-82.35836	Otter Creek	11-Jul-13	2013-PNM-LSCD-110713-004A	G	-
2013-53	42.60514	-82.36430	Otter Creek	11-Jul-13	2013-PNM-LSCD-110713-005A	G	-
2013-54	42.60409	-82.37935	Otter Creek	11-Jul-13	2013-PNM-LSCD-110713-006A	G	-

Map Label	Latitude	Longitude	Waterbody	Date	Field number	Selection	Historical and/or resample site ID
2013-55	42.62872	-82.33484	West Otter Creek	09-Jul-13	2013-PNM-LSCD-090713-001C	G	-
2013-56	42.61649	-82.33562	West Otter Creek	09-Jul-13	2013-PNM-LSCD-090713-002C	G	-
2013-57	42.64129	-82.33255	West Otter Creek	10-Jul-13	2013-PNM-LSCD-100713-003B	G	-
2021-01	42.68629	-82.24316	East Otter Creek	08-Sep-21	2021-EWOC-PNM-080921-001A	G	-
2021-02	42.67639	-82.25847	East Otter Creek	08-Sep-21	2021-EWOC-PNM-080921-002A	H+, R-	DFO2003 (EOC091903-01SN) & DFO2010 (PDAH-PNM-2010-270710-002A)
2021-03	42.68607	-82.22631	East Otter Creek	08-Sep-21	2021-EWOC-PNM-080921-003A	G	-
2021-04	42.64011	-82.29013	East Otter Creek	08-Sep-21	2021-EWOC-PNM-080921-004A	G	-
2021-05	42.62774	-82.29299	East Otter Creek	08-Sep-21	2021-EWOC-PNM-080921-005A	R-	DFO2013 (2013-PNM-LSCD-090713-003C)
2021-06	42.62459	-82.29785	East Otter Creek	08-Sep-21	2021-EWOC-PNM-080921-006A	G	-
2021-07	42.65226	-82.28854	East Otter Creek	09-Sep-21	2021-EWOC-PNM-090921-005A	G	-
2021-08	42.67116	-82.27356	East Otter Creek	09-Sep-21	2021-EWOC-PNM-090921-006A	G	-
2021-09	42.61371	-82.30597	East Otter Creek	15-Sep-21	2021-EWOC-PNM-150921-001A	R-	DFO2013 (2013-PNM-LSCD-070813-005A u/s)
2021-10	42.61277	-82.32097	East Otter Creek	15-Sep-21	2021-EWOC-PNM-150921-002A	R-	DFO2013 (2013-PNM-LSCD-070813-006A)
2021-11	42.6118	-82.33608	East Otter Creek	06-Oct-21	2021-EWOC-PNM-061021-002A	R-	DFO2013 (2013-PNM-LSCD-090713-005C & 2013-PNM-LSCD-110713-001A)
2021-12	42.61129	-82.34174	Otter Creek	06-Oct-21	2021-EWOC-PNM-061021-003A	R-	DFO2013 (2013-PNM-LSCD-110713-002A)
2021-13	42.61178	-82.35108	Otter Creek	06-Oct-21	2021-EWOC-PNM-061021-004A	R-	DFO2013 (2013-PNM-LSCD-110713-003A)
2021-14	42.61045	-82.35832	Otter Creek	06-Oct-21	2021-EWOC-PNM-061021-005A	R-	DFO2013 (2013-PNM-LSCD-110713-004A)
2021-15	42.60974	-82.36095	Otter Creek	07-Oct-21	2021-EWOC-PNM-071021-001A	R-	DFO2010 (PDAH-PNM-2010-290710-001A)
2021-16	42.60526	-82.36421	Otter Creek	07-Oct-21	2021-EWOC-PNM-071021-002A	R-	DFO2013 (2013-PNM-LSCD-110713-005A)
2021-17	42.60343	-82.38004	Otter Creek	07-Oct-21	2021-EWOC-PNM-071021-003A	R-	DFO2013 (2013-PNM-LSCD-110713-006A)
2021-18	42.66535	-82.31971	West Otter Creek	09-Sep-21	2021-EWOC-PNM-090921-001A	G	-
2021-19	42.65318	-82.33173	West Otter Creek	09-Sep-21	2021-EWOC-PNM-090921-002A	G	-
2021-20	42.64101	-82.33246	West Otter Creek	09-Sep-21	2021-EWOC-PNM-090921-003A	R-	DFO2013 (2013-PNM-LSCD-100713-003B)
2021-21	42.62857	-82.33509	West Otter Creek	09-Sep-21	2021-EWOC-PNM-090921-004A	R-	DFO2013 (2013-PNM-LSCD-090713-001C)
2021-22	42.61626	-82.33553	West Otter Creek	06-Oct-21	2021-EWOC-PNM-061021-001A	R-	DFO2013 (2013-PNM-LSCD-090713-002C)

* unintentional resample at same location within same year

Appendix 2. Site-specific effort data for all targeted sampling for Pugnose Minnow in 2010, 2013, and 2021 using seine nets (SN) and pelagic trawls (TRL). An asterisk (*) indicates a measurement not recorded, a dash (-) indicates measurement not applicable.

Map Label	Field Number	Gear	Effort (hauls/tows)	Sampled width (m)	Sampled length (m)	Trawl time (sec) 1	Trawl time (sec) 2	Trawl time (sec) 3	Stream Width (m)	Distance From Shore (m)
2010-01	PDAH-PNM-2010-270710-002A	SN	3	5	18	-	-	-	5	0
2010-02	PDAH-PNM-2010-270710-004B	SN	3	*	*	-	-	-	63	2
2010-03	PDAH-PNM-2010-270710-005B	SN	5	*	*	-	-	-	54	0
2010-04	PDAH-PNM-2010-280710-001B	SN	5	*	*	-	-	-	50	*
2010-05	PDAH-PNM-2010-280710-002B	SN	5	5	8	-	-	-	47	0
2010-06	PDAH-PNM-2010-280710-003B	SN	3	*	*	-	-	-	49	0
2010-07	PDAH-PNM-2010-270710-004A	SN	3	5	11	-	-	-	5	0
2010-08	PDAH-PNM-2010-260710-001A	SN	3	*	*	-	-	-	11	8
2010-09	PDAH-PNM-2010-290710-001B	SN	3	8	*	-	-	-	16	0
2010-10	PDAH-PNM-2010-030810-001A	SN	7	8	*	-	-	-	104	0
2010-11	PDAH-PNM-2010-030810-002A	SN	3	8	*	-	-	-	11	0
2010-12	PDAH-PNM-2010-270710-003A	SN	3	8	*	-	-	-	18	0
2010-13	PDAH-PNM-2010-290710-002B	SN	5	*	*	-	-	-	*	*
2010-14	PDAH-PNM-2010-260710-002A	SN	3	8	*	-	-	-	70	0
2010-15	PDAH-PNM-2010-270710-001A	SN	5	*	*	-	-	-	61	0
2010-16	PDAH-PNM-2010-280710-001A	SN	3	*	*	-	-	-	89	0
2010-17	PDAH-PNM-2010-280710-002A	SN	3	*	*	-	-	-	9	0
2010-18	PDAH-PNM-2010-280710-003A	SN	3	*	*	-	-	-	35	0
2010-19	PDAH-PNM-2010-290710-002A	SN	3	9	*	-	-	-	52	0
2010-20	PDAH-PNM-2010-290710-001A	SN	3	*	*	-	-	-	27	0
2010-21	PDAH-PNM-2010-270710-003B	SN	5	8	*	-	-	-	20	0
2013-01	2013-PNM-LSCD-100713-001C	SN	3	8	27	-	-	-	8	0
2013-02	2013-PNM-LSCD-100713-003C	SN	3	10	24	-	-	-	10	0
2013-03	2013-PNM-LSCD-100713-004C	SN	3	9	30	-	-	-	9	0
2013-04	2013-PNM-LSCD-110713-001C	SN	3	8	20	-	-	-	8	0
2013-05	2013-PNM-LSCD-110713-002C	SN	3	8	60	-	-	-	8	0
2013-06	2013-PNM-LSCD-110713-003C	SN	3	6	30	-	-	-	10	0
2013-07	2013-PNM-LSCD-110713-004C	SN	3	3	6	-	-	-	10	0
2013-08	2013-PNM-LSCD-070813-001A	SN	3	8	13	-	-	-	8	0
2013-09	2013-PNM-LSCD-070813-002A	SN	3	10	12	-	-	-	10	0
2013-10	2013-PNM-LSCD-070813-003A	SN	3	6	11	-	-	-	6	0
2013-11	2013-PNM-LSCD-070813-004A	SN	3	9	16	-	-	-	9	0
2013-12	2013-PNM-LSCD-090713-001A	TRL	3	3	100	238	175	238	81	5
2013-13	2013-PNM-LSCD-090713-003C	SN	3	8	11	-	-	-	7	0
2013-14	2013-PNM-LSCD-090713-004C	SN	3	7	35	-	-	-	7	0
2013-15	2013-PNM-LSCD-070813-005A	SN	3	14	14	-	-	-	14	0
2013-16	2013-PNM-LSCD-070813-006A	SN	3	10	15	-	-	-	13	0
2013-17	2013-PNM-LSCD-100713-001B	SN	3	4	10	-	-	-	8	0
2013-18	2013-PNM-LSCD-100713-002B	SN	3	6	12	-	-	-	6	0
2013-19	2013-PNM-LSCD-260913-001A	SN	3	5	10	-	-	-	17	0
2013-20	2013-PNM-LSCD-260913-002A	SN	3	10	10	-	-	-	12	0
2013-21	2013-PNM-LSCD-260913-003A	SN	3	10	6	-	-	-	11	0
2013-22	2013-PNM-LSCD-090713-002A	TRL	3	3	100	60	82	69	26	5
2013-23	2013-PNM-LSCD-090713-003A	TRL	3	3	50	77	66	*	26	3
2013-24	2013-PNM-LSCD-090713-004A	TRL	3	3	50	72	62	73	27	0
2013-25	2013-PNM-LSCD-090713-005A	TRL	3	3	35	50	47	48	24	0
2013-26	2013-PNM-LSCD-090713-006A	TRL	3	3	50	68	78	73	27	2
2013-27	2013-PNM-LSCD-100713-001A	TRL	3	3	100	81	79	82	27	0
2013-28	2013-PNM-LSCD-100713-002A	TRL	3	3	50	81	79	83	28	0
2013-29	2013-PNM-LSCD-100713-003A	TRL	3	3	50	90	94	81	28	0
2013-30	2013-PNM-LSCD-100713-004A	TRL	3	3	50	75	78	72	32	0
2013-31	2013-PNM-LSCD-100713-005A	TRL	3	3	50	96	91	87	36	0
2013-32	2013-PNM-LSCD-100713-006A	TRL	3	3	50	69	69	74	39	0
2013-33	2013-PNM-LSCD-100713-007A	TRL	3	3	50	81	71	69	370	0
2013-34	2013-PNM-LSCD-110713-001B	TRL	3	3	50	80	79	80	14	0
2013-35	2013-PNM-LSCD-110713-002B	TRL	3	3	50	83	72	82	25	0
2013-36	2013-PNM-LSCD-110713-003B	TRL	3	3	50	109	111	78	22	0
2013-37	2013-PNM-LSCD-110713-004B	TRL	3	3	50	105	74	67	25	0
2013-38	2013-PNM-LSCD-110713-005B	TRL	3	3	50	71	85	80	26	0

Map Label	Field Number	Gear	Effort (hauls/tows)	Sampled width (m)	Sampled length (m)	Trawl time (sec) 1	Trawl time (sec) 2	Trawl time (sec) 3	Stream Width (m)	Distance From Shore (m)
2013-39	2013-PNM-LSCD-250913-001A	TRL	3	3	100	163	134	134	12	3
2013-40	2013-PNM-LSCD-250913-002A	TRL	3	3	100	148	164	136	15	4
2013-41	2013-PNM-LSCD-250913-003A	TRL	3	3	50	68	72	62	9	3
2013-42	2013-PNM-LSCD-250913-004A	TRL	3	3	100	156	154	155	15	3
2013-43	2013-PNM-LSCD-090713-001B	SN	3	4	10	-	-	-	8	0
2013-44	2013-PNM-LSCD-090713-002B	SN	3	6	10	-	-	-	11	0
2013-45	2013-PNM-LSCD-090713-003B	SN	3	4	10	-	-	-	17	0
2013-46	2013-PNM-LSCD-090713-004B	SN	3	6	10	-	-	-	21	*
2013-47	2013-PNM-LSCD-090713-005B	SN	3	4	10	-	-	-	17	0
2013-48	2013-PNM-LSCD-090713-005C	SN	3	16	25	-	-	-	15	0
2013-49	2013-PNM-LSCD-110713-001A	TRL	3	3	50	65	66	70	17	0
2013-50	2013-PNM-LSCD-110713-002A	TRL	3	3	50	90	92	91	21	0
2013-51	2013-PNM-LSCD-110713-003A	TRL	3	3	50	72	68	69	27	0
2013-52	2013-PNM-LSCD-110713-004A	TRL	3	3	50	90	92	90	23	0
2013-53	2013-PNM-LSCD-110713-005A	TRL	3	3	50	79	85	89	23	0
2013-54	2013-PNM-LSCD-110713-006A	TRL	3	3	50	89	88	86	32	0
2013-55	2013-PNM-LSCD-090713-001C	SN	3	8	20	-	-	-	8	0
2013-56	2013-PNM-LSCD-090713-002C	SN	3	8	30	-	-	-	13	0
2013-57	2013-PNM-LSCD-100713-003B	SN	3	6	10	-	-	-	6	0
2021-01	2021-EWOC-PNM-080921-001A	SN	3	4	10	-	-	-	4	0
2021-02	2021-EWOC-PNM-080921-002A	SN	3	5	10	-	-	-	5	0
2021-03	2021-EWOC-PNM-080921-003A	SN	3	10	10	-	-	-	10	0
2021-04	2021-EWOC-PNM-080921-004A	SN	3	10	10	-	-	-	12	0
2021-05	2021-EWOC-PNM-080921-005A	SN	3	9	10	-	-	-	9	0
2021-06	2021-EWOC-PNM-080921-006A	SN	3	8	10	-	-	-	13	0
2021-07	2021-EWOC-PNM-090921-005A	SN	3	4	6	-	-	-	4	0
2021-08	2021-EWOC-PNM-090921-006A	SN	3	8	8	-	-	-	8	0
2021-09	2021-EWOC-PNM-150921-001A	TRL	3	3	50	105	83	91	10	3
2021-10	2021-EWOC-PNM-150921-002A	TRL	1	3	50	97	-	-	20	1
2021-11	2021-EWOC-PNM-061021-002A	TRL	3	3	50	101	121	109	18	5
2021-12	2021-EWOC-PNM-061021-003A	TRL	3	3	50	106	106	111	28	5
2021-13	2021-EWOC-PNM-061021-004A	TRL	3	3	50	108	95	108	31	*
2021-14	2021-EWOC-PNM-061021-005A	TRL	3	3	50	117	111	97	33	4
2021-15	2021-EWOC-PNM-071021-001A	TRL	3	3	50	113	108	111	30	5
2021-16	2021-EWOC-PNM-071021-002A	TRL	3	3	50	105	109	109	35	5
2021-17	2021-EWOC-PNM-071021-003A	TRL	3	3	50	99	113	105	37	5
2021-18	2021-EWOC-PNM-090921-001A	SN	3	3	5	-	-	-	3	0
2021-19	2021-EWOC-PNM-090921-002A	SN	3	5	6	-	-	-	5	0
2021-20	2021-EWOC-PNM-090921-003A	SN	3	3	10	-	-	-	3	0
2021-21	2021-EWOC-PNM-090921-004A	SN	3	2	6	-	-	-	9	0
2021-22	2021-EWOC-PNM-061021-001A	TRL	3	3	50	98	108	94	13	2

Appendix 3. Cumulative catch (abundance) of fishes at each site sampled in 2010 ($n = 21$ sites), 2013 ($n = 57$ sites), and 2021 ($n = 21$ sites). Frequency of occurrence (FOO) is the number of sites at which each species was detected. Species count includes only groups identified to species-level.

Part 1 – (*Alosa pseudoharengus* – *Dorosoma cepedianum*)

MapID	Field number	<i>Alosa pseudoharengus</i>	<i>Ambloplites rupestris</i>	<i>Ameiurus melas</i>	<i>Ameiurus natalis</i>	<i>Ameiurus nebulosus</i>	<i>Aplodinotus grunniens</i>	<i>Carassius auratus</i>	<i>Cariodes cyprinus</i>	<i>Catostomus commersonii</i>	Clupeidae	<i>Cyprinella spiloptera</i>	<i>Cyprinus carpio</i>	<i>Dorosoma cepedianum</i>
2010-01	PDAH-PNM-2010-270710-002A	0	0	9	2	0	0	0	0	3	0	5	0	0
2010-02	PDAH-PNM-2010-270710-004B	0	43	0	0	0	0	0	0	0	0	0	0	1
2010-03	PDAH-PNM-2010-270710-005B	0	0	0	0	0	1	0	0	0	0	2	0	34
2010-04	PDAH-PNM-2010-280710-001B	0	1	0	0	0	0	0	0	0	0	1	0	5
2010-05	PDAH-PNM-2010-280710-002B	0	0	0	0	0	0	0	0	0	0	3	0	29
2010-06	PDAH-PNM-2010-280710-003B	0	0	0	0	0	0	0	0	0	0	1	0	81
2010-07	PDAH-PNM-2010-270710-004A	0	0	0	0	0	0	0	0	2	0	0	0	2
2010-08	PDAH-PNM-2010-260710-001A	0	29	0	6	3	0	0	0	0	0	0	0	5
2010-09	PDAH-PNM-2010-290710-001B	0	0	0	0	0	0	0	0	0	0	0	0	0
2010-10	PDAH-PNM-2010-030810-001A	0	47	0	2	1	0	0	0	0	0	1	1	0
2010-11	PDAH-PNM-2010-030810-002A	0	0	0	0	0	0	0	0	0	0	0	0	0
2010-12	PDAH-PNM-2010-270710-003A	0	4	0	0	0	0	0	0	0	0	0	0	0
2010-13	PDAH-PNM-2010-290710-002B	0	0	0	1	0	0	0	0	0	0	0	0	0
2010-14	PDAH-PNM-2010-260710-002A	0	3	0	0	0	1	0	0	0	0	0	0	135
2010-15	PDAH-PNM-2010-270710-001A	2	0	0	0	0	0	0	0	0	0	0	0	26
2010-16	PDAH-PNM-2010-280710-001A	0	2	0	1	0	4	0	0	0	0	0	0	129
2010-17	PDAH-PNM-2010-280710-002A	0	0	0	1	0	0	0	0	0	0	0	0	6
2010-18	PDAH-PNM-2010-280710-003A	0	0	0	2	0	1	0	0	0	0	0	0	429
2010-19	PDAH-PNM-2010-290710-002A	0	3	0	1	0	0	0	0	0	0	0	0	7
2010-20	PDAH-PNM-2010-290710-001A	0	0	0	0	0	0	0	0	0	0	0	0	2
2010-21	PDAH-PNM-2010-270710-003B	0	0	0	6	0	0	0	0	0	0	0	0	0
2013-01	2013-PNM-LSCD-100713-001C	0	0	0	0	2	0	2	0	0	0	0	0	0
2013-02	2013-PNM-LSCD-100713-003C	0	0	0	0	0	0	27	0	0	0	0	0	0
2013-03	2013-PNM-LSCD-100713-004C	0	0	1	0	0	0	1	0	0	0	0	0	0
2013-04	2013-PNM-LSCD-110713-001C	0	0	0	0	0	0	0	0	0	0	0	0	0
2013-05	2013-PNM-LSCD-110713-002C	0	0	1	0	0	0	3	0	0	0	0	0	0
2013-06	2013-PNM-LSCD-110713-003C	0	0	0	0	0	0	5	0	0	0	0	0	0
2013-07	2013-PNM-LSCD-110713-004C	0	0	0	0	0	0	9	0	0	0	0	0	0
2013-08	2013-PNM-LSCD-070813-001A	0	10	0	0	0	0	0	0	0	0	0	0	0
2013-09	2013-PNM-LSCD-070813-002A	0	4	0	2	0	0	0	0	0	0	0	0	0
2013-10	2013-PNM-LSCD-070813-003A	0	1	0	0	0	0	1	0	0	0	0	0	0
2013-11	2013-PNM-LSCD-070813-004A	0	1	0	0	0	0	0	0	0	0	0	0	0
2013-12	2013-PNM-LSCD-090713-001A	0	5	0	0	0	0	1	3	0	0	0	0	11
2013-13	2013-PNM-LSCD-090713-003C	0	0	0	0	0	0	0	0	0	0	0	0	0
2013-14	2013-PNM-LSCD-090713-004C	0	0	0	1	0	0	0	0	0	0	0	0	0
2013-15	2013-PNM-LSCD-070813-005A	0	0	0	0	0	0	0	0	0	0	0	0	5
2013-16	2013-PNM-LSCD-070813-006A	0	0	0	0	0	0	0	0	0	0	0	0	25
2013-17	2013-PNM-LSCD-100713-001B	0	0	0	0	0	0	0	0	0	0	0	0	0
2013-18	2013-PNM-LSCD-100713-002B	0	0	0	0	0	0	0	0	0	0	0	0	0
2013-19	2013-PNM-LSCD-260913-001A	0	0	0	1	0	0	0	0	0	0	0	0	0
2013-20	2013-PNM-LSCD-260913-002A	0	1	0	0	0	0	0	0	0	0	0	0	0
2013-21	2013-PNM-LSCD-260913-003A	0	0	0	0	0	0	0	1	0	0	1	0	0
2013-22	2013-PNM-LSCD-090713-002A	0	0	0	0	0	0	0	0	0	0	0	0	0
2013-23	2013-PNM-LSCD-090713-003A	0	2	0	0	0	0	0	0	0	0	0	0	0
2013-24	2013-PNM-LSCD-090713-004A	0	0	0	0	0	0	0	0	0	0	0	0	0
2013-25	2013-PNM-LSCD-090713-005A	0	0	0	0	0	0	0	0	0	0	0	0	0
2013-26	2013-PNM-LSCD-090713-006A	0	1	0	0	0	0	0	0	0	0	0	0	0
2013-27	2013-PNM-LSCD-100713-001A	0	0	0	0	0	0	0	0	0	0	0	0	0
2013-28	2013-PNM-LSCD-100713-002A	0	0	0	0	0	0	0	0	0	2	0	0	0
2013-29	2013-PNM-LSCD-100713-003A	0	1	0	1	0	0	0	0	0	0	0	0	4

MapID	Field number	<i>Alosa pseudoharengus</i>	<i>Ambloplites rupestris</i>	<i>Ameiurus melas</i>	<i>Ameiurus natalis</i>	<i>Ameiurus nebulosus</i>	<i>Aplodinotus grunniens</i>	<i>Carassius auratus</i>	<i>Carpioles cyprinus</i>	<i>Catostomus commersonii</i>	Clupeidae	<i>Cyprinella spiloptera</i>	<i>Cyprinus carpio</i>	<i>Dorosoma cepedianum</i>
2013-30	2013-PNM-LSCD-100713-004A	1	0	0	0	0	0	0	0	0	0	0	0	0
2013-31	2013-PNM-LSCD-100713-005A	0	0	0	0	0	0	0	0	0	0	0	0	4
2013-32	2013-PNM-LSCD-100713-006A	0	0	0	0	0	0	0	0	0	0	2	0	0
2013-33	2013-PNM-LSCD-100713-007A	0	2	0	0	0	0	0	0	0	1	0	0	0
2013-34	2013-PNM-LSCD-110713-001B	0	0	0	0	0	0	0	0	0	0	0	0	0
2013-35	2013-PNM-LSCD-110713-002B	0	0	0	0	0	0	0	0	0	0	0	0	0
2013-36	2013-PNM-LSCD-110713-003B	0	3	0	0	0	0	0	0	0	0	0	0	0
2013-37	2013-PNM-LSCD-110713-004B	0	2	0	0	0	0	0	0	0	0	0	0	0
2013-38	2013-PNM-LSCD-110713-005B	0	1	0	0	0	0	0	0	0	0	0	0	0
2013-39	2013-PNM-LSCD-250913-001A	0	0	0	0	1	0	1	0	0	0	1	0	0
2013-40	2013-PNM-LSCD-250913-002A	0	0	0	0	0	0	0	0	0	0	0	0	0
2013-41	2013-PNM-LSCD-250913-003A	0	0	0	0	0	0	0	0	0	0	0	0	0
2013-42	2013-PNM-LSCD-250913-004A	0	0	0	0	0	0	0	0	0	0	0	0	0
2013-43	2013-PNM-LSCD-090713-001B	0	0	0	0	0	0	0	0	0	0	0	0	0
2013-44	2013-PNM-LSCD-090713-002B	0	0	0	0	0	0	0	0	0	0	0	0	0
2013-45	2013-PNM-LSCD-090713-003B	0	0	0	2	0	0	0	0	0	0	0	0	0
2013-46	2013-PNM-LSCD-090713-004B	0	0	0	0	0	0	0	0	0	0	0	0	0
2013-47	2013-PNM-LSCD-090713-005B	0	0	0	0	0	0	0	0	0	0	0	0	0
2013-48	2013-PNM-LSCD-090713-005C	0	0	0	0	0	0	0	0	0	0	0	0	34
2013-49	2013-PNM-LSCD-110713-001A	0	0	0	0	0	0	0	0	0	0	0	0	1
2013-50	2013-PNM-LSCD-110713-002A	0	0	0	2	0	0	0	0	0	0	0	0	0
2013-51	2013-PNM-LSCD-110713-003A	0	0	0	0	0	0	0	0	0	0	0	0	0
2013-52	2013-PNM-LSCD-110713-004A	0	0	0	1	0	0	5	0	0	0	0	0	6
2013-53	2013-PNM-LSCD-110713-005A	0	0	0	0	0	0	0	1	0	0	0	0	52
2013-54	2013-PNM-LSCD-110713-006A	0	0	0	0	0	0	0	4	0	0	0	0	30
2013-55	2013-PNM-LSCD-090713-001C	0	0	0	0	0	0	2	1	0	0	0	0	0
2013-56	2013-PNM-LSCD-090713-002C	15	0	0	0	0	0	0	3	0	0	0	0	0
2013-57	2013-PNM-LSCD-100713-003B	0	0	0	1	0	0	3	15	0	0	0	0	0
2021-01	2021-EWOC-PNM-080921-001A	0	0	0	1	0	0	0	0	4	0	0	0	0
2021-02	2021-EWOC-PNM-080921-002A	0	0	1	1	0	0	0	0	0	0	0	0	0
2021-03	2021-EWOC-PNM-080921-003A	0	0	2	1	0	0	0	0	1	0	0	0	0
2021-04	2021-EWOC-PNM-080921-004A	0	0	1	1	1	0	0	0	0	0	0	0	2
2021-05	2021-EWOC-PNM-080921-005A	0	0	0	1	0	0	0	0	0	0	0	0	0
2021-06	2021-EWOC-PNM-080921-006A	0	0	0	1	0	0	0	0	0	0	0	0	3
2021-07	2021-EWOC-PNM-090921-005A	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-08	2021-EWOC-PNM-090921-006A	0	0	1	0	0	0	0	0	0	0	0	0	0
2021-09	2021-EWOC-PNM-150921-001A	0	0	0	0	0	0	0	0	0	0	0	0	57
2021-10	2021-EWOC-PNM-150921-002A	0	0	0	1	0	0	0	0	0	0	0	0	5
2021-11	2021-EWOC-PNM-061021-002A	0	0	0	0	0	0	0	0	0	0	0	0	19
2021-12	2021-EWOC-PNM-061021-003A	0	0	0	0	0	0	0	0	0	0	0	0	18
2021-13	2021-EWOC-PNM-061021-004A	0	0	0	0	0	0	0	0	0	0	0	0	7
2021-14	2021-EWOC-PNM-061021-005A	0	0	0	0	0	0	0	0	0	0	0	0	6
2021-15	2021-EWOC-PNM-071021-001A	0	0	0	0	0	0	0	0	0	0	0	0	16
2021-16	2021-EWOC-PNM-071021-002A	0	0	0	4	0	0	0	0	0	0	0	0	89
2021-17	2021-EWOC-PNM-071021-003A	0	2	0	3	2	0	0	0	0	0	0	0	21
2021-18	2021-EWOC-PNM-090921-001A	0	0	6	6	0	0	0	0	0	0	0	0	0
2021-19	2021-EWOC-PNM-090921-002A	0	0	0	0	0	0	0	0	0	0	0	0	3
2021-20	2021-EWOC-PNM-090921-003A	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-21	2021-EWOC-PNM-090921-004A	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-22	2021-EWOC-PNM-061021-001A	0	0	0	0	0	0	0	0	0	0	0	0	28
Grand Total		18	168	22	53	10	7	59	25	14	1	18	2	1337
FOO (2010)		1	8	1	9	2	4	0	0	2	0	6	1	14
FOO (2013)		2	13	2	8	2	0	11	6	2	1	3	1	10
FOO (2021)		0	1	5	10	2	0	0	0	2	0	0	0	13

Part 2 – (Erimyzon sucetta – Lepisosteus osseus)

MapID	Field number	<i>Erimyzon sucetta</i>	<i>Esox americanus vermiculatus</i>	<i>Esox lucius</i>	<i>Etheostoma blennioides</i>	<i>Etheostoma caeruleum</i>	<i>Etheostoma nigrum</i>	<i>Fundulus diaphanus</i>	<i>Fundulus notatus</i>	Gobiidae	<i>Hudsonius hudsonius</i>	<i>Ictalurus punctatus</i>	<i>Labidesthes sicculus</i>	<i>Lepisosteus osseus</i>
2010-01	PDAH-PNM-2010-270710-002A	0	0	0	0	0	10	0	6	0	0	0	0	0
2010-02	PDAH-PNM-2010-270710-004B	0	0	0	0	0	0	0	14	0	0	0	7	0
2010-03	PDAH-PNM-2010-270710-005B	0	0	1	0	0	10	0	29	0	1	2	6	0
2010-04	PDAH-PNM-2010-280710-001B	0	0	0	0	1	6	0	33	0	0	0	3	0
2010-05	PDAH-PNM-2010-280710-002B	0	0	0	1	0	3	0	9	0	1	2	2	0
2010-06	PDAH-PNM-2010-280710-003B	0	0	0	0	0	4	0	7	0	0	0	0	0
2010-07	PDAH-PNM-2010-270710-004A	0	0	4	0	0	2	0	0	0	0	0	0	0
2010-08	PDAH-PNM-2010-260710-001A	0	0	2	0	0	0	1	0	0	0	0	5	0
2010-09	PDAH-PNM-2010-290710-001B	0	0	0	0	0	0	0	2	0	0	0	0	0
2010-10	PDAH-PNM-2010-030810-001A	0	0	2	0	0	0	0	57	0	0	0	69	0
2010-11	PDAH-PNM-2010-030810-002A	0	0	0	0	0	0	0	0	0	0	0	0	0
2010-12	PDAH-PNM-2010-270710-003A	0	0	0	0	0	0	0	0	0	0	0	0	0
2010-13	PDAH-PNM-2010-290710-002B	0	0	0	0	0	0	0	3	0	0	0	0	0
2010-14	PDAH-PNM-2010-260710-002A	0	0	0	0	0	11	0	7	0	0	3	17	1
2010-15	PDAH-PNM-2010-270710-001A	0	0	0	0	0	0	0	0	0	0	0	3	0
2010-16	PDAH-PNM-2010-280710-001A	0	0	0	0	0	8	0	11	0	0	21	0	0
2010-17	PDAH-PNM-2010-280710-002A	0	0	0	0	0	13	0	44	0	0	1	2	0
2010-18	PDAH-PNM-2010-280710-003A	0	0	0	0	0	6	0	12	0	0	6	0	0
2010-19	PDAH-PNM-2010-290710-002A	0	0	0	0	0	7	0	23	0	0	0	9	0
2010-20	PDAH-PNM-2010-290710-001A	0	0	0	0	0	2	0	4	0	0	5	1	0
2010-21	PDAH-PNM-2010-270710-003B	0	0	0	0	0	0	0	2	0	0	0	0	0
2013-01	2013-PNM-LSCD-100713-001C	0	0	0	0	0	0	0	1	0	0	0	0	0
2013-02	2013-PNM-LSCD-100713-003C	0	0	0	0	0	0	0	1	0	0	0	0	0
2013-03	2013-PNM-LSCD-100713-004C	0	0	0	0	0	0	0	0	0	0	0	0	0
2013-04	2013-PNM-LSCD-110713-001C	0	0	0	0	0	0	0	0	0	0	0	0	0
2013-05	2013-PNM-LSCD-110713-002C	0	0	0	0	0	1	0	0	0	0	0	0	0
2013-06	2013-PNM-LSCD-110713-003C	0	0	0	0	0	0	0	0	0	0	0	0	0
2013-07	2013-PNM-LSCD-110713-004C	0	0	1	0	0	0	0	0	0	0	0	0	0
2013-08	2013-PNM-LSCD-070813-001A	0	0	0	0	0	6	0	1	0	1	0	0	0
2013-09	2013-PNM-LSCD-070813-002A	0	0	0	0	0	1	0	5	0	0	0	0	0
2013-10	2013-PNM-LSCD-070813-003A	0	0	0	0	0	1	0	50	0	0	0	0	0
2013-11	2013-PNM-LSCD-070813-004A	0	0	0	0	0	0	0	5	0	0	0	0	0
2013-12	2013-PNM-LSCD-090713-001A	0	0	0	0	0	7	0	0	0	3	0	0	0
2013-13	2013-PNM-LSCD-090713-003C	0	0	0	0	0	0	0	0	0	0	0	0	0
2013-14	2013-PNM-LSCD-090713-004C	0	0	0	0	0	1	0	0	0	0	0	0	0
2013-15	2013-PNM-LSCD-070813-005A	0	0	0	0	0	1	0	0	0	0	0	0	0
2013-16	2013-PNM-LSCD-070813-006A	0	0	0	0	0	0	0	0	0	0	0	0	0
2013-17	2013-PNM-LSCD-100713-001B	0	0	0	0	0	0	0	0	0	0	0	0	0
2013-18	2013-PNM-LSCD-100713-002B	0	0	0	0	0	0	0	0	0	0	0	0	0
2013-19	2013-PNM-LSCD-260913-001A	2	0	9	0	0	5	0	10	0	0	0	0	0
2013-20	2013-PNM-LSCD-260913-002A	0	3	0	0	0	9	0	3	0	1	0	0	0
2013-21	2013-PNM-LSCD-260913-003A	0	0	0	0	0	8	0	0	0	0	0	0	0
2013-22	2013-PNM-LSCD-090713-002A	0	0	0	0	0	0	0	0	13	0	0	0	0
2013-23	2013-PNM-LSCD-090713-003A	0	0	0	0	0	0	0	0	0	0	0	0	0
2013-24	2013-PNM-LSCD-090713-004A	0	0	0	0	0	0	0	0	0	0	0	0	0
2013-25	2013-PNM-LSCD-090713-005A	0	0	0	0	0	0	0	0	0	0	0	0	0
2013-26	2013-PNM-LSCD-090713-006A	0	0	0	0	0	0	0	0	0	0	0	0	0
2013-27	2013-PNM-LSCD-100713-001A	0	0	0	0	0	0	0	0	0	0	0	0	0
2013-28	2013-PNM-LSCD-100713-002A	0	0	0	0	0	0	0	0	0	0	0	0	0
2013-29	2013-PNM-LSCD-100713-003A	0	0	2	0	0	0	0	0	0	0	0	0	0
2013-30	2013-PNM-LSCD-100713-004A	0	0	0	0	0	0	0	0	0	0	0	0	0
2013-31	2013-PNM-LSCD-100713-005A	0	0	0	0	0	0	0	0	0	0	0	0	0
2013-32	2013-PNM-LSCD-100713-006A	0	0	0	0	0	0	0	0	0	0	0	0	0
2013-33	2013-PNM-LSCD-100713-007A	0	0	0	0	0	1	0	0	0	0	0	0	0
2013-34	2013-PNM-LSCD-110713-001B	0	0	1	0	0	1	0	2	0	0	0	0	1
2013-35	2013-PNM-LSCD-110713-002B	0	0	0	0	0	4	0	1	0	0	0	0	0
2013-36	2013-PNM-LSCD-110713-003B	0	0	0	0	0	0	0	0	0	0	0	2	0
2013-37	2013-PNM-LSCD-110713-004B	0	0	0	0	0	0	0	0	0	0	0	0	0

MapID	Field number	<i>Erimyzon sucetta</i>	<i>Esox americanus vermiculatus</i>	<i>Esox lucius</i>	<i>Etheostoma blennioides</i>	<i>Etheostoma caeruleum</i>	<i>Etheostoma nigrum</i>	<i>Fundulus diaphanus</i>	<i>Fundulus notatus</i>	Gobiidae	<i>Hudsonius hudsonius</i>	<i>Ictalurus punctatus</i>	<i>Labidesthes sicculus</i>	<i>Lepisosteus osseus</i>
2013-38	2013-PNM-LSCD-110713-005B	0	0	0	0	0	0	0	0	0	1	0	1	0
2013-39	2013-PNM-LSCD-250913-001A	0	0	0	0	0	0	0	2	0	6	0	3	0
2013-40	2013-PNM-LSCD-250913-002A	0	0	0	0	0	0	0	1	0	0	0	8	0
2013-41	2013-PNM-LSCD-250913-003A	0	0	0	0	0	0	0	0	0	0	0	190	0
2013-42	2013-PNM-LSCD-250913-004A	0	0	0	0	0	0	0	0	0	30	0	110	0
2013-43	2013-PNM-LSCD-090713-001B	0	0	0	0	0	0	0	0	0	0	0	0	0
2013-44	2013-PNM-LSCD-090713-002B	0	0	0	0	0	0	0	0	0	0	0	0	0
2013-45	2013-PNM-LSCD-090713-003B	0	0	0	0	0	0	0	0	0	0	0	0	0
2013-46	2013-PNM-LSCD-090713-004B	0	0	0	0	0	0	0	0	0	0	0	0	0
2013-47	2013-PNM-LSCD-090713-005B	0	0	0	0	0	0	0	0	0	0	0	0	0
2013-48	2013-PNM-LSCD-090713-005C	0	0	0	0	0	2	0	0	0	0	0	0	0
2013-49	2013-PNM-LSCD-110713-001A	0	0	0	0	0	2	0	0	0	0	1	0	0
2013-50	2013-PNM-LSCD-110713-002A	0	0	0	0	0	12	0	0	0	0	0	0	0
2013-51	2013-PNM-LSCD-110713-003A	0	0	0	0	0	0	0	0	0	0	1	0	0
2013-52	2013-PNM-LSCD-110713-004A	0	0	0	0	0	3	0	0	0	0	1	0	0
2013-53	2013-PNM-LSCD-110713-005A	0	0	1	0	0	4	0	0	0	0	0	0	0
2013-54	2013-PNM-LSCD-110713-006A	0	0	0	0	0	1	0	0	0	0	1	0	0
2013-55	2013-PNM-LSCD-090713-001C	0	0	0	0	0	7	0	2	0	0	0	0	1
2013-56	2013-PNM-LSCD-090713-002C	0	0	1	0	0	1	0	0	0	0	0	0	0
2013-57	2013-PNM-LSCD-100713-003B	0	0	0	0	0	12	0	0	0	0	0	0	0
2021-01	2021-EWOC-PNM-080921-001A	0	0	1	0	0	23	0	14	0	15	0	0	0
2021-02	2021-EWOC-PNM-080921-002A	0	0	0	0	0	38	0	8	0	0	0	0	0
2021-03	2021-EWOC-PNM-080921-003A	0	0	1	0	0	1	0	26	0	0	0	0	0
2021-04	2021-EWOC-PNM-080921-004A	0	0	1	0	0	1	0	4	0	0	0	0	0
2021-05	2021-EWOC-PNM-080921-005A	0	0	0	0	0	0	0	2	0	0	0	0	0
2021-06	2021-EWOC-PNM-080921-006A	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-07	2021-EWOC-PNM-090921-005A	0	0	0	0	0	1	0	1	0	0	0	0	0
2021-08	2021-EWOC-PNM-090921-006A	0	0	0	0	0	4	0	6	0	0	0	0	0
2021-09	2021-EWOC-PNM-150921-001A	0	0	0	0	0	0	0	0	0	0	0	2	0
2021-10	2021-EWOC-PNM-150921-002A	0	0	0	0	0	0	0	1	0	0	0	0	0
2021-11	2021-EWOC-PNM-061021-002A	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-12	2021-EWOC-PNM-061021-003A	0	0	0	0	0	0	0	0	0	0	1	1	0
2021-13	2021-EWOC-PNM-061021-004A	0	0	0	0	0	0	0	0	0	0	0	1	0
2021-14	2021-EWOC-PNM-061021-005A	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-15	2021-EWOC-PNM-071021-001A	0	0	0	0	0	0	0	0	0	0	0	1	0
2021-16	2021-EWOC-PNM-071021-002A	0	0	0	0	0	0	0	1	0	0	0	0	0
2021-17	2021-EWOC-PNM-071021-003A	0	0	0	0	0	0	0	0	0	0	0	4	0
2021-18	2021-EWOC-PNM-090921-001A	0	0	0	0	0	0	0	13	0	0	0	0	0
2021-19	2021-EWOC-PNM-090921-002A	0	0	0	0	0	0	0	43	0	0	0	0	0
2021-20	2021-EWOC-PNM-090921-003A	0	0	0	0	0	0	0	3	0	0	0	0	0
2021-21	2021-EWOC-PNM-090921-004A	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-22	2021-EWOC-PNM-061021-001A	0	0	0	0	0	0	0	0	0	0	0	1	0
Grand Total		2	3	27	1	1	240	1	469	13	59	45	448	3
FOO (2010)		0	0	4	1	1	12	1	16	0	2	7	11	1
FOO (2013)		1	1	6	0	0	22	0	13	1	6	4	6	2
FOO (2021)		0	0	3	0	0	6	0	12	0	1	1	6	0

Part 3 – (*Lepomis cyanellus* – *Miniellus anogenus*)

MapID	Field number	<i>Lepomis cyanellus</i>	<i>Lepomis cyanellus</i> X <i>Lepomis gibbosus</i>	<i>Lepomis cyanellus</i> X <i>Lepomis macrochirus</i>	<i>Lepomis gibbosus</i>	<i>Lepomis hybrid</i>	<i>Lepomis macrochirus</i>	<i>Lepomis peltastes</i>	<i>Lepomis</i> sp.	Leuciscidae	<i>Luxilus cornutus</i>	<i>Lythrurus umbratilis</i>	<i>Micropterus dolomieu</i>	<i>Micropterus nigricans</i>	<i>Miniellus anogenus</i>
2010-01	PDAH-PNM-2010-270710-002A	3	0	0	0	0	0	0	0	0	0	0	0	0	0
2010-02	PDAH-PNM-2010-270710-004B	0	0	0	250	0	32	2	272	0	0	0	0	7	0
2010-03	PDAH-PNM-2010-270710-005B	0	0	0	1	0	29	1	4	1	2	0	0	5	0
2010-04	PDAH-PNM-2010-280710-001B	1	0	0	6	0	10	0	4	6	0	0	0	12	0
2010-05	PDAH-PNM-2010-280710-002B	0	0	0	4	0	16	0	0	1	2	0	0	6	0
2010-06	PDAH-PNM-2010-280710-003B	0	0	0	7	0	32	0	0	3	0	0	0	5	0
2010-07	PDAH-PNM-2010-270710-004A	1	0	0	3	0	0	0	0	0	0	0	0	0	0
2010-08	PDAH-PNM-2010-260710-001A	7	0	0	41	10	337	0	32	0	0	0	0	80	2
2010-09	PDAH-PNM-2010-290710-001B	0	2	0	3	0	6	0	1	0	0	0	0	6	0
2010-10	PDAH-PNM-2010-030810-001A	2	0	0	12	0	44	0	17	0	0	0	0	14	10
2010-11	PDAH-PNM-2010-030810-002A	0	0	0	0	0	0	0	0	0	0	0	0	0	1
2010-12	PDAH-PNM-2010-270710-003A	0	0	0	13	0	4	0	0	0	0	0	0	10	0
2010-13	PDAH-PNM-2010-290710-002B	0	0	0	69	0	126	0	21	0	0	0	0	19	1
2010-14	PDAH-PNM-2010-260710-002A	0	0	0	1	0	24	0	20	1	0	0	0	6	0
2010-15	PDAH-PNM-2010-270710-001A	0	0	0	1	0	2	0	0	0	0	0	1	0	0
2010-16	PDAH-PNM-2010-280710-001A	3	0	0	0	0	19	0	57	0	0	0	0	18	0
2010-17	PDAH-PNM-2010-280710-002A	12	0	0	0	0	21	0	263	0	0	0	0	3	0
2010-18	PDAH-PNM-2010-280710-003A	0	0	0	0	0	14	0	0	0	0	0	0	2	0
2010-19	PDAH-PNM-2010-290710-002A	1	0	0	0	0	24	0	57	0	0	0	0	4	0
2010-20	PDAH-PNM-2010-290710-001A	8	1	0	0	0	83	1	7	0	0	0	0	13	0
2010-21	PDAH-PNM-2010-270710-003B	17	0	1	11	0	107	0	3	0	0	0	0	8	0
2013-01	2013-PNM-LSCD-100713-001C	0	0	0	0	0	0	0	0	0	0	0	0	1	0
2013-02	2013-PNM-LSCD-100713-003C	0	0	0	0	0	2	0	0	0	0	0	0	8	0
2013-03	2013-PNM-LSCD-100713-004C	0	0	0	1	0	0	0	0	0	0	0	0	0	0
2013-04	2013-PNM-LSCD-110713-001C	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2013-05	2013-PNM-LSCD-110713-002C	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2013-06	2013-PNM-LSCD-110713-003C	0	0	0	0	0	1	0	0	1	0	0	0	1	0
2013-07	2013-PNM-LSCD-110713-004C	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2013-08	2013-PNM-LSCD-070813-001A	0	0	0	0	0	0	0	0	0	0	0	0	2	0
2013-09	2013-PNM-LSCD-070813-002A	0	0	0	3	0	12	0	0	0	0	0	0	5	0
2013-10	2013-PNM-LSCD-070813-003A	0	0	0	4	0	4	0	0	0	0	0	0	7	0
2013-11	2013-PNM-LSCD-070813-004A	0	0	0	1	0	6	0	0	0	0	0	0	7	0
2013-12	2013-PNM-LSCD-090713-001A	0	0	0	0	0	0	0	0	1	0	0	0	0	0
2013-13	2013-PNM-LSCD-090713-003C	0	1	0	0	0	0	0	0	0	0	4	0	0	0
2013-14	2013-PNM-LSCD-090713-004C	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2013-15	2013-PNM-LSCD-070813-005A	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2013-16	2013-PNM-LSCD-070813-006A	0	0	0	0	0	0	1	0	0	0	0	0	0	0
2013-17	2013-PNM-LSCD-100713-001B	0	0	0	0	0	1	0	0	0	0	0	0	0	0
2013-18	2013-PNM-LSCD-100713-002B	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2013-19	2013-PNM-LSCD-260913-001A	1	0	0	12	0	5	0	0	0	0	0	0	0	0
2013-20	2013-PNM-LSCD-260913-002A	1	0	0	1	0	3	0	0	0	0	0	0	0	0
2013-21	2013-PNM-LSCD-260913-003A	3	0	0	0	0	0	0	0	0	0	0	0	1	0
2013-22	2013-PNM-LSCD-090713-002A	0	0	0	0	0	2	0	0	0	0	0	0	0	0
2013-23	2013-PNM-LSCD-090713-003A	0	0	0	0	0	9	0	0	0	0	0	0	1	0
2013-24	2013-PNM-LSCD-090713-004A	0	0	0	0	0	10	0	0	0	0	1	0	3	1
2013-25	2013-PNM-LSCD-090713-005A	0	0	0	0	0	1	0	0	0	0	1	0	0	0
2013-26	2013-PNM-LSCD-090713-006A	0	0	0	0	0	3	0	0	0	0	0	0	0	2
2013-27	2013-PNM-LSCD-100713-001A	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2013-28	2013-PNM-LSCD-100713-002A	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2013-29	2013-PNM-LSCD-100713-003A	0	0	0	0	0	3	0	0	0	0	0	0	1	0
2013-30	2013-PNM-LSCD-100713-004A	0	0	0	0	0	1	0	0	0	0	0	0	0	0
2013-31	2013-PNM-LSCD-100713-005A	0	0	0	0	0	3	0	0	0	0	0	0	3	0
2013-32	2013-PNM-LSCD-100713-006A	0	0	0	0	0	1	0	1	4	0	0	0	8	0
2013-33	2013-PNM-LSCD-100713-007A	0	0	0	2	0	3	0	0	0	0	0	0	4	0
2013-34	2013-PNM-LSCD-110713-001B	0	0	0	0	0	3	0	0	0	0	0	0	1	1
2013-35	2013-PNM-LSCD-110713-002B	0	0	0	1	0	2	0	0	4	0	0	0	9	12
2013-36	2013-PNM-LSCD-110713-003B	0	0	0	3	0	10	0	0	0	0	1	0	4	61
2013-37	2013-PNM-LSCD-110713-004B	0	0	0	0	0	3	0	0	0	0	0	0	0	2
2013-38	2013-PNM-LSCD-110713-005B	0	0	0	0	0	11	0	0	0	0	0	0	2	2

MapID	Field number	<i>Lepomis cyanellus</i>	<i>Lepomis cyanellus</i> X <i>Lepomis gibbosus</i>	<i>Lepomis cyanellus</i> X <i>Lepomis macrochirus</i>	<i>Lepomis gibbosus</i>	<i>Lepomis hybrid</i>	<i>Lepomis macrochirus</i>	<i>Lepomis peltastes</i>	<i>Lepomis</i> sp.	Leuciscidae	<i>Luxilus cornutus</i>	<i>Lythrurus umbratilis</i>	<i>Micropterus dolomieu</i>	<i>Micropterus nigricans</i>	<i>Miniellus anogenus</i>
2013-39	2013-PNM-LSCD-250913-001A	1	0	0	2	0	10	0	0	0	0	0	0	0	0
2013-40	2013-PNM-LSCD-250913-002A	0	0	0	6	0	9	0	0	0	0	0	0	0	0
2013-41	2013-PNM-LSCD-250913-003A	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2013-42	2013-PNM-LSCD-250913-004A	0	0	0	2	0	3	0	0	0	0	1	0	1	1
2013-43	2013-PNM-LSCD-090713-001B	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2013-44	2013-PNM-LSCD-090713-002B	0	0	0	0	0	10	0	0	0	0	0	0	0	0
2013-45	2013-PNM-LSCD-090713-003B	0	0	0	1	0	1	0	0	0	0	0	0	2	0
2013-46	2013-PNM-LSCD-090713-004B	0	0	0	1	0	12	0	0	0	0	0	0	12	0
2013-47	2013-PNM-LSCD-090713-005B	0	0	0	0	0	10	0	0	0	0	0	0	12	0
2013-48	2013-PNM-LSCD-090713-005C	0	0	0	0	0	2	0	0	0	0	0	0	0	0
2013-49	2013-PNM-LSCD-110713-001A	0	0	0	0	0	1	0	0	0	0	0	0	0	0
2013-50	2013-PNM-LSCD-110713-002A	0	0	0	0	0	0	0	4	0	0	0	0	0	0
2013-51	2013-PNM-LSCD-110713-003A	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2013-52	2013-PNM-LSCD-110713-004A	0	0	0	0	0	1	0	0	0	0	0	0	0	0
2013-53	2013-PNM-LSCD-110713-005A	0	0	0	0	0	3	0	0	0	0	0	0	0	0
2013-54	2013-PNM-LSCD-110713-006A	0	0	0	0	0	1	0	0	0	0	0	0	0	0
2013-55	2013-PNM-LSCD-090713-001C	0	0	0	0	0	1	2	0	0	0	0	0	1	1
2013-56	2013-PNM-LSCD-090713-002C	0	0	0	0	0	1	1	0	0	0	0	0	1	0
2013-57	2013-PNM-LSCD-100713-003B	0	0	0	0	0	0	0	0	0	0	2	0	0	0
2021-01	2021-EWOC-PNM-080921-001A	10	0	0	0	1	0	0	0	0	0	0	0	0	0
2021-02	2021-EWOC-PNM-080921-002A	3	0	0	0	0	2	0	0	0	0	2	0	0	0
2021-03	2021-EWOC-PNM-080921-003A	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-04	2021-EWOC-PNM-080921-004A	3	0	0	0	1	0	0	0	0	0	0	0	1	0
2021-05	2021-EWOC-PNM-080921-005A	0	0	0	0	1	0	0	0	0	0	0	0	0	0
2021-06	2021-EWOC-PNM-080921-006A	0	0	0	0	0	5	0	0	0	0	0	0	1	0
2021-07	2021-EWOC-PNM-090921-005A	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-08	2021-EWOC-PNM-090921-006A	9	0	0	0	3	1	0	1	0	0	1	0	0	0
2021-09	2021-EWOC-PNM-150921-001A	0	0	0	0	0	5	0	0	0	0	0	0	0	0
2021-10	2021-EWOC-PNM-150921-002A	0	0	0	1	0	36	0	0	0	0	0	0	1	0
2021-11	2021-EWOC-PNM-061021-002A	0	0	0	0	0	12	0	0	0	0	0	0	1	0
2021-12	2021-EWOC-PNM-061021-003A	0	0	0	0	0	2	0	0	0	0	0	0	0	0
2021-13	2021-EWOC-PNM-061021-004A	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-14	2021-EWOC-PNM-061021-005A	0	0	0	0	0	3	0	0	0	0	0	0	1	0
2021-15	2021-EWOC-PNM-071021-001A	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-16	2021-EWOC-PNM-071021-002A	0	0	0	6	0	130	0	0	0	0	0	0	1	0
2021-17	2021-EWOC-PNM-071021-003A	0	0	0	2	0	125	0	0	0	0	0	0	0	0
2021-18	2021-EWOC-PNM-090921-001A	1	0	0	0	0	0	0	0	0	0	0	0	1	0
2021-19	2021-EWOC-PNM-090921-002A	3	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-20	2021-EWOC-PNM-090921-003A	1	0	0	0	1	0	0	0	0	0	0	0	1	0
2021-21	2021-EWOC-PNM-090921-004A	1	0	0	1	0	6	0	0	0	0	0	0	0	0
2021-22	2021-EWOC-PNM-061021-001A	0	0	0	0	0	1	0	0	0	0	0	0	0	0
	Grand Total	92	4	1	472	17	1422	8	764	22	4	13	1	323	103
	FOO (2010)	10	2	1	14	1	18	3	13	5	2	0	1	17	4
	FOO (2013)	4	1	0	14	0	37	3	2	4	0	6	0	24	10
	FOO (2021)	8	0	0	4	5	12	0	1	0	0	2	0	8	0

Part 4 – (Miniellus heterodon – Paranotropis volucellus)

MapID	Field number	<i>Miniellus heterodon</i>	<i>Miniellus stramineus</i>	<i>Minytrema melanops</i>	<i>Morone americana</i>	<i>Moxostoma macrolepidotum</i>	<i>Neogobius melanostomus</i>	<i>Notemigonus crysoleucas</i>	<i>Notropis atherinoides</i>	<i>Notropis heterolepis</i>	<i>Noturus gyrinus</i>	<i>Opsopoeodus emiliae</i>	<i>Paranotropis buchanani</i>	<i>Paranotropis sp.</i>	<i>Paranotropis volucellus</i>
2010-01	PDAH-PNM-2010-270710-002A	0	0	0	0	0	0	0	0	0	4	0	0	0	0
2010-02	PDAH-PNM-2010-270710-004B	0	0	2	0	0	50	1	0	0	0	9	0	0	0
2010-03	PDAH-PNM-2010-270710-005B	0	0	1	1	0	37	0	4	0	0	1	16	0	8
2010-04	PDAH-PNM-2010-280710-001B	0	0	0	0	0	47	0	2	0	0	5	0	0	5
2010-05	PDAH-PNM-2010-280710-002B	0	0	0	0	0	40	0	1	0	0	2	3	0	15
2010-06	PDAH-PNM-2010-280710-003B	0	0	0	0	1	54	0	0	0	0	4	1	0	2
2010-07	PDAH-PNM-2010-270710-004A	0	2	0	0	0	0	0	0	0	2	0	0	0	0
2010-08	PDAH-PNM-2010-260710-001A	0	0	0	0	0	18	13	0	0	0	9	0	0	0
2010-09	PDAH-PNM-2010-290710-001B	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2010-10	PDAH-PNM-2010-030810-001A	0	0	0	0	0	12	3	3	2	0	0	0	0	0
2010-11	PDAH-PNM-2010-030810-002A	0	0	0	0	0	0	0	0	0	0	2	0	0	0
2010-12	PDAH-PNM-2010-270710-003A	0	0	0	0	0	0	0	0	0	5	0	0	0	0
2010-13	PDAH-PNM-2010-290710-002B	0	0	0	0	0	0	1	0	0	1	0	0	0	0
2010-14	PDAH-PNM-2010-260710-002A	0	0	0	0	0	49	0	0	0	0	0	0	0	6
2010-15	PDAH-PNM-2010-270710-001A	0	0	0	0	0	25	0	2	0	0	0	7	0	0
2010-16	PDAH-PNM-2010-280710-001A	0	0	1	0	0	18	0	0	0	1	0	18	0	0
2010-17	PDAH-PNM-2010-280710-002A	0	0	0	0	0	7	0	0	0	25	0	21	0	0
2010-18	PDAH-PNM-2010-280710-003A	0	0	0	0	0	0	0	0	0	14	0	0	1	4
2010-19	PDAH-PNM-2010-290710-002A	0	0	0	0	0	39	0	0	0	5	0	1	0	0
2010-20	PDAH-PNM-2010-290710-001A	0	0	0	0	0	3	0	0	0	8	0	1	0	0
2010-21	PDAH-PNM-2010-270710-003B	0	0	0	0	0	0	6	0	0	10	0	0	0	0
2013-01	2013-PNM-LSCD-100713-001C	0	0	0	0	0	11	0	0	0	1	0	0	0	0
2013-02	2013-PNM-LSCD-100713-003C	0	0	0	0	0	0	4	0	0	0	0	0	0	0
2013-03	2013-PNM-LSCD-100713-004C	0	0	0	0	0	0	5	0	0	0	0	0	0	0
2013-04	2013-PNM-LSCD-110713-001C	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2013-05	2013-PNM-LSCD-110713-002C	0	0	0	0	0	0	2	0	0	1	0	0	0	0
2013-06	2013-PNM-LSCD-110713-003C	0	0	0	0	0	0	1	0	0	0	0	0	0	0
2013-07	2013-PNM-LSCD-110713-004C	0	0	0	0	0	0	2	0	0	0	0	0	0	0
2013-08	2013-PNM-LSCD-070813-001A	0	0	0	0	0	192	90	0	0	27	0	0	0	0
2013-09	2013-PNM-LSCD-070813-002A	0	0	0	0	0	1	16	0	0	4	0	0	0	0
2013-10	2013-PNM-LSCD-070813-003A	0	0	0	0	0	43	0	0	0	20	0	0	0	0
2013-11	2013-PNM-LSCD-070813-004A	0	0	0	0	0	15	1	0	0	7	0	0	0	0
2013-12	2013-PNM-LSCD-090713-001A	0	0	0	2	0	14	0	0	0	0	0	1	0	0
2013-13	2013-PNM-LSCD-090713-003C	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2013-14	2013-PNM-LSCD-090713-004C	0	0	0	0	0	2	0	0	0	0	0	3	0	0
2013-15	2013-PNM-LSCD-070813-005A	0	0	0	0	0	1	0	0	0	0	0	135	0	0
2013-16	2013-PNM-LSCD-070813-006A	0	0	0	0	0	1	0	0	0	0	0	97	0	0
2013-17	2013-PNM-LSCD-100713-001B	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2013-18	2013-PNM-LSCD-100713-002B	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2013-19	2013-PNM-LSCD-260913-001A	0	0	0	0	0	37	0	0	0	9	0	0	0	0
2013-20	2013-PNM-LSCD-260913-002A	0	0	0	1	0	26	0	0	0	0	0	0	0	0
2013-21	2013-PNM-LSCD-260913-003A	0	0	0	2	0	7	0	0	0	0	0	0	0	0
2013-22	2013-PNM-LSCD-090713-002A	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2013-23	2013-PNM-LSCD-090713-003A	0	0	0	0	0	11	0	0	0	0	0	0	0	0
2013-24	2013-PNM-LSCD-090713-004A	0	0	0	0	0	7	0	0	0	0	0	0	0	2
2013-25	2013-PNM-LSCD-090713-005A	0	0	0	0	0	10	0	0	0	0	0	0	0	0
2013-26	2013-PNM-LSCD-090713-006A	0	0	0	0	0	1	0	0	0	0	0	0	0	0
2013-27	2013-PNM-LSCD-100713-001A	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2013-28	2013-PNM-LSCD-100713-002A	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2013-29	2013-PNM-LSCD-100713-003A	0	0	0	0	0	6	0	0	0	0	0	0	0	0
2013-30	2013-PNM-LSCD-100713-004A	0	0	0	0	0	0	1	0	0	0	0	0	0	0
2013-31	2013-PNM-LSCD-100713-005A	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2013-32	2013-PNM-LSCD-100713-006A	0	0	0	0	0	0	0	0	0	0	0	2	0	0
2013-33	2013-PNM-LSCD-100713-007A	0	0	0	0	0	2	1	4	0	0	0	0	0	0
2013-34	2013-PNM-LSCD-110713-001B	0	0	0	0	0	2	0	0	0	0	0	0	0	0
2013-35	2013-PNM-LSCD-110713-002B	0	0	0	0	0	6	26	0	0	3	0	0	0	0
2013-36	2013-PNM-LSCD-110713-003B	0	0	0	0	0	6	15	0	0	3	0	0	0	0
2013-37	2013-PNM-LSCD-110713-004B	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2013-38	2013-PNM-LSCD-110713-005B	1	0	0	0	0	0	1	0	0	0	0	0	0	0

MapID	Field number	<i>Miniellus heterodon</i>	<i>Miniellus stramineus</i>	<i>Minytrema melanops</i>	<i>Morone americana</i>	<i>Moxostoma macrolepidotum</i>	<i>Neogobius melanostomus</i>	<i>Notemigonus crysoleucas</i>	<i>Notropis atherinoides</i>	<i>Notropis heterolepis</i>	<i>Noturus gyrinus</i>	<i>Opsopoeodus emiliae</i>	<i>Paranotropis buchhanani</i>	<i>Paranotropis sp.</i>	<i>Paranotropis volucellus</i>
2013-39	2013-PNM-LSCD-250913-001A	0	0	0	0	0	2	45	0	0	4	0	0	0	0
2013-40	2013-PNM-LSCD-250913-002A	0	0	0	0	0	0	40	0	0	0	0	0	0	0
2013-41	2013-PNM-LSCD-250913-003A	0	0	0	0	0	0	30	0	0	0	0	0	0	0
2013-42	2013-PNM-LSCD-250913-004A	0	0	0	0	0	0	30	0	0	0	0	0	0	0
2013-43	2013-PNM-LSCD-090713-001B	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2013-44	2013-PNM-LSCD-090713-002B	0	0	0	0	0	0	2	0	0	0	0	0	0	0
2013-45	2013-PNM-LSCD-090713-003B	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2013-46	2013-PNM-LSCD-090713-004B	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2013-47	2013-PNM-LSCD-090713-005B	0	0	0	0	0	0	2	0	0	1	0	0	0	0
2013-48	2013-PNM-LSCD-090713-005C	0	0	0	0	0	2	0	0	0	0	0	6	0	0
2013-49	2013-PNM-LSCD-110713-001A	0	0	0	0	0	1	0	0	0	0	0	11	0	0
2013-50	2013-PNM-LSCD-110713-002A	0	0	0	0	0	0	1	0	0	6	0	24	0	0
2013-51	2013-PNM-LSCD-110713-003A	0	0	0	0	0	0	0	0	0	0	0	1	3	1
2013-52	2013-PNM-LSCD-110713-004A	0	0	0	0	0	0	0	0	7	0	7	0	0	0
2013-53	2013-PNM-LSCD-110713-005A	0	0	0	0	0	0	0	0	0	0	0	1	22	0
2013-54	2013-PNM-LSCD-110713-006A	0	0	0	0	0	1	0	0	0	0	0	47	0	0
2013-55	2013-PNM-LSCD-090713-001C	0	0	0	0	0	0	0	0	0	0	0	8	0	0
2013-56	2013-PNM-LSCD-090713-002C	0	0	0	0	0	0	0	0	0	0	0	4	0	0
2013-57	2013-PNM-LSCD-100713-003B	0	0	0	0	0	0	0	0	1	0	0	0	0	0
2021-01	2021-EWOC-PNM-080921-001A	0	0	0	0	0	0	0	0	2	0	0	0	0	0
2021-02	2021-EWOC-PNM-080921-002A	0	0	0	0	0	0	0	0	2	0	0	0	0	0
2021-03	2021-EWOC-PNM-080921-003A	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-04	2021-EWOC-PNM-080921-004A	0	0	0	0	0	2	0	0	13	0	3	0	0	0
2021-05	2021-EWOC-PNM-080921-005A	0	0	0	0	0	12	0	0	0	0	14	0	0	0
2021-06	2021-EWOC-PNM-080921-006A	0	0	0	0	0	2	0	0	0	0	2	0	0	0
2021-07	2021-EWOC-PNM-090921-005A	0	0	0	0	0	6	0	0	1	0	0	0	0	0
2021-08	2021-EWOC-PNM-090921-006A	0	0	0	0	0	0	0	0	0	0	1	0	0	0
2021-09	2021-EWOC-PNM-150921-001A	0	0	0	0	0	0	0	0	0	0	5	0	0	0
2021-10	2021-EWOC-PNM-150921-002A	0	0	0	0	0	0	1	0	0	0	1	0	0	0
2021-11	2021-EWOC-PNM-061021-002A	0	0	0	0	0	0	0	0	0	0	11	0	0	0
2021-12	2021-EWOC-PNM-061021-003A	0	0	0	0	0	0	0	0	0	0	11	0	0	0
2021-13	2021-EWOC-PNM-061021-004A	0	0	0	0	0	0	0	0	0	0	8	0	0	0
2021-14	2021-EWOC-PNM-061021-005A	0	0	0	0	0	0	0	0	2	0	26	0	0	0
2021-15	2021-EWOC-PNM-071021-001A	0	0	0	0	0	0	0	0	0	0	23	0	0	0
2021-16	2021-EWOC-PNM-071021-002A	0	0	0	0	0	3	0	0	0	0	38	0	0	0
2021-17	2021-EWOC-PNM-071021-003A	0	0	0	0	0	2	0	0	2	0	22	0	0	0
2021-18	2021-EWOC-PNM-090921-001A	0	0	0	0	0	0	0	0	2	0	0	0	0	0
2021-19	2021-EWOC-PNM-090921-002A	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-20	2021-EWOC-PNM-090921-003A	0	0	0	0	0	4	0	0	0	0	0	0	0	0
2021-21	2021-EWOC-PNM-090921-004A	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-22	2021-EWOC-PNM-061021-001A	0	0	0	0	0	0	0	0	0	0	17	0	0	0
	Grand Total	1	2	4	6	1	837	340	16	2	193	32	597	26	43
	FOO (2010)	0	1	3	1	1	13	5	5	1	10	7	8	1	6
	FOO (2013)	1	0	0	3	0	25	20	1	0	14	0	14	2	2
	FOO (2021)	0	0	0	0	0	7	1	0	0	7	0	14	0	0

Part 5 – (*Perca flavescens* – Total species)

MapID	Field number	<i>Perca flavescens</i>	<i>Percina caprodes</i>	<i>Percina maculata</i>	<i>Percopsis omiscomaycus</i>	<i>Pimephales notatus</i>	<i>Pomoxis annularis</i>	<i>Pomoxis nigromaculatus</i>	<i>Pomoxis</i> sp.	<i>Proterorhinus semilunaris</i>	<i>Semotilus atromaculatus</i>	<i>Umbra limi</i>	Total fishes	Total species
2010-01	PDAH-PNM-2010-270710-002A	0	0	1	0	1	0	0	0	0	7	0	51	11
2010-02	PDAH-PNM-2010-270710-004B	0	0	0	0	237	1	5	3	0	0	0	936	15
2010-03	PDAH-PNM-2010-270710-005B	0	0	2	0	57	0	0	0	0	0	0	256	23
2010-04	PDAH-PNM-2010-280710-001B	0	0	0	0	34	0	0	0	0	0	0	182	16
2010-05	PDAH-PNM-2010-280710-002B	0	1	4	0	35	0	0	0	0	0	0	180	20
2010-06	PDAH-PNM-2010-280710-003B	0	0	2	0	45	0	0	0	0	0	0	249	14
2010-07	PDAH-PNM-2010-270710-004A	0	0	0	0	0	0	0	0	0	7	6	31	10
2010-08	PDAH-PNM-2010-260710-001A	0	0	0	0	12	0	5	0	0	0	0	617	17
2010-09	PDAH-PNM-2010-290710-001B	0	0	0	0	0	0	0	0	0	0	5	25	5
2010-10	PDAH-PNM-2010-030810-001A	2	0	0	0	50	0	1	0	6	0	0	358	21
2010-11	PDAH-PNM-2010-030810-002A	0	0	0	0	0	0	0	0	0	0	0	3	2
2010-12	PDAH-PNM-2010-270710-003A	0	0	0	0	0	0	0	0	0	0	0	36	5
2010-13	PDAH-PNM-2010-290710-002B	0	0	0	0	2	0	1	0	0	0	0	245	10
2010-14	PDAH-PNM-2010-260710-002A	0	3	3	0	33	1	1	1	0	0	0	327	18
2010-15	PDAH-PNM-2010-270710-001A	0	1	0	0	4	0	0	0	0	0	0	74	11
2010-16	PDAH-PNM-2010-280710-001A	0	2	5	0	3	7	4	0	0	0	0	332	19
2010-17	PDAH-PNM-2010-280710-002A	0	0	0	0	4	1	0	9	0	0	0	433	14
2010-18	PDAH-PNM-2010-280710-003A	0	0	4	0	0	2	0	16	0	0	0	513	12
2010-19	PDAH-PNM-2010-290710-002A	0	0	0	0	10	2	4	0	0	0	0	197	15
2010-20	PDAH-PNM-2010-290710-001A	0	0	1	0	2	0	8	0	0	0	0	150	15
2010-21	PDAH-PNM-2010-270710-003B	0	0	0	0	0	0	1	0	3	0	3	178	11
2013-01	2013-PNM-LSCD-100713-001C	0	0	0	0	0	0	0	0	0	0	0	18	6
2013-02	2013-PNM-LSCD-100713-003C	1	0	0	0	0	0	0	0	0	0	0	43	6
2013-03	2013-PNM-LSCD-100713-004C	0	0	0	0	0	0	0	0	0	0	4	12	5
2013-04	2013-PNM-LSCD-110713-001C	0	0	0	0	0	0	0	0	0	0	1	1	1
2013-05	2013-PNM-LSCD-110713-002C	0	0	0	0	0	0	0	0	0	0	0	8	5
2013-06	2013-PNM-LSCD-110713-003C	0	0	0	0	0	0	0	0	0	0	0	9	4
2013-07	2013-PNM-LSCD-110713-004C	0	0	0	0	0	0	0	0	0	0	1	13	4
2013-08	2013-PNM-LSCD-070813-001A	1	0	0	0	1	0	0	0	0	0	1	332	11
2013-09	2013-PNM-LSCD-070813-002A	0	0	0	0	1	0	0	0	0	0	0	54	11
2013-10	2013-PNM-LSCD-070813-003A	0	2	0	0	0	0	0	0	0	0	0	133	10
2013-11	2013-PNM-LSCD-070813-004A	1	1	0	0	7	0	0	0	0	0	1	53	12
2013-12	2013-PNM-LSCD-090713-001A	1	1	1	1	2	0	0	0	17	0	0	71	15
2013-13	2013-PNM-LSCD-090713-003C	0	0	0	0	0	0	0	0	0	0	0	5	1
2013-14	2013-PNM-LSCD-090713-004C	0	0	0	0	0	0	0	0	0	0	0	7	4
2013-15	2013-PNM-LSCD-070813-005A	0	0	0	0	0	0	0	0	0	0	0	142	4
2013-16	2013-PNM-LSCD-070813-006A	0	0	0	0	0	5	3	0	0	0	0	132	6
2013-17	2013-PNM-LSCD-100713-001B	0	0	0	0	0	0	0	0	0	0	3	4	2
2013-18	2013-PNM-LSCD-100713-002B	0	0	0	0	0	0	0	0	0	0	0	0	0
2013-19	2013-PNM-LSCD-260913-001A	1	0	0	0	0	0	0	0	0	0	9	101	12
2013-20	2013-PNM-LSCD-260913-002A	6	7	0	0	5	0	0	0	0	0	0	67	13
2013-21	2013-PNM-LSCD-260913-003A	7	0	0	0	0	0	0	0	0	0	0	30	8
2013-22	2013-PNM-LSCD-090713-002A	0	0	0	0	0	0	0	0	2	0	0	17	2
2013-23	2013-PNM-LSCD-090713-003A	0	0	0	0	12	0	0	0	0	0	0	35	5
2013-24	2013-PNM-LSCD-090713-004A	0	0	0	0	15	0	0	0	0	0	0	39	7
2013-25	2013-PNM-LSCD-090713-005A	2	0	0	0	2	0	0	0	0	0	0	16	5
2013-26	2013-PNM-LSCD-090713-006A	0	0	0	0	3	0	0	0	0	0	0	10	5
2013-27	2013-PNM-LSCD-100713-001A	0	0	0	0	0	0	0	0	0	0	0	0	0
2013-28	2013-PNM-LSCD-100713-002A	0	0	0	0	1	0	0	0	0	0	0	3	2
2013-29	2013-PNM-LSCD-100713-003A	0	0	0	0	0	0	0	0	0	0	0	18	7
2013-30	2013-PNM-LSCD-100713-004A	0	0	0	0	1	0	1	0	0	0	0	5	5
2013-31	2013-PNM-LSCD-100713-005A	0	0	0	0	10	0	0	0	0	0	0	20	4
2013-32	2013-PNM-LSCD-100713-006A	0	0	0	0	0	0	1	0	0	0	0	19	5
2013-33	2013-PNM-LSCD-100713-007A	1	3	1	0	4	0	0	0	0	0	0	29	12
2013-34	2013-PNM-LSCD-110713-001B	0	0	0	0	1	0	0	0	0	0	0	13	9
2013-35	2013-PNM-LSCD-110713-002B	2	0	0	0	23	0	1	0	0	0	0	94	12
2013-36	2013-PNM-LSCD-110713-003B	2	0	0	0	38	0	0	0	0	0	0	148	12
2013-37	2013-PNM-LSCD-110713-004B	0	0	0	0	1	0	0	0	0	0	0	8	4
2013-38	2013-PNM-LSCD-110713-005B	1	0	0	0	2	1	0	0	0	0	0	24	11
2013-39	2013-PNM-LSCD-250913-001A	0	0	0	0	1	0	0	0	0	0	0	85	14

2013-40	2013-PNM-LSCD-250913-002A	0	0	0	0	2	0	0	0	0	0	0	66	6
2013-41	2013-PNM-LSCD-250913-003A	0	0	0	0	0	0	0	0	0	0	0	220	2
2013-42	2013-PNM-LSCD-250913-004A	0	0	0	0	8	0	0	0	0	0	0	186	9
2013-43	2013-PNM-LSCD-090713-001B	0	0	0	0	0	0	0	0	0	0	0	0	0
2013-44	2013-PNM-LSCD-090713-002B	0	0	0	0	0	0	0	0	0	0	0	12	2
2013-45	2013-PNM-LSCD-090713-003B	0	0	0	0	0	0	0	0	0	0	0	6	4
2013-46	2013-PNM-LSCD-090713-004B	0	0	0	0	0	0	0	0	0	0	0	25	3
2013-47	2013-PNM-LSCD-090713-005B	0	0	0	0	0	0	0	0	0	0	0	25	4
2013-48	2013-PNM-LSCD-090713-005C	0	0	0	0	0	0	3	0	0	0	0	49	6
2013-49	2013-PNM-LSCD-110713-001A	0	0	0	0	0	0	0	0	0	0	0	17	6
2013-50	2013-PNM-LSCD-110713-002A	0	0	0	0	0	1	1	0	0	0	0	51	7
2013-51	2013-PNM-LSCD-110713-003A	0	0	0	0	0	0	0	0	0	0	0	6	3
2013-52	2013-PNM-LSCD-110713-004A	0	0	0	0	0	2	3	6	0	0	0	42	10
2013-53	2013-PNM-LSCD-110713-005A	0	0	0	0	0	20	0	3	0	0	0	107	7
2013-54	2013-PNM-LSCD-110713-006A	0	0	0	0	0	14	6	0	0	0	0	105	9
2013-55	2013-PNM-LSCD-090713-001C	0	0	0	0	0	0	0	0	0	0	0	26	10
2013-56	2013-PNM-LSCD-090713-002C	0	0	0	0	0	2	1	0	0	0	0	30	10
2013-57	2013-PNM-LSCD-100713-003B	0	0	0	0	2	0	0	0	0	0	0	36	7
2021-01	2021-EWOC-PNM-080921-001A	0	0	1	0	0	0	0	0	0	6	0	78	10
2021-02	2021-EWOC-PNM-080921-002A	0	0	11	0	10	0	0	0	0	11	0	89	11
2021-03	2021-EWOC-PNM-080921-003A	0	0	0	0	0	0	0	0	0	5	0	37	7
2021-04	2021-EWOC-PNM-080921-004A	0	0	0	0	0	0	0	0	0	0	0	34	12
2021-05	2021-EWOC-PNM-080921-005A	0	0	0	0	0	0	0	0	0	0	0	30	4
2021-06	2021-EWOC-PNM-080921-006A	0	0	0	0	0	3	0	0	0	0	0	17	7
2021-07	2021-EWOC-PNM-090921-005A	0	0	2	0	2	0	0	0	0	3	0	16	7
2021-08	2021-EWOC-PNM-090921-006A	0	0	4	0	60	0	0	0	0	0	0	91	9
2021-09	2021-EWOC-PNM-150921-001A	0	0	0	0	0	0	1	0	0	0	0	70	5
2021-10	2021-EWOC-PNM-150921-002A	0	0	0	0	0	0	3	0	0	0	0	50	9
2021-11	2021-EWOC-PNM-061021-002A	0	0	0	0	0	0	3	0	0	0	0	46	5
2021-12	2021-EWOC-PNM-061021-003A	0	0	0	0	0	0	0	0	0	0	0	33	5
2021-13	2021-EWOC-PNM-061021-004A	0	0	0	0	0	0	0	0	0	0	0	16	3
2021-14	2021-EWOC-PNM-061021-005A	0	0	0	0	0	0	2	0	0	0	0	40	6
2021-15	2021-EWOC-PNM-071021-001A	0	0	0	0	0	0	0	0	0	0	0	40	3
2021-16	2021-EWOC-PNM-071021-002A	0	1	0	0	0	1	18	0	0	0	0	292	11
2021-17	2021-EWOC-PNM-071021-003A	3	3	0	0	0	4	15	0	0	0	0	210	14
2021-18	2021-EWOC-PNM-090921-001A	0	0	1	0	0	0	0	0	0	0	6	36	8
2021-19	2021-EWOC-PNM-090921-002A	0	0	1	0	0	0	0	0	0	3	1	54	6
2021-20	2021-EWOC-PNM-090921-003A	0	0	0	0	1	0	0	0	0	0	0	11	5
2021-21	2021-EWOC-PNM-090921-004A	0	0	0	0	0	0	0	0	0	0	0	8	3
2021-22	2021-EWOC-PNM-061021-001A	0	1	0	0	0	0	2	0	0	0	0	50	6
	Grand Total	31	26	44	1	744	67	94	38	28	42	41	9548	56
	FOO (2010)	1	4	8	0	15	6	9	4	2	2	3		
	FOO (2013)	12	5	2	1	22	7	9	2	2	0	7		
	FOO (2021)	1	3	6	0	4	3	7	0	0	5	2		

Appendix 4. Individual total length (TL; mm) and weight (g) of SARA-listed fishes: a) Pugnose Minnow, b) Pugnose Shiner, c) Blackstripe Topminnow, d) Spotted Sucker, e) Lake Chubsucker, f) Grass Pickerel, and g) Northern Sunfish. Weight was only collected in 2021; an asterisk (*) indicates parameter not measured. Clip indicates whether a tissue sample (i.e., fin clip) was retained (true/false).

a) Pugnose Minnow (*Opsopoeodus emiliae*)

Waterbody	MapID	Field number	TL	Wt	Clip
East Sydenham River	2010-02	PDAH-PNM-2010-270710-004B	37	*	T
East Sydenham River	2010-02	PDAH-PNM-2010-270710-004B	37	*	T
East Sydenham River	2010-02	PDAH-PNM-2010-270710-004B	37	*	T
East Sydenham River	2010-02	PDAH-PNM-2010-270710-004B	37	*	T
East Sydenham River	2010-02	PDAH-PNM-2010-270710-004B	38	*	T
East Sydenham River	2010-02	PDAH-PNM-2010-270710-004B	38	*	T
East Sydenham River	2010-02	PDAH-PNM-2010-270710-004B	39	*	T
East Sydenham River	2010-02	PDAH-PNM-2010-270710-004B	39	*	T
East Sydenham River	2010-02	PDAH-PNM-2010-270710-004B	39	*	T
East Sydenham River	2010-02	PDAH-PNM-2010-270710-004B	39	*	T
East Sydenham River	2010-03	PDAH-PNM-2010-270710-005B	36	*	T
East Sydenham River	2010-04	PDAH-PNM-2010-280710-001B	25	*	T
East Sydenham River	2010-04	PDAH-PNM-2010-280710-001B	35	*	T
East Sydenham River	2010-04	PDAH-PNM-2010-280710-001B	37	*	T
East Sydenham River	2010-04	PDAH-PNM-2010-280710-001B	37	*	T
East Sydenham River	2010-04	PDAH-PNM-2010-280710-001B	40	*	T
East Sydenham River	2010-05	PDAH-PNM-2010-280710-002B	37	*	T
East Sydenham River	2010-05	PDAH-PNM-2010-280710-002B	39	*	T
East Sydenham River	2010-06	PDAH-PNM-2010-280710-003B	37	*	T
East Sydenham River	2010-06	PDAH-PNM-2010-280710-003B	38	*	T
East Sydenham River	2010-06	PDAH-PNM-2010-280710-003B	38	*	T
East Sydenham River	2010-06	PDAH-PNM-2010-280710-003B	41	*	T
Little Bear Creek	2010-08	PDAH-PNM-2010-260710-001A	31	*	F
Little Bear Creek	2010-08	PDAH-PNM-2010-260710-001A	32	*	F
Little Bear Creek	2010-08	PDAH-PNM-2010-260710-001A	34	*	F
Little Bear Creek	2010-08	PDAH-PNM-2010-260710-001A	40	*	F
Little Bear Creek	2010-08	PDAH-PNM-2010-260710-001A	*	*	F
Little Bear Creek	2010-08	PDAH-PNM-2010-260710-001A	*	*	F

b) Pugnose Shiner (*Miniellus anogenus*)

Waterbody	MapID	Field number	TL	Wt	Clip
Little Bear Creek	2010-08	PDAH-PNM-2010-260710-001A	45	*	F
Little Bear Creek	2010-08	PDAH-PNM-2010-260710-001A	47	*	F
Little Bear Creek	2010-10	PDAH-PNM-2010-030810-001A	48	*	F
Little Bear Creek	2010-10	PDAH-PNM-2010-030810-001A	23	*	F
Little Bear Creek	2010-10	PDAH-PNM-2010-030810-001A	36	*	F
Little Bear Creek	2010-10	PDAH-PNM-2010-030810-001A	33	*	F
Little Bear Creek	2010-10	PDAH-PNM-2010-030810-001A	55	*	F
Little Bear Creek	2010-10	PDAH-PNM-2010-030810-001A	34	*	F
Little Bear Creek	2010-10	PDAH-PNM-2010-030810-001A	25	*	F
Little Bear Creek	2010-10	PDAH-PNM-2010-030810-001A	28	*	F
Little Bear Creek	2010-10	PDAH-PNM-2010-030810-001A	35	*	F
Little Bear Creek	2010-10	PDAH-PNM-2010-030810-001A	40	*	F
Little Bear Creek	2010-11	PDAH-PNM-2010-030810-002A	46	*	F
Maxwell Creek	2010-13	PDAH-PNM-2010-290710-002B	29	*	T
Little Bear Creek	2013-24	2013-PNM-LSCD-090713-004A	46	*	F
Little Bear Creek	2013-26	2013-PNM-LSCD-090713-006A	43	*	F
Little Bear Creek	2013-26	2013-PNM-LSCD-090713-006A	52	*	F
Little Bear Creek	2013-34	2013-PNM-LSCD-110713-001B	53	*	F
Little Bear Creek	2013-35	2013-PNM-LSCD-110713-002B	28	*	F
Little Bear Creek	2013-35	2013-PNM-LSCD-110713-002B	38	*	F
Little Bear Creek	2013-35	2013-PNM-LSCD-110713-002B	42	*	F
Little Bear Creek	2013-35	2013-PNM-LSCD-110713-002B	44	*	F
Little Bear Creek	2013-35	2013-PNM-LSCD-110713-002B	44	*	F
Little Bear Creek	2013-35	2013-PNM-LSCD-110713-002B	45	*	F
Little Bear Creek	2013-35	2013-PNM-LSCD-110713-002B	46	*	F
Little Bear Creek	2013-35	2013-PNM-LSCD-110713-002B	48	*	F
Little Bear Creek	2013-35	2013-PNM-LSCD-110713-002B	49	*	F
Little Bear Creek	2013-35	2013-PNM-LSCD-110713-002B	49	*	F

Waterbody	MapID	Field number	TL	Wt	Clip
Big Creek	2013-11	2013-PNM-LSCD-070813-004A	30	*	F
Big Creek	2013-11	2013-PNM-LSCD-070813-004A	32	*	F
Little Bear Creek	2013-19	2013-PNM-LSCD-260913-001A	30	*	F
Little Bear Creek	2013-19	2013-PNM-LSCD-260913-001A	32	*	F
Little Bear Creek	2013-19	2013-PNM-LSCD-260913-001A	35	*	F
Little Bear Creek	2013-19	2013-PNM-LSCD-260913-001A	37	*	F
Little Bear Creek	2013-19	2013-PNM-LSCD-260913-001A	37	*	F
Little Bear Creek	2013-19	2013-PNM-LSCD-260913-001A	37	*	F
Little Bear Creek	2013-19	2013-PNM-LSCD-260913-001A	39	*	F
Little Bear Creek	2013-19	2013-PNM-LSCD-260913-001A	39	*	F
Little Bear Creek	2013-19	2013-PNM-LSCD-260913-001A	40	*	F
Little Bear Creek	2013-19	2013-PNM-LSCD-260913-001A	64	*	F
Little Bear Creek	2013-20	2013-PNM-LSCD-260913-002A	40	*	F
Little Bear Creek	2013-20	2013-PNM-LSCD-260913-002A	40	*	F
Little Bear Creek	2013-20	2013-PNM-LSCD-260913-002A	57	*	F
Little Bear Creek	2013-34	2013-PNM-LSCD-110713-001B	*	*	F
Little Bear Creek	2013-34	2013-PNM-LSCD-110713-001B	*	*	F
Little Bear Creek	2013-35	2013-PNM-LSCD-110713-002B	61	*	F
Little Bear Creek	2013-39	2013-PNM-LSCD-250913-001A	37	*	F
Little Bear Creek	2013-39	2013-PNM-LSCD-250913-001A	41	*	F
Little Bear Creek	2013-40	2013-PNM-LSCD-250913-002A	39	*	F
West Otter Creek	2013-55	2013-PNM-LSCD-090713-001C	55	*	F
West Otter Creek	2013-55	2013-PNM-LSCD-090713-001C	58	*	F
East Otter Creek	2021-01	2021-EWOC-PNM-080921-001A	37	0.6	F
East Otter Creek	2021-01	2021-EWOC-PNM-080921-001A	39	0.3	F
East Otter Creek	2021-01	2021-EWOC-PNM-080921-001A	40	0.4	F
East Otter Creek	2021-01	2021-EWOC-PNM-080921-001A	40	0.4	F
East Otter Creek	2021-01	2021-EWOC-PNM-080921-001A	42	0.5	F
East Otter Creek	2021-01	2021-EWOC-PNM-080921-001A	43	0.5	F
East Otter Creek	2021-01	2021-EWOC-PNM-080921-001A	43	0.5	F
East Otter Creek	2021-01	2021-EWOC-PNM-080921-001A	45	1.2	F
East Otter Creek	2021-01	2021-EWOC-PNM-080921-001A	52	1.6	F
East Otter Creek	2021-01	2021-EWOC-PNM-080921-001A	58	1.8	F
East Otter Creek	2021-01	2021-EWOC-PNM-080921-001A	59	1.6	F
East Otter Creek	2021-01	2021-EWOC-PNM-080921-001A	62	2.0	F
East Otter Creek	2021-01	2021-EWOC-PNM-080921-001A	64	1.8	F
East Otter Creek	2021-01	2021-EWOC-PNM-080921-001A	64	2.0	F
East Otter Creek	2021-02	2021-EWOC-PNM-080921-002A	34	0.3	F
East Otter Creek	2021-02	2021-EWOC-PNM-080921-002A	35	0.3	F
East Otter Creek	2021-02	2021-EWOC-PNM-080921-002A	35	0.3	F
East Otter Creek	2021-02	2021-EWOC-PNM-080921-002A	36	0.3	F
East Otter Creek	2021-02	2021-EWOC-PNM-080921-002A	36	0.3	F
East Otter Creek	2021-02	2021-EWOC-PNM-080921-002A	37	0.3	F
East Otter Creek	2021-02	2021-EWOC-PNM-080921-002A	40	0.4	F
East Otter Creek	2021-02	2021-EWOC-PNM-080921-002A	66	2.3	F
East Otter Creek	2021-03	2021-EWOC-PNM-080921-003A	35	0.3	F
East Otter Creek	2021-03	2021-EWOC-PNM-080921-003A	36	0.2	F
East Otter Creek	2021-03	2021-EWOC-PNM-080921-003A	36	0.3	F
East Otter Creek	2021-03	2021-EWOC-PNM-080921-003A	40	0.4	F
East Otter Creek	2021-03	2021-EWOC-PNM-080921-003A	40	0.4	F
East Otter Creek	2021-03	2021-EWOC-PNM-080921-003A	40	0.5	F
East Otter Creek	2021-03	2021-EWOC-PNM-080921-003A	41	0.4	F
East Otter Creek	2021-03	2021-EWOC-PNM-080921-003A	41	0.5	F
East Otter Creek	2021-03	2021-EWOC-PNM-080921-003A	42	0.3	F
East Otter Creek	2021-03	2021-EWOC-PNM-080921-003A	44	0.6	F
East Otter Creek	2021-03	2021-EWOC-PNM-080921-003A	46	0.8	F
East Otter Creek	2021-03	2021-EWOC-PNM-080921-003A	55	1.5	F
East Otter Creek	2021-03	2021-EWOC-PNM-080921-003A	55	1.7	F
East Otter Creek	2021-03	2021-EWOC-PNM-080921-003A	56	1.4	F
East Otter Creek	2021-03	2021-EWOC-PNM-080921-003A	56	1.7	F
East Otter Creek	2021-03	2021-EWOC-PNM-080921-003A	57	1.5	F
East Otter Creek	2021-03	2021-EWOC-PNM-080921-003A	57	1.7	F
East Otter Creek	2021-03	2021-EWOC-PNM-080921-003A	57	1.8	F
East Otter Creek	2021-03	2021-EWOC-PNM-080921-003A	57	1.9	F
East Otter Creek	2021-03	2021-EWOC-PNM-080921-003A	58	1.3	F
East Otter Creek	2021-03	2021-EWOC-PNM-080921-003A	58	1.6	F
East Otter Creek	2021-03	2021-EWOC-PNM-080921-003A	59	1.8	F
East Otter Creek	2021-03	2021-EWOC-PNM-080921-003A	60	1.8	F

Waterbody	MapID	Field number	TL	Wt	Clip
West Otter Creek	2021-19	2021-EWOC-PNM-090921-002A	44	0.7	F
West Otter Creek	2021-19	2021-EWOC-PNM-090921-002A	44	1.0	F
West Otter Creek	2021-19	2021-EWOC-PNM-090921-002A	45	0.6	F
West Otter Creek	2021-19	2021-EWOC-PNM-090921-002A	45	0.6	F
West Otter Creek	2021-19	2021-EWOC-PNM-090921-002A	46	0.6	F
West Otter Creek	2021-19	2021-EWOC-PNM-090921-002A	46	0.8	F
West Otter Creek	2021-20	2021-EWOC-PNM-090921-003A	38	0.6	F
West Otter Creek	2021-20	2021-EWOC-PNM-090921-003A	51	0.8	F
West Otter Creek	2021-20	2021-EWOC-PNM-090921-003A	62	1.9	F

d) *Spotted Sucker (Minytrema melanops)*

Waterbody	MapID	Field number	TL	Wt	Clip
East Sydenham River	2010-02	PDAH-PNM-2010-270710-004B	132	*	T
East Sydenham River	2010-02	PDAH-PNM-2010-270710-004B	138	*	T
East Sydenham River	2010-03	PDAH-PNM-2010-270710-005B	162	*	T
North Sydenham River	2010-16	PDAH-PNM-2010-280710-001A	101	*	T

e) *Lake Chubsucker (Erimyzon sucetta)*

Waterbody	MapID	Field number	TL	Wt	Clip
Little Bear Creek	2013-19	2013-PNM-LSCD-260913-001A	43	*	F
Little Bear Creek	2013-19	2013-PNM-LSCD-260913-001A	53	*	F

f) *Grass Pickerel (Esox americanus vermiculatus)*

Waterbody	MapID	Field number	TL	Wt	Clip
Little Bear Creek	2013-20	2013-PNM-LSCD-260913-002A	106	*	F
Little Bear Creek	2013-20	2013-PNM-LSCD-260913-002A	125	*	F
Little Bear Creek	2013-20	2013-PNM-LSCD-260913-002A	139	*	F

g) *Northern Sunfish (Lepomis peltastes)*

Waterbody	MapID	Field number	TL	Wt	Clip
East Sydenham River	2010-02	PDAH-PNM-2010-270710-004B	71	*	F
East Sydenham River	2010-02	PDAH-PNM-2010-270710-004B	166	*	F
East Sydenham River	2010-03	PDAH-PNM-2010-270710-005B	98	*	F
Otter Creek	2010-20	PDAH-PNM-2010-290710-001A	92	*	F
East Otter Creek	2013-16	2013-PNM-LSCD-070813-006A	190	*	F
West Otter Creek	2013-55	2013-PNM-LSCD-090713-001C	159	*	F
West Otter Creek	2013-55	2013-PNM-LSCD-090713-001C	212	*	F
West Otter Creek	2013-56	2013-PNM-LSCD-090713-002C	219	*	F

Appendix 5. Physical characteristics – water chemistry, mean depth, and mean water velocity – of all sites sampled for Pugnose Minnow in 2010, 2013, and 2021. An asterisk (*) indicates a value not recorded in the field.

Map Label	Field number	Air temp. (°C)	Water temp. (°C)	Condu-ctivity (µS/cm)	DO (mg/L)	pH	Water clarity (m)	Turbidity (NTU)	Mean depth (m)	Mean water velocity (m/s)
2010-01	PDAH-PNM-2010-270710-002A	28	21.6	547	4.46	7.09	0.06	*	0.48	slow
2010-02	PDAH-PNM-2010-270710-004B	28.4	27.5	543	10.2	8.37	0.64	*	*	none
2010-03	PDAH-PNM-2010-270710-005B	33.7	30.32	540	12.6	8.56	0.44	*	1.6	none
2010-04	PDAH-PNM-2010-280710-001B	25.4	26.3	495	10.6	7.05	0.36	*	*	none
2010-05	PDAH-PNM-2010-280710-002B	28.5	27.8	485	11.85	7.17	0.25	*	0.91	slow
2010-06	PDAH-PNM-2010-280710-003B	29.6	29	481	10.09	7.26	0.22	*	*	slow
2010-07	PDAH-PNM-2010-270710-004A	32.2	23.3	623	5.25	7.08	0.14	*	0.42	slow
2010-08	PDAH-PNM-2010-260710-001A	28.4	28.35	518	6.5	7.95	0.33	*	*	none
2010-09	PDAH-PNM-2010-290710-001B	25.1	24.3	352.4	3.6	7.22	> 1.2	*	*	none
2010-10	PDAH-PNM-2010-030810-001A	27.3	26.2	105	9.57	8.65	0.55	*	1.46	none
2010-11	PDAH-PNM-2010-030810-002A	*	*	518	*	*	0.33	*	*	none
2010-12	PDAH-PNM-2010-270710-003A	35.7	27.6	574	4.53	7.28	0.32	*	1.08	slow
2010-13	PDAH-PNM-2010-290710-002B	23.8	26.2	423	6.54	7.2	0.31	*	*	none
2010-14	PDAH-PNM-2010-260710-002A	30.2	29.45	479	11.5	8.62	0.16	*	1.2	none
2010-15	PDAH-PNM-2010-270710-001A	24.2	25.6	402	*	*	0.19	*	1.3	none
2010-16	PDAH-PNM-2010-280710-001A	28.9	26.41	472	8.95	8.34	0.14	*	1.2	none
2010-17	PDAH-PNM-2010-280710-002A	30	27.6	451	10.28	8.31	0.2	*	0.63	none
2010-18	PDAH-PNM-2010-280710-003A	32.8	28.69	439	12.02	8.63	0.21	*	1.1	none
2010-19	PDAH-PNM-2010-290710-002A	22.9	25.79	477	6.42	8.1	0.16	*	1	*
2010-20	PDAH-PNM-2010-290710-001A	21.7	25.42	476	6.3	7.9	0.11	*	1	none
2010-21	PDAH-PNM-2010-270710-003B	24	23.82	575	4.32	7.57	0.83	*	1	none
2013-01	2013-PNM-LSCD-100713-001C	24.4	21.87	593	6.19	8.05	0.09	81.1	0.77	0.32
2013-02	2013-PNM-LSCD-100713-003C	27.7	22.95	664	5.64	8.13	0.57	7.5	0.87	*
2013-03	2013-PNM-LSCD-100713-004C	31.5	22.23	679	7.63	7.91	0.58	12.8	0.73	0.27
2013-04	2013-PNM-LSCD-110713-001C	19	19.13	656	5.32	8.03	0.83	6.8	0.5	0.16
2013-05	2013-PNM-LSCD-110713-002C	20.4	20.04	674	4.71	8.03	> 1.2	1.6	0.5	0.18
2013-06	2013-PNM-LSCD-110713-003C	21.6	20.69	685	5.87	8.11	> 1.2	2.3	*	0.17
2013-07	2013-PNM-LSCD-110713-004C	*	21.55	717	6.21	7.96	> 1.2	3.1	0.94	0
2013-08	2013-PNM-LSCD-070813-001A	22.2	18.97	586.1	5.64	7.97	> 1.2	3.81	0.41	0.14
2013-09	2013-PNM-LSCD-070813-002A	24.7	19.3	609.9	6.67	8.17	0.7	5.88	0.53	0.12
2013-10	2013-PNM-LSCD-070813-003A	25.9	20.45	623	7.42	8.11	1	3.52	0.65	0.05
2013-11	2013-PNM-LSCD-070813-004A	25.2	21.5	663.6	12.73	8.5	1.04	1.48	0.4	0.09
2013-12	2013-PNM-LSCD-090713-001A	27.2	20.33	416.8	7.29	7.94	0.2	41.9	0.77	0.09
2013-13	2013-PNM-LSCD-090713-003C	27.9	21.77	243	6.37	7.88	0.05	284	1.09	0.35
2013-14	2013-PNM-LSCD-090713-004C	32.9	22.17	296	6.51	8.19	0.05	345.6	1.13	0.38
2013-15	2013-PNM-LSCD-070813-005A	28	22.77	476.8	5.13	8.17	0.22	93.52	0.72	0
2013-16	2013-PNM-LSCD-070813-006A	29	24.22	395.5	4.4	7.99	0.13	50.44	1.07	0.07
2013-17	2013-PNM-LSCD-100713-001B	25.4	20.49	797.8	5.4	7.79	0.36	7.78	1.09	0.27
2013-18	2013-PNM-LSCD-100713-002B	25.4	21.03	794	5.64	7.9	0.7	4.95	0.77	0.19
2013-19	2013-PNM-LSCD-260913-001A	16.6	13.8	741	*	*	0.16	*	0.63	0
2013-20	2013-PNM-LSCD-260913-002A	17.9	14.8	747	*	*	0.29	*	0.75	0
2013-21	2013-PNM-LSCD-260913-003A	19	14.6	757	*	*	0.09	*	0.53	0
2013-22	2013-PNM-LSCD-090713-002A	*	19.47	*	9.38	7.83	0.3	3.41	0.8	0.24
2013-23	2013-PNM-LSCD-090713-003A	33	20.01	731.9	6.1	7.73	0.33	20.14	0.8	0.19
2013-24	2013-PNM-LSCD-090713-004A	30.6	20.19	727.7	6.34	7.87	0.36	25.22	0.87	0.11
2013-25	2013-PNM-LSCD-090713-005A	36	21.22	744.3	6.41	7.92	0.27	27.68	0.83	0.04
2013-26	2013-PNM-LSCD-090713-006A	37.5	20.97	752.8	6.66	7.87	0.29	47.98	0.9	0.06
2013-27	2013-PNM-LSCD-100713-001A	25.2	20.13	700.9	6.22	7.79	0.19	40.02	1.17	0.2
2013-28	2013-PNM-LSCD-100713-002A	27.2	20.17	701.1	6.15	7.7	0.16	38.01	1.17	0.16
2013-29	2013-PNM-LSCD-100713-003A	27.6	20.24	701.9	6.15	7.71	0.19	54.46	1.13	0.1
2013-30	2013-PNM-LSCD-100713-004A	29.5	20.41	703.3	6.12	7.79	0.17	57.66	1.03	0.11
2013-31	2013-PNM-LSCD-100713-005A	30.2	20.68	709.2	5.93	7.71	0.12	108.37	0.63	0.12
2013-32	2013-PNM-LSCD-100713-006A	34	21.19	715.6	5.9	7.7	0.12	52.44	1.4	0.1
2013-33	2013-PNM-LSCD-100713-007A	30.3	21.29	717.6	5.96	7.71	0.12	47.65	*	0.2
2013-34	2013-PNM-LSCD-110713-001B	27.6	19.97	665	5.28	7.69	0.4	13.13	0.77	0.13
2013-35	2013-PNM-LSCD-110713-002B	26.1	20.32	655.3	5.56	7.67	0.29	102.9	0.7	0.16
2013-36	2013-PNM-LSCD-110713-003B	25.7	20.94	657.8	6.56	7.79	0.47	13.98	0.67	0.08
2013-37	2013-PNM-LSCD-110713-004B	26.9	21.39	651	6.84	7.78	0.32	12.58	0.57	0.05
2013-38	2013-PNM-LSCD-110713-005B	27.8	21.92	666.1	7.53	7.83	0.3	12.66	0.7	0.08
2013-39	2013-PNM-LSCD-250913-001A	14.3	14.9	729	*	*	0.19	*	0.85	0

2013-40	2013-PNM-LSCD-250913-002A	19.4	14.6	725	*	*	0.17	*	0.93	0
2013-41	2013-PNM-LSCD-250913-003A	22.9	15.5	727	*	*	0.28	*	1.2	0
2013-42	2013-PNM-LSCD-250913-004A	24.3	16.9	700	*	*	0.26	*	1.07	0
2013-43	2013-PNM-LSCD-090713-001B	25.8	18.86	658.4	4.85	7.58	0.52	6.26	1.15	0.08
2013-44	2013-PNM-LSCD-090713-002B	25.5	19.11	602.4	4.26	7.54	0.81	5.5	0.77	0.12
2013-45	2013-PNM-LSCD-090713-003B	24.8	19.82	669.3	5.34	7.7	0.51	8.86	0.98	0.14
2013-46	2013-PNM-LSCD-090713-004B	27.8	20.99	680.9	7.27	7.71	0.63	7.33	0.7	0.12
2013-47	2013-PNM-LSCD-090713-005B	28.9	21.83	690.2	8.21	7.75	0.43	9.36	0.92	0.04
2013-48	2013-PNM-LSCD-090713-005C	29	22.15	390	6.95	8.29	0.05	234.5	1.1	*
2013-49	2013-PNM-LSCD-110713-001A	20.5	20.04	341	5.78	7.63	0.02	469.24	0.76	0.08
2013-50	2013-PNM-LSCD-110713-002A	26.6	19.95	317.6	5.75	7.61	0.02	454.5	0.62	0.02
2013-51	2013-PNM-LSCD-110713-003A	27.2	20.46	366.7	5.65	7.64	0.18	446.49	0.94	0.1
2013-52	2013-PNM-LSCD-110713-004A	27.4	21.05	353	5.6	7.71	0.03	462	0.7	0.01
2013-53	2013-PNM-LSCD-110713-005A	24.3	21.4	372	5.26	7.76	0.03	464	0.53	0.03
2013-54	2013-PNM-LSCD-110713-006A	23.7	22.77	408	5.19	7.71	0.03	355.8	0.79	0.03
2013-55	2013-PNM-LSCD-110713-001C	23.5	20.85	380	6.95	7.66	0.06	238	0.73	0.17
2013-56	2013-PNM-LSCD-090713-002C	28.2	21.26	359	8.16	8.03	0.05	252	1.07	0.1
2013-57	2013-PNM-LSCD-100713-003B	30.8	26.13	479.1	6.93	7.94	0.08	388	0.5	0.16
2021-01	2021-EWOC-PNM-080921-001A	20.8	19.23	586	5.34	8.04	0.06	304	0.42	0.01
2021-02	2021-EWOC-PNM-080921-002A	21	18.86	514	5.66	7.93	0.07	175	0.49	0.04
2021-03	2021-EWOC-PNM-080921-003A	26.2	19.42	507	4.47	7.96	0.1	81.6	0.57	0.1
2021-04	2021-EWOC-PNM-080921-004A	26.5	19.67	446.4	7.21	8.26	0.04	418.5	0.66	0.15
2021-05	2021-EWOC-PNM-080921-005A	24.9	20.24	499.1	7.09	8.31	0.03	311.04	0.52	0.06
2021-06	2021-EWOC-PNM-080921-006A	24	20.99	531	6.87	8.31	0.05	150.5	1	0.03
2021-07	2021-EWOC-PNM-090921-005A	20.3	18.29	476.2	7.66	8.29	0.05	178.82	0.28	0.08
2021-08	2021-EWOC-PNM-090921-006A	18.6	19.39	449.5	5.41	8.01	0.05	268.77	0.71	0
2021-09	2021-EWOC-PNM-150921-001A	25.6	20.78	455.6	5.45	8.08	0.04	267.45	1.63	*
2021-10	2021-EWOC-PNM-150921-002A	24.1	21.78	556	6.09	8.19	0.1	65.49	1.5	*
2021-11	2021-EWOC-PNM-061021-002A	21.1	18.9	345	*	*	0.04	*	1.73	*
2021-12	2021-EWOC-PNM-061021-003A	20.7	19.5	312	*	*	0.45	*	1.83	*
2021-13	2021-EWOC-PNM-061021-004A	21.6	19.2	303	*	*	0.04	*	2.27	*
2021-14	2021-EWOC-PNM-061021-005A	20.3	19.4	324	*	*	0.03	*	1.57	*
2021-15	2021-EWOC-PNM-071021-001A	19.5	17.79	275.6	4.02	7.79	0.03	320	1.5	*
2021-16	2021-EWOC-PNM-071021-002A	19.1	17.94	271.6	2.76	7.69	0.03	321	0.77	*
2021-17	2021-EWOC-PNM-071021-003A	20.5	18.71	262.3	3.42	7.75	0.03	375	0.73	*
2021-18	2021-EWOC-PNM-090921-001A	16.2	16.78	396.7	6.61	8.16	0.04	251.4	0.39	0.08
2021-19	2021-EWOC-PNM-090921-002A	17.8	17.36	398.8	5.9	8.09	0.05	246.47	0.39	0.04
2021-20	2021-EWOC-PNM-090921-003A	20.1	18.1	494.4	7.56	8.37	0.14	102.47	0.26	0.07
2021-21	2021-EWOC-PNM-090921-004A	18.4	18.43	517	1.38	7.87	*	40.12	1.09	0
2021-22	2021-EWOC-PNM-061021-001A	19.7	19	349	*	*	0.05	*	1.37	*

Appendix 6. Physical characteristics – substrate percent composition by type – of all sites sampled for Pugnose Minnow in 2010, 2013, and 2021. An asterisk (*) indicates a value not recorded in the field.

Map label	Field number	Organic (%)	Clay (%)	Silt (%)	Sand (%)	Gravel (%)	Cobble (%)	Boulder (%)	Bedrock (%)	Hardpan (%)	Rubble (%)	Concrete (%)	Dominant substrate type
2010-01	PDAH-PNM-2010-270710-002A	0	10	0	0	80	0	0	0	0	10	0	Gravel
2010-02	PDAH-PNM-2010-270710-004B	0	0	15	85	0	0	0	0	0	0	0	Sand
2010-03	PDAH-PNM-2010-270710-005B	0	0	20	80	0	0	0	0	0	0	0	Sand
2010-04	PDAH-PNM-2010-280710-001B	*	*	*	*	*	*	*	*	*	*	*	*
2010-05	PDAH-PNM-2010-280710-002B	10	0	40	50	0	0	0	0	0	0	0	Sand
2010-06	PDAH-PNM-2010-280710-003B	30	40	30	0	0	0	0	0	0	0	0	Clay
2010-07	PDAH-PNM-2010-270710-004A	10	70	0	0	20	0	0	0	0	0	0	Clay
2010-08	PDAH-PNM-2010-260710-001A	30	0	60	0	0	0	10	0	0	0	0	Silt
2010-09	PDAH-PNM-2010-290710-001B	10	50	40	0	0	0	0	0	0	0	0	Clay
2010-10	PDAH-PNM-2010-030810-001A	25	0	25	25	25	0	0	0	0	0	0	Gravel
2010-11	PDAH-PNM-2010-030810-002A	30	0	60	0	0	0	10	0	0	0	0	Silt
2010-12	PDAH-PNM-2010-270710-003A	20	25	50	0	5	0	0	0	0	0	0	Silt
2010-13	PDAH-PNM-2010-290710-002B	5	80	15	0	0	0	0	0	0	0	0	Clay
2010-14	PDAH-PNM-2010-260710-002A	0	0	5	0	95	0	0	0	0	0	0	Gravel
2010-15	PDAH-PNM-2010-270710-001A	0	0	0	0	90	5	5	0	0	0	0	Gravel
2010-16	PDAH-PNM-2010-280710-001A	10	90	0	0	0	0	0	0	0	0	0	Clay
2010-17	PDAH-PNM-2010-280710-002A	20	50	30	0	0	0	0	0	0	0	0	Clay
2010-18	PDAH-PNM-2010-280710-003A	20	60	20	0	0	0	0	0	0	0	0	Clay
2010-19	PDAH-PNM-2010-290710-002A	5	90	5	0	0	0	0	0	0	0	0	Clay
2010-20	PDAH-PNM-2010-290710-001A	20	60	20	0	0	0	0	0	0	0	0	Clay
2010-21	PDAH-PNM-2010-270710-003B	10	80	10	0	0	0	0	0	0	0	0	Clay
2013-01	2013-PNM-LSCD-100713-001C	60	30	0	0	0	5	0	0	0	0	5	Organic
2013-02	2013-PNM-LSCD-100713-003C	60	0	40	0	0	0	0	0	0	0	0	Organic
2013-03	2013-PNM-LSCD-100713-004C	60	0	40	0	0	0	0	0	0	0	0	Organic
2013-04	2013-PNM-LSCD-110713-001C	10	10	80	0	0	0	0	0	0	0	0	Silt
2013-05	2013-PNM-LSCD-110713-002C	50	20	30	0	0	0	0	0	0	0	0	Organic
2013-06	2013-PNM-LSCD-110713-003C	70	5	15	10	0	0	0	0	0	0	0	Organic
2013-07	2013-PNM-LSCD-110713-004C	70	10	20	0	0	0	0	0	0	0	0	Organic
2013-08	2013-PNM-LSCD-070813-001A	30	0	50	10	5	5	0	0	0	0	0	Silt
2013-09	2013-PNM-LSCD-070813-002A	20	50	30	0	0	0	0	0	0	0	0	Clay
2013-10	2013-PNM-LSCD-070813-003A	10	80	10	0	0	0	0	0	0	0	0	Clay
2013-11	2013-PNM-LSCD-070813-004A	10	60	10	20	0	0	0	0	0	0	0	Clay
2013-12	2013-PNM-LSCD-090713-001A	0	85	0	5	10	0	0	0	0	0	0	Clay
2013-13	2013-PNM-LSCD-090713-003C	20	40	0	30	10	0	0	0	0	0	0	Clay
2013-14	2013-PNM-LSCD-090713-004C	0	80	0	0	10	10	0	0	0	0	0	Clay
2013-15	2013-PNM-LSCD-070813-005A	0	80	10	10	0	0	0	0	0	0	0	Clay
2013-16	2013-PNM-LSCD-070813-006A	25	0	0	50	15	10	0	0	0	0	0	Sand
2013-17	2013-PNM-LSCD-100713-001B	5	85	10	0	0	0	0	0	0	0	0	Clay
2013-18	2013-PNM-LSCD-100713-002B	80	15	5	0	0	0	0	0	0	0	0	Organic
2013-19	2013-PNM-LSCD-260913-001A	20	60	20	0	0	0	0	0	0	0	0	Clay
2013-20	2013-PNM-LSCD-260913-002A	10	90	0	0	0	0	0	0	0	0	0	Clay
2013-21	2013-PNM-LSCD-260913-003A	20	80	0	0	0	0	0	0	0	0	0	Clay
2013-22	2013-PNM-LSCD-090713-002A	0	0	50	50	0	0	0	0	0	0	0	Silt
2013-23	2013-PNM-LSCD-090713-003A	10	0	80	10	0	0	0	0	0	0	0	Silt
2013-24	2013-PNM-LSCD-090713-004A	10	0	10	80	0	0	0	0	0	0	0	Sand
2013-25	2013-PNM-LSCD-090713-005A	10	0	20	70	0	0	0	0	0	0	0	Sand
2013-26	2013-PNM-LSCD-090713-006A	10	40	40	10	0	0	0	0	0	0	0	Clay
2013-27	2013-PNM-LSCD-100713-001A	0	70	0	20	10	0	0	0	0	0	0	Clay
2013-28	2013-PNM-LSCD-100713-002A	10	0	70	20	0	0	0	0	0	0	0	Silt
2013-29	2013-PNM-LSCD-100713-003A	0	0	50	40	10	0	0	0	0	0	0	Silt
2013-30	2013-PNM-LSCD-100713-004A	60	0	30	10	0	0	0	0	0	0	0	Organic
2013-31	2013-PNM-LSCD-100713-005A	0	0	95	5	0	0	0	0	0	0	0	Silt
2013-32	2013-PNM-LSCD-100713-006A	0	10	90	0	0	0	0	0	0	0	0	Silt
2013-33	2013-PNM-LSCD-100713-007A	0	90	0	0	10	0	0	0	0	0	0	Clay
2013-34	2013-PNM-LSCD-110713-001B	20	80	0	0	0	0	0	0	0	0	0	Clay
2013-35	2013-PNM-LSCD-110713-002B	10	40	45	5	0	0	0	0	0	0	0	Silt
2013-36	2013-PNM-LSCD-110713-003B	15	5	80	0	0	0	0	0	0	0	0	Silt
2013-37	2013-PNM-LSCD-110713-004B	30	5	60	5	0	0	0	0	0	0	0	Silt
2013-38	2013-PNM-LSCD-110713-005B	5	5	15	75	0	0	0	0	0	0	0	Sand

Map label	Field number	Organic (%)	Clay (%)	Silt (%)	Sand (%)	Gravel (%)	Cobble (%)	Boulder (%)	Bedrock (%)	Hardpan (%)	Rubble (%)	Concrete (%)	Dominant substrate type
2013-39	2013-PNM-LSCD-250913-001A	15	55	20	10	0	0	0	0	0	0	0	Clay
2013-40	2013-PNM-LSCD-250913-002A	0	100	0	0	0	0	0	0	0	0	0	Clay
2013-41	2013-PNM-LSCD-250913-003A	0	90	10	0	0	0	0	0	0	0	0	Clay
2013-42	2013-PNM-LSCD-250913-004A	40	15	45	0	0	0	0	0	0	0	0	Silt
2013-43	2013-PNM-LSCD-090713-001B	10	70	20	0	0	0	0	0	0	0	0	Clay
2013-44	2013-PNM-LSCD-090713-002B	20	30	50	0	0	0	0	0	0	0	0	Silt
2013-45	2013-PNM-LSCD-090713-003B	20	40	40	0	0	0	0	0	0	0	0	Clay
2013-46	2013-PNM-LSCD-090713-004B	5	90	5	0	0	0	0	0	0	0	0	Clay
2013-47	2013-PNM-LSCD-090713-005B	20	0	70	10	0	0	0	0	0	0	0	Silt
2013-48	2013-PNM-LSCD-090713-005C	20	70	0	0	0	10	0	0	0	0	0	Clay
2013-49	2013-PNM-LSCD-110713-001A	15	0	70	15	0	0	0	0	0	0	0	Silt
2013-50	2013-PNM-LSCD-110713-002A	20	0	40	40	0	0	0	0	0	0	0	Silt
2013-51	2013-PNM-LSCD-110713-003A	20	80	0	0	0	0	0	0	0	0	0	Clay
2013-52	2013-PNM-LSCD-110713-004A	25	0	50	25	0	0	0	0	0	0	0	Silt
2013-53	2013-PNM-LSCD-110713-005A	25	25	50	0	0	0	0	0	0	0	0	Silt
2013-54	2013-PNM-LSCD-110713-006A	10	0	80	10	0	0	0	0	0	0	0	Silt
2013-55	2013-PNM-LSCD-090713-001C	20	60	0	0	5	15	0	0	0	0	0	Clay
2013-56	2013-PNM-LSCD-090713-002C	10	70	0	10	0	0	0	0	0	10	0	Clay
2013-57	2013-PNM-LSCD-100713-003B	0	100	0	0	0	0	0	0	0	0	0	Clay
2021-01	2021-EWOC-PNM-080921-001A	0	15	15	20	50	0	0	0	0	0	0	Gravel
2021-02	2021-EWOC-PNM-080921-002A	10	0	10	20	40	10	10	0	0	0	0	Gravel
2021-03	2021-EWOC-PNM-080921-003A	0	20	20	50	0	0	0	0	0	10	0	Sand
2021-04	2021-EWOC-PNM-080921-004A	0	0	20	20	0	0	10	0	0	0	50	Concrete
2021-05	2021-EWOC-PNM-080921-005A	10	0	10	30	50	0	0	0	0	0	0	Gravel
2021-06	2021-EWOC-PNM-080921-006A	25	0	50	25	0	0	0	0	0	0	0	Silt
2021-07	2021-EWOC-PNM-090921-005A	0	20	20	50	0	0	0	0	0	10	0	Sand
2021-08	2021-EWOC-PNM-090921-006A	25	25	50	0	0	0	0	0	0	0	0	Silt
2021-09	2021-EWOC-PNM-150921-001A	*	*	*	*	*	*	*	*	*	*	*	Unknown
2021-10	2021-EWOC-PNM-150921-002A	*	*	*	*	*	*	*	*	*	*	*	Unknown
2021-11	2021-EWOC-PNM-061021-002A	0	60	40	0	0	0	0	0	0	0	0	Clay
2021-12	2021-EWOC-PNM-061021-003A	0	50	50	0	0	0	0	0	0	0	0	Clay
2021-13	2021-EWOC-PNM-061021-004A	0	60	40	0	0	0	0	0	0	0	0	Clay
2021-14	2021-EWOC-PNM-061021-005A	0	60	40	0	0	0	0	0	0	0	0	Clay
2021-15	2021-EWOC-PNM-071021-001A	0	60	40	0	0	0	0	0	0	0	0	Clay
2021-16	2021-EWOC-PNM-071021-002A	20	40	40	0	0	0	0	0	0	0	0	Clay
2021-17	2021-EWOC-PNM-071021-003A	0	40	60	0	0	0	0	0	0	0	0	Silt
2021-18	2021-EWOC-PNM-090921-001A	10	40	20	20	0	10	0	0	0	0	0	Clay
2021-19	2021-EWOC-PNM-090921-002A	0	20	20	40	10	5	0	0	0	5	0	Sand
2021-20	2021-EWOC-PNM-090921-003A	10	10	10	40	10	20	0	0	0	0	0	Sand
2021-21	2021-EWOC-PNM-090921-004A	0	40	40	0	0	0	0	0	0	20	0	Silt
2021-22	2021-EWOC-PNM-061021-001A	0	50	50	0	0	0	0	0	0	0	0	Clay

Appendix 7. Physical characteristics – aquatic and riparian vegetation percent composition by type – of all sites sampled for Pugnose Minnow in 2010, 2013, and 2021. An asterisk (*) indicates a value not recorded in the field.

Map label	Field number	Emergent (%)	Floating (%)	Submerged (%)	Open water (%)	Dominant aquatic vegetation type	Aquatic macrophytes present (first listed is dominant)	Deciduous (%)	Coniferous (%)	Herbaceous (%)	Shrubs (%)	None (%)	Dominant riparian vegetation type
2010-01	PDAH-PNM-2010-270710-002A	5	0	0	95	Open water	*	10	0	90	0	0	Herbaceous
2010-02	PDAH-PNM-2010-270710-004B	0	0	60	40	Submerged	water celery	25	0	75	0	0	Herbaceous
2010-03	PDAH-PNM-2010-270710-005B	0	0	5	95	Open water	*	50	0	50	0	0	Herbaceous
2010-04	PDAH-PNM-2010-280710-001B	*	*	*	*	*	*	*	*	*	*	*	*
2010-05	PDAH-PNM-2010-280710-002B	0	0	10	90	Open water	coontail	20	0	80	0	0	Herbaceous
2010-06	PDAH-PNM-2010-280710-003B	0	0	40	60	Open water	coontail	60	0	40	0	0	Deciduous
2010-07	PDAH-PNM-2010-270710-004A	0	0	0	100	Open water	*	40	0	60	0	0	Herbaceous
2010-08	PDAH-PNM-2010-260710-001A	0	20	50	30	Submerged	*	5	0	95	0	0	Herbaceous
2010-09	PDAH-PNM-2010-290710-001B	0	95	0	5	Floating	coontail, duckweed sp.	75	0	25	0	0	Deciduous
2010-10	PDAH-PNM-2010-030810-001A	0	0	75	25	Submerged	water celery	45	0	55	0	0	Herbaceous
2010-11	PDAH-PNM-2010-030810-002A	0	20	50	30	Submerged	*	5	0	95	0	0	Herbaceous
2010-12	PDAH-PNM-2010-270710-003A	0	10	30	60	Open water	milfoil sp.	0	0	100	0	0	Herbaceous
2010-13	PDAH-PNM-2010-290710-002B	75	0	0	25	Emergent	white water lily, coontail	0	0	100	0	0	Herbaceous
2010-14	PDAH-PNM-2010-260710-002A	20	0	0	80	Open water	*	5	0	95	0	0	Herbaceous
2010-15	PDAH-PNM-2010-270710-001A	0	0	0	100	Open water	*	20	0	80	0	0	Herbaceous
2010-16	PDAH-PNM-2010-280710-001A	0	15	15	70	Open water	pondweed sp.	70	0	30	0	0	Deciduous
2010-17	PDAH-PNM-2010-280710-002A	5	75	20	0	Floating	algae, coontail	20	0	80	0	0	Herbaceous
2010-18	PDAH-PNM-2010-280710-003A	40	0	0	60	Open water	pondweed sp., algae	10	0	90	0	0	Herbaceous
2010-19	PDAH-PNM-2010-290710-002A	0	0	10	90	Open water	pondweed sp.	100	0	0	0	0	Deciduous
2010-20	PDAH-PNM-2010-290710-001A	0	10	10	80	Open water	coontail, pondweed sp.	80	0	20	0	0	Deciduous
2010-21	PDAH-PNM-2010-270710-003B	0	50	50	0	Floating	white water lily, duckweed sp., coontail, slender pondweed	0	0	100	0	0	Herbaceous
2013-01	2013-PNM-LSCD-100713-001C	5	0	80	15	Submerged	pondweed sp.	5	0	90	5	0	Herbaceous
2013-02	2013-PNM-LSCD-100713-003C	15	5	30	50	Open water	*	10	0	90	0	0	Herbaceous
2013-03	2013-PNM-LSCD-100713-004C	10	0	25	65	Open water	sedge	10	15	60	15	0	Herbaceous
2013-04	2013-PNM-LSCD-110713-001C	10	0	60	30	Submerged	*	0	0	100	0	0	Herbaceous
2013-05	2013-PNM-LSCD-110713-002C	20	0	80	0	Submerged	*	40	0	30	30	0	Deciduous
2013-06	2013-PNM-LSCD-110713-003C	0	20	80	0	Submerged	*	50	0	20	30	0	Deciduous
2013-07	2013-PNM-LSCD-110713-004C	40	0	60	0	Submerged	*	0	0	90	10	0	Herbaceous
2013-08	2013-PNM-LSCD-070813-001A	0	0	100	0	Submerged	pondweed sp.	30	0	70	0	0	Herbaceous
2013-09	2013-PNM-LSCD-070813-002A	0	10	40	50	Open water	coontail	0	0	90	10	0	Herbaceous
2013-10	2013-PNM-LSCD-070813-003A	0	0	40	60	Open water	pondweed sp.	0	0	100	0	0	Herbaceous
2013-11	2013-PNM-LSCD-070813-004A	10	0	80	10	Submerged	pondweed sp.	15	0	85	0	0	Herbaceous
2013-12	2013-PNM-LSCD-090713-001A	30	0	70	0	Submerged	coontail, milfoil sp., Canada waterweed	0	0	100	0	0	Herbaceous
2013-13	2013-PNM-LSCD-090713-003C	10	0	0	90	Open water	*	30	0	30	40	0	Shrubs
2013-14	2013-PNM-LSCD-090713-004C	0	0	0	100	Open water	*	40	0	50	10	0	Herbaceous
2013-15	2013-PNM-LSCD-070813-005A	0	0	0	100	Open water	*	80	0	20	0	0	Deciduous
2013-16	2013-PNM-LSCD-070813-006A	5	0	0	95	Open water	*	5	0	95	0	0	Herbaceous
2013-17	2013-PNM-LSCD-100713-001B	0	0	40	60	Open water	*	40	0	60	0	0	Herbaceous

Map label	Field number	Emergent (%)	Floating (%)	Submerged (%)	Open water (%)	Dominant aquatic vegetation type	Aquatic macrophytes present (first listed is dominant)	Deciduous (%)	Coniferous (%)	Herbaceous (%)	Shrubs (%)	None (%)	Dominant riparian vegetation type
2013-18	2013-PNM-LSCD-100713-002B	0	0	0	100	Open water	*	40	0	30	30	0	Deciduous
2013-19	2013-PNM-LSCD-260913-001A	0	20	40	40	Open water	coontail, duckweed sp.	5	0	95	0	0	Herbaceous
2013-20	2013-PNM-LSCD-260913-002A	0	10	15	75	Open water	coontail, duckweed sp., pondweed sp.	40	0	60	0	0	Herbaceous
2013-21	2013-PNM-LSCD-260913-003A	0	5	30	65	Open water	coontail, duckweed sp.	40	0	60	0	0	Herbaceous
2013-22	2013-PNM-LSCD-090713-002A	0	0	100	0	Submerged	*	10	0	90	0	0	Herbaceous
2013-23	2013-PNM-LSCD-090713-003A	0	0	100	0	Submerged	*	15	0	85	0	0	Herbaceous
2013-24	2013-PNM-LSCD-090713-004A	0	0	100	0	Submerged	*	10	0	80	10	0	Herbaceous
2013-25	2013-PNM-LSCD-090713-005A	0	0	100	0	Submerged	*	20	0	80	0	0	Herbaceous
2013-26	2013-PNM-LSCD-090713-006A	10	0	90	0	Submerged	milfoil sp.	70	0	20	10	0	Deciduous
2013-27	2013-PNM-LSCD-100713-001A	30	0	70	0	Submerged	*	40	0	60	0	0	Herbaceous
2013-28	2013-PNM-LSCD-100713-002A	10	0	90	0	Submerged	*	10	0	90	0	0	Herbaceous
2013-29	2013-PNM-LSCD-100713-003A	0	0	100	0	Submerged	*	5	0	95	0	0	Herbaceous
2013-30	2013-PNM-LSCD-100713-004A	20	0	80	0	Submerged	common reed	0	0	100	0	0	Herbaceous
2013-31	2013-PNM-LSCD-100713-005A	15	0	85	0	Submerged	*	5	0	95	0	0	Herbaceous
2013-32	2013-PNM-LSCD-100713-006A	10	10	80	0	Submerged	common reed	0	0	100	0	0	Herbaceous
2013-33	2013-PNM-LSCD-100713-007A	10	10	80	0	Submerged	*	30	0	70	0	0	Herbaceous
2013-34	2013-PNM-LSCD-110713-001B	5	0	5	90	Open water	coontail, grasses, common reed	5	0	95	0	0	Herbaceous
2013-35	2013-PNM-LSCD-110713-002B	10	0	5	85	Open water	grasses	5	0	90	5	0	Herbaceous
2013-36	2013-PNM-LSCD-110713-003B	0	0	80	20	Submerged	coontail	85	5	10	0	0	Deciduous
2013-37	2013-PNM-LSCD-110713-004B	10	0	30	60	Open water	coontail	10	0	80	10	0	Herbaceous
2013-38	2013-PNM-LSCD-110713-005B	5	0	80	15	Submerged	coontail	5	0	85	10	0	Herbaceous
2013-39	2013-PNM-LSCD-250913-001A	0	5	85	10	Submerged	coontail, duckweed sp.	50	0	50	0	0	Herbaceous
2013-40	2013-PNM-LSCD-250913-002A	0	10	65	25	Submerged	coontail, duckweed sp.	70	0	30	0	0	Deciduous
2013-41	2013-PNM-LSCD-250913-003A	0	15	10	75	Open water	coontail, duckweed sp.	75	0	25	0	0	Deciduous
2013-42	2013-PNM-LSCD-250913-004A	0	25	20	55	Open water	coontail, duckweed sp., pondweed sp.	70	0	30	0	0	Deciduous
2013-43	2013-PNM-LSCD-090713-001B	0	0	5	95	Open water	*	0	0	100	0	0	Herbaceous
2013-44	2013-PNM-LSCD-090713-002B	0	5	5	90	Open water	duckweed sp.	0	0	80	20	0	Herbaceous
2013-45	2013-PNM-LSCD-090713-003B	0	0	0	100	Open water	*	5	0	95	0	0	Herbaceous
2013-46	2013-PNM-LSCD-090713-004B	5	5	70	20	Submerged	white water lily	0	0	100	0	0	Herbaceous
2013-47	2013-PNM-LSCD-090713-005B	10	20	50	20	Submerged	duckweed sp., white water lily	5	0	90	5	0	Herbaceous
2013-48	2013-PNM-LSCD-090713-005C	5	0	0	95	Open water	*	80	0	10	10	0	Deciduous
2013-49	2013-PNM-LSCD-110713-001A	15	0	0	85	Open water	*	60	0	40	0	0	Deciduous
2013-50	2013-PNM-LSCD-110713-002A	15	30	0	55	Open water	pondweed sp.	60	0	40	0	0	Deciduous
2013-51	2013-PNM-LSCD-110713-003A	10	0	0	90	Open water	*	45	5	50	0	0	Herbaceous
2013-52	2013-PNM-LSCD-110713-004A	20	10	0	70	Open water	*	20	30	50	0	0	Herbaceous
2013-53	2013-PNM-LSCD-110713-005A	15	0	0	85	Open water	*	0	0	100	0	0	Herbaceous
2013-54	2013-PNM-LSCD-110713-006A	10	0	10	80	Open water	coontail	0	0	100	0	0	Herbaceous
2013-55	2013-PNM-LSCD-090713-001C	10	0	0	90	Open water	*	65	0	20	10	5	Deciduous
2013-56	2013-PNM-LSCD-090713-002C	5	0	0	95	Open water	common reed	40	0	50	0	10	Herbaceous
2013-57	2013-PNM-LSCD-100713-003B	0	0	0	100	Open water	*	20	0	70	10	0	Herbaceous
2021-01	2021-EWOC-PNM-080921-001A	10	0	5	85	Open water	*	0	0	90	0	10	Herbaceous
2021-02	2021-EWOC-PNM-080921-002A	5	0	0	95	Open water	*	60	0	35	0	5	Deciduous
2021-03	2021-EWOC-PNM-080921-003A	5	0	0	95	Open water	*	0	0	10	0	90	None

Map label	Field number	Emergent (%)	Floating (%)	Submerged (%)	Open water (%)	Dominant aquatic vegetation type	Aquatic macrophytes present (first listed is dominant)	Deciduous (%)	Coniferous (%)	Herbaceous (%)	Shrubs (%)	None (%)	Dominant riparian vegetation type
2021-04	2021-EWOC-PNM-080921-004A	0	0	0	100	Open water	*	0	0	10	0	90	None
2021-05	2021-EWOC-PNM-080921-005A	5	0	5	90	Open water	*	80	0	20	0	0	Deciduous
2021-06	2021-EWOC-PNM-080921-006A	5	0	5	90	Open water	*	50	0	40	0	10	Deciduous
2021-07	2021-EWOC-PNM-090921-005A	0	0	0	100	Open water	*	60	0	20	0	20	Deciduous
2021-08	2021-EWOC-PNM-090921-006A	5	0	0	95	Open water	grasses	60	0	40	0	0	Deciduous
2021-09	2021-EWOC-PNM-150921-001A	5	45	0	50	Open water	duckweed sp., common reed	0	0	85	15	0	Herbaceous
2021-10	2021-EWOC-PNM-150921-002A	5	80	0	15	Floating	duckweed sp., common reed	0	0	100	0	0	Herbaceous
2021-11	2021-EWOC-PNM-061021-002A	10	0	5	85	Open water	*	30	0	40	30	0	Herbaceous
2021-12	2021-EWOC-PNM-061021-003A	0	0	0	100	Open water	*	0	0	60	40	0	Herbaceous
2021-13	2021-EWOC-PNM-061021-004A	5	5	0	90	Open water	common reed, duckweed sp.	10	10	80	0	0	Herbaceous
2021-14	2021-EWOC-PNM-061021-005A	10	5	5	80	Open water	common reed, duckweed sp., coontail	0	20	80	0	0	Herbaceous
2021-15	2021-EWOC-PNM-071021-001A	0	10	0	90	Open water	duckweed sp., common reed	15	0	85	0	0	Herbaceous
2021-16	2021-EWOC-PNM-071021-002A	5	10	20	65	Open water	coontail, duckweed sp., common reed	0	0	100	0	0	Herbaceous
2021-17	2021-EWOC-PNM-071021-003A	10	10	50	30	Submerged	coontail, duckweed sp., common reed	0	0	100	0	0	Herbaceous
2021-18	2021-EWOC-PNM-090921-001A	10	0	0	90	Open water	*	0	0	100	0	0	Herbaceous
2021-19	2021-EWOC-PNM-090921-002A	20	0	0	80	Open water	arrowhead sp., burreed, grasses	5	0	95	0	0	Herbaceous
2021-20	2021-EWOC-PNM-090921-003A	20	0	0	80	Open water	grasses	10	0	90	0	0	Herbaceous
2021-21	2021-EWOC-PNM-090921-004A	5	5	0	90	Open water	grasses, duckweed sp.	5	0	95	0	0	Herbaceous
2021-22	2021-EWOC-PNM-061021-001A	5	0	0	95	Open water	grasses	30	0	70	0	0	Herbaceous