Disease Screening of Fishes in Candidate Source and Recipient Locations to Inform Eastern Sand Darter Reintroduction

Karl A. Lamothe, David Groman, Carly White, Jason Barnucz, Robin C. Gáspárdy, and D. Andrew R. Drake

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Disease Screening of Fishes in Candidate Source and Recipient Locations to Inform Eastern Sand Darter Reintroduction

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ABSTRACT

Lamothe, K.A., Groman, D., White, C., Barnucz, J., Gáspárdy, R.C., and Drake, D.A.R. 2025. Disease Screening of Fishes in Candidate Source and Recipient Locations to Inform Eastern Sand Darter Reintroduction. Can. Manuscr. Rep. Fish. Aquat. Sci. 3305: vi + 20 p. https://doi.org/10.60825/6vqv-1c70

Three extirpations of Eastern Sand Darter (ESD; *Ammocrypta pellucida*), a fish species listed under the *Species at Risk Act*, have occurred in Ontario in the last century. The recovery strategy for Ontario ESD populations suggested that reintroduction could benefit the species and identified the need to investigate feasibility. A feasibility assessment suggested that the potential for disease transmission of known and novel diseases was a key uncertainty for achieving a successful reintroduction. As such, disease screening was performed for ESD in the Grand River, a potential source population for future reintroductions. As well, disease screening was performed for common fishes at candidate recipient locations for reintroduction in Big Otter Creek, which included: Common Shiner (*Luxilus cornutus*), White Sucker (*Catostomus commersonii*), Johnny Darter (*Etheostoma nigrum*), Blackside Darter (*Percina maculata*), Round Goby (*Neogobius melanostomus*), and Spotfin Shiner (*Cyprinella spiloptera*). A total of 308 fishes were collected for disease screening. No communicable viruses or bacteria were detected. Scant or light growth of non-pathogenic bacteria was identified on 14% of collected fishes after three weeks of incubation. The cause of bacterial growth was likely environmental and/or caused by contamination when performing kidney swabs on the small-bodied fishes. A lack of communicable diseases among collected fishes suggests that transfer of the screened diseases during reintroduction is unlikely to occur. This research will support decision-making around the translocation of ESD from the Grand River to Big Otter Creek.

RÉSUMÉ

Lamothe, K.A., Groman, D., White, C., Barnucz, J., Gáspárdy, R.C., and Drake, D.A.R. 2025. Disease Screening of Fishes in Candidate Source and Recipient Locations to Inform Eastern Sand Darter Reintroduction. Can. Manuscr. Rep. Fish. Aquat. Sci. 3305: vi + 20 p.
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Trois populations de dard de sable (*Ammocrypta pellucida*), une espèce de poisson inscrite en vertu de la Loi sur les espèces en péril, ont disparu en Ontario au cours du dernier siècle. Le programme de rétablissement du dard de sable (populations de l'Ontario) laissait entendre que la réintroduction d'individus pourrait être bénéfique pour l'espèce, et il indiquait la nécessité d'en étudier la faisabilité. Une évaluation de la faisabilité a révélé que le potentiel de transmission de maladies connues et nouvelles était une incertitude majeure concernant la réussite d'une réintroduction. Par conséquent, un dépistage de maladies a été effectué dans la population de dard de sable de la rivière Grand, de laquelle des individus pourraient être prélevés à des fins de réintroduction. Un dépistage de maladies a également été effectué chez les espèces de poisson communes à la rivière Grand et aux sites de réintroduction envisagés dans le ruisseau Big Otter, à savoir le méné à nageoires rouges (*Luxilus cornutus*), le meunier noir (*Catostomus commersonii*), le raseux-de-terre noir (*Etheostoma nigrum*), le dard noir (*Percina maculata*), le gobie à taches noires *(Neogobius melanostomus*) et le méné bleu (*Cyprinella spiloptera*). Au total, 308 poissons ont été prélevés pour le dépistage de maladies. Aucun virus ni aucune bactérie transmissible n'a été détecté. Une croissance faible de bactéries non pathogènes a été observée chez 14% de ces poissons après trois semaines d'incubation. Cette croissance bactérienne a probablement été causée par un facteur environnemental ou une contamination lors du prélèvement d'échantillons de rein sur les poissons de petite taille. L'absence de maladies transmissibles parmi les poissons étudiés donne à penser qu'un transfert à la suite d'une réintroduction serait peu probable. Cette recherche appuiera la prise de décisions concernant le déplacement de dards de sable de la rivière Grand au ruisseau Big Otter.

INTRODUCTION

Eastern Sand Darter (ESD; *Ammocrypta pellucida*) is a freshwater fish species listed under the federal *Species at Risk Act* (SARA). Three Designatable Units (DUs) are recognized for ESD in Canada: the Southwestern Ontario DU (Threatened), West Lake DU (Threatened), and Québec DU (Special Concern). Three extirpations have occurred across the species range in Ontario (Ausable River, Big Otter Creek, and Catfish Creek). In response to these extirpations, the recovery strategy for Ontario populations suggested that reintroduction could benefit the species and identified the need to investigate its feasibility (Fisheries and Oceans Canada 2012). As such, a Canadian Science Advisory Secretariat (CSAS) meeting was convened to apply the decision-support framework for the conservation translocation of SARA-listed freshwater fishes and mussels (Fisheries and Oceans Canada 2023) for ESD in Ontario. At the meeting, experts with knowledge on ESD biology, fish ecology, local habitat, and species reintroduction evaluated the ecological benefits, risks, and feasibility of reintroduction for ESD in Ontario.

Several scenarios were considered at the CSAS meeting for implementing a reintroduction that differed based on the source population and recipient locations. There are no active efforts to breed or maintain ESD under human care in Canada; therefore, individuals from a wild source population are needed to implement reintroduction at this time. As such, CSAS participants considered population, abiotic, biotic, and threat-related factors that could influence the success of translocating wild individuals from the Grand and/or Thames rivers to the Ausable River and/or Big Otter Creek. Overall, there was greater support to suggest that Big Otter Creek has the ecological characteristics necessary for supporting a reintroduced ESD population and that the Grand River population was the most suitable source for reintroduction efforts. Nevertheless, there remained uncertainty about some aspects of reintroduction for ESD that should be addressed prior to implementation.

One uncertainty regarding the potential success of an ESD reintroduction is the prevalence of, and potential to spread disease from the source population to the recipient location. A disease could also prevent the establishment of individuals at the recipient location, regardless of whether the disease was already present in the recipient location or spread during translocation (Viggers et al. 1993; Sainsbury et al. 2012). However, relatively little is known about the diseases that may affect ESD and co-occurring species. As such, disease screening was undertaken to understand the prevalence of communicable diseases within the candidate recipient freshwater fish community (Big Otter Creek) and the candidate Grand River ESD source population. Here, we describe the methods for collecting and screening fishes for disease and the results of those tests. The information presented in this report will support decision-making around the translocation of ESD from the Grand River to Big Otter Creek.

METHODS

STUDY SYSTEM

The Grand River is a tributary of Lake Erie that flows south through agricultural and urban areas from Wareham, ON, to Dunnville at Port Maitland. Agriculture is the primary land use in this region, with farms making up approximately 70% of the watershed. At least 67 freshwater fish species have been documented in the Grand River, including the largest and most well-studied ESD population in Ontario. Recent population abundance estimates for ESD in the Grand River suggested that between 48,011 and 125,891 individuals older than age one exist, based on species-specific monitoring and extrapolation using estimates of habitat availability.

Big Otter Creek is a tributary of Lake Erie that flows south from Norwich, ON, through the western side of the Norfolk Sand Plain, emptying at Port Burwell just west of Long Point National Wildlife Area. Similar to the Grand River, agriculture is the primary land use in this region, covering approximately 74% of the Big Otter Creek watershed (Lake Erie Source Protection Regional Technical Team 2008). Crops produced in this region include those that benefit from sandy soils, such as tobacco, ginseng, and vegetables. Additionally, due to high water demand for agriculture, dams have been constructed on nearly all connecting tributaries (Lake Erie Source Protection Regional Technical Team 2008). The last known collections of ESD from Big Otter Creek include a single adult collected in 1923 near Tillsonburg, upstream of Highway 3 (Hubbs and Brown 1929), as well as collections near Calton and Richmond in 1955 (COSEWIC 2009; Barnucz et al. 2020, 2022).

FISH COLLECTIONS

The objective of sampling Big Otter Creek was to collect up to 50 individuals from each of the common species known to occupy the river that may directly interact with reintroduced ESD. This included Common Shiner (*Luxilus cornutus*), White Sucker (*Catostomus commersonii*), Johnny Darter (*Etheostoma nigrum*), Blackside Darter (*Percina maculata*), Round Goby (*Neogobius melanostomus*), and Spotfin Shiner (*Cyprinella spiloptera*). Fifty individuals were chosen as the sample size for collection to limit harm to the populations while providing ~95% confidence that at least one infected fish (if present in the wild) would be detected through screening (USFWS and AFS-FHS 2014).

Fishes were collected across two seasons; Big Otter Creek was surveyed in fall 2023 (October 30-November 1) and spring 2024 (May 24-June 11; Figure 1). A non-standardized, targeted approach was used for selecting sites for collections that were near candidate locations for reintroduction. In fall 2023, fishes were collected from four sites, one in the Municipality of Bayham, ON, east of Aylmer, and three in the Town of Tillsonburg (Table 1; Figure 1). In the fall of 2024, fishes were collected from three sites in Eden, ON, three sites adjacent to the Tillsonburg Conservation Area, and two sites adjacent to The Bridges at Tillsonburg Golf Course (Table 1; Figure 1). Collections of ESD from the Grand River were performed in spring 2024. A total of 50 individuals were obtained from four candidate source locations, one west of Kerby Island downstream of Wilkes Dam, two upstream of Cockshutt Bridge access point, and one in Cayuga east of Mt. Healy, ON (Figure 2; Table 2).

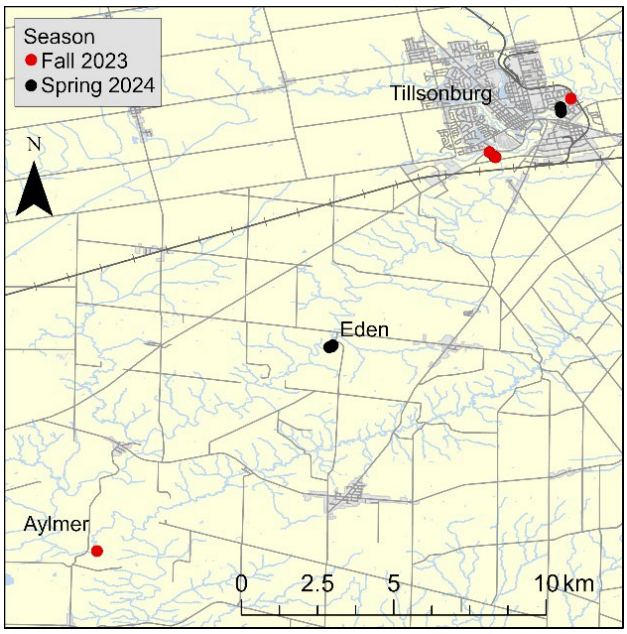

Figure 1. *Location of fish collections from Big Otter Creek (2023, 2024).*

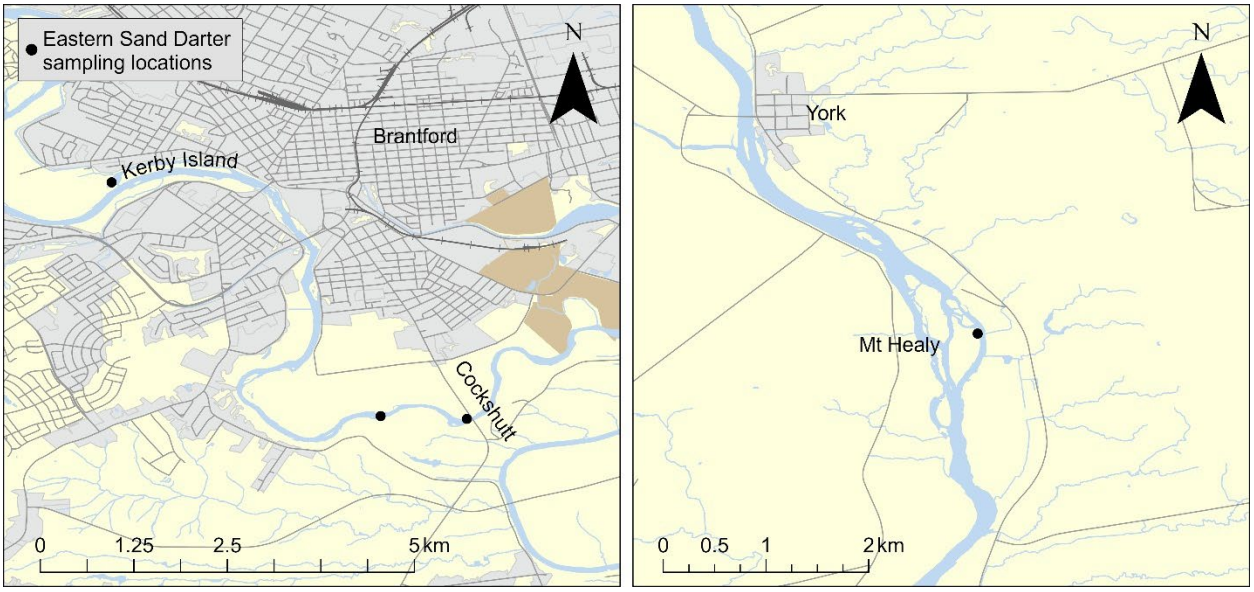

Figure 2*. Location of Eastern Sand Darter collections from the Grand River (2024).*

Collected fishes were euthanized on site following the Fish Euthanasia Protocol (GWACC-107), where 1-3 mL of clove oil was mixed in 10 mL of ethanol; this solution was then added to 1 L of water. Fishes were immersed in this solution until loss of equilibrium and when gill vents stopped moving. Each euthanized fish was bagged individually in Whirl-Pak® bags, labelled with an identification number, and stored immediately on dry ice. Fishes were transferred to a -80°C freezer at the Canadian Centre for Inland Waters, Burlington, ON, following collection and stored until disease testing.

DISEASE SCREENING

The Canadian Food Inspection Agency (CFIA), the federal department in charge of safeguarding food, animals, and plants, lists 10 federally reportable diseases for aquatic animals (CFIA 2019). Those relevant to an ESD reintroduction are Viral Hemorrhagic Septicemia (VHS), Infectious Pancreatic Necrosis (IPN), and Spring Viremia of Carp (SVC). VHS is a virus that was first detected in Lake Ontario in 2005, and has been detected in finfishes from Lake Erie, Lake Huron, Lake Simcoe, Lake Superior, the lower Thames River, and the St. Lawrence River (CFIA 2013). IPN is a virus that most often infects salmonids, but has also been detected in other species like Goldfish (*Carassius auratus*) and Eurasian Minnow (*Phoxinus phoxinus*; CFIA 2020*a*). Finally, SVC is caused by *Carp sprivivirus*, formerly known as spring viraemia of carp virus. The virus is known to affect over a dozen species in Canada, including potential co-occurring species in Big Otter Creek (e.g., Fathead Minnow *Pimephales promelas*; CFIA 2020*b*). In addition, CFIA collects data on Annually Notifiable Diseases of Finfish, which include four bacterial agents: Bacterial Kidney Disease (*Renibacterium salmoninarum*), Enteric Red Mouth Disease (*Yersinia ruckeri*); Furunculosis (*Aeromonas salmonicida*), and Streptococcosis (*Streptococcus iniae*).

To comply with these two categories of CFIA regulations (Reportable and Notifiable Diseases), diagnostic testing for bacteria and viruses was conducted. Bacteriology was performed on each individual fish. Virology was performed in pools of five individuals; hence, 10 batches were tested for each species. Testing was conducted by the Aquatic Diagnostic Testing Service at the Atlantic Veterinary College in Prince Edward Island, Canada.

SAMPLING PERMITS

Sampling was conducted by Fisheries and Oceans Canada under SARA Permit Number 24-PCAA-00013. Seining was conducted under Standard Operating Protocol GWACC-116, fish euthanasia was conducted under Standard Operating Procedure GWACC-107, and lethal collections were conducted under Animal Use Permit OPA-ACC-2024-24, “Disease Screening for an experimental Eastern Sand Darter translocation in Big Otter Creek (Lake Erie drainage)”, all of which were approved by the Fisheries and Oceans Canada and Environment and Climate Change Canada Animal Care Committee.

RESULTS

FISH COLLECTION

In total, 308 fishes were collected and tested for disease (Table 1; Table 2). In fall 2023, 190 fishes were sampled from Big Otter Creek, which included 50 Common Shiner, 50 White Sucker, 50 Johnny Darter, 30 Blackside Darter, 9 Round Goby, and 1 Spotfin Shiner (Table 1). In spring 2024, 20 Blackside Darter and 48 Round Goby were collected from Big Otter Creek, and 50 ESD from the Grand River (Table 2). Due to challenges with locating Spotfin Shiner, only a single individual was tested for disease. The total length (mm) and weight (g) of the collected ESD ranged between 50-65 mm and 0.9-2.1 g, respectively (Table 3).

DISEASE SCREENING

No communicable viruses or bacteriology were isolated from the 308 fishes collected from Big Otter Creek or the Grand River. Thirty-two of the 190 fishes (16.8%) from the fall 2023 sampling (Table 1) and 11 of the 128 fishes (8.6%) from the spring 2024 sampling showed limited (scant or light) growth of non-pathogenic bacteria (Table 2). This included two ESD (Table 2). Isolated bacteria included *Acinetobacter johnsonii*, *A. lwoffii*, *Bacillus pumilus*, *Brevundimonas* sp.,

Carnobacterium maltaromaticum, *Erwinia* spp., *Microbacterium* spp., *Neomicrococcus aestuarii*, mixed flora, *Shewanella putrefaciens*, *Staphylococcus warneri*, *Pseudomonas* spp., *Rahnella* sp., *Staphylococcus epidermidis*, *Streptomyces* spp., and several unidentifiable organisms (Table 1; Table 2).

DISCUSSION

Results of the disease screening indicated a lack of communicable diseases among ESD from the Grand River and the tested species from Big Otter Creek. The light or scant growth of non-pathogenic bacteria was expected as bacteria are often isolated from healthy fish and occur naturally in the freshwater environment. As well, due to the challenges of swabbing the kidneys of small-bodied fishes, it is possible that the swabs may have been contaminated by bacteria found on the skin. The results of this work suggest a low probability (< 5%) of occurrence of communicable diseases from ESD in the Grand River and common species from Big Otter Creek that may directly interact with reintroduced ESD, suggesting a low probability of transmission of these diseases between locations due to reintroduction.

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***Table 1**. Bacteriology results for fishes collected from Big Otter Creek in fall 2023.*

Site ID	Date Captured	Species	Fish ID	Growth	Bacteriology	Latitude	Longitude
2023-BOC-LC-301023-001	30-Oct-23	Common Shiner	CS-018	Scant	*Rahnella* sp.	42.84890	-80.73349
2023-BOC-LC-301023-001	30-Oct-23	Common Shiner	CS-020	Light	Mixed flora (4 colony types) including environmental pseudomanads	42.84890	-80.73349
2023-BOC-LC-301023-001	30-Oct-23	Common Shiner	CS-021	Scant	Mixed flora (4 colony types) including environmental pseudomanads	42.84890	-80.73349
2023-BOC-LC-311023-001	31-Oct-23	Common Shiner	CS-031	None		42.84890	-80.73349
2023-BOC-LC-311023-001	31-Oct-23	Common Shiner	CS-051	None		42.84890	-80.73349
2023-BOC-LC-301023-001	30-Oct-23	Common Shiner	CS-001	None		42.84890	-80.73349
2023-BOC-LC-301023-001	30-Oct-23	Common Shiner	CS-002	None		42.84890	-80.73349
2023-BOC-LC-301023-001	30-Oct-23	Common Shiner	CS-003	None		42.84890	-80.73349
2023-BOC-LC-301023-001	30-Oct-23	Common Shiner	CS-004	None		42.84890	-80.73349
2023-BOC-LC-301023-001	30-Oct-23	Common Shiner	CS-005	None		42.84890	-80.73349
2023-BOC-LC-301023-001	30-Oct-23	Common Shiner	CS-006	None		42.84890	-80.73349
2023-BOC-LC-301023-001	30-Oct-23	Common Shiner	CS-007	None		42.84890	-80.73349
2023-BOC-LC-301023-001	30-Oct-23	Common Shiner	CS-008	None		42.84890	-80.73349
2023-BOC-LC-301023-001	30-Oct-23	Common Shiner	CS-009	None		42.84890	-80.73349
2023-BOC-LC-301023-001	30-Oct-23	Common Shiner	CS-010	None		42.84890	-80.73349
2023-BOC-LC-301023-001	30-Oct-23	Common Shiner	CS-011	None		42.84890	-80.73349
2023-BOC-LC-301023-001	30-Oct-23	Common Shiner	CS-012	None		42.84890	-80.73349
2023-BOC-LC-301023-001	30-Oct-23	Common Shiner	CS-013	None		42.84890	-80.73349
2023-BOC-LC-301023-001	30-Oct-23	Common Shiner	CS-014	None		42.84890	-80.73349
2023-BOC-LC-301023-001	30-Oct-23	Common Shiner	CS-015	None		42.84890	-80.73349
2023-BOC-LC-301023-001	30-Oct-23	Common Shiner	CS-016	None		42.84890	-80.73349
2023-BOC-LC-301023-001	30-Oct-23	Common Shiner	CS-017	None		42.84890	-80.73349
2023-BOC-LC-301023-001	30-Oct-23	Common Shiner	CS-019	None		42.84890	-80.73349
2023-BOC-LC-301023-001	30-Oct-23	Common Shiner	CS-022	None		42.84890	-80.73349
2023-BOC-LC-301023-001	30-Oct-23	Common Shiner	CS-023	None		42.84890	-80.73349
2023-BOC-LC-301023-001	30-Oct-23	Common Shiner	CS-024	None		42.84890	-80.73349
2023-BOC-LC-301023-001	30-Oct-23	Common Shiner	CS-025	None		42.84890	-80.73349

Site ID	Date Captured	Species	Fish ID	Growth	Bacteriology	Latitude	Longitude
2023-BOC-LC-301023-001	30-Oct-23	Common Shiner	CS-026	None		42.84890	-80.73349
2023-BOC-LC-301023-001	30-Oct-23	Common Shiner	CS-027	None		42.84890	-80.73349
2023-BOC-LC-301023-001	30-Oct-23	Common Shiner	CS-028	None		42.84890	-80.73349
2023-BOC-LC-301023-001	30-Oct-23	Common Shiner	CS-029	None		42.84890	-80.73349
2023-BOC-LC-301023-001	30-Oct-23	Common Shiner	CS-030	None		42.84890	-80.73349
2023-BOC-LC-311023-001	31-Oct-23	Common Shiner	CS-032	None		42.84890	-80.73349
2023-BOC-LC-311023-001	31-Oct-23	Common Shiner	CS-033	None		42.84890	-80.73349
2023-BOC-LC-311023-001	31-Oct-23	Common Shiner	CS-034	None		42.84890	-80.73349
2023-BOC-LC-311023-001	31-Oct-23	Common Shiner	CS-035	None		42.84890	-80.73349
2023-BOC-LC-311023-001	31-Oct-23	Common Shiner	CS-036	None		42.84890	-80.73349
2023-BOC-LC-311023-001	31-Oct-23	Common Shiner	CS-037	None		42.84890	-80.73349
2023-BOC-LC-311023-001	31-Oct-23	Common Shiner	CS-038	None		42.84890	-80.73349
2023-BOC-LC-311023-001	31-Oct-23	Common Shiner	CS-039	None		42.84890	-80.73349
2023-BOC-LC-311023-001	31-Oct-23	Common Shiner	CS-040	None		42.84890	-80.73349
2023-BOC-LC-311023-001	31-Oct-23	Common Shiner	CS-041	None		42.84890	-80.73349
2023-BOC-LC-311023-001	31-Oct-23	Common Shiner	CS-042	None		42.84890	-80.73349
2023-BOC-LC-311023-001	31-Oct-23	Common Shiner	CS-043	None		42.84890	-80.73349
2023-BOC-LC-311023-001	31-Oct-23	Common Shiner	CS-044	None		42.84890	-80.73349
2023-BOC-LC-311023-001	31-Oct-23	Common Shiner	CS-045	None		42.84890	-80.73349
2023-BOC-LC-311023-001	31-Oct-23	Common Shiner	CS-046	None		42.84890	-80.73349
2023-BOC-LC-311023-001	31-Oct-23	Common Shiner	CS-047	None		42.84890	-80.73349
2023-BOC-LC-311023-001	31-Oct-23	Common Shiner	CS-048	None		42.84890	-80.73349
2023-BOC-LC-311023-001	31-Oct-23	Common Shiner	CS-049	None		42.84890	-80.73349
2023-BOC-LC-301023-001	30-Oct-23	White Sucker	WS-003	Scant	Mixed flora, 3 colony types	42.84890	-80.73349
2023-BOC-LC-301023-001	30-Oct-23	White Sucker	WS-008	None		42.84890	-80.73349
2023-BOC-LC-311023-001	30-Oct-23	White Sucker	WS-018	None		42.84890	-80.73349
2023-BOC-LC-311023-001	30-Oct-23	White Sucker	WS-020	None		42.84890	-80.73349
2023-BOC-LC-311023-001	30-Oct-23	White Sucker	WS-031	None		42.84890	-80.73349
2023-BOC-LC-301023-001	30-Oct-23	White Sucker	WS-001	None		42.84890	-80.73349

Site ID	Date Captured	Species	Fish ID	Growth	Bacteriology	Latitude	Longitude
2023-BOC-LC-301023-001	30-Oct-23	White Sucker	WS-002	None		42.84890	-80.73349
2023-BOC-LC-301023-001	30-Oct-23	White Sucker	WS-004	None		42.84890	-80.73349
2023-BOC-LC-301023-001	30-Oct-23	White Sucker	WS-005	None		42.84890	-80.73349
2023-BOC-LC-301023-001	30-Oct-23	White Sucker	WS-006	None		42.84890	-80.73349
2023-BOC-LC-301023-001	30-Oct-23	White Sucker	WS-007	None		42.84890	-80.73349
2023-BOC-LC-301023-001	30-Oct-23	White Sucker	WS-009	None		42.84890	-80.73349
2023-BOC-LC-301023-001	30-Oct-23	White Sucker	WS-010	None		42.84890	-80.73349
2023-BOC-LC-301023-001	30-Oct-23	White Sucker	WS-011	None		42.84890	-80.73349
2023-BOC-LC-301023-001	30-Oct-23	White Sucker	WS-012	None		42.84890	-80.73349
2023-BOC-LC-301023-001	30-Oct-23	White Sucker	WS-013	None		42.84890	-80.73349
2023-BOC-LC-301023-001	30-Oct-23	White Sucker	WS-014	None		42.84890	-80.73349
2023-BOC-LC-301023-001	30-Oct-23	White Sucker	WS-015	None		42.84890	-80.73349
2023-BOC-LC-311023-001	30-Oct-23	White Sucker	WS-016	None		42.84890	-80.73349
2023-BOC-LC-311023-001	30-Oct-23	White Sucker	WS-017	None		42.84890	-80.73349
2023-BOC-LC-311023-001	30-Oct-23	White Sucker	WS-019	None		42.84890	-80.73349
2023-BOC-LC-311023-001	30-Oct-23	White Sucker	WS-021	None		42.84890	-80.73349
2023-BOC-LC-311023-001	30-Oct-23	White Sucker	WS-022	None		42.84890	-80.73349
2023-BOC-LC-311023-001	30-Oct-23	White Sucker	WS-023	None		42.84890	-80.73349
2023-BOC-LC-311023-001	30-Oct-23	White Sucker	WS-024	None		42.84890	-80.73349
2023-BOC-LC-311023-001	30-Oct-23	White Sucker	WS-025	None		42.84890	-80.73349
2023-BOC-LC-311023-001	30-Oct-23	White Sucker	WS-026	None		42.84890	-80.73349
2023-BOC-LC-311023-001	30-Oct-23	White Sucker	WS-027	None		42.84890	-80.73349
2023-BOC-LC-311023-001	30-Oct-23	White Sucker	WS-028	None		42.84890	-80.73349
2023-BOC-LC-311023-001	30-Oct-23	White Sucker	WS-029	None		42.84890	-80.73349
2023-BOC-LC-311023-001	30-Oct-23	White Sucker	WS-030	None		42.84890	-80.73349
2023-BOC-LC-311023-001	30-Oct-23	White Sucker	WS-032	None		42.84890	-80.73349
2023-BOC-LC-311023-001	30-Oct-23	White Sucker	WS-033	None		42.84890	-80.73349
2023-BOC-LC-311023-001	30-Oct-23	White Sucker	WS-034	None		42.84890	-80.73349
2023-BOC-LC-311023-001	30-Oct-23	White Sucker	WS-035	None		42.84890	-80.73349

Site ID	Date Captured	Species	Fish ID	Growth	Bacteriology	Latitude	Longitude
2023-BOC-LC-311023-001	30-Oct-23	White Sucker	WS-036	None		42.84890	-80.73349
2023-BOC-LC-311023-001	30-Oct-23	White Sucker	WS-037	None		42.84890	-80.73349
2023-BOC-LC-311023-001	30-Oct-23	White Sucker	WS-038	None		42.84890	-80.73349
2023-BOC-LC-311023-001	30-Oct-23	White Sucker	WS-039	Scant	Unidentifiable organism (unable to ID by MALDI-TOF MS using direct smear or formic acid extraction)	42.84890	-80.73349
2023-BOC-LC-311023-001	30-Oct-23	White Sucker	WS-040	None		42.84890	-80.73349
2023-BOC-LC-311023-001	30-Oct-23	White Sucker	WS-041	None		42.84890	-80.73349
2023-BOC-LC-311023-001	30-Oct-23	White Sucker	WS-042	None		42.84890	-80.73349
2023-BOC-LC-311023-001	30-Oct-23	White Sucker	WS-043	None		42.84890	-80.73349
2023-BOC-LC-311023-001	30-Oct-23	White Sucker	WS-044	None		42.84890	-80.73349
2023-BOC-LC-311023-001	30-Oct-23	White Sucker	WS-045	None		42.84890	-80.73349
2023-BOC-LC-311023-001	30-Oct-23	White Sucker	WS-046	None		42.84890	-80.73349
2023-BOC-LC-311023-001	30-Oct-23	White Sucker	WS-047	None		42.84890	-80.73349
2023-BOC-LC-311023-001	30-Oct-23	White Sucker	WS-048	Scant	Unidentifiable organism (unable to ID by MALDI-TOF MS using direct smear or formic acid extraction)	42.84890	-80.73349
2023-BOC-LC-311023-001	30-Oct-23	White Sucker	WS-049	None		42.84890	-80.73349
2023-BOC-LC-311023-002	31-Oct-23	White Sucker	WS-050	None		42.86618	-80.71133
2023-BOC-LC-301023-001	30-Oct-23	Johnny Darter	JD-009	None		42.84890	-80.73349
2023-BOC-LC-301023-001	30-Oct-23	Johnny Darter	JD-015	Scant	Mixed flora (5 colony types) including *Shewanella putrefaciens*, *Microbacterium* spp.	42.84890	-80.73349
2023-BOC-LC-301023-001	30-Oct-23	Johnny Darter	JD-025	Scant	Mixed flora including *Acinetobacter lwoffii*, *Staphylococcus warneri*	42.84890	-80.73349
2023-BOC-LC-311023-001	30-Oct-23	Johnny Darter	JD-034	None		42.84890	-80.73349
2023-BOC-LC-311023-001	30-Oct-23	Johnny Darter	JD-043	Scant	Mixed flora including *Erwinia* spp.	42.84890	-80.73349
2023-BOC-LC-301023-001	30-Oct-23	Johnny Darter	JD-001	None		42.84890	-80.73349
2023-BOC-LC-301023-001	30-Oct-23	Johnny Darter	JD-002	Scant	*Acinetobacter johnsonii*	42.84890	-80.73349
2023-BOC-LC-301023-001	30-Oct-23	Johnny Darter	JD-003	Scant	Mixed flora	42.84890	-80.73349
2023-BOC-LC-301023-001	30-Oct-23	Johnny Darter	JD-004	None		42.84890	-80.73349
2023-BOC-LC-301023-001	30-Oct-23	Johnny Darter	JD-005	Scant	*Acinetobacter johnsonii*	42.84890	-80.73349
2023-BOC-LC-301023-001	30-Oct-23	Johnny Darter	JD-006	None		42.84890	-80.73349

Site ID	Date Captured	Species	Fish ID	Growth	Bacteriology	Latitude	Longitude
2023-BOC-LC-301023-001	30-Oct-23	Johnny Darter	JD-007	None		42.84890	-80.73349
2023-BOC-LC-301023-001	30-Oct-23	Johnny Darter	JD-008	None		42.84890	-80.73349
2023-BOC-LC-301023-001	30-Oct-23	Johnny Darter	JD-010	None		42.84890	-80.73349
2023-BOC-LC-301023-001	30-Oct-23	Johnny Darter	JD-011	None		42.84890	-80.73349
2023-BOC-LC-301023-001	30-Oct-23	Johnny Darter	JD-012	None		42.84890	-80.73349
2023-BOC-LC-301023-001	30-Oct-23	Johnny Darter	JD-013	None		42.84890	-80.73349
2023-BOC-LC-301023-001	30-Oct-23	Johnny Darter	JD-014	None		42.84890	-80.73349
2023-BOC-LC-301023-001	30-Oct-23	Johnny Darter	JD-016	None		42.84890	-80.73349
2023-BOC-LC-301023-001	30-Oct-23	Johnny Darter	JD-017	None		42.84890	-80.73349
2023-BOC-LC-301023-001	30-Oct-23	Johnny Darter	JD-018	None		42.84890	-80.73349
2023-BOC-LC-301023-001	30-Oct-23	Johnny Darter	JD-019	None		42.84890	-80.73349
2023-BOC-LC-301023-001	30-Oct-23	Johnny Darter	JD-020	None		42.84890	-80.73349
2023-BOC-LC-301023-001	30-Oct-23	Johnny Darter	JD-021	None		42.84890	-80.73349
2023-BOC-LC-301023-001	30-Oct-23	Johnny Darter	JD-022	None		42.84890	-80.73349
2023-BOC-LC-301023-001	30-Oct-23	Johnny Darter	JD-023	None		42.84890	-80.73349
2023-BOC-LC-301023-001	30-Oct-23	Johnny Darter	JD-027	None		42.84890	-80.73349
2023-BOC-LC-301023-001	30-Oct-23	Johnny Darter	JD-028	Scant	Gram Positive Cocci, *Neomicrococcus aestuarii*	42.84890	-80.73349
2023-BOC-LC-301023-001	30-Oct-23	Johnny Darter	JD-029	None		42.84890	-80.73349
2023-BOC-LC-311023-001	30-Oct-23	Johnny Darter	JD-030	None		42.84890	-80.73349
2023-BOC-LC-311023-001	30-Oct-23	Johnny Darter	JD-031	None		42.84890	-80.73349
2023-BOC-LC-311023-001	30-Oct-23	Johnny Darter	JD-032	None		42.84890	-80.73349
2023-BOC-LC-311023-001	30-Oct-23	Johnny Darter	JD-033	None		42.84890	-80.73349
2023-BOC-LC-311023-001	30-Oct-23	Johnny Darter	JD-035	Light	Mixed flora	42.84890	-80.73349
2023-BOC-LC-311023-001	30-Oct-23	Johnny Darter	JD-036	None		42.84890	-80.73349
2023-BOC-LC-311023-001	30-Oct-23	Johnny Darter	JD-037	None		42.84890	-80.73349
2023-BOC-LC-311023-001	30-Oct-23	Johnny Darter	JD-038	Scant	Unidentifiable organism	42.84890	-80.73349
2023-BOC-LC-311023-001	30-Oct-23	Johnny Darter	JD-039	Scant	Mixed flora	42.84890	-80.73349
2023-BOC-LC-311023-001	30-Oct-23	Johnny Darter	JD-040	None		42.84890	-80.73349
2023-BOC-LC-311023-001	30-Oct-23	Johnny Darter	JD-041	None		42.84890	-80.73349

Site ID	Date Captured	Species	Fish ID	Growth	Bacteriology	Latitude	Longitude
2023-BOC-LC-311023-001	30-Oct-23	Johnny Darter	JD-042	None		42.84890	-80.73349
2023-BOC-LC-311023-001	30-Oct-23	Johnny Darter	JD-044	None		42.84890	-80.73349
2023-BOC-LC-311023-001	30-Oct-23	Johnny Darter	JD-045	Scant	Unidentifiable organism	42.84890	-80.73349
2023-BOC-LC-311023-001	30-Oct-23	Johnny Darter	JD-046	None		42.84890	-80.73349
2023-BOC-LC-311023-001	30-Oct-23	Johnny Darter	JD-047	None		42.84890	-80.73349
2023-BOC-LC-311023-001	30-Oct-23	Johnny Darter	JD-048	Scant	Mixed flora	42.84890	-80.73349
2023-BOC-LC-311023-001	30-Oct-23	Johnny Darter	JD-049	None		42.84890	-80.73349
2023-BOC-LC-311023-001	30-Oct-23	Johnny Darter	JD-050	Scant	Mixed flora	42.84890	-80.73349
2023-BOC-LC-311023-001	30-Oct-23	Johnny Darter	JD-051	Scant	Mixed flora	42.84890	-80.73349
2023-BOC-LC-311023-001	30-Oct-23	Johnny Darter	JD-052	None		42.84890	-80.73349
2023-BOC-LC-011123-001	1-Nov-23	Blackside Darter	BS-001	None		42.85045	-80.73532
2023-BOC-LC-011123-001	1-Nov-23	Blackside Darter	BS-008	Scant	Mixed flora (3 colony types)	42.85045	-80.73532
2023-BOC-LC-011123-001	1-Nov-23	Blackside Darter	BS-014	Scant	Mixed flora (3 colony types)	42.85045	-80.73532
2023-BOC-LC-011123-001	1-Nov-23	Blackside Darter	BS-015	None		42.85045	-80.73532
2023-BOC-LC-011123-001	1-Nov-23	Blackside Darter	BS-018	Scant	Mixed flora (3 colony types)	42.85045	-80.73532
2023-BOC-LC-011123-001	1-Nov-23	Blackside Darter	BS-002	None		42.85045	-80.73532
2023-BOC-LC-011123-001	1-Nov-23	Blackside Darter	BS-003	Scant	Mixed flora	42.85045	-80.73532
2023-BOC-LC-011123-001	1-Nov-23	Blackside Darter	BS-004	None		42.85045	-80.73532
2023-BOC-LC-011123-001	1-Nov-23	Blackside Darter	BS-005	None		42.85045	-80.73532
2023-BOC-LC-011123-001	1-Nov-23	Blackside Darter	BS-006	None		42.85045	-80.73532
2023-BOC-LC-011123-001	1-Nov-23	Blackside Darter	BS-007	Scant	Mixed flora	42.85045	-80.73532
2023-BOC-LC-011123-001	1-Nov-23	Blackside Darter	BS-009	Scant	*Brevundimonas* sp.	42.85045	-80.73532
2023-BOC-LC-011123-001	1-Nov-23	Blackside Darter	BS-010	None		42.85045	-80.73532
2023-BOC-LC-011123-001	1-Nov-23	Blackside Darter	BS-011	None		42.85045	-80.73532
2023-BOC-LC-011123-001	1-Nov-23	Blackside Darter	BS-012	Scant	Unidentifiable organism	42.85045	-80.73532
2023-BOC-LC-011123-001	1-Nov-23	Blackside Darter	BS-013	None		42.85045	-80.73532
2023-BOC-LC-011123-001	1-Nov-23	Blackside Darter	BS-016	None		42.85045	-80.73532
2023-BOC-LC-011123-001	1-Nov-23	Blackside Darter	BS-017	None		42.85045	-80.73532
2023-BOC-LC-011123-001	1-Nov-23	Blackside Darter	BS-019	None		42.85045	-80.73532

Site ID	Date Captured	Species	Fish ID	Growth	Bacteriology	Latitude	Longitude
2023-BOC-LC-011123-001	1-Nov-23	Blackside Darter	BS-020	None		42.85045	-80.73532
2023-BOC-LC-011123-001	1-Nov-23	Blackside Darter	BS-021	None		42.85045	-80.73532
2023-BOC-LC-011123-001	1-Nov-23	Blackside Darter	BS-022	None		42.85045	-80.73532
2023-BOC-LC-011123-001	1-Nov-23	Blackside Darter	BS-023	Scant	Unidentifiable organism	42.85045	-80.73532
2023-BOC-LC-011123-001	1-Nov-23	Blackside Darter	BS-024	None		42.85045	-80.73532
2023-BOC-LC-011123-001	1-Nov-23	Blackside Darter	BS-025	None		42.85045	-80.73532
2023-BOC-LC-011123-001	1-Nov-23	Blackside Darter	BS-026	None		42.85045	-80.73532
2023-BOC-LC-011123-001	1-Nov-23	Blackside Darter	BS-027	None		42.85045	-80.73532
2023-BOC-LC-011123-001	1-Nov-23	Blackside Darter	BS-028	None		42.85045	-80.73532
2023-BOC-LC-011123-001	1-Nov-23	Blackside Darter	BS-029	Scant	*Carnobacterium maltaromaticum*	42.85045	-80.73532
2023-BOC-LC-011123-001	1-Nov-23	Blackside Darter	BS-030	Scant	Mixed flora	42.85045	-80.73532
2023-BOC-LC-311023-001	31-Oct-23	Round Goby	RG-001	None		42.73273	-80.85109
2023-BOC-LC-311023-003	31-Oct-23	Round Goby	RG-002	Scant	*Pseudomonas* sp.; Environmental pseudomonad	42.73273	-80.85109
2023-BOC-LC-011123-001	1-Nov-23	Round Goby	RG-003	None		42.85045	-80.73532
2023-BOC-LC-011123-001	1-Nov-23	Round Goby	RG-004	None		42.85045	-80.73532
2023-BOC-LC-011123-001	1-Nov-23	Round Goby	RG-005	None		42.85045	-80.73532
2023-BOC-LC-011123-001	1-Nov-23	Round Goby	RG-006	Scant	Mixed flora	42.85045	-80.73532
2023-BOC-LC-011123-001	1-Nov-23	Round Goby	RG-007	None		42.85045	-80.73532
2023-BOC-LC-011123-001	1-Nov-23	Round Goby	RG-008	None		42.85045	-80.73532
2023-BOC-LC-011123-001	1-Nov-23	Round Goby	RG-009	None		42.85045	-80.73532
2023-BOC-LC-311023-001	31-Oct-23	Spotfin Shiner	SS-001	None		42.84890	-80.73349

***Table 2**. Bacteriology results for fishes collected from Big Otter Creek (Blackside Darter, Round Goby) and the Grand River (Eastern Sand Darter) in spring 2024.*

Site ID	Date Captured	Species	Fish ID	Growth	Bacteriology	Latitude	Longitude
2024-BOC-LC-310524-001A	31-May-24	Blackside Darter	BS-031	None		42.848954	-80.733547
2024-BOC-LC-310524-001A	31-May-24	Blackside Darter	BS-032	None		42.848954	-80.733547
2024-BOC-LC-310524-001A	31-May-24	Blackside Darter	BS-033	None		42.848954	-80.733547
2024-BOC-LC-310524-001A	31-May-24	Blackside Darter	BS-034	None		42.848954	-80.733547
2024-BOC-LC-310524-001A	31-May-24	Blackside Darter	BS-035	None		42.848954	-80.733547
2024-BOC-LC-310524-001A	31-May-24	Blackside Darter	BS-036	None		42.848954	-80.733547
2024-BOC-LC-310524-001A	31-May-24	Blackside Darter	BS-037	None		42.848954	-80.733547
2024-BOC-LC-310524-001A	31-May-24	Blackside Darter	BS-038	None		42.848954	-80.733547
2024-BOC-LC-310524-001A	31-May-24	Blackside Darter	BS-039	None		42.848954	-80.733547
2024-BOC-LC-310524-001A	31-May-24	Blackside Darter	BS-040	Scant	*Pseudomonas* sp.; *P. chlororaphis / corrugata*	42.848954	-80.733547
2024-BOC-LC-310524-001A	31-May-24	Blackside Darter	BS-041	None		42.848954	-80.733547
2024-BOC-LC-310524-001A	31-May-24	Blackside Darter	BS-042	None		42.848954	-80.733547
2024-BOC-LC-310524-001A	31-May-24	Blackside Darter	BS-043	None		42.848954	-80.733547
2024-BOC-LC-310524-001A	31-May-24	Blackside Darter	BS-044	None		42.848954	-80.733547
2024-BOC-LC-310524-001A	31-May-24	Blackside Darter	BS-045	None		42.848954	-80.733547
2024-BOC-LC-310524-001A	31-May-24	Blackside Darter	BS-046	Scant	Mixed flora (Unable to ID by MALDI-TOF MS)	42.848954	-80.733547
2024-BOC-LC-310524-001A	31-May-24	Blackside Darter	BS-047	None		42.848954	-80.733547
2024-BOC-LC-310524-001A	31-May-24	Blackside Darter	BS-048	None		42.848954	-80.733547
2024-BOC-LC-310524-001A	31-May-24	Blackside Darter	BS-049	None		42.848954	-80.733547
2024-BOC-LC-310524-001A	31-May-24	Blackside Darter	BS-050	None		42.848954	-80.733547
2024-ESD-GR-060524-404A	6-May-24	Eastern Sand Darter	ESD-001	None		42.002982	-79.871752
2024-ESD-GR-060524-404A	6-May-24	Eastern Sand Darter	ESD-002	None		42.002982	-79.871752
2024-ESD-GR-060524-404A	6-May-24	Eastern Sand Darter	ESD-003	None		42.002982	-79.871752
2024-ESD-GR-060524-404A	6-May-24	Eastern Sand Darter	ESD-004	None		42.002982	-79.871752
2024-ESD-GR-060524-404A	6-May-24	Eastern Sand Darter	ESD-005	None		42.002982	-79.871752
2024-ESD-GR-060524-404A	6-May-24	Eastern Sand Darter	ESD-006	None		42.002982	-79.871752

Site ID	Date Captured	Species	Fish ID	Growth	Bacteriology	Latitude	Longitude
2024-ESD-GR-060524-404A	6-May-24	Eastern Sand Darter	ESD-007	None		42.002982	-79.871752
2024-ESD-GR-060524-404A	6-May-24	Eastern Sand Darter	ESD-008	None		42.002982	-79.871752
2024-ESD-GR-060524-404A	6-May-24	Eastern Sand Darter	ESD-009	None		42.002982	-79.871752
2024-ESD-GR-060524-404A	6-May-24	Eastern Sand Darter	ESD-010	None		42.002982	-79.871752
2024-ESD-GR-080524-101A	8-May-24	Eastern Sand Darter	ESD-011	None		43.109694	-80.245758
2024-ESD-GR-080524-101A	8-May-24	Eastern Sand Darter	ESD-012	None		43.109694	-80.245758
2024-ESD-GR-080524-101A	8-May-24	Eastern Sand Darter	ESD-013	None		43.109694	-80.245758
2024-ESD-GR-080524-101A	8-May-24	Eastern Sand Darter	ESD-014	None		43.109694	-80.245758
2024-ESD-GR-080524-101A	8-May-24	Eastern Sand Darter	ESD-015	None		43.109694	-80.245758
2024-ESD-GR-080524-101A	8-May-24	Eastern Sand Darter	ESD-016	None		43.109694	-80.245758
2024-ESD-GR-080524-101A	8-May-24	Eastern Sand Darter	ESD-017	None		43.109694	-80.245758
2024-ESD-GR-080524-101A	8-May-24	Eastern Sand Darter	ESD-018	None		43.109694	-80.245758
2024-ESD-GR-080524-101A	8-May-24	Eastern Sand Darter	ESD-019	None		43.109694	-80.245758
2024-ESD-GR-080524-101A	8-May-24	Eastern Sand Darter	ESD-020	None		43.109694	-80.245758
2024-ESD-GR-080524-101A	8-May-24	Eastern Sand Darter	ESD-021	None		43.109694	-80.245758
2024-ESD-GR-080524-101A	8-May-24	Eastern Sand Darter	ESD-022	None		43.109694	-80.245758
2024-ESD-GR-080524-101A	8-May-24	Eastern Sand Darter	ESD-023	None		43.109694	-80.245758
2024-ESD-GR-080524-101A	8-May-24	Eastern Sand Darter	ESD-024	None		43.109694	-80.245758
2024-ESD-GR-080524-101A	8-May-24	Eastern Sand Darter	ESD-025	Light	Mixed flora (5 colony types)	43.109694	-80.245758
2024-ESD-GR-080524-101A	8-May-24	Eastern Sand Darter	ESD-026	None		43.109694	-80.245758
2024-ESD-GR-080524-101A	8-May-24	Eastern Sand Darter	ESD-027	None		43.109694	-80.245758
2024-ESD-GR-080524-101A	8-May-24	Eastern Sand Darter	ESD-028	None		43.109694	-80.245758
2024-ESD-GR-080524-101A	8-May-24	Eastern Sand Darter	ESD-029	None		43.109694	-80.245758
2024-ESD-GR-080524-101A	8-May-24	Eastern Sand Darter	ESD-030	None		43.109694	-80.245758
2024-ESD-GR-080524-101A	8-May-24	Eastern Sand Darter	ESD-031	None		43.109694	-80.245758
2024-ESD-GR-080524-101A	8-May-24	Eastern Sand Darter	ESD-032	None		43.109694	-80.245758
2024-ESD-GR-080524-101A	8-May-24	Eastern Sand Darter	ESD-033	None		43.109694	-80.245758
2024-ESD-GR-080524-101A	8-May-24	Eastern Sand Darter	ESD-034	None		43.109694	-80.245758
2024-ESD-GR-080524-101A	8-May-24	Eastern Sand Darter	ESD-035	None		43.109694	-80.245758

Site ID	Date Captured	Species	Fish ID	Growth	Bacteriology	Latitude	Longitude
2024-ESD-GR-080524-101A	8-May-24	Eastern Sand Darter	ESD-036	None		43.109694	-80.245758
2024-ESD-GR-080524-101A	8-May-24	Eastern Sand Darter	ESD-037	Light	Unidentifiable organism (Unable to ID by MALDI-TOF MS)	43.109694	-80.245758
2024-ESD-GR-080524-101A	8-May-24	Eastern Sand Darter	ESD-038	None		43.109694	-80.245758
2024-ESD-GR-080524-101A	8-May-24	Eastern Sand Darter	ESD-039	None		43.109694	-80.245758
2024-ESD-GR-080524-101A	8-May-24	Eastern Sand Darter	ESD-040	None		43.109694	-80.245758
2024-ESD-GR-150524-002C	15-May-24	Eastern Sand Darter	ESD-041	None		43.138029	-80.288414
2024-ESD-GR-220524-201A	22-May-24	Eastern Sand Darter	ESD-042	None		43.110017	-80.256117
2024-ESD-GR-220524-201A	22-May-24	Eastern Sand Darter	ESD-043	None		43.110017	-80.256117
2024-ESD-GR-220524-201A	22-May-24	Eastern Sand Darter	ESD-044	None		43.110017	-80.256117
2024-ESD-GR-220524-201A	22-May-24	Eastern Sand Darter	ESD-045	None		43.110017	-80.256117
2024-ESD-GR-220524-201A	22-May-24	Eastern Sand Darter	ESD-046	None		43.110017	-80.256117
2024-ESD-GR-220524-201A	22-May-24	Eastern Sand Darter	ESD-047	None		43.110017	-80.256117
2024-ESD-GR-220524-201A	22-May-24	Eastern Sand Darter	ESD-048	None		43.110017	-80.256117
2024-ESD-GR-220524-201A	22-May-24	Eastern Sand Darter	ESD-049	None		43.110017	-80.256117
2024-ESD-GR-220524-201A	22-May-24	Eastern Sand Darter	ESD-050	None		43.110017	-80.256117
2024-BOC-LC-310524-001A	31-May-24	Round Goby	RG-002	None		42.848954	-80.733547
2024-BOC-LC-310524-001A	31-May-24	Round Goby	RG-003	Scant	*Bacillus pumilus* (1 colony)	42.848954	-80.733547
2024-BOC-LC-310524-001A	31-May-24	Round Goby	RG-004	None		42.848954	-80.733547
2024-BOC-LC-310524-001A	31-May-24	Round Goby	RG-005	None		42.848954	-80.733547
2024-BOC-LC-310524-001A	31-May-24	Round Goby	RG-006	None		42.848954	-80.733547
2024-BOC-LC-310524-001A	31-May-24	Round Goby	RG-007	None		42.848954	-80.733547
2024-BOC-LC-030624-001A	3-Jun-24	Round Goby	RG-008	None		42.863669	-80.714326
2024-BOC-LC-030624-001A	3-Jun-24	Round Goby	RG-009	Scant	Unidentifiable organism; 1 colony; (Unable to ID by MALDI-TOF MS)	42.863669	-80.714326
2024-BOC-LC-040624-001A	4-Jun-24	Round Goby	RG-010	Scant	*Streptomyces* sp.; *S. badius*	42.862420	-80.714166
2024-BOC-LC-040624-001A	4-Jun-24	Round Goby	RG-011	None		42.862242	-80.714166
2024-BOC-LC-040624-001A	4-Jun-24	Round Goby	RG-012	None		42.862420	-80.714166
2024-BOC-LC-040624-001A	4-Jun-24	Round Goby	RG-013	None		42.862242	-80.714166
2024-ESD-BOC-050624-202A	5-Jun-24	Round Goby	RG-015	None		42.792845	-80.782551

Site ID	Date Captured	Species	Fish ID	Growth	Bacteriology	Latitude	Longitude
2024-ESD-BOC-050624-203A	5-Jun-24	Round Goby	RG-016	None		42.793002	-80.781924
2024-ESD-BOC-050624-204A	5-Jun-24	Round Goby	RG-017	Scant	*Bacillus pumilus* (1 colony)	42.793413	-80.781544
2024-BOC-LC-100624-001A	10-Jun-24	Round Goby	RG-018	Scant	*Streptomyces* sp.; *S. pasteuri* (1 colony)	42.849177	-80.733933
2024-BOC-LC-100624-001A	10-Jun-24	Round Goby	RG-019	None		42.849177	-80.733933
2024-BOC-LC-100624-001A	10-Jun-24	Round Goby	RG-020	None		42.849177	-80.733933
2024-BOC-LC-100624-001A	10-Jun-24	Round Goby	RG-021	Scant	*Staphylococcus epidermidis* (1 colony)	42.849177	-80.733933
2024-BOC-LC-100624-001A	10-Jun-24	Round Goby	RG-022	None		42.849177	-80.733933
2024-BOC-LC-100624-001A	10-Jun-24	Round Goby	RG-023	None		42.849177	-80.733933
2024-BOC-LC-100624-001A	10-Jun-24	Round Goby	RG-024	None		42.849177	-80.733933
2024-BOC-LC-100624-001A	10-Jun-24	Round Goby	RG-025	Scant	Mixed flora (Unable to ID by MALDI-TOF MS)	42.849177	-80.733933
2024-BOC-LC-100624-001A	10-Jun-24	Round Goby	RG-026	None		42.849177	-80.733933
2024-BOC-LC-100624-001A	10-Jun-24	Round Goby	RG-027	None		42.849177	-80.733933
2024-BOC-LC-100624-001A	10-Jun-24	Round Goby	RG-028	None		42.849177	-80.733933
2024-BOC-LC-100624-001A	10-Jun-24	Round Goby	RG-029	None		42.849177	-80.733933
2024-BOC-LC-100624-001A	10-Jun-24	Round Goby	RG-030	None		42.849177	-80.733933
2024-BOC-LC-100624-001A	10-Jun-24	Round Goby	RG-031	None		42.849177	-80.733933
2024-BOC-LC-100624-001A	10-Jun-24	Round Goby	RG-032	None		42.849177	-80.733933
2024-BOC-LC-100624-001A	10-Jun-24	Round Goby	RG-033	None		42.849177	-80.733933
2024-BOC-LC-100624-001A	10-Jun-24	Round Goby	RG-034	None		42.849177	-80.733933
2024-BOC-LC-100624-001A	10-Jun-24	Round Goby	RG-035	None		42.849177	-80.733933
2024-BOC-LC-100624-001A	10-Jun-24	Round Goby	RG-036	None		42.849177	-80.733933
2024-BOC-LC-100624-001A	10-Jun-24	Round Goby	RG-037	None		42.849177	-80.733933
2024-BOC-LC-100624-001A	10-Jun-24	Round Goby	RG-038	None		42.849177	-80.733933
2024-BOC-LC-100624-001A	10-Jun-24	Round Goby	RG-039	None		42.849177	-80.733933
2024-BOC-LC-100624-001A	10-Jun-24	Round Goby	RG-040	None		42.849177	-80.733933
2024-BOC-LC-100624-001A	10-Jun-24	Round Goby	RG-041	None		42.849177	-80.733933
2024-BOC-LC-100624-001A	10-Jun-24	Round Goby	RG-042	None		42.849177	-80.733933
2024-BOC-LC-100624-001A	10-Jun-24	Round Goby	RG-043	None		42.849177	-80.733933

Site ID	Date Captured	Species	Fish ID	Growth	Bacteriology	Latitude	Longitude
2024-BOC-LC-100624-001A	10-Jun-24	Round Goby	RG-044	None		42.849177	-80.733933
2024-BOC-LC-100624-001A	10-Jun-24	Round Goby	RG-045	None		42.849177	-80.733933
2024-BOC-LC-100624-001A	10-Jun-24	Round Goby	RG-046	None		42.849177	-80.733933
2024-BOC-LC-100624-001A	10-Jun-24	Round Goby	RG-047	None		42.849177	-80.733933
2024-BOC-LC-100624-001A	10-Jun-24	Round Goby	RG-048	None		42.849177	-80.733933
2024-BOC-LC-100624-001A	10-Jun-24	Round Goby	RG-049	None		42.849177	-80.733933
2024-BOC-LC-100624-001A	10-Jun-24	Round Goby	RG-050	None		42.849177	-80.733933

***Table 3**. Length (mm) and weight (g) measurements of Eastern Sand Darter collected for disease testing.*

Site ID	Date Captured	Fish ID	Latitude	Longitude	Total Length (mm)	Weight (g)
2024-ESD-GR-060524-404A	6-May-24	ESD-001	42.002982	-79.871752	64	1.4
2024-ESD-GR-060524-404A	6-May-24	ESD-002	42.002982	-79.871752	61	1.3
2024-ESD-GR-060524-404A	6-May-24	ESD-003	42.002982	-79.871752	61	1.3
2024-ESD-GR-060524-404A	6-May-24	ESD-004	42.002982	-79.871752	60	1.3
2024-ESD-GR-060524-404A	6-May-24	ESD-005	42.002982	-79.871752	65	1.5
2024-ESD-GR-060524-404A	6-May-24	ESD-006	42.002982	-79.871752	63	1.5
2024-ESD-GR-060524-404A	6-May-24	ESD-007	42.002982	-79.871752	64	1.1
2024-ESD-GR-060524-404A	6-May-24	ESD-008	42.002982	-79.871752	58	1.3
2024-ESD-GR-060524-404A	6-May-24	ESD-009	42.002982	-79.871752	62	1.5
2024-ESD-GR-060524-404A	6-May-24	ESD-010	42.002982	-79.871752	63	1.3
2024-ESD-GR-080524-101A	8-May-24	ESD-011	43.109694	-80.245758	57	1.1
2024-ESD-GR-080524-101A	8-May-24	ESD-012	43.109694	-80.245758	60	1.5
2024-ESD-GR-080524-101A	8-May-24	ESD-013	43.109694	-80.245758	56	1.5
2024-ESD-GR-080524-101A	8-May-24	ESD-014	43.109694	-80.245758	54	1.0
2024-ESD-GR-080524-101A	8-May-24	ESD-015	43.109694	-80.245758	53	1.2
2024-ESD-GR-080524-101A	8-May-24	ESD-016	43.109694	-80.245758	56	1.6
2024-ESD-GR-080524-101A	8-May-24	ESD-017	43.109694	-80.245758	57	1.3
2024-ESD-GR-080524-101A	8-May-24	ESD-018	43.109694	-80.245758	59	1.5
2024-ESD-GR-080524-101A	8-May-24	ESD-019	43.109694	-80.245758	59	1.3
2024-ESD-GR-080524-101A	8-May-24	ESD-020	43.109694	-80.245758	65	1.8
2024-ESD-GR-080524-101A	8-May-24	ESD-021	43.109694	-80.245758	58	1.8
2024-ESD-GR-080524-101A	8-May-24	ESD-022	43.109694	-80.245758	61	1.4
2024-ESD-GR-080524-101A	8-May-24	ESD-023	43.109694	-80.245758	56	1.4
2024-ESD-GR-080524-101A	8-May-24	ESD-024	43.109694	-80.245758	60	1.6
2024-ESD-GR-080524-101A	8-May-24	ESD-025	43.109694	-80.245758	55	1.5
2024-ESD-GR-080524-101A	8-May-24	ESD-026	43.109694	-80.245758	56	1.7
2024-ESD-GR-080524-101A	8-May-24	ESD-027	43.109694	-80.245758	64	1.9
2024-ESD-GR-080524-101A	8-May-24	ESD-028	43.109694	-80.245758	65	2.1
2024-ESD-GR-080524-101A	8-May-24	ESD-029	43.109694	-80.245758	62	1.5
2024-ESD-GR-080524-101A	8-May-24	ESD-030	43.109694	-80.245758	59	1.3
2024-ESD-GR-080524-101A	8-May-24	ESD-031	43.109694	-80.245758	58	1.6
2024-ESD-GR-080524-101A	8-May-24	ESD-032	43.109694	-80.245758	59	1.7
2024-ESD-GR-080524-101A	8-May-24	ESD-033	43.109694	-80.245758	55	1.4
2024-ESD-GR-080524-101A	8-May-24	ESD-034	43.109694	-80.245758	60	1.7
2024-ESD-GR-080524-101A	8-May-24	ESD-035	43.109694	-80.245758	65	2.0
2024-ESD-GR-080524-101A	8-May-24	ESD-036	43.109694	-80.245758	60	1.5
2024-ESD-GR-080524-101A	8-May-24	ESD-037	43.109694	-80.245758	60	1.7
2024-ESD-GR-080524-101A	8-May-24	ESD-038	43.109694	-80.245758	65	1.7

Site ID	Date Captured	Fish ID	Latitude	Longitude	Total Length (mm)	Weight (g)
2024-ESD-GR-080524-101A	8-May-24	ESD-039	43.109694	-80.245758	57	1.4
2024-ESD-GR-080524-101A	8-May-24	ESD-040	43.109694	-80.245758	58	1.8
2024-ESD-GR-150524-002C	15-May-24	ESD-041	43.138029	-80.288414	60	1.7
2024-ESD-GR-220524-201A	22-May-24	ESD-042	43.110017	-80.256117	55	0.9
2024-ESD-GR-220524-201A	22-May-24	ESD-043	43.110017	-80.256117	59	1.2
2024-ESD-GR-220524-201A	22-May-24	ESD-044	43.110017	-80.256117	57	1.1
2024-ESD-GR-220524-201A	22-May-24	ESD-045	43.110017	-80.256117	60	1.2
2024-ESD-GR-220524-201A	22-May-24	ESD-046	43.110017	-80.256117	59	1.1
2024-ESD-GR-220524-201A	22-May-24	ESD-047	43.110017	-80.256117	64	1.6
2024-ESD-GR-220524-201A	22-May-24	ESD-048	43.110017	-80.256117	57	1.3
2024-ESD-GR-220524-201A	22-May-24	ESD-049	43.110017	-80.256117	50	1.0
2024-ESD-GR-220524-201A	22-May-24	ESD-050	43.110017	-80.256117	55	1.0