Lake Manitoba & Lake St. Martin Outlet Channels Project

Aquatic Environment Monitoring, Spring 2021 - Larval Fish Studies

REPORT

Prepared for Manitoba Transportation and Infrastructure
By North/South Consultants Inc. • 83 Scurfield Blvd. • Winnipeg, MB • R3Y 1G4

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Aquatic Environment Monitoring Spring 2021

Larval Fish Studies

A Report Prepared for

Manitoba Transportation and Infrastructure

By:

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EXECUTIVE SUMMARY

North/South Consultants Inc. (NSC) was retained by Manitoba Transportation and Infrastructure (MTI) to collect supplemental data with respect to the aquatic environment in support of the Lake Manitoba and Lake St. Martin Outlet Channel Project (the Project). A draft Aquatic Effects Monitoring Program (AEMP) was developed in 2020 to provide a plan for monitoring the effects of the Project on the aquatic environment, focusing on key issues identified in the Environmental Impact Statement (EIS).

The AEMP identified the need for the collection of data to supplement existing information that had been presented in the EIS. Several studies in the AEMP included components to monitor fish spawning and larval fish movements in the Fairford and Dauphin rivers, and in Lake St. Martin. This report provides results of field investigations conducted in spring 2021 to provide baseline information to support those studies. Objectives of the spring 2021 program were to:

- Estimate the density and species composition of fish larvae drifting into the Fairford and Dauphin rivers from upstream waterbodies;
- Document the occurrence and density of fish larvae in the Dauphin and Fairford rivers during the spring; and
- Document the density and distribution of larval fish in Lake St. Martin.

Larval fish were captured in the Fairford and Dauphin rivers using drift traps. A neuston sampler was used to collect larval fish in Lake St. Martin. The study included three discrete sampling sessions, conducted from April 28 to June 3.

Warm air temperatures in early spring 2021 resulted in an early ice break up on rivers and creeks in the Lake St. Martin area. Subsequent cool air temperatures slowed ice break up Lake St. Martin. Flow on the Fairford and Dauphin rivers was low and approximately equal to historic 25th percentile flows. It is not known whether abnormal ice break up, low flow conditions and resultant low water level on Lake St. Martin affected spring spawning activity or larval fish movements within the study area. Larval fish catches are discussed by study objectives below.

Larval Fish Movements into the Fairford and Dauphin Rivers:

Two drift traps were set in the Fairford River immediately downstream of Lake Manitoba and in the Dauphin River approximately 3 km downstream of Lake St. Martin. The traps were set for two 19-24 hour sampling periods during each of three sampling sessions. Three larval fish, only one of which was a larval Coregonine (*Coregonus* sp; either Lake Whitefish or Cisco), were captured drifting into the Fairford River from Lake Manitoba. More larval fish were captured drifting into the Dauphin River (n = 67). Most of the catch (89.5%) at the Dauphin River was comprised of larval Lake Whitefish, Cisco, and unidentified Coregonines captured on May 1 and 2. A small number of larval suckers (n = 3; *Catostomus* sp. or *Moxostoma* sp.) were captured on June 1 and 2.

Larval Fish Movements within the Fairford and Dauphin Rivers:

Two larval drift traps were set in the Fairford River approximately 1 km downstream of the FRWCS to determine whether fish spawned at the base of the structure, and an additional two traps were set approximately 2 km upstream of Lake St. Martin to document larval fish movement out of the river. Traps were set for two 17-26 hour sampling periods during each of the three sampling sessions.

The capture of very few larval fish entering the Fairford River and the capture of larval Lake Whitefish within the river indicate that whitefish spawned in the river during fall 2020. Based on the abundance of pre-spawning whitefish and Cisco observed immediately downstream of the FRWCS in fall 2020, it was anticipated that spawning would occur there. However, only a small number of larval whitefish or Cisco were captured at that location during spring 2021. It is possible that whitefish and Cisco left the FRWCS area and spawned elsewhere during fall 2020, or that eggs had hatched and larvae drifted downstream prior to the onset of the spring 2021 study.

Two larval drift traps were set in the Dauphin River immediately upstream of its confluence with Buffalo Creek to document the movement of larval fish from areas of the river upstream of Buffalo Creek. The Buffalo Creek/Dauphin River confluence is known to support spawning by spring and fall spawning species. An additional two traps were set approximately 2.5 km upstream of Sturgeon Bay to document larval fish movement out of the Dauphin River. Traps were set for two 17-25 hour sampling periods during each of the three sampling sessions. On one occasion, two traps could not be retrieved due to high winds.

Larval whitefish were captured in the lower Dauphin River during spring 2021. However, the number of larvae captured was much lower than would have been expected given the large number of pre-spawning adult Lake Whitefish occurring in the lower Dauphin River during late October 2020. As in the Fairford River, it is possible that whitefish and Cisco moved to alternate spawning areas in response to low flow, or that eggs spawned in the lower part of the Dauphin River had hatched and most larvae had drifted downstream prior to the onset of the study.

Larval Lake Whitefish Distribution within Lake St. Martin:

Larval fish sampling was conducted on Lake St. Martin during two sampling sessions conducted from May 7–15 and on May 31 and June 1. Sampling could not be conducted in two sampling areas on Lake St. Martin due to restricted access caused by low flow on the Fairford River and high winds during much of May. The persistence of high winds and ice cover on parts of Lake St. Martin precluded sampling during late April and early May when sampling in the Fairford and Dauphin rivers occurred. During each sampling session, 3-4 neuston tows of 20 minutes in duration were conducted in each of four general sampling areas. These included Birch Bay in the south Basin, downstream of the Narrows, and near the outlet of the LSMOC and near the outlet to the Dauphin River in the north basin.

Lake Whitefish and Cisco were the only species captured during sampling conducted during May 7-15. Larval whitefish occurred in all areas where sampling occurred; densities were highest near the outlet to the Dauphin (mean CPUE of 16.51 ± 12.74 larvae/100m^3 on May 7) and in Birch Bay (13.73 ± 6.28 larvae/100m^3 on May 15) during mid-May. Yellow Perch larvae and larvae and larvae of other Percid

species were abundant at the end of May and comprised 87% of the larval fish catch. Whitefish were less abundant than during the early May session, and comprised 11% of the catch. Given that pre-spawn adult Lake Whitefish have been documented in Birch Bay at the time when whitefish would be expected to spawn, the capture of larval whitefish in Birch Bay indicates that whitefish may spawn there.

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ACRONYMS

AEMP	Aquatic Effects Monitoring Program
CPUE	Catch Per Unit Effort
EIS	Environmental Impact Statement
FRWCS	Fairford River Water Control Structure
GPS	Global Positioning System
GO	General Oceanics
LFR	Lower Fairford River sampling area
LMOC	Lake Manitoba Outlet Channel
LSMOC	Lake St. Martin Outlet Channel
MTI	Manitoba Transportation and Infrastructure
NSC	North/South Consultants Inc.
QA/QC	Quality Assurance/Quality Control
SD	Standard Deviation
UTM	Universal Transverse Mercator
UFR	Upper Fairford River sampling area
WSC	Water Survey of Canada

1.0 INTRODUCTION

North/South Consultants Inc. (NSC) was retained by Manitoba Transportation and Infrastructure (MTI) to collect supplemental data with respect to the aquatic environment in support of the Lake Manitoba and Lake St. Martin Outlet Channels Project (the Project). The proposed Project is designed to manage flood waters on Lake Manitoba and Lake St. Martin by providing channels by which flood waters can be conveyed, in addition to the natural outflows via the Fairford and Dauphin rivers (Figure 1). The Project consists of two outlet channels that are intended to work together:

- The 24 km Lake Manitoba Outlet Channel (LMOC) will work in tandem with the existing water control structure on the Fairford River (the Fairford River Water Control Structure or FRWCS) to help regulate water levels and mitigate flooding on Lake Manitoba; and
- The 24 km Lake St. Martin Outlet Channel (LSMOC) will restore a more natural water regime to Lake St. Martin and will also provide flood protection by mitigating increased inflows from operation of the FRWCS, as well as additional inflows from the planned LMOC.

A draft Aquatic Effects Monitoring Program (AEMP) was developed in November 2020 to provide a plan for monitoring the effects of the Project on the aquatic environment, focusing on key issues identified in the Environmental Impact Statement (EIS). The specific objectives of the AEMP are to:

- Verify the predicted effects presented in the surface water quality and fish and fish habitat sections of the EIS;
- Determine the effectiveness of mitigation measures;
- Assess the need for additional mitigation measures if initial measures are not adequate;
- Determine the effectiveness of any additional/adapted measure(s); and
- Confirm compliance with regulatory requirements relevant to surface water quality and fish and fish habitat set out in the Project approvals (e.g., Manitoba Environment Act License; Fisheries Act Authorization).

In support of these objectives, the AEMP identified the need for the collection of data to supplement existing information that had been presented in the EIS. Several studies were identified that included components to monitor larval fish. This report provides results of field investigations conducted in spring 2021 to provide baseline information with respect to the presence and abundance of larval fish. Objectives of the spring 2021 program were to:

- Estimate the density and species composition of fish larvae drifting into the Fairford and Dauphin rivers from upstream waterbodies;
- Document the occurrence and density of fall and spring spawning species drifting in the Dauphin and Fairford rivers during the spring 2021.; and

- Document the density and distribution of larval Lake Whitefish (*Coregonus clupeaformis*) in Lake St. Martin.

Results of these larval fish studies will be used in conjunction with fall 2020 and spring 2021 spawning fish movement studies (NSC 2021, 2022a,b) studies to provide a record of spawning and egg hatch under low flow conditions in the Fairford and Dauphin rivers.

2.0 METHODS

2.1 STUDY DESIGN

Drift traps were used to determine the occurrence and abundance of larval fish drifting in the Fairford and Dauphin Rivers. A neuston sampler was used to capture larval fish in the surface waters of Lake St. Martin.

2.2 STUDY TIMING

The study was comprised of three sampling sessions to provide sampling coverage throughout spring. This was to account for differences in the timing of hatch and at which larvae of different species are vulnerable to passive movement with water flow. Specifically, larval Lake Whitefish and Cisco (*Coregonus artedi*) drift immediately after ice off, while spring spawning species such as Walleye (*Sander vitreus*) and sucker (*Catostomus* sp. and *Moxostoma* sp.) species drift later in spring. The field program was initiated late April/early May and was repeated at approximately two week intervals until early June.

2.3 SAMPLING AREAS

Numerous sampling areas were selected within study waterbodies to address study objectives. These are described below and summarized in Table 1 and Figure 2.

2.3.1 Larval Fish Movements into the Fairford and Dauphin Rivers

Drift traps were deployed in the Fairford River immediately downstream of Lake Manitoba and upstream of the FRWCS to document the movement of larval fish into the river from Lake Manitoba (Table 1; Figure 2). Similarly, drift traps were deployed in the Dauphin River approximately 3 km downstream of Lake St Martin to document larval fish drifting out of the lake (Table 1; Figure 2).

2.3.2 Larval Fish Movements within the Fairford and Dauphin Rivers

Drift traps were deployed in the Fairford River approximately 1.2 km downstream of the FRWCS (Table 1; Figure 2) to determine whether pre-spawning Lake Whitefish and Cisco observed downstream of the FRWCS during late fall 2020 (NSC 2022a) spawned there. Additional drift traps were deployed in the Fairford River approximately 2.2 km upstream of Lake St. Martin (Figure 2) to document larval fish moving out of the Fairford River and into Lake St. Martin.

Two areas were sampled in the downstream portion of the Dauphin River to document spawning and movements of larval fish out of the river. The first area was upstream of the confluence of Buffalo Creek, an area in the Dauphin River known to support spawning by spring and fall spawning fish (NSC 2016; Table 1; Figure 2). Sampling at this location would provide some evidence to indicate whether spawning occurred upstream of the known spawning area at Buffalo Creek. The second was situated downstream of Buffalo Creek and was intended to assist in determining whether fish spawned at the Buffalo Creek confluence or if larval fish originated at areas farther upstream.

2.3.3 Larval Lake Whitefish Distribution within Lake St. Martin

Neuston tows were conducted in several areas within Lake St. Martin to document the occurrence, abundance and distribution of larval fish in the surface waters of Lake St. Martin. Sampling areas in the north basin of Lake St. Martin were the same as those used during previous larval fish investigations (NSC 2016, 2019) and included areas near the outlets to the Dauphin River and the LSMOC, as well as downstream of the Narrows (Table 1; Figure 2). Proposed sampling areas in the south basin included Birch Bay to help ascertain whether Lake Whitefish spawned within the bay. Two additional areas within the south basin of Lake St. Martin (near the Fairford River outlet to Lake St. Martin and downstream of the Narrows; Table 1; Figure 2) were identified to provide context for results from Birch Bay. However, low water level and high winds through much of spring 2021 precluded safe boat access to these sites and, consequently, they were not sampled.

2.4 DATA COLLECTION

2.4.1 Water Temperature

Water temperature loggers manufactured by the Onset Corporation (HOBO Water Temperature Pro v2; Model U22-001) were installed at select locations throughout the study area at the beginning of the spring field investigations or, in one case, during fall 2020. The loggers were operated continuously throughout 2021 and were programmed to record water temperature at one-hour intervals. Data was downloaded from the loggers using software provided by the Onset Corporation.

Logger locations included the following:

- Fairford River downstream of the FRWCS;
- Dauphin River downstream of Lake St. Martin; and
- Lake St. Martin in Birch Bay

Water temperature was also measured using a hand-held thermometer on days when sampling occurred.

2.4.2 Hydrometric Data

2.4.2.1 Discharge

Mean daily discharge data for the Fairford (Station 05LM001) and Dauphin (Station 05LM006) rivers during 2021 were provided by the Water Survey of Canada (WSC 2021a, b). Historic data (1977–2019) were also downloaded for both rivers and were used to calculate percentile flow conditions for each river (WSC 2021c. d).

2.4.2.2 Water Level

Hourly water level data for Lake St. Martin (Station 05LM005) during 2021 were provided by the Water Survey of Canada (WSC 2022a). Historic data (1966-2017) were also downloaded and to calculate percentile water level conditions for the lake (WSC 2022b).

2.4.3 Fish Collection and Biological Sampling

2.4.3.1 Drift Traps

Drift traps used in this study were designed after Burton and Flannagan (1976), had a mouth opening of 15 x 15 cm, and a 1 m long cod-end constructed of 500 µm Nitex®. Traps were either deployed as floating drift traps set at the water surface or were attached to two metal T-bars pounded into the waterbody substrate. The choice of deployment method was determined by water depth and velocity, as well as accessibility to the site. When deployed as floating traps, a wooden pontoon approximately 20 cm wide, 2.5 cm thick, and 120 cm long was used to buoy the traps. The trap was attached to the bottom of the pontoon using metal brackets such that the trap mouth was approximately 10 cm below the surface of the water when deployed. Traps were oriented with the trap mouth facing upstream and were held in position by a 10 m line attached to a large anchor. Traps attached to metal T-bars were positioned so that the trap mouth was oriented directly into the current and positioned approximately 10 cm below the surface of the water. As water levels receded, traps were moved to areas of higher water velocity. In general, floating traps were deployed and accessed by boat, whereas traps deployed using T-bars were accessed by foot from shore.

Drift traps were set for two 24-hour sessions during each sampling period. Set and lift dates and times were recorded, along with the Universal Transverse Mercator (UTM) coordinates for each trap location. Traps were emptied after each 24-hour period. Contents from each trap were preserved in 10% formalin for subsequent sorting in the laboratory. Water velocity was measured at the mouth of each drift trap using a Swoffer flow meter to allow for the estimation of the volume of water filtered.

2.4.3.2 Neuston Tows

Sampling for larval fish in Lake St. Martin was conducted using a neuston sampler. Neuston samplers are towed behind and to the side of a boat in order to filter organisms from surface waters undisturbed by the boat's propeller and wake. The sampler consists of an aluminum box with a 45 x 45 cm mouth opening equipped with a screen bag and removable cod end constructed of 500 µm Nitex® (Mason and Phillips 1986). During operation, the sampler and tow speed are adjusted so that approximately 30 cm of the mouth opening is submerged and the top of the box is oriented parallel to the surface of the water. Wings on either side of the box and a depressor plate on the bottom of the box control sampler elevation within the water column. Preferred boat speed is 4–6 knots (7–11 km/hr; Mason and Phillips 1986).

Neuston tows were approximately 20 minutes in duration. Start location and end point were recorded with a hand-held GPS unit. The GPS unit also provided a track log illustrating the route over which the tow occurred. A General Oceanics (GO) flow meter mounted in the mouth opening of the aluminum box collected data to estimate the volume of water filtered and provide a means of standardizing catch-per-

unit-effort (CPUE). Readings from the GO flow meter were recorded at the beginning and end of each tow. At the completion of each tow, cod end contents were transferred into labelled sampling jars and preserved with 10% formalin for subsequent identification in the NSC laboratory.

2.5 LABORATORY AND DATA ANALYSIS

2.5.1 Water Temperature

Daily mean water temperature was calculated and plotted to illustrate daily changes throughout the monitoring period.

2.5.2 Hydrometric Data

2.5.2.1 Discharge

Mean daily discharge was plotted for the Fairford and Dauphin rivers. The daily 5^{th}, 25^{th}, 50^{th},75^{th} and 95^{th} percentile flows were calculated based on 1977–2019 data for the respective rivers and plotted to provide historical context for the spring 2021 data.

2.5.2.2 Water Level

Mean daily water level was plotted for Lake St. Martin. The daily 5th, 25th, 50th,75th and 95th percentile water levels were calculated based on 1966-2017 data and plotted to provide historical context for the spring 2021 data.

2.5.3 Larval Fish

2.5.3.1 Drift Traps

Drift trap samples were examined in the NSC laboratory. Fish and fish eggs were removed and enumerated by taxon for each sample. Larval fish were identified to the lowest taxonomic level possible, usually species and/or genus. Several sucker species (Family Catostomidae; *Catostomus* sp. and *Moxostoma* sp.) occur in the study waterbodies but sucker larvae are difficult to identify to species. Consequently, all sucker larvae were pooled for analyses and are referred to collectively as “suckers”. Similarly, numerous percid species (Family Percidae; Walleye, Sauger [*Sander canadensis*], Darter species [*Etheostoma* sp. and *Percina* sp.]) occur within the study area and are also difficult to differentiate between at the larval stage of development. As with suckers, percid species were pooled for analyses and are collectively referred to as “Percids”. Of note, Yellow Perch (*Perca flavescens*) are a member of the Percid family, but larval perch are readily differentiated from the larvae of other percid species. As a result, perch were analyzed separately from the other Percids. Eggs were identified to family.

Drift samples were subjected to quality assurance/quality control (QA/QC) measures whereby a second taxonomist identified and enumerated a random subsample representing approximately 10% of the total samples. Particular emphasis was placed on QA/QC for Lake Whitefish and Cisco identification due to their importance to the Project. If there was less than 5% difference in counts and identifications between

the two taxonomists for all samples, then the original numbers were used for consistency of reporting. If the difference was greater, the samples in question were re-examined by the first taxonomist.

Larval fish and egg catches were tabulated and relative abundance (%) for each taxon was also calculated by site and sampling area. Drift density was calculated for each trap using the following formula:

$$X = 100a/bdc$$

where: X = number of organisms/100m^3;

a = number of organisms in net;

b = number of seconds in interval;

c = velocity in m/sec; and,

d = area of net opening in m^2.

2.5.3.2 Neuston Tows

Neuston tow sample contents were examined in the NSC laboratory. As with the drift trap samples, larval fish captured in the neuston tow samples were identified to the lowest taxonomic level possible, usually species and/or genus. Several sucker species occur in the study waterbodies but sucker larvae are difficult to identify to species. Consequently, all sucker larvae were pooled for analyses and are referred to collectively as "suckers". Similarly, numerous percid species occur within the study area and are also difficult to differentiate between at the larval stage of development. As with suckers, percid species were pooled for analyses and are collectively referred to as "Percids". Of note, Yellow Perch are a member of the Percid family, but larval perch are readily differentiated from the larvae of other percid species. As a result, perch were analyzed separately from the other Percids. The larval fish catch was enumerated and tabulated by tow and taxon.

The volume of water filtered during each tow was calculated by first subtracting the GO flow meter reading recorded at the end of each tow from the reading recorded at the start. This difference was then multiplied by a correction factor unique to the specific GO meter to obtain the distance traveled. Finally, the distance traveled was multiplied by the dimensions of the submerged portion of the neuston sampler (30 x 45 cm) to obtain volume of water sampled. CPUE was calculated for each tow as the number of fish captured per 100 m^3 of water filtered by the neuston.

3.0 RESULTS

Spring larval fish studies were initiated on April 27 and continued until June 3. Three sampling sessions were conducted during this period, occurring from April 27 to May 4, May 14 to May 20, and May 29 to June 3.

3.1 WATER TEMPERATURE

A temperature logger installed in the Fairford River downstream of the FRWCS on October 27, 2020 was retrieved on November 2 during 2021, providing a full year of water temperature data for that location (Table 2; Figure 2). The temperature logger in the Dauphin River was deployed on April 30 and retrieved on November 3 (Table 2; Figure 2). Ice cover did not break in Birch Bay on Lake St. Martin until May 9 and the temperature logger there was not deployed until May 15. This logger was retrieved on November 4 (Table 2; Figure 2).

The Fairford and Dauphin River rivers were both ice free at the onset of the spring sampling program on April 27. From the beginning of March, water temperature in the Fairford River ranged from 1-6.5^{o}C and fluctuated between 5.0-7.5^{o}C in the Fairford and Dauphin rivers at the onset of the field program at the end of April (Figure 3). Water temperatures increased steadily to 17^{o}C and 19^{o}C by May 19 but dropped abruptly to 10 ^{o}C and 8 ^{o}C on 21 May in the Fairford and Dauphin rivers, respectively (Figure 3). Water temperature was 20^{o}C in both rivers at the cessation of the field program on June 3 (Figure 3).

Water temperature data for Lake St. Martin was not collected during the first part of the field program because of the persistence of ice on most of the lake until the beginning of May. Birch Bay did not become accessible by boat until after May 6. Water temperature increased rapidly after the ice melted and was 14.0^{o}C when the temperature logger was installed in Birch Bay on 15 May (Figure 3). Water temperature fluctuations observed in Birch Bay for the remainder of the field program closely reflected those observed in the rivers (Figure 3).

3.2 HYDROMETRIC DATA

3.2.1 Discharge

Discharge on the Fairford River fluctuated between 25 and 52 m^3/s from mid-April to mid-June during 2021, lower than median discharge conditions recorded from mid-April to mid-June during 1977-2019 (97-158 m^3/s; Figure 4). Flows recorded in the Fairford River during 2021 ranged between the 20-37th percentile flows observed in the same time period during 1977-2019. Average flow was equal to the historic 29th percentile flow.

Flows on the Dauphin River were also low. Discharge fluctuated between 28 and 95 m^3/s from mid-April to mid-June, lower than median discharge conditions recorded in mid-April to mid-June during 1977-2019 (102-127 m^3/s; Figure 5). Flows on the Dauphin River during spring 2021 ranged between the 9-39th

percentile flows observed in the same time period during 1977–2019. Average flow during the 2021 study period was equal to the historic 24th percentile flow.

3.2.2 Water Level

Water level on Lake St. Martin ranged between 242.9-243.3 mASL during mid-April to mid-June in 2021 (Figure 6), lower than median water level conditions recorded for the same period during 1966-2017 (243.6-243.9 mASL; Figure 6). Water level observed during the 2021 sampling period ranged between the 14-29th percentile levels recorded during 1966–2017. Average level during the 2021 study period was equal to the historic 22nd percentile level.

3.3 LARVAL FISH

3.3.1 Larval Fish Movements into the Fairford and Dauphin Rivers

Two drift traps were set in the Fairford River downstream of Lake Manitoba and two traps were set in the Dauphin River downstream of Lake St. Martin (Figure 2) during three sampling sessions conducted between late April and early June (Figure 2; Table 3). The traps were left in place for two 19-24 hour sampling periods during each sampling session (Table 3).

Very few larval fish or fish eggs were captured at the Fairford River site. A single Coregonine larva (*Coregonus* sp.; Cisco or Lake Whitefish but not identifiable to species) was captured on April 30 and two larval Percids (Walleye, Sauger, or Darter species) were captured in early June (Table 4). Density of drifting larval fish was very low, with an average of 0.09 larvae/100m^3 (SD = 0.17) in both drift traps over all sampling sessions (Table 5). Only one fish egg was collected on May 18; the taxon could not be identified.

More larval fish (n = 67) were captured in the Dauphin River near Lake St. Martin. Most of the larval fish catch (89.5%) was comprised of Lake Whitefish or Cisco captured on May 1 or May 2 (Table 6). A small number of whitefish (n = 3) were captured on May 19 and a small number of sucker larvae (n = 3) were captured on June 1 and June 2 (Table 6). The density of larval fish drifting in the upper Dauphin River was less than 1.0 larvae/ 100m^3 for all trap locations and on all days except for DR-DT-001 on May 2, when the drift density was 10.46 larvae/100 m^3 (Table 7). Water temperature was approximately 10.5^{o}C at the time (Table 3; Figure 3).

3.3.2 Larval Fish Movements within the Fairford and Dauphin Rivers

Two drift traps were set in each of two sampling areas in the Fairford River including an area approximately 1.2 km downstream of the FRWCS and another approximately 2.2 km upstream of Lake St. Martin (Figure 2; Table 8). Two additional areas were sampled in the downstream portion of the Dauphin River. The first was upstream of the confluence of Buffalo Creek and the second was situated downstream of the creek (Table 8; Figure 2). Sampling was conducted during three sampling sessions conducted between late April and the beginning of June (Table 8). The drift traps were left in place for two 17-29 hour periods during each sampling session, except on one occasion in mid-May when the downstream-most traps in the Dauphin River could not be accessed for 48 hours because of high winds (Table 8).

Drift traps set in the Fairford River downstream of the FRWCS captured only 4 larval Lake Whitefish and one unidentifiable fish larva during sampling on April 30–May 1 and no larval fish during sampling on May 17–18 (Table 9). More larvae were captured during the last sampling session during June 1–2. In total, 74 larvae, comprised of Percid species (59.4%), sculpin species (Family Cottidae; 13.5%), minnow species (Family Cyprinidae; 10.8%), stickleback species (Gasterosteidae; 9.5%), Trout-perch (*Percopsis omiscomaycus;* 2.7%) and unidentifiable larvae (4.0%) were captured (Table 9). The density of drifting larval fish captured downstream of the FRWCS is provided in Table 10.

More larval fish were captured in drift traps set in the downstream portion of the Fairford River. During the first sampling session, 57 larval fish were captured, all of which except for one larva were Cisco (n = 37), Lake Whitefish (n = 17) or larval Coregonines that could not be identified to species (n = 2; Table 11). A single unidentifiable larva was captured during May 17–18, but 218 larvae were captured on June 2–3 (Table 11). The catch included a diverse assemblage of species or species groups and included sculpin species (53.7% of the sampling session catch), Trout-perch (21.1%); Percid species (11.5%), stickleback species (10.6%) and sucker species (3.2%). The density of drifting larval fish captured in the downstream reach of the Fairford River is provided in Table 12.

No fish eggs were captured in drift traps set downstream of the FRWCS, but 249 were collected in drift traps set in the lower Fairford River (Table 20). Most were eggs from Percid species (n = 115) or sucker species (n= 47). Taxon could not be determined for 87 eggs (Table 13).

A total of 60 larval fish were captured in drift traps set upstream of Buffalo creek in the Dauphin River (Table 14). The catch consisted of 28 larval Lake Whitefish (n = 21), Cisco (n = 5) or larval Coregonines (n = 2) for which species could not be determined (Table 14). All but three of the larval whitefish, Cisco, or unidentified Coregonines were captured during the April 28–29 sampling session; the remaining three were captured during May 18–19 (Table 14). An additional larval sucker and an unidentifiable larva were captured during May 18–19. Twenty-eight larval fish, including 18 Percid larvae and 10 sucker larvae, were captured at this location during May 30-31 (Table 14). The density of drifting larval fish is provided in Table 15.

Considerably fewer larval fish were captured in drift traps set in the Dauphin River downstream of Buffalo Creek. Only 21 larvae were captured, four during April 28–29, six during May 18–19 and 11 during May 30–31 (Table 16). The catch included larval suckers (9.5%), Lake Whitefish (9.5%), Percids (9.5%), Coregonines (9.5%), Burbot (*Lota lota*) and unidentified fish (9.5%; Table 23). Densities for drifting larvae are provided in Table 17.

A large number of fish eggs were captured in drift traps set in the lower Dauphin River. Throughout the spring program, 3,638 fish eggs were collected from drift traps set upstream and downstream of Buffalo Creek (Table 18). The catch was predominantly comprised of sucker (57.6%) and Percid (39.2%) eggs (Table 18). Small numbers of Coregonine eggs (n = 29; 0.8%) and Burbot eggs (n = 2; 0.1%) were also captured. Taxon could not be determined for 84 (2.4%) eggs.

3.3.3 Larval Lake Whitefish Distribution within Lake St. Martin

Neuston tows were conducted on Lake St Martin during two sampling periods during spring 2021. The first occurred during from May 7–15, during which time 13 neuston tows were completed in four of the six proposed sampling areas (Tables 1 and 19). These included Birch Bay in the south basin, and downstream of the Narrows, near the outlet of the LSMOC and near the outlet to the Dauphin River in the north basin. The second sampling session occurred on May 31 and June 1, when 14 tows were completed in the same four general areas (Table 19). Neuston tows could not be completed in the south basin near the Fairford River or upstream of the Narrows because low water on the Fairford River and high winds during most of May prevented boat access to those areas.

A total of 187 larval fish were captured during the first sampling session. The catch was comprised exclusively of Lake Whitefish (n = 176) and Cisco (n= 11; Figure 6). Lake Whitefish were captured in all four sampling areas but occurred in greatest densities in the north basin near the Dauphin River and in Birch Bay (Tables 20 and 21). Maximum larval whitefish fish densities near the Dauphin River and in Birch Bay were 27.06 larvae/100 m^3 and 22.73 larvae/100 m^3, respectively (Table 21). Lake Whitefish are known to spawn in the Narrows but, surprisingly, only one larval whitefish was captured downstream of the Narrows. Lake Whitefish and Cisco generally hatch immediately after ice off and it is possible that larvae had already drifted out of the Narrows by the time sampling had occurred on May 8. As noted in Section 3.3.1, peak numbers of Lake Whitefish larvae entering the Dauphin River from Lake St. Martin were captured on May 1 and 2. Several whitefish larvae (n = 10) were captured in the eastern part of the north basin, near the outlet to the LSMOC. Cisco were captured in small numbers (≤ 8 fish; Table 20) in all sampling areas except near the outlet to the LSMOC.

Considerably more larval fish were captured during the second sampling session, and fish species composition was more diverse than observed during the earlier sampling session. A total of 401 larvae were captured, including Yellow Perch (50.1%), other Percid larvae (36.9%), Lake Whitefish (11.0%) and sucker species (1.7%; Table 23; Figure 7). Larval Cisco were not captured during the second sampling session.

Larval Yellow Perch were captured near the outlet to the LSMOC and near the outlet to the Dauphin River (Table 23). Maximum perch density near the LSMOC outlet was 63.27 larvae/100 m^3 and was 14.54 larvae/100 m^3 near the outlet to the Dauphin River (Table 24). Larval Percids other than Yellow Perch were captured in all areas where sampling occurred. Due to the similarity between larvae of various Percid species (e.g., Walleye, Sauger, Darter species), it was not possible to determine the species of larvae other than perch and all references to larval Percids herein excludes Yellow Perch. Larval Percid density was highest near the outlet to the Dauphin River (mean density of 8.12 larvae/100m^3; Table 25) and was comparable downstream of the Narrows (mean density of 5.93 larvae/100m^3; Table 25) and in Birch Bay (mean density of 5.34 larvae/100m^3; Table 25).

Lake Whitefish larvae were captured in all four study areas during the second sampling session, but in smaller numbers (total of 44 larvae; Table 23) than were captured during the earlier session (n = 176; Table 20). Larval whitefish density was highest near the outlet to the LSMOC (mean density of 2.22

larvae/100m^3; Table 25). Mean larval whitefish density ranged from were 0.80–1.60 larvae/100m^3 in the other areas of the lake (Table 25).

The few sucker larvae captured (n = 7; Table 23) were all from near the outlet to the Dauphin River. As with Percid larvae, larvae of the various sucker species are difficult to differentiate and, consequently, these were not identified to species.

4.0 DISCUSSION AND SUMMARY

Objectives of the spring 2021 program were to:

- Estimate the density and species composition of fish larvae drifting into the Fairford and Dauphin rivers from upstream waterbodies;
- Document the occurrence and density of fish larvae in the Dauphin and Fairford rivers during the spring; and
- Document the density and distribution of larval fish in Lake St. Martin.

Overall, larval fish were captured in all sampling areas during spring 2021. Lake Whitefish, Cisco or Coregonines (Cisco or Lake Whitefish but not identifiable to species) were frequently captured and occurred in all waterbodies sampled during this study. As expected, these species were most abundant during early spring sampling and declined in abundance in many locations as spring progressed. Larvae from spring spawning species became more abundant later in spring. By the beginning of June, Percid larvae occurred in Lake St. Martin and the Fairford River downstream of the FRWCS, Yellow Perch were abundant in the north basin of Lake St. Martin near the outlet to the LSMOC, and larvae from forage species such as minnows and sculpins were captured downstream of the FRWCS. Other than Yellow Perch, none of the Percid larvae could be identified to species so no direct evidence of Walleye spawning success (i.e., capture of larval Walleye) was collected.

Notably, few sucker larvae were captured anywhere in the system, despite large numbers of pre-and post-spawning White Sucker occurring in the Dauphin and Fairford rivers during early May (NSC 2022a). Sucker eggs generally hatch about two weeks after spawning, but the larvae remain in the spawning substrate (usually gravel) for a week or two prior to entering the water column (Scott and Crossman 1998). A small number of sucker larvae appeared in drift and neuston catches at the beginning of June, so it is likely that larval fish sampling in 2021 was completed prior to most larval sucker movements.

Although larval fish were captured in all sampling areas, the number and location of larvae captured may have been impacted by abnormal weather conditions that occurred during spring 2021. Little snow during winter 2020/2021 and abnormally warm air temperatures in March resulted in an early melt and ice break up on rivers and tributaries in the area. The Fairford River was ice-free by mid-March and the Dauphin River had cleared of ice by mid-April. Ice cover on Lake St. Martin began to break in early April when the Narrows was ice-free and ice between the Narrows and the Dauphin River began to degrade. Subsequent cold air temperature in late April slowed ice break up on Lake St. Martin and the north basin did not clear of ice until early May. Ice persisted in Birch Bay until May 9.

Flows on the Fairford and Dauphin rivers were very low during fall 2020 (NSC 2022a) and remained low through spring 2021 (WSC 2021a,b,c,d) due to lack of precipitation. Flows during spring were approximately equal to the historic 25th percentile flows recorded on both rivers.

The combination of abnormal temperature conditions and resultant effects to ice break up as well as low flow and resultant low water level may have affected the timing and location of fish spawning activities during 2020/2021. For example, early ice break up in spring 2021 may have resulted in an earlier whitefish hatch in the Fairford River, while low flow conditions in fall 2020 (NSC 2022a) may have shifted whitefish spawning away from areas known to have been used in previous years. For example, whitefish are known to spawn at the confluence of the Dauphin River and Buffalo Creek but this area was not accessible in fall 2020 because of low water levels. In addition to possibly affecting spawning, low flow and water level also prevented boat access to some proposed sampling areas, particularly in the south basin of Lake St. Martin.

Larval fish catches are discussed by study objectives in the following sections.

Larval Fish Movements into the Fairford and Dauphin Rivers

Results suggest that very few larval fish drifted into the Fairford River from Lake Manitoba during 2021. Only three larval fish, a Coregonine and two Percids, were captured in drift traps set in the upper-most reach of the Fairford River. It may be that low flow entering the Fairford River during 2021 resulted in few larvae drifting into the system; future monitoring will help determine whether few larval fish typically drift out of Lake Manitoba .

In contrast, 63 larval Lake Whitefish, Cisco, or Coregonines were captured drifting out of Lake St. Martin and into the Dauphin River in early May during 2021. This movement of larval whitefish and Cisco, as well other species, was previously noted in studies conducted during spring 2012–2015 (NSC 2016).

Larval Fish Movements within the Fairford and Dauphin Rivers

Few larval coregonines were captured in the Fairford River in spring 2021. Large numbers of adult Lake Whitefish and, to a lesser extent, Cisco in pre-spawning condition were documented within approximately one kilometer downstream of the FRWCS during late October 2020 (NSC 2022a). As current thinking was that fish could not readily ascend the fishway at the FRWCS, it was anticipated that the whitefish and Cisco observed during fall 2020 would spawn downstream of the FRWCS. However, only four larval Lake Whitefish were captured in drift traps set approximately 1.2 km downstream of the FRWCS during spring 2021, suggesting that spawning in that reach of the Fairford River was limited during fall 2020. It is possible that many of the pre-spawn fish observed in fall 2020 left the FRWCS area to spawn elsewhere.

An additional consideration is that most whitefish and Cisco spawned during fall 2020 may have hatched prior to the onset of the spring 2021 field program. Experimental studies have shown that normal development of Lake Whitefish eggs occurs between 0.5 and 6.0˚C (Price 1940; Brook 1975). Taking this into account, Lake Whitefish should hatch prior to river temperatures reaching 6.0˚C. The Fairford River had been clear of ice for at least a month and water temperature was 6-7^{o}C at the onset of the field program on April 28–29, suggesting that most whitefish and Cisco eggs would have hatched and larvae drifted downstream prior to the onset on monitoring. In support of this, several coregonine eggs captured in drift traps in the Dauphin River on April 28-29 (water temperature of 6-6.5^{o}C; Table 8) had hatched (i.e., only the empty shell was recovered).

Only a small number of larval fish (< 100 fish in total from both sampling areas) were captured in the lower Dauphin River. In comparison, spring sampling in the lower Dauphin River captured several thousand larvae in each of 2012–2015 (NSC 2016). Part of the low catch in 2021 is because sucker larval drift had only begun to occur when the field program ended, as discussed above. Larval suckers comprised 60.5–96.5% of the total larval fish catch in the lower Dauphin River during 2012–2015 (NSC 2016). It was expected that more larval fish, especially Lake Whitefish, would have been captured in the lower Dauphin River in 2021, given the large number of pre-spawning Lake Whitefish occurring there during fall 2020 (NSC 2022a). Reasons for the low larval fish catch are not clear but could be because alternate spawning areas were selected due to low flow in the Dauphin River; whitefish could have spawned downstream of the 2021 drift trap locations or moved upstream into Lake St. Martin. As in the Fairford River, it is also possible that whitefish or Cisco eggs spawned in the lower Dauphin River and hatched and larvae had drifted out of the lower part of the river prior to the sampling program.

Larval Fish within Lake St. Martin

Neuston sampling revealed that larval Lake Whitefish were distributed throughout all areas where sampling occurred in Lake St. Martin, albeit in varying densities. Areas of greatest density included near the outlet to the Dauphin River in the north basin and in Birch Bay in the south basin. Lake Whitefish are known to spawn in the Narrows and, as the Dauphin River is the outflow of Lake St. Martin, it is not surprising that larval fish are moved towards the area by lake currents. In this study, only one whitefish larva was captured in the Narrows. Water temperature was 6.5^{o}C when neuston tows were first conducted in the north basin of Lake St. Martin and, as discussed previously, it is possible that whitefish larvae had already drifted out of the Narrows by the time neuston tows were conducted. However, neuston tows conducted in 2012–2015 indicate that, in some years, larval whitefish can occur in high numbers in the Narrows until at least the end of June (NSC 2016). Flow in the Fairford and Dauphin rivers was much higher in 2012–2015 than in 2021, and water level was much higher on Lake St. Martin in 2012–2015. It is not known whether the low flows and water level may have affected Lake Whitefish spawning success and larval whitefish distribution in the north basin of Lake St Martin.

Neuston tows conducted during this study provide the first documentation of larval Lake Whitefish occurring in Birch Bay. Previous fisheries investigations have recorded the presence of adult whitefish during October and November 2015 (AAE Tech Services Inc. 2016) and an ongoing acoustic telemetry study documented the movement of an adult Lake Whitefish from the upper Dauphin River into Birch Bay at the end of October 2020 (NSC 2021). Lake Whitefish typically spawn around the end of October in the Lake St. Martin area (NSC 2016). The occurrence of adults in Birch Bay around the time that spawning would be expected to occur as well as the capture of larval whitefish during spring 2021 indicates that spawning by Lake Whitefish occurs in Birch Bay.

To summarize:

1) Warm air temperatures in early spring 2021 resulted in an early ice break up on rivers and creeks in the Lake St. Martin area. Subsequent cool air temperatures slowed ice break up Lake St. Martin. Flow on the Fairford and Dauphin rivers was low and approximately equal to historic 25th

percentile flows. It is not known whether abnormal ice break up, low flow conditions and resultant low water level on Lake St. Martin affected spring spawning activity or larval hatch/drift.

2) Larval fish movements into the Fairford and Dauphin Rivers: Very few larval fish (n = 3) were captured drifting into the Fairford River from Lake Manitoba. More (n = 67) larvae were captured drifting into the Dauphin River. The majority (94%) of the catch at the Dauphin River was comprised of larval Lake Whitefish, Cisco, and unidentified Coregonines (i.e., either Lake Whitefish or Cisco). A small number of larval suckers (4.5%) were also captured but sampling may have ended prior to most of the sucker drift.

3) Larval fish movements out the Fairford and Dauphin Rivers: The capture of very few larval fish entering the Fairford River and the capture larval Lake Whitefish within the river indicate that whitefish spawned in the river during fall 2020. Based on the abundance of pre-spawning whitefish and Cisco observed immediately downstream of the FRWCS in fall 2020, it was anticipated that spawning would occur there. However, only a small number of larval whitefish or Cisco were captured at that location during spring 2021. Reasons for the capture of only a small number of larval whitefish or Cisco is not clear, but it is possible that the whitefish and Cisco present during fall 2020 moved elsewhere to spawn. Alternately, it is possible that whitefish and Cisco did spawn downstream of the FRWCS, but that eggs had hatched and the majority of larvae had drifted downstream prior to the onset of the study.

   Larval whitefish were captured in the lower Dauphin River during spring 2021. However, the number of larvae captured was much lower than would have been expected given the large number of pre-spawning adult Lake Whitefish occurring in the lower Dauphin River during late October 2020. As in the Fairford River, it is possible that whitefish and Cisco moved to alternate spawning areas in response to low flow, or that eggs spawned in the lower part of the Dauphin River had hatched and the majority of larvae had drifted downstream prior to the onset of the study.

4) Larval Lake Whitefish Distribution in Lake St. Martin: Sampling for larval fish could not be conducted in two sampling areas on Lake St. Martin due to restricted access caused by low flow on the Fairford River and high winds during much of May. Lake Whitefish and Cisco were the only species captured during sampling conducted during May 7–15. Larval whitefish occurred in all areas where sampling occurred; densities were highest near the outlet to the Dauphin (mean CPUE of 16.51 ± 12.74 larvae/100m^3 on May 7) and in Birch Bay (13.73 ± 6.28 larvae/100m^3 on May 15) during early and mid-May. Yellow Perch larvae and larvae of other Percid species were abundant at the end of May and comprised 87% of the larval fish catch. Whitefish were less abundant than during the early May session and comprised 11% of the catch. Given that adult Lake Whitefish have been documented in Birch Bay at the time when whitefish would be expected to spawn, the capture of larval whitefish in Birch Bay indicates that whitefish may spawn there.

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Table 1. Sampling methods and areas for larval fish studies, spring 2021.

Collection Method and Waterbody	Site Description [1]
Drift Traps	
Fairford River	DS of Lake Manitoba and US of FRWCS
	DS of FRWCS
	Fairford River US of Lake St. Martin
Dauphin River	DS of Lake St. Martin
	Dauphin River US of Buffalo Creek
	Dauphin River DS of Buffalo Creek
Neuston Sampler	
Lake St. Martin (north basin)	Near the outlet to the LSMOC
	Near the outlet to the Dauphin River
	DS of the Narrows
Lake St. Martin (south basin)	Birch Bay
	Near Fairford River outlet
	US of the Narrows

1 - sampling areas illustrated on Figure 2

Table 2. Location, set and retrieval information for temperature loggers deployed in Lake St. Martin and the Fairford and Dauphin rivers.

Location	Logger SN	Location [1]		Date Set	Lift Date
		Easting	Northing		
Fairford River downstream of Lake Manitoba	20853071	518538	5715127	27 Oct 2020	02 Nov 2021
Dauphin River at Lake St. Martin	21063362	546626	5744308	29-Apr 2021	03 Nov 2021
Lake St. Martin in Birch Bay	21063368	534524	5703783	15 May 2021	04 Nov 2021

1 - UTM coordinates; NAD 1983 Zone 14U; general locations illustrated on Figure 2.

Table 3. Location and fishing effort for drift traps set to capture larval fish drifting into the Fairford and Dauphin rivers, spring 2021.

Sampling Area and Site		Sampling Session	Location [1]		Set Date	Set Time	Water Depth (m)	Water Velocity (m/s)	Water Temperature (°C)	Pull Date	Pull Time	Set Duration (dec.hrs)
			Easting	Northing								
Fairford River DS of Lake Manitoba	FR-DT-001	1	518538	5715127	29-Apr	16:57	2.50	0.14	6.5	30-Apr	16:13	23.3
	FR-DT-001	1	518538	5715127	30-Apr	16:13	2.50	0.14	7.0	01-May	13:03	20.8
	FR-DT-001	2	518538	5715127	16-May	10:50	2.50	0.15	13.0	17-May	10:24	23.6
	FR-DT-001	2	518538	5715127	17-May	10:24	2.50	0.12	14.0	18-May	10:18	23.9
	FR-DT-001	3	518538	5715127	31-May	17:09	2.50	0.17	17.0	01-Jun	12:58	19.8
	FR-DT-001	3	518538	5715127	01-Jun	12:58	2.50	0.17	17.0	02-Jun	9:50	20.9
	FR-DT-002	1	518574	5715089	29-Apr	17:02	3.00	0.14	6.5	30-Apr	16:10	23.1
	FR-DT-002	1	518574	5715089	30-Apr	16:10	3.00	0.14	7.0	01-May	12:58	20.8
	FR-DT-002	2	518574	5715089	16-May	10:41	2.30	0.15	13.0	17-May	10:24	23.7
	FR-DT-002	2	518574	5715089	17-May	10:24	2.30	0.14	14.0	18-May	10:12	23.8
	FR-DT-002	3	518574	5715089	31-May	17:15	2.30	0.11	17.0	01-Jun	13:02	19.8
	FR-DT-002	3	518574	5715089	01-Jun	13:02	3.00	0.11	17.0	02-Jun	10:00	21.0
Dauphin River DS of Lake St. Martin	DR-DT-001	1	546571	5744289	30-Apr	14:15	1.35	0.29	9.0	01-May	12:55	22.7
	DR-DT-001	1	546571	5744289	01-May	12:55	1.35	0.29	10.5	02-May	9:16	20.3
	DR-DT-001	2	546565	5744294	17-May	16:33	1.00	0.27	19.0	18-May	13:07	20.6
	DR-DT-001	2	546565	5744294	18-May	13:07	1.00	0.27	19.0	19-May	9:59	20.9
	DR-DT-001	3	546565	5744294	31-May	17:10	1.35	0.30	14.5	01-Jun	11:45	18.6
	DR-DT-001	3	546565	5744294	01-Jun	11:45	1.35	0.30	17.0	02-Jun	9:25	21.7
	DR-DT-002	1	546626	5744308	30-Apr	15:01	1.40	0.35	9.0	01-May	12:45	21.7
	DR-DT-002	1	546626	5744308	01-May	12:45	1.40	0.35	10.5	02-May	9:06	20.3
	DR-DT-002	2	546624	5744314	17-May	16:25	1.00	0.27	19.0	18-May	13:17	20.9
	DR-DT-002	2	546624	5744314	18-May	13:17	1.00	0.32	19.0	19-May	9:43	20.4
	DR-DT-002	3	546624	5744314	31-May	17:21	1.50	0.33	14.5	01-Jun	11:30	18.1
	DR-DT-002	3	546624	5744314	01-Jun	11:30	1.50	0.33	17.0	02-Jun	9:39	22.2

1 - UTM coordinates; NAD 83 Zone 14U; drift trap locations illustrated on Figure 2.

Table 4. Site-specific catch of larval and young-of-the-year (YOY) fish from drift traps set in the Fairford River upstream of the FRWCS, spring 2021.

Lift Date	Site	Larval/YOY Fish [1]													All Species
		Minnows	Suckers	Northern Pike	Coregonines	Cisco	Lake Whitefish	Burbot	Trout-perch	Sticklebacks	Sculpins	Percids	Yellow Perch	Unidentified	
30-Apr	FR-DT-001	-	-	-	-	-	-	-	-	-	-	-	-	-	0
	FR-DT-002	-	-	-	1	-	-	-	-	-	-	-	-	-	1
01-May	FR-DT-001	-	-	-	-	-	-	-	-	-	-	-	-	-	0
	FR-DT-002	-	-	-	-	-	-	-	-	-	-	-	-	-	0
17-May	FR-DT-001	-	-	-	-	-	-	-	-	-	-	-	-	-	0
	FR-DT-002	-	-	-	-	-	-	-	-	-	-	-	-	-	0
18-May	FR-DT-001	-	-	-	-	-	-	-	-	-	-	-	-	-	0
	FR-DT-002	-	-	-	-	-	-	-	-	-	-	-	-	-	0
01-Jun	FR-DT-001	-	-	-	-	-	-	-	-	-	-	1	-	-	1
	FR-DT-002	-	-	-	-	-	-	-	-	-	-	-	-	-	0
02-Jun	FR-DT-001	-	-	-	-	-	-	-	-	-	-	1	-	-	1
	FR-DT-002	-	-	-	-	-	-	-	-	-	-	-	-	-	0
	Total	0	0	0	1	0	0	0	0	0	0	2	0	0	3
	RA (%) [2]	0.0	0.0	0.0	33.3	0.0	0.0	0.0	0.0	0.0	0.0	66.7	0.0	0.0	100.0

1 - Several sucker (Family Catostomidae), minnow (Family Cyprinidae), Coregonine (Lake Whitefish and Cisco), sculpin and Percid (e.g., Walleye, Sauger, Darter sp.) species may spawn in Lake Manitoba or the Fairford River upstream of the FRWCS. Note that Yellow Perch are a member of the Percid family, but larval perch are readily distinguished from larvae of other percid species and so are identified to species here.

2 - Relative abundance calculated as a percentage of the total catch.

Table 5. Site- and species-specific density (# larvae/100m^3) of larval and young-of-the-year (YOY) fish in the Fairford River upstream of the FRWCS, spring 2021.

Lift Date	Site	Larval/YOY Fish [1]													All Species
		Minnows	Suckers	Northern Pike	Coregonines	Cisco	Lake Whitefish	Burbot	Trout-perch	Sticklebacks	Sculpins	Percids	Yellow Perch	Unidentified	
30-Apr	FR-DT-001	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	FR-DT-002	0.00	0.00	0.00	0.38	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.38
01-May	FR-DT-001	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	FR-DT-002	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
17-May	FR-DT-001	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	FR-DT-002	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
18-May	FR-DT-001	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	FR-DT-002	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
01-Jun	FR-DT-001	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.37	0.00	0.00	0.37
	FR-DT-002	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
02-Jun	FR-DT-001	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.35	0.00	0.00	0.35
	FR-DT-002	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Mean	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.00	0.00	0.09
	SD [2]	0.00	0.00	0.00	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.14	0.00	0.00	0.17

1 - Several sucker (Family Catostomidae), minnow (Family Cyprinidae), Coregonine (Lake Whitefish and Cisco), sculpin and Percid (e.g., Walleye, Sauger, Darter sp.) species may spawn in Lake Manitoba or the Fairford River upstream of the FRWCS. Note that Yellow Perch are a member of the Percid family, but larval perch are readily distinguished from larvae of other percid species and so are identified to species here.

2 - Standard deviation.

Table 6. Site-specific catch of larval and young-of-the-year (YOY) fish from drift traps set in the Dauphin River downstream of Lake St. Martin, spring 2021.

Lift Date	Site	Larval/YOY Fish [1]													All Species
		Minnows	Suckers	Northern Pike	Coregonines	Cisco	Lake Whitefish	Burbot	Trout-perch	Sticklebacks	Sculpins	Percids	Yellow Perch	Unidentified	
01-May	DR-DT-001	-	-	-	1	-	1	-	-	-	-	-	-	-	2
	DR-DT-002	-	-	-	5	-	-	-	-	-	-	-	-	-	5
02-May	DR-DT-001	-	-	-	-	9	40	-	-	-	-	-	-	1	50
	DR-DT-002	-	-	-	-	-	4	-	-	-	-	-	-	-	4
18-May	DR-DT-001	-	-	-	-	-	-	-	-	-	-	-	-	-	0
	DR-DT-002	-	-	-	-	-	-	-	-	-	-	-	-	-	0
19-May	DR-DT-001	-	-	-	-	-	-	-	-	-	-	-	-	-	0
	DR-DT-002	-	-	-	-	-	3	-	-	-	-	-	-	-	3
01-Jun	DR-DT-001	-	-	-	-	-	-	-	-	-	-	-	-	-	0
	DR-DT-002	-	1	-	-	-	-	-	-	-	-	-	-	-	1
02-Jun	DR-DT-001	-	1	-	-	-	-	-	-	-	-	-	-	-	1
	DR-DT-002	-	1	-	-	-	-	-	-	-	-	-	-	-	1
	Total	0	3	0	6	9	48	0	0	0	0	0	0	1	67
	RA (%) [2]	0.0	4.5	0.0	9.0	13.4	71.6	0.0	0.0	0.0	0.0	0.0	0.0	1.5	100.0

1 - Several sucker (Family Catstomidae), minnow (Family Cyprinidae), Coregonine (Lake Whitefish and Cisco), sculpin and Percid (e.g., Walleye, Sauger, Darter sp.) species may spawn in Lake St. Martin. Note that Yellow Perch are a member of the Percid family, but larval perch are readily distinguished from larvae of other percid species and so are identified to species here.

2 - relative abundance calculated as a percentage of the total catch

Table 7. Site- and species-specific density (# larvae/100m^3) of larval and young-of-the-year (YOY) fish in the Dauphin River downstream of Lake St. Martin, spring 2021.

Lift Date	Site	Larval/YOY Fish [1]												All Species
		Minnows	Suckers	Northern Pike	Coregonines	Cisco	Lake Whitefish	Burbot	Trout-perch	Sticklebacks	Sculpins	Percids	Yellow Perch	Unidentified	
01-May	DR-DT-001	0.00	0.00	0.00	0.19	0.00	0.19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.38
	DR-DT-002	0.00	0.00	0.00	0.81	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.81
02-May	DR-DT-001	0.00	0.00	0.00	0.00	1.88	8.37	0.00	0.00	0.00	0.00	0.00	0.00	0.21	10.46
	DR-DT-002	0.00	0.00	0.00	0.00	0.00	0.69	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.69
18-May	DR-DT-001	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	DR-DT-002	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
19-May	DR-DT-001	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	DR-DT-002	0.00	0.00	0.00	0.00	0.00	0.57	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.57
01-Jun	DR-DT-001	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	DR-DT-002	0.00	0.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.21
02-Jun	DR-DT-001	0.00	0.19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.19
	DR-DT-002	0.00	0.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.17
	Mean	0.00	0.05	0.00	0.08	0.16	0.82	0.00	0.00	0.00	0.00	0.00	0.00	0.02	1.12
	SD [2]	0.00	0.09	0.00	0.24	0.54	2.39	0.00	0.00	0.00	0.00	0.00	0.00	0.06	2.95

1 - Several sucker (Family Catostomidae), minnow (Family Cyprinidae), Coregonine (Lake Whitefish and Cisco), sculpin and Percid (e.g., Walleye, Sauger, Darter species) species may spawn in Lake St. Martin. Note that Yellow Perch are a member of the Percid family, but larval perch are readily distinguished from larvae of other percid species and so are identified to species here.

Table 8. Location, and fishing effort for drift traps set in the Fairford and Dauphin rivers, spring 2021.

Sampling Area and Site		Sampling Session	Location [1]		Set Date	Set Time	Water Depth (m)	Water Velocity (m/s)	Water Temperature (°C)	Pull Date	Pull Time	Set Duration (dec.hrs)
			Easting	Northing								
Fairford River DS of FRWCS	FR-DT-003	1	519834	5715241	29-Apr	15:57	2.00	0.09	6.5	30-Apr	15:43	23.8
	FR-DT-003	1	519834	5715241	30-Apr	15:43	2.00	0.09	7.0	01-May	12:17	20.6
	FR-DT-003	2	519834	5715241	16-May	11:24	1.50	0.28	13.0	17-May	10:57	23.6
	FR-DT-003	2	519834	5715241	17-May	10:57	1.50	0.25	14.0	18-May	10:57	24.0
	FR-DT-003	3	519834	5715241	31-May	17:37	1.50	0.32	18.0	01-Jun	13:33	19.9
	FR-DT-003	3	519834	5715241	01-Jun	13:33	1.50	0.14	17.0	02-Jun	10:41	21.1
	FR-DT-004	1	519836	5715204	29-Apr	15:44	2.00	0.20	6.5	30-Apr	15:29	23.8
	FR-DT-004	1	519836	5715204	30-Apr	15:29	2.00	0.20	7.0	01-May	12:17	20.8
	FR-DT-004	2	519825	5715221	16-May	11:34	1.40	0.30	13.0	17-May	11:02	23.5
	FR-DT-004	2	519825	5715221	17-May	11:02	1.40	0.30	14.0	18-May	11:10	24.1
	FR-DT-004	3	519825	5715221	31-May	17:43	1.40	0.31	18.0	01-Jun	10:46	17.1
	FR-DT-004	3	519825	5715221	01-Jun	10:46	1.40	0.31	17.0	02-Jun	10:46	24.0
Fairford River US of Lake St. Martin	FR-DT-005	1	558045	7914568	05-May	11:10	1.50	0.20	9.0	06-May	8:25	21.2
	FR-DT-005	1	526553	5718431	06-May	8:45	2.50	0.20	10.0	07-May	10:30	25.7
	FR-DT-005	2	526553	5718431	16-May	12:36	2.50	0.25	15.0	17-May	11:58	23.4
	FR-DT-005	2	526553	5718431	17-May	11:58	2.50	0.25	14.0	18-May	10:45	22.8
	FR-DT-005	3	526553	5718431	01-Jun	12:08	2.50	0.68	17.0	02-Jun	13:59	25.8
	FR-DT-005	3	526553	5718431	02-Jun	13:59	2.50	0.22	17.0	03-Jun	8:45	18.8
	FR-DT-006	1	526961	5717919	05-May	11:15	1.50	0.21	9.0	06-May	8:30	21.2
	FR-DT-006	1	526559	5718435	06-May	8:50	2.40	0.21	10.0	07-May	10:43	25.9
	FR-DT-006	2	526559	5718435	16-May	12:40	2.40	0.61	15.0	17-May	12:03	23.4
	FR-DT-006	2	526559	5718435	17-May	12:03	2.40	0.61	14.0	18-May	10:45	22.7
	FR-DT-006	3	526559	5718435	01-Jun	12:12	2.50	0.71	17.0	02-Jun	14:05	25.9
	FR-DT-006	3	526559	5718435	02-Jun	14:05	2.40	0.41	17.0	03-Jun	8:52	18.8

Table 8. (continued).

Sampling Area and Site		Sampling Session	Location [1]		Set Date	Set Time	Water Depth (m)	Water Velocity (m/s)	Water Temperature (°C)	Pull Date	Pull Time	Set Duration (dec.hrs)
			Easting	Northing								
Dauphin River US of Buffalo Creek	DR-DT-003	1	561934	5754955	27-Apr	14:28	0.60	-	6.0	28-Apr	14:15	23.8
	DR-DT-003	1	561934	5754955	28-Apr	14:15	0.60	-	6.5	29-Apr	8:33	18.3
	DR-DT-003	2	561931	5754951	17-May	16:37	0.50	0.41	16.0	18-May	10:10	17.5
	DR-DT-003	2	561931	5754951	18-May	10:10	0.50	0.41	19.0	19-May	11:32	25.4
	DR-DT-003	3	561931	5754951	29-May	15:18	0.40	0.39	14.0	30-May	12:03	20.8
	DR-DT-003	3	561931	5754951	30-May	12:03	0.40	0.39	14.5	31-May	11:25	23.4
	DR-DT-004	1	561904	5754921	27-Apr	14:44	0.70	-	6.0	28-Apr	14:30	23.8
	DR-DT-004	1	561904	5754921	28-Apr	14:30	0.70	-	6.5	29-Apr	8:40	18.2
	DR-DT-004	2	561907	5754920	17-May	16:37	0.55	0.68	16.0	18-May	10:15	17.6
	DR-DT-004	2	561907	5754920	18-May	10:15	0.55	0.68	19.0	19-May	11:38	25.4
	DR-DT-004	3	561907	5754920	29-May	15:24	0.60	0.66	14.0	30-May	12:25	21.0
	DR-DT-004	3	561907	5754920	30-May	12:25	0.60	0.66	14.5	31-May	11:25	23.0
Dauphin River DS of Buffalo Creek	DR-DT-005	1	563654	5755536	27-Apr	12:48	0.90	0.25	6.0	28-Apr	12:15	23.4
	DR-DT-005	1	563654	5755536	28-Apr	12:15	0.90	0.25	6.5	29-Apr	9:41	21.4
	DR-DT-005	2	563654	5755536	17-May	15:43	1.00	0.05	16.0	19-May	10:50	43.1
	DR-DT-005	2	563654	5755536	19-May	10:50	1.00	0.05	16.0	20-May	11:45	24.9
	DR-DT-005	3	562154	5754476	29-May	14:40	1.20	0.16	14.0	30-May	10:30	19.8
	DR-DT-005	3	562154	5754476	30-May	10:30	1.20	0.16	14.5	31-May	15:00	28.5
	DR-DT-006	1	563067	5755319	27-Apr	12:56	0.90	0.96	6.0	28-Apr	12:30	23.6
	DR-DT-006	1	563067	5755319	28-Apr	12:30	0.90	0.96	6.5	29-Apr	10:00	21.5
	DR-DT-006	2	563149	5755366	17-May	15:45	1.30	0.15	16.0	19-May	10:40	42.9
	DR-DT-006	2	563149	5755366	19-May	10:40	1.30	0.15	16.0	20-May	12:00	25.3
	DR-DT-006	3	563149	5755366	29-May	14:50	1.30	0.17	14.0	30-May	10:30	19.7
	DR-DT-006	3	563149	5755366	30-May	10:30	1.30	0.17	14.5	31-May	15:15	28.7

1 - UTM coordinates; NAD 83 Zone 14U; drift trap locations illustrated on Figure 2

Table 9. Site-specific catch of larval and young-of-the-year (YOY) fish from drift traps set in the Fairford River downstream of the FRWCS, spring 2021.

Lift Date	Site	Larval/YOY Fish [1]													All Species
		Minnows	Suckers	Northern Pike	Coregonines	Cisco	Lake Whitefish	Burbot	Trout-perch	Sticklebacks	Sculpins	Percids	Yellow Perch	Unidentified	
30-Apr	FR-DT-003	-	-	-	-	-	-	-	-	-	-	-	-	-	0
	FR-DT-004	-	-	-	-	-	-	-	-	-	-	-	-	-	0
01-May	FR-DT-003	-	-	-	-	-	-	-	-	-	-	-	-	-	0
	FR-DT-004	-	-	-	-	-	4	-	-	-	-	-	-	1	5
17-May	FR-DT-003	-	-	-	-	-	-	-	-	-	-	-	-	-	0
	FR-DT-004	-	-	-	-	-	-	-	-	-	-	-	-	-	0
18-May	FR-DT-003	-	-	-	-	-	-	-	-	-	-	-	-	-	0
	FR-DT-004	-	-	-	-	-	-	-	-	-	-	-	-	-	0
01-Jun	FR-DT-003	3	-	-	-	-	-	-	-	1	-	-	-	-	4
	FR-DT-004	2	-	-	-	-	-	-	-	3	2	18	-	-	25
02-Jun	FR-DT-003	-	-	-	-	-	-	-	2	2	-	6	-	-	10
	FR-DT-004	3	-	-	-	-	-	-	-	1	8	20	-	3	35
	Total	8	0	0	0	0	4	0	2	7	10	44	0	4	79
	RA (%)	10.1	0.0	0.0	0.0	0.0	5.1	0.0	2.5	8.9	12.7	55.7	0.0	5.1	100.0

1 - Several sucker (Family Catostomidae), minnow (Family Cyprinidae), Coregonine (Lake Whitefish and Cisco), sculpin and Percid (e.g., Walleye, Sauger, Darter sp.) species may spawn in Lake Manitoba or the Fairford River. Note that Yellow Perch are a member of the Percid family, but larval perch are readily distinguished from larvae of other percid species and so are identified to species here.

2 - Relative abundance calculated as a percentage of the total catch

Table 10. Site- and species-specific density (# larvae/100m^3) of larval and young-of-the-year (YOY) fish in the Fairford River downstream of the FRWCS, spring 2021.

Lift Date	Site	Larval/YOY Fish [1]													All Species
		Minnows	Suckers	Northern Pike	Coregonines	Cisco	Lake Whitefish	Burbot	Trout-perch	Sticklebacks	Sculpins	Percids	Yellow Perch	Unidentified	
30-Apr	FR-DT-003	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	FR-DT-004	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
01-May	FR-DT-003	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	FR-DT-004	0.00	0.00	0.00	0.00	0.00	1.19	0.00	0.00	0.00	0.00	0.00	0.00	0.30	1.48
17-May	FR-DT-003	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	FR-DT-004	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
18-May	FR-DT-003	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	FR-DT-004	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
01-Jun	FR-DT-003	0.58	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.19	0.00	0.00	0.00	0.00	0.77
	FR-DT-004	0.47	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.70	0.47	4.20	0.00	0.00	5.84
02-Jun	FR-DT-003	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.83	0.83	0.00	2.50	0.00	0.00	4.17
	FR-DT-004	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.17	1.33	3.32	0.00	0.50	5.81
	Mean	0.13	0.00	0.00	0.00	0.00	0.10	0.00	0.07	0.16	0.15	0.84	0.00	0.07	1.51
	SD [2]	0.23	0.00	0.00	0.00	0.00	0.34	0.00	0.24	0.29	0.39	1.55	0.00	0.16	2.35

1 - Several sucker (Family Catostomidae), minnow (Family Cyprinidae), Coregonine (Lake Whitefish and Cisco), sculpin and Percid (e.g., Walleye, Sauger, Darter sp.) species may spawn in Lake Manitoba or the Fairford River. Note that Yellow Perch are a member of the Percid family, but larval perch are readily distinguished from larvae of other percid species and so are identified to species here.

2 - Standard deviation

Table 11. Site-specific catch of larval and young-of-the-year (YOY) fish from drift traps set in the Fairford River upstream of Lake St. Martin, spring 2021.

Lift Date	Site	Larval/YOY Fish [1]													All Species
		Minnows	Suckers	Northern Pike	Coregonines	Cisco	Lake Whitefish	Burbot	Trout-perch	Sticklebacks	Sculpins	Percids	Yellow Perch	Unidentified	
06-May	FR-DT-005	-	-	-	1	-	-	-	-	-	-	-	-	-	1
	FR-DT-006	-	-	-	-	4	2	-	-	-	-	-	-	-	6
07-May	FR-DT-005	-	-	-	1	-	-	-	-	-	-	-	-	-	1
	FR-DT-006	-	-	-	-	33	15	-	-	-	-	-	-	1	49
17-May	FR-DT-005	-	-	-	-	-	-	-	-	-	-	-	-	-	0
	FR-DT-006	-	-	-	-	-	-	-	-	-	-	-	-	-	0
18-May	FR-DT-005	-	-	-	-	-	-	-	-	-	-	-	-	1	1
	FR-DT-006	-	-	-	-	-	-	-	-	-	-	-	-	-	0
02-Jun	FR-DT-005	-	-	-	-	-	-	-	-	1	4	6	-	-	11
	FR-DT-006	-	4	-	-	-	-	-	-	-	19	14	-	-	37
03-Jun	FR-DT-005	-	1	-	-	-	-	-	16	10	73	3	-	-	103
	FR-DT-006	-	2	-	-	-	-	-	30	12	21	2	-	-	67
	Total	0	7	0	2	37	17	0	46	23	117	25	0	2	276
	RA (%) [2]	0.0	2.5	0.0	0.7	13.4	6.2	0.0	16.7	8.3	42.4	9.1	0.0	0.7	100.0

1 - Several sucker (Family Catostomidae), minnow (Family Cyprinidae), Coregonine (Lake Whitefish and Cisco), sculpin and Percid (e.g., Walleye, Sauger, Darter sp.) species may spawn in Lake Manitoba or the Fairford River. Note that Yellow Perch are a member of the Percid family, but larval perch are readily distinguished from larvae of other percid species and so are identified to species here.

2 - relative abundance calculated as a percentage of the total catch.

Table 12. Site- and species-specific density (# larvae/100m^3) of larval and young-of-the-year (YOY) fish in the Fairford River upstream of Lake St. Martin, spring 2021.

Lift Date	Site	Larval/YOY Fish [1]													All Species
		Minnows	Suckers	Northern Pike	Coregonines	Cisco	Lake Whitefish	Burbot	Trout-perch	Sticklebacks	Sculpins	Percids	Yellow Perch	Unidentified	
06-May	FR-DT-005	0.00	0.00	0.00	0.29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.29
	FR-DT-006	0.00	0.00	0.00	0.00	1.11	0.55	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.66
07-May	FR-DT-005	0.00	0.00	0.00	0.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.24
	FR-DT-006	0.00	0.00	0.00	0.00	7.50	3.41	0.00	0.00	0.00	0.00	0.00	0.00	0.23	11.13
17-May	FR-DT-005	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	FR-DT-006	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
18-May	FR-DT-005	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.22	0.22
	FR-DT-006	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
02-Jun	FR-DT-005	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.28	0.42	0.00	0.00	0.77
	FR-DT-006	0.00	0.27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.28	0.94	0.00	0.00	2.49
03-Jun	FR-DT-005	0.00	0.30	0.00	0.00	0.00	0.00	0.00	4.78	2.99	21.83	0.90	0.00	0.00	30.80
	FR-DT-006	0.00	0.32	0.00	0.00	0.00	0.00	0.00	4.81	1.92	3.37	0.32	0.00	0.00	10.74
	Mean	0.00	0.07	0.00	0.04	0.72	0.33	0.00	0.80	0.42	2.23	0.21	0.00	0.04	4.86
	SD [2]	0.00	0.13	0.00	0.10	2.16	0.98	0.00	1.87	0.98	6.25	0.36	0.00	0.09	9.12

1 - Several sucker (Family Catostomidae), minnow (Family Cyprinidae), Coregonine (Lake Whitefish and Cisco), sculpin and Percid (e.g., Walleye, Sauger, Darter sp.) species may spawn in Lake Manitoba or the Fairford River. Note that Yellow Perch are a member of the Percid family, but larval perch are readily distinguished from larvae of other percid species and so are identified to species here.

2 - Standard deviation.

Table 13. Site-specific catch of fish eggs from drift traps set in the Fairford River upstream of Lake St. Martin, spring 2021.

Site	Lift Date	Fish Eggs	
		Count	Taxon
FR-DT-005	06-May	0	-
FR-DT-006		1	unidentified
FR-DT-005	07-May	0	-
FR-DT-006		51	unidentified
FR-DT-005	17-May	41	29 sucker sp., 12 Percid sp./Trout-perch
FR-DT-006		0	-
FR-DT-005	18-May	3	sucker Sp.
FR-DT-006		33	10 sucker, 23 Percid
FR-DT-005	02-Jun	97	5 sucker Sp., 92 Percid sp.
FR-DT-006		0	-
FR-DT-005	03-Jun	18	Percid sp./Trout-perch
FR-DT-006		5	unidentified
	Total:	249	

Table 14. Site-specific catch of larval and young-of-the-year (YOY) fish from drift traps set in the Dauphin River upstream of Buffalo Creek, spring 2021.

Lift Date	Site	Larval/YOY Fish [1]													All Species
		Minnows	Suckers	Northern Pike	Coregonines	Cisco	Lake Whitefish	Burbot	Trout-perch	Sticklebacks	Sculpins	Percids	Yellow Perch	Unidentified	
28-Apr	DR-DT-003	-	-	-	-	-	2	2	-	-	-	-	-	-	4
	DR-DT-004	-	-	-	1	-	7	-	-	-	-	-	-	-	8
29-Apr	DR-DT-003	-	-	-	-	1	6	-	-	-	-	-	-	-	7
	DR-DT-004	-	-	-	-	4	4	-	-	-	-	-	-	-	8
18-May	DR-DT-003	-	-	-	-	-	-	-	-	-	-	-	-	1	1
	DR-DT-004	-	1	-	-	-	2	-	-	-	-	-	-	-	3
19-May	DR-DT-003	-	-	-	-	-	-	-	-	-	-	-	-	-	0
	DR-DT-004	-	-	-	1	-	-	-	-	-	-	-	-	-	1
30-May	DR-DT-003	-	-	-	-	-	-	-	-	-	-	-	-	-	0
	DR-DT-004	-	8	-	-	-	-	-	-	-	-	18	-	-	26
31-May	DR-DT-003	-	1	-	-	-	-	-	-	-	-	-	-	-	1
	DR-DT-004	-	1	-	-	-	-	-	-	-	-	-	-	-	1
	Total	0	11	0	2	5	21	2	0	0	0	18	0	1	60
	RA (%) [2]	0.0	18.3	0.0	3.3	8.3	35.0	3.3	0.0	0.0	0.0	30.0	0.0	1.7	100.0

1 - Several sucker (Family Catostomidae), minnow (Family Cyprinidae), Coregonine (Lake Whitefish and Cisco), sculpin and percid (e.g., Walleye, Sauger, Darter sp.) species may spawn in Lake St. Martin or the Dauphin River. Note that Yellow Perch are a member of the Percid family, but larval perch are readily distinguished from larvae of other percid species and so are identified to species here.

2 - Relative abundance calculated as a percentage of the total catch.

Table 15. Site- and species-specific density (# larvae/100m^3) of larval and young-of-the-year (YOY) fish in the Dauphin River upstream of Buffalo Creek, spring 2021.

Lift Date	Site	Larval/YOY Fish [1]													All Species
		Minnows	Suckers	Northern Pike	Coregonines	Cisco	Lake Whitefish	Burbot	Trout-perch	Sticklebacks	Sculpins	Percids	Yellow Perch	Unidentified	
06-May	FR-DT-005	0.00	0.00	0.00	0.29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.29
	FR-DT-006	0.00	0.00	0.00	0.00	1.11	0.55	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.66
07-May	FR-DT-005	0.00	0.00	0.00	0.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.24
	FR-DT-006	0.00	0.00	0.00	0.00	7.50	3.41	0.00	0.00	0.00	0.00	0.00	0.00	0.23	11.13
17-May	FR-DT-005	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	FR-DT-006	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
18-May	FR-DT-005	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.22	0.22
	FR-DT-006	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
02-Jun	FR-DT-005	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.28	0.42	0.00	0.00	0.77
	FR-DT-006	0.00	0.27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.28	0.94	0.00	0.00	2.49
03-Jun	FR-DT-005	0.00	0.30	0.00	0.00	0.00	0.00	0.00	4.78	2.99	21.83	0.90	0.00	0.00	30.80
	FR-DT-006	0.00	0.32	0.00	0.00	0.00	0.00	0.00	4.81	1.92	3.37	0.32	0.00	0.00	10.74
	Mean	0.00	0.07	0.00	0.04	0.72	0.33	0.00	0.80	0.42	2.23	0.21	0.00	0.04	4.86
	SD [2]	0.00	0.13	0.00	0.10	2.16	0.98	0.00	1.87	0.98	6.25	0.36	0.00	0.09	9.12

1 - Several sucker (Family Catostomidae), minnow (Family Cyprinidae), Coregonine (Lake Whitefish and Cisco), sculpin and percid (e.g., Walleye, Sauger, Darter sp.) species may spawn in Lake St. Martin or the Dauphin River. Note that Yellow Perch are a member of the Percid family, but larval perch are readily distinguished from larvae of other percid species and so are identified to species here.

2 - Standard deviation.

Table 16. Site-specific catch of larval and young-of-the-year (YOY) fish from drift traps set in the Dauphin River downstream of Buffalo Creek, spring 2021.

Lift Date	Site	Larval/YOY Fish [1]													All Species
		Minnows	Suckers	Northern Pike	Coregonines	Cisco	Lake Whitefish	Burbot	Trout-perch	Sticklebacks	Sculpins	Percids	Yellow Perch	Unidentified	
28-Apr	DR-DT-005	-	-	-	-	-	-	2	-	-	-	-	-	-	2
	DR-DT-006	-	-	-	-	-	-	-	-	-	-	-	-	-	0
29-Apr	DR-DT-005	-	-	-	-	-	-	-	-	-	-	-	-	-	0
	DR-DT-006	-	-	-	2	-	-	-	-	-	-	-	-	-	2
18-May	DR-DT-005	-	-	-	-	-	-	-	-	-	-	-	-	-	0
	DR-DT-006	-	-	-	-	-	-	-	-	-	-	-	-	-	0
20-May	DR-DT-005	-	-	-	-	-	-	-	-	-	-	-	-	-	0
	DR-DT-006	-	2	-	-	-	4	-	-	-	-	-	-	-	6
30-May	DR-DT-005	-	2	-	-	-	-	-	-	-	-	-	-	-	2
	DR-DT-006	-	-	-	-	-	-	-	-	-	-	-	-	2	2
31-May	DR-DT-005	-	4	-	-	-	-	-	-	-	-	1	-	-	5
	DR-DT-006	-	-	-	-	-	-	-	-	-	-	2	-	-	2
	Total	0	8	0	2	0	4	2	0	0	0	3	0	2	21
	RA (%)	0.0	38.1	0.0	9.5	0.0	19.0	9.5	0.0	0.0	0.0	14.3	0.0	9.5	100.0

1 - Several sucker (Family Catostomidae), minnow (Family Cyprinidae), Coregonine (Lake Whitefish and Cisco), sculpin and percid (e.g., Walleye, Sauger, Darter sp.) species may spawn in Lake St. Martin or the Dauphin River. Note that Yellow Perch are a member of the Percid family, but larval perch are readily distinguished from larvae of other percid species and so are identified to species here.

2 - Relative abundance calculated as a percentage of the total catch.

Table 17. Site- and species-specific density (# larvae/100m^3) of larval and young-of-the-year (YOY) fish in the Dauphin River downstream of Buffalo Creek, spring 2021.

Lift Date	Site	Larval/YOY Fish [1]													All Species
		Minnows	Suckers	Northern Pike	Coregonines	Cisco	Lake Whitefish	Burbot	Trout-perch	Sticklebacks	Sculpins	Percids	Yellow Perch	Unidentified	
28-Apr	DR-DT-005	0.00	0.00	0.00	0.00	0.00	0.00	0.42	0.00	0.00	0.00	0.00	0.00	0.00	0.42
	DR-DT-006	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
29-Apr	DR-DT-005	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	DR-DT-006	0.00	0.00	0.00	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.12
18-May	DR-DT-005	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	DR-DT-006	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20-May	DR-DT-005	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	DR-DT-006	0.00	0.65	0.00	0.00	0.00	1.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.95
30-May	DR-DT-005	0.00	0.78	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.78
	DR-DT-006	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.74	0.74
31-May	DR-DT-005	0.00	1.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.27	0.00	0.00	1.35
	DR-DT-006	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.51	0.00	0.00	0.51
	Mean	0.00	0.21	0.00	0.01	0.00	0.11	0.04	0.00	0.00	0.00	0.06	0.00	0.06	0.49
	SD [2]	0.00	0.39	0.00	0.03	0.00	0.38	0.12	0.00	0.00	0.00	0.16	0.00	0.21	0.63

1 - Several sucker (Family Catostomidae), minnow (Family Cyprinidae), Coregonine (Lake Whitefish and Cisco), sculpin and percid (e.g., Walleye, Sauger, Darter sp.) species may spawn in Lake St. Martin or the Dauphin River. Note that Yellow Perch are a member of the Percid family, but larval perch are readily distinguished from larvae of other percid species and so are identified to species here.

2 - Standard deviation.

Table 18. Site-specific catch of fish eggs from drift traps set in the Dauphin River upstream and downstream of Buffalo Creek, spring 2021.

	Sampling Area and Site	Lift Date	Fish Eggs	
			Count	Taxon
Dauphin River US of Buffalo Creek	DR-DT-003	28-Apr	9	2 Burbot, 7 Coregonine sp.
	DR-DT-004		11	4 Coregonine sp., 7 unidentified
	DR-DT-003	29-Apr	2	1 Coregonine sp., 1 unidentified
	DR-DT-004		7	2 Coregonine sp., 5 unidentified
	DR-DT-003	18-May	14	unidentified
	DR-DT-004		20	unidentified
	DR-DT-003	19-May	0	-
	DR-DT-004		53	Percid sp.
	DR-DT-003	30-May	1	unidentified
	DR-DT-004		4	Sucker sp.
	DR-DT-003	31-May	6	unidentified
	DR-DT-004		12	unidentified
		Total:	139	
Dauphin River DS of Buffalo Creek	DR-DT-005	28-Apr	0	-
	DR-DT-006		0	-
	DR-DT-005	29-Apr	7	Coregonine sp.
	DR-DT-006		10	1 Sucker sp., 8 Coregonine sp., 1 unidentified
	DR-DT-005	18-May	16	unidentified
	DR-DT-006		596	248 Sucker sp.; 348 Percid sp.
	DR-DT-005	20-May	1	unidentified
	DR-DT-006		353	174 Sucker sp., 179 Percid sp.
	DR-DT-005	30-May	48	40 Sucker sp., 8 Percid sp.
	DR-DT-006		886	611 Sucker, 275 Percid sp.
	DR-DT-005	31-May	90	25 Sucker, 65 Percid sp.
	DR-DT-006		1492	994 Sucker sp., 498 Percid sp.
		Total:	3499	

Table 19. The location, distance, duration, and volume of water filtered for neuston tows conducted in Lake St. Martin, May 7-15, 2021.

Sampling Area	Neuston Tow	Date	Start Location [1]		End Location [1]		Water Temperature (°C)	Duration (minutes)	Tow Distance [2] (m)	Volume [3] (m3)
			Easting	Northing	Easting	Northing				
Outlet to the Dauphin River	NT-141	07-May-21	547507	5740193	548181	5739711	6.5	20	1449	196
Outlet to the Dauphin River	NT-142	07-May-21	548162	5739597	546733	5739423	6.5	20	1383	187
Outlet to the Dauphin River	NT-143	07-May-21	546739	5739295	546150	5740510	6.5	20	1478	200
Outlet to the LSMOC	NT-144	08-May-21	553061	5738256	554116	5738089	7.0	20	1462	197
Outlet to the LSMOC	NT-145	08-May-21	554052	5738077	553662	5736768	7.0	20	1562	211
Outlet to the LSMOC	NT-146	08-May-21	553581	5736703	551986	5736713	7.0	20	1401	189
DS of the Narrows	NT-147	08-May-21	548059	5734872	548397	5734242	7.0	17	945	128
DS of the Narrows	NT-148	08-May-21	548281	5734326	548299	5734209	7.0	19	1332	180
DS of the Narrows	NT-149	08-May-21	547981	5734232	548396	5735226	7.0	20	1609	217
Birch Bay	NT-150	15-May-21	534631	5703762	534671	5703497	-	20	1174	159
Birch Bay	NT-151	15-May-21	534698	5703395	534670	5703579	-	20	717	97
Birch Bay	NT-152	15-May-21	534660	5703488	534574	5703348	-	20	1170	158
Birch Bay	NT-153	15-May-21	534647	5703333	534464	5703936	-	25	941	127

1 - UTM coordinates; NAD 83 Zone 14U; neuston sampling areas illustrated on Figure 2.

2 - Tow distance (m) calculated as the number of flow meter revolutions x the GO Meter constant (26873) divided by 999999.

3 - Volume filtered calculated as the tow distance (m) x 0.135 m^2.

Table 20. Species-specific larval fish catch for neuston tows conducted in Lake St. Martin, May 7-15, 2021.

Sampling Area	Neuston Tow	Date	Larval Fish Count [1]						Total
			Suckers	Cisco	Lake Whitefish	Percids	Yellow Perch	Unidentified	
Outlet to the Dauphin River	NT-141	07-May	-	-	4	-	-	-	4
Outlet to the Dauphin River	NT-142	07-May	-	6	40	-	-	-	46
Outlet to the Dauphin River	NT-143	07-May	-	2	52	-	-	-	54
Outlet to the LSMOC	NT-144	08-May	-	-	2	-	-	-	2
Outlet to the LSMOC	NT-145	08-May	-	-	1	-	-	-	1
Outlet to the LSMOC	NT-146	08-May	-	-	7	-	-	-	7
DS of the Narrows	NT-147	08-May	-	1	-	-	-	-	1
DS of the Narrows	NT-148	08-May	-	1	1	-	-	-	2
DS of the Narrows	NT-149	08-May	-	-	-	-	-	-	0
Birch Bay	NT-150	15-May	-	-	18	-	-	-	18
Birch Bay	NT-151	15-May	-	-	22	-	-	-	22
Birch Bay	NT-152	15-May	-	1	13	-	-	-	14
Birch Bay	NT-153	15-May	-	-	16	-	-	-	16
		Total:	0	11	176	0	0	0	187
		RA (%) [2]	0.0	5.9	94.1	0.0	0.0	0.0	100.0

1 - Several sucker (Family Catostomidae) and percid (Family Percidae; e.g., Walleye, Sauger, Darter sp.) species may spawn in Lake St. Martin. Note that Yellow Perch are a member of the Percid family, but larval perch are readily distinguished from larvae of other percid species and so are identified to species here.

2 - Relative abundance calculated as a percentage of the total catch.

Table 21. Tow- and species-specific CPUE (# larvae/100 m^3) of larval fish catches from neuston tows conducted in Lake St. Martin, May 7-15, 2021.

Sampling Area	Neuston Tow	Date	Larval Fish CPUE [1]						Total
			Suckers	Cisco	Lake Whitefish	Percids	Yellow Perch	Unidentified	
Outlet to the Dauphin River	NT-141	07-May	0.00	0.00	2.05	0.00	0.00	0.00	2.05
Outlet to the Dauphin River	NT-142	07-May	0.00	3.21	21.43	0.00	0.00	0.00	24.64
Outlet to the Dauphin River	NT-143	07-May	0.00	1.00	26.06	0.00	0.00	0.00	27.06
Outlet to the LSMOC	NT-144	08-May	0.00	0.00	1.01	0.00	0.00	0.00	1.01
Outlet to the LSMOC	NT-145	08-May	0.00	0.00	0.47	0.00	0.00	0.00	0.47
Outlet to the LSMOC	NT-146	08-May	0.00	0.00	3.70	0.00	0.00	0.00	3.70
DS of the Narrows	NT-147	08-May	0.00	0.78	0.00	0.00	0.00	0.00	0.78
DS of the Narrows	NT-148	08-May	0.00	0.56	0.56	0.00	0.00	0.00	1.11
DS of the Narrows	NT-149	08-May	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Birch Bay	NT-150	15-May	0.00	0.00	11.35	0.00	0.00	0.00	11.35
Birch Bay	NT-151	15-May	0.00	0.00	22.73	0.00	0.00	0.00	22.73
Birch Bay	NT-152	15-May	0.00	0.63	8.23	0.00	0.00	0.00	8.87
Birch Bay	NT-153	15-May	0.00	0.00	12.60	0.00	0.00	0.00	12.60
		Mean	0.00	0.48	8.48	0.00	0.00	0.00	8.95
		SD [2]	0.00	0.86	9.18	0.00	0.00	0.00	9.61

1 - Several sucker (Family Catostomidae) and percid (Family Percidae; e.g., Walleye, Sauger, Darter sp.) species may spawn in Lake St. Martin. Note that Yellow Perch are a member of the Percid family, but larval perch are readily distinguished from larvae of other percid species and so are identified to species here.

2 - Standard deviation.

Table 22. The location, distance, duration, and volume of water filtered for neuston tows conducted in Lake St. Martin, May 31-June 1, 2021.

Sampling Area	Neuston Tow	Date	Start Location [1]		End Location [1]		Water Temperature (°C)	Duration (minutes)	Tow Distance [2] (m)	Volume [3] (m^3)
			Easting	Northing	Easting	Northing				
Birch Bay	NT-154	31-May-21	534098	5704773	534641	5703681	15.0	20	1670	225
Birch Bay	NT-155	31-May-21	534700	5703727	534873	5705387	15.0	20	1659	224
Birch Bay	NT-156	31-May-21	534887	5705448	534660	5706746	15.0	19	1320	178
Birch Bay	NT-157	31-May-21	534810	5707569	533308	5707636	15.0	21	1764	238
DS of the Narrows	NT-158	01-Jun-21	547936	5734269	548689	5733960	16.0	21	1501	203
DS of the Narrows	NT-159	01-Jun-21	548700	5734023	548612	5734309	16.0	5	241	33
DS of the Narrows	NT-160	01-Jun-21	548511	5734274	548134	5734840	16.0	15	997	135
DS of the Narrows	NT-161	01-Jun-21	548165	5735374	548159	5735781	16.0	20	1599	216
Outlet to the LSMOC	NT-162	01-Jun-21	553362	5738210	554757	5737897	16.0	20	1751	236
Outlet to the LSMOC	NT-163	01-Jun-21	554764	5737854	555586	5737394	16.0	20	1707	230
Outlet to the LSMOC	NT-164	01-Jun-21	555564	5737296	553880	5737060	16.0	20	1827	247
Outlet to the Dauphin River	NT-165	01-Jun-21	548042	5740267	547282	5739303	16.0	19	1721	232
Outlet to the Dauphin River	NT-166	01-Jun-21	547235	5739198	546763	5740714	16.0	20	1713	231
Outlet to the Dauphin River	NT-167	01-Jun-21	546756	5740650	546756	5740650	16.0	20	1693	229

1 - UTM coordinates; NAD 83 Zone 14U; neuston sampling areas illustrated on Figure 2

2 - Tow distance (m) calculated as the number of flow meter revolutions x the GO Meter constant (26873) divided by 999999.

3 - Volume filtered calculated as the tow distance (m) x 0.135 m^2.

Table 23. Species-specific larval fish catch for neuston tows conducted in Lake St. Martin, May 31-June 1, 2021.

Sampling Area	Neuston Tow	Date	Larval Fish [1]						Total
			Suckers	Cisco	Lake Whitefish	Percids	Yellow Perch	Unidentified	
Birch Bay	NT-154	31-May	-	-	2	16	-	-	18
Birch Bay	NT-155	31-May	-	-	1	4	-	-	5
Birch Bay	NT-156	31-May	-	-	6	20	-	-	26
Birch Bay	NT-157	31-May	-	-	4	3	-	-	7
DS of the Narrows	NT-158	01-Jun	-	-	5	15	-	-	20
DS of the Narrows	NT-159	01-Jun	-	-	-	-	-	-	0
DS of the Narrows	NT-160	01-Jun	-	-	1	12	-	-	13
DS of the Narrows	NT-161	01-Jun	-	-	-	16	-	-	16
Outlet to the LSMOC	NT-162	01-Jun	-	-	5	3	-	1	9
Outlet to the LSMOC	NT-163	01-Jun	-	-	3	-	11	-	14
Outlet to the LSMOC	NT-164	01-Jun	-	-	8	3	156	-	167
Outlet to the Dauphin River	NT-165	01-Jun	-	-	2	12	34	-	48
Outlet to the Dauphin River	NT-166	01-Jun	5	-	4	13	-	-	22
Outlet to the Dauphin River	NT-167	01-Jun	2	-	3	31	-	-	36
		Total:	7	0	44	148	201	1	401
		RA (%) [2]	1.7	0.0	11.0	36.9	50.1	0.2	100.0

1 - Several sucker (Family Catostomidae) and percid (Family Percidae; e.g., Walleye, Sauger, Darter sp.) species may spawn in Lake St. Martin. Note that Yellow Perch are a member of the Percid family, but larval perch are readily distinguished from larvae of other percid species and so are identified to species here.

2 - Relative abundance calculated as a percentage of the total catch

Table 24. Tow- and species-specific CPUE (# larvae/100 m^3) of larval fish catches from neuston tows conducted in Lake St. Martin, May 31-June 1, 2021.

Sampling Area	Neuston Tow	Date	Larval Fish CPUE (# larvae/100 m^3) [1]						Total
			Suckers	Cisco	Lake Whitefish	Percids	Yellow Perch	Unidentified	
Birch Bay	NT-154	31-May	0.00	0.00	0.89	7.10	0.00	0.00	7.99
Birch Bay	NT-155	31-May	0.00	0.00	0.45	1.79	0.00	0.00	2.23
Birch Bay	NT-156	31-May	0.00	0.00	3.37	11.22	0.00	0.00	14.59
Birch Bay	NT-157	31-May	0.00	0.00	1.68	1.26	0.00	0.00	2.94
DS of the Narrows	NT-158	01-Jun	0.00	0.00	2.47	7.40	0.00	0.00	9.87
DS of the Narrows	NT-159	01-Jun	0.00	0.00	0.00	0.00	0.00	0.00	0.00
DS of the Narrows	NT-160	01-Jun	0.00	0.00	0.74	8.92	0.00	0.00	9.66
DS of the Narrows	NT-161	01-Jun	0.00	0.00	0.00	7.41	0.00	0.00	7.41
Outlet to the LSMOC	NT-162	01-Jun	0.00	0.00	2.12	1.27	0.00	0.42	3.81
Outlet to the LSMOC	NT-163	01-Jun	0.00	0.00	1.30	0.00	4.77	0.00	6.07
Outlet to the LSMOC	NT-164	01-Jun	0.00	0.00	3.24	1.22	63.27	0.00	67.73
Outlet to the Dauphin River	NT-165	01-Jun	0.00	0.00	0.86	5.17	14.64	0.00	20.66
Outlet to the Dauphin River	NT-166	01-Jun	2.16	0.00	1.73	5.62	0.00	0.00	9.51
Outlet to the Dauphin River	NT-167	01-Jun	0.87	0.00	1.31	13.56	0.00	0.00	15.75
		Mean	0.22	0.00	1.44	5.14	5.91	0.03	12.73
		SD [2]	0.58	0.00	1.03	4.19	16.37	0.11	16.19

1 - Several sucker (Family Catostomidae) and percid (Family Percidae; e.g., Walleye, Sauger, Darter sp.) species may spawn in Lake St. Martin. Note that Yellow Perch are a member of the Percid family, but larval perch are readily distinguished from larvae of other percid species and so are identified to species here.

2 - Standard deviation

Table 25. Comparison of mean larval fish CPUE between sampling areas and dates for neuston tows conducted in Lake St. Martin, spring 2021.

Sampling Area	# of Neuston Tows	Date	Mean CPUE (# larvae/100 m^3) ± 1 Standard Deviation [1]						Total
			Suckers	Cisco	Lake Whitefish	Percids	Yellow Perch	Unidentified	
Birch Bay	4	15-May	0.00 ± 0.00	0.16 ± 0.32	13.73 ± 6.28	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	13.89 ± 6.10
	4	31-May	0.00 ± 0.00	0.00 ± 0.00	1.60 ± 1.29	5.34 ± 4.72	0.00 ± 0.00	0.00 ± 0.00	6.94 ± 5.71
DS of the Narrows	3	08-May	0.00 ± 0.00	0.45 ± 0.40	0.19 ± 0.32	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.63 ± 0.57
	4	01-Jun	0.00 ± 0.00	0.00 ± 0.00	0.80 ± 1.16	5.93 ± 4.02	0.00 ± 0.00	0.00 ± 0.00	6.74 ± 4.63
Outlet to the Dauphin River	3	07-May	0.00 ± 0.00	1.41 ± 1.64	16.51 ± 12.74	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	17.92 ± 13.80
	3	01-Jun	1.01 ± 1.09	0.00 ± 0.00	1.30 ± 0.43	8.12 ± 4.72	4.88 ± 8.45	0.00 ± 0.00	15.31 ± 5.59
Outlet to the LSMOC	3	08-May	0.00 ± 0.00	0.00 ± 0.00	1.73 ± 1.73	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	1.73 ± 1.73
	3	01-Jun	0.00 ± 0.00	0.00 ± 0.00	2.22 ± 0.98	0.83 ± 0.72	22.68 ± 35.23	0.14 ± 0.24	25.87 ± 36.27

1 - Several sucker (Family Catostomidae) and percid (Family Percidae; e.g., Walleye, Sauger, Darter sp.) species may spawn in Lake St. Martin. Note that Yellow Perch are a member of the Percid family, but larval perch are readily distinguished from larvae of other percid species and so are identified to species here.

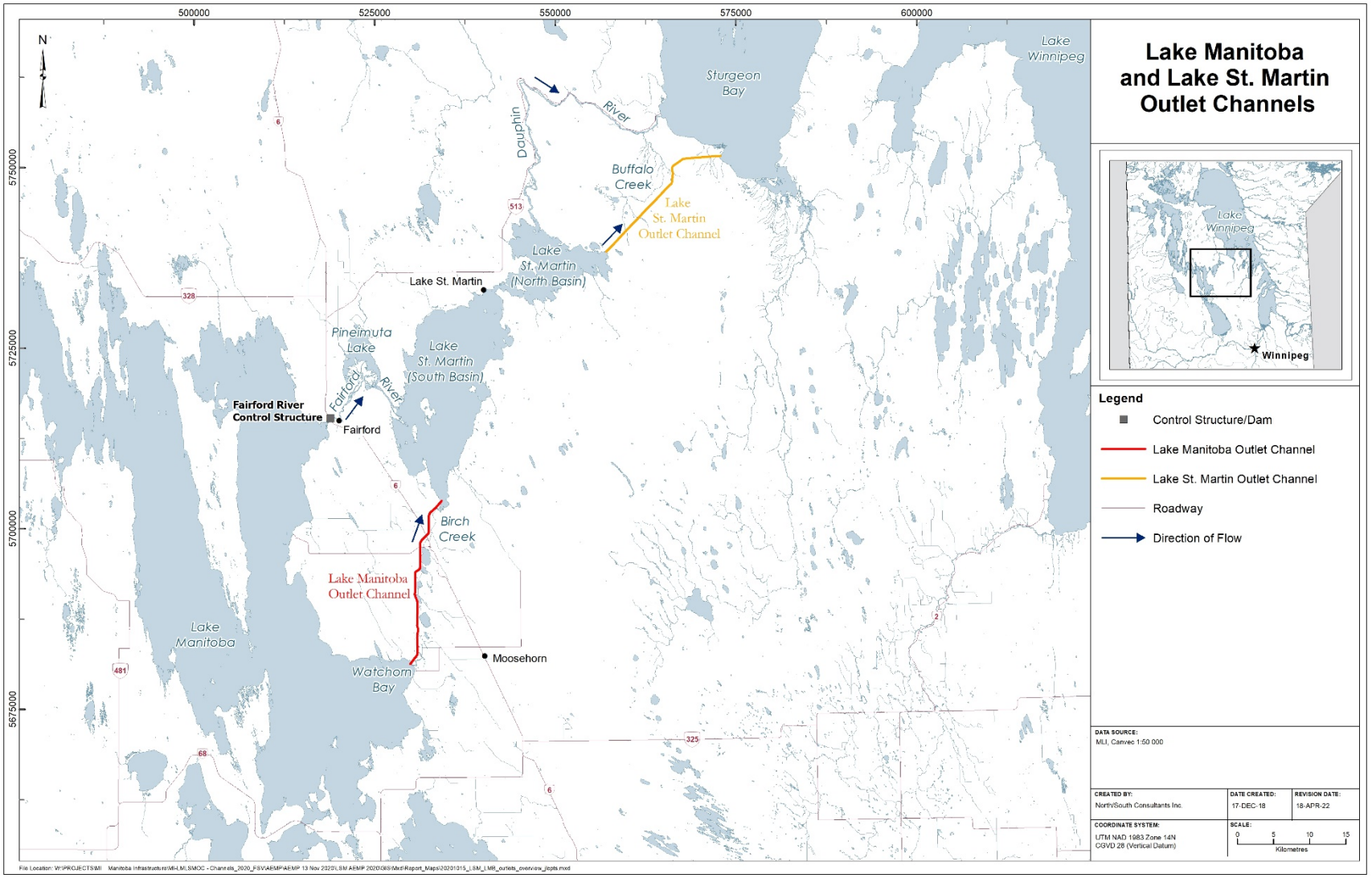

Figure 1. Location of Lake Manitoba and Lake St. Martin Outlet Channels in central Manitoba.

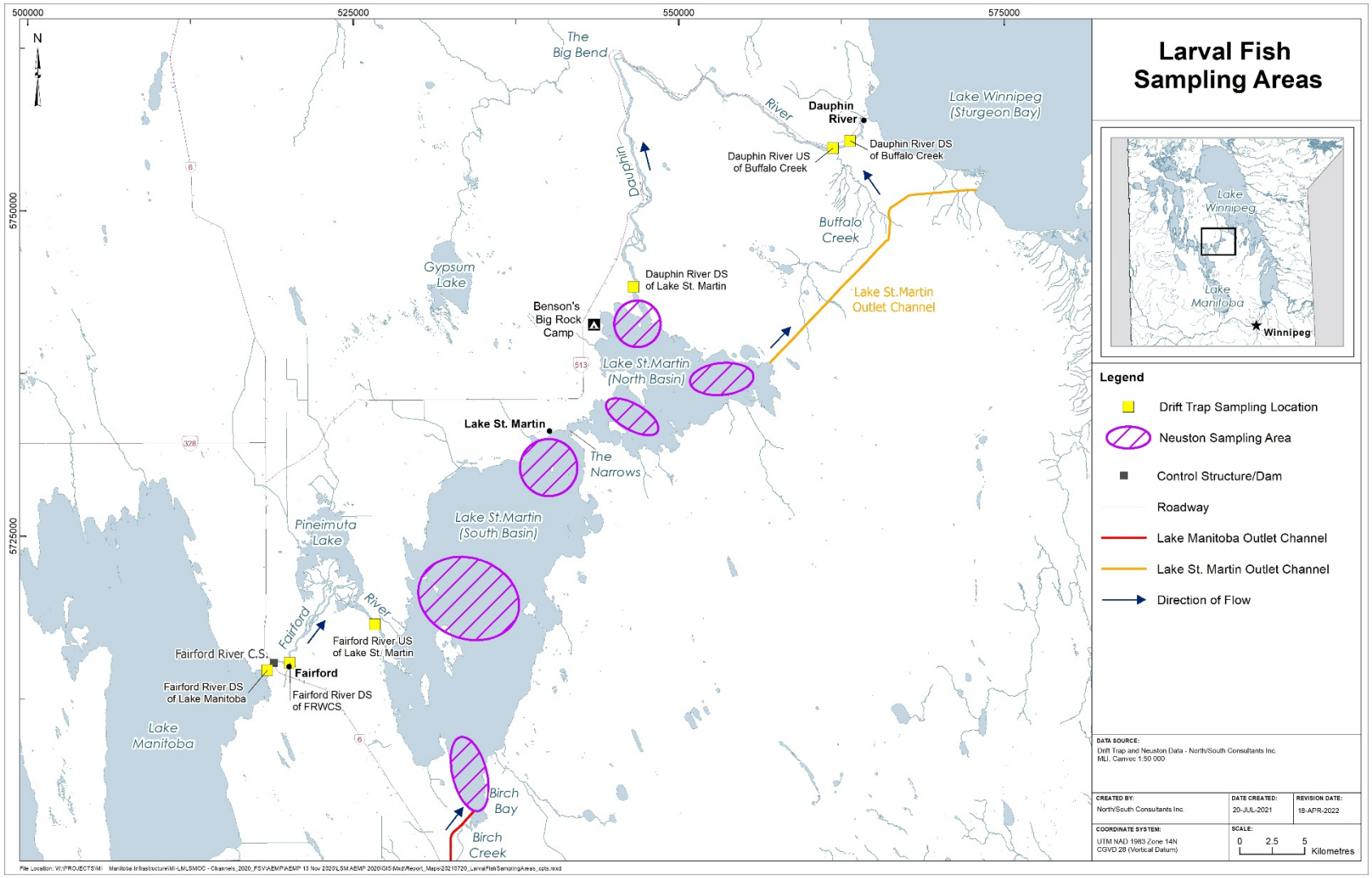

Figure 2. Proposed general sampling areas for larval fish studies, spring 2021. Neuston sampling could not be conducted upstream of the Narrows or in the central south basin of Lake St. Martin due to low water level and high winds throughout much of spring 2021.

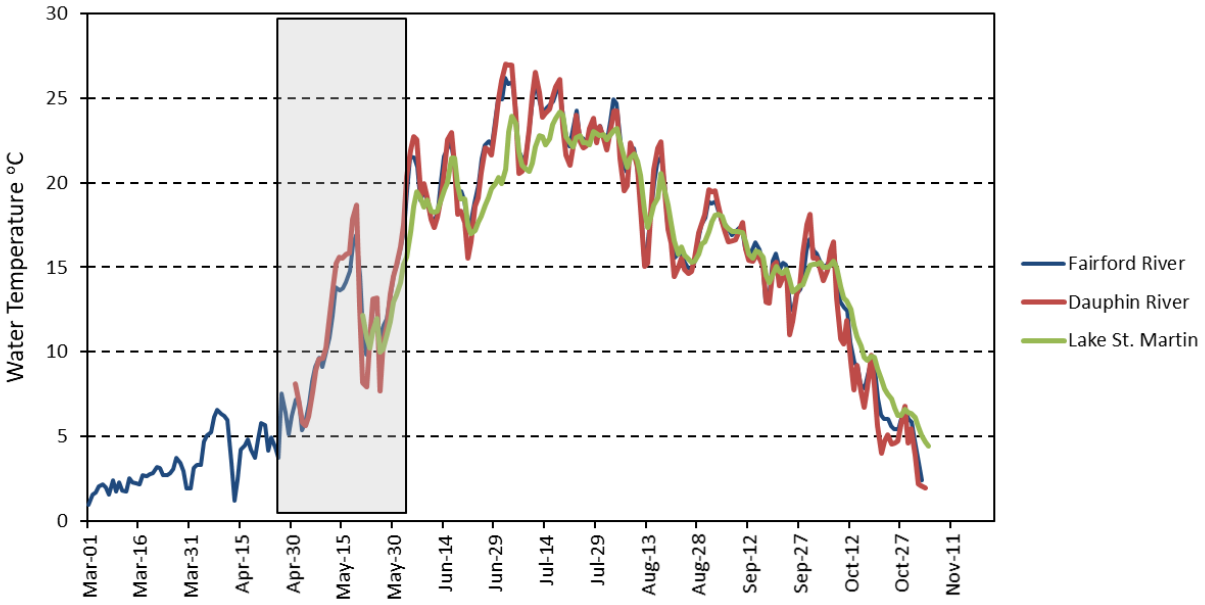

Figure 3. Mean daily water temperature in Lake St. Martin and the Fairford and Dauphin rivers, 2021. Shaded box encompasses the larval fish study period.

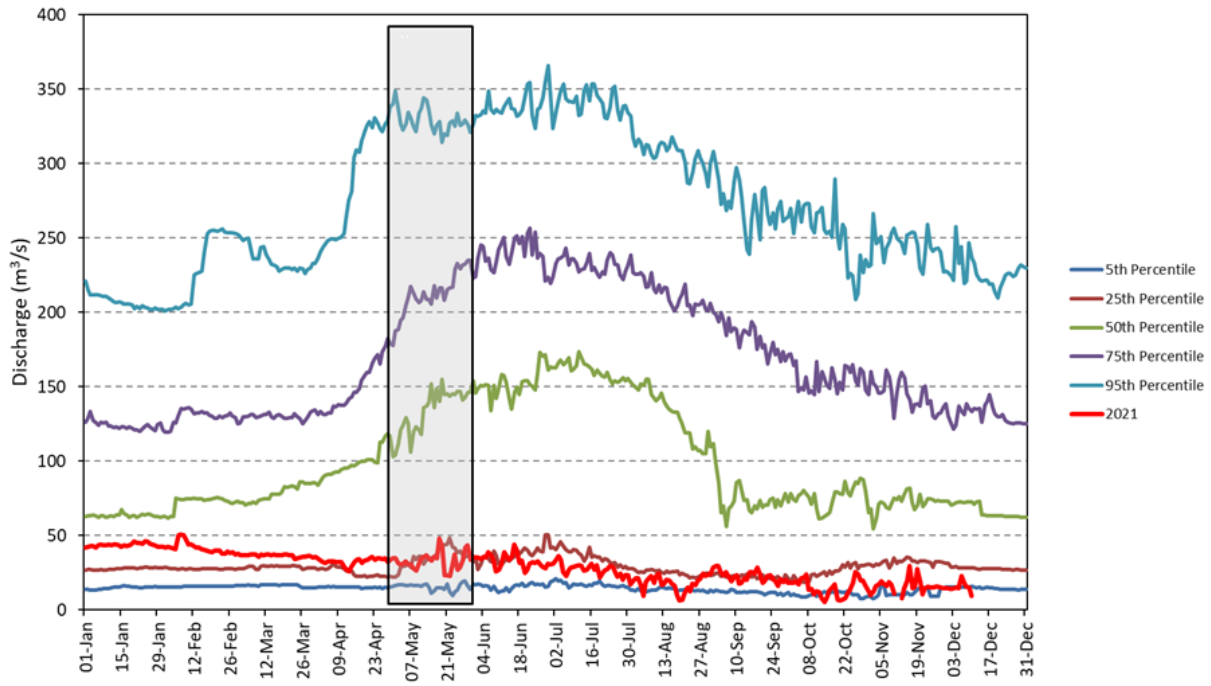

Figure 4. Percentile flow conditions (1977-2019) and mean daily discharge in the Fairford River, spring 2021. Data provided by Water Survey of Canada (Station 05LM001). Shaded box encompasses the larval fish study period.

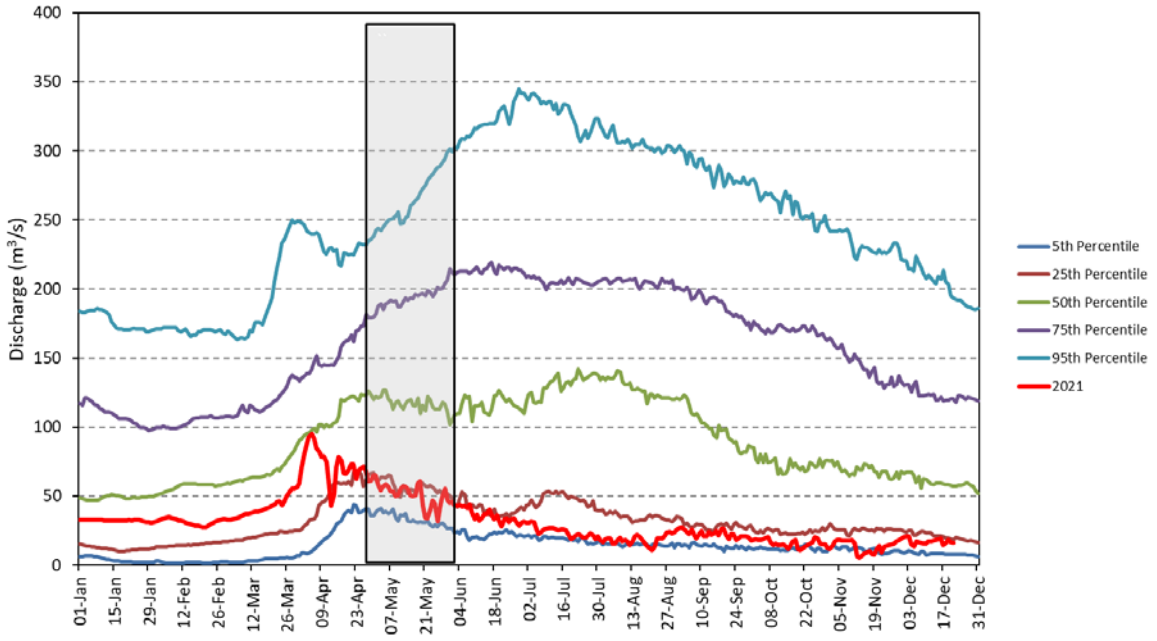

Figure 5. Percentile flow conditions (1977-2019) and mean daily discharge on the Dauphin River, spring 2021. Data provided by Water Survey of Canada (Station 05LM006). Shaded box encompasses the larval fish study period.

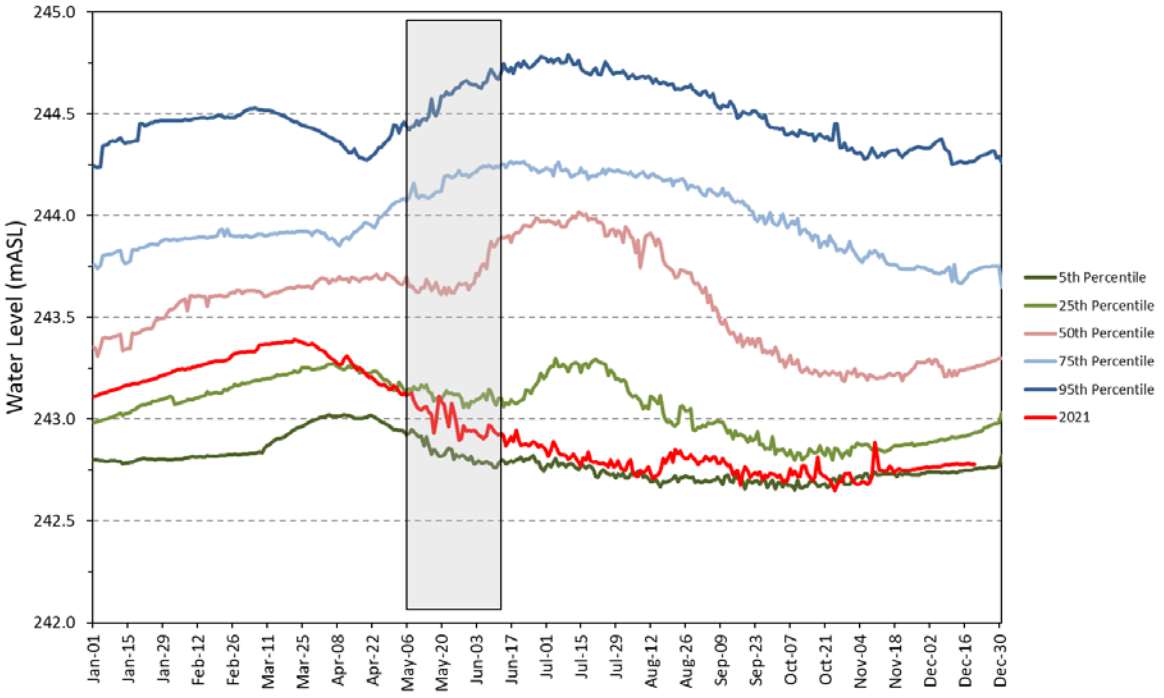

Figure 6. Percentile water level conditions (1966-2017) and mean daily water level on Lake St. Martin, 2021. Data provided by Water Survey of Canada (Station 05LM005). Shaded box encompasses the larval fish study period.

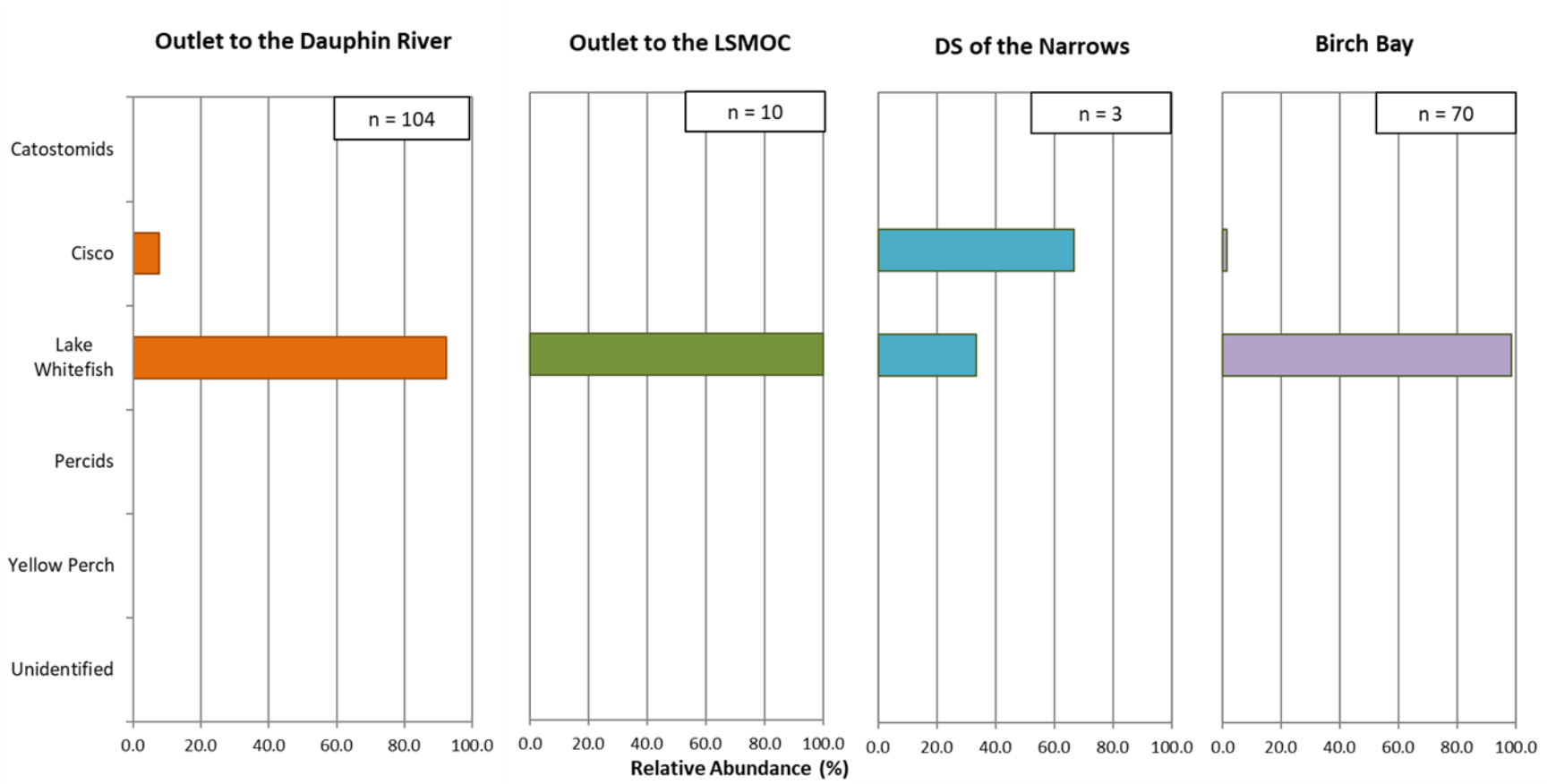

Figure 7. Sampling area-specific relative abundance of fish species captured in neuston tows in Lake St. Martin, May 7–15, 2021.

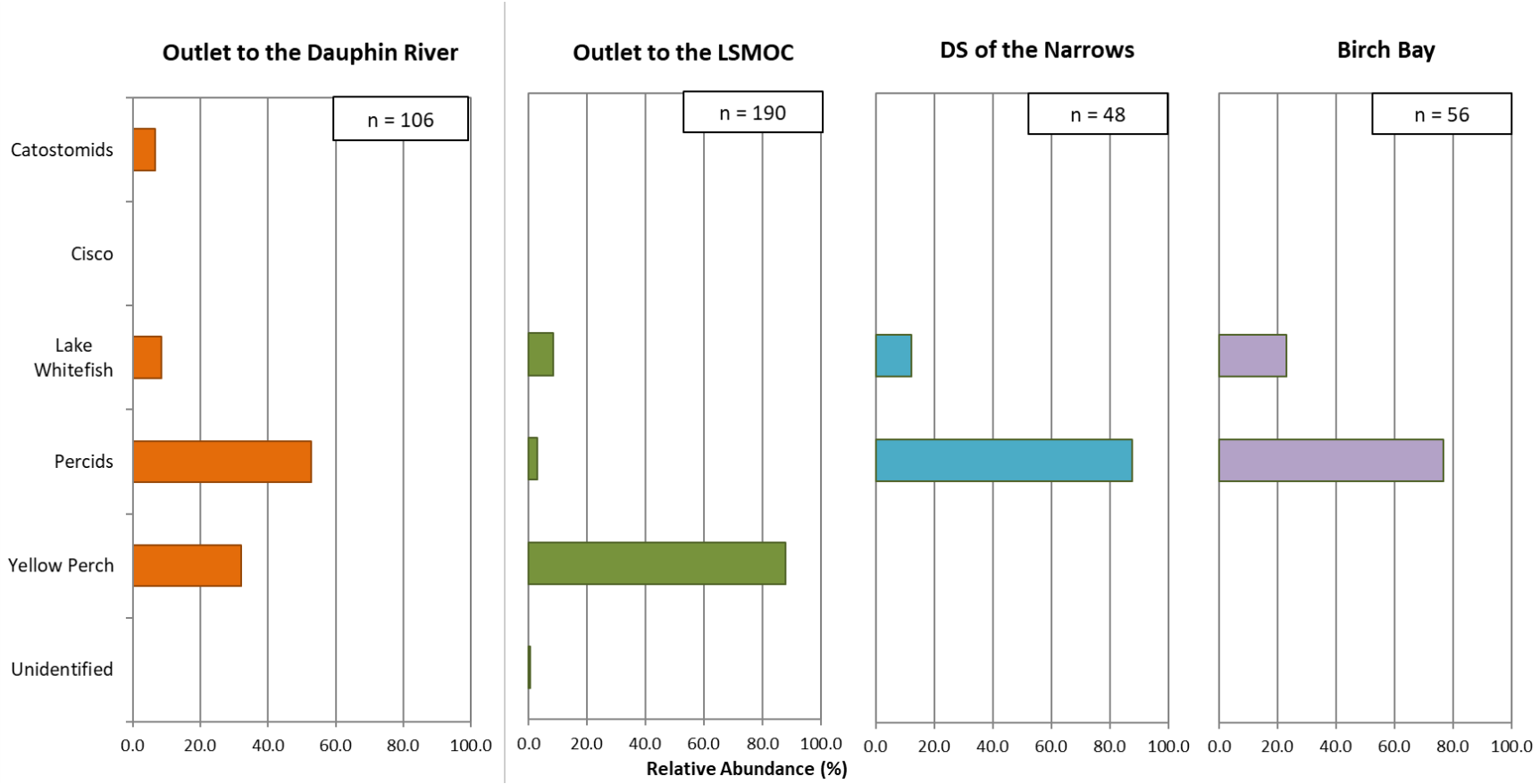

Figure 8. Sampling area-specific relative abundance of fish species captured in neuston tows in Lake St. Martin, May 31-June 1, 2021.