Targeted surveys for Channel Darter and Round Goby along the Trent and Moira rivers 2001, 2009-2019

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Canadian Data Report of
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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.

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The spread of the invasive Round Goby (*Neogobius melanostomus*) was assessed as a significant threat to those populations of Channel Darter (*Percina copelandi*) identified by the Committee on the Status of Endangered Wildlife in Canada as the Lake Ontario designatable unit. However, expert-based threat assessments require validation through field research and monitoring. Between 2001 and 2019, electrofishing surveys to detect and monitor the two species were undertaken along two Lake Ontario tributaries: the Trent River (15 sites) and Moira River (17 sites). A total of 1,280 Channel Darter and 3,104 Round Goby were captured from the Trent River across all sample events between 2001 and 2018. Round Goby co-occurred with Channel Darter at 7 sites. Four Channel Darter and six Round Goby were captured from the Moira River in 2019. Round Goby was only detected below the first dam in Belleville; Channel Darter was not detected at this site. In the summer of 2019, angling surveys were undertaken on Moira (25 sites) and Stoco (22 sites) lakes - potential baitfish introduction sites. Round Goby was not detected in either lake.

RÉSUMÉ

LeBaron, A., and Reid, S.M. 2021. Targeted surveys for Channel Darter and Round Goby along the Trent and Moira rivers 2001, 2009-2019. Can. Data Rep. Fish. Aquat. Sci. 1332: vii + 49 p.

Selon les évaluations, la propagation du gobie à taches noires (*Neogobius melanostomus*), une espèce envahissante, représente une menace importante pour les populations de fouille-roches gris (*Percina copelandi*) désignées par le Comité sur la situation des espèces en péril au Canada comme appartenant à l'unité désignable du lac Ontario. Cependant, les évaluations des menaces réalisées par des experts doivent être validées au moyen d'activités de recherche et de suivi sur le terrain. Entre 2001 et 2019, on a mené des relevés de pêche à l'électricité visant à détecter et à suivre les deux espèces susmentionnées dans deux affluents du lac Ontario, soit les rivières Trent (15 sites) et Moira (17 sites). Dans le cadre de toutes les activités d'échantillonnage menées entre 2001 et 2018 dans la rivière Trent, on a capturé 1 280 fouille-roches gris et 3 104 gobies à taches noires. On a observé la cohabitation du gobie à taches noires et du fouille-roche gris à sept sites. En 2019, on a capturé quatre fouille-roches gris et six gobies à taches noires dans la rivière Moira. On a seulement détecté le gobie à taches noires en aval du premier barrage près de Belleville, et aucun fouille-roche gris n'a été détecté à ce site. Pendant l'été 2019, on a mené des relevés de pêche à la ligne dans les lacs Moira (25 sites) et Stoco (22 sites), soit des sites possibles d'introduction de poissons-appâts. Aucun gobie à taches noires n'a été détecté dans ces lacs.

INTRODUCTION

The Channel Darter (*Percina copelandi*) is a small, elongate, benthic fish found in both rivers and lakes, typically in areas with moderate water flow and coarse substrate [Committee on the Status of Endangered Wildlife in Canada (COSEWIC) 2016]. The species has a widespread but extremely disjunct distribution across North America, occurring west of the Appalachian Mountains from Louisiana north through 15 American states, and into Ontario and Quebec [Fisheries and Oceans Canada (DFO) 2013]. In Ontario, populations are split into three designatable units (DU) as defined by COSEWIC (2016): Lake Erie populations (DU1), Lake Ontario populations (DU2), and St. Lawrence populations (DU3). Lake Erie and Lake Ontario populations were assessed by COSEWIC as *Endangered* in 2016; St. Lawrence populations were designated as *Special Concern*. New populations were discovered in Ontario and Quebec during surveys conducted from 2001 to 2009, but this finding can most likely be attributed to increased sampling effort, rather than range expansion (DFO 2013).

In Canada, Channel Darter is threatened by habitat loss and degradation (e.g., shoreline modifications, altered flow regimes, barriers to movement, turbidity and sediment loading, contaminants and toxic substances), the introduction of invasive species and diseases, and possibly baitfish harvesting (DFO 2013). The most significant threat to Channel Darter is the invasive Round Goby (*Neogobius melanostomus*). This invasive species competes with Channel Darter for space and resources (Phelps and Francis 2002) and may also prey on Channel Darter eggs [Corkum et al. 2004; Committee on the Status of Species at Risk in Ontario (COSSARO) 2017]. Since its introduction into the lower Great Lakes, Round Goby has been implicated in the declines of native benthic fishes (Baker 2005; Thomas and Haas 2004). For imperiled darters, the adverse population impacts due to Round Goby have been assessed as high, however; these assessments require validation through field research and monitoring (DFO 2011; COSEWIC 2016).

While changes to the composition of Great Lakes fishes have been investigated (e.g. Reid and Mandrak 2008), impacts to native fishes in Great Lakes tributaries are not well documented. In 2001, and from 2009 to 2018, the Ontario Ministry of Natural Resources and Forestry undertook monitoring-based research along the Trent River, where extant populations of Channel Darter persist and Round Goby is known to be well-established (COSEWIC 2016). The objective of this research is to characterize changes over time in the composition of native benthic fishes, with special consideration for the Channel Darter. The distribution of Round Goby in the neighboring Moira River is unknown, as is the potential effect of numerous barriers (dams and waterfalls) to restrict upstream colonization from the Bay of Quinte or spread from potential bait-fish introduction sites (e.g. Moira and Stoco lakes). In 2019, electrofishing surveys were undertaken along the Moira River, as well as additional angling surveys to detect Round Goby in Moira and Stoco lakes. Updated inventory information on the distribution of Round Goby and Channel Darter will inform future invasion risk and species status assessments.

DFO data reports are published to support the Species at Risk Program by providing an overview of field activities and to provide a medium for archiving data associated with the sampling of SARA-listed species and their habitat. This report presents data collected during monitoring-based research undertaken along the Trent and Moira rivers, and on Moira and Stoco lakes. Field sampling was done in support of the following research and monitoring actions identified in the *Federal Recovery Strategy for the Channel Darter in Canada* (2013):

- Complete targeted surveys using gear types proven effective at detecting Channel Darter at historical and extant locations, and;

- Investigate potential threats to Channel Darter, such as invasive species (e.g. competition, predation).

METHODS

Sampling locations for this study were informed by recent and historical Channel Darter capture locations and critical habitat descriptions.

TRENT RIVER

Summer Sampling

In 2001, a single-pass backpack electrofishing survey for Channel Darter was done along an 80 km reach of the lower Trent River between Healey Falls (north of Campbellford) and Trenton (Reid 2006). Fishes were collected from 14 wadeable sites that were either historical Channel Darter collection sites or assessed as providing potential suitable habitat conditions. Sites sampled were shoal-type habitats in the tailwaters of dams, consisting of coarse bed material (gravel, cobble, boulder and bedrock) and fast-flowing waters. Between 2009 and 2018, annual summer sampling was carried out at the same 14 sites (Figure 1), plus an additional site (T05). In 2012, site T05 was not sampled (reason unknown); in 2017, T14 was not sampled due to high water levels, and in 2018, T03 was not sampled (reason unknown). Fish collection data from 2001 provides a pre-Round Goby invasion baseline for comparison.

Sampling was carried out using a Smith-Root model 12-B backpack electrofishing unit (pulsed DC settings: 300 – 400 V, 50 – 60 Hz, 4 – 6 ms) and one or two netters. Sampling effort (electrofishing seconds) varied among sites (range: 489 – 2282 s), but effort at each site was consistent across sample years. Variation in sampling effort was due to among-site differences in wadeable habitat area. This single-pass approach differed from other river electrofishing protocols based on a fixed number of point samples, sampling fixed reach lengths, or variable reach lengths defined by the mean wetted channel width. Based on the large amount of non-wadeable habitat and the discontinuous and variable amount of wadeable habitat along the Trent River, a flexible sampling design was assessed to be more practical than reach length-based approaches. Based on Reid and Haxton (2017), detection probabilities (p) are expected to be > 0.6 for Channel Darter, and > 0.8 for Round Goby.

All fishes, when captured, were immediately transferred from nets into a bucket of clean water. Additional buckets were used if necessary to prevent overcrowding. During processing, fishes were sorted into multiple buckets or tubs and water was periodically refreshed. Fishes were identified to species, enumerated, measured for total length then released. Channel Darter were processed before other species.

Habitat was assessed following fish sampling and processing. Channel widths were measured using a tape measure or range finder: mean channel width of sample sites was 25.8 m (range: 4 – 122 m). Water quality parameters were measured using a handheld meter: mean summer water temperature and conductivity were 24.2 °C (range: 19.5 – 28.2 °C) and 238 µS/cm (range: 107 – 440 µS/cm), respectively. Site details and habitat characteristics are provided in Appendix 1.

Spring and Fall Sampling at Sonoco Generating Station (T04)

In addition to summer sampling, the same methods were used to conduct annual (except for 2015) spring and fall sampling at a shoal downstream of the Sonoco Generating Station (T04). In 2002 and 2003, a study of seasonal patterns in Channel Darter micro-habitat use was done at the shoal (Reid 2006). Additionally, electrofishing monitoring data was collected using the same method from 2004 to 2008 (George Coker, unpublished data). Spring and fall sampling were done in 2015; however, field sheets were lost before data entry and results cannot be presented. Channel Darter collection data prior to the first Round Goby detection at this site (2008) provides a pre-invasion baseline for comparison.

During spring and fall sampling American Eel (*Anguilla rostrate*), Round Goby, and darter species were targeted for capture: other species were either not netted, released upon capture, or inconsistently targeted.

Mean water temperature and conductivity were 21.8 °C and 269 µS/cm respectively during spring electrofishing, and 17.6 °C and 227 µS/cm in the fall.

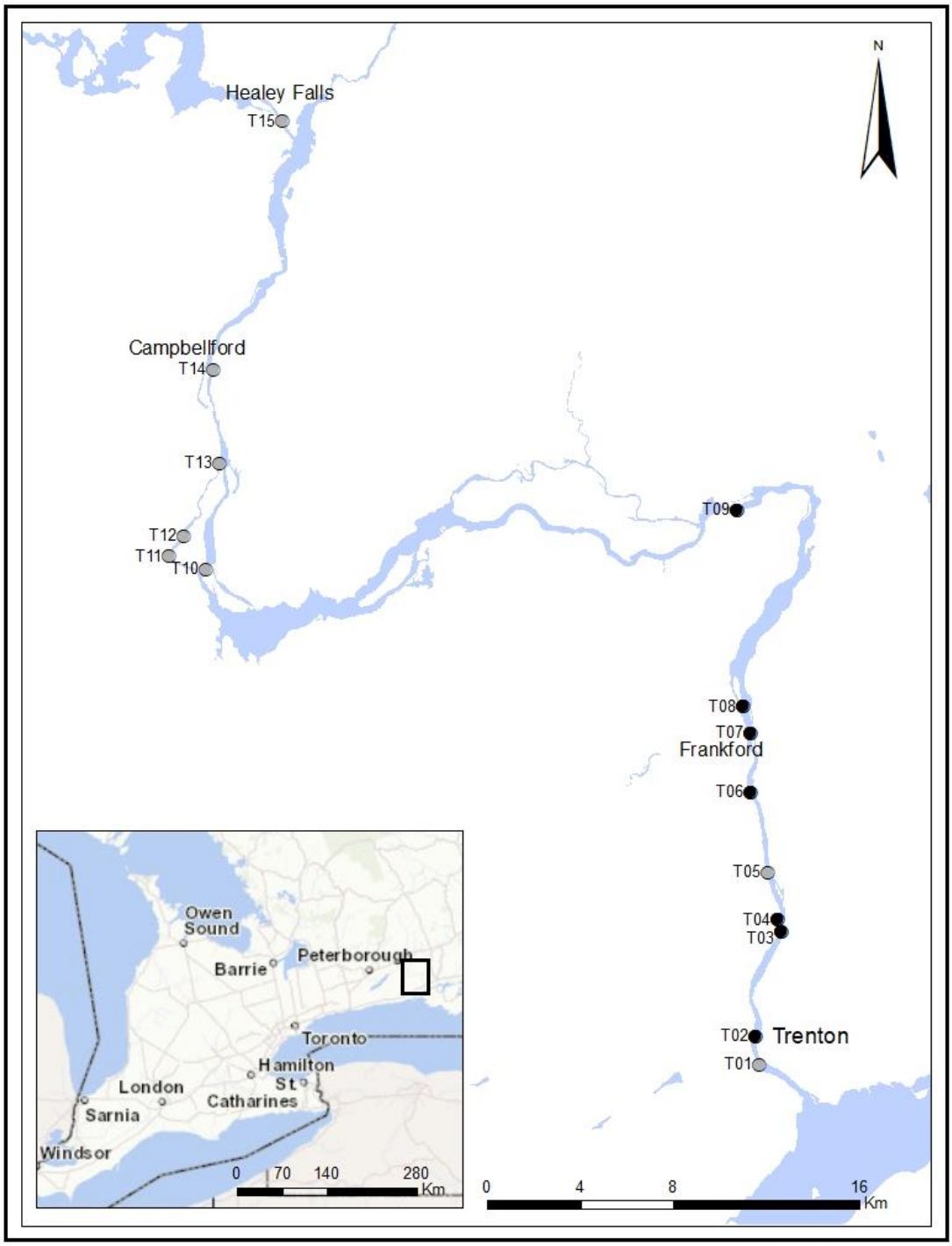

Figure 1. Map of 15 Trent River Channel Darter monitoring sites sampled using a single-pass backpack electrofishing method in 2001 and 2009-2018. Black circle = monitoring site where Channel Darter was detected; grey circle = monitoring site where Channel Darter was not detected.

MOIRA RIVER

In 2019, seventeen wadeable sites along the Moira River were sampled during summer low flow conditions. Sites were located between Moira Lake and the Bay of Quinte (Figure 2) in habitats comparable to the Trent River sites based on visual observation (substrate data was not collected). Mean channel width, water temperature, and conductivity, collected using the same methods as above, were 48.7 m (range: 20 – 87 m), 20.7 °C (range: 16.0 – 23.1 °C), and 247.7 µS/cm (range: 103 – 311 µS/cm), respectively. Site details are provided in Appendix 2.

A transect-based electrofishing strategy was used to collect American Eel, Round Goby, Channel Darter, and other darter species (Reid 2011). Sampling was done with a Smith-Root model 12-B backpack electrofishing unit (pulsed DC settings: 300 – 400 V, 50 – 60 Hz, 4 – 6 ms) and one or two netters. At each site, 40 transects (each 10 x 1 m) were sampled. Transects were placed in a series along the length of the river parallel to the shoreline and separated by 2 m widths across the channel. The standard configuration is presented in Figure 3, though variations were used depending on availability of wadeable habitat. Mean sampling effort along each 10 m transect was 61 seconds (standard deviation: 11.8 s). The number of each species captured from each transect was recorded and fishes were held in buckets of clean water until processing. Once sampling was complete, total length was measured and fishes were released into the river.

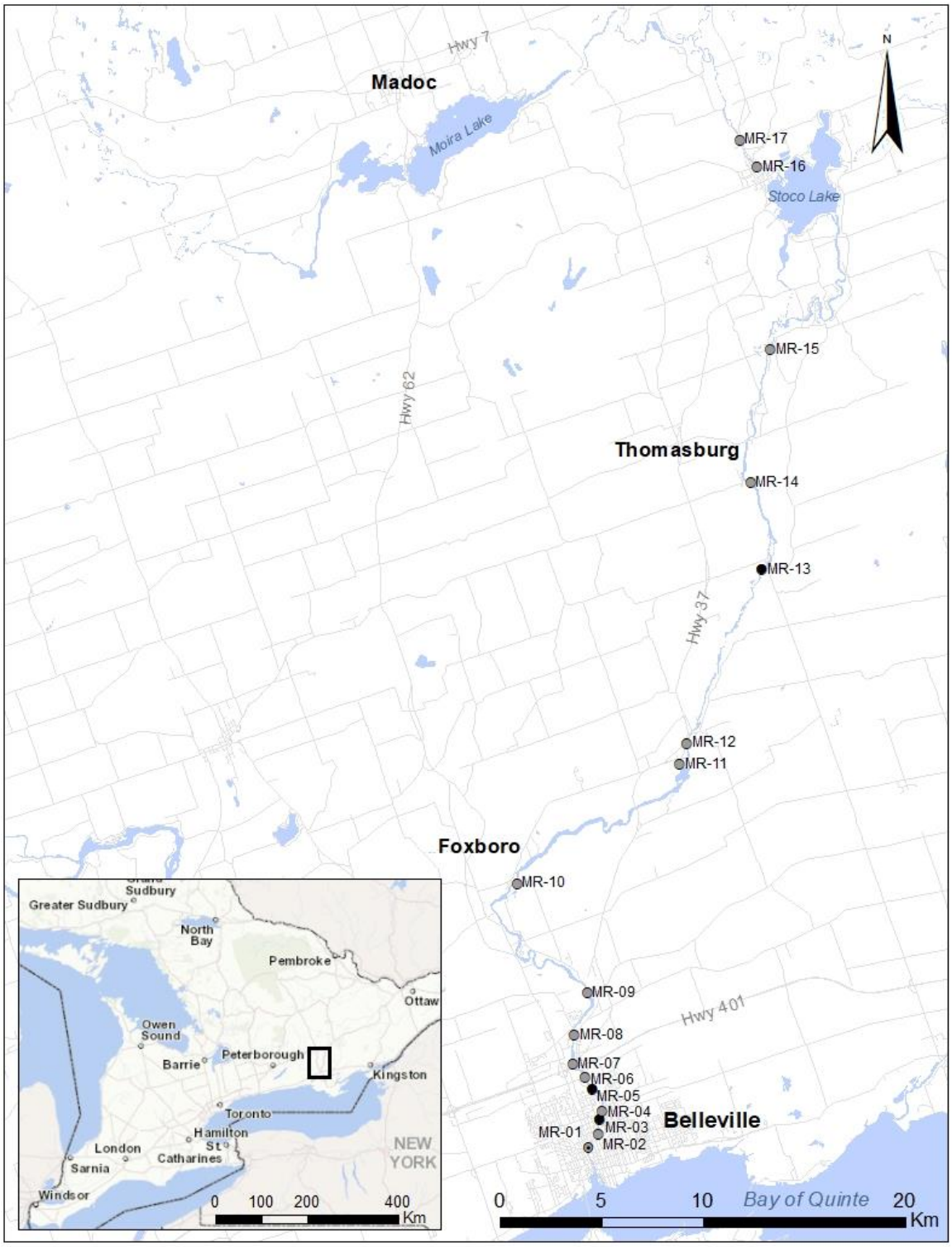

Figure 2. Map of 17 sites sampled along the Moira River in 2019 using a single-pass backpack electrofishing method. Black circle = monitoring site where Channel Darter was detected; grey circle with black dot = monitoring site where Round Goby was detected; grey circle = monitoring site where neither Channel Darter nor Round Goby were detected.

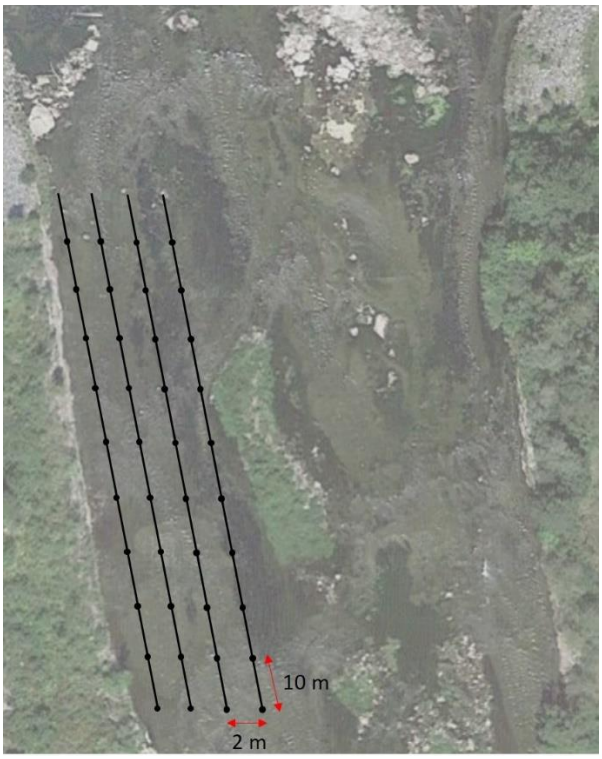

Figure 3. Schematic diagram of transect-based electrofishing sampling design: 40 transects of 10x1 m each were placed in a series along the length of the river running parallel to the shoreline, separated by 2 m widths across the channel. Configuration varied depending on sampleable habitat. Points represent the start of a transect. Image is not to scale.

MOIRA AND STOCO LAKES

In the summer of 2019, angling surveys for Round Goby following methods described by Gutowsky et al. (2011) were done at Moira Lake (25 sites) and Stoco Lake (22 sites) near Madoc, Ontario (Figure 4). Prior to sampling, a list of potential sampling sites was generated using the Create Random Points tool in ArcMap 10.3.1 and an online random number generator. Initially, only randomly selected sites were visited. However, after the first day of sampling, a targeted approach was used. Because of the widespread coverage of dense aquatic macrophytes, angling focused on sites with habitat more suitable for Round Goby, specifically more cobble, gravel and sand substrates and lower aquatic macrophyte coverage [Ontario Ministry of Natural Resources (OMNR) 2010].

Angling was done from a 16-foot jon boat by two individuals using ultra light-weight spinning rods, 0.15 mm zero-stretch fishing line with a single size-4 split-shot sinker, and #20 fly fishing hooks baited with a small portion of scented plastic maggot (white). The boat was anchored from bow and stern to prevent shifting. Angling was done in a 1.5 m^2 area delineated by a foam quadrat fixed to the side of the boat (Figure 5). There was a 5 minute waiting period after anchoring to mitigate disturbance, followed by four consecutive 5 minute periods of angling. Captured fishes were kept in a bucket of water (a separate bucket was used for each 5 minute period) and processed after 20 minutes of angling. Individuals were identified to species and measured for total length before release.

Water depth, water temperature, substrate and aquatic macrophyte cover was measured at each angling site. Water depth and temperature were obtained using a Humminbird® FishFinder 565. Substrate was sampled using a Wildco® Petite Ponar™ benthic grab (15 cm x

15 cm) as shown in Figure 6. Percent composition of each sample was assessed visually (based on size) and by texture (for clay and organics). Bed material size categories were as follows: clay (< 0.002 mm), silt (0.002 – 0.05 mm), sand (0.5 – 2 cm), gravel (0.2 – 8 cm), cobble (8 – 25 cm), rubble (25 – 60 cm), and boulder (> 60 mm). Percent aquatic macrophyte cover (open water, emergent, submergent and floating vegetation) was visually assessed at each site. Site details and habitat characteristics can be found in Appendix 3.

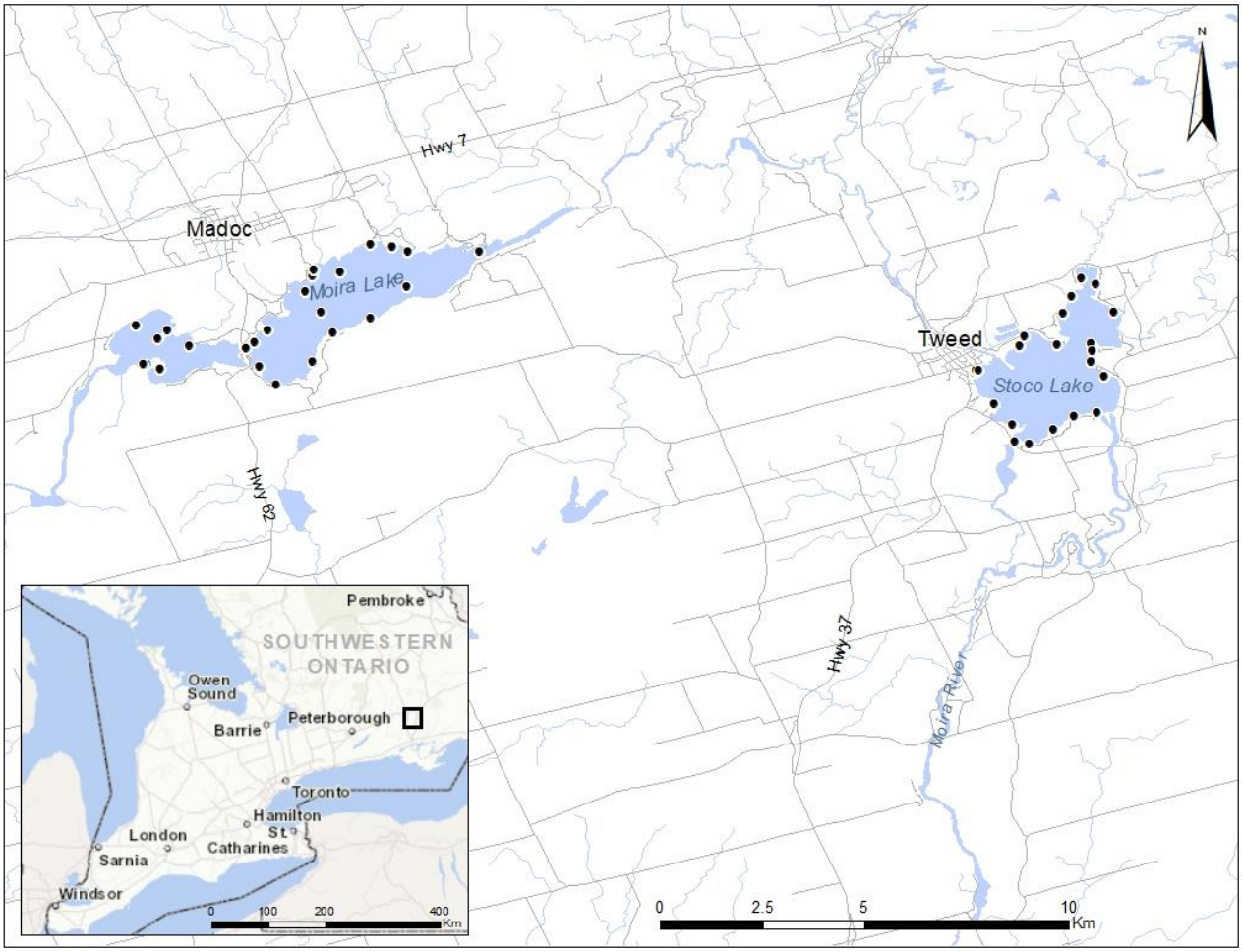

Figure 4. Map of targeted Round Goby sampling sites on Moira Lake (n = 25) and Stoco Lake (n = 22) completed in 2019. Fishes were collected using an angling-based method.

Figure 5. Samplers angling within foam quadrat fixed to the side of a boat.

Figure 6. Deploying the Petite Ponar™ benthic grab to collect substrate samples.

RESULTS

Common and Scientific names for all species captured are provided in Appendix 4. Photos of common and at-risk fishes are provided in Appendix 5.

TRENT RIVER

Summer Sampling

A total of 40 species were collected from the Trent River (Table 1). Species richness ranged from 2 – 14 species per site (mean: 7). Across the years sampled, the total number of species detected along the Trent River was similar (21 – 25) with species richness highest in 2009 and 2013. The number of individuals captured was more variable than species richness, with 2017 yearly total catch less than half of yearly total catch in each of 2010, 2011, and 2016 (Table 2).

Smallmouth Bass (*Micropterus dolomieu*), Round Goby, and Logperch (*Percina caprodes*) were the most abundant species, representing 28%, 16%, and 15% of the total catch, respectively. The most widespread species were Logperch, Rock Bass (*Ambloplites rupestris*), Round Goby, and Smallmouth Bass. All four species were detected at least once from each site between 2001 and 2018 (Table 1). Species count data is provided in Appendix 6.

Three fish species at risk were detected: American Eel, Channel Darter, and Northern Sunfish (*Lepomis peltastes*). A total of 772 Channel Darter were captured from seven sites: T02 – T04 and T06 – T09. The number of sites where Channel Darter was detected each year ranged from 4 – 6. The number of Channel Darter captured per sampling visit ranged from 1 – 95 individuals (mean: 16). Total lengths ranged from 37 – 69 mm (mean TL: 56 mm) as shown in Figure 7. Over the years sampled, Channel Darter represented 1.9 – 11.4% of all fishes collected from the Trent River. The highest numbers of Channel Darter were collected during the years 2009 to 2011, and 2015 (Table 3). Conversely, the lowest capture rates occurred during four of the last five years of sampling (2014, 2016 – 2018).

With respect to the American Eel, 221 were collected from four sites. American Eel total lengths ranged from 133 – 700 mm (mean TL: 270 mm). Two Northern Sunfish (104 and 163 mm TL) were collected from one site. Although known to occur in the Trent River, Lake Sturgeon (*Acipenser fulvescens*), Pugnose Shiner (*Notropis anogenus*), and River Redhorse (*Moxostoma carinatum*) were not detected.

A total of 2,403 Round Goby were captured. The number of individuals captured per sample event ranged from 1 – 115 (mean: 19). Lengths ranged from 20 to 166 mm with a mean of 72 mm (Figure 8). The number of sites where Round Goby was detected each year ranged from 9 – 15. Round Goby co-occurred with Channel Darter at seven sites, and was captured along with Channel Darter during 89% of those sampling events. Over the years sampled, Round Goby represented 11.1 – 29.6% of all fishes collected. The highest total detections of Round Goby were during the years 2010, 2012, 2015 and 2016 (Table 3).

Table 1. Frequency of occurrence (FO) and relative abundance (RA) of fishes captured from 15 Trent River sites between 2001 and 2018.

Species	FO (%)	Total # sites	RA (%)	Total # individuals
American Eel	26.7	4	1.50	221
Banded Killifish	20.0	3	0.03	5
Black Crappie	6.7	1	0.01	1
Blacknose Dace	13.3	2	0.01	2
Bluegill	93.3	14	1.49	220
Bluntnose Minnow	66.7	10	0.77	114
Brook Silverside	40.0	6	0.32	47
Brown Bullhead	40.0	6	0.11	16
Central Mudminnow	6.7	1	0.01	1
Central Stoneroller	33.3	5	0.50	74
Channel Catfish	13.3	2	0.06	9
Channel Darter	46.7	7	5.24	772
Common Carp	6.7	1	0.01	2
Common Shiner	20.0	3	0.02	3
Creek Chub	33.3	5	0.32	47
Fallfish	73.3	11	5.14	757
Fantail Darter	20.0	3	0.04	6
Finescale Dace	6.7	1	0.01	1
Gizzard Shad	6.7	1	0.01	1
Golden Shiner	6.7	1	0.01	2
Greater Redhorse	6.7	1	0.01	1
Hornyhead Chub	20.0	3	0.03	5
Johnny Darter	66.7	10	0.62	91
Largemouth Bass	93.3	14	3.45	509
Logperch	100.0	15	14.50	2137
Longnose Dace	53.3	8	9.20	1356
Longnose Gar	26.7	4	0.05	8
Mimic Shiner	66.7	10	1.19	175
Minnow spp.	13.3	2	0.07	10
Northern Sunfish	6.7	1	0.01	2
Pumpkinseed	93.3	14	1.58	233
Redhorse spp.	33.3	5	0.14	21
Rock Bass	100.0	15	7.87	1160
Rosyface Shiner	33.3	5	0.25	37
Round Goby	100.0	15	16.31	2403
Shorthead Redhorse	20.0	3	0.04	6
Silver Redhorse	13.3	2	0.01	2
Smallmouth Bass	100.0	15	27.62	4070
Stonecat Madtom	26.7	4	0.07	11
Sunfish spp. (YOY)	26.7	4	0.06	9
Walleye	6.7	1	0.01	1
White Sucker	46.7	7	0.53	78
Yellow Perch	40.0	6	0.75	110

Table 2. Summary of summer Trent River backpack electrofishing capture rates for species richness and number of individuals collected (2001, and 2009 – 2018).

Year	Species richness		Number of individuals		
	All sites	Mean (SD) per site	All sites	Mean (SD) per site	Catch per 1000 s
2001	24	6.6 (2.3)	1406	100.4 (59.8)	87
2009	25	6.7 (2.4)	1516	101.1 (60.1)	90
2010	22	7.5 (2.6)	1558	103.9 (50.5)	91
2011	23	7.8 (3.0)	1765	112.4 (107.1)	104
2012	23	6.9 (2.1)	1178	84.1 (57.2)	76
2013	25	7.5 (3.0)	1033	68.9 (47.4)	61
2014	21	6.9 (2.7)	1088	72.5 (51.7)	64
2015	23	6.8 (2.7)	1067	70.1 (42.6)	63
2016	24	7.9 (2.4)	1966	131.1 (111.8)	115
2017	23	6.6 (2.4)	762	54.4 (48.1)	47
2018	22	6.9 (2.7)	1394	99.8 (72.2)	86

Table 3. Summary of summer Trent River backpack electrofishing collection data for Channel Darter and Round Goby (2001, and 2009 – 2018). SD = standard deviation; s = seconds; TL = total length.

	Channel Darter				Round Goby			
Year	Total captured	Mean (SD) per site	Catch per 1000 s	Median (range) TL (mm)	Total captured	Mean (SD) per site	Catch per 1000 s	Median (range) TL (mm)
2001	41	5.9 (12.7)	5	N/A	0	0	0	N/A
2009	103	14.7 (13.2)	12	57 (44-66)	118	7.9 (15.6)	7	82 (34-143)
2010	178	25.4 (21.4)	21	56 (37-65)	329	21.9 (19.4)	19	72 (20-145)
2011	131	18.7 (31.6)	15	56 (38-64)	120	8.0 (8.1)	7	75 (29-143)
2012	49	7.0 (8.0)	6	55 (44-62)	288	20.6 (21.7)	19	61 (28-128)
2013	52	7.4 (6.2)	6	57 (46-64)	193	12.9 (13.6)	11	71 (29-130)
2014	28	4.0 (4.7)	3	60 (52-68)	121	8.1 (14.3)	7	79 (37-134)
2015	96	13.7 (11.8)	11	56 (50-69)	287	19.1 (17.3)	17	74 (27-141)
2016	38	5.4 (5.7)	4	57 (38-67)	582	38.8 (28.5)	34	70 (24-166)
2017	30	4.3 (4.6)	4	53 (46-62)	165	11.8 (15.6)	10	70 (32-138)
2018	26	4.3 (3.1)	3	56 (47-66)	200	14.3 (28.9)	12	78 (38-161)

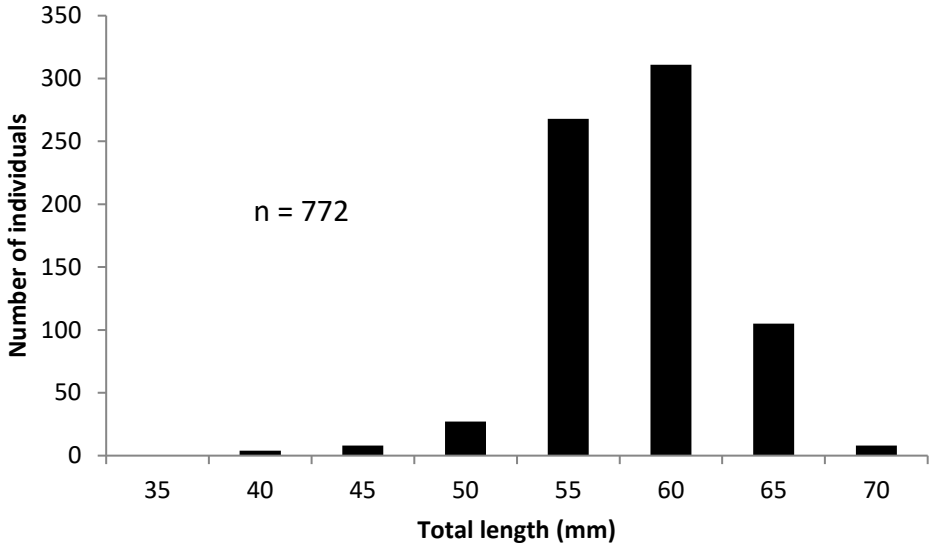

Figure 7. Length frequencies for Channel Darter caught during summer sampling on the Trent River between 2001 and 2018.

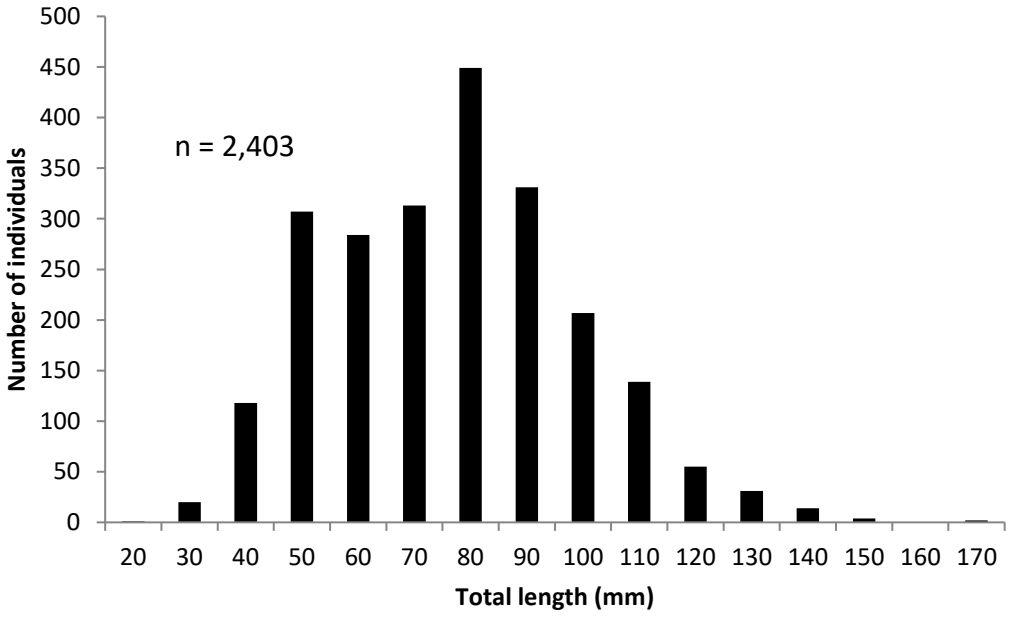

Figure 8. Length frequencies for Round Goby caught during summer sampling on the Trent River between 2001 and 2018.

Spring and Fall Sampling at Sonoco Generating Station (T04)

Channel Darter (n = 508) was collected during every spring and fall sampling visit at the shoal site downstream of Sonoco Generating Station (T04). The mean number of individuals captured was 30 (range: 7 – 60) in the spring compared to 19 (range: 4 – 50) in the fall. Across the sample years, spring and fall capture rates were highly variable; with the greatest numbers of Channel Darter collected in 2009 and 2014.

Round Goby (n = 701) was collected during all sample events except in spring 2012, and fall 2009 and 2010. The mean number of individuals captured was 19 (range: 1 – 48) in the spring compared to 73 (range: 45 – 154) in the fall. Across the sampling years, Round Goby capture rates at this site were variable in spring but relatively stable in the fall. Highest capture rates were in 2016.

Other darter species captured include Logperch and Johnny Darter (*Etheostoma nigrum*). Species count data is provided in Appendix 7.

MOIRA RIVER

A total of 549 individuals representing five target species and one non-target species were captured across all sites, including American Eel (n = 149), Channel Darter (n = 4), Round Goby (n = 6), and Northern Sunfish (non-target species; n = 29).

American Eel was captured from eight sites (MR01-07 and MR14), with total lengths ranging from 125 – 620 mm (mean: 300 mm). Previous sampling had only detected American Eel as far upstream as Highway 401 in Belleville (Reid and Hogg, 2014), however, one individual (300 mm) was captured in 2019 at Vanderwater Conservation Area (MR14), 42 km upstream of its previously known locations. Channel Darter was captured from three sites (MR03, MR05 and MR13), reaching as far upstream as Chisolm's Mills (MR13), south of Thomasburg. Total length of Channel Darter ranged from 45 – 62 mm (mean: 56 mm). Round Goby was only detected at one site (MR01), below the first dam in Belleville. Total length of Round Goby ranged from 30 – 65 mm (mean: 50 mm). Channel Darter and Round Goby did not co-occur at any site. Other species captured were Fantail Darter (*Etheostoma flabellare*), and Logperch. Species count data are provided in Appendix 8.

MOIRA AND STOCO LAKES

A total of 17 individuals representing four species [Pumpkinseed (*Lepomis gibbosus*), Bluegill (*Lepomis macrochirus*), Rock Bass, and Smallmouth Bass] were captured from Moira Lake, and 3 individuals representing 2 species (Pumpkinseed and Rock Bass) were captured from Stoco Lake during angling surveys. Additional fishes, including Logperch, were observed within the angling quadrat during sampling but did not bite or were lost. No Round Goby were observed. Conversations with anglers and landowners provided further support for this result. Species count data is provided in Appendix 9.

At sampling sites, mean water depth and water temperature were 1.4 m (range: 0.4 – 5.4 m) and 25.1 °C (range: 22.6 – 27.8 °C) respectively in Moira Lake, and 0.8 m (range: 0.4 – 3.9 m) and 24.5 °C (range: 21.2 – 28.2 °C) respectively in Stoco Lake. Moira Lake sites had predominantly open water (mean 56% across all sites) and submerged macrophytes (27%), with organic matter (23%), sand (20%), cobble (15%) and rubble (13%). Stoco Lake sites had predominantly open water (65%) and submerged macrophytes (34%), with sand (48%), rubble (13%), cobble (11%), and gravel (10%). Dreissenid shells were abundant (> 20% substrate composition) at four Moira Lake sites and one Stoco Lake site; no live dreissenids were observed.

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APPENDICES

Appendix 1. Site details, mean sampling effort and mean habitat conditions at 15 Trent River Channel Darter monitoring sites from 2001, 2009 – 2018.

										Substrate Composition (%)				
Site Code	Latitude	Longitude	Shocking Seconds	Channel Width (m)	Water Depth (m)	Water Velocity (m/s)	Water Temperature (°C)	Conductivity (uS/cm)	Fines	Sand	Gravel	Cobble	Boulder	Bedrock
T01	44.10978	-77.58990	1115	-	-	-	24.3	260	-	-	-	-	-	-
T02	44.11766	-77.59105	2282*	31.4	0.29	0.17	25.0	230	5.0	0.0	25.0	45.0	20.0	5.0
T03	44.14670	-77.58133	723	-	-	-	24.3	252	-	-	-	-	-	-
T04	44.14985	-77.58241	842	96.1	0.45	0.23	21.8	246	0.0	1.3	18.8	52.5	25.0	2.5
T05	44.16293	-77.58653	889	-	-	-	24.4	251	-	-	-	-	-	-
T06	44.18520	-77.59291	951	44.3	0.26	0.08	25.3	235	0.0	0.0	15.0	31.3	40.0	13.8
T07	44.20159	-77.59317	771	47.8	0.43	0.13	23.4	252	0.0	17.5	30.0	41.3	10.0	3.8
T08	44.20885	-77.59575	1456	13.5	0.23	0.22	24.8	224	0.0	5.0	37.5	35.0	16.3	6.3
T09	44.26309	-77.59807	1431	16.8	0.33	0.27	25.6	220	0.0	0.0	27.5	43.8	10.0	18.8
T10	44.24670	-77.80311	1872	12.3	0.19	0.31	24.2	211	0.0	0.0	12.5	43.8	27.5	16.3
T11	44.25030	-77.81728	489	-	-	-	21.9	352	10.0	-	20.0	10.0	-	60.0
T12	44.25601	-77.81161	1157	-	-	-	24.2	228	-	-	-	-	-	-
T13	44.27599	-77.79799	1462	9.2	0.33	0.20	23.9	215	0.0	0.0	11.3	45.0	15.0	28.8
T14	44.30198	-77.80037	865	10.3	0.19	0.35	25.1	225	0.0	0.0	6.3	28.8	26.3	38.8
T15	44.37035	-77.77346	729	7.0	0.31	0.17	23.3	228	0.0	0.0	10.0	22.5	45.0	22.5

*Effort was 1557 s in 2012

Appendix 2. Site details for 17 sites sampled along the Moira River in 2019.

Site Code	Sample Date	Latitude	Longitude	Water Temperature (°C)	Conductivity (µs/cm)	Channel Width (m)
MR01	10-Sep-19	44.1681	-77.3871	22.0	275	45
MR02	10-Sep-19	44.1723	-77.3828	22.0	275	44
MR03	16-Sep-19	44.1770	-77.3820	17.7	311	47
MR04	04-Sep-19	44.1796	-77.3809	22.3	288	44
MR05	03-Sep-19	44.1866	-77.3856	23.1	287	68
MR06	04-Sep-19	44.1903	-77.3886	22.8	298	60
MR07	03-Sep-19	44.1946	-77.3942	22.9	244	78
MR08	09-Sep-19	44.2037	-77.3933	20.9	275	44
MR09	09-Sep-19	44.2173	-77.3877	22.7	280	53
MR10	17-Sep-19	44.2521	-77.4187	17.2	286	87
MR11	17-Sep-19	44.2898	-77.3465	20.3	251	28
MR12	24-Sep-19	44.2986	-77.3422	20.1	248	50
MR13	24-Sep-19	44.3517	-77.3101	17.8	200	41
MR14	20-Sep-19	44.3794	-77.3151	16.0	258	48
MR15	20-Sep-19	44.4217	-77.3062	21.0	222	20
MR16	11-Sep-19	44.4795	-77.3122	21.8	110	38
MR17	11-Sep-19	44.4881	-77.3200	20.5	103	33

Appendix 3a. Site details and habitat characteristics of summer 2019 Round Goby angling survey sites in Moira Lake (n = 25 sites).

						Macrophyte Coverage (%)					Substrate Composition (%)									
Site Code	Sample Date	Latitude	Longitude	Water Temperature (ºC)	Water Depth (m)	Open Water	Emergent	Submerged	Floating	Unknown	Organic	Clay	Silt	Sand	Gravel	Cobble	Rubble	Boulder	Bedrock	Unknown*
ML01	13-Aug-19	44.4915	-77.4547	24.6	5.4	0	0	0	0	100	100	0	0	0	0	0	0	0	0	0
ML02	13-Aug-19	44.4951	-77.4530	23.8	3.5	0	0	0	0	100	100	0	0	0	0	0	0	0	0	0
ML03	13-Aug-19	44.4964	-77.4528	23.7	1.4	0	0	100	0	0	100	0	0	0	0	0	0	0	0	0
ML04	13-Aug-19	44.4857	-77.4404	25.8	0.6	75	0	25	0	0	0	0	0	5	5	0	90	0	0	0
ML05	13-Aug-19	44.4824	-77.4485	26.3	1.3	10	0	90	0	0	0	0	0	10	0	0	0	0	0	90
ML06	13-Aug-19	44.4959	-77.4469	25.2	2.1	0	0	0	0	100	30	0	0	70	0	0	0	0	0	0
ML07	13-Aug-19	44.5014	-77.4355	25.1	0.9	55	5	40	0	0	0	0	0	50	45	5	0	0	0	0
ML08	13-Aug-19	44.5003	-77.4320	27.8	1.1	90	0	10	0	0	0	0	0	10	10	10	65	5	0	0
ML09	13-Aug-19	44.4926	-77.4323	27.8	1.1	80	20	0	0	0	0	0	0	5	5	5	60	25	0	0
ML10	13-Aug-19	44.4751	-77.4648	24.8	2.6	0	0	0	0	100	40	0	20	40	0	0	0	0	0	0
ML11	15-Aug-19	44.4745	-77.4868	22.6	2.4	0	0	100	0	0	100	0	0	0	0	0	0	0	0	0
ML12	15-Aug-19	44.4796	-77.4804	23.5	0.8	55	5	40	0	0	0	0	0	30	10	45	15	0	0	0
ML13	15-Aug-19	44.4755	-77.4896	23.2	0.4	90	0	10	0	0	0	0	0	10	30	60	0	0	0	0
ML14	15-Aug-19	44.4755	-77.4904	24.6	1.4	90	0	10	0	0	5	0	0	0	0	0	0	80	0	15
ML15	15-Aug-19	44.4840	-77.4919	25.1	2.2	0	0	100	0	0	60	0	0	0	0	0	0	0	0	40
ML16	15-Aug-19	44.4830	-77.4852	26.7	0.7	100	0	0	0	0	0	0	0	15	15	20	20	30	0	0
ML17	15-Aug-19	44.4811	-77.4873	27.6	0.8	100	0	0	0	0	0	0	0	15	15	50	20	0	0	0
ML18	15-Aug-19	44.5003	-77.4162	25.2	1.2	20	0	80	0	0	40	0	0	0	0	0	0	0	20	40
ML19	19-Aug-19	44.4871	-77.4513	23.8	1.1	95	0	5	0	0	0	0	0	100	0	0	0	0	0	0
ML20	19-Aug-19	44.4791	-77.4676	24.1	0.7	95	0	5	0	0	0	0	0	55	20	20	5	0	0	0
ML21	19-Aug-19	44.4803	-77.4658	25.5	1.0	90	0	10	0	0	0	0	0	5	5	85	5	0	0	0
ML22	19-Aug-19	44.4831	-77.4631	24.5	0.8	80	0	20	0	0	0	0	0	10	15	70	5	0	0	0
ML23	19-Aug-19	44.5019	-77.4402	25.0	0.8	95	0	5	0	0	0	0	0	55	40	5	0	0	0	0
ML24	19-Aug-19	44.4760	-77.4531	25.3	0.5	100	0	0	0	0	0	0	0	0	5	10	40	45	0	0
ML25	19-Aug-19	44.4710	-77.4610	25.3	1.1	70	0	30	0	0	10	0	0	20	0	0	5	20	0	45

*Dreissenid shells

Appendix 4b. Site details and habitat characteristics of summer 2019 Round Goby angling survey sites in Moira Lake (n = 25 sites).

						Macrophyte Coverage (%)					Substrate Composition (%)									
Site Code	Sample Date	Latitude	Longitude	Water Temperature (ºC)	Water Depth (m)	Open Water	Emergent	Submerged	Floating	Unknown	Organic	Clay	Silt	Sand	Gravel	Cobble	Rubble	Boulder	Bedrock	Unknown*
SL01	14-Aug-19	44.47961	-77.29723	21.7	0.5	80	0	20	0	0	0	0	0	10	5	10	25	0	50	0
SL02	14-Aug-19	44.48159	-77.29613	23.1	0.5	30	0	70	0	0	0	0	0	35	20	25	20	0	0	0
SL03	14-Aug-19	44.47970	-77.28903	26.0	0.7	90	0	10	0	0	0	0	0	45	25	10	0	20	0	0
SL04	14-Aug-19	44.49313	-77.28055	27.5	0.5	5	0	95	0	0	0	0	0	100	0	0	0	0	0	0
SL05	14-Aug-19	44.48009	-77.28163	25.5	3.9	100	0	0	0	0	20	0	75	5	0	0	0	0	0	0
SL06	14-Aug-19	44.45805	-77.29510	28.2	0.4	60	0	40	0	0	0	0	0	100	0	0	0	0	0	0
SL07	14-Aug-19	44.47379	-77.30703	27.2	0.8	40	0	60	0	0	0	0	10	90	0	0	0	0	0	0
SL08	20-Aug-19	44.47416	-77.30688	21.2	0.6	40	0	60	0	0	80	0	0	20	0	0	0	0	0	0
SL09	20-Aug-19	44.47423	-77.30618	22.1	1.0	100	0	0	0	0	0	0	0	0	90	10	0	0	0	0
SL10	20-Aug-19	44.46237	-77.29880	22.6	0.6	55	0	45	0	0	0	0	0	5	10	60	20	0	0	5
SL11	20-Aug-19	44.45858	-77.29842	23.3	1.1	80	0	20	0	0	0	0	0	10	25	0	10	5	0	50
SL12	20-Aug-19	44.46120	-77.28968	24.1	0.6	50	0	50	0	0	0	0	0	85	0	15	0	0	0	0
SL13	20-Aug-19	44.46400	-77.28519	25.4	0.6	80	0	20	0	0	0	0	0	60	0	20	20	0	0	0
SL14	20-Aug-19	44.46483	-77.28008	25.6	0.9	95	0	5	0	0	0	0	0	5	0	10	70	15	0	0
SL15	20-Aug-19	44.47291	-77.27872	26.6	0.5	95	0	5	0	0	0	0	0	90	0	0	10	0	0	0
SL16	22-Aug-19	44.46679	-77.30293	22.6	0.8	90	0	5	5	0	0	0	0	10	0	10	60	5	0	15
SL17	22-Aug-19	44.47602	-77.28159	22.5	0.7	30	0	70	0	0	0	0	0	100	0	0	0	0	0	0
SL18	22-Aug-19	44.48697	-77.27641	23.3	0.6	60	0	40	0	0	0	0	0	100	0	0	0	0	0	0
SL19	22-Aug-19	44.49455	-77.28364	24.8	0.7	40	0	60	0	0	50	0	0	50	0	0	0	0	0	0
SL20	22-Aug-19	44.49049	-77.28574	25.8	1.0	80	0	20	0	0	10	0	0	20	0	20	40	10	0	0
SL21	22-Aug-19	44.48681	-77.28767	25.0	0.7	40	0	60	0	0	0	0	0	100	0	0	0	0	0	0
SL22	22-Aug-19	44.47858	-77.28132	25.7	0.5	80	20	0	0	0	0	0	0	5	35	50	0	10	0	0

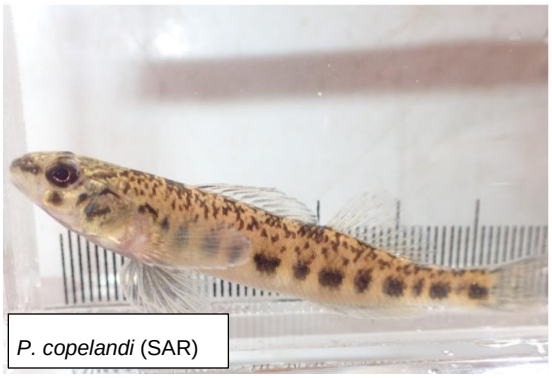
*Dreissenid shells

Appendix 5. Common and Scientific names of fishes captured from the Trent and Moira rivers and Moira and Stoco lakes between 2001 and 2019.

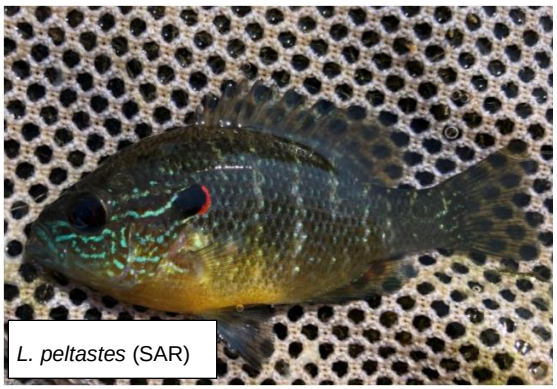
Common Name	Scientific Name
American Eel	*Anguilla rostrata*
Banded Killifish	*Fundulus diaphanus*
Black Crappie	*Pomoxis nigromaculatus*
Blacknose Dace	*Rhinichthys atratulus*
Bluegill	*Lepomis macrochirus*
Bluntnose Minnow	*Pimephales notatus*
Brook Silverside	*Labidesthes sicculus*
Brown Bullhead	*Ameiurus nebulosus*
Central Mudminnow	*Umbra limi*
Central Stoneroller	*Campostoma anomalum*
Channel Catfish	*Ictalurus punctatus*
Channel Darter	*Percina copelandi*
Common Carp	*Cyprinus carpio*
Common Shiner	*Luxilus cornutus*
Creek Chub	*Semotilus atromaculatus*
Fallfish	*Semotilus corporalis*
Fantail Darter	*Etheostoma flabellare*
Finescale Dace	*Phoxinus neogaeus*
Gizzard Shad	*Dorosoma cepedianum*
Golden Shiner	*Notemigonus crysoleucas*
Greater Redhorse	*Moxostoma valenciennesi*
Hornyhead Chub	*Nocomis biguttatus*
Iowa Darter	*Etheostoma exile*
Johnny Darter	*Etheostoma nigrum*
Largemouth Bass	*Micropterus salmoides*
Logperch	*Percina caprodes*
Longnose Dace	*Rhinichthys cataractae*
Longnose Gar	*Lepisosteus osseus*
Mimic Shiner	*Notropis volucellus*
Northern Pike	*Esox lucius*
Northern Sunfish	*Lepomis peltastes*
Pumpkinseed	*Lepomis gibbosus*
Rock Bass	*Ambloplites rupestris*
Rosyface Shiner	*Notropis rubellus*
Round Goby	*Neogobius melanostomus*
Shorthead Redhorse	*Moxostoma macrolepidotum*
Silver Redhorse	*Moxostoma anisurum*
Smallmouth Bass	*Micropterus dolomieu*
Stonecat Madtom	*Noturus flavus*
Walleye	*Sander vitreus*
White Sucker	*Catostomus commersonii*
Yellow Perch	*Perca flavescens*

Appendix 6. Photos of species at risk (SAR) and common fishes captured during inventories for invasive and at-risk fishes on the Trent and Moira rivers, and Moira and Stoco lakes between 2001 and 2019.

A. rostrata (SAR)



P. copelandi (SAR)



L. peltastes (SAR)

P. caprodes

A. rupestris

M. dolomieu

Appendix 7a. Summary of individuals captured at Trent River Channel Darter monitoring sites during 2001 (n = 14 sites).

Site Code	Date	American Eel	Banded Killifish	Black Crappie	Blacknose Dace	Bluegill	Bluntnose Minnow	Brook Silverside	Brown Bullhead	Central Mudminnow	Central Stoneroller	Channel Catfish	Channel Darter	Common Carp	Common Shiner	Creek Chub	Fallfish	Fantail Darter	Finescale Dace	Gizzard Shad	Golden Shiner	Greater Redhorse	Hornyhead Chub	Iowa Darter	Johnny Darter	Largemouth Bass	Logperch	Longnose Dace	Longnose Gar
T01	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	9	0	0
T02	-	0	0	0	0	2	0	0	0	0	1	0	37	0	0	0	0	0	0	0	0	0	0	0	0	1	31	10	0
T03	-	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	20	0	0
T04	-	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0
T06	-	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	21	0	0
T07	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0
T08	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	0	0	0	0	0	0	0	0	0	1	0	0
T09	-	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	3	17	0
T10	-	0	3	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	0
T11	-	0	0	0	1	0	10	0	0	0	0	0	0	0	0	0	43	0	0	0	0	0	0	0	0	0	2	2	0
T12	-	0	0	0	0	0	4	0	0	0	0	0	0	0	0	1	7	0	0	0	0	0	0	0	0	0	2	77	0
T13	-	0	0	0	1	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	3	0	13	0
T14	-	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T15	-	0	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	2	0

Appendix 6a. continued

Site Code	Date	Mimic Shiner	Minnow sp.	Northern Pike	Northern Sunfish	Pumpkinseed	Redhorse Sp.	Rock Bass	Rosyface Shiner	Round Goby	Shorthead Redhorse	Silver Redhorse	Smallmouth Bass	Stonecat Madtom	Sunfish sp. (YOY)	Walleye	White Sucker	Yellow Perch
T01	-	0	0	0	0	0	0	23	0	0	0	0	17	0	0	0	0	7
T02	-	0	0	0	0	2	0	9	0	0	0	0	50	1	0	0	2	2
T03	-	0	0	0	0	1	0	0	0	0	0	0	6	0	1	0	0	0
T04	-	0	0	0	0	0	0	0	0	0	0	0	23	0	0	0	0	0
T06	-	0	4	0	0	33	0	7	0	0	0	0	46	0	0	0	0	0
T07	-	0	0	0	0	27	3	7	0	0	0	0	27	0	4	0	0	0
T08	-	0	0	0	0	7	1	2	0	0	0	0	218	0	0	0	0	0
T09	-	0	0	0	0	1	0	2	0	0	0	0	55	0	0	0	0	0
T10	-	0	0	0	0	3	3	12	0	0	0	0	165	0	0	0	0	1
T11	-	0	0	0	0	13	4	13	0	0	0	0	19	0	0	0	2	0
T12	-	0	0	0	0	1	3	1	0	0	0	0	22	0	0	0	0	0
T13	-	0	0	0	0	1	0	0	0	0	0	0	38	0	0	0	5	0
T14	-	0	0	0	0	0	0	13	0	0	0	0	92	0	0	0	19	0
T15	-	0	0	0	0	0	0	7	0	0	0	0	12	0	0	0	0	0

Appendix 8b. Summary of individuals captured at Trent River Channel Darter monitoring sites during 2009 (n = 15 sites).

Site Code	Date	American Eel	Banded Killifish	Black Crappie	Blacknose Dace	Bluegill	Bluntnose Minnow	Brook Silverside	Brown Bullhead	Central Mudminnow	Central Stoneroller	Channel Catfish	Channel Darter	Common Carp	Common Shiner	Creek Chub	Fallfish	Fantail Darter	Finescale Dace	Gizzard Shad	Golden Shiner	Greater Redhorse	Hornyhead Chub	Iowa Darter	Johnny Darter	Largemouth Bass	Logperch	Longnose Dace	Longnose Gar
T01	14-Aug	0	0	0	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	7	0	0
T02	14-Aug	2	0	0	0	6	0	0	0	0	0	0	0	0	0	0	7	1	0	0	0	0	0	0	0	4	92	8	0
T03	17-Aug	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	1
T04	17-Aug	0	0	0	0	0	0	0	0	0	0	0	18	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0
T05	17-Aug	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	13	2	0	0	0	0	0	0	13	0	10	0	0
T06	12-Aug	0	0	0	0	0	5	0	0	0	0	0	28	0	0	0	5	0	0	0	0	0	0	0	1	0	3	0	0
T07	12-Aug	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	21	0	0	0	0	0	0	0	8	0	1	0	0
T08	12-Aug	0	0	0	0	0	0	0	0	0	0	0	36	0	0	0	0	0	0	0	0	0	0	0	3	0	3	0	0
T09	17-Aug	0	0	0	0	0	0	0	0	0	0	0	18	0	0	0	0	0	0	0	0	0	0	0	1	0	4	34	0
T10	13-Aug	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	69	29	0
T11	11-Aug	0	0	0	0	0	4	0	0	0	7	0	0	0	0	1	2	0	0	0	0	0	0	0	2	0	1	0	0
T12	11-Aug	0	0	0	0	0	12	0	0	0	0	0	0	0	0	0	68	0	0	0	0	0	0	0	0	0	5	42	0
T13	01-Sep	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12	8	0
T14	11-Aug	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T15	13-Aug	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	1	53	0

Appendix 6b. continued

Site Code	Date	Mimic Shiner	Minnow sp.	Northern Pike	Northern Sunfish	Pumpkinseed	Redhorse Sp.	Rock Bass	Rosyface Shiner	Round Goby	Shorthead Redhorse	Silver Redhorse	Smallmouth Bass	Stonecat Madtom	Sunfish sp. (YOY)	Walleye	White Sucker	Yellow Perch
T01	14-Aug	0	0	0	0	0	0	24	0	11	0	0	0	0	0	0	0	0
T02	14-Aug	0	0	0	0	0	0	16	0	25	1	0	33	0	3	0	0	2
T03	17-Aug	0	0	0	0	0	0	0	0	1	0	1	10	0	0	0	0	0
T04	17-Aug	0	0	0	0	0	0	1	0	7	0	0	5	0	0	0	0	0
T05	17-Aug	0	0	0	0	0	0	5	0	4	0	0	6	0	0	0	0	0
T06	12-Aug	3	0	0	0	3	0	7	0	0	0	0	69	0	0	0	0	0
T07	12-Aug	0	0	0	0	0	0	2	0	0	0	0	23	0	0	0	0	0
T08	12-Aug	1	0	0	0	0	0	4	0	0	0	0	96	0	0	0	0	0
T09	17-Aug	0	0	0	0	0	0	0	0	0	0	0	10	1	0	0	0	0
T10	13-Aug	0	0	0	0	1	0	7	0	1	0	0	84	0	0	0	0	0
T11	11-Aug	0	0	0	0	1	0	9	0	0	0	0	16	0	0	0	4	0
T12	11-Aug	0	0	0	0	0	0	11	0	1	0	0	36	0	0	0	0	0
T13	01-Sep	0	0	0	0	0	0	17	0	61	0	0	9	0	0	0	0	0
T14	11-Aug	0	0	0	0	0	0	0	0	7	0	0	167	0	0	0	0	0
T15	13-Aug	0	0	0	0	0	0	8	0	0	0	0	0	0	0	0	0	0

Appendix 9c. Summary of individuals captured at Trent River Channel Darter monitoring sites during 2010 (n = 15 sites).

Site Code	Date	American Eel	Banded Killifish	Black Crappie	Blacknose Dace	Bluegill	Bluntnose Minnow	Brook Silverside	Brown Bullhead	Central Mudminnow	Central Stoneroller	Channel Catfish	Channel Darter	Common Carp	Common Shiner	Creek Chub	Fallfish	Fantail Darter	Finescale Dace	Gizzard Shad	Golden Shiner	Greater Redhorse	Hornyhead Chub	Iowa Darter	Johnny Darter	Largemouth Bass	Logperch	Longnose Dace	Longnose Gar
T01	07-Sep	1	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0
T02	07-Sep	19	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	2	53	6	0
T03	30-Aug	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	0	0
T04	30-Aug	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	0
T05	19-Aug	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	10	0	0
T06	30-Aug	0	0	0	0	0	3	0	0	0	0	0	41	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0
T07	20-Aug	0	0	0	0	0	0	0	0	0	0	0	31	0	0	0	0	0	0	0	0	0	0	0	0	0	8	0	0
T08	20-Aug	0	0	0	0	0	0	0	0	0	0	0	32	0	0	0	1	0	0	0	0	0	0	0	0	1	7	0	0
T09	20-Aug	0	0	0	0	2	0	0	0	0	0	1	63	0	0	0	0	0	0	0	0	0	0	0	0	11	1	12	0
T10	19-Aug	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	26	60	41	0
T11	18-Aug	0	0	0	0	0	3	0	0	0	1	0	0	0	0	0	2	0	0	0	0	0	0	0	2	7	1	0	0
T12	18-Aug	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	51	0	0	0	0	0	0	0	0	6	15	28	0
T13	19-Aug	0	0	0	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	5	16	0
T14	18-Aug	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T15	18-Aug	0	0	0	0	5	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	36	25	15	0

Appendix 6c. continued

Site Code	Date	Mimic Shiner	Minnow sp.	Northern Pike	Northern Sunfish	Pumpkinseed	Redhorse Sp.	Rock Bass	Rosyface Shiner	Round Goby	Shorthead Redhorse	Silver Redhorse	Smallmouth Bass	Stonecat Madtom	Sunfish sp. (YOY)	Walleye	White Sucker	Yellow Perch
T01	07-Sep	0	0	0	0	0	0	38	0	8	0	0	5	0	0	0	0	0
T02	07-Sep	0	0	0	0	0	0	1	0	47	0	0	15	0	0	0	0	0
T03	30-Aug	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0
T04	30-Aug	0	0	0	0	0	0	1	0	34	0	0	1	0	0	0	0	0
T05	19-Aug	4	0	0	0	6	0	6	0	5	0	0	2	0	0	0	0	1
T06	30-Aug	0	0	0	0	23	0	10	0	13	0	0	7	0	0	0	0	0
T07	20-Aug	8	0	0	0	0	1	3	0	57	0	0	0	0	0	0	0	0
T08	20-Aug	33	0	0	0	1	0	2	0	25	0	0	43	0	0	0	0	0
T09	20-Aug	2	0	0	0	0	0	6	0	43	0	0	1	0	0	0	0	0
T10	19-Aug	0	0	0	0	1	0	9	0	4	0	0	40	0	0	0	0	0
T11	18-Aug	0	0	0	0	14	0	2	0	0	0	0	15	0	0	0	0	0
T12	18-Aug	0	0	0	0	1	0	5	1	1	0	0	23	1	0	0	0	0
T13	19-Aug	0	0	0	0	0	0	6	0	53	0	0	10	0	0	0	0	0
T14	18-Aug	0	0	0	0	0	0	1	0	23	0	0	159	0	0	0	0	0
T15	18-Aug	0	0	0	0	1	0	12	0	13	0	0	1	0	0	0	0	0

Appendix 10d. Summary of individuals captured at Trent River Channel Darter monitoring sites during 2011 (n = 15 sites).

Site Code	Date	American Eel	Banded Killifish	Black Crappie	Blacknose Dace	Bluegill	Bluntnose Minnow	Brook Silverside	Brown Bullhead	Central Mudminnow	Central Stoneroller	Channel Catfish	Channel Darter	Common Carp	Common Shiner	Creek Chub	Fallfish	Fantail Darter	Finescale Dace	Gizzard Shad	Golden Shiner	Greater Redhorse	Hornyhead Chub	Iowa Darter	Johnny Darter	Largemouth Bass	Logperch	Longnose Dace	Longnose Gar
T01	09-Aug	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	0
T02	22-Aug	29	0	0	0	0	3	0	0	0	0	0	3	0	0	0	9	0	0	0	0	0	0	0	1	1	113	1	0
T03	09-Aug	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	4	1	0	0
T04	23-Aug	0	0	0	0	0	0	0	0	0	0	0	11	0	0	0	0	0	0	0	0	0	0	0	0	0	7	0	0
T05	09-Aug	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	2	12	0	0
T06	22-Aug	0	0	0	0	0	0	0	0	0	0	0	15	0	0	0	1	0	0	0	0	0	0	0	0	0	31	0	0
T07	09-Aug	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	0	0	0	0	0	0	0	0	0	1	0	0
T08	25-Aug	0	0	0	0	2	0	0	0	0	0	0	7	0	0	0	5	0	0	0	0	0	0	0	0	1	26	0	0
T09	23-Aug	0	0	0	0	3	0	0	0	0	0	0	95	0	0	0	0	0	0	0	0	0	0	0	0	2	37	0	0
T10	25-Aug	0	0	0	0	7	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	17	161	31	0
T11	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	1	2	1	0	0
T12	-	0	0	0	0	0	2	3	0	0	0	0	0	0	1	0	29	0	0	0	0	0	1	0	0	11	9	50	1
T13	22-Aug	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	5	0
T14	25-Aug	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T15	-	0	0	0	0	12	0	2	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	13	103	9	0

Appendix 6d. continued

Site Code	Date	Mimic Shiner	Minnow sp.	Northern Pike	Northern Sunfish	Pumpkinseed	Redhorse Sp.	Rock Bass	Rosyface Shiner	Round Goby	Shorthead Redhorse	Silver Redhorse	Smallmouth Bass	Stonecat Madtom	Sunfish sp. (YOY)	Walleye	White Sucker	Yellow Perch
T01	09-Aug	0	0	0	0	6	0	14	0	7	0	0	5	0	0	0	0	5
T02	22-Aug	1	0	0	0	0	0	14	0	28	0	0	25	0	0	1	0	1
T03	09-Aug	0	0	0	0	5	0	0	0	0	0	0	1	0	0	0	0	0
T04	23-Aug	0	0	0	0	0	0	2	0	19	0	0	3	0	0	0	0	0
T05	09-Aug	0	0	0	0	7	0	1	0	5	0	0	7	0	0	0	0	0
T06	22-Aug	0	0	0	0	21	0	6	0	4	0	0	34	0	0	0	0	0
T07	09-Aug	2	0	0	0	0	0	10	0	0	0	0	10	0	0	0	0	0
T08	25-Aug	0	0	0	0	15	0	18	0	19	1	0	144	0	0	0	1	0
T09	23-Aug	0	0	0	0	0	0	8	0	9	0	0	39	0	0	0	0	0
T10	25-Aug	0	0	0	0	4	0	25	0	7	0	0	139	0	0	0	0	0
T11	-	0	0	0	0	1	0	1	0	0	0	0	13	0	0	0	0	0
T12	-	0	0	0	0	3	0	5	0	0	0	0	16	1	0	0	0	0
T13	22-Aug	0	0	0	0	0	0	0	0	5	0	0	4	0	0	0	0	0
T14	25-Aug	0	0	0	0	0	0	2	0	4	0	0	56	0	0	0	0	0
T15	-	0	0	0	0	0	0	8	0	13	0	0	21	0	0	0	0	10

Appendix 11e. Summary of individuals captured at Trent River Channel Darter monitoring sites during 2012 (n = 14 sites).

Site Code	Date	American Eel	Banded Killifish	Black Crappie	Blacknose Dace	Bluegill	Bluntnose Minnow	Brook Silverside	Brown Bullhead	Central Mudminnow	Central Stoneroller	Channel Catfish	Channel Darter	Common Carp	Common Shiner	Creek Chub	Fallfish	Fantail Darter	Finescale Dace	Gizzard Shad	Golden Shiner	Greater Redhorse	Hornyhead Chub	Iowa Darter	Johnny Darter	Largemouth Bass	Logperch	Longnose Dace	Longnose Gar
T01	-	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	12	0	0
T02	-	27	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	11	15	2	0
T03	-	0	0	0	0	0	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0
T04	-	0	0	0	0	0	0	0	0	0	0	0	18	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0
T06	-	0	0	0	0	0	0	0	0	0	0	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0
T07	-	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T08	-	0	0	0	0	0	0	0	0	0	0	0	20	0	0	1	0	0	0	0	0	0	0	0	0	0	3	0	0
T09	-	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	5	0	4	0
T10	-	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	13	0	0
T11	-	0	0	0	0	3	0	0	0	0	5	0	0	0	0	0	6	0	0	0	0	0	0	0	0	8	8	0	0
T12	-	0	0	0	0	0	2	0	0	0	16	0	0	0	0	5	26	0	0	0	0	0	1	0	0	30	1	19	0
T13	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	12	5	0
T14	-	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T15	-	0	0	0	0	16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14	4	12	0

Appendix 6e. continued

Site Code	Date	Mimic Shiner	Minnow sp.	Northern Pike	Northern Sunfish	Pumpkinseed	Redhorse Sp.	Rock Bass	Rosyface Shiner	Round Goby	Shorthead Redhorse	Silver Redhorse	Smallmouth Bass	Stonecat Madtom	Sunfish sp. (YOY)	Walleye	White Sucker	Yellow Perch
T01	-	0	0	0	0	0	0	24	0	21	0	0	1	0	0	0	0	1
T02	-	0	0	0	0	0	0	13	0	87	0	0	7	0	0	0	0	0
T03	-	0	0	0	0	0	0	2	0	16	0	0	10	0	0	0	0	0
T04	-	0	0	0	0	0	0	1	0	21	0	0	1	0	0	0	0	0
T06	-	0	0	0	0	1	0	8	0	11	0	0	33	0	0	0	0	0
T07	-	0	0	0	0	0	0	7	0	28	0	0	12	0	0	0	0	0
T08	-	1	0	0	0	0	0	1	0	43	0	0	64	0	0	0	0	0
T09	-	0	0	0	0	0	0	1	0	7	0	0	2	0	0	0	0	0
T10	-	0	0	0	0	0	0	0	0	13	0	0	202	0	0	0	0	0
T11	-	0	0	0	0	0	0	5	0	1	0	0	21	0	0	0	0	0
T12	-	0	0	0	0	0	0	2	0	0	0	1	14	1	0	0	0	0
T13	-	0	0	0	0	0	0	6	0	27	0	0	11	0	0	0	0	0
T14	-	0	0	0	0	5	0	2	0	6	0	0	21	0	1	0	0	0
T15	-	0	0	0	0	0	0	8	0	7	0	0	22	0	0	0	0	3

Appendix 12f. Summary of individuals captured at Trent River Channel Darter monitoring sites during 2013 (n = 15 sites).

Site Code	Date	American Eel	Banded Killifish	Black Crappie	Blacknose Dace	Bluegill	Bluntnose Minnow	Brook Silverside	Brown Bullhead	Central Mudminnow	Central Stoneroller	Channel Catfish	Channel Darter	Common Carp	Common Shiner	Creek Chub	Fallfish	Fantail Darter	Finescale Dace	Gizzard Shad	Golden Shiner	Greater Redhorse	Hornyhead Chub	Iowa Darter	Johnny Darter	Largemouth Bass	Logperch	Longnose Dace	Longnose Gar
T01	06-Aug	2	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	4	0	0
T02	07-Aug	32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	17	4	4	0
T03	06-Aug	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	4	0	0
T04	07-Aug	1	0	0	0	0	0	0	0	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0
T05	06-Aug	0	0	0	0	1	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	1	1	0	0
T06	08-Aug	0	0	0	0	1	0	0	0	0	0	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T07	07-Aug	0	0	0	0	0	0	0	0	0	0	0	6	0	0	0	2	0	0	0	0	0	0	0	0	0	2	0	0
T08	22-Aug	0	0	0	0	2	1	0	0	0	0	0	14	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0
T09	08-Aug	0	0	0	0	1	0	0	0	0	0	2	18	0	0	0	0	0	0	0	0	0	0	0	0	11	0	9	0
T10	30-Aug	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	28	11	0
T11	06-Aug	0	0	0	0	1	0	0	0	0	4	0	0	0	0	21	48	0	0	0	0	1	2	0	4	1	2	0	0
T12	07-Aug	0	0	0	0	2	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	33	57	0
T13	08-Aug	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	39	0
T14	06-Aug	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T15	08-Aug	0	0	0	0	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	2	0	0

Appendix 6f. continued

Site Code	Date	Mimic Shiner	Minnow sp.	Northern Pike	Northern Sunfish	Pumpkinseed	Redhorse Sp.	Rock Bass	Rosyface Shiner	Round Goby	Shorthead Redhorse	Silver Redhorse	Smallmouth Bass	Stonecat Madtom	Sunfish sp. (YOY)	Walleye	White Sucker	Yellow Perch
T01	06-Aug	0	0	0	0	0	0	24	0	6	0	0	1	0	0	0	0	1
T02	07-Aug	0	0	0	2	0	0	34	0	21	0	0	4	0	0	0	0	0
T03	06-Aug	0	0	0	0	0	0	0	0	20	0	0	0	0	0	0	0	0
T04	07-Aug	0	0	0	0	0	0	0	0	3	0	0	1	0	0	0	0	0
T05	06-Aug	0	0	0	0	0	0	1	0	3	0	0	0	0	0	0	1	0
T06	08-Aug	0	0	0	0	0	0	4	0	9	0	0	23	0	0	0	0	0
T07	07-Aug	6	0	0	0	0	0	1	0	9	0	0	4	0	0	0	0	0
T08	22-Aug	1	0	0	0	2	0	4	0	29	0	0	36	0	0	0	0	0
T09	08-Aug	5	0	0	0	0	0	3	0	11	0	0	5	0	0	0	0	0
T10	30-Aug	0	0	0	0	0	0	46	0	7	0	0	74	0	0	0	0	0
T11	06-Aug	2	5	0	0	0	1	7	0	3	0	0	9	0	0	0	0	3
T12	07-Aug	0	0	0	0	0	0	4	0	4	0	0	9	0	0	0	0	0
T13	08-Aug	0	0	0	0	0	0	11	0	55	0	0	7	0	0	0	0	0
T14	06-Aug	0	0	0	0	0	0	1	0	12	0	0	9	0	0	0	0	0
T15	08-Aug	0	0	0	0	0	0	2	0	1	0	0	13	0	0	0	0	0

Appendix 13g. Summary of individuals captured at Trent River Channel Darter monitoring sites during 2014 (n = 15 sites).

Site Code	Date	American Eel	Banded Killifish	Black Crappie	Blacknose Dace	Bluegill	Bluntnose Minnow	Brook Silverside	Brown Bullhead	Central Mudminnow	Central Stoneroller	Channel Catfish	Channel Darter	Common Carp	Common Shiner	Creek Chub	Fallfish	Fantail Darter	Finescale Dace	Gizzard Shad	Golden Shiner	Greater Redhorse	Hornyhead Chub	Iowa Darter	Johnny Darter	Largemouth Bass	Logperch	Longnose Dace	Longnose Gar
T01	19-Aug	1	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0
T02	08-Sep	15	0	0	0	1	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	1	15	0	0
T03	13-Aug	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
T04	13-Aug	0	0	0	0	0	0	0	0	0	0	0	13	0	0	0	0	0	0	0	0	0	0	0	1	0	4	0	0
T05	13-Aug	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	2	0	0
T06	03-Sep	0	0	0	0	0	1	0	0	0	0	0	2	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
T07	13-Aug	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0
T08	03-Sep	0	0	0	0	1	3	0	0	0	0	0	9	0	1	0	12	0	0	0	0	0	0	0	2	1	5	0	0
T09	03-Sep	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	9	2	0	0
T10	03-Sep	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	97	6	0
T11	19-Aug	0	0	0	0	0	1	0	0	0	5	0	0	0	0	0	21	0	0	0	0	0	0	0	17	4	6	0	0
T12	13-Aug	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	52	0	0	0	0	0	0	0	0	0	9	55	0
T13	19-Aug	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	16	0	0	0	0	0	0	0	0	0	12	7	0
T14	14-Aug	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	3	0
T15	13-Aug	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	35	25	10	0

Appendix 6g. continued

Site Code	Date	Mimic Shiner	Minnow sp.	Northern Pike	Northern Sunfish	Pumpkinseed	Redhorse Sp.	Rock Bass	Rosyface Shiner	Round Goby	Shorthead Redhorse	Silver Redhorse	Smallmouth Bass	Stonecat Madtom	Sunfish sp. (YOY)	Walleye	White Sucker	Yellow Perch
T01	19-Aug	0	0	0	0	0	0	35	0	6	0	0	1	0	0	0	0	1
T02	08-Sep	0	0	0	0	0	0	7	0	17	0	0	2	0	0	0	0	0
T03	13-Aug	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0
T04	13-Aug	0	0	0	0	0	0	3	0	3	0	0	16	0	0	0	0	0
T05	13-Aug	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0
T06	03-Sep	0	0	0	0	0	0	0	0	2	0	0	62	0	0	0	0	0
T07	13-Aug	5	0	0	0	0	0	1	0	2	0	0	5	0	0	0	0	0
T08	03-Sep	3	0	0	0	0	0	6	0	13	0	0	50	0	0	0	0	0
T09	03-Sep	0	0	0	0	0	0	1	0	8	0	0	14	0	0	0	0	0
T10	03-Sep	0	0	0	0	0	0	10	0	0	0	0	66	0	0	0	0	0
T11	19-Aug	0	0	0	0	0	1	4	0	0	0	0	22	0	0	0	2	0
T12	13-Aug	0	0	0	0	0	0	6	0	0	0	0	38	2	0	0	3	0
T13	19-Aug	0	0	0	0	0	0	7	0	58	0	0	21	0	0	0	2	0
T14	14-Aug	0	0	0	0	0	0	0	0	9	0	0	45	1	0	0	8	0
T15	13-Aug	0	0	0	0	0	0	3	0	3	0	0	4	0	0	0	0	0

Appendix 14h. Summary of individuals captured at Trent River Channel Darter monitoring sites during 2015 (n = 15 sites).

Site Code	Date	American Eel	Banded Killifish	Black Crappie	Blacknose Dace	Bluegill	Bluntnose Minnow	Brook Silverside	Brown Bullhead	Central Mudminnow	Central Stoneroller	Channel Catfish	Channel Darter	Common Carp	Common Shiner	Creek Chub	Fallfish	Fantail Darter	Finescale Dace	Gizzard Shad	Golden Shiner	Greater Redhorse	Hornyhead Chub	Iowa Darter	Johnny Darter	Largemouth Bass	Logperch	Longnose Dace	Longnose Gar
T01	12-Aug	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	7	0	0
T02	12-Aug	23	0	0	0	3	0	0	0	0	1	0	6	0	0	0	4	0	0	0	0	0	0	0	1	0	8	0	0
T03	11-Aug	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T04	10-Aug	2	0	0	0	0	0	0	0	0	0	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
T05	11-Aug	0	0	0	0	0	16	0	0	0	0	0	0	0	0	0	22	0	0	0	0	0	0	0	0	2	6	0	0
T06	12-Aug	0	0	0	0	0	0	0	0	0	0	0	21	0	0	0	5	0	0	0	0	0	0	0	0	6	0	0	0
T07	12-Aug	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	3	0	0	0	0	0	0	0	0	2	1	0	0
T08	10-Aug	3	0	0	0	0	0	0	0	0	0	0	30	0	0	0	9	0	0	0	0	0	0	0	0	0	17	0	1
T09	10-Aug	0	0	0	0	0	0	0	0	0	0	1	29	0	0	0	0	0	0	0	0	0	0	0	0	4	0	9	0
T10	13-Aug	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	77	0	0
T11	11-Aug	0	0	0	0	0	0	0	0	0	1	0	0	0	0	3	51	0	1	0	0	0	0	0	8	1	7	0	0
T12	11-Aug	0	0	0	0	0	0	0	0	0	7	0	0	0	0	0	24	0	0	0	0	0	0	0	0	6	23	43	1
T13	13-Aug	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	5	0
T14	11-Aug	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
T15	11-Aug	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	1	0

Appendix 6h. continued

Site Code	Date	Mimic Shiner	Minnow sp.	Northern Pike	Northern Sunfish	Pumpkinseed	Redhorse Sp.	Rock Bass	Rosyface Shiner	Round Goby	Shorthead Redhorse	Silver Redhorse	Smallmouth Bass	Stonecat Madtom	Sunfish sp. (YOY)	Walleye	White Sucker	Yellow Perch
T01	12-Aug	1	0	0	0	0	0	21	0	2	0	0	0	0	0	0	0	1
T02	12-Aug	0	0	0	0	0	0	17	2	45	0	0	9	0	0	0	0	0
T03	11-Aug	0	0	0	0	0	0	1	0	3	0	0	0	0	0	0	0	0
T04	10-Aug	0	0	0	0	0	0	2	0	33	0	0	2	0	0	0	0	0
T05	11-Aug	11	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0
T06	12-Aug	0	0	0	0	1	0	6	0	10	0	0	1	0	0	0	0	0
T07	12-Aug	0	0	0	0	0	0	2	0	29	0	0	0	0	0	0	0	0
T08	10-Aug	0	0	0	0	0	0	1	0	44	0	0	18	0	0	0	0	0
T09	10-Aug	0	0	0	0	0	0	6	0	35	0	0	2	0	0	0	0	0
T10	13-Aug	0	0	0	0	0	0	1	0	15	0	0	25	0	0	0	0	0
T11	11-Aug	6	1	0	0	0	0	3	0	3	0	0	10	0	0	0	0	0
T12	11-Aug	1	0	0	0	0	0	15	1	5	0	0	22	0	0	0	0	0
T13	13-Aug	0	0	0	0	0	0	1	0	10	0	0	18	0	0	0	0	0
T14	11-Aug	0	0	0	0	0	0	0	0	49	0	0	43	0	0	0	0	0
T15	11-Aug	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0

Appendix 15i. Summary of individuals captured at Trent River Channel Darter monitoring sites during 2016 (n = 15 sites).

Site Code	Date	American Eel	Banded Killifish	Black Crappie	Blacknose Dace	Bluegill	Bluntnose Minnow	Brook Silverside	Brown Bullhead	Central Mudminnow	Central Stoneroller	Channel Catfish	Channel Darter	Common Carp	Common Shiner	Creek Chub	Fallfish	Fantail Darter	Finescale Dace	Gizzard Shad	Golden Shiner	Greater Redhorse	Hornyhead Chub	Iowa Darter	Johnny Darter	Largemouth Bass	Logperch	Longnose Dace	Longnose Gar
T01	25-Aug	1	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	4	0	0
T02	23-Aug	17	0	0	0	12	0	36	0	0	0	0	10	0	0	0	0	0	0	0	2	0	0	0	0	24	50	4	0
T03	23-Aug	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	25	0	0
T04	25-Aug	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0
T05	23-Aug	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	2	1	0	0	0	0	0	0	0	1	13	0	0
T06	24-Aug	0	0	0	0	4	1	0	0	0	0	0	17	0	0	0	0	0	0	0	0	0	0	0	0	0	22	0	0
T07	25-Aug	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T08	25-Aug	1	0	0	0	0	0	0	0	0	0	0	6	0	0	0	1	0	0	0	0	0	0	0	0	0	10	0	0
T09	25-Aug	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	2	1	5	0
T10	24-Aug	0	0	0	0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	9	154	197	0
T11	23-Aug	0	0	0	0	0	4	0	0	0	11	0	0	0	0	0	1	0	0	0	0	0	0	0	9	12	21	1	0
T12	23-Aug	0	0	1	0	11	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	16	14	17	0
T13	24-Aug	0	0	0	0	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	25	17	0
T14	23-Aug	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	0	81	0
T15	23-Aug	0	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	39	0	0

Appendix 6i. continued

Site Code	Date	Mimic Shiner	Minnow sp.	Northern Pike	Northern Sunfish	Pumpkinseed	Redhorse Sp.	Rock Bass	Rosyface Shiner	Round Goby	Shorthead Redhorse	Silver Redhorse	Smallmouth Bass	Stonecat Madtom	Sunfish sp. (YOY)	Walleye	White Sucker	Yellow Perch
T01	25-Aug	0	0	0	0	0	0	41	0	5	0	0	1	0	0	0	0	0
T02	23-Aug	0	0	0	0	0	0	3	20	37	0	0	11	0	0	0	0	65
T03	23-Aug	0	0	0	0	1	0	5	0	14	0	0	0	0	0	0	0	0
T04	25-Aug	0	0	0	0	0	0	3	0	20	0	0	2	0	0	0	0	0
T05	23-Aug	1	0	0	0	3	0	4	0	26	0	0	0	0	0	0	0	0
T06	24-Aug	0	0	0	0	1	0	2	0	42	0	0	16	0	0	0	0	0
T07	25-Aug	0	0	0	0	0	0	2	0	24	0	0	6	0	0	0	0	0
T08	25-Aug	74	0	0	0	0	0	5	7	70	0	0	7	0	0	0	0	0
T09	25-Aug	0	0	0	0	0	0	0	0	93	0	0	4	0	0	0	0	0
T10	24-Aug	0	0	0	0	0	0	4	0	75	0	0	22	0	0	0	0	0
T11	23-Aug	0	0	0	0	0	0	4	4	12	0	0	12	0	0	0	6	0
T12	23-Aug	0	0	0	0	0	0	5	0	1	0	0	9	0	0	0	0	0
T13	24-Aug	0	0	0	0	0	0	11	0	80	0	0	14	0	0	0	0	0
T14	23-Aug	0	0	0	0	0	0	0	0	59	0	0	9	0	0	0	23	0
T15	23-Aug	0	0	0	0	2	0	10	0	24	0	0	2	0	0	0	0	2

Appendix 16j. Summary of individuals captured at Trent River Channel Darter monitoring sites during 2017 (n = 14 sites).

Site Code	Date	American Eel	Banded Killifish	Black Crappie	Blacknose Dace	Bluegill	Bluntnose Minnow	Brook Silverside	Brown Bullhead	Central Mudminnow	Central Stoneroller	Channel Catfish	Channel Darter	Common Carp	Common Shiner	Creek Chub	Fallfish	Fantail Darter	Finescale Dace	Gizzard Shad	Golden Shiner	Greater Redhorse	Hornyhead Chub	Iowa Darter	Johnny Darter	Largemouth Bass	Logperch	Longnose Dace	Longnose Gar
T01	13-Sep	2	1	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T02	02-Aug	27	0	0	0	2	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	1	0	5	0
T03	02-Aug	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	3
T04	09-Aug	1	0	0	0	0	0	0	0	0	0	0	7	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0
T05	02-Aug	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
T06	01-Aug	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0
T07	01-Aug	0	0	0	0	1	0	0	0	0	0	0	9	0	0	0	1	0	0	0	0	0	0	0	0	0	6	0	0
T08	01-Aug	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T09	09-Aug	0	1	0	0	1	5	0	2	0	0	0	12	0	0	0	0	0	0	0	0	0	0	0	0	6	8	2	0
T10	29-Aug	0	0	0	0	4	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	2	22	33	0
T11	01-Aug	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	7	0	0
T12	02-Aug	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	8	9	0
T13	29-Aug	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0
T15	29-Aug	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	17	49	25	0

Appendix 6j. continued

Site Code	Date	Mimic Shiner	Minnow sp.	Northern Pike	Northern Sunfish	Pumpkinseed	Redhorse Sp.	Rock Bass	Rosyface Shiner	Round Goby	Shorthead Redhorse	Silver Redhorse	Smallmouth Bass	Stonecat Madtom	Sunfish sp. (YOY)	Walleye	White Sucker	Yellow Perch
T01	13-Sep	0	0	0	0	0	0	5	0	4	0	0	0	0	0	0	0	0
T02	02-Aug	0	0	0	0	0	0	26	0	1	0	0	3	0	0	0	0	1
T03	02-Aug	0	0	0	0	1	0	0	0	5	0	0	0	0	0	0	0	0
T04	09-Aug	0	0	0	0	0	0	2	0	16	0	0	1	0	0	0	0	0
T05	02-Aug	1	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0
T06	01-Aug	0	0	0	0	0	0	1	0	2	0	0	0	0	0	0	0	0
T07	01-Aug	1	0	0	0	0	0	1	0	5	0	0	0	0	0	0	0	0
T08	01-Aug	0	0	0	0	0	0	15	0	36	0	0	40	0	0	0	0	0
T09	09-Aug	1	0	0	0	1	0	7	0	10	0	0	12	0	0	0	0	0
T10	29-Aug	0	0	0	0	0	0	13	0	9	0	0	35	0	0	0	0	0
T11	01-Aug	0	0	0	0	0	1	4	0	3	0	0	3	0	0	0	0	0
T12	02-Aug	0	0	0	0	0	0	5	0	0	0	0	8	1	0	0	0	0
T13	29-Aug	0	0	0	0	0	0	16	0	57	0	0	19	0	0	0	0	0
T15	29-Aug	0	0	0	0	0	0	0	0	17	0	0	58	0	0	0	0	0

Appendix 17k. Summary of individuals captured at Trent River Channel Darter monitoring sites during 2018 (n = 14 sites).

Site Code	Date	American Eel	Banded Killifish	Black Crappie	Blacknose Dace	Bluegill	Bluntnose Minnow	Brook Silverside	Brown Bullhead	Central Mudminnow	Central Stoneroller	Channel Catfish	Channel Darter	Common Carp	Common Shiner	Creek Chub	Fallfish	Fantail Darter	Finescale Dace	Gizzard Shad	Golden Shiner	Greater Redhorse	Hornyhead Chub	Iowa Darter	Johnny Darter	Largemouth Bass	Logperch	Longnose Dace	Longnose Gar
T01	27-Jul	1	0	0	0	3	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	0	0	0
T02	26-Jul	6	0	0	0	39	0	0	1	0	0	0	5	0	0	0	3	0	0	0	0	0	0	0	0	5	8	6	0
T04	31-Jul	2	0	0	0	0	0	0	0	0	0	0	7	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
T05	26-Jul	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	1
T06	26-Jul	0	0	0	0	0	3	0	0	0	0	0	7	0	0	0	9	0	0	0	0	0	0	0	0	0	1	0	0
T07	27-Jul	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	44	0	0	0	0	0	0	0	0	3	0	0	0
T08	26-Jul	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0
T09	27-Jul	0	0	0	0	0	0	0	0	0	0	0	7	0	0	0	0	0	0	0	0	0	0	0	0	8	0	6	0
T10	03-Aug	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	60	77	0
T11	02-Aug	0	0	0	0	0	2	0	0	0	7	0	0	0	0	11	15	0	0	0	0	0	0	0	2	1	11	1	0
T12	26-Jul	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	56	0	0	0	0	0	0	0	0	0	17	25	0
T13	02-Aug	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14	0	0	0	0	0	0	0	0	0	6	16	0
T14	02-Aug	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	0
T15	01-Aug	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	16	1	0

Appendix 6k. continued

Site Code	Date	Mimic Shiner	Minnow sp.	Northern Pike	Northern Sunfish	Pumpkinseed	Redhorse Sp.	Rock Bass	Rosyface Shiner	Round Goby	Shorthead Redhorse	Silver Redhorse	Smallmouth Bass	Stonecat Madtom	Sunfish sp. (YOY)	Walleye	White Sucker	Yellow Perch
T01	27-Jul	0	0	0	0	3	0	23	0	0	0	0	0	0	0	0	0	1
T02	26-Jul	0	0	0	0	7	0	96	0	9	0	0	8	0	0	0	0	2
T04	31-Jul	0	0	0	0	0	0	2	0	23	0	0	5	0	0	0	0	0
T05	26-Jul	0	0	0	0	2	0	0	0	0	0	0	1	0	0	0	0	0
T06	26-Jul	0	0	0	0	0	0	5	0	1	0	0	78	0	0	0	0	0
T07	27-Jul	0	0	0	0	0	0	11	0	16	0	0	15	0	0	0	0	0
T08	26-Jul	0	0	0	0	0	0	3	0	19	0	0	131	0	0	0	0	0
T09	27-Jul	0	0	0	0	0	0	0	0	3	0	0	22	0	0	0	0	0
T10	03-Aug	0	0	0	0	0	0	1	0	3	0	0	107	0	0	0	0	0
T11	02-Aug	0	0	0	0	0	3	0	0	3	4	0	16	0	0	0	0	0
T12	26-Jul	0	0	0	0	0	0	12	1	1	0	0	54	2	0	0	0	0
T13	02-Aug	0	0	0	0	0	0	4	1	115	0	0	10	0	0	0	0	0
T14	02-Aug	0	0	0	0	0	0	0	0	7	0	0	15	0	0	0	0	0
T15	01-Aug	0	0	0	0	0	0	1	0	0	0	0	5	0	0	0	0	0

Appendix 18a. Summary of individuals captured from Sonoco Generating Station (T04) during spring sampling from 2009 to 2018.

Year	Sample Date	Effort	American Eel	Channel Darter	Johnny Darter	Logperch	Round Goby
2009	4-Jun	2594	0	60	0	9	1
2009	16-Jun	1751	0	38	0	12	3
2010	8-Jun	4194	0	31	0	4	27
2010	11-Jun	3541	0	23	0	2	48
2011	21-Jun	2500	0	23	0	8	27
2012	20-Jun	2500	0	7	0	1	0
2013	27-Jun	1000	0	7	0	1	10
2014	19-Jun	2500	2	52	0	8	3
2016	31-May	2500	0	37	1	3	39
2017	9-Jun	2500	1	11	0	9	6
2018	29-May	2500	0	45	0	3	25

Appendix 19b. Summary of individuals captured from Sonoco Generating Station (T04) during fall sampling from 2009 to 2018.

Year	Sample Date	Effort	American Eel	Channel Darter	Logperch	Round Goby
2009	24-Sep-09	2660	0	26	8	0
2010	17-Sep-10	2623	0	23	11	0
2011	30-Sep-11	2500	0	12	3	67
2012	21-Sep-12	2500	0	8	0	53
2013	9-Sep-13	2500	1	4	1	64
2014	10-Oct-14	2500	2	50	45	45
2016	19-Oct-16	2500	6	4	15	154
2017	25-Sep-17	2500	2	38	5	63
2018	3-Oct-18	2500	7	9	6	66

Appendix 20. Summary of individuals captured from 17 sites along the Moira River in 2019.

Site	American Eel	Channel Darter	Fantail Darter	Logperch	Northern Sunfish	Round Goby
MR01	6	0	5	36	0	6
MR02	31	0	1	99	0	0
MR03	3	1	0	26	0	0
MR04	24	0	0	10	0	0
MR05	15	2	2	7	1	0
MR06	9	0	7	3	0	0
MR07	60	0	9	2	0	0
MR08	0	0	0	2	0	0
MR09	0	0	10	0	0	0
MR10	0	0	0	11	0	0
MR11	0	0	0	6	0	0
MR12	0	0	1	11	28	0
MR13	0	1	0	16	0	0
MR14	1	0	0	23	0	0
MR15	0	0	0	23	0	0
MR16	0	0	3	58	0	0
MR17	0	0	1	0	0	0

Appendix 21a. Catch data from angling surveys on Moira Lake (n=25 sites) in 2019.

Site	Bluegill	Pumpkinseed	Rock Bass	Smallmouth Bass
ML01	0	0	0	0
ML02	0	0	0	0
ML03	0	0	0	0
ML04	1	1	0	0
ML05	1	0	0	0
ML06	0	0	0	0
ML07	0	0	0	0
ML08	2	2	0	0
ML09	0	0	0	0
ML10	0	0	0	0
ML11	1	1	0	0
ML12	0	0	1	0
ML13	0	0	0	0
ML14	0	1	1	0
ML15	1	0	0	0
ML16	0	0	0	0
ML17	0	0	0	0
ML18	0	0	0	0
ML19	0	0	0	1
ML20	0	2	0	0
ML21	0	0	0	0
ML22	0	0	1	0
ML23	0	0	0	0
ML24	0	0	0	0
ML25	0	0	0	0

Appendix 22b. Catch data from angling surveys on Stoco Lake (n=22 sites) in 2019.

Site	Bluegill	Pumpkinseed	Rock Bass	Smallmouth Bass
SL01	0	0	0	0
SL02	0	0	0	0
SL03	0	0	0	0
SL04	0	0	0	0
SL05	0	0	0	0
SL06	0	0	0	0
SL07	0	0	0	0
SL08	0	1	0	0
SL09	0	0	2	0
SL10	0	0	0	0
SL11	0	0	0	0
SL12	0	0	0	0
SL13	0	0	0	0
SL14	0	0	0	0
SL15	0	0	0	0
SL16	0	0	0	0
SL17	0	0	0	0
SL18	0	0	0	0
SL19	0	0	0	0
SL20	0	0	0	0
SL21	0	0	0	0
SL22	0	0	0	0