Appendix E

Fish and Fish Habitat Technical Report

NEW BRUNSWICK POWER CORPORATION

Fish and Fish Habitat Technical Report

Milltown Generating Station Decommissioning Project
Milltown, New Brunswick

November 2020 – 19-1594

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1.0 Introduction

This document is a supplementary technical report that is intended to support the environmental impact assessment (EIA) registration document and other environmental permitting applications for the Milltown Generating Station Decommissioning Project (the Project) proposed by the New Brunswick Power Corporation (NB Power) in the neighbourhood of Milltown, in the Town of St. Stephen, Charlotte County, New Brunswick, Canada.

The Project is situated on the international boundary between Canada and the United States of America, within the wetted portion of the St. Croix River (also known as the Skutik by the Peskotomuhkati [Passamaquoddy] First Nation). Because of this physical location, the Project is subject to the regulatory review and approval processes by Canadian, U.S.A., and international jurisdictions.

In Canada, the Project is an "undertaking" under item (b) of Schedule A of the New Brunswick *Environmental Impact Assessment Regulation – Clean Environment Act* (EIA Regulation) *["(b) all electric power generating facilities with a production rating of three megawatts or more"*]. Dillon Consulting Limited (Dillon) was retained by NB Power to complete natural environment surveys in support of a provincial EIA registration and other Canadian and U.S.A. environmental permitting requirements for the Project. The information will also be provided to regulatory agencies in the U.S.A., in particular the Maine Department of Environmental Protection (DEP), the United States Army Corps of Engineers (USACE), and the National Oceanic and Atmospheric Administration—National Marine Fisheries Service (NOAA-NMFS), as supporting information in their review of U.S.A. permit applications for the Project.

Fish and fish habitat are considered an important feature and valued component (VC) of the environment and thus make up a key part of the assessment of the Project's potential effects on the environment. This technical report provides a summary of fish and fish habitat surveys conducted in support of the Project's EIA registration and environmental permit applications, and includes: a brief description of the Project; a description of the regulatory framework; survey scope and methodology; a summary of the results; and discussion thereof. The assessment of residual effects (including potential interactions and mitigation) of the Project on fish and fish habitat is addressed within the main body of the Project's EIA registration document.

Though other focused environmental surveys were completed concurrently, the focus of this technical report is on fish and fish habitat. The remaining field surveys (i.e., wood turtles, bats, birds, wetlands, and vegetation) are summarized in separate technical reports that are also intended to support the EIA registration and other environmental permits.

1.1 Project Overview

This Project overview is an abbreviated summary for the purposes of this technical report. For a detailed description of the Project facilities/components, phases and activities, the reader is referred to the EIA registration document (Dillon 2020).

The Project will be carried out in the neighbourhood of Milltown, in the Town of St. Stephen, Charlotte County, New Brunswick, Canada as well as in the City of Calais, Washington County, Maine, U.S.A. The parcel identifiers (PID) of the properties owned by NB Power in Canada and which are associated with the Milltown Generating Station (the Milltown Station), as referenced by Service New Brunswick, are PID Nos. 01311208, 15043961, 15086127, 01310713, 01309988, and 15086119. The Milltown Station is situated on the international boundary between Canada and the United States of America. On the Canadian side of the Canada/U.S.A. international boundary, the land at the Milltown Station site has an area of approximately 5.86 hectares (ha). In addition, NB Power owns a submerged water lot of the Canadian portion of the St. Croix River bed, with an approximate area of 2.0 ha.

Physical infrastructure on the U.S.A. side of the international boundary will be managed separately through the applicable U.S.A./State permitting processes.

The Milltown Station is comprised of the following existing facilities located on both sides of the international boundary:

- **Powerhouses and related equipment:** Powerhouses A, B, and C contain the turbine-generators and other mechanical and electrical systems and related instrumentation, including: control room, motor control centres, various instrumentation, and related systems. In addition, there is office space, a lunch room, washrooms, and related amenities.
- **Dam and related structures:** The dam, which retains water in a relatively small impoundment, includes: a gated spillway with gate house, a rollway with flashboards, a spillway with stop logs, and an impoundment. The impoundment extends approximately 450-500 m upstream of the Milltown Station (i.e., the head of the impoundment is at the nearest upstream rapids located near some small islands in the river, known locally as Milltown Rapids), and has a surface area of approximately 6 ha.
- **Fish passage facilities:** An upstream pool-and-weir fishway is adjacent to Powerhouse A, and a downstream fishway is located at the gated spillway.
- **Electrical substation:** An electrical substation (terminal) is located on-site which connects the Milltown Station to the remainder of the New Brunswick electrical grid.
- **Other related facilities and infrastructure:** Other facilities and infrastructure include a security guard house, security gate, perimeter fencing, navigational safety buoys in the impoundment, retaining walls, parking and related facilities, and other facilities typical of industrial facilities.

As currently envisioned by NB Power, decommissioning of the Milltown Station (i.e., the Project) will involve the full dismantling and removal of all equipment, buildings, and structures associated with the existing Milltown Station in both Canada and the United States (except for the on-site electrical substation which will remain in place), including a full bank-to-bank decommissioning of all structures within the St. Croix River. All structures and mechanical and electrical components associated with the powerhouses, gate house, gated spillway, rollway, stop log spillway, dam, fishways, and other structures will be dismantled, demolished, and removed, and limited restoration of the site and the river at the location of the Milltown Station will be conducted with the ultimate goal of the Project to remove all

human-made structures that obstruct fish passage so as to allow fish to naturally access the upstream reaches of the St. Croix River.

While the Milltown Station was reportedly built atop a natural waterfall (Salmon Falls), the full removal of the Milltown Station, dam, and associated components will be carried out with the intention to allow the unimpeded ability for diadromous (migrating) fish that are able to ascend the falls to volitionally access a further 16 kilometres (km) of the St. Croix River and its tributaries (i.e., up to the next upstream natural or human-made obstruction) in order to carry out their lifecycle processes.

1.1.1 Project Development Area

The Project Development Area (PDA) is defined as the area of physical disturbance (or physical footprint) associated with the Project. In Canada, the PDA on land consists of an area of approximately 1.4 ha (i.e., a portion of the Milltown site within the larger 5.86 ha properties associated with the Milltown Station) that will be directly affected by Project activities, and includes all Milltown Station-related facilities that will be decommissioned and removed as well as areas to be used as laydown/temporary storage for the decommissioning activities. The portion of the PDA on land within the U.S.A. jurisdiction is estimated at 0.54 ha.

The portion of the PDA located within the St. Croix River itself (Canadian side only of the International Boundary Commission's official boundary line) that will be directly affected by Project activities is approximately 0.4 ha. The portion of the PDA that is within the U.S.A side of the International Boundary Commission's official boundary line, within the St. Croix River is 0.13 ha.

The Canadian portion of the PDA for the Project is presented on **Figure 1**. The study area (discussed below in **Section 2.2.1**) was based on the extent of the PDA. The area of physical disturbance associated with the Project (i.e., PDA) on the U.S.A. side of the international boundary is shown for illustrative purposes on **Figure 2**.

1.2 Overview of Applicable Regulatory Framework

Because the Milltown Station is situated on the international boundary between Canada and the U.S.A., the Project is subject to both federal and provincial Canadian environmental permitting and EIA processes as well as federal, state, and local U.S.A. environmental permitting processes, and international jurisdictions.

The New Brunswick *Environmental Impact Assessment Regulation – Clean Environment Act*, administered by the New Brunswick Department of Environment and Local Government (NBDELG), establishes the EIA process in New Brunswick. The EIA Regulation requires that all "undertakings" listed on Schedule A of the EIA Regulation (including their proposed construction, operation, modification, extension, abandonment, demolition, or rehabilitation) require registration. The following item under Schedule "A" of the EIA regulation applies to the Project: *"(b) all electric power generating facilities with a production rating of three megawatts or more"* (for the physical decommissioning, demolition, abandonment, and rehabilitation work associated with the Milltown Station).

Additionally, fish and fish habitat are protected through the federal *Fisheries Act* as well as the New Brunswick *Fish and Wildlife Act* and the New Brunswick *Watercourse and Wetland Alteration Regulation – Clean Water Act*. The federal *Fisheries Act* provides protection for all fish and fish habitat (DFO 2019). Additionally, aquatic species at risk (SAR) are protected under both the federal *Species at Risk Act* (SARA) and New Brunswick *Species at Risk Act* (NB SARA). Although the Canadian Council of Ministers of Environment (CCME) "Canadian Environmental Quality Guidelines for the Protection of Freshwater Aquatic Life" (CEQG FWAL) do not have force of law, they provide environmental quality objectives for protecting fish from lethal and sub-lethal effects.

Within the U.S.A., jurisdiction, fish and their habitat are protected by several enabling Acts and Ordinances, including: the *Rivers and Harbors Act* (Section 10), *Clean Water Act* (Section 401 and 404), *Endangered Species Act, Maine Waterway Development and Conservation Act, Maine Endangered Species Act,* as well as the City of Calais' *Shoreland Zoning Ordinance, and Floodplain Management Ordinance.*

Furthermore, the Milltown dam itself is regulated by the International Joint Commission (IJC), who is mandated by the Boundary Waters Treaty to maintain water levels that form an international boundary.

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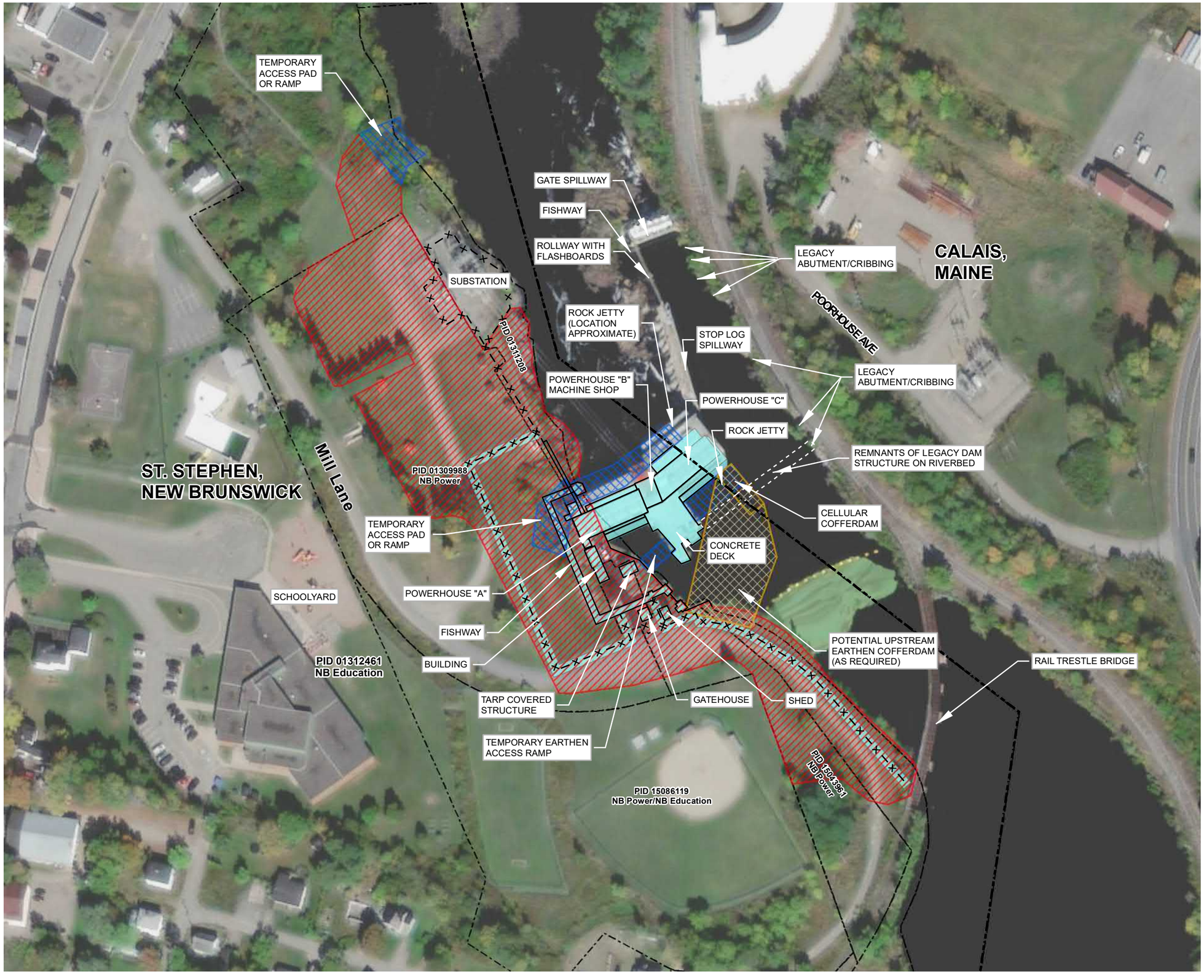

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MILLTOWN GENERATING STATION DECOMMISSIONING PROJECT

ENVIRONMENTAL IMPACT ASSESSMENT REGISTRATION

PROJECT DEVELOPMENT AREA (PDA) - CANADIAN JURISDICTION

FIGURE 1

- Fence
- Canada-USA Border
- Laydown/Access
- Earthen Structures
- Infrastructure to be Decomissioned/Removed
- Potential Cofferdam
- Property Parcels

* Project components on the US side of the International Boundary are not included in the scope of this EIA, but will be subject to applicable US permitting.

0 12.5 25 50 Metres

SCALE 1:1,500

MAP DRAWING INFORMATION: ESRI, DIGITALGLOBE, GEOEYE, EATHSTAR GEOGRAPHICS, CNES/AIRBUS DS, USDA, USGS,AEROGRID, IGN, AND THE GIS USER COMMUNITY
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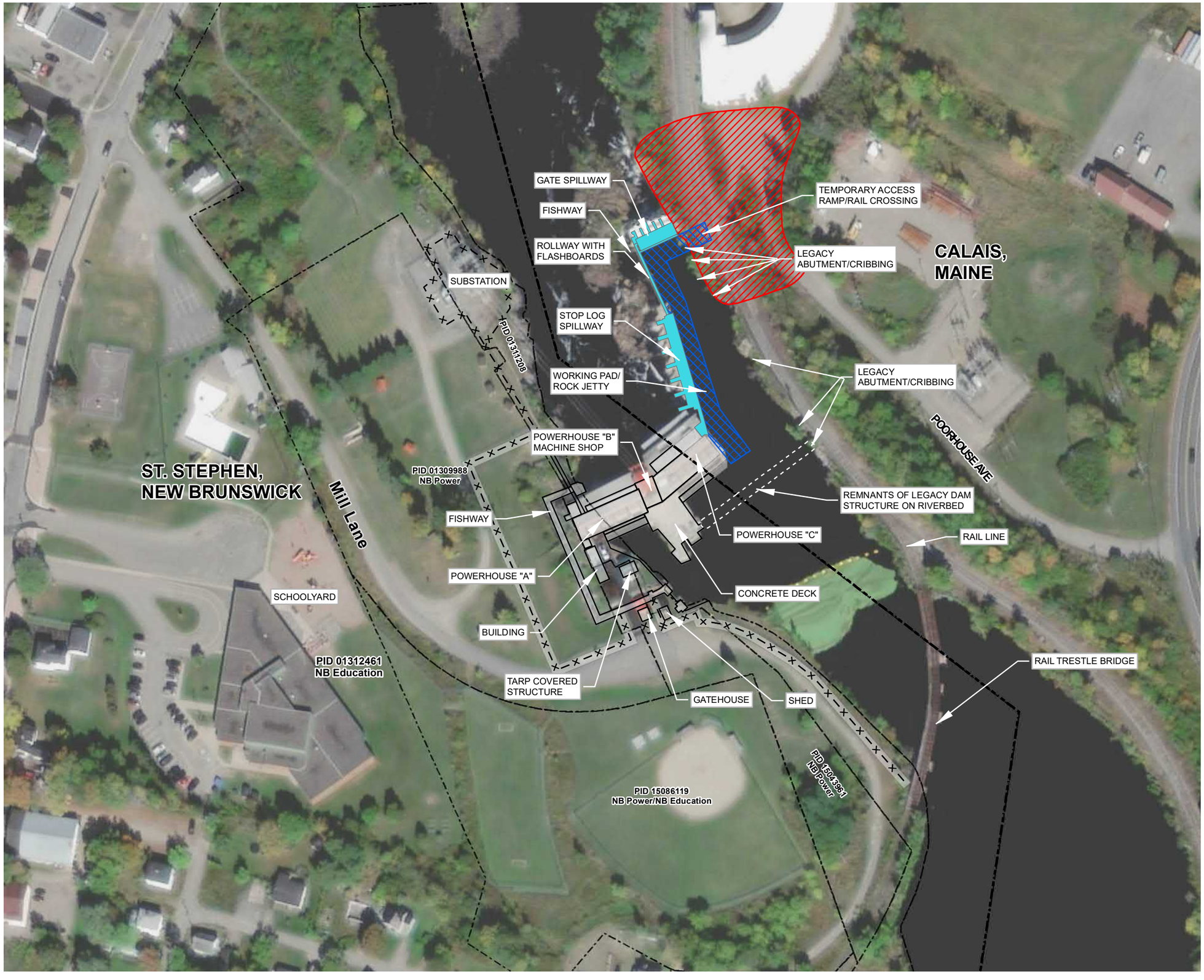

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MILLTOWN GENERATING STATION DECOMMISSIONING PROJECT

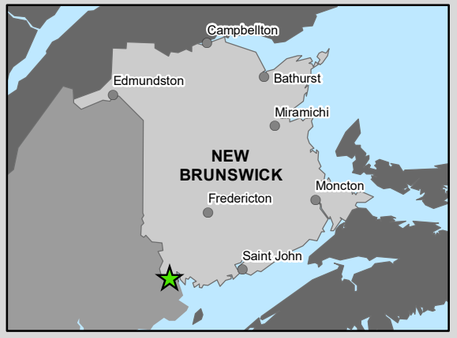
ENVIRONMENTAL IMPACT ASSESSMENT REGISTRATION

PROJECT DEVELOPMENT AREA (PDA) - UNITED STATES JURISDICTION

FIGURE 2

- Fence
- Canada-USA Border
- Laydown/Access Area
- Earthen Structures
- Infrastructure to be Decomissioned/Removed
- Property Parcels

* Project components on the US side of the International Boundary are not included in the scope of this EIA, but will be subject to applicable US permitting.



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2.0 Scope of Work and Methodology

The following section outlines the methodology that was undertaken to conduct desktop analysis as well as the fish and fish habitat field surveys.

2.1 Scope of Work

The New Brunswick "Guide to Environmental Impact Assessment in New Brunswick" (EIA Guide; NBDELG 2018) requires that physical and natural features be described and assessed to support assessment of environmental effects and permitting; including, where appropriate, the collection of field data during appropriate seasonal windows. This information typically includes the following:

- The type or significance of fish populations and their habitat;
- Presence of or potential for aquatic species at risk or their habitat; and
- Presence of critical, sensitive or otherwise designated protected aquatic habitat.

The scope of work for the fish and fish habitat surveys for this project is based upon an understanding of the nature of the Project, the extent of the PDA, as well as Dillon's experience in assessing similar landscapes/natural systems. For the purposes of this report and in support of the EIA registration for the Project, the fish and fish habitat considers the following definitions:

- **Watercourses** – Watercourses in New Brunswick are defined as: "*A feature in which the primary function is the conveyance or containment of water, which includes: a) the bed, banks and sides of any watercourse that is depicted on the New Brunswick Hydrographic Network layer (available on GeoNB Map Viewer); b) the bed, banks and sides of any incised channel greater than 0.5 metres in width that displays a rock or soil (mineral or organic) bed, that is not depicted on New Brunswick Hydrographic Network layer (available on GeoNB Map Viewer); water/flow does not have to be continuous and may be absent during any time of year; or c) a natural or man-made basin (i.e. lakes and ponds).*" (NBDELG 2017);
- **Fish and Fish Habitat** – All fish and their habitat are protected in Canada under the *Fisheries Act*. Fish species include all species of anadromous, catadromous and resident fish, as well as benthic invertebrates and other aquatic invertebrates such as mollusks. Aquatic mammals or herpetiles are not assessed as part of fish and fish habitat and have been separately assessed as part of the EIA registration.
- **Fish Species at Risk and Fish Species of Conservation Concern** – "Species at risk" (abbreviated SAR) as those species that are listed as "Extirpated", "Endangered", or "Threatened" on Schedule 1 of the *Species at Risk* Act (SARA) or the New Brunswick *Species at Risk Act* (NB SARA). We also define "species of conservation concern" (abbreviated SOCC) as those species that are not SAR but are listed in other parts of SARA, NB SARA, the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), or are regionally rare or endangered by the Atlantic

Canada Conservation Data Centre (AC CDC) (i.e., those species with AC CDC S-ranks of "extremely rare" [S1], "rare" [S2], or "uncommon" [S3]).

- **Unique or Sensitive Aquatic Habitats** – includes aquatic habitats identified as protected or managed by federal and provincial authorities or non-governmental organizations (e.g., Nature Trust of New Brunswick).

It is understood that many, if not all, natural systems are directly or indirectly connected to one another. The fish and fish habitat VC is most specifically directly connected to surface water, as well as vegetation and wetlands. Surface water and sediment sampling is included within this technical report (as discussed within the sections below); and is directly connected to the health of freshwater aquatic life. The information presented herein on surface water and sediment quality is also connected to the surface water VC, and is summarized within Section 5.5 of the EIA registration document. Vegetation and wetland surveys were also conducted in support of the EIA registration and are summarized in separate technical reports.

Fish and fish habitat surveys were conducted during the 2020 field season; including:

- presence/absence fish surveys;
- observations and identification of other fish passage barriers;
- aquatic habitat assessments to characterize habitat quality;
- surface water sampling, both using in-situ water quality measurements as well as sampling with subsequent laboratory analysis; and
- sediment sampling with subsequent laboratory analysis.

Methodologies used during these surveys are discussed below in **Section 2.2**. This information informs a general understanding of fish and fish habitat and the potential for effects. Additional detail may be required to meet permit requirements.

The properties and portions of the River on the U.S.A. side of the international boundary were not included within the scope of the fish and fish habitat technical field surveys and studies discussed herein, due to the relatively homogeneous nature of the river on both sides of the international boundary line as well due to border restrictions, specifically a closed international border at the time of the surveys due to COVID-19. Nonetheless, the information presented herein is believed to be relevant and sufficient to inform the regulatory processes on the U.S.A. side of the international boundary. The concept of conducting field surveys on the Canadian side of the international boundary only was discussed with the Maine DEP and was determined to be acceptable. Certain aspects of the Project and VCs that are located within U.S.A. jurisdiction will be assessed as applicable following U.S.A. protocols and regulatory permitting processes, and will be summarized in separate documents as required. As such, freshwater mussel surveys with a focus on rare and at risk species (i.e., a VC related to U.S.A permitting processes) will be summarized in a separate technical report, at a later time. Freshwater mussels are therefore not discussed further within this document.

2.2 Methodologies

The methods to characterize existing conditions for fish and fish habitat are described below.

2.2.1 Study Area

The study area for desktop analysis of fish and fish habitat in relation to the Project included the PDA. The fish and fish habitat study area encompassed approximately 450 m upstream and 200 m downstream of the Milltown Station along the St. Croix River (also referred to herein as "the River" or its traditional name of "Skutik"; refer to **Figure 3**). The downstream portion of the study area is also referred to herein as the "lower reach", which consisted of the portion of the river downstream of the Station starting at point below the tailrace (where safe access could be provided) and extending to a braided riffle portion below the Milltown Station. The upstream portion of the study area is referred to as the "upper reach" (which consisted of the current impoundment area above the Milltown Station). The study area was focussed on the wetted channel of the St. Croix River, as well as the riparian area on the Canadian side of the international boundary. Due to logistics, the study area associated with the fish and fish habitat surveys was within the confines of the Canadian side of the International Boundary Commission's official boundary line. The information outlined herein, however, will inform U.S.A. environmental permitting applications where applicable.

2.2.2 Desktop Analysis

Desktop analysis of readily available information from reputable sources on the aquatic setting of the Skutik/St. Croix River, its associated fish habitat, water quality, fish species assemblages, freshwater mussel species assemblages, benthic macroinvertebrate communities, and aquatic species at risk around the PDA was conducted and summarized as part of the EIA registration; it can be referenced in Section 5.6.2 of the EIA registration document. Prior to completing the fish and fish habitat field surveys, Dillon reviewed the results of the desktop analysis to assist in scoping, and preparing for, the field surveys. Information sources included:

- Atlantic Canada Conservation Data Centre (AC CDC) 2020 Report;
- Department of Fisheries and Oceans Canada (DFO);
- New Brunswick Department of Natural Resources and Energy Development (NBDNRED);
- NBDELG;
- The federal SARA;
- The provincial SARA;
- The Committee on the Status of Endangered Wildlife in Canada (COSEWIC);
- St. Croix International Waterway Commission fish count data; and
- High resolution aerial photography.

2.2.3 Field Survey Methods

Several environmental surveys were combined into an aquatic field program including fish and fish habitat surveys, in-situ water quality measurements, surface water sampling, and sediment sampling. Survey locations were both upstream and downstream of the Milltown Station within the predefined study area (described in **Section 2.2.1**) and were completed during the summer 2020 field season during low flow conditions. The field survey team was led by an experienced biologist from Boreal Environmental and supplemented by Dillon aquatic technicians, representatives from the Peskotomuhkati First Nation, and NB Power's Indigenous field liaison. Field surveys for fish and fish habitat were conducted from August 31 to September 3, 2020.

The fish and fish habitat surveys were conducted using survey protocols based on NBDNRED (formerly NBDNR) and DFO standard aquatic assessment forms (Hooper et al. 1995) and the NBDNR Provincial Brook Trout Assessment Outline (NBDNR 2010). In addition, qualitative fish presence assessments were conducted using backpack electrofishing techniques, fyke nets, seine netting, and conventional angling where conditions allowed within the study area. Finally, in-situ water quality measurements, surface water sampling, and sediment sampling were conducted. Where needed, a boat was available to aid in the methods described above. These methods are further described in the sub-sections below.

2.2.3.1 Fish Habitat Assessment

Using the NBDNRED and DFO standard aquatic assessment forms, fish habitat and aquatic features were assessed within the study area (i.e., 450 m upstream and 200 m downstream of the Milltown Station) along the Skutik/St. Croix River. The habitat assessment was completed on transects for each aquatic habitat type (**Figure 4**), including two transects downstream and four transects upstream of the Milltown Station. Assessment criteria included:

- **Description of aquatic habitat type:**
  Habitat types within each watercourse were visually assessed as riffle, run, pool, or flat, where possible, in the area of the proposed Project;
- **Dominant substrate type and embeddedness:**
  Dominant substrate types were described and documented by percent of relative abundance based on visual assessment. Substrate type (e.g., gravel or silt) is especially important for fish spawning habitat;
- **Stream channel characteristics:**
  Stream channel characteristics including average wet width, approximate bankfull width, average wetted depth, and maximum wetted depth were estimated in the field;
- **Instream cover and overhead canopy cover ratings:**
  Instream cover such as submerged woody debris, cobble, boulders, and aquatic vegetation was visually assessed, and overhead canopy cover ratings (i.e., percent covered by shrubs and trees) were scored;

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FISH AND FISH HABITAT TECHNICAL REPORT

FISH AND FISH HABITAT STUDY AREA

FIGURE 3

Project Location

Canada-USA Border

Fish and Fish Habitat Study Area

0 25 50 100 m

SCALE 1:3,000

N W E S

MAP DRAWING INFORMATION:
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Document Path: G:\GIS\191594 Milltown GS Decommissioning\data_maps\mxds\Technical Reports Figures\Fish and Fish Habitat Supplementary Report\Figure 3 Study Area.mxd

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MILLTOWN GENERATING STATION DECOMMISSIONING PROJECT

FISH AND FISH HABITAT TECHNICAL REPORT

FISH AND FISH HABITAT SURVEY TRANSECTS

FIGURE 4

- Project Location
- Fish and Fish Habitat Survey Transects
  LR=Lower Reach, UR= Upper Reach
- Canada-USA Border

0 25 50 100 m

SCALE 1:3,000

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Document Path: G:\GIS\191594 Milltown GS Decommissioning\data_maps\mxds\Technical Reports Figures\Fish and Fish Habitat Supplementary Report\Figure 4 Fish and Fish Habitat Survey Transects.mxd

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- **Fish habitat suitability:**
  Habitat suitability for fish was assessed based on the evaluation of habitat type, substrate type, instream cover, overhead cover, and other ecological observations in relation to documented habitat suitability index for salmonids and other species observed;
- **Environmental conditions and water level:**
  Environmental conditions (e.g., drier than normal seasonal conditions) were noted during the assessment and water level was rated as "low, moderate, or high". Hotter and drier environmental conditions resulting in lower water levels will stress salmonid fish populations;
- **Bank stability:**
  Bank stability and presence of eroding banks (potential for natural and anthropogenic sources) was visually assessed within the study area; and
- **Riparian vegetation community:**
  In addition to the vegetation species list provided in the "Wetlands and Vegetation Technical Report" (Boreal Environmental 2020a), the riparian vegetation community was described by percent trees, shrubs, grasses and bare ground within an approximate 15 m buffer adjacent to the watercourse. Aquatic vegetation was also visually assessed and documented as part of aquatic vegetation communities and instream cover.

2.2.3.2 Fish Presence/Absence and Fish Assemblages

Qualitative fish presence assessments were completed using various passive and active methods. Active methods included backpack electrofishing, conventional angling, and seine netting. Passive methods included fyke netting and eel traps. A combination of these methods were used to accommodate the varying conditions in the study area upstream and downstream of the Milltown Station (refer to **Figure 5**). Assessment methods were designed to collect a representative sample of the fish community by distributing assessment efforts between habitat types (i.e., riffle, pool, and undercut banks) within the upper and lower reaches of the river (refer to **Appendix A**). Methods were used in accordance with applicable permits. Additional details on each assessment (set lengths and locations, equipment settings) are provided in the results section and **Appendix A**. Fish capture methods included the following:

- A backpack electrofishing unit (Halltech HT2000) equipped with an 11-inch anode ring was used for the electrofishing surveys where conditions allowed, with one technician operating the electrofisher and two technicians to recover the fish using dip nets. Unit settings ranged from 150 to 250 V and a frequency of 40 to 60 Hz, depending on the conductivity of the watercourse and observed fish response. This method was used in shallow areas, in water less than a metre deep, with low velocity conditions (i.e., below the Milltown Station in the lower reach of the study area).

- Fyke nets are modified hoops with nets and equipped with netted/webbed wings intended to intercept fish and funnel them into the hoop net. Fyke nets can be set for 12 to 24 hour periods and can be deployed with the aid of a boat where needed. This method was used in areas where the backpack electrofisher unit could not be used (i.e., above the Milltown Station in portions of the upper reach of the study area).
- Seine nets are large nets that hang vertically in the water with floatation devices on the top and weights on the bottom, used to intercept fish. Personnel held and manoeuvered the net on either side. The net was deployed in a circular shape in the water, and the net was slowly brought to shore and retrieved with the intent that fish are funneled into the net's catchment bag. This method was attempted in shallow areas, in water less than a metre deep; however, it was not successful at capturing fish, despite multiple efforts.

- Conventional angling was conducted where conditions allowed using conventional spin fishing methods. Angling was done from both the shore and from a boat in the above the Milltown Station, in the upper reach of the study area.
- Eel traps funnel fish into a framed or cylindrical trap via a tapered mesh opening at the subsurface of the water using bait where once the fish swim through they cannot get out. Traps were used both above and below the Milltown Station in the upper and lower portions of the study area, using mackerel as bait.

It is noted that gill nets were not used for this project, because of concerns about fish injury/mortality that often result from their use.

It is noted that Dillon personnel (including its subconsultants and NB Power personnel assisting with the field work) conducted this work in accordance with a Scientific Collection License (#322696) issued to Dillon by DFO. Anglers were also fishing under the authority of a fishing licence issued by NBDNRED under the New Brunswick *Fish and Wildlife Act.*

2.2.3.3 Surface Water Sampling

Surface water samples (i.e., grab samples) were collected using the Canadian Council of Ministers of the Environment (CCME) Surface Water Sampling Protocol (CCME 2011) within both the upper reach and the lower reach of the study area (**Figure 6**). Sample bottles were provided by the laboratory and storage and transport protocols were conducted as determined by the laboratory.

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FISH AND FISH HABITAT TECHNICAL REPORT

QUALITATIVE FISH PRESENCE SURVEYS

FIGURE 5

- Project Location
- Eel Trap Location
- Fyke Net Location
- Seine Net Location
- Angling Area
- Electrofishing Area
- Canada-USA Border

0 25 50 100 m

SCALE 1:3,000

N W E S

MAP DRAWING INFORMATION:
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Document Path: G:\GIS\191594 Milltown GS Decommissioning\data_maps\mxds\Technical Reports Figures\Fish and Fish Habitat Supplementary Report\Figure 5 Qualitative Fish Presence Surveys.mxd

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In addition, in-situ measurements of water quality parameters using a YSI Pro Plus water quality meter were obtained at the same locations. In-situ measurements were taken within the top 0.5 m of the water surface and included: water temperature (°C), conductivity (µS/cm), dissolved oxygen (DO) (mg/L and %), total dissolved solids (TDS) (mg/L), and pH. In addition, water clarity and water level were also characterized at each watercourse using a visual assessment.

The collected surface water samples were sent to a Canadian Association for Laboratory Accreditation (CALA) laboratory (i.e., the Research and Productivity Council [RPC] laboratory in Fredericton, New Brunswick) to be analyzed for:

- General chemistry (including: total organic carbon, total suspended solids (TSS), turbidity, alkalinity, hardness, pH, nitrate and nitrite, total ammonia, sulphate, chloride, and fluoride); and
- Trace metals (total metals analysis, including: aluminum, cadmium, cobalt, copper, iron, nickel, lead, vanadium, zinc, and mercury).

Results were compared to the CCME environmental quality guidelines for chemical concentrations in various environmental media, as established in its Canadian Environmental Quality Guidelines (CEQG) for the protection of freshwater aquatic life (FWAL) (CCME 1999). Where CCME guidelines did not exist, relevant provincial guidelines were used for comparison purposes. For example, where no equivalent New Brunswick guidelines were available, applicable Nova Scotia guidelines were applied. The guidelines used for comparison to the surface water results are summarized in **Table 1** below.

Table 1: Surface Water Quality Guidelines

Guideline	Description
Canadian Council of Ministers of the Environment Canadian Water Quality Guidelines for the Protection of Aquatic Life	Canadian environmental quality guidelines that provide science based goals for the protection and quality of aquatic ecosystems (CCME 1999).
Nova Scotia Environmental Quality Standards for Contaminated Sites Rationale and Guidance Document	Nova Scotia Environment (NSE) guidance for the assessment and remediation of contaminated sites for various chemicals in surface water (NSE 2014).

2.2.3.4 Sediment Sampling

Sediment samples were collected at two locations within the upper reach and one location within the lower reach of the study area (**Figure 6**). These locations were selected based on overall fish habitat representativeness and proximity to areas used to assess fish presence and assemblages. The two sediment sampling locations in the upper reach were areas of known sediment deposition as determined through depth-to-refusal sounding conducted in November 2019 by GHD and Inter-Fluve (GHD and Inter-Fluve 2020). The sediment samples were collected wearing nitrile gloves using a 6”x6” mini-ponar grab sampler, either from a boat or the shoreline (depending upon water depths/accessibility). The samples were decanted and collected using a composition of multiple grabs to

obtain a representative composite sample before being placed directly into laboratory supplied containers. Sampling equipment was cleaned and rinsed between each sampling location.

The sediment samples were sent to RPC to be analyzed for:

- General chemistry, including: grain size analysis, trace metals, and petroleum hydrocarbons; and
- Additional chemical analysis to include pesticides and herbicides.

Results were compared to the CCME environmental quality guidelines for chemical concentrations in various environmental media, as established in its CEQG FWAL, as described above for surface water (CCME 1999). Where CCME guidelines did not exist, relevant provincial guidelines were used for comparison purposes. For example, where no equivalent New Brunswick guidelines were available, applicable Nova Scotia guidelines were applied. The guidelines used for comparison to the sediment results are summarized in **Table 2** below.

Table 2: Sediment Quality Guidelines

Guideline	Description
Canadian Council of Ministers of the Environment Canadian Sediment Quality Guidelines for the Protection of Aquatic Life	Canadian environmental quality guidelines recommended for analysis of both freshwater and marine sediments (CCME 1999).
Nova Scotia Environmental Quality Standards for Contaminated Sites Rationale and Guidance Document	Nova Scotia Environment (NSE) guidance for the assessment and remediation of contaminated sites for various chemicals in sediment (NSE 2014).
Atlantic Risk-Based Corrective Action for Petroleum Impacted Sites in Atlantic Canada	Guidelines for ecological screening levels for petroleum hydrocarbons (Atlantic PIRI 2012).

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SURFACE WATER AND SEDIMENT SAMPLING LOCATIONS

FIGURE 6

- Surface Water Sample Location
- Sediment Sample Location
- Project Location
- Canada-USA Border

0 25 50 100 m

SCALE 1:3,000

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MAP CREATED BY: SCM
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Document Path: G:\GIS\191594 Milltown GS Decommissioning\data_maps\mxds\Technical Reports Figures\Fish and Fish Habitat Supplementary Report\Figure 6 Surface Water and Sediment Sampling Locations.mxd

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3.0 Results and Discussion

The results of the desktop assessment as well as the field studies are presented below.

3.1 Desktop Assessment Results

This section provides a brief overview of desktop information reviewed in preparation for the field surveys. The results of more detailed desktop analysis conducted on available fish and fish habitat data/information can be referenced in Section 5.6.2 of the EIA registration document (Dillon 2020). A summary follows.

As described in the EIA registration document, the Project is located within the Valley Lowlands ecoregion and, more specifically, within the Magaguadavic ecodistrict, which features an undulating plateau with many wetlands, meandering streams and minimal relief (Zelazny 2007). This ecoregion is characterized by dramatic influence of major watercourses and large lakes, including the St. Croix River (Zelazny 2007). The St. Croix River forms the Canada/U.S.A. international boundary, with the state of Maine and the province of New Brunswick located on either side of the international boundary. The Milltown Station sits atop of Salmon Falls within the St. Croix River; no other watercourses were identified within the study area.

As discussed within the EIA registration, the St. Croix River (i.e., Skutik) is recognized to hold significant cultural value for New Brunswick's Indigenous peoples, and specifically the Peskotomuhkati (Passamaquoddy) First Nation. Greater detail on the significance of the Skutik to the Peskotomuhkati people is presented within the EIA registration document. Fish species of traditional importance include known to occur within the River: Atlantic salmon (*Salmo salar*), American eel (*Anguilla rostrata*), and gaspereau (*Alosa spp.*), among others (Paul 2018).

Several fish species (i.e, gaspereau, American shad [*Alosa sapidissima*], sea lamprey [*Petromyzon marinus*], Atlantic salmon) known to occur or having historically occurred in the River are considered to be diadromous species, meaning they migrate from the St. Croix River (i.e., freshwater) to the Bay of Fundy (i.e., saltwater) or vice versa throughout their life cycles. Refer to Tables 5.6.1 and 5.6.3 in the EIA registration document for a list of species and their migration trends.

It should be noted that fish count surveys and aquatic studies are conducted in areas surrounding the proposed Project by the St. Croix International Waterway Commission (on behalf of NB Power) and the Peskotomuhkati). A summary of the fish species that have been documented during the recent fish counts at the fishway at the Milltown Station during the peak spring migration period for the 2019 and 2020 seasons are provided in **Table 3**, below.

Table 3: Milltown Station Fish Count Results from 2019 and 2020

Species	2019 Count[1]	2020 Count (unofficial)[2]
Gaspereau – Alewife (*Alosa pseudoharengus*) and Blueback herring (*Alosa aestivalis*)	480, 500	611,907
American shad (*Alosa sapidissima*)	29	-
American eel (*Anguilla rostrata*)	4	-
Brook trout (*Salvelinus fontinalis*)	5	-
Smallmouth bass (*Micropterus dolomieu*)	6	-
White sucker (*Catostomus commersonii*)	43	-
Pumpkinseed (*Lepomis gibbosus*)	1	-
Fallfish (*Semotilus corporalis*)	1	-

Source 1: SCIWC 2020a
Source 2: Babcock, J., pers. comm., 2020

The St. Croix River flows directly into the Bay of Fundy, and also provides estuarine habitat in this area. Although located outside of the PDA, as discussed within the EIA registration document, there exists five other major operational dams upstream of the Milltown Station. Although most provide some form of fish passage, the dams located on the St. Croix River are a major obstacle to anadromous fish species who use the River for parts of their life cycle.

The results of the field surveys completed during the 2020 field season to assess fish and fish habitat within the study area are presented below.

3.2 Field Survey Results

Fish and Fish habitat surveys were conducted within the study area between August 31 and September 3, 2020. The surveys were conducted in collaboration between Dillon aquatic sciences staff, Boreal Environmental, the NB Power Indigenous field liaison, and Peskotomuhkati First Nation members, all of which were trained in aquatic assessment. The results and discussion of each field survey type are discussed within the subsections below.

3.2.1 Fish Habitat Assessment

The St. Croix River is a large fish bearing river that provides, in general, good quality habitat for various species of clupeidae (i.e., herrings/gaspereau), salmonids (i.e., trout and salmon), cyprinids (i.e., minnows), centrarchidae (i.e., sunfish), and anguilliformes (i.e., eels).

Fish habitat surveys were conducted via transects within the upper reach (i.e., transects UR-1 to UR-5) and the lower reach (i.e., transects LR-1 and LR-2) of the study area (refer to **Figure 4**). The upper reach was characterized, in general, as a headpond impoundment. The lower reach was characterized as run habitat throughout the restricted/confined tailrace area before braiding into two separate riffles/channeled sections. Of the two reaches surveyed within the study area, the upper reach was observed to provide suitable habitat for species such as smallmouth bass (*Micropterus dolomieu*), which

was the most abundant species in this reach at the time of the field survey (discussed further in **Section 3.2.4** below). The lower reach was observed to provide suitable habitat for salmonids and American eel (most abundant within this reach). Habitat present in the lower reach was characterized as good riffle/run habitat, which provide a more diverse habitat compared to that observed within the impoundment. Water levels were low to average due to a warm and dry summer, however, recent rain events occurred around the time of the field surveys (GOC 2020). Fish habitat results are summarized in **Table 4**, below. Refer to field data sheets in **Appendix A** for more details.

Table 4: Summary of Aquatic Habitat Characteristics

Transect ID	Representative Photo	Average Widths (m)	Dominant Aquatic Habitat Type and Other Observations
Upper Reach - Headpond Impoundment			
UR-1		**Wet Width:** 192 m **Bankfull Width:** 194 m	**Fish Habitat Suitability and Watercourse Characteristics:** Deep pools with bedrock and gravel substrates. Potential for some forage habitat (e.g., smallmouth bass) and cold water refuge at depth. **Dominant Substrate:** 70% Bedrock, 10% Boulder, 5% Rock, 5% Rubble, 5% Gravel, 5% Sand. **Average Depth(s):** 3.37 m – Pool/run
UR-2		**Wet Width:** 105 m **Bankfull Width:** 109 m	**Fish Habitat Suitability and Watercourse Characteristics:** Deep pools with bedrock and gravel substrates. Potential for some forage habitat (e.g., smallmouth bass) and cold water refuge at depth. **Dominant Substrate:** 70% Bedrock, 10% Boulder, 5% Rock, 5% Rubble, 5% Gravel, 5% Sand. **Average Depth(s):** 3.91 m – Pool/run
UR-3		**Wet Width:** 122 m **Bankfull Width:** 128 m	**Fish Habitat Suitability and Watercourse Characteristics:** Deep pools with bedrock and gravel substrates. Potential for some forage habitat (e.g., smallmouth bass) and cold water refuge at depth. **Dominant Substrate:** 70% Bedrock, 10% Boulder, 5% Rock, 5% Rubble, 5% Gravel, 5% Sand. **Average Depth(s):** 4.1 m – Pool/run

Transect ID	Representative Photo	Average Widths (m)	Dominant Aquatic Habitat Type and Other Observations
UR-4		**Wet Width:** 65 m **Bankfull Width:** 66 m	**Fish Habitat Suitability and Watercourse Characteristics:** Deep pools with bedrock and gravel substrates. Potential for some forage habitat (e.g., smallmouth bass) and cold water refuge at depth. **Dominant Substrate:** 70% Bedrock, 10% Boulder, 5% Rock, 5% Rubble, 5% Gravel, 5% Sand. **Average Depth(s):** 4.93 m – Pool/run
UR-5		**Wet Width:** 550 m **Bankfull Width:** 56 m	**Fish Habitat Suitability and Watercourse Characteristics:** Deep pools with bedrock and gravel substrates. Potential for some forage habitat (e.g., smallmouth bass) and cold water refuge at depth. **Dominant Substrate:** 70% Bedrock, 10% Boulder, 5% Rock, 5% Rubble, 5% Gravel, 5% Sand. **Average Depth(s):** 4.35 m – Pool/run
Lower Reach - Braided Channel			
LR-1		**Wet Width:** 33 m (1 of 2 channels) **Bankfull Width:** 84 m	**Fish Habitat Suitability and Watercourse Characteristics:** Braided channels with good riffle/run (fish) habitat. Potential spawning, rearing, foraging and passage habitat for multiple species, including salmonids. **Dominant Substrate:** 40% Bedrock, 15% Rock, 15% Rubble, 15% Gravel, 10% Sand, 5% Fines **Average Depth(s):** 0.44 m – Riffle
LR-2		**Wet Width:** 31 m (1 of 2 channels) **Bankfull Width:** 98 m	**Fish Habitat Suitability and Watercourse Characteristics:** Braided channels with good riffle/run (fish) habitat. Potential spawning, rearing, foraging and passage habitat for multiple species, including salmonids. **Dominant Substrate:** 40% Bedrock, 10% Boulder, 5% Rock, 15% Rubble, 15% Gravel, 15% Sand **Average Depth(s):** 0.50 m – Riffle

Sediment in the upper reach is dominated by bedrock and medium to smaller sized boulders, rock, and rubble with silt and organics, whereas sediment in the lower reach was dominated by bedrock and larger to medium sized boulders, rock, rubble, and sand. Bank erosion was not noted during the field surveys; this may be attributed to the relatively vegetated riparian area and the natural presence of bedrock and boulders/rock/rubble along the watercourse banks.

The River is braided both above and below the Milltown Station. Braided river systems form when the sediment load within them is high and promotes the development of bars/islands (USNPS 2020). High sediment loading within watercourses can be attributed to slope characteristics, presence of mid-channel islands (a likely factor within the study area), as well as other sources of sedimentation from former and active anthropogenic developments such as logging and agriculture (FEI 2014). Turbidity levels were low and no elevated sedimentation levels were observed during the field survey.

The dam associated with the Milltown Station is considered to be a partial obstruction to fish passage. It is assumed that the naturally occurring Salmon Falls, for which the Milltown Station is constructed on, was also likely a natural barrier to fish passage for some fish species (potentially particularly during low flow events). No other obstructions to fish passage within the study area were observed during the field survey.

3.2.2 Summary of In-situ Water Quality

The in-situ water quality parameters were collected in locations both upstream and downstream in the study area where easy access was obtainable. In-situ water quality parameters were measured within the top 0.5 m from the surface of the water using a calibrated YSI Pro Plus multimeter. The parameters sampled consisted of pH (measured values ranged from 7.3 to 7.73), temperature in degrees Celsius (°C) (measured values ranged from 19 to 20.2°C), dissolved oxygen in milligrams per litre (measured values ranged from 13.98 to 19.11 mg/L), total dissolved solids in milligrams per litre (measured values ranged from 53.95 to 56.25 mg/L), and specific water conductance in microsiemens per centimeter (measured values ranged from 82.8 to 85.4 µS/cm. The water quality parameters measured throughout the field survey are summarized in **Table 5** below.

Table 5: Daily Field Parameters for In-Situ Surface Water Quality, August 31-September 2, 2020

Parameter	UR1[1]	UR3[1]	UR5[1]	Seine Location 1[2]	Seine Location 2[2]	LR1[1]
Date	August 31, 2020	August 31, 2020	August 31, 2020	September 1, 2020	September 2, 2020	September 2, 2020
Temperature (° Celsius)	19.6	19.4	19.4	19.1	20.2	19
Conductivity (µS/cm)	85	83.9	83	82.8	84.8	85.4
Dissolved Oxygen (mg/L)	19.11	17.53	17.69	13.98	15.69	17.45
Total Dissolved Solids (mg/L)	55.9	54.6	53.95	53.95	56.25	55.25
pH (units)	7.3	6.52	6.75	7.47	7.32	7.73

1. Refer to **Figure 4**
2. Refer to **Figure 5**

As noted above, surface temperature was consistently slightly below or at 20°C, which is considered to be relatively warm in relation to fish habitat (MacMillan et al. 2005), although not unexpected given the hot, dry summer conditions experienced throughout summer 2020. Some species of fish including salmonids require cool water temperatures (< 16.5°C) to survive and cooler temperatures may occur at lower depths (MacMillan et al. 2005). Cooler temperatures may occur at depth within the impoundment. The DO values throughout the field surveys were well above the CEQG FWAL DO requirement for early life stages of warm water biota (6 mg/L), and the CEQG FWAL DO requirement of early life stages of cool water biota (9.5 mg/L), indicating generally good water quality for fish health. It is anticipated that the upper strata of the impoundment as well as the shallow water would be warmest, and it should be noted that the weather had been seasonally warm and dry at the time of, and leading up to the field survey. The pH values were within the CEQG FWAL acceptable range of 6.5 to 9.0.

3.2.3 Designated, Unique, and Protected Aquatic Habitat

3.2.3.1 General

Although the impoundment associated with the Milltown Station is an anthropogenic feature that would have changed the physical characteristics of the River, this area may now provide some cool water refuge for species when water temperatures are high and water levels are low during summer months, as was noted within the study area during the field surveys. It should be noted, however, that the impoundment was dominated by smallmouth bass (as discussed below), which is an invasive species that is known to outcompete other native salmonids.

3.2.3.2 Aquatic Species at Risk Habitat

American eel have a known occurrence in New Brunswick and were observed during field surveys; the St. Croix River is not identified as critical habitat (COSEWIC 2006). American eel use the St. Croix River to swim to sea to spawn, as they are catadromous. They require both freshwater, where they spend most of their life, and saltwater, where they migrate to spawn in the Sargasso Sea (Page and Burr 1991). In freshwater, the American eel is found in rivers such as the St. Croix and lakes up to 10 m deep with sufficient cover and dissolved oxygen (i.e., rock, sand, mud, woody debris, vegetation) (COSEWIC 2012), all of which were noted during the field surveys.

Although not observed during field surveys, Atlantic salmon (outer Bay of Fundy population (OBoF)), Atlantic sturgeon (*Acipenser oxyrinchus* - Maritimes population), and shortnose sturgeon (*Acipenser brevirostrum*) have all been recorded and/or have historically been found in the St. Croix River (refer to Section 5.6.2.3 of the EIA registration document (Saunders et al. 2006; COSEWIC 2010). Habitat requirements for OBoF Atlantic salmon include shallow riffles with gravel, rubble, rock, or boulder substrates, while “redds” require gravel beds near head of riffles, or the tail of a pool (Page and Burr 1991). Atlantic sturgeon prefer large, deep rivers, with relatively warm estuaries and require rocky-gravel substrates near waterfalls or deep pools for spawning (COSEWIC 2011). Lastly, shortnose sturgeon require fast-flowing water over boulders and gravel substrate to spawn (COSEWIC 2005).

Habitat types and requirements as described for the above species were noted during field surveys. Refer to **Table 4** and **Appendix A** for more details.

3.2.3.3 Environmentally Significant Areas

As indicated within the EIA registration document, there are two biologically significant areas within 5 km of the Project footprint (AC CDC 2020). The Dennis Stream Environmentally Significant Area (ESA) and St. Croix River ESA, are both located approximately 1 km to the east, and downstream, of the Project area (AC CDC 2020). There are no Protected Natural Areas (PNAs) within 5 km of the PDA. No unique or limited habitat types were observed within the study area during the field survey.

3.2.3.4 Traditional Knowledge

Although an Indigenous traditional land and resource use study has not yet been completed for this Project and that First Nations engagement is ongoing, it is known from early engagement and literature that Salmon Falls and the islands in the Skutik/St. Croix River around the falls are traditionally important areas to the Peskotomuhkati Nation for fishing. Although the exact characteristics or configuration of the falls are unknown, it is anticipated that they were likely a unique feature of the local aquatic landscape and potentially a natural barrier for some migrant fish species. It is expected that further information in this regard will be obtained through ongoing engagement of First Nations in respect of the Project.

3.2.4 Fish Presence and Assemblage

Qualitative fish presence assessments in the PDA were conducted on September 1-3, 2020 by Dillon aquatic staff, Boreal Environmental staff, an NB Power representative, and Peskotomuhkati members and staff, all of whom were experienced in conducting fish surveys. The weather conditions at the time of the surveys were sunny and daytime temperatures hovered around 21° C. The water levels noted at the time of the field survey were considered to be seasonally low (due to a warm and dry summer) (GOC 2020). A variety of methods as described above in **Section 2.2.3.2** were used to accommodate the varying conditions throughout the study area (refer to **Figure 5**). Of the methods presented in **Section 2.2.3.2**, backpack electrofishing, fyke nets, and conventional angling were most successful in obtaining fish presence data, and resulted in the identification of the fish species presented in **Table 6,** below. In total, 85 individual fish and six species were captured, weighed, and measured for length (i.e., fork length) (refer to field data sheets in **Appendix A**).

Table 6: Summary of Fish Species Observed within the St. Croix River

Common Name	Scientific Name	Number of Individuals		Capture Methods		Average Weight and Fork Length	Maximum and Minimum Weight	Maximum and Minimum Fork Length
		Upper Reach	Lower Reach	Upper Reach	Lower Reach			
American eel	*Anguilla rostrata*	2	35	Fyke Net	Electrofishing	21.59 (g) and 143.89 (mm)	303 (g) and 0.65 (g)	490 (mm) and 58 (mm)
Smallmouth bass	*Micropterus dolomieu*	31	5	Angling and Fyke Net	Electrofishing	89.82 (g) and 147.167 (mm)	463 (g) and 2.60 (g)	350 (mm) and 58 (mm)
Golden shiner	*Notemigonus crysoleucas*	-	4	N/A	Electrofishing	2.52 (g) and 59.4 (mm)	2.90 (g) and 2.00 (g)	67 (mm) and 45 (mm)
Crayfish	*Luxilus cornutus*	1	4	Fyke Net	Electrofishing	9.31 (g) and 56.8 (mm)	22.40 (g) and 3.72 (g)	75 (mm) and 22 (mm)
Blacknose dace	*Rhinichthys atratulus*	-	1	N/A	Electrofishing	2.68 (g) and 57 (mm)	2.68 (g)	57 (mm)
White sucker	*Catostomus commersoni*	-	1	N/A	Electrofishing	3.34 (g) and 63 (mm)	3.34 (g)	63 (mm)

As indicated in **Section 2.2.3.2**, both active and passive fishing methods were employed to gather fish assemblage data. Active fishing methods consisted of conventional angling, seine netting, and electrofishing. A summary by each fishing method is as follows.

- **Electrofishing:** Three separate passes were conducted at transects LR1 and LR2 (refer to **Figure 4**) using the electrofisher with a fishing period of 1,623 seconds for the first pass, 822 seconds for the second pass, and 827 seconds for the third pass. Catch per unit effort (number of fish caught divided by total seconds fished) for the three passes are 0.016, 0.019, and 0.009, respectively.
- **Angling:** Conventional angling took place in the upper reach only from September 1 to 2, for a period of approximately 2 hours each day. The lures used (i.e., Senko worms, Rapala Lures) were mainly targeting smallmouth bass. Angling was successful in capturing fish on September 1 only.
- **Seine Netting:** Seine netting was conducted multiple times at two different locations within the upper reach, but was unsuccessful in catching any fish due to the large size of the area and the depth of the area.
- **Fyke Nets:** Fyke nets were deployed in two areas (refer to **Figure 5**) within the upper reach. One fyke net was deployed for two hours, due ease of access and the potential to lose the equipment, and the second net was in place for a period of 24 hours. Several species were captured using this method, as noted in **Table 6**.
- **Eel Traps:** Two eel traps were deployed, including one in the upper reach and one in the lower reach. The eel traps were in place for a 24 hour period and were both empty and still baited when retrieved.

Overall, American eel were the most abundant species observed, followed closely by smallmouth bass (i.e., both species recorded over 30 individuals). Low numbers (i.e., 5 or less) of crayfish and golden shiner, and even lower numbers of blacknose dace and white sucker (i.e., 1 each) were observed (refer to **Table 6**).

Above the Milltown Station in the upper reach of the study area, smallmouth bass were the most abundant fish species, with minor numbers of American eel and crayfish present (refer to **Table 6**). Smallmouth bass is an invasive species introduced to the watershed for sport fishing in the late 1800's (Brown et al. 2009). Habitats in the impoundment, as described in **Section 3.2**, were characterized by deeper pools with submerged logs, rocky and gravely substrates, i.e., areas preferred by smallmouth bass. Lower overall species diversity within the upper reach may be due to the presence of smallmouth bass as they are top predators that are known to outcompete salmonids and prey on smaller fish species (DFO 2018).

Below the Milltown Station in the lower reach of the study area, there was a greater number of individual fish and a greater diversity of fish species caught during the field survey. It should be noted that, although a variety of methods were employed to attempt to survey fish presence and assemblages, the methods employed (in many cases due to access and safety) between the upper reach and the lower reach may influence the species that were successfully sampled in each area. Although fewer fish and

fish species were observed in the upper reach of the study area above the Milltown Station, species on average were larger in size compared to those found downstream in the lower reach of the study area.

3.2.5 Aquatic Species at Risk and Species of Conservation Concern

In this report, "species at risk" (abbreviated SAR) are defined as those species that are listed as "extirpated", "endangered", or "threatened" on the federal *Species at Risk Act* (SARA) or the New Brunswick *Species at Risk Act* (NB SARA). We also define "species of conservation concern" (abbreviated SOCC) as those species that are not SAR but are listed in other parts of SARA, NB SARA, the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), or as regionally rare or endangered by the AC CDC.

A custom AC CDC (2020) data report was obtained for a 5 km radius around the PDA. Refer to Section 5.6.2.3 of the EIA registration document for a description of SARs and SOCCs that have been observed within the PDA. The American eel was the only SAR observed during the field surveys and is listed as "threatened" under NB SARA. No other fish/aquatic SARs or SOCCs were observed during the fish and fish habitat field surveys. American eel is also listed as "threatened" by COSEWIC. Two American eels were observed in the upper reach, and 35 were observed in the lower reach of the study area (refer to **Table 6**). The American eel is a catadromous species that spends most of its life in freshwater and returns to saltwater to spawn anytime between August to December. As such, the St. Croix River provides an ideal habitat due to its proximity/direct flow to the Bay of Fundy.

The habitat requirements of aquatic SARs and SOCCs observed during the field surveys, and which have been historically observed based on reputable data sources, are described above in **Section 3.2.3**.

3.2.6 Surface Water and Sediment Sampling Results

Water and sediment samples were collected during the field surveys on September 2 and 3, 2020, within the study area (refer to **Figure 6**). Two surface water samples and three sediment samples were collected during the field survey (refer to **Figure 6**). The water and sediment samples were submitted to the Research and Productivity Council (RPC) Laboratory in Fredericton, New Brunswick. RPC holds a Canadian Association for Laboratory Accreditation (CALA) as well as being accredited by the Standards Council of Canada (SCC).

3.2.6.1 Surface Water Quality

The results of the surface water quality laboratory analyses are provided in **Tables 7A**, **8A**, and **9** in **Appendix B**. Note, similar limits as described below may exist on the U.S.A. side.

The results of metals in surface water were below the applicable CCME guidelines for the sample collected from the lower reach below the Milltown Station (i.e., Surface Water 2 [SW2]).

There was a minor exceedance of the CCME FWAL guidelines for cadmium (i.e., 0.05 µg/L) within sample SW1, collected in the upper reach above the Milltown Station, as summarized in **Table 7A** in **Appendix B**. The other metals analyzed within SW1 were below the applicable CCME FWAL guidelines.

Metals in surface water were also compared to the Nova Scotia Tier I Environmental Quality Standards (EQS) for surface water where CCME guidelines do not exist; metals in surface water were below the Nova Scotia Tier I EQS.

Pesticide and herbicide results in surface water are summarized in **Table 8A** in **Appendix B**. Concentrations of pesticides and herbicides were below the laboratory detection limits and therefore both SW1 and SW2 samples met the applicable CCME guideline. It should be noted that in some cases (e.g., Endosulfan in the CCME guidelines and Malathion and Parathion in the NS Tier 1 guidelines), the laboratory detection limit is above the corresponding guideline value.

General chemistry results for surface water are summarized in **Table 9** in **Appendix B**. There are no applicable guidelines for these parameters; however, the general chemistry results fall within the expected range of a typical New Brunswick watercourse and show almost no difference in parameters between upstream and downstream sampling locations.

3.2.6.2 Sediment Quality

The results of the sediment quality laboratory analyses are provided in **Tables 7B**, **8B**, and **10** in **Appendix B**. Note, similar limits as described below may exist on the U.S.A. side.

Metals in sediment are summarized in **Table 7B** in **Appendix B**. Concentrations of cadmium were above the CCME interim sediment quality guidelines (ISQGs) for both samples collected within the upper reach of the study area (i.e., SA1: 0.71 mg/kg and SA3: 0.72 mg/kg), however, these concentrations are below the CCME probable effects levels (PELs) guidelines. The CCME ISQGs are no or low effect level sediment quality benchmarks that represent sediment concentrations associated with never or almost never observed effects in benthic organisms. It has become well established in the scientific and regulatory literature over the years that exceedances over PELs and similar benchmarks are often a better or more reliable indicator of potential sediment toxicity (or an increased likelihood for benthic community impairment) than no or low effect level benchmark (e.g., ISQG) exceedances. Concentrations of zinc were slightly above the CCME ISQG guidelines (i.e., SA2: 133 mg/kg and SA3: 173 mg/kg) both above and below the Milltown Station, but were not above the PEL guideline. Concentrations of copper (SA3: 53 mg/kg) and arsenic (SA2: 7 mg/kg) were also above the CCME ISQG, but were below the PEL guidelines. Concentrations of lead were above the CCME PEL guideline in SA3 (i.e., 122 mg/kg). Concentrations of manganese were above the NS Tier I EQS guidelines (1,120 mg/kg) in SA3 (note: no CCME parameter exists for manganese).

The greatest number of exceedances of metals in sediment (i.e., cadmium, copper, lead, manganese and zinc) were noted within SA3 of the upper reach. It should be noted that SA3 is located on an inside meander of the River within the impoundment, where water velocity is slower and where deposition and therefore accumulated fine particles would be higher. This greater number of exceedances observed may be attributed to this environmental factor/characteristic at this sampling location.

Pesticides and herbicide results are summarized in **Table 8B** in **Appendix B**. Concentrations of pesticides in sediment were below the laboratory detection limits, and therefore, below the CCME guidelines and the NS Tier I EQS guidelines.

Hydrocarbon concentrations in sediment are summarized in **Table 10** in **Appendix B**. There were no CCME guidelines for sediment with regard to the protection of aquatic life in freshwater. The results were therefore compared to the Atlantic PIRI Tier I Ecological Screening Levels for the Protection of Plants and Soil Invertebrates. There were no detectable hydrocarbon concentrations in the lower reach below the Milltown Station (i.e., SA2); however, there were total petroleum hydrocarbon concentrations above the detection limit but below the applicable guidelines in both of the upstream sampling locations (i.e., SW1 and SW3). Concentrations were higher in SW3 than in SW2, which may be attributed to this sampling location being within the inside meander of the watercourse where higher amounts of sediment is likely deposited, as described above.

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4.0 Summary and Conclusion

This technical report is intended to supplement the EIA registration for the Milltown Generating Station Decommissioning Project and meet the requirements of the New Brunswick "Guide to Environmental Impact Assessment in New Brunswick" (EIA Guide; NBDELG 2018) as well as contribute information to other environmental permitting in both Canada and the U.S.A. This report summarizes the methods and results of the field assessment of fish and fish habitat, including fish SAR and SOCC, and unique or protected aquatic habitats, as well as surface water and sediment quality sampling completed over the 2020 field season.

Results of the qualitative fish presence assessments confirm that a number of species identified in the desktop review, including smallmouth bass, American eel, golden shiner, crayfish, blacknose dace, and white sucker, are present and using habitats offered within the study area. American eel, the only SAR/SOCC observed during the field survey, was the dominant species found below the Milltown Station. The invasive smallmouth bass was the dominant species found above the Milltown Station. Furthermore, results indicated a slightly higher abundance of fish and greater diversity of fish species below the Milltown Station in the lower reach of the study area, than what was observed in the upper reach above the Milltown Station at the time of the field study. Although these assemblages change during different seasons/migration periods, the arrangement of species observed within the study area could potentially be attributed to factors such as: sampling methodology, habitat variations between the lower reach (i.e., a riffle/run) being preferred over the habitat characteristics of the impoundment (i.e., deeper water levels and less aquatic vegetation present), the potential passage barrier for certain species related to the dam/Station, and lastly, the potential that other species are being outcompeted or preyed upon by smallmouth bass within the impoundment. In addition, based on available background data reviewed and presented within the EIA registration document, other species that were not observed during the field survey may be present.

The results of the surface water sampling indicated a slightly elevated concentration of cadmium above the CCME FWAL guidelines within the sample collected in the upper reach (SW1). The remaining metals analyzed in surface water were below the applicable CCME and NS Tier I EQS guidelines. Furthermore, concentrations of pesticides were below the laboratory detection limits. The results of the general chemistry analysis along with the YSI measurements taken in the field were all within the expected range for this environment and with the exception of temperature (due to the unseasonably warm and dry conditions), were within acceptable ranges that can support salmonids and the fish species observed.

Concentrations of metals in sediment were compared to the CCME ISQGs, which are no or low effect level sediment quality benchmarks that represent sediment concentrations associated with never or almost never observed effects in benthic organisms. It has become well established in the scientific and regulatory literature over the years that exceedances over PELs and similar benchmarks are often a better or more reliable indicator of potential sediment toxicity (or an increased likelihood for benthic community impairment) than no or low effect level benchmark (e.g., ISQG) exceedances. The results of

sediment sampling indicated that concentrations of cadmium, copper, manganese, and zinc exceeded the CCME ISQGs or NS Tier I EQS, but were below the CCME PELs. Concentrations of lead were noted above the CCME PEL guideline in SA3 (i.e., 122 mg/kg). Concentrations of pesticides in sediment were below the laboratory detection limits, and therefore, below the CCME guidelines and the NS Tier I EQS guidelines. There were no detectable hydrocarbon concentrations in the lower reach below the Milltown Station (i.e., SA2), however, there were total petroleum hydrocarbon concentrations above the detection limit but below the applicable guidelines in both of the upstream sampling locations (i.e., SW1 and SW3).

The results of the fish and fish habitat field surveys confirm that fish occupancy and suitable habitats are present above and below the Milltown Station, within the study area. Foraging and potential cold water refuge were characterized in the impoundment above the Milltown Station, whereas spawning, rearing, foraging, and passage habitat were characterized downstream of the Milltown Station. The assessment of potential interactions and proposed mitigation for fish and fish habitat with respect to the Project are outlined in Section 5.6.3 of the EIA registration document.

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5.0 Closure

This report was prepared by Dillon Consulting Limited (Dillon) on behalf of the New Brunswick Power Corporation, in support of the EIA and permitting of the Milltown Generating Station Decommissioning Project. Dillon has used the degree of care and skill ordinarily exercised under similar circumstances at the time the work was performed by reputable members of the environmental consulting profession practicing in Canada. Dillon assumes no responsibility for conditions which were beyond its scope of work. There is no warranty expressed or implied by Dillon.

The material in the report reflects Dillon's best judgment in light of the information available to Dillon at the time of preparation. Any use which a third party makes of this report, or any reliance on or decisions made based on it, are the responsibilities of such third parties. Dillon accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

Yours truly,

DILLON CONSULTING LIMITED

Denis L. Marquis, M.Sc.E., P.Eng.
Associate, Project Manager

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Appendix A

Fish and Fish Habitat Field Data Sheets

ELECTROFISHING SITE FORM

Fish Collection Permit #: 11847049

Session ID#: 08312020

Date *(yyyy-mm-dd):* 2020-08-31

Water Name: St. Croix

Tributary to: N/A

Site ID#: Upper Reach (Head pond)

Site Name: Milltown Generating Station

Agency: Dillon Consulting

Personnel: Tyler Crocker

Second Agency/Contact: Austin Paul (NB Power)

Weather: Sunny

SITE COORDINATES:

Start Waypoint ID#: _____ End Waypoint ID#: _____

Coordinates:		End Point
x/long:	634132.397	634182.524
y / lat:	5003469.992	5003813.364

Projection: *(e.g., UTM)* UTM Datum: *(e.g., NAD83)* NAD83

Site Pictures: _____

Water ID: Upper Reach **Drainage Code:** 1

Rating of the site for brook trout prior to electrofishing: ☑ Poor ☐ Fair ☐ Good ☐ Excellent

Angler Pressure: Low ☑ Moderate ☐ High ☐

Access Rating: Easy ☑ Moderate ☐ Difficult ☐

ELECTROFISHING DETAILS: (Reminder: electrofishing MUST proceed in upstream direction!)
(check one of the choices under each of the following headings and provide additional details if required.)

Method Used:
- ☐ Diminishing Returns
- ☐ Catch Per Unit Effort
- ☐ Spot Check
- ☐ Salvage

Site Set-Up: Open ☐ Closed ☐

Gear Used: Model
- ☐ Backpack _____
- ☐ Boat _____
- ☐ Shore-based

Settings:
- Voltage: _____
- Frequency: _____
- Duty-Cycle: _____
- POW Setting: _____
- **Power Output (watts):** _____

Date: _____ (if different then habitat data)

Sweep/Effort	1 (t = s)	2 (t = s)	3 (t = s)	4 (t = s)	5 (t = s)
# of Netters					

WATER CHEMISTRY: *(see "Forms Manual" for details)*

Specific Water Conductivity (Cs) = 73.5 **TDS (ppt)** 53.95 **pH** 7.47

Dissolved Oxygen (mg/l) = 13.98
(%) 151.1

Water Clarity: Poor ☐ Fair ☑ Good ☐

Temperature (oC)

	Water	Air	Time
Start	19.1	10	8:30
End	19.3	20	15:30

Water Level: Low ☐ Moderate ☑ High ☐

SITE DIMENSIONS: SUMMARY

Length (m): 395
Average Wetted Width (m): 117.5
Average Bankfull Width (m): _____
Average Wetted Depth (m): 4.132
Average Bankfull Depth (m): _____
Maximum Site Depth (m): 5.50
Bankfull Area (m^2): _____
Wetted Area (m^2): 1632.14 *(specify)*

STREAM TYPE:

	% of area	Qty
Riffle:	10	
Run:	10	
Rapid:	10	
Pool:	30	
Flat:	40	
Other:		

SUBSTRATE TYPE: *(% of wetted surface area)*

Bedrock (ledge): 70
Boulder (> 460 mm): 10
Rock (180 - 460 mm): 5
Rubble (54 - 179 mm): 5
Gravel (2.6 - 53 mm): 5
Sand (0.06 - 2.5 mm): 5
Fines (0.0005 - 0.05 mm): 0

CHANNEL TYPE: ☑ Main ☐ Side ☐ Split ☐ Bogan

% Embeddness: ☑ 1 (< 20%) ☐ 2 (20 - 35%) ☐ 3 (35 - 50%) ☐ 4 (≥ 50%)

Water Velocity (m/s): _____
☐ from meter ☐ from calculation

Water Flow (m^3/sec): _____

Formula (CMS) = W (m) x D (m) x A x L (m) / T (sec)

Coefficient		FLOAT TIME (sec) of Length of ___m			
Smooth	0.9	¼ WAY	½ WAY	¾ WAY	Average
Rough	0.8				

where W = width, D = depth, A = coefficient for the stream bottom, L = length, and T = average float time

Comments: *Specific portions of the form were filled out as per DND instruction.

*** *MUST COMPLETE BACK SIDE OR SECOND PAGE OF FORM ***

ELECTROFISHING SITE FORM

Session ID#: 08312020 **Site ID#:** Upper Reach (Head Pond)

Date (yyyy-mm-dd): 2020-08-31 **Site Name:** Milltown

STANDARDIZED STREAM TRANSECTS:

Indicate which transect was used for the flow measurement calculation.

Transect #	Stream Type	WIDTH (m):		WETTED DEPTH (m)					BANKFULL DEPTH (m)		
		Wet	Bankfull	1/4	1/2	3/4	DIFF.	MAX	1/4	1/2	3/4
1		209		3.40	3.35						
2		104		4.20	3.62						
3		119		4.00	4.20						
4		78		4.35	5.50						
5		47		4.20	4.50						

STREAM BANK CHARACTERISTICS & CANOPY: based on the BANKFULL WIDTH

	% Bank Erosion			% Bank Vegetation			
	Stable	Bare Stable	Eroding	Bare	Grasses	Shrubs	Trees
LEFT	70	10	20	10	10	50	30
RIGHT	85	5	10	5	50	50	10

% OVERHEAD CANOPY

(e.g. mature trees)

☐	0	0
☐	1	≤ 1-20%
☑	2	21 - 40%
☐	3	41 - 70%
☐	4	71- 90%
☐	5	>90%

LARGE WOODY DEBRIS (LWD): Individual lengths (m)

(Record for each piece if it is Dry (D), Wet (W) and if Wet what Stream Type does the piece fall within).

LWD(m)										
S. Type										

LWD(m)										
S. Type										

% COVER BY TYPE:

	% Undercut		*% OHV "Cover"*	
	Wet	Bankfull	*Wet*	*Bankfull*
LEFT	5	30	10	15
RIGHT	5	20	5	15

POOL WITH STRUCTURE (PWS):

Individual Measurements

PWS#	Length (m)	Width (m)	Area (m2)

% INSTREAM COVER BY TYPE: based on WETTED area

COVER TYPE	%
Turbulence	15
Instream vegetation	
Instream SWD	5
Other: Cobble	5
Other: Boulder	5
Other: (specify)	

TOTAL BROOK TROUT COVER RATING: (visual estimate of the % stream wetted area that offers cover)

☑ **<20%** ☐ **20-40%** ☐ **40-60%** ☐ **>60%**

*** * * * * * * * * * * * * * * *MUST COMPLETE FRONT SIDE OR FIRST PAGE OF FORM * * * * * * * * * * * * * * * * ***

ELECTROFISHING SITE FORM

Fish Collection Permit #: 11847049

Session ID#: 08312020

Date *(yyyy-mm-dd):* 2020-08-31

Water Name: St. Croix

Tributary to: N/A

Site ID#: Upper Reach (Head pond)

Site Name: Milltown Generating Station

Agency: Dillon Consulting

Personnel: Tyler Crocker

Second Agency/Contact: Austin Paul (NB Power)

Weather: Sunny

SITE COORDINATES:

Start Waypoint ID#: _____ End Waypoint ID#: _____

Coordinates:		End Point
x/long:	634132.397	634182.524
y / lat:	5003469.992	5003813.364

Projection: *(e.g., UTM)* UTM Datum: *(e.g., NAD83)* NAD83

Site Pictures: _____

Water ID: Upper Reach **Drainage Code:** 1

Rating of the site for brook trout prior to electrofishing: ☑ Poor ☐ Fair ☐ Good ☐ Excellent

Angler Pressure: Low ☑ Moderate ☐ High ☐ **Access Rating:** Easy ☐ Moderate ☐ Difficult ☐

ELECTROFISHING DETAILS: (Reminder: electrofishing MUST proceed in upstream direction!)
(check one of the choices under each of the following headings and provide additional details if required.)

Method Used:
- ☐ Diminishing Returns
- ☐ Catch Per Unit Effort
- ☐ Spot Check
- ☐ Salvage

Site Set-Up: Open ☐ Closed ☐

Gear Used: Model
- ☐ Backpack _____
- ☐ Boat _____
- ☐ Shore-based

Settings:
- Voltage: _____
- Frequency: _____
- Duty-Cycle: _____
- POW Setting: _____
- **Power Output (watts):** _____

Date: _____ (if different then habitat data)

Sweep/Effort	1 (t = s)	2 (t = s)	3 (t = s)	4 (t = s)	5 (t = s)
# of Netters					

WATER CHEMISTRY: *(see "Forms Manual" for details)*

Specific Water Conductivity (Cs) = 73.5 **TDS (ppt)** 53.95 **pH** 7.47

Dissolved Oxygen (mg/l) = 13.98
(%) 151.1

Water Clarity: Poor ☐ Fair ☑ Good ☐

Temperature (oC)

	Water	Air	Time
Start	19.1	10	8:30
End	19.3	20	15:30

Water Level: Low ☐ Moderate ☑ High ☐

SITE DIMENSIONS: SUMMARY

Length (m): 395
Average Wetted Width (m): 117.5
Average Bankfull Width (m): _____
Average Wetted Depth (m): 4.132
Average Bankfull Depth (m): _____
Maximum Site Depth (m): 5.50
Bankfull Area (m^2): _____
Wetted Area (m^2): 1632.14 *(specify)*

STREAM TYPE:

	% of area	Qty
Riffle:	10	
Run:	10	
Rapid:	10	
Pool:	30	
Flat:	40	
Other:		

SUBSTRATE TYPE: *(% of wetted surface area)*

Bedrock (ledge): 70
Boulder (> 460 mm): 10
Rock (180 - 460 mm): 5
Rubble (54 - 179 mm): 5
Gravel (2.6 - 53 mm): 5
Sand (0.06 - 2.5 mm): 5
Fines (0.0005 - 0.05 mm): 0

CHANNEL TYPE: ☑ Main ☐ Side ☐ Split ☐ Bogan

% Embeddness: ☑ 1 (< 20%) ☐ 2 (20 - 35%) ☐ 3 (35 - 50%) ☐ 4 (≥ 50%)

Water Velocity (m/s): _____
☐ from meter ☐ from calculation

Water Flow (m^3/sec): _____

Formula (CMS) = W (m) x D (m) x A x L (m) / T (sec)

Coefficient		FLOAT TIME (sec) of Length of ___m			
Smooth	0.9	¼ WAY	½ WAY	¾ WAY	Average
Rough	0.8				

where W = width, D = depth, A = coefficient for the stream bottom, L = length, and T = average float time

Comments: *Specific portions of the form were filled out as per DND instruction.

*** *MUST COMPLETE BACK SIDE OR SECOND PAGE OF FORM ***

INDIVIDUAL FISH MEASUREMENTS FORM

Session ID #: 09012020 **Date :** 2020-09-01 (yyyy-mm-dd)

Water Name: St. Croix **Site ID #:** Upper Reach

Sampling Method: [x] Angling [ ] Netting [ ] Electofishing [ ] Other (specify):
[ ] Stocking [ ] Trapping [ ] Counting Facility

Weighing device: Scale **Comments:**

Run/ Sweep Net	Fish ID#	Species Code	Length in mm [x] Total [ ] Fork	Weight in g	Run/ Sweep Net	Fish ID#	Species Code	Length in mm [ ] Total [ ] Fork	Weight in g	Run/ Sweep Net	Fish ID#	Species Code	Length in mm [ ] Total [ ] Fork	Weight in g
1	10	SMB	73	5.13										
1	11	SMB	54	2.60										
1	12	SMB	83	8.41										
1	13	SMB	87	10.11										
1	14	SMB	81	7.04										
1	15	SMB	138	35.6										
1	16	SMB	64	2.11										
1	17	SMB	68	4.67										
1	18	SMB	63	3.03										
1	19	SMB	72	2.00										
1	20	SMB	73	9.60										
1	21	SMB	77	7.26										
1	22	SMB	78	6.96										
1	23	SMB	57	3.88										
1	24	SMB	69	4.45										

BATCH COUNT/WEIGHT DATA BY SWEEP FOR SPECIES IN WHICH INDIVIDUALS WERE NOT MEASURED.

Sweep	Count	Weight	Sweep	Count	Weight	Sweep	Count	Weight	Sweep	Count	Weight

INDIVIDUAL FISH MEASUREMENTS FORM

Session ID #: 09012020 **Date :** 2020-09-01 (yyyy-mm-dd)

Water Name: St. Croix **Site ID #:** Upper Reach

Sampling Method: Angling ☐ Fyke Netting ☐ Electofishing ☐ Other (specify): ☐ Stocking ☐ Trapping ☐ Counting Facility

Weighing device: Scale **Comments:**

Run/ Sweep Net	Fish ID#	Species Code	Length in mm ☑ Total ☐ Fork	Weight in g	Run/ Sweep Net	Fish ID#	Species Code	Length in mm ☐ Total ☐ Fork	Weight in g	Run/ Sweep Net	Fish ID#	Species Code	Length in mm ☐ Total ☐ Fork	Weight in g
1	10	SMB	73	5.13										
1	11	SMB	54	2.60										
1	12	SMB	83	8.41										
1	13	SMB	87	10.11										
1	14	SMB	81	7.04										
1	15	SMB	138	35.6										
1	16	SMB	64	2.11										
1	17	SMB	68	4.67										
1	18	SMB	63	3.03										
1	19	SMB	72	2.00										
1	20	SMB	73	9.60										
1	21	SMB	77	7.26										
1	22	SMB	78	6.96										
1	23	SMB	57	3.88										
1	24	SMB	69	4.45										

BATCH COUNT/WEIGHT DATA BY SWEEP FOR SPECIES IN WHICH INDIVIDUALS WERE NOT MEASURED.

Sweep	Count	Weight	Sweep	Count	Weight	Sweep	Count	Weight	Sweep	Count	Weight

ELECTROFISHING SITE FORM

Fish Collection Permit #: 11847049

Session ID#: 08312020

Date *(yyyy-mm-dd):* 2020-08-31

Water Name: St. Croix

Tributary to: N/A

Site ID#: Upper Reach (Head pond)

Site Name: Milltown Generating Station

Agency: Dillon Consulting

Personnel: Tyler Crocker

Second Agency/Contact: Austin Paul (NB Power)

Weather: Sunny

SITE COORDINATES:

Start Waypoint ID#: _____ End Waypoint ID#: _____

Coordinates:		End Point
x/long:	634132.397	634182.524
y / lat:	5003469.992	5003813.364

Projection: *(e.g., UTM)* UTM Datum: *(e.g., NAD83)* NAD83

Site Pictures: _____

Water ID: Upper Reach **Drainage Code:** 1

Rating of the site for brook trout prior to electrofishing: ☐ Poor ☑ Fair ☐ Good ☐ Excellent

Angler Pressure: Low ☑ Moderate ☐ High ☐

Access Rating: Easy ☑ Moderate ☐ Difficult ☐

ELECTROFISHING DETAILS: (Reminder: electrofishing MUST proceed in upstream direction!)
(check one of the choices under each of the following headings and provide additional details if required.)

Method Used:
- ☐ Diminishing Returns
- ☑ Catch Per Unit Effort
- ☐ Spot Check
- ☐ Salvage

Site Set-Up: Open ☑ Closed ☐

Gear Used: Model
- ☑ Backpack _____
- ☐ Boat _____
- ☑ Shore-based

Settings:
- Voltage: _____
- Frequency: _____
- Duty-Cycle: _____
- POW Setting: _____
- **Power Output (watts):** _____

Date: _____ (if different then habitat data)

Sweep/Effort	1 (t = s)	2 (t = s)	3 (t = s)	4 (t = s)	5 (t = s)
# of Netters					

WATER CHEMISTRY: *(see "Forms Manual" for details)*

Specific Water Conductivity (Cs) = 73.5 **TDS (ppt)** 53.95 **pH** 7.47

Dissolved Oxygen (mg/l) = 13.98
(%) 151.1

Water Clarity: Poor ☐ Fair ☑ Good ☐

Temperature (oC)

	Water	Air	Time
Start	19.1	10	8:30
End	19.3	20	15:30

Water Level: Low ☑ Moderate ☐ High ☐

SITE DIMENSIONS: SUMMARY

Length (m): 395
Average Wetted Width (m): 117.5
Average Bankfull Width (m): _____
Average Wetted Depth (m): 4.132
Average Bankfull Depth (m): _____
Maximum Site Depth (m): 5.50
Bankfull Area (m^2): _____
Wetted Area (m^2): 1632.14 *(specify)*

STREAM TYPE:

	% of area	Qty
Riffle:	10	
Run:	10	
Rapid:	10	
Pool:	30	
Flat:	40	
Other:		

SUBSTRATE TYPE: *(% of wetted surface area)*

Bedrock (ledge): 70
Boulder (> 460 mm): 10
Rock (180 - 460 mm): 5
Rubble (54 - 179 mm): 5
Gravel (2.6 - 53 mm): 5
Sand (0.06 - 2.5 mm): 5
Fines (0.0005 - 0.05 mm): 0

CHANNEL TYPE: ☑ Main ☐ Side ☐ Split ☐ Bogan

% Embeddness: ☑ 1 (< 20%) ☐ 2 (20 - 35%) ☐ 3 (35 - 50%) ☐ 4 (≥ 50%)

Water Velocity (m/s):
☐ from meter ☑ from calculation

Water Flow (m^3/sec): _____

Formula (CMS) = W (m) x D (m) x A x L (m) / T (sec)

Coefficient		FLOAT TIME (sec) of Length of ___m			
Smooth	0.9	¼ WAY	½ WAY	¾ WAY	Average
Rough	0.8				

where W = width, D = depth, A = coefficient for the stream bottom, L = length, and T = average float time

Comments: *Specific portions of the form were filled out as per DND instruction.

*** *MUST COMPLETE BACK SIDE OR SECOND PAGE OF FORM ***

ELECTROFISHING SITE FORM

Session ID#: 08312020 **Site ID#:** Upper Reach (Head Pond)

Date (yyyy-mm-dd): 2020-08-31 **Site Name:** Milltown

STANDARDIZED STREAM TRANSECTS:

Indicate which transect was used for the flow measurement calculation.

Transect #	Stream Type	WIDTH (m):		WETTED DEPTH (m)					BANKFULL DEPTH (m)		
		Wet	Bankfull	1/4	1/2	3/4	DIFF.	MAX	1/4	1/2	3/4
1		209		3.40	3.35						
2		104		4.20	3.62						
3		119		4.00	4.20						
4		78		4.35	5.50						
5		47		4.20	4.50						

STREAM BANK CHARACTERISTICS & CANOPY: based on the BANKFULL WIDTH

	% Bank Erosion			% Bank Vegetation			
	Stable	Bare Stable	Eroding	Bare	Grasses	Shrubs	Trees
LEFT	70	10	20	10	10	50	30
RIGHT	85	5	10	5	50	50	10

% OVERHEAD CANOPY

(e.g. mature trees)

☐	0	0
☑	1	≤ 1-20%
☐	2	21 - 40%
☐	3	41 - 70%
☐	4	71- 90%
☐	5	>90%

LARGE WOODY DEBRIS (LWD): Individual lengths (m)

(Record for each piece if it is Dry (D), Wet (W) and if Wet what Stream Type does the piece fall within).

LWD(m)										
S. Type										

LWD(m)										
S. Type										

% COVER BY TYPE:

	% Undercut		*% OHV "Cover"*	
	Wet	Bankfull	*Wet*	*Bankfull*
LEFT	5	30	10	15
RIGHT	5	20	5	15

POOL WITH STRUCTURE (PWS):

Individual Measurements

PWS#	Length (m)	Width (m)	Area (m2)

% INSTREAM COVER BY TYPE: based on WETTED area

COVER TYPE	%
Turbulence	15
Instream vegetation	
Instream SWD	5
Other: Cobble	5
Other: Boulder	5
Other: (specify)	

TOTAL BROOK TROUT COVER RATING: (visual estimate of the % stream wetted area that offers cover)

☑ **<20%** ☐ **20-40%** ☐ **40-60%** ☐ **>60%**

*** * * * * * * * * * * * * * * *MUST COMPLETE FRONT SIDE OR FIRST PAGE OF FORM * * * * * * * * * * * * * * * * ***

INDIVIDUAL FISH MEASUREMENTS FORM

Session ID #: 09012020 **Date :** 2020-09-01 (yyyy-mm-dd)

Water Name: St. Croix **Site ID #:** Upper Reach

Sampling Method: Angling Netting Electofishing Other (specify):
Stocking Trapping Counting Facility

Weighing device: Scale **Comments:**

Run/ Sweep Net	Fish ID#	Species Code	Length in mm ☑ Total ☐ Fork	Weight in g	Run/ Sweep Net	Fish ID#	Species Code	Length in mm ☐ Total ☐ Fork	Weight in g	Run/ Sweep Net	Fish ID#	Species Code	Length in mm ☐ Total ☐ Fork	Weight in g
1	10	SMB	73	5.13										
1	11	SMB	54	2.60										
1	12	SMB	83	8.41										
1	13	SMB	87	10.11										
1	14	SMB	81	7.04										
1	15	SMB	138	35.6										
1	16	SMB	64	2.11										
1	17	SMB	68	4.67										
1	18	SMB	63	3.03										
1	19	SMB	72	2.00										
1	20	SMB	73	9.60										
1	21	SMB	77	7.26										
1	22	SMB	78	6.96										
1	23	SMB	57	3.88										
1	24	SMB	69	4.45										

BATCH COUNT/WEIGHT DATA BY SWEEP FOR SPECIES IN WHICH INDIVIDUALS WERE NOT MEASURED.

AMEE											
Sweep	Count	Weight	Sweep	Count	Weight	Sweep	Count	Weight	Sweep	Count	Weight

ELECTROFISHING SITE FORM

Fish Collection Permit #: 11847049

Session ID#: 03092020

Date *(yyyy-mm-dd):* 2020-09-03

Water Name: St. Croix

Tributary to: N/A

Site ID#: Milltown Generating Station

Site Name: Upper Reach

Agency: Dillon Consulting

Personnel: Tyler Crocker

Second Agency/Contact: Austin Paul (NB Power)

Weather: Overcast

SITE COORDINATES:

Start Waypoint ID#: _____ End Waypoint ID#: _____

Coordinates:		End Point
x/long:		
y / lat:		

Projection: *(e.g., UTM)* UTM Datum: *(e.g., NAD83)* NAD83

Site Pictures: _____

Water ID: Upper Reach **Drainage Code:** 1

WATER CHEMISTRY: *(see "Forms Manual" for details)*

Specific Water Conductivity (Cs) = 89.1 **TDS (ppt)** 57.85 **pH** 7.11

Dissolved Oxygen (mg/l) = 15.96

(%) 177.2

Water Clarity: Poor ☐ Fair ☑ Good ☐

Temperature (oC)

	Water	Air	Time
Start	19.1	10	8:30
End	19.6	22	10:15

Water Level: Low ☐ Moderate ☑ High ☐

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Appendix B

Surface Water and Sediment Sample Analytical Data Summary Tables

Table 7.A

METAL CONCENTRATIONS IN SURFACE WATER

NB Power

Milltown, NB

Project No. 19-1594

Parameter	CCME Water Quality Guidelines for the Protection of Aquatic Life in Freshwater (ug/L)	Nova Scotia Tier I EQS for Surface Water (ug/L)	SW 1 Sept. 3/20	SW 2 Sept. 3/20
Aluminum	100	-	60	56
Antimony	NG	20	<0.1	<0.1
Arsenic	5	-	<1	<1
Barium	NG	1000	10	9
Berylium	NG	5.3	<0.1	<0.1
Bismuth	NG	NG	<1	<1
Boron	1500	-	5	4
Cadmium	0.04	-	**0.05**	0.04
Calcium	NG	NG	4100	4020
Chromium	1	-	<1	<1
Cobalt	NG	10	<0.1	<0.1
Copper	2	-	<1	<1
Iron	300	-	90	90
Lead	1	-	0.1	<0.1
Lithium	NG	NG	0.3	0.3
Magnesium	NG	NG	670	670
Manganese	240	-	42	40
Mercury	0.026	NG	<0.025	<0.025
Molybdenum	73	-	0.1	<0.1
Nickel	25	-	<1	<1
Potassium	NG	NG	1190	1160
Rubidium	NG	NG	3.3	3.2
Selenium	1	-	<1	<1
Silver	0.25	-	<0.1	<0.1
Sodium	NG	NG	11800	11500
Strontium	NG	21000	22	22
Tellerium	NG	NG	<0.1	<0.1
Thallium	0.8	-	<0.1	<0.1
Tin	NG	NG	<0.1	<0.1
Uranium	15	-	<0.1	<0.1
Vanadium	NG	6	<1	<1
Zinc	7	-	4	5

"-" CCME Guideline applies

NG = no guideline available

100 denotes concentration exceeds 2014 Nova Scotia Tier I Environmental Quality Standards

100 denotes concentration exceeds the CCME Freshwater Guidelines

Table 7.B

METAL CONCENTRATIONS IN SEDIMENT
NB Power
Milltown, NB
Project No. 19-1594

Parameter	CCME Sediment Quality Guidelines for the Protection of Aquatic Life in Freshwater (mg/kg)		Nova Scotia Tier I EQS for Sediment (mg/kg)	SA1 Sept. 2/20	SA2 Sept. 3/20	SA3 Sept. 3/20
	ISQGs	PELs				
Aluminum	NG	NG	NG	11600	11600	10900
Antimony	NG	NG	25	0.4	0.1	4.4
Arsenic	5.9	17	-	5	**7**	4
Barium	NG	NG	NG	255	32	125
Berylium	NG	NG	NG	0.6	0.4	0.5
Bismuth	NG	NG	NG	<1	<1	<1
Boron	NG	NG	NG	3	1	2
Cadmium	0.6	3.5	-	**0.71**	0.1	**0.72**
Calcium	NG	NG	NG	4230	1640	2920
Chromium	37.3	90	-	19	24	25
Cobalt	NG	NG	NG	6	7.8	6.3
Copper	35.7	197	-	18	15	**53**
Iron	NG	NG	43766	15900	33800	22400
Lead	35	91.3	-	28.4	20.9	**122**
Lithium	NG	NG	NG	16.9	22.8	18.7
Magnesium	NG	NG	NG	3540	6770	4300
Manganese	NG	NG	1100	765	825	**1120**
Mercury	0.17	0.486	-	0.17	0.02	0.44
Molybdenum	NG	NG	NG	1.5	1.9	1.7
Nickel	NG	NG	75	17	25	24
Potassium	NG	NG	NG	500	430	710
Rubidium	NG	NG	NG	8.6	4.3	8
Selenium	NG	NG	2	<1	<1	<1
Silver	NG	NG	1	<0.1	<0.1	<0.1
Sodium	NG	NG	NG	200	70	120
Strontium	NG	NG	NG	27	9	20
Telleirum	NG	NG	NG	<0.1	<0.1	<0.1
Thallium	NG	NG	NG	<0.1	<0.1	<0.1
Tin	NG	NG	NG	1	<1	49
Uranium	NG	NG	NG	2.3	0.6	1
Vanadium	NG	NG	NG	31	22	24
Zinc	123	315	-	105	**133**	**173**

"-" CCME Guideline applies
NG = no guideline available

100	denotes concentration exceeds 2014 Nova Scotia Tier I Environmental Quality Standards
100	denotes concentration exceeds the CCME ISQG Guidelines
100	denotes concentration exceeds the CCME PEL Guidelines

Table 8.A

PESTICIDE CONCENTRATIONS IN SURFACE WATER

NB Power

Milltown, NB

Project No. 19-1594

General Pesticides	CCME Water Quality Guidelines for the Protection of Aquatic Life in Feshwater (ug/L)	Nova Scotia Tier I EQS for Surface Water (ug/L)	SW 1 Sept. 3/20	SW 2 Sept. 3/20
Azoxystrobin	NG	NG	< 0.02	< 0.02
Bentazone	NG	NG	< 0.03	< 0.03
Boscalid	NG	NG	< 0.01	< 0.01
Chlorantraniliprole	NG	NG	< 0.02	< 0.02
Clothianidin	NG	NG	< 0.01	< 0.01
Diazinon	NG	0.08	< 0.01	< 0.01
Difenoconazole	NG	NG	< 0.02	< 0.02
Dimethoate	6.2	-	< 0.04	< 0.04
Fenamidone	NG	NG	< 0.01	< 0.01
Fluazifop-p-butyl	NG	NG	< 0.02	< 0.02
Fludioxonil	NG	NG	< 0.01	< 0.01
Fluopyram	NG	NG	< 0.01	< 0.01
Hexazinone	NG	NG	< 0.02	< 0.02
Imidacloprid	NG	NG	< 0.02	< 0.02
Linuron	7	-	< 0.02	< 0.02
Mandipropamid	NG	NG	< 0.01	< 0.01
Metalaxyl	NG	NG	< 0.03	< 0.03
Metobromuron	NG	NG	< 0.03	< 0.03
Metolachlor	NG	7.8	< 0.01	< 0.01
Metribuzin	NG	1	< 0.03	< 0.03
Oxathiapiprolin	NG	NG	< 0.01	< 0.01
Penflufen	NG	NG	< 0.01	< 0.01
Phorate	NG	NG	< 0.01	< 0.01
Propiconazole	NG	NG	< 0.02	< 0.02
Propyzamide	NG	NG	< 0.01	< 0.01
Pyraclostrobin	NG	NG	< 0.01	< 0.01
Rimsulfuron	NG	NG	< 0.02	< 0.02
Thiabendazole	NG	NG	< 0.02	< 0.02
Thiamethoxam	NG	NG	< 0.01	< 0.01
Thifensulfuron-methyl	NG	NG	< 0.02	< 0.02
Tribenuron-methyl	NG	NG	< 0.04	< 0.04
Organochlorines				
a-BHC	NG	NG	< 0.01	< 0.01
b-BHC	NG	NG	< 0.01	< 0.01
g-BHC (Lindane)	0.01	-	< 0.01	< 0.01
d-BHC	NG	NG	< 0.01	< 0.01
Heptachlor	NGR	-	< 0.01	< 0.01
Aldrin	NGR	0.01	< 0.01	< 0.01
Heptachlor epoxide	NGR	-	< 0.01	< 0.01
2,4'-DDE	NG	NG	< 0.01	< 0.01
Endosulfan I	0.003	-	< 0.01	< 0.01
4,4'-DDE	NG	NG	< 0.01	< 0.01
Dieldrin	0.04	-	< 0.01	< 0.01
2,4'-DDD	NG	NG	< 0.01	< 0.01
Endrin	NGR	-	< 0.01	< 0.01
Endosulfan II	0.003	-	< 0.01	< 0.01
4,4'-DDD	NG	NG	< 0.01	< 0.01
2,4'-DDT	NG	NG	< 0.01	< 0.01
Endrin aldehyde	NG	NG	< 0.01	< 0.01
Endosulfan sulfate	NG	NG	< 0.01	< 0.01
4,4'-DDT	NG	NG	< 0.01	< 0.01
Endrin ketone	NG	NG	< 0.01	< 0.01
Methoxychlor	NG	0.05	< 0.01	< 0.01
Mirex	NG	NG	< 0.01	< 0.01
Organophosphorous				
Alachlor	NG	NG	< 0.2	< 0.2
Ametryn	NG	NG	< 0.3	< 0.3
Atrazine	1.8	-	< 0.3	< 0.3
Atrazine desethyl	NG	NG	< 0.5	< 0.5
Atrazine desisopropyl	NG	NG	< 0.5	< 0.5
Azinphos-methyl	NG	0.01	< 1.0	< 1.0
Bendiocarb	NG	NG	< 0.5	< 0.5
Cyanazine	2	-	< 0.5	< 0.5
Disulfoton	NG	NG	< 0.5	< 0.5
Malathion	NG	0.1	< 0.5	< 0.5
Methyl Parathion	NG	NG	< 0.5	< 0.5
Parathion	NG	0.008	< 0.4	< 0.4
Phosmet	NG	NG	< 0.4	< 0.4
Phosphamidon	NG	NG	< 0.5	< 0.5
Prometon	NG	NG	< 2.0	< 2.0
Prometryn	NG	NG	< 0.3	< 0.3
Propazine	NG	NG	< 0.3	< 0.3
Simazine	10	-	< 0.5	< 0.5
Terbufos	NG	NG	< 0.4	< 0.4
Terbutryn	NG	NG	< 0.5	< 0.5
Triallate	0.24	-	< 0.2	< 0.2
Trifluralin	0.2	-	< 1.0	< 1.0

NG = no guideline available

NGR = This guideline (originally published in Canadian Water Quality Guidelines [CCREM 1987 + Appendixes] in 1987 or 1991 [PCBs in marine waters]) is no longer recommended and the value is withdrawn. A water quality guideline is not recommended.

100	denotes concentration exceeds the CCME Freshwater Guidelines
100	denotes concentration exceeds 2014 Nova Scotia Tier I Environmental Quality Standards

Table 8.B

PESTICIDE CONCENTRATIONS IN SEDIMENT
NB Power
Milltown, NB
Project No. 19-1594

General Pesticides	CCME Sediment Quality Guidelines for the Protection of Aquatic Life in Feshwater (ug/g)	Nova Scotia Tier I EQS for Sediment (mg/kg)	SA 1 Sept. 2/20	SA 2 Sept. 3/20	SA 3 Sept. 3/20
Azoxystrobin	NG	NG	< 0.02	< 0.02	< 0.02
Bentazone	NG	NG	< 0.03	< 0.03	< 0.03
Boscalid	NG	NG	< 0.01	< 0.01	< 0.01
Chlorantraniliprole	NG	NG	< 0.02	< 0.02	< 0.02
Clothianidin	NG	NG	< 0.01	< 0.01	< 0.01
Diazinon	NG	2.2	< 0.01	< 0.01	< 0.01
Difenoconazole	NG	NG	< 0.02	< 0.02	< 0.02
Dimethoate	NG	NG	< 0.04	< 0.04	< 0.04
Fenamidone	NG	NG	< 0.01	< 0.01	< 0.01
Fluazifop-p-butyl	NG	NG	< 0.02	< 0.02	< 0.02
Fludioxonil	NG	NG	< 0.01	< 0.01	< 0.01
Fluopyram	NG	NG	< 0.01	< 0.01	< 0.01
Hexazinone	NG	NG	< 0.02	< 0.02	< 0.02
Imidacloprid	NG	NG	< 0.02	< 0.02	< 0.02
Linuron	NG	NG	< 0.02	< 0.02	< 0.02
Mandipropamid	NG	NG	< 0.01	< 0.01	< 0.01
Metalaxyl	NG	NG	< 0.03	< 0.03	< 0.03
Metobromuron	NG	NG	< 0.03	< 0.03	< 0.03
Metolachlor	NG	NG	< 0.01	< 0.01	< 0.01
Metribuzin	NG	NG	< 0.03	< 0.03	< 0.03
Oxathiapiprolin	NG	NG	< 0.01	< 0.01	< 0.01
Penflufen	NG	NG	< 0.01	< 0.01	< 0.01
Phorate	NG	NG	< 0.01	< 0.01	< 0.01
Propiconazole	NG	NG	< 0.02	< 0.02	< 0.02
Propyzamide	NG	NG	< 0.01	< 0.01	< 0.01
Pyraclostrobin	NG	NG	< 0.01	< 0.01	< 0.01
Rimsulfuron	NG	NG	< 0.02	< 0.02	< 0.02
Thiabendazole	NG	NG	< 0.02	< 0.02	< 0.02
Thiamethoxam	NG	NG	< 0.01	< 0.01	< 0.01
Thifensulfuron-methyl	NG	NG	< 0.02	< 0.02	< 0.02
Tribenuron-methyl	NG	NG	< 0.04	< 0.04	< 0.04
Organochlorines					
a-BHC	NG	NG	< 0.01	< 0.01	< 0.01
b-BHC	NG	NG	< 0.01	< 0.01	< 0.01
g-BHC (Lindane)	0.94	-	< 0.01	< 0.01	< 0.01
d-BHC	NG	NG	< 0.01	< 0.01	< 0.01
Heptachlor	0.6	-	< 0.01	< 0.01	< 0.01
Aldrin	NG	0.08	< 0.01	< 0.01	< 0.01
Heptachlor epoxide	0.6	-	< 0.01	< 0.01	< 0.01
2,4'-DDE	NG	NG	< 0.01	< 0.01	< 0.01
Endosulfan I	NG	0.01	< 0.01	< 0.01	< 0.01
4,4'-DDE	NG	NG	< 0.01	< 0.01	< 0.01
Dieldrin	2.85	-	< 0.01	< 0.01	< 0.01
2,4'-DDD	NG	NG	< 0.01	< 0.01	< 0.01
Endrin	2.67	-	< 0.01	< 0.01	< 0.01
Endosulfan II	NG	0.01	< 0.01	< 0.01	< 0.01
4,4'-DDD	NG	NG	< 0.01	< 0.01	< 0.01
2,4'-DDT	NG	NG	< 0.01	< 0.01	< 0.01
Endrin aldehyde	NG	NG	< 0.01	< 0.01	< 0.01
Endosulfan sulfate	NG	NG	< 0.01	< 0.01	< 0.01
4,4'-DDT	NG	NG	< 0.01	< 0.01	< 0.01
Endrin ketone	NG	NG	< 0.01	< 0.01	< 0.01
Methoxychlor	NG	0.05	< 0.01	< 0.01	< 0.01
Mirex	NG	NG	< 0.01	< 0.01	< 0.01
Organophosphorous					
Alachlor	NG	NG	< 0.2	< 0.2	< 0.2
Ametryn	NG	NG	< 0.3	< 0.3	< 0.3
Atrazine	NG	NG	< 0.3	< 0.3	< 0.3
Atrazine desethyl	NG	NG	< 0.5	< 0.5	< 0.5
Atrazine desisopropyl	NG	NG	< 0.5	< 0.5	< 0.5
Azinphos-methyl	NG	NG	< 1.0	< 1.0	< 1.0
Bendiocarb	NG	NG	< 0.5	< 0.5	< 0.5
Cyanazine	NG	NG	< 0.5	< 0.5	< 0.5
Disulfoton	NG	NG	< 0.5	< 0.5	< 0.5
Malathion	NG	0.82	< 0.5	< 0.5	< 0.5
Methyl Parathion	NG	NG	< 0.5	< 0.5	< 0.5
Parathion	NG	NG	< 0.4	< 0.4	< 0.4
Phosmet	NG	NG	< 0.4	< 0.4	< 0.4
Phosphamidon	NG	NG	< 0.5	< 0.5	< 0.5
Prometon	NG	NG	< 2.0	< 2.0	< 2.0
Prometryn	NG	NG	< 0.3	< 0.3	< 0.3
Propazine	NG	NG	< 0.3	< 0.3	< 0.3
Simazine	NG	NG	< 0.5	< 0.5	< 0.5
Terbufos	NG	NG	< 0.4	< 0.4	< 0.4
Terbutryn	NG	NG	< 0.5	< 0.5	< 0.5
Triallate	NG	NG	< 0.2	< 0.2	< 0.2
Trifluralin	NG	NG	< 0.1	< 0.1	< 0.1

NG = no guideline available

100 denotes concentration exceeds the CCME Freshwater Guidelines

100 denotes concentration exceeds 2014 Nova Scotia Tier I Environmental Quality Standards

Table 9

GENERAL CHEMISTRY IN SURFACE WATER
NB Power
Milltown, NB
Project No. 19-1594

Parameter	CCME Water Quality Guidelines for the Protection of Aquatic Life in Feshwater (mg/L)	SW 1 Sept. 3/20	SW 2 Sept. 3/20
Sodium	NG	11.8	11.5
Potassium	NG	1.19	1.16
Calcium	NG	4.1	4.02
Magnesium	NG	0.67	0.67
Iron	NG	0.09	0.09
Manganese	NG	0.042	0.04
Copper	0.002	<0.001	<0.001
Zinc	0.007	0.004	0.004
Ammonia (as N)	NG	0.09	<0.05
pH (units)	6.5-9.0	7.6	7.4
Alkalinity (as CaCO)	NG	19	18
Chloride	640	8.7	8.6
Sulfate	NG	10	10
Nitrate + Nitrite (as N)	NG	0.05	0.06
o-Phosphate (as P)	NG	0.01	0.01
r-Silica (as SiO)	NG	1.9	1.9
Carbon - Total Organic	NG	7.2	7
Tannin & Lignin	NG	2.1	2.1
Turbidity (NTU)	NG	0.9	1.4
Solids - Total Suspended	NG	<5	<5
Conductivity (us/cm)	NG	93	89
Bicarbonate (as CaCO)	NG	18.9	17.9
Carbonate (as CaCO)	NG	0.071	0.042
Hydroxide (as CaCO)	NG	0.02	0.013
Cation Sum (meq/L)	NG	0.816	0.792
Anion Sum (meq/L)	NG	0.837	0.815
Percent Difference (%)	NG	-1.27	-1.43
Theoretical Conductivity (us/cm)	NG	89	87
Hardness (as $CaCO_3$)	NG	13	12.8
Ion Sum	NG	50	49
Saturation pH (5C)	NG	9.6	9.7
Langelier Index (5C)	NG	-2.05	-2.28

"---" Denotes Parameter Not Analyzed

100 denotes concentration exceeds the CCME Freshwater Guidelines

TABLE 10
PETROLEUM HYDROCARBON CONCENTRATIONS IN SEDIMENT
NB Power
Milltown, NB
Project No. 19-1594

Sample	Sample Date	BTEX Concentration (mg/kg)				Modified Total Petroleum Hydrocarbons (mg/kg)						
		Benzene	Toluene	E. Benzene	Xylenes	Purgeable C6 - C10	Purgeable C10 - C16	Exctractable C16 -C21	Extractable C21 - C32	Extractable >C16-C32	Total	
SA1	Sept. 2/20	<0.005	<0.05	<0.01	<0.05	<2.5	12	21	110	130	130	PLO.UP
SA2	Sept. 3/20	<0.005	<0.05	<0.01	<0.05	<2.5	12	<12	<12	<12	<21	ND
SA3	Sept. 3/20	<0.10	<0.10	<0.10	<0.10	<5.0	15	220	810	1000	1000	LO.UP
2015 ATLANTIC PIRI TIER I ESLs (Commercial Receptor, Protection of Plants and Soil Invertebrates, Coarse-Grained Soil)		180	250	300	350	320	260	1700		3300		

'ND' denotes not detected
"NR" denotes no resemblance
"UP" denotes unknown peaks
"LO" denotes lube oil fraction
"PLO" denotes possible lube oil fraction
7500

Appendix C

Laboratory Analytical Certificates

Report ID: 366711-OAS
Report Date: 14-Sep-20
Date Received: 03-Sep-20

CERTIFICATE OF ANALYSIS

for
Dillon Consulting Ltd
1149 Smythe Street, Suite 200
Fredericton, NB E3B 3H4

rpc
921 College Hill Rd
Fredericton NB
Canada E3B 6Z9
Tel: 506.452.1212
Fax: 506.452.0594
www.rpc.ca

Attention: Denis Marquis
Project #: 19-1594
Location: Milltown

Hydrocarbon Analysis in Soil (Atlantic MUST)

RPC Sample ID:			366711-1	366711-2	366711-3
Client Sample ID:			SA1	SA2	SA3
Date Sampled:			2-Sep-20	3-Sep-20	3-Sep-20
Matrix:			soil	soil	soil
Analytes	Units	RL			
Benzene	mg/kg	0.005	< 0.005	< 0.005	< 0.10
Toluene	mg/kg	0.05	< 0.05	< 0.05	< 0.10
Ethylbenzene	mg/kg	0.01	< 0.01	< 0.01	< 0.10
Xylenes	mg/kg	0.05	< 0.05	< 0.05	< 0.10
VPH C6-C10 (Less BTEX)	mg/kg	2.5	< 2.5	< 2.5	< 5.0
EPH >C10-C16	mg/kg	12	< 12	< 12	15
EPH >C16-C21	mg/kg	12	21	< 12	220
EPH >C21-C32	mg/kg	12	110	< 12	810
EPH (>C16-C32)	mg/kg	12	130	< 12	1000
Modified TPH Tier 1	mg/kg	21	130	< 21	1000
VPH Surrogate (IBB)	%		95	96	91
EPH Surrogate (IBB)	%		95	90	99
EPH Surrogate (C32)	%		114	102	116
Resemblance			PLO.UP	ND	LO.UP
Return to Baseline at C32			No	Yes	No
Moisture Content	%		42	11	78

This report relates only to the sample(s) and information provided to the laboratory.
RL = Reporting Limit; Soil results are expressed on a dry weight basis.

Angela Colford
Lab Supervisor
Organic Analytical Services

Steven Davenport
Senior Technician
Organic Analytical Services

Report ID: 366711-OAS
Report Date: 14-Sep-20
Date Received: 03-Sep-20

CERTIFICATE OF ANALYSIS

for
Dillon Consulting Ltd
1149 Smythe Street, Suite 200
Fredericton, NB E3B 3H4

rpc
921 College Hill Rd
Fredericton NB
Canada E3B 6Z9
Tel: 506.452.1212
Fax: 506.452.0594
www.rpc.ca

Method Summary

OAS-HC03:The Determination of Petroleum Hydrocarbons (Atlantic MUST) in Soil (VPH)
OAS-HC03: Determination of Petroleum Hydrocarbons (Atlantic MUST) in Soil (EPH)

Resemblance Legend

Resemblance Code	Resemblance	Resemblance Code	Resemblance
COMMENT	See General Report Comments	PAH	Possible PAHs Detected
FO	Fuel Oil Fraction	PG	Possible Gasoline Fraction
FO.LO	Fuel Oil and Lube Oil Fraction	PLO	Possible Lube Oil Fraction
G	Gasoline Fraction	PWFO	Possible Weathered Fuel Oil Fraction
LO	Lube Oil Fraction	PWG	Possible Weathered Gasoline Fraction
ND	Not Detected	TO	Transformer Oil
NR	No Resemblance (not-petrogenic in origin)	UP	Unknown Peaks
NRLR	No Resemblance in the lube oil range (>C21-C32).	WFO	Weathered Fuel Oil Fraction
OP	One Product (unidentified)	WG	Weathered Gasoline Fraction

General Report Comments

366711-3 - Elevated VPH RL's due to the low weight of sample in the methanol preserved vial and the high moisture content of the sample.
Return to Baseline: Samples are considered to have returned to baseline if the area from C32-C36 is less than 10% of the area from C10-C32.

Report ID: 366711-OAS
Report Date: 14-Sep-20
Date Received: 03-Sep-20

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for
Dillon Consulting Ltd
1149 Smythe Street, Suite 200
Fredericton, NB E3B 3H4

rpc
921 College Hill Rd
Fredericton NB
Canada E3B 6Z9
Tel: 506.452.1212
Fax: 506.452.0594
www.rpc.ca

Project #: 19-1594
Location: Milltown
QA/QC Report

RPC Sample ID:			BLANKC8727	BLANKC8748	SPIKEC8727	SPIKEC8746
Type:			VPH	EPH	VPH	EPH
Matrix:			soil	soil	soil	soil
Analytes	Units	RL			% Recovery	% Recovery
Benzene	mg/kg	0.005	< 0.005	-	102%	-
Toluene	mg/kg	0.05	< 0.05	-	104%	-
Ethylbenzene	mg/kg	0.01	< 0.01	-	114%	-
Xylenes	mg/kg	0.05	< 0.05	-	111%	-
VPH C6-C10 (Less BTEX)	mg/kg	2.5	< 2.5	-	99%	-
EPH >C10-C16	mg/kg	12	-	< 12	-	-
EPH >C16-C21	mg/kg	12	-	< 12	-	-
EPH >C21-C32	mg/kg	12	-	< 12	-	-
EPH >C10-C32	mg/kg	21	-	-	-	96%

RL = Reporting Limit

Report ID: 366711-OAS
Report Date: 14-Sep-20
Date Received: 03-Sep-20

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for

Dillon Consulting Ltd
1149 Smythe Street, Suite 200
Fredericton, NB E3B 3H4

rpc
921 College Hill Rd
Fredericton NB
Canada E3B 6Z9
Tel: 506.452.1212
Fax: 506.452.0594
www.rpc.ca

Project #: 19-1594

Summary of Date Analyzed

	VPH		EPH	
RPC Sample ID	**Extracted**	**Analyzed**	**Extracted**	**Analyzed**
366711-1	8-Sep-20	9-Sep-20	8-Sep-20	9-Sep-20
366711-2	8-Sep-20	9-Sep-20	8-Sep-20	9-Sep-20
366711-3	8-Sep-20	9-Sep-20	8-Sep-20	9-Sep-20

Report ID: 366711-IAS
Report Date: 18-Sep-20
Date Received: 03-Sep-20

CERTIFICATE OF ANALYSIS

for

Dillon Consulting Ltd
1149 Smythe Street, Suite 200
Fredericton, NB E3B 3H4

rpc
921 College Hill Rd
Fredericton NB
Canada E3B 6Z9
Tel: 506.452.1212
Fax: 506.452.0594
www.rpc.ca

Attention: Denis Marquis
Project #: 19-1594
Location: Milltown

Analysis of Samples

RPC Sample ID:			366711-1	366711-2	366711-3
Client Sample ID:			SA1	SA2	SA3
Date Sampled:			2-Sep-20	3-Sep-20	3-Sep-20
Analytes	**Units**	**RL**			
Carbon - Total Organic	%	0.01	13.3	0.30	12.4

This report relates only to the sample(s) and information provided to the laboratory.

RL = Reporting Limit

Peter Crowhurst, B.Sc., C.Chem.
Director
Inorganic Analytical Chemistry

Brannen Burhoe
Supervisor
Inorganic Analytical Services

Report ID: 366711-IAS
Report Date: 18-Sep-20
Date Received: 03-Sep-20

CERTIFICATE OF ANALYSIS

for

Dillon Consulting Ltd
1149 Smythe Street, Suite 200
Fredericton, NB E3B 3H4

rpc
921 College Hill Rd
Fredericton NB
Canada E3B 6Z9
Tel: 506.452.1212
Fax: 506.452.0594
www.rpc.ca

Attention: Denis Marquis
Project #: 19-1594
Location: Milltown

Grain Size

RPC Sample ID:			366711-1	366711-2	366711-3
Client Sample ID:			SA1	SA2	SA3
Date Sampled:			2-Sep-20	3-Sep-20	3-Sep-20
Analytes	**Units**	**RL**			
PHI -2 (4mm)	% Finer	0.1	78.5	62.0	93.9
PHI -1 (2 mm)	% Finer	0.1	55.2	38.3	87.9
PHI 0 (1 mm)	% Finer	0.1	33.1	15.0	79.1
PHI 1 (0.5 mm)	% Finer	0.1	17.7	3.7	64.8
PHI 2 (0.25 mm)	% Finer	0.1	10.8	1.1	39.9
PHI 3 (0.125 mm)	% Finer	0.1	6.9	0.5	14.9
PHI 4 (62.5 µm)	% Finer	0.1	5.0	0.4	7.6
PHI 5 (31.25 µm)	% Finer	0.1	4.0	0.4	6.9
PHI 6 (15.6 µm)	% Finer	0.1	3.0	0.3	4.5
PHI 7 (7.8 µm)	% Finer	0.1	1.5	0.2	2.1
PHI 8 (3.9 µm)	% Finer	0.1	0.5	0.2	1.5
PHI 9 (1.9 µm)	% Finer	0.1	0.4	< 0.1	0.6
Gravel	%	0.1	44.8	61.7	12.1
Sand	%	0.1	50.2	37.9	80.2
Silt	%	0.1	4.5	0.3	6.1
Clay	%	0.1	0.5	0.2	1.5

Report ID: 366711-IAS
Report Date: 18-Sep-20
Date Received: 03-Sep-20

CERTIFICATE OF ANALYSIS

for
Dillon Consulting Ltd
1149 Smythe Street, Suite 200
Fredericton, NB E3B 3H4

rpc
921 College Hill Rd
Fredericton NB
Canada E3B 6Z9
Tel: 506.452.1212
Fax: 506.452.0594
www.rpc.ca

Attention: Denis Marquis
Project #: 19-1594
Location: Milltown

Analysis of Samples

RPC Sample ID:			366711-1	366711-2	366711-3
Client Sample ID:			SA1	SA2	SA3
Date Sampled:			2-Sep-20	3-Sep-20	3-Sep-20
Analytes	**Units**	**RL**			
Aluminum	mg/kg	1	11600	11600	10900
Antimony	mg/kg	0.1	0.4	0.1	4.4
Arsenic	mg/kg	1	5	7	4
Barium	mg/kg	1	255	32	125
Beryllium	mg/kg	0.1	0.6	0.4	0.5
Bismuth	mg/kg	1	< 1	< 1	< 1
Boron	mg/kg	1	3	1	2
Cadmium	mg/kg	0.01	0.71	0.10	0.72
Calcium	mg/kg	50	4230	1640	2920
Chromium	mg/kg	1	19	24	25
Cobalt	mg/kg	0.1	6.0	7.8	6.3
Copper	mg/kg	1	18	15	53
Iron	mg/kg	20	15900	33800	22400
Lead	mg/kg	0.1	28.4	20.9	122.
Lithium	mg/kg	0.1	16.9	22.8	18.7
Magnesium	mg/kg	10	3540	6770	4300
Manganese	mg/kg	1	765	825	1120
Mercury	mg/kg	0.01	0.17	0.02	0.44
Molybdenum	mg/kg	0.1	1.5	1.9	1.7
Nickel	mg/kg	1	17	25	24
Potassium	mg/kg	20	500	430	710
Rubidium	mg/kg	0.1	8.6	4.3	8.0
Selenium	mg/kg	1	< 1	< 1	< 1
Silver	mg/kg	0.1	< 0.1	< 0.1	< 0.1
Sodium	mg/kg	50	200	70	120
Strontium	mg/kg	1	27	9	20
Tellurium	mg/kg	0.1	< 0.1	< 0.1	< 0.1
Thallium	mg/kg	0.1	< 0.1	< 0.1	< 0.1
Tin	mg/kg	1	1	< 1	49
Uranium	mg/kg	0.1	2.3	0.6	1.0
Vanadium	mg/kg	1	31	22	24
Zinc	mg/kg	1	105	133	173

Report ID: 366711-IAS
Report Date: 18-Sep-20
Date Received: 03-Sep-20

CERTIFICATE OF ANALYSIS

for
Dillon Consulting Ltd
1149 Smythe Street, Suite 200
Fredericton, NB E3B 3H4

rpc
921 College Hill Rd
Fredericton NB
Canada E3B 6Z9
Tel: 506.452.1212
Fax: 506.452.0594
www.rpc.ca

Attention: Denis Marquis
Project #: 19-1594
Location: Milltown

Analysis of Water

RPC Sample ID:			366711-4	366711-5
Client Sample ID:			SW1	SW2
Date Sampled:			3-Sep-20	3-Sep-20
Analytes	**Units**	**RL**		
Sodium	mg/L	0.05	11.8	11.5
Potassium	mg/L	0.02	1.19	1.16
Calcium	mg/L	0.05	4.10	4.02
Magnesium	mg/L	0.01	0.67	0.67
Iron	mg/L	0.02	0.09	0.09
Manganese	mg/L	0.001	0.042	0.040
Copper	mg/L	0.001	< 0.001	< 0.001
Zinc	mg/L	0.001	0.004	0.005
Ammonia (as N)	mg/L	0.05	0.09	< 0.05
pH	units	-	7.6	7.4
Alkalinity (as $CaCO_3$)	mg/L	2	19	18
Chloride	mg/L	0.5	8.7	8.6
Sulfate	mg/L	1	10	10
Nitrate + Nitrite (as N)	mg/L	0.05	0.05	0.06
o-Phosphate (as P)	mg/L	0.01	0.01	0.01
r-Silica (as SiO_2)	mg/L	0.1	1.9	1.9
Carbon - Total Organic	mg/L	0.5	7.2	7.0
Tannin & Lignin	mg/L	0.5	2.1	2.1
Turbidity	NTU	0.1	0.9	1.4
Solids - Total Suspended	mg/L	5	< 5	< 5
Conductivity	µS/cm	1	93	89
Calculated Parameters				
Bicarbonate (as $CaCO_3$)	mg/L	-	18.9	17.9
Carbonate (as $CaCO_3$)	mg/L	-	0.071	0.042
Hydroxide (as $CaCO_3$)	mg/L	-	0.020	0.013
Cation Sum	meq/L	-	0.816	0.792
Anion Sum	meq/L	-	0.837	0.815
Percent Difference	%	-	-1.27	-1.43
Theoretical Conductivity	µS/cm	-	89	87
Hardness (as $CaCO_3$)	mg/L	0.2	13.0	12.8
Ion Sum	mg/L	-	50	49
Saturation pH (5°C)	units	-	9.6	9.7
Langelier Index (5°C)	-	-	-2.05	-2.28

Report ID: 366711-IAS
Report Date: 18-Sep-20
Date Received: 03-Sep-20

CERTIFICATE OF ANALYSIS

for
Dillon Consulting Ltd
1149 Smythe Street, Suite 200
Fredericton, NB E3B 3H4

rpc
921 College Hill Rd
Fredericton NB
Canada E3B 6Z9
Tel: 506.452.1212
Fax: 506.452.0594
www.rpc.ca

Attention: Denis Marquis
Project #: 19-1594
Location: Milltown

Analysis of Metals in Water

RPC Sample ID:			366711-4	366711-5
Client Sample ID:			SW1	SW2
Date Sampled:			3-Sep-20	3-Sep-20
Analytes	**Units**	**RL**		
Aluminum	µg/L	1	60	56
Antimony	µg/L	0.1	< 0.1	< 0.1
Arsenic	µg/L	1	< 1	< 1
Barium	µg/L	1	10	9
Beryllium	µg/L	0.1	< 0.1	< 0.1
Bismuth	µg/L	1	< 1	< 1
Boron	µg/L	1	5	4
Cadmium	µg/L	0.01	0.05	0.04
Calcium	µg/L	50	4100	4020
Chromium	µg/L	1	< 1	< 1
Cobalt	µg/L	0.1	< 0.1	< 0.1
Copper	µg/L	1	< 1	< 1
Iron	µg/L	20	90	90
Lead	µg/L	0.1	0.1	< 0.1
Lithium	µg/L	0.1	0.3	0.3
Magnesium	µg/L	10	670	670
Manganese	µg/L	1	42	40
Mercury	µg/L	0.025	< 0.025	< 0.025
Molybdenum	µg/L	0.1	0.1	< 0.1
Nickel	µg/L	1	< 1	< 1
Potassium	µg/L	20	1190	1160
Rubidium	µg/L	0.1	3.3	3.2
Selenium	µg/L	1	< 1	< 1
Silver	µg/L	0.1	< 0.1	< 0.1
Sodium	µg/L	50	11800	11500
Strontium	µg/L	1	22	22
Tellurium	µg/L	0.1	< 0.1	< 0.1
Thallium	µg/L	0.1	< 0.1	< 0.1
Tin	µg/L	0.1	< 0.1	< 0.1
Uranium	µg/L	0.1	< 0.1	< 0.1
Vanadium	µg/L	1	< 1	< 1
Zinc	µg/L	1	4	5

CERTIFICATE OF ANALYSIS

for

Dillon Consulting Ltd
1149 Smythe Street, Suite 200
Fredericton, NB E3B 3H4

rpc
921 College Hill Rd
Fredericton NB
Canada E3B 6Z9
Tel: 506.452.1212
Fax: 506.452.0594
www.rpc.ca

General Report Comments

366711-1 to 366711-3
Samples were air dried and sieved at 2 mm. A portion of each was digested according to EPA Method 3050B.
The resulting solutions were analyzed for trace elements by ICP-MS.
Mercury was analyzed by Cold Vapour AAS (SOP 4.M52 & SOP 4.M53).
A portion of the sample was dried and sieved at 2 mm. Total and Inorganic Carbon were determined using combustion/acid evolution infrared methods. Total Organic Carbon is calculated as the difference.

Report ID: 366711-IAS
Report Date: 18-Sep-20
Date Received: 03-Sep-20

CERTIFICATE OF ANALYSIS
for
Dillon Consulting Ltd
1149 Smythe Street, Suite 200
Fredericton, NB E3B 3H4

rpc
921 College Hill Rd
Fredericton NB
Canada E3B 6Z9
Tel: 506.452.1212
Fax: 506.452.0594
www.rpc.ca

Project #: 19-1594
Location: Milltown
QA/QC Report

RPC Sample ID:			CRM123527	RB071049
Type:			CRM NIST2709a	Blank
Analytes	**Units**	**RL**		
Aluminum	mg/kg	1	24400	< 1
Antimony	mg/kg	0.1	0.1	0.1
Arsenic	mg/kg	1	8	< 1
Barium	mg/kg	1	414	< 1
Beryllium	mg/kg	0.1	0.7	< 0.1
Bismuth	mg/kg	1	< 1	< 1
Boron	mg/kg	1	34	< 1
Cadmium	mg/kg	0.01	0.35	< 0.01
Calcium	mg/kg	50	13100	< 50
Chromium	mg/kg	1	70	< 1
Cobalt	mg/kg	0.1	11.5	< 0.1
Copper	mg/kg	1	27	2
Iron	mg/kg	20	29200	< 20
Lead	mg/kg	0.1	10.9	< 0.1
Lithium	mg/kg	0.1	38.8	< 0.1
Magnesium	mg/kg	10	12100	< 10
Manganese	mg/kg	1	470	< 1
Mercury	mg/kg	0.01	0.77	< 0.01
Molybdenum	mg/kg	0.1	0.9	< 0.1
Nickel	mg/kg	1	76	< 1
Potassium	mg/kg	20	3450	110
Rubidium	mg/kg	0.1	33.0	< 0.1
Selenium	mg/kg	1	< 1	< 1
Silver	mg/kg	0.1	< 0.1	< 0.1
Sodium	mg/kg	50	520	< 50
Strontium	mg/kg	1	102	< 1
Tellurium	mg/kg	0.1	< 0.1	< 0.1
Thallium	mg/kg	0.1	0.1	0.3
Tin	mg/kg	1	< 1	3
Uranium	mg/kg	0.1	1.8	< 0.1
Vanadium	mg/kg	1	64	< 1
Zinc	mg/kg	1	84	< 1

Report ID: 366711-IAS
Report Date: 18-Sep-20
Date Received: 03-Sep-20

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for
Dillon Consulting Ltd
1149 Smythe Street, Suite 200
Fredericton, NB E3B 3H4

rpc
921 College Hill Rd
Fredericton NB
Canada E3B 6Z9
Tel: 506.452.1212
Fax: 506.452.0594
www.rpc.ca

Methods

Analyte	RPC SOP #	Method Reference	Method Principle
Ammonia	4.M47	APHA 4500-NH_3 G	Phenate Colourimetry
pH	4.M03	APHA 4500-H^+ B	pH Electrode - Electrometric
Alkalinity (as $CaCO_3$)	4.M43	EPA 310.2	Methyl Orange Colourimetry
Chloride	4.M44	APHA 4500-CL E	Ferricyanide Colourimetry
Sulfate	4.M45	APHA 4500-SO_4 E	Turbidimetry
Nitrate + Nitrite (as N)	4.M48	APHA 4500-NO_3 H	Hydrazine Red., Derivitization, Colourimetry
o-Phosphate (as P)	4.M50	APHA 4500-P F	Molybdate/Ascorbic Acid Colourimetry
r-Silica (as SiO_2)	4.M46	APHA 4500-SI F	Heteropoly Blue Colourimetry
Tannin & Lignin	4.M56	APHA 5550 B	Folin Phenol Reagent, Automated Colourimetry
Carbon - Total Organic	4.M38	APHA 5310 C	UV-Persulfate Digestion, NDIR Detection
Turbidity	4.M06	APHA 2130 B	Nephelometry
Conductivity	4.M04	APHA 2510 B	Conductivity Meter - Electrode
Solids - Total Suspended	4.M05	APHA 2540 D	Filtration, Gravimetry
Trace Metals	4.M01/4.M29	EPA 200.8/EPA 200.7	ICP-MS/ICP-ES
Mercury	4.M52	EPA 245.1	Cold Vapor AAS

Report ID: 366711-OAS-B
Report Date: 26-Oct-20
Date Received: 03-Sep-20

Dillon Consulting Ltd
1149 Smythe Street
Suite 200
Fredericton, NB E3B 3H4

rpc
921 College Hill Rd
Fredericton NB
Canada E3B 6Z9
Tel: 506-452-1212
Fax: 506-452-0594
www.rpc.ca

Attention: Denis Marquis
Fax #:
dmarquis@dillon.ca; jgreenlaw@dillon.ca; njohnson@dillon.ca; Dillon@ESdat.net

Project #: 19-1594
Location: Milltown
General Pesticides in Soil

RPC Sample ID:			366711-1	366711-2	366711-3	Method Blank	Spike Rec. (%)
Client Sample ID:			SA1	SA2	SA3		
Date Sampled:			02-Sep-20	03-Sep-20	03-Sep-20		
Matrix:			soil	soil	soil	soil	soil
Analytes	Units	RL					
Azoxystrobin	µg/g	0.02	< 0.02	< 0.02	< 0.02	< 0.02	100
Bentazone	µg/g	0.001	< 0.03	< 0.03	< 0.03	< 0.03	25
Boscalid	µg/g	0.004	< 0.01	< 0.01	< 0.01	< 0.01	85
Chlorantraniliprole	µg/g	0.02	< 0.02	< 0.02	< 0.02	< 0.02	100
Clothianidin	µg/g	0.01	< 0.01	< 0.01	< 0.01	< 0.01	90
Diazinon	µg/g	0.002	< 0.01	< 0.01	< 0.01	< 0.01	80
Difenoconazole	µg/g	0.003	< 0.02	< 0.02	< 0.02	< 0.02	90
Dimethoate	µg/g	0.04	< 0.04	< 0.04	< 0.04	< 0.04	95
Fenamidone	µg/g	0.002	< 0.01	< 0.01	< 0.01	< 0.01	90
Fluazifop-p-butyl	µg/g	0.02	< 0.02	< 0.02	< 0.02	< 0.02	75
Fludioxonil	µg/g	0.01	< 0.01	< 0.01	< 0.01	< 0.01	100
Fluopyram	µg/g	0.003	< 0.01	< 0.01	< 0.01	< 0.01	80
Hexazinone	µg/g	0.02	< 0.02	< 0.02	< 0.02	< 0.02	90
Imidacloprid	µg/g	0.02	< 0.02	< 0.02	< 0.02	< 0.02	100
Linuron	µg/g	0.02	< 0.02	< 0.02	< 0.02	< 0.02	95
Mandipropamid	µg/g	0.002	< 0.01	< 0.01	< 0.01	< 0.01	85
Metalaxyl	µg/g	0.03	< 0.03	< 0.03	< 0.03	< 0.03	110
Metobromuron	µg/g	0.03	< 0.03	< 0.03	< 0.03	< 0.03	100
Metolachlor	µg/g	0.002	< 0.01	< 0.01	< 0.01	< 0.01	95
Metribuzin	µg/g	0.03	< 0.03	< 0.03	< 0.03	< 0.03	95
Oxathiapiprolin	µg/g	0.01	< 0.01	< 0.01	< 0.01	< 0.01	60
Penflufen	µg/g	0.003	< 0.01	< 0.01	< 0.01	< 0.01	85
Phorate	µg/g	0.01	< 0.01	< 0.01	< 0.01	< 0.01	80
Propiconazole	µg/g	0.02	< 0.02	< 0.02	< 0.02	< 0.02	105
Propyzamide	µg/g	0.01	< 0.01	< 0.01	< 0.01	< 0.01	65
Pyraclostrobin	µg/g	0.002	< 0.01	< 0.01	< 0.01	< 0.01	95
Rimsulfuron	µg/g	0.02	< 0.02	< 0.02	< 0.02	< 0.02	95
Thiabendazole	µg/g	0.02	< 0.02	< 0.02	< 0.02	< 0.02	15
Thiamethoxam	µg/g	0.01	< 0.01	< 0.01	< 0.01	< 0.01	90
Thifensulfuron-methyl	µg/g	0.02	< 0.02	< 0.02	< 0.02	< 0.02	95
Tribenuron-methyl	µg/g	0.04	< 0.04	< 0.04	< 0.04	< 0.04	95
Moisture Content	%	-	70	20	76	-	-

This report relates only to the sample(s) and information provided to the laboratory.
Method: General pesticides by High Performance Liquid Chromatography/Tandem Mass Selective Detection (LC/MS/MS).
RL = Reporting Limit

Karen Broad
Chemist
Organic Analytical Services

Nigel Skinner
Senior Technician
Organic Analytical Services

Report ID: 366711-OAS-B
Report Date: 26-Oct-20
Date Received: 03-Sep-20

Dillon Consulting Ltd
1149 Smythe Street
Suite 200
Fredericton, NB E3B 3H4

rpc
921 College Hill Rd
Fredericton NB
Canada E3B 6Z9
Tel: 506-452-1212
Fax: 506-452-0594
www.rpc.ca

Attention: Denis Marquis
Fax #:
dmarquis@dillon.ca; jgreenlaw@dillon.ca; njohnson@dillon.ca; Dillon@ESdat.net

Project #: 19-1594
Location: Milltown
Organochlorine Pesticides in Soil

RPC Sample ID:			366711-1	366711-2	366711-3	Method Blank	Spike Rec. (%)
Client Sample ID:			SA1	SA2	SA3		
Date Sampled:			02-Sep-20	03-Sep-20	03-Sep-20		
Matrix:			soil	soil	soil	soil	soil
Analytes	Units	RL					
α-BHC	µg/g	0.01	< 0.01	< 0.01	< 0.01	< 0.01	85
β-BHC	µg/g	0.01	< 0.01	< 0.01	< 0.01	< 0.01	76
γ-BHC (Lindane)	µg/g	0.01	< 0.01	< 0.01	< 0.01	< 0.01	74
δ-BHC	µg/g	0.01	< 0.01	< 0.01	< 0.01	< 0.01	42
Heptachlor	µg/g	0.01	< 0.01	< 0.01	< 0.01	< 0.01	61
Aldrin	µg/g	0.01	< 0.01	< 0.01	< 0.01	< 0.01	78
Heptachlor epoxide	µg/g	0.01	< 0.01	< 0.01	< 0.01	< 0.01	83
2,4'-DDE	µg/g	0.01	< 0.01	< 0.01	< 0.01	< 0.01	84
Endosulfan I	µg/g	0.01	< 0.01	< 0.01	< 0.01	< 0.01	81
4,4'-DDE	µg/g	0.01	< 0.01	< 0.01	< 0.01	< 0.01	71
Dieldrin	µg/g	0.01	< 0.01	< 0.01	< 0.01	< 0.01	77
2,4'-DDD	µg/g	0.01	< 0.01	< 0.01	< 0.01	< 0.01	84
Endrin	µg/g	0.01	< 0.01	< 0.01	< 0.01	< 0.01	66
Endosulfan II	µg/g	0.01	< 0.01	< 0.01	< 0.01	< 0.01	64
4,4'-DDD	µg/g	0.01	< 0.01	< 0.01	< 0.01	< 0.01	81
2,4'-DDT	µg/g	0.01	< 0.01	< 0.01	< 0.01	< 0.01	38
Endrin aldehyde	µg/g	0.01	< 0.01	< 0.01	< 0.01	< 0.01	56
Endosulfan sulfate	µg/g	0.01	< 0.01	< 0.01	< 0.01	< 0.01	73
4,4'-DDT	µg/g	0.01	< 0.01	< 0.01	< 0.01	< 0.01	28
Endrin ketone	µg/g	0.01	< 0.01	< 0.01	< 0.01	< 0.01	56
Methoxychlor	µg/g	0.01	< 0.01	< 0.01	< 0.01	< 0.01	29
Mirex	µg/g	0.01	< 0.01	< 0.01	< 0.01	< 0.01	61

This report relates only to the sample(s) and information provided to the laboratory.
Method: Organochlorine pesticides in soil: Solvent extraction followed by GC-ECD analysis; based on USEPA 3540C/8270C.
RL = Reporting Limit

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Project #: 19-1594
Location: Milltown
Organophosphorous Pesticides in soil

RPC Sample ID:			366711-1	366711-2	366711-3	Method Blank	Spike Rec. (%)
Client Sample ID:			SA1	SA2	SA3		
Date Sampled:			02-Sep-20	03-Sep-20	03-Sep-20		
Matrix:			soil	soil	soil	soil	soil
Analytes	Units	RL					
Alachlor	µg/g	0.2	< 0.2	< 0.2	< 0.2	< 0.2	97
Ametryn	µg/g	0.3	< 0.3	< 0.3	< 0.3	< 0.3	52
Atrazine	µg/g	0.3	< 0.3	< 0.3	< 0.3	< 0.3	96
Atrazine desethyl	µg/g	0.5	< 0.5	< 0.5	< 0.5	< 0.5	99
Atrazine desisopropyl	µg/g	0.5	< 0.5	< 0.5	< 0.5	< 0.5	89
Azinphos-methyl	µg/g	1.0	< 1.0	< 1.0	< 1.0	< 1.0	67
Bendiocarb	µg/g	0.5	< 0.5	< 0.5	< 0.5	< 0.5	107
Cyanazine	µg/g	0.5	< 0.5	< 0.5	< 0.5	< 0.5	85
Disulfoton	µg/g	0.5	< 0.5	< 0.5	< 0.5	< 0.5	86
Malathion	µg/g	0.5	< 0.5	< 0.5	< 0.5	< 0.5	81
Methyl Parathion	µg/g	0.5	< 0.5	< 0.5	< 0.5	< 0.5	94
Parathion	µg/g	0.4	< 0.4	< 0.4	< 0.4	< 0.4	88
Phosmet	µg/g	0.4	< 0.4	< 0.4	< 0.4	< 0.4	67
Phosphamidon	µg/g	0.5	< 0.5	< 0.5	< 0.5	< 0.5	66
Prometon	µg/g	2.0	< 2.0	< 2.0	< 2.0	< 2.0	31
Prometryn	µg/g	0.3	< 0.3	< 0.3	< 0.3	< 0.3	68
Propazine	µg/g	0.3	< 0.3	< 0.3	< 0.3	< 0.3	98
Simazine	µg/g	0.5	< 0.5	< 0.5	< 0.5	< 0.5	89
Terbufos	µg/g	0.4	< 0.4	< 0.4	< 0.4	< 0.4	96
Terbutryn	µg/g	0.5	< 0.5	< 0.5	< 0.5	< 0.5	56
Triallate	µg/g	0.2	< 0.2	< 0.2	< 0.2	< 0.2	101
Trifluralin	µg/g	0.1	< 0.1	< 0.1	< 0.1	< 0.1	103

This report relates only to the sample(s) and information provided to the laboratory.
Method: Organophosphorous pesticides by GC-MS analysis.
RL = Reporting Limit

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Project #: 19-1594
Location: Milltown
Pesticides in Water

RPC Sample ID:			366711-4	366711-5	Method Blank	Spike Rec. (%)
Client Sample ID:			SW1	SW2		
Date Sampled:			03-Sep-20	03-Sep-20		
Matrix:			water	water	water	water
Analytes	Units	RL				
Azoxystrobin	ng/mL	0.02	< 0.02	< 0.02	< 0.02	92
Bentazone	ng/mL	0.03	< 0.03	< 0.03	< 0.03	32
Boscalid	ng/mL	0.01	< 0.01	< 0.01	< 0.01	74
Chlorantraniliprole	ng/mL	0.02	< 0.02	< 0.02	< 0.02	60
Clothianidin	ng/mL	0.01	< 0.01	< 0.01	< 0.01	96
Diazinon	ng/mL	0.01	< 0.01	< 0.01	< 0.01	76
Difenoconazole	ng/mL	0.02	< 0.02	< 0.02	< 0.02	76
Dimethoate	ng/mL	0.04	< 0.04	< 0.04	< 0.04	66
Fenamidone	ng/mL	0.01	< 0.01	< 0.01	< 0.01	74
Fluazifop-p-butyl	ng/mL	0.02	< 0.02	< 0.02	< 0.02	76
Fludioxonil	ng/mL	0.01	< 0.01	< 0.01	< 0.01	58
Fluopyram	ng/mL	0.01	< 0.01	< 0.01	< 0.01	74
Hexazinone	ng/mL	0.02	< 0.02	< 0.02	< 0.02	84
Imidacloprid	ng/mL	0.02	< 0.02	< 0.02	< 0.02	92
Linuron	ng/mL	0.02	< 0.02	< 0.02	< 0.02	86
Mandipropamid	ng/mL	0.01	< 0.01	< 0.01	< 0.01	82
Metalaxyl	ng/mL	0.03	< 0.03	< 0.03	< 0.03	88
Metobromuron	ng/mL	0.03	< 0.03	< 0.03	< 0.03	82
Metolachlor	ng/mL	0.01	< 0.01	< 0.01	< 0.01	80
Metribuzin	ng/mL	0.03	< 0.03	< 0.03	< 0.03	84
Oxathiapiprolin	ng/mL	0.01	< 0.01	< 0.01	< 0.01	60
Penflufen	ng/mL	0.01	< 0.01	< 0.01	< 0.01	76
Phorate	ng/mL	0.01	< 0.01	< 0.01	< 0.01	56
Propiconazole	ng/mL	0.02	< 0.02	< 0.02	< 0.02	90
Propyzamide	ng/mL	0.01	< 0.01	< 0.01	< 0.01	62
Pyraclostrobin	ng/mL	0.01	< 0.01	< 0.01	< 0.01	74
Rimsulfuron	ng/mL	0.02	< 0.02	< 0.02	< 0.02	44
Thiabendazole	ng/mL	0.02	< 0.02	< 0.02	< 0.02	20
Thiamethoxam	ng/mL	0.01	< 0.01	< 0.01	< 0.01	78
Thifensulfuron-methyl	ng/mL	0.02	< 0.02	< 0.02	< 0.02	70
Tribenuron-methyl	ng/mL	0.04	< 0.04	< 0.04	< 0.04	80

This report relates only to the sample(s) and information provided to the laboratory.
Method: General pesticides by High Performance Liquid Chromatography/Tandem Mass Selective Detection (LC/MS/MS).
RL = Reporting Limit

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Project #: 19-1594
Location: Milltown
Organochlorine Pesticides in Water

RPC Sample ID:			366711-4	366711-5	Method Blank	Spike Rec. (%)
Client Sample ID:			SW1	SW2		
Date Sampled:			03-Sep-20	03-Sep-20		
Matrix:			water	water	water	water
Analytes	Units	RL				
α-BHC	ng/mL	0.01	< 0.01	< 0.01	< 0.01	82
β-BHC	ng/mL	0.01	< 0.01	< 0.01	< 0.01	89
γ-BHC (Lindane)	ng/mL	0.01	< 0.01	< 0.01	< 0.01	84
δ-BHC	ng/mL	0.01	< 0.01	< 0.01	< 0.01	96
Heptachlor	ng/mL	0.01	< 0.01	< 0.01	< 0.01	46
Aldrin	ng/mL	0.01	< 0.01	< 0.01	< 0.01	34
Heptachlor epoxide	ng/mL	0.01	< 0.01	< 0.01	< 0.01	95
2,4'-DDE	ng/mL	0.01	< 0.01	< 0.01	< 0.01	76
Endosulfan I	ng/mL	0.01	< 0.01	< 0.01	< 0.01	86
4,4'-DDE	ng/mL	0.01	< 0.01	< 0.01	< 0.01	78
Dieldrin	ng/mL	0.01	< 0.01	< 0.01	< 0.01	85
2,4'-DDD	ng/mL	0.01	< 0.01	< 0.01	< 0.01	81
Endrin	ng/mL	0.01	< 0.01	< 0.01	< 0.01	85
Endosulfan II	ng/mL	0.01	< 0.01	< 0.01	< 0.01	82
4,4'-DDD	ng/mL	0.01	< 0.01	< 0.01	< 0.01	83
2,4'-DDT	ng/mL	0.01	< 0.01	< 0.01	< 0.01	81
Endrin aldehyde	ng/mL	0.01	< 0.01	< 0.01	< 0.01	86
Endosulfan sulfate	ng/mL	0.01	< 0.01	< 0.01	< 0.01	81
4,4'-DDT	ng/mL	0.01	< 0.01	< 0.01	< 0.01	77
Endrin ketone	ng/mL	0.01	< 0.01	< 0.01	< 0.01	70
Methoxychlor	ng/mL	0.01	< 0.01	< 0.01	< 0.01	110
Mirex	ng/mL	0.01	< 0.01	< 0.01	< 0.01	103

This report relates only to the sample(s) and information provided to the laboratory.
Method: Organochlorine pesticides in water (OAS-SV05): Solvent extraction followed by GC-ECD analysis; based on USEPA 3510C/3620/8081A.
RL = Reporting Limit
Spike recoveries for heptachlor and aldrin were below acceptance limit.

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Organic Analytical Services

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Project #: 19-1594
Location: Milltown
Organophosphorous Pesticides in Water

RPC Sample ID:			366711-4	366711-5	Method Blank	Spike Rec. (%)
Client Sample ID:			SW1	SW2		
Date Sampled:			03-Sep-20	03-Sep-20		
Matrix:			water	water	water	water
Analytes	Units	RL				
Alachlor	ng/mL	0.2	< 0.2	< 0.2	< 0.2	64
Ametryn	ng/mL	0.3	< 0.3	< 0.3	< 0.3	64
Atrazine	ng/mL	0.3	< 0.3	< 0.3	< 0.3	64
Atrazine desethyl	ng/mL	0.5	< 0.5	< 0.5	< 0.5	63
Atrazine desisopropyl	ng/mL	0.5	< 0.5	< 0.5	< 0.5	44
Azinphos-methyl	ng/mL	1.0	< 1.0	< 1.0	< 1.0	71
Bendiocarb	ng/mL	0.5	< 0.5	< 0.5	< 0.5	67
Cyanazine	ng/mL	0.5	< 0.5	< 0.5	< 0.5	70
Disulfoton	ng/mL	0.5	< 0.5	< 0.5	< 0.5	61
Malathion	ng/mL	0.5	< 0.5	< 0.5	< 0.5	66
Methyl Parathion	ng/mL	0.5	< 0.5	< 0.5	< 0.5	66
Parathion	ng/mL	0.4	< 0.4	< 0.4	< 0.4	66
Phosmet	ng/mL	0.4	< 0.4	< 0.4	< 0.4	71
Phosphamidon	ng/mL	0.5	< 0.5	< 0.5	< 0.5	70
Prometon	ng/mL	2.0	< 2.0	< 2.0	< 2.0	64
Prometryn	ng/mL	0.3	< 0.3	< 0.3	< 0.3	66
Propazine	ng/mL	0.3	< 0.3	< 0.3	< 0.3	64
Simazine	ng/mL	0.5	< 0.5	< 0.5	< 0.5	64
Terbufos	ng/mL	0.4	< 0.4	< 0.4	< 0.4	62
Terbutryn	ng/mL	0.5	< 0.5	< 0.5	< 0.5	67
Triallate	ng/mL	0.2	< 0.2	< 0.2	< 0.2	64
Trifluralin	ng/mL	0.1	< 1.0	< 1.0	< 1.0	63

This report relates only to the sample(s) and information provided to the laboratory.
Method: Organophosphorous pesticides by GC-MS analysis.
RL = Reporting Limit

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Appendix D

Site Photographs

Photo 1 - Looking north at the Milltown Station from land above it (August 2020).

Photo 2 – Looking at the U.S.A. side in a south east direction below the Milltown Station (December 2020).

Photo 3 – Looking west toward the Canadian above the Milltown Station showing the general location of SA1 (August 2020).

Photo 4 – Taken from the same location as Photo 3 looking east toward the U.S.A. side (August 2020).

Photo 5 – Same location as Photo 3 and 4 looking north showing both the Canada and U.S.A. sides of the river (August 2020).

Photo 6 – Looking south west up the Canadian channel above the Milltown Station (August 2020).

Photo 7 – Looking northwest at the Milltown Station from the water above it (September 2020).

Photo 8 – Looking south at the train bridge just above the Milltown Station (September 2020).

Photo 9 – Looking south showing the riparian vegetation of the island above the Milltown Station (September 2020).

Photo 10 – Looking south east showing the forest habitat of the island above the Milltown Station (September 2020).

Photo 11 – Looking south west at the vegetation along the Canadian side above the Milltown Station taken from the boat launch (September 2020).

Photo 12 – Looking south east at technicians setting nets for population data taken from the boat launch (September 2020)

Photo 13 – A Small Mouth Bass caught in a fyke net above the Milltown station being processed by technicians (September 2020).

Photo 14 – Looking north from below the Milltown Station at technicians taking watercourse measurements (September 2020).

Photo 15 – Looking south east from below the Milltown station at technicians electrofishing for population data (September 2020).

Photo 16 – An American Eel caught while electrofishing below the Milltown Station (September 2020).

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