Brookfield
Renewable U.S.

December 31, 2025

VIA E-FILING

Debbie-Anne Reese
Secretary
Federal Energy Regulatory Commission
888 First Street, N.E.
Washington, D.C. 20426

RE: **Brunswick Hydroelectric Project (FERC No. 2284), Initial Study Report, Initial Study Report Meeting, and Notice of Intent to File Draft License Application**

Dear Secretary Reese:

Brookfield White Pine Hydro LLC (BWPH) is licensed by the Federal Energy Regulatory Commission (FERC or Commission) to operate the Brunswick Hydroelectric Project (FERC No. 2284). The Project is located on the Androscoggin River in the towns of Brunswick and Topsham, Maine (ME). The Project straddles the border between Cumberland and Sagadahoc counties.

On February 21, 2024, BWPH filed its Notice of Intent (NOI) and Pre-Application Document (PAD) with the Federal Energy Regulatory Commission (FERC or Commission) to pursue a new license for the continued operation of the Project. Consistent with the Commission's Integrated Licensing Process (ILP) and 18 CFR §5.15(c), BWPH is filing the enclosed Initial Study Report (ISR) with the Commission.

BWPH has been conducting studies as required by the Commission in its Study Plan Determination letter issued on December 30, 2024. This ISR describes BWPH's overall progress in implementing the study plan and schedule, summarizes available data, and describes any variances from the study plan and schedule approved by the Commission. While fieldwork and data processing are ongoing for several studies, BWPH is filing the following individual study reports as part of this ISR filing:

1. Water Quality Assessment
2. Tailwater Benthic Macroinvertebrate Study
3. Visual Surveys of Upstream American Eel Movements
4. Diadromous Fish Behavior, Movement, and Project Interaction Study
5. Fish Assemblage Study
6. Evaluation of Stranding Risk/Bathymetry Study
7. Mussel Survey
8. Recreation Study
9. Historic Architectural Survey
10. Prehistoric and Historic Archeological Survey
11. Invasive Plant Survey

BROOKFIELD WHITE PINE HYDRO LLC
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Brookfield
Renewable U.S.

Pursuant to 18 CFR §5.15(c)(2), BWPH will hold a meeting with relicensing participants and the Commission within 15 days of filing the enclosed ISR. **BWPH has scheduled the ISR Meeting for Thursday January 15, 2026, via Microsoft Teams. The meeting is scheduled to start at 9:00 am and be concluded by 2:15 pm. If you are interested in participating in the virtual meeting, please notify Kirk Smith (ksmith@gomezandsullivan.com) via email no later than Friday January 9, 2026.** Once notified, we will send attendees instructions on how to access the meeting. The agenda for the meeting is included in Table 1. A meeting summary will be filed by BWPH no later than January 31, 2026.

Table 1: Initial Study Report Meeting Agenda
January 15, 2026 – 9:00 am to 2:15 pm

Time[1]	Duration	Task
9:00 am-9:15 am	15 min	Meeting Logistics, Introductions, Meeting Purpose
9:15 am-9:30 am	15 min	Water Quality Assessment
9:30 am-9:45 am	15 min	Tailwater Benthic Macroinvertebrate Study
9:45 am-10:00 am	15 min	Computational Fluid Dynamics Modeling
10:00 am-10:15 am	15 min	Upstream and Downstream Fish Passage Alternatives Study
10:15 am-10:30 am	15 min	Break
10:30 am-10:45 am	15 min	Visual Surveys of Upstream American Eel Movements
10:45 am-11:15 pm	30 min	Diadromous Fish Behavior, Movement, and Project Interaction Study
11:15-11:30 pm	15 min	Fish Assemblage Study
11:30-12:00 pm	30 min	Evaluation of Stranding Risk/Bathymetry Study
12:00-12:30 pm	30 min	Lunch
12:30-12:45 pm	15 min	Mussel Survey
12:45-1:15 pm	30 min	Recreation Study
1:15-1:30 pm	15 min	Historic Architectural Survey
1:30-1:45 pm	15 min	Prehistoric and Historic Archeological Survey
1:45-2:00 pm	15 min	Invasive Plant Survey
2:00-2:15 pm	15 min	Next Steps, Wrap-Up

If there are any questions or comments regarding the RSP, please contact me by phone at (315) 566-0197 or by email at Michael.Scarzello@brookfieldrenewable.com.

Sincerely,

Michael Scarzello
Manager, Licensing

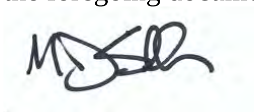
Attachment: Brunswick Hydroelectric Project ISR

cc: Distribution List

[1] Note the times are estimates and may be subject to change pending the meeting progress.

DISTRIBUTION LIST
Brunswick Hydroelectric Project (FERC No. 2284)
Initial Study Report

I, Michael Scarzello, Manager, Licensing, Brookfield Renewable, hereby certify that copies of the foregoing document have been transmitted to the following parties on December 31, 2025.



Michael Scarzello
Manager, Licensing

December 31, 2025

One copy, via e-filing to:

Ms. Debbie-Anne Reese, Secretary
Federal Energy Regulatory Commission
888 First Street, N.E., Dockets Room
Washington, D.C. 20426

Via email or electronic link, or Regular mail, postage paid to:

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INITIAL STUDY REPORT
BRUNSWICK HYDROELECTRIC PROJECT
FERC NO. 2284

Submitted by:

Brookfield White Pine Hydro LLC
150 Main Street
Lewiston, ME 04240

Prepared by:

GOMEZ AND SULLIVAN ENGINEERS

December 2025

Brookfield

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TABLE OF CONTENTS

LIST OF APPENDICES

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS AND DEFINITIONS

Brookfield	Brookfield Renewable
BWPH	Brookfield White Pine Hydro LLC
CFD	Computational fluid dynamics
CFR	Code of Federal Regulations
cfs	Cubic feet per second
Commission	Federal Energy Regulatory Commission
FERC	Federal Energy Regulatory Commission
FOMB	Friends of Merrymeeting Bay
ft	Feet/foot
ILP	Integrated Licensing Process
ISR	Initial Study Report
Licensee	Brookfield White Pine Hydro, LLC
MDEP	Maine Department of Environmental Protection
MDIFW	Maine Department of Inland Fisheries and Wildlife
MDMR	Maine Department of Marine Resources
ME	Maine
msl	Mean Sea Level
MW	Megawatt
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NOI	Notice of Intent
NPS	National Park Service
NRHP	National Register of Historic Places
PAD	Pre-Application Document
Project	Brunswick Hydroelectric Project (FERC No. 2284)
PSP	Proposed Study Plan
RSP	Revised Study Plan
SD1	Scoping Document 1
SPD	Study Plan Determination
sqm	Square mile
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
USR	Updated Study Report

1 OVERVIEW

Brookfield White Pine Hydro LLC (BWPH or Licensee) hereby files this Initial Study Report (ISR) with the Federal Energy Regulatory Commission (FERC or Commission) in support of relicensing the Brunswick Hydroelectric Project (Project) (FERC No. 2284). The Project is located on the Androscoggin River in the towns of Topsham and Brunswick, Maine. The Project straddles the border between Cumberland and Sagadahoc counties. The Project provides a valuable source of renewable energy, and BWPH is proposing to continue operating the Project under a new FERC license.

The Project's current license was issued on February 9, 1979, and expires on February 28, 2029. BWPH is using FERC's Integrated Licensing Process (ILP) as established in Title 18 Code of Federal Regulations (CFR), Part 5. Consistent with 18 CFR § 5.5 and 5.6, BWPH initiated the process of relicensing the Project by filing the Pre-Application Document (PAD) and Notice of Intent (NOI) on February 21, 2024. FERC subsequently issued Scoping Document 1 (SD1) on April 16, 2024. FERC also held agency and public scoping meetings and a site visit on May 7, 2024.

The FERC Process Plan and Schedule provided agencies and interested parties an opportunity to file comments on the PAD and SD1 and request studies by June 20, 2024. Comments and study requests were received from the following stakeholders:

1. National Marine Fisheries Service (NMFS)
2. National Park Service (NPS)
3. United States Fish and Wildlife Service (USFWS)
4. Maine Department of Environmental Protection (MDEP)
5. Maine Department of Inland Fisheries and Wildlife (MDIFW)
6. Maine Department of Marine Resources (MDMR)
7. Town of Brunswick
8. Friends of Merrymeeting Bay (FOMB)
9. Merrymeeting Bay Chapter of Trout Unlimited (MMBTU)

FERC subsequently issued Scoping Document 2 (SD2) on July 29, 2024. In accordance with the ILP requirements and SD2 process plan and schedule, BWPH filed a Proposed Study Plan (PSP) on August 2, 2024, and held study plan meetings on August 28 and October 9, 2024. The Revised Study Plan (RSP) was filed in accordance with the ILP schedule on December 2, 2024. FERC issued a Study Plan Determination (SPD) on December 30, 2024, that identified 13 studies to be performed in support of the FERC relicensing.

BWPH began the approved studies in the spring of 2025 and consulted with interested stakeholders at various times during the 2025 field season in support of performing the studies. This ISR is being submitted in accordance with 18 CFR § 5.15(c) and describes BWPH's overall process of implementing the Study Plan and an explanation of variances, if any, from the Study Plan.

1.1 <u>Project Location and Area</u>

The Project is located on the Androscoggin River at the head-of-tide at approximately river mile (RM) 6 in the Towns of Brunswick and Topsham, ME. The Project straddles the border between Cumberland and Sagadahoc counties. The Project dam is the first dam on the mainstem of the Androscoggin River. The dam and powerhouse span the Androscoggin River immediately above the U.S. Route 201 bridge connecting Topsham and Brunswick, ME, at a site originally known as Brunswick Falls (Figure 1.1-1). The drainage area at the Project is 3,437 square miles (sqm) while the average annual inflow to the Project is approximately 7,018 cubic feet per second (cfs).

The Project boundary follows the contour level of 42.0 feet above mean sea level (msl) around most of the Project impoundment, except along the northerly shore of the impoundment between the Project dam and the Black Bridge railroad crossing where it follows the contour level of 46.0 feet, msl. The Project boundary also encloses the principal Project works including the dam, intake, powerhouse, tailrace, and fishway. The Project boundary extends approximately 4.5 miles upstream to the Pejepscot Dam and encompasses a total of approximately 348 acres. The Project boundary is depicted in Figure 1.1-2.

1.2 Project Description

The Project generally consists of a 4.5-mile-long, 175-acre impoundment; an 830-foot-long and 40-foot-high concrete gravity dam with a gate section containing two Tainter gates and an emergency spillway; an intake and a powerhouse containing three turbine-generating units with an authorized rating of 19.0 MW. The Project also has a vertical slot upstream fishway, a downstream fish bypass, a 21-foot-high fish barrier wall between the dam and Shad Island, and a 3-foot-high by 20-foot-long concrete fish barrier weir across Granney Hole Stream in Topsham. The Project's primary facilities are depicted in Figure 1.1-2.

1.3 Process and Schedule

Consistent with the process plan and schedule included in the Commission's SD2, BWPH is filing this ISR on or before January 1, 2026. In addition, as defined by CFR §5.15(c)(2), BWPH will hold an ISR meeting with the relicensing participants and Commission staff (scheduled for January 15, 2026). The purpose of the meeting is to discuss the study results, as well as to discuss BWPH's or the other relicensing participants' proposals, if any, to modify the study plans considering the progress of the studies and data collected thus far. After this meeting and in accordance with CFR §5.15(c)(3), BWPH will file a summary of the ISR meeting on or before January 31, 2026, after which participants may file, on or before March 2, 2026, any disagreement concerning the ISR meeting summary and BWPH's study proposals, as well as any recommendations for modifications to ongoing studies or requests for new studies. Recommendations for modified or new studies must be accompanied by justification in accordance CFR §5.15(c)(4) and meet the applicable criteria as defined by CFR §5.15(d) for modification of an approved study and CFR §5.15(e) for a new study. BWPH will then have 30 days (on or before April 1, 2026) to file any responses to comments, disagreements, or requests, and then FERC will have an additional 30 days (on or before May 1, 2026) to issue a determination regarding any disagreements and/or modifications to the approved study plans.

In accordance with the Process Plan and Schedule, an Updated Study Report (USR) must be filed with FERC no later than January 1, 2027, to provide study results from any second year (2026) studies. Within 15 days following the filing of the USR (or by January 16, 2027) BWPH will meet the relicensing participants and FERC staff to discuss the 2026 study results. Within 15 days following this meeting (or by January 31, 2027) BWPH will file a meeting summary with FERC.

1.4 Study Plan Implementation

Consistent with the RSP and SPD, BWPH initiated work on all 13 studies in accordance with the approved schedule and methods. A summary of studies initiated is provided in Table 1.4-1. Appendices A thru M provide reports/summaries on all 13 studies included in the Commission's SPD that have been conducted to date. The reports describe study objectives, study area, methods, results to date, variances from FERC-approved Study Plan and Proposed Modifications (if any) and any remaining work (if any).

Table 1.4-1: List of Relicensing Studies Initiated and Status

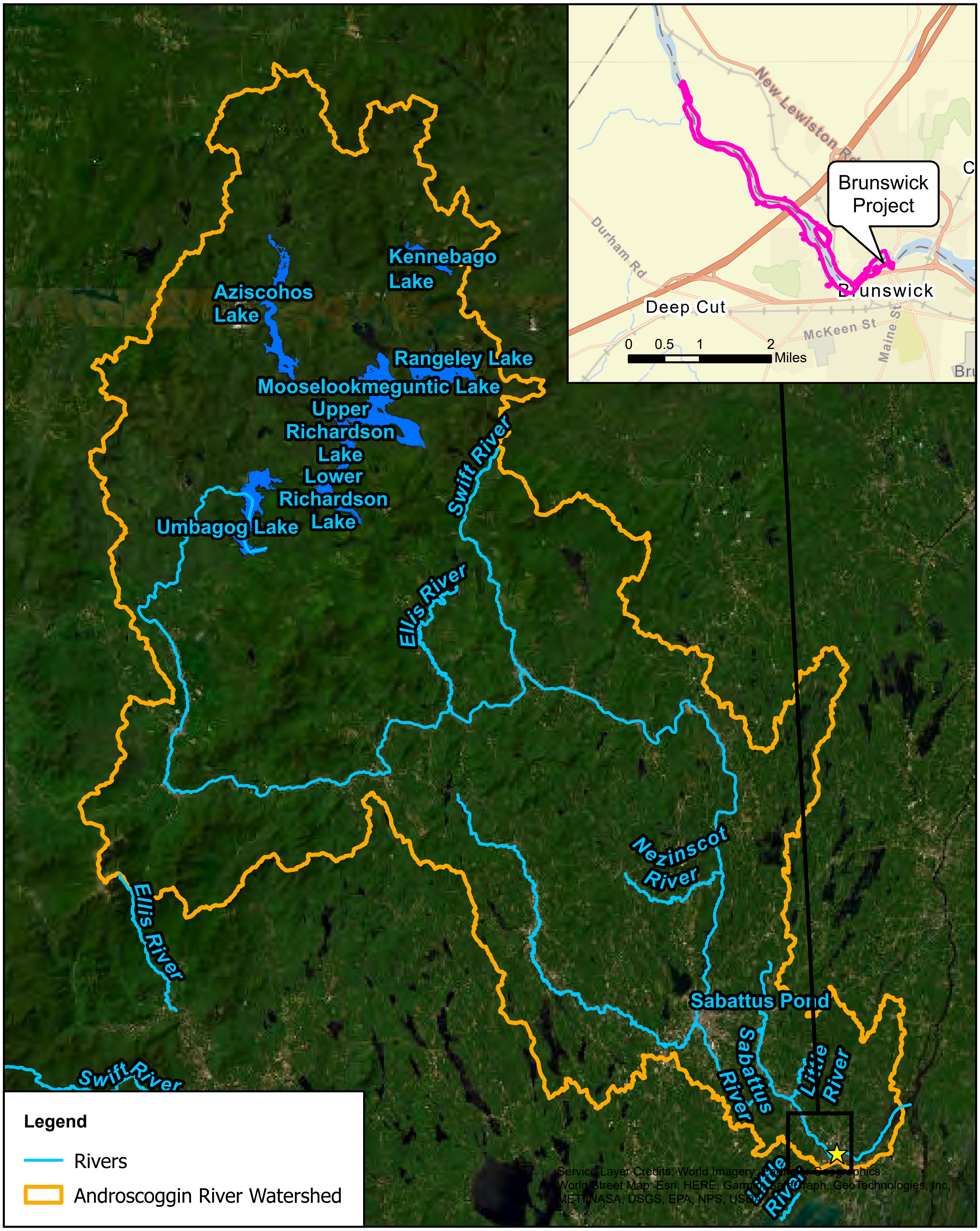
Study	Status
Water Quality Assessment	BWPH completed the water quality monitoring during the 2025 field season. The analysis and report are provided in Appendix A.
Tailwater Benthic Macroinvertebrate Study	BWPH completed the benthic macroinvertebrate sampling during the 2025 field season. The analysis and report are provided in Appendix B.
Computational Fluid Dynamics Modeling	BWPH completed bathymetry and velocity data collection in the impoundment, tailwater, and spillway. These data, along with project drawing information, were compiled into CFD model input datasets. Remaining work includes development and validation of a 3D CFD model and 2D hydraulic model, and completion of production runs of various flow and fishway alternative scenarios. Appendix C contains a summary of the work completed in 2025.
Upstream and Downstream Fish Passage Alternatives Study	BWPH has developed screening matrices and conceptual sketches for upstream and downstream fish passage alternatives (2 matrices total) based on the initial informational gathering and review of agency design guidelines. A resource agency meeting is scheduled for January2026 to review the initial list of alternatives. Remaining work includes the completion of the Phase 1 alternatives report and Phase 2 feasibility assessment of alternatives. Appendix D contains a summary of the work completed in 2025.
Visual Surveys of Upstream American Eel Movements	BWPH completed the eel surveys during the 2025 field season. The analysis and report are provided in Appendix E.
Diadromous Fish Behavior, Movement, and Project Interaction Study	BWPH completed Phase 1 of the study during the 2025 field season and drafted a study plan for Phase 2 of the study which will be completed in 2026. The analysis and report for Phase 1 is provided in Appendix F.
Fish Assemblage Study	BWPH completed the fish sampling and bass spawning survey during the 2025 field season. The analysis and report are provided in Appendix G.
Evaluation of Stranding Risk/Bathymetry Study	BWPH completed the stranding evaluation during the 2025 field season. The analysis and report are provided in Appendix H.
Mussel Survey	BWPH completed the mussel survey during the 2025 field season. The analysis and report are provided in Appendix I.
Recreation Study	BWPH completed the recreation assessment during the 2025 field season. The analysis and report are provided in Appendix J.
Historic Architectural Survey	BWPH completed the historic architectural survey during the 2025 field season. The analysis and report are provided in Appendix K.
Prehistoric and Historic Archeological Survey	BWPH completed the prehistoric and historic archeological survey during the 2025 field season. The analysis and report are provided in Appendix L.
Invasive Plant Survey	BWPH completed the invasive plant survey during the 2025 field season. The analysis and report are provided in Appendix M.

1.5 Initial Study Report Meeting

Pursuant to 18 CFR §5.15(c)(2), BWPH will hold a meeting with relicensing participants and the Commission within 15 days of filing the enclosed ISR. **BWPH has scheduled the ISR Meeting for Thursday January 15, 2026, via Microsoft Teams. The meeting is scheduled to start at 9:00 am and be concluded by 2:15 pm. If you are interested in participating in the virtual meeting, please notify Kirk Smith (ksmith@gomezandsullivan.com) via email no later than Friday January 9, 2026**. Once notified, we will send attendees instructions on how to access the meeting.

1.6 Draft License Application

In accordance with 18 CFR §5.16(c), BWPH plans to file a Draft License Application (DLA) with the Commission and distribute the DLA to the licensing stakeholders on or before October 1, 2026.



Brookfield

Brunswick Hydroelectric Project (FERC No. 2284)

N

0 7.5 15 30 Miles

Figure 1.1-1: Project Location Map

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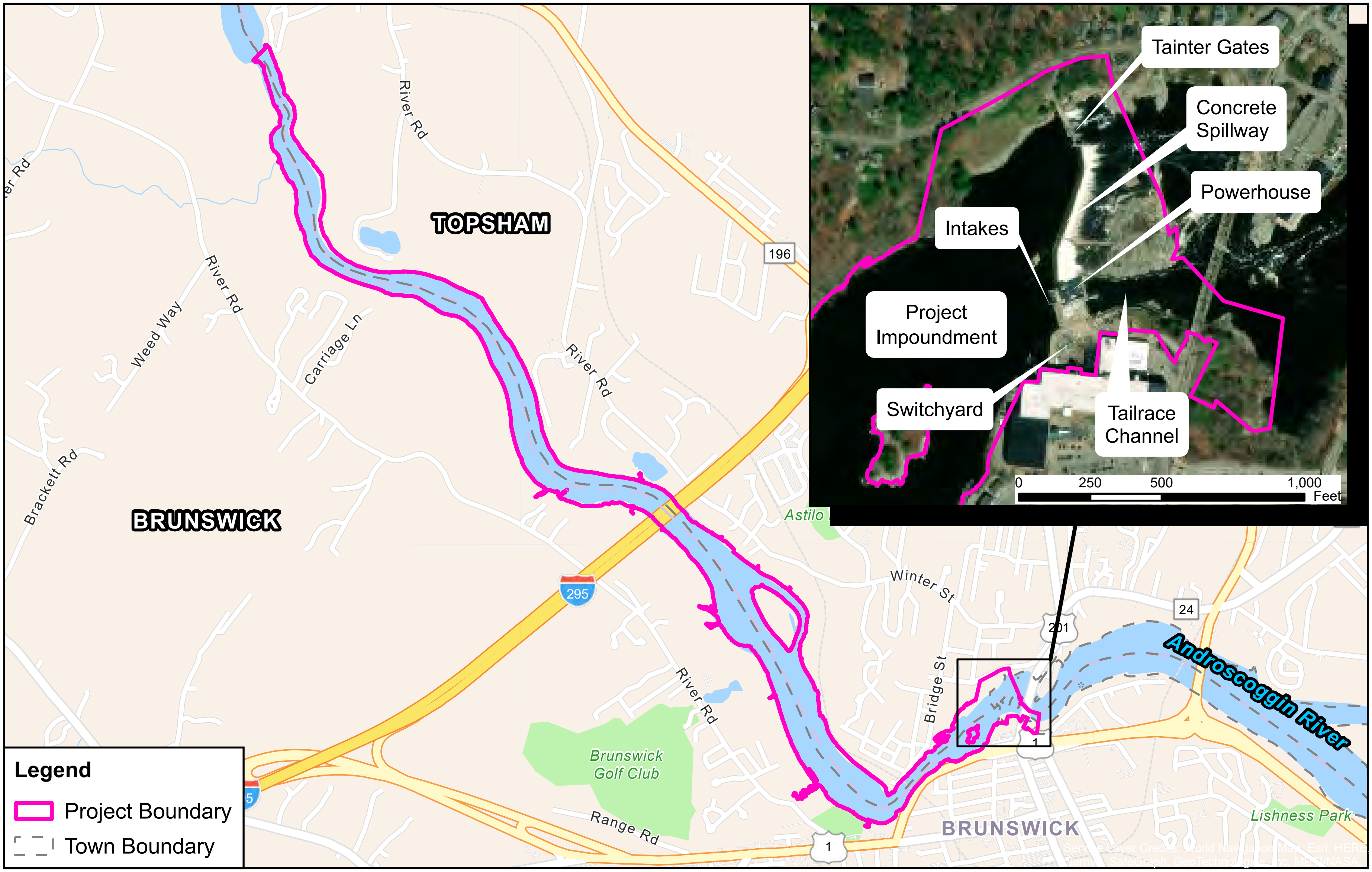

Brookfield

Brunswick Hydroelectric
Project (FERC No. 2284)

N

Figure 1.1-2:
Project Boundary and Primary Project Facilities

0 1,250 2,500 5,000
Feet

Path: D:\Brookfield\02456\GIS\Maps\PAD\PAD.aprx

APPENDIX A: WATER QUALITY ASSESSMENT

WATER QUALITY ASSESSMENT
INITIAL STUDY REPORT
BRUNSWICK HYDROELECTRIC PROJECT
FERC NO. 2284

Submitted by:

Brookfield White Pine Hydro LLC
150 Main Street
Lewiston, ME 04240

Prepared by:

Kleinschmidt

January 2026

Brookfield

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LIST OF ABBREVIATIONS AND DEFINITIONS

Brookfield	Brookfield Renewable
BWPH	Brookfield White Pine Hydro LLC
°C	Degrees Celsius
CFR	Code of Federal Regulations
cfs	Cubic feet per second
Commission	Federal Energy Regulatory Commission
CMC	Criteria Maximum Concentration
CCC	Criterion Continuous Concentration
DO	Dissolved Oxygen
DOC	Dissolved Organic Carbon
°F	Degrees Fahrenheit
ft	Feet/foot
g	Gram
ILP	Integrated Licensing Process
ISR	Initial Study Report
Licensee	Brookfield White Pine Hydro, LLC
M	meter
MDEP	Maine Department of Environmental Protection
ME	Maine
mg/L	Milligrams per liter
mi	Mile
mm	Millimeter
MRSA	Maine Revised Statutes Article
MW	Megawatt
NCEI	National Centers for Environmental Information
NOAA	National Oceanic and Atmospheric Administration
NOI	Notice of Intent
PAD	Pre-Application Document
PCU	Platinum Cobalt Units
pH	potential of hydrogen
Project	Brunswick Hydroelectric Project (FERC No. 2284)
PSP	Proposed Study Plan
QA/QC	Quality Assurance/Quality Control
RSP	Revised Study Plan
TKN	Total Kjeldahl Nitrogen
TSI	Trophic State Index
SD1	Scoping Document 1
SD2	Scoping Document 2
SPD	Study Plan Determination
µg/L	Microgram per liter
µS/cm	Microsiemens Per Centimeter
USGS	United States Geological Survey

1 INTRODUCTION

Brookfield White Pine Hydro LLC (BWPH or Licensee) is licensed by the Federal Energy Regulatory Commission (FERC or Commission) to operate the 19-megawatt (MW) Brunswick Hydroelectric Project (Project) (FERC No. 2284). The Project is located on the Androscoggin River in the towns of Topsham and Brunswick, Maine. The Project straddles the border between Cumberland and Sagadahoc counties. The original license was issued on February 9, 1979, and expires on February 28, 2029.

BWPH is using FERC's Integrated Licensing Process (ILP) as established in Title 18 Code of Federal Regulations (CFR), Part 5. BWPH filed a Pre-Application Document (PAD) and Notice of Intent (NOI) to seek a new license for the Project on February 21, 2024. The PAD provides a description of the Project, including its structures, operations, and potentially affected resources. BWPH distributed the PAD and NOI simultaneously to Federal and state resource agencies, local governments, Native American tribes, members of the public, and others thought to be interested in the relicensing proceeding. Following the filing of the PAD, FERC prepared and issued Scoping Document 1 (SD1) on April 16, 2024. FERC also held agency and public scoping meetings and a site visit on May 7, 2024. The FERC Process Plan and Schedule provided agencies and interested parties with an opportunity to file comments on the PAD and SD1 and request studies by June 20, 2024. FERC issued Scoping Document 2 (SD2) on July 29, 2024. BWPH filed a Proposed Study Plan (PSP) on August 2, 2024, and held study plan meetings on August 28 and October 9, 2024. The Revised Study Plan (RSP) was filed in accordance with the ILP schedule on December 2, 2024. FERC issued a Study Plan Determination (SPD) on December 30, 2024.

Specific to water quality, in the RSP, BWPH proposed to conduct a water quality assessment, which was approved without modification in the SPD. This Initial Study Report (ISR) presents the results of the study, including the goals and objectives, methods, results, summary, and variances (if any) from the FERC approved study plan.

1.1 Background

Maine statute 38 Maine Revised Statutes Article (MRSA) §464-470 establishes the State's classification system of surface waters. The mainstem of the Androscoggin River from the Worumbo Dam in Lisbon Falls downstream through the Brunswick Project to a line formed by extension of the Bath-Brunswick boundary across Merrymeeting Bay (approximately 6 river miles downstream of the Brunswick Dam) is a Class B waterbody. Class B waters must meet standards ensuring they are suitable for the designated uses of drinking water supply after treatment, agriculture, fishing, recreation in and on water, industrial process and cooling water supply, navigation, habitat for fish and other aquatic life (the habitat must be characterized as unimpaired), and hydroelectric power generation, except as prohibited under Title 12, section 403. Water quality standards for Class B waters are provided in Table 1-1.

Table 1-1: Water Quality Standards for Class B Waters

Parameter	Standard
Dissolved oxygen (DO)	Minimum of 7 mg/L or 75% saturation, whichever is higher, except for October 1 to May 14 to ensure spawning and egg incubation of indigenous fish, the 7 day mean DO concentration may not be less than 9.5 mg/L and the one day minimum may not be less than 8 mg/L in identified salmonid spawning areas
Aquatic Life	May not cause adverse impacts to aquatic life in that the receiving waters must be of sufficient quality to support all aquatic species indigenous to the receiving water without detrimental changes in the resident biological community

Parameter	Standard
pH	6.5-9.0
Chlorophyll-a	Geometric Mean ≤ 8 µg/L (0.008 mg/L) and no value > 10 µg/L
Total Phosphorus	Geometric Mean ≤ 30 µg/L (0.03 mg/L)
Total Aluminum	CMC: 0.75 mg/L; CCC= 0.087 mg/L
Chloride	CMC=860 mg/L; CCC=230 mg/L
Total Iron	CCC= 1 mg/L

Source: MDEP 2020, 2025; MRS 2021
** µg/L = microgram per liter, mg/L=milligram per liter, CMC=criteria maximum concentration; CCC=Criterion Continuous Concentration*

1.2 Goals and Objectives

Pursuant to the study requests received from the Maine Department of Environmental Protection (MDEP) on June 13, 2024, BWPH conducted two water quality studies in accordance with the 2022 MDEP Sampling Protocol for Hydropower Studies (MDEP 2022a): an impoundment trophic state study, and a water temperature and dissolved oxygen (DO) study.

The goals of the water quality study were to collect baseline information and document water quality conditions upstream and downstream of the Brunswick Project dam to determine if existing MDEP standards and guidelines are met. The objectives of the study were to:

1. Asses the trophic state of the impoundment.
2. Conduct a water temperature and DO study in the impoundment and in the tailwater area during low flow, warm water temperature conditions.

2 METHODOLOGY

2.1 Meteorological and Project Operations Data

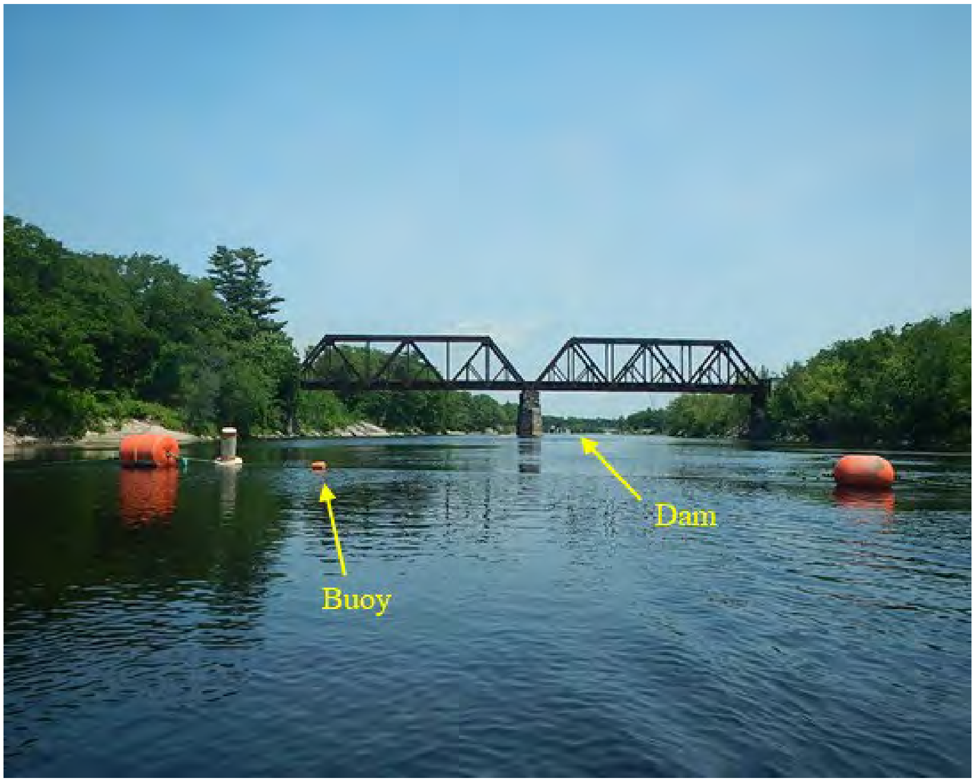
Daily total precipitation data for June through October 2025 was obtained from the National Oceanic and Atmospheric Administration (NOAA) National Centers for Environmental Information (NCEI) daily station summary data for Station US1MECM0161 in Brunswick, ME (NOAA NCEI 2025). This station is located approximately 4,750 feet (0.9 miles) from the Brunswick Dam. Air temperature was recorded with an Onset HOBO U20-001 data logger installed next to the Water Street Boat Launch. The air temperature was continuously recorded at 1-hour intervals from June 30 to September 17, 2025. BWPH provided impoundment elevation, total generation, and spill data in hourly intervals for the study period for use in the analysis.

Androscoggin River flow data in 15-minute intervals was obtained from United States Geological Survey (USGS) Gage # 01059000 Androscoggin River near Auburn, Maine from June 23 to October 16, 2025 (USGS 2025). The USGS gage is approximately 22 river miles upstream of the Brunswick Dam with a drainage area of 3,266 square miles. Data from the gage was prorated by the ratio of the drainage areas (3,437/3,266=1.052) to the Brunswick Project.

2.2 Impoundment Trophic State Study

BWPH completed the impoundment trophic state study at the deep area of the impoundment in accordance with MDEP's 2022 Sampling Protocol for Hydropower Studies (MDEP 2022a). Sample parameters included water transparency, water temperature and DO vertical profiles (1-meter intervals), and epilimnetic core samples of total phosphorus, chlorophyll-a, color, pH, and total alkalinity. BWPH sampled from the deepest, safely accessible spot in the impoundment upstream of the boat barrier twice per month for five consecutive months (June through October). Prior to collecting the first sample, BWPH performed a general water depth survey of the lower impoundment to identify the deep spot and establish the sampling station. BWPH installed a buoy to mark the location for the remainder of the monitoring season (Photo 2-2-1). The sample site was approximately 2,900 feet (0.55 miles) upstream of the dam with a depth of approximately 33 feet (10 meters) of water (Figure 2-2.1). BWPH consulted with MDEP regarding the location of the trophic state sample site (See Appendix A).

Photo 2.2-1: Impoundment trophic state study site in the Brunswick Project impoundment.



Additional water samples were collected during one of the late summer sampling events on August 20, 2025. The additional late summer sample parameters included nitrate, total kjeldahl nitrogen (TKN), dissolved organic carbon (DOC), total iron, total and dissolved aluminum, total calcium, total magnesium, total sodium, total potassium, total silica, specific conductance, chloride, and sulfate. The samples were collected using an epilimnetic core because the water column was not stratified (see Section 3.3).

Water temperature and DO were measured at 1-meter intervals with a handheld YSI ProSolo meter twice per month. The calibration of the handheld meter was checked in the field prior to each sampling event. According to the manufacturer's specifications, the accuracy of the YSI ProSolo meter is ±0.1 mg/L or ±1% of the reading, whichever is greater, for DO concentrations of 0 to 20 mg/L; ±1% air saturation or ±1% of the reading, whichever is greater, for DO percent saturation values ranging from 0 percent to 200 percent; and ±0.2ºC for temperature values ranging from -5°C to 70°C.

Water transparency was measured at the impoundment sampling location during each field visit using a Secchi disk and an Aquascope.

2.3 Downstream Study

BWPH continuously monitored water temperature and DO downstream of the powerhouse once per hour with an Onset HOBO U-26 data logger during the low flow, high temperature period. The Androscoggin River downstream of the Brunswick Dam is tidally influenced. Thus, BWPH also installed a conductivity logger (Onset HOBO U24) to adjust the DO data for salinity, if necessary; the conductivity logger was also programmed to record once per hour. Sampling occurred over an approximately 10-week period between June 30 and September 17, 2025.

The data loggers were deployed from an anchored buoy approximately one meter below the surface. The loggers were encased in a flow-through PVC container, and the DO logger was equipped with a bio-fouling guard. The data loggers were calibrated at the beginning of the monitoring period and at periodic intervals as needed, per the manufacturer's specifications. The equipment was checked, and the data were downloaded every week. Spot-check measurements of the DO concentration, DO percent saturation, water temperature, and conductivity were collected using a calibrated handheld meter (YSI ProSolo) at deployment, retrieval, and during each data download. The spot-check measurements assisted with verifying that the loggers were operating correctly, and with determining whether the data needed to be adjusted. BWPH consulted with MDEP regarding the sampling location following field reconnaissance (See Appendix A).

Per MDEP protocols, prior to deploying the data loggers, BWPH measured water temperature and DO at quarter points along a transect across the river. The DO concentration was the same at each point (8.8 mg/L) (Table 2.3-1), therefore, there was no significant difference in concentration among the quarter points. The data loggers were deployed on the river left, approximately 900 feet downstream of the powerhouse in an area representative of the main flow (Photo 2.3-1). The approximate locations of the initial transect and the sampling site are depicted in Figure 2.2-1.

Table 2.3-1: Quarterly measurements of water temperature and DO downstream of the Brunswick Dam, June 30, 2025

Parameter	River Right	Center	River Left
Water Temperature (°C)	23.0	23.0	23.0
DO (mg/L)	8.8	8.8	8.8

BWPH also installed an atmospheric pressure logger (Onset HOBO U-20) to record the air pressure once per hour. The atmospheric pressure data was used to calculate the DO percent saturation in the manufacturer's data processing software.

Photo 2.3-1: Location of data loggers downstream of the Brunswick Dam

Brookfield

Brunswick Hydroelectric Project (FERC No. 2284)

N

0 350 700 1,400 Feet

Figure 2.2-1:
Water Quality Monitoring Sites

Path: Q:\Client_Data\FERC_Projects\P2284\40_ISR\Brunswick_PSP_WQ.aprx

2.4 Data QC and Analysis

Data was reviewed for QA/QC purposes throughout the field study and following completion of the monitoring. Spot check measurements were used to determine if logger data needed to be adjusted or flagged for accuracy. Measurements recorded when the loggers were out of water for download or calibration were removed from the final dataset. Conductivity was low throughout the study period (approximately 70 µS/cm to 100 µS/cm); thus, no adjustments to the continuous DO data for salinity conditions were necessary.

3 RESULTS

3.1 Meteorological Conditions

From June 23 through October 16, 2025, 5.44 inches of rain fell in Brunswick, ME (Figure 3.1-1). The monthly precipitation totals were as follows: June = 0.0 inches, July = 2.04 inches, August = 0.34 inches, September = 3.06 inches, and October = 0.0 inches. The largest rain event occurred on September 27, 2025, delivering 2.05 inches of rainfall. The hourly air temperature ranged from 49.2°F (9.6°C) on September 9 to 87.4°F (30.8°C) on August 12 (Figure 3.1-2). The daily average air temperature ranged from 56.5°F (13.6°C) on September 10 to 76.1°F (24.5°C) on August 12.

Figure 3.1-1: Daily total precipitation (inches) in Brunswick, ME, from weather station US1MECM0161, June 23 to October 16, 2025

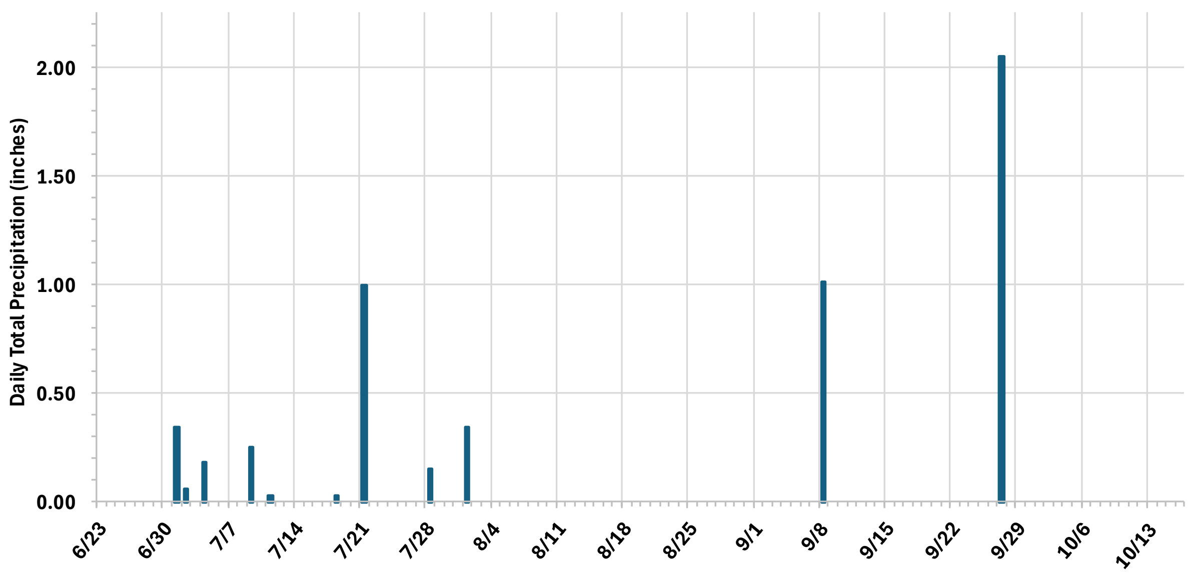
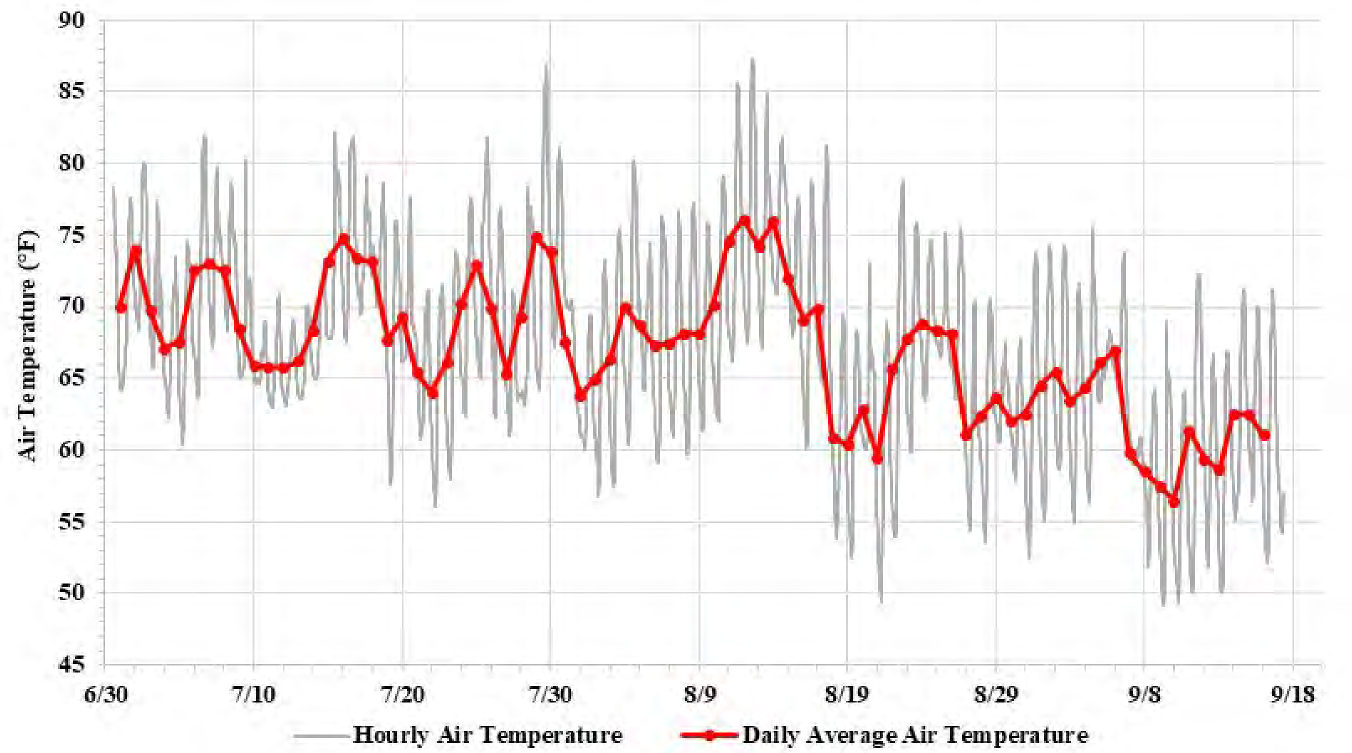


Figure 3.1-2: Air temperature recorded near the Brunswick Dam, June 30 to September 17, 2025



3.2 <u>Project Operations</u>

Impoundment elevation data for June 23 to October 16, 2025, is shown in Figure 3.2-1. The elevation was near the normal pond level of 39.4 feet mean sea level (msl) during the study, except for two drawdowns for maintenance on August 14 to 15, and on October 1 to 2, 2025 (see Appendix A for documentation of agency consultation regarding the drawdowns). The Project generated throughout the study (Figure 3.2-1). River flows ranged from 906 cubic feet per second (cfs) to 7,227 (cfs) (Figure 3.2-2).

Figure 3.2-1: Impoundment Elevation (feet msl) and Total Generation (MW), June 23 to October 16, 2025.

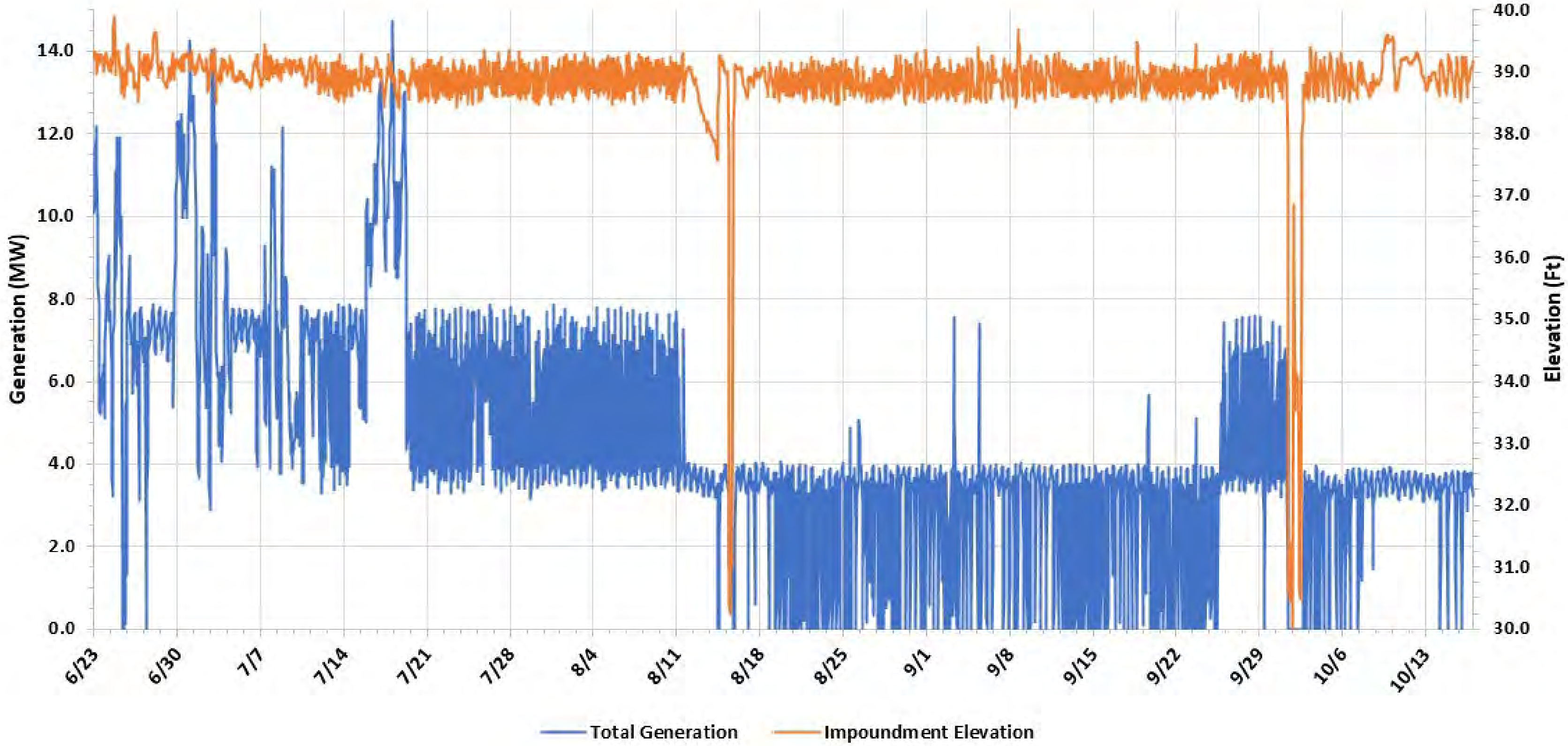
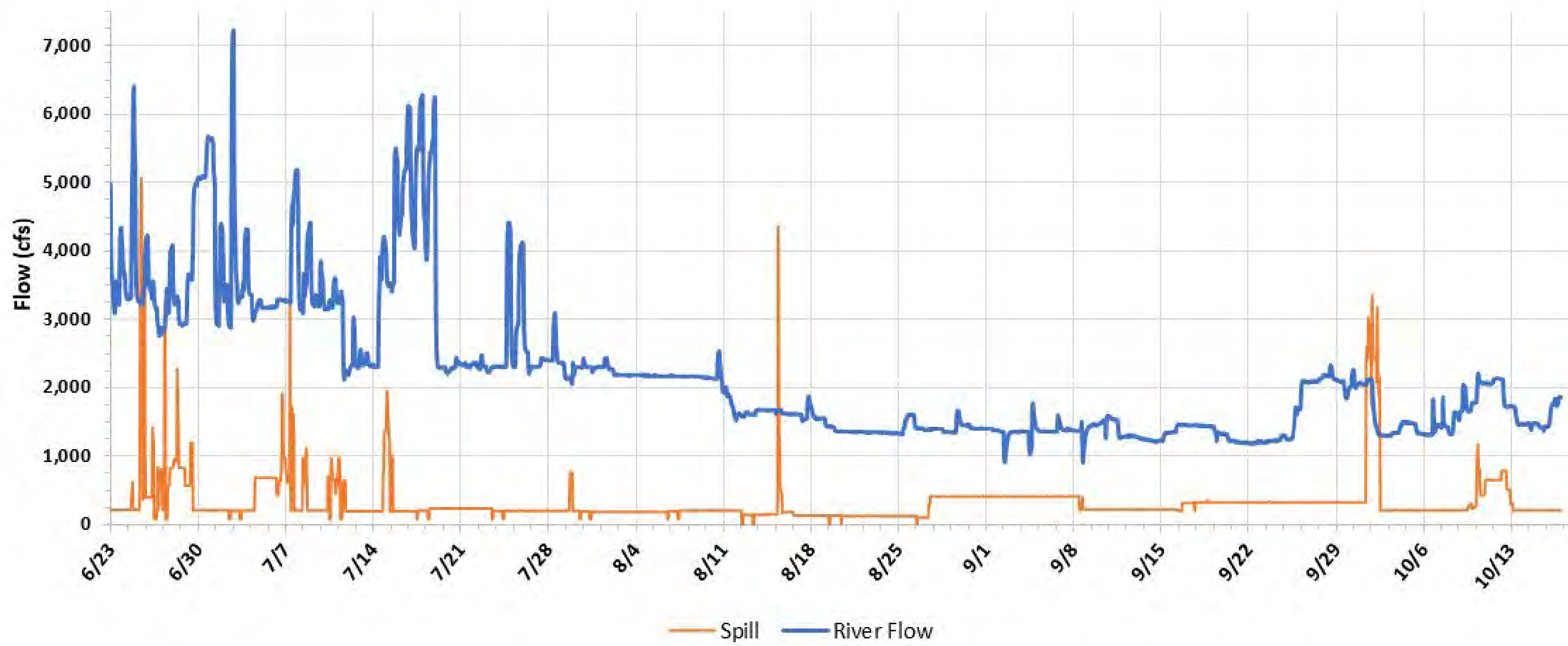


Figure 3.2-2: River Flow (cfs) and Spill (cfs), June 23 to October 16, 2025.



3.3 Impoundment Trophic State Study

3.3.1 Water Chemistry and Transparency

The water chemistry and transparency results are presented in Table 3.3-1. Total phosphorus ranged from 11 µg/L to 20 µg/L (Table 3.3-1). The average total phosphorus throughout the monitoring period was 16.2 µg/L and was below the state standard (30 µg/L). Chlorophyll-a ranged from 1.8 µg/L to 4.5 µg/L with an average of 2.9 µg/L which was below the state standard (8 µg/L). pH ranged from 6.6 to 6.8 with an average of 6.7 (Table 3.3-1). All pH values were within the range of the Class B standard (6.5 to 9.0).

Color ranged from 21 Platinum Cobalt Units (PCU) to 30 PCU with an average of 23.8 PCU (Table 3.3-1). Total alkalinity in the Brunswick impoundment ranged from 12 mg/L to 21 mg/L with an average of 16.2 mg/L indicating that the buffering capacity of the Brunswick impoundment was sufficient. Water bodies with alkalinity values less than 10 mg/L are considered poorly buffered (MDEP 2022b).

The water transparency ranged from 3.7 m to 6.4 m (12.1 ft to 21.0 ft) with an average of 4.9 m (14.7 ft) (Table 3.3-1). MDEP has often used a water transparency of less than 2 m as an indicator of algal blooms (MDEP 1996, 2024). The water transparency in the Brunswick impoundment was above the 2.0 m threshold throughout the sampling period.

Table 3.3-1: Water Chemistry and Transparency results for the Brunswick Impoundment

Date	Total Phosphorus (µg/L)	Color (PCU)	Chlorophyll-a (µg/L)	Total Alkalinity (mg/L)	pH	Water Transparency (m)
6/23/2025 11:50	17	29	4.1	12	6.6	3.7
6/30/2025 14:50	18	30	1.8	14	6.8	4.0
7/9/2025 13:30	15	24	3.0	13	6.7	4.1
7/24/2025 9:50	18	26	2.7	14	6.7	4.8
8/6/2025 11:25	13	22	4.5	13	6.6	5.2
8/20/2025 11:55	11	22	2.9	16	6.7	5.6
9/9/2025 12:15	16	21	2.6	19	6.7	6.2
9/22/2025 10:50	16	21	2.3	20	6.8	6.4
10/9/2025 10:30	20	21	2.3	21	6.7	4.7
10/16/2025 11:25	18	22	2.6	20	6.6	4.9
Minimum	**11**	**21**	**1.8**	**12**	**6.6**	**3.7**
Maximum	**20**	**30**	**4.5**	**21**	**6.8**	**6.4**
Average	**16.2**	**23.8**	**2.9**	**16.2**	**6.7**	**4.9**

Conductivity is a measure of the concentration of dissolved ions in water and is an indicator of the presence of pollutants. Undisturbed rivers have low conductivity values (e.g., 30-50 µS/cm) which will generally increase as pollutant levels in the water increase, whereas more urban streams and rivers can have conductivity values more than 100 µS/cm (MDEP 2022b). Metals are needed for many biochemical processes but can be toxic at high concentrations. In the late summer sample, conductivity was 98.3 µS/cm which is indicative of low pollution levels (Table 3.3-2). Iron (0.16 mg/L), chloride (11 mg/L), and dissolved aluminum (0.023 mg/L) concentrations were below the state standards. The results of the remaining parameters (cations, anions, nutrients, silica, DOC) from the late summer sample are provided in Table 3.3-2.

Table 3.3-2: Results of late-summer conductivity, dissolved metals, and nutrient sampling in the Brunswick impoundment, August 20, 2025.

Parameter	Unit	Value
Chloride	mg/L	11
Sulfate	mg/L	8
Nitrate-nitrogen	mg/L	0.06
TKN	mg/L	0.3
Calcium	mg/L	4.7
Iron	mg/L	0.16
Magnesium	mg/L	1.1
Potassium	mg/L	1
Sodium	mg/L	12
Aluminum	mg/L	0.023
Dissolved Aluminum	mg/L	0.023
DOC	mg/L	4.6
Silica	mg/L	3.19
Conductivity	µS/cm	98.3

3.3.2 Trophic State

Total phosphorus, chlorophyll-a, and water transparency are often used as indicators of trophic state, or the biological productivity in a water body, particularly a lake (MDEP 2024). An oligotrophic lake is characterized as having low productivity, a mesotrophic lake has medium productivity, and a eutrophic lake is highly productive. Table 3.3-3 lists the criteria used to classify the trophic state of lakes in Maine (MDEP 2024).

Table 3.3-3: Criteria for Classifying the Trophic State of Lakes in Maine

Trophic State	Chlorophyll-a (µg/L)	Total Phosphorus (µg/L)	Water Transparency (m)	Trophic State Index (TSI)
Oligotrophic	< 1.5	< 4.5	> 8	0-25
Mesotrophic	1.5 – 7	4.5 - 20	4 - 8	25-60
Eutrophic	> 7	> 20	< 4	>60 and/or repeated algal blooms

Source: MDEP 2024

The Maine Trophic State Index (TSI) for lakes can be calculated using the mean chlorophyll-a and total phosphorus concentrations (for lakes with color < 30 PCU) concentrations (MDEP 1996) as follows:

$$\mathbf{TSI = 70*log\ (mean\ chlorophyll\text{-}a + 0.7)}$$

$$\mathbf{TSI = 70*log\ (0.33 * mean\ total\ phosphorus + 0.7)}$$

Using the mean chlorophyll-a concentration (2.9 µg/L) and the mean total phosphorus concentration (16.2 µg/L) for the entire sampling period, the TSI for the Brunswick impoundment were estimated to be 39 and 55, respectively, which are categorized as mesotrophic. Based on the water transparency, the impoundment would be characterized as mesotrophic.

3.3.3 Vertical Profiles

The DO concentration and percent saturation in the impoundment were above the state of Maine's standards for Class B waters (7 mg/L and 75 percent saturation) throughout the monitoring period based on the vertical profile results. The impoundment was not stratified[1] during the monitoring events, and the water temperature and DO were generally uniform throughout the water column (Figure 3.3-1, Figure 3.3-2, Figure 3.3-3). The water temperature varied by 0.6ºC or less throughout the water column, the DO concentration varied by 0.3 mg/L or less, and the DO percent saturation varied by 2.8 percent or less throughout the water column.

The water temperature at the impoundment trophic state sampling site ranged from 14.1ºC on October 16 to 25ºC on July 9 (Table 3.3-4, Figure 3.3-1). The average water temperature throughout the water column ranged from 14.1ºC on October 16 to 24.9ºC on July 9. The DO concentration ranged from 7.8 mg/L (at a depth of 4 m and below on August 20) to 9.9 mg/L on October 16 (Table 3.3-5, Figure 3.3-2). The average DO concentration throughout the water column ranged from 7.8 mg/L on August 20 to 9.9 mg/L on October 16. The DO percent saturation ranged from 92.4 percent at a depth of 8 m and below on August 20 to 102 percent on August 6 (Table 3.3-6, Figure 3.3-3). The average DO percent saturation throughout the water column ranged from 92.8 percent on August 20 to 101.6 percent on August 6.

[1] Thermal stratification is defined as a greater than 1°C change in water temperature per 1 m below a depth of 2 m from the water surface (MDEP 2022)

Table 3.3-4: Vertical profiles of water temperature (°C) at the deep spot in the Brunswick Impoundment

Depth (m)	6/23/2025 11:30	6/30/2025 13:30	7/9/2025 12:48	7/24/2025 9:31	8/6/2025 11:05	8/20/25 11:13	9/9/2025 12:00	9/22/2025 10:50	10/9/2025 10:14	10/16/2025 10:55
0.25	23.4	24.0	25.0	24.3	24.8	23.8	21.6	19.4	17.2	14.1
1	23.3	24.0	25.0	24.1	24.8	23.9	21.4	19.5	17.4	14.1
2	23.3	24.0	25.0	24.1	24.7	23.9	21.3	19.4	17.4	14.1
3	23.2	24.0	24.9	24.1	24.7	23.9	21.2	19.4	17.5	14.1
4	23.1	23.9	24.9	24.1	24.7	23.9	21.1	19.4	17.4	14.1
5	23.1	24.0	24.9	24.1	24.7	23.9	21.1	19.4	17.4	14.1
6	23.1	23.9	24.9	24.1	24.7	23.9	21.1	19.4	17.5	14.1
7	23.1	24.0	24.9	24.1	24.7	23.9	21	19.4	17.5	14.1
8	23.1	24.0	24.9	24.1	24.7	23.9	21	19.3	17.5	14.1
9	23.0	24.0	24.9	24.1	24.7	23.9	21	19.3	17.5	14.1
10	23.1	24.0	24.9	24.1		23.9			17.5	14.1
11									17.5	14.1
Minimum	**23.0**	**23.9**	**24.9**	**24.1**	**24.7**	**23.8**	**21.0**	**19.3**	**17.2**	**14.1**
Maximum	**23.4**	**24.0**	**25.0**	**24.3**	**24.8**	**23.9**	**21.6**	**19.5**	**17.5**	**14.1**
Average	**23.2**	**24.0**	**24.9**	**24.1**	**24.7**	**23.9**	**21.2**	**19.4**	**17.4**	**14.1**

Table 3.3-5: Vertical profiles of the DO concentration (mg/L) at the deep spot in the Brunswick Impoundment

Depth (m)	6/23/2025 11:30	6/30/2025 13:30	7/9/2025 12:48	7/24/2025 9:31	8/6/2025 11:05	8/20/25 11:13	9/9/2025 12:00	9/22/2025 10:50	10/9/2025 10:14	10/16/2025 10:55
0.25	8.5	8.3	8.0	8.0	8.4	7.9	8.5	9.1	9.4	9.9
1	8.5	8.3	8.0	8.0	8.5	7.9	8.5	9.0	9.3	9.9
2	8.5	8.3	8.0	8.0	8.4	7.9	8.5	9.0	9.3	9.9
3	8.5	8.4	8.0	8.0	8.4	7.9	8.5	9.0	9.2	9.9
4	8.5	8.3	8.0	7.9	8.4	7.8	8.6	8.9	9.2	9.9
5	8.5	8.3	8.0	7.9	8.4	7.8	8.6	8.9	9.1	9.9
6	8.5	8.3	8.0	7.9	8.4	7.8	8.6	8.9	9.1	9.9
7	8.5	8.3	8.0	7.9	8.5	7.8	8.6	8.9	9.1	9.9
8	8.5	8.3	8.0	7.9	8.5	7.8	8.6	8.9	9.1	9.9
9	8.5	8.3	8.0	7.9	8.4	7.8	8.6	8.9	9.1	9.9
10	8.5	8.3	8.0	7.9		7.8			9.1	9.8
11									9.1	9.8
Minimum	**8.5**	**8.3**	**8.0**	**7.9**	**8.4**	**7.8**	**8.5**	**8.9**	**9.1**	**9.8**
Maximum	**8.5**	**8.4**	**8.0**	**8.0**	**8.5**	**7.9**	**8.6**	**9.1**	**9.4**	**9.9**
Average	**8.5**	**8.3**	**8.0**	**8.0**	**8.4**	**7.8**	**8.6**	**9.0**	**9.2**	**9.9**

Table 3.3-6: Vertical profiles of the DO percent saturation (%) at the deep spot in the Brunswick Impoundment

Depth (m)	6/23/2025 11:30	6/30/2025 13:30	7/9/2025 12:48	7/24/2025 9:31	8/6/2025 11:05	8/20/25 11:13	9/9/2025 12:00	9/22/2025 10:50	10/9/2025 10:14	10/16/2025 10:55
0.25	99.5	98.8	97.1	95.8	101.9	93.3	96.6	98.3	97.9	96
1	99.7	98.4	97.1	95.5	101.9	93.5	96.5	97.7	96.9	96.1
2	99.7	99.0	97.1	95.3	101.4	93.5	96.3	97.4	96.6	96.1
3	99.6	99.2	96.6	94.9	101.6	93.2	96.1	97.3	96.3	96
4	98.9	98.6	96.3	94.4	101.5	92.6	96.1	97	95.5	96
5	98.9	98.6	96.3	94.4	101.5	92.5	96.3	97	95.4	95.9
6	99.0	98.3	96.9	94.6	101.6	92.5	96.3	97	95.4	95.8
7	98.9	98.5	96.9	94.5	102	92.5	96.3	97	95.2	95.8
8	98.9	98.3	96.9	94.4	101.6	92.4	96.3	96.9	95.2	95.8
9	98.9	98.4	96.6	94.4	101.3	92.4	96.1	96.9	95.1	95.7
10	99.1	98.3	96.4	94.3		92.4			95.1	95.7
11									95.1	95.7
Minimum	**98.9**	**98.3**	**96.3**	**94.3**	**101.3**	**92.4**	**96.1**	**96.9**	**95.1**	**95.7**
Maximum	**99.7**	**99.2**	**97.1**	**95.8**	**102.0**	**93.5**	**96.6**	**98.3**	**97.9**	**96.1**
Average	**99.2**	**98.6**	**96.7**	**94.8**	**101.6**	**92.8**	**96.3**	**97.3**	**95.8**	**95.9**

Figure 3.3-1: Water temperature (°C) vertical profiles at the deep spot in the Brunswick impoundment

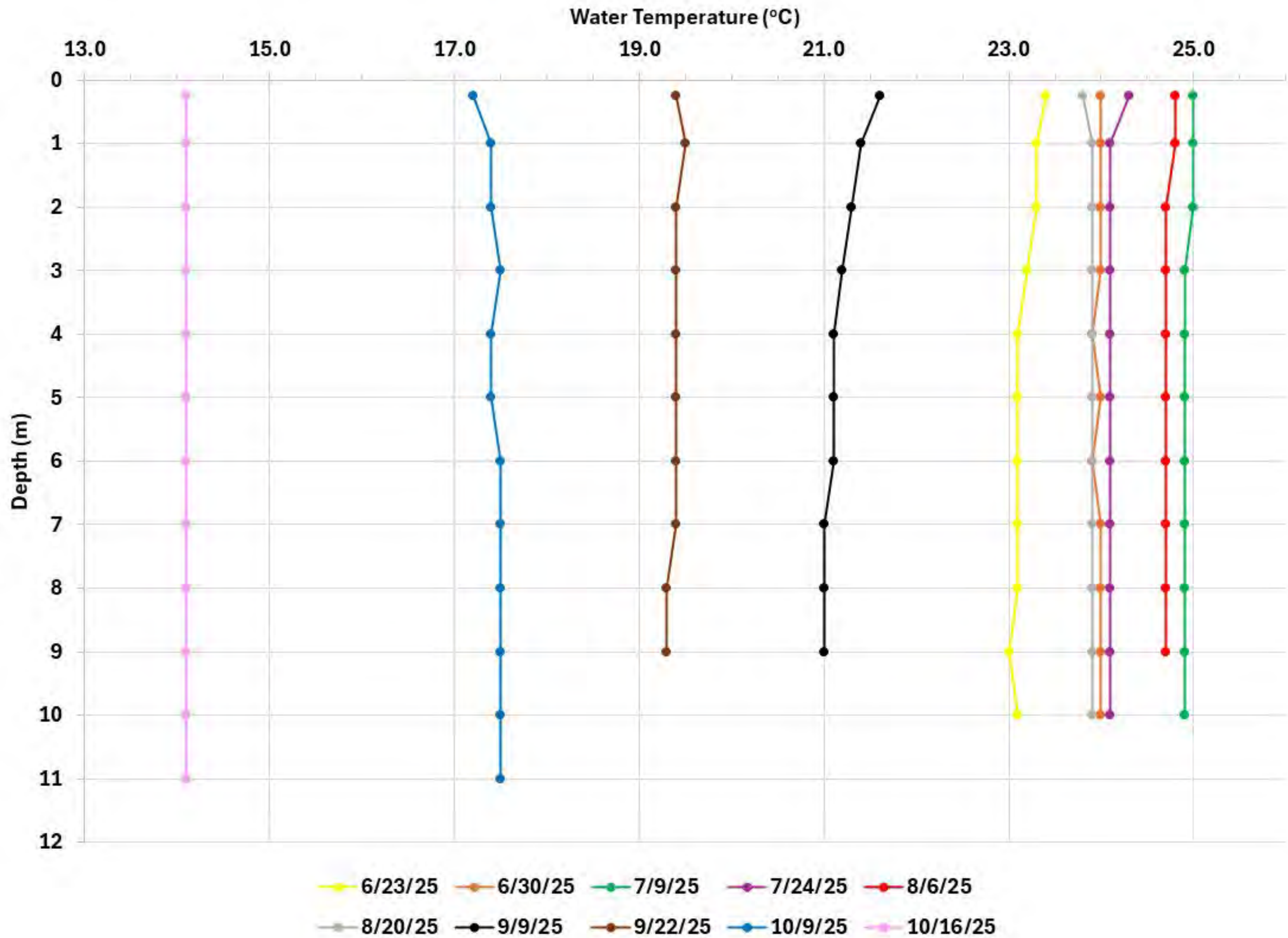


Figure 3.3-2: DO concentration (mg/L) vertical profiles at the deep spot in the Brunswick impoundment

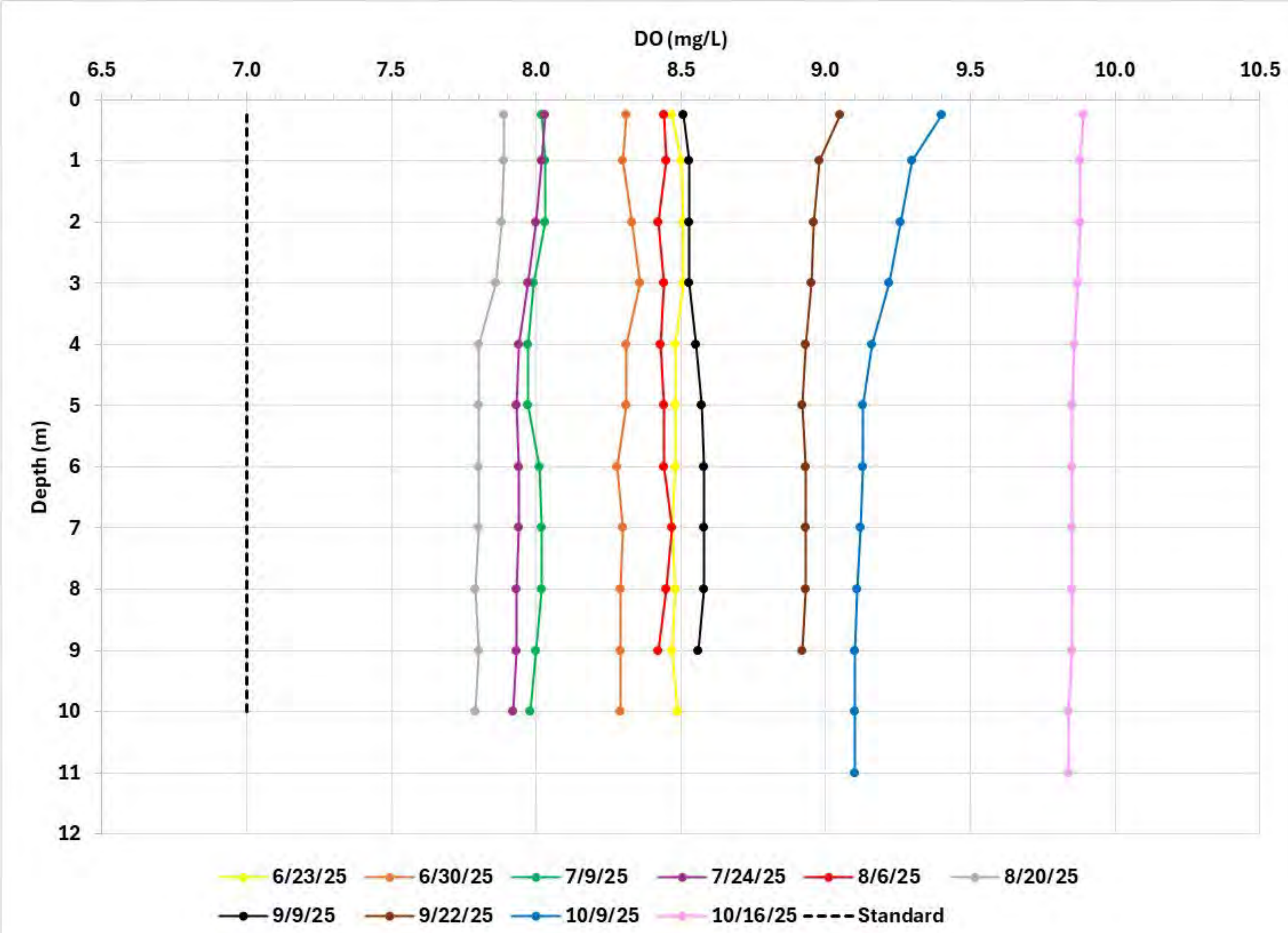
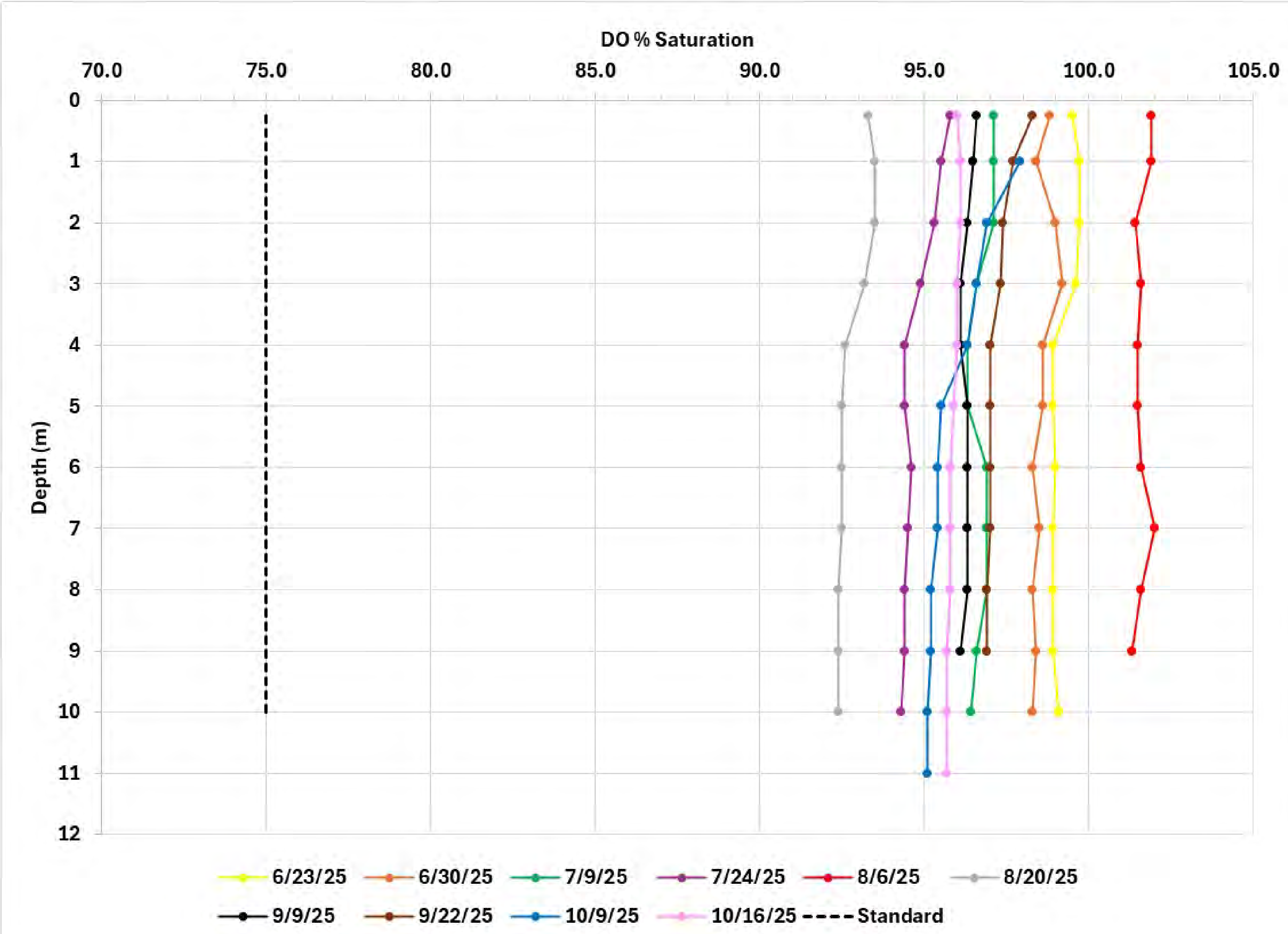


Figure 3.3-3: DO percent saturation vertical profiles at the deep spot in the Brunswick impoundment



3.4 Downstream Study

The water temperature ranged from 20.2ºC on September 11 to 27.3ºC on August 15 (Table 3.4-1, Figure 3.4-1). The average water temperature throughout the monitoring period was 24.0ºC, and the median was 24.3ºC. In July, the water temperature averaged 24.8ºC (Table 3.4-1). In August, the average water temperature was slightly lower at 24.5°C with the temperature falling in the second half of the month to a minimum of 21.7°C. In September, the water temperature continued to decrease averaging 21.5°C.

The DO concentration and percent saturation both exceeded the standards for Class B waters throughout the entire study period (7.0 mg/L and 75 percent saturation) (Figures 3.4-2 and 3.4-3). DO ranged from 7.4 mg/L on August 1 to 9.7 mg/L on September 16 (Table 3.4-1, Figure 3.4-2). The average and median DO concentration over the entire monitoring period was 8.6 mg/L. The DO concentration was between approximately 7.5 mg/L and 9.4 mg/L in July and August and generally ranged between 8.0 mg/L to 9.7 mg/L in September. The DO percent saturation ranged from 89.3 percent on August 1 to 114.8 percent on July 7 (Table 3.4-1, Figure 3.4-3). The average and median DO percent saturation was 101.1 percent throughout the study.

The seasonal and diurnal variability in DO reflected natural processes. During the highest water temperature periods (e.g., July 26 to August 1 and August 11 to 17), DO was lower because warmer water holds less oxygen. Overall, the DO concentration increased as the water temperature decreased in late August and September. In general, DO was higher during the day suggesting that DO was produced through photosynthesis, while at night DO was lower due to respiration (Figures 3.4-1 and 3.4-2). A distinct diurnal trend in DO was less apparent from mid-August through the end of the study when the river flow was lowest (approximately 1,100 cfs to 1,500 cfs) and total generation was lower (less than 4 MW) (Figure 3.2-1 and Figure 3.2-2).

Table 3.4-1: Water temperature (ºC), DO concentration (mg/L), and DO percent saturation statistics downstream of the Brunswick Dam, June 30 to September 17, 2025

Statistic	Water Temperature (°C)	DO (mg/L)	DO (Percent Saturation)
July 1-31			
Minimum	23.0	7.5	91.3
Maximum	27.0	9.4	114.8
Median	24.8	8.4	101.0
Average	24.8	8.4	101.1
August 1-31			
Minimum	21.7	7.4	89.3
Maximum	27.3	9.3	110.4
Median	24.5	8.5	101.0
Average	24.5	8.5	101.2
September 1-17			
Minimum	20.2	8.0	91.2
Maximum	22.8	9.7	107.8
Median	21.4	9.0	101.3
Average	21.5	9.0	101.2
June 30 – September 17			

Statistic	Water Temperature (°C)	DO (mg/L)	DO (Percent Saturation)
Minimum	20.2	7.4	89.3
Maximum	27.3	9.7	114.8
Median	24.3	8.6	101.1
Average	24.0	8.6	101.1

Figure 3.4-1: Water temperature (°C) downstream of the Brunswick Dam, June 30 to September 17, 2025.

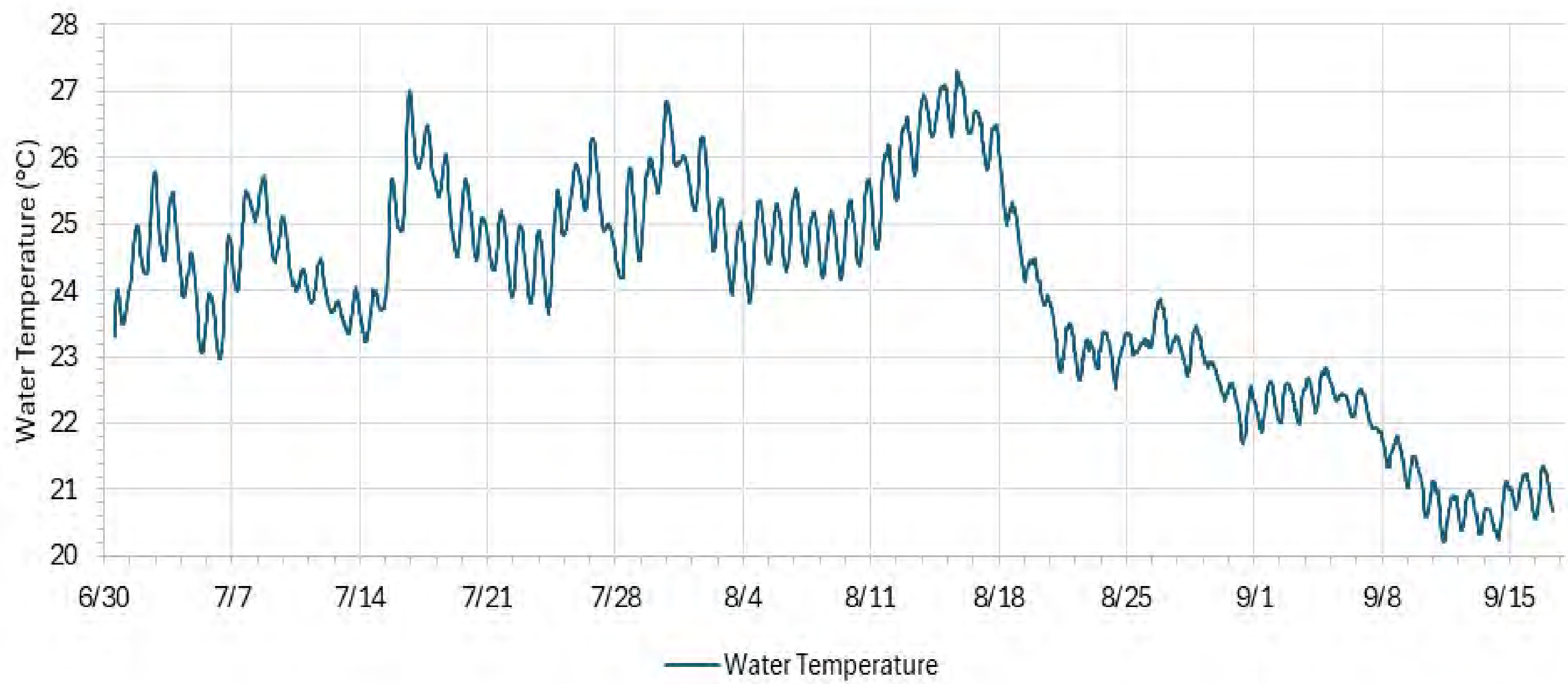


Figure 3.4-2: DO concentration (mg/L) downstream of the Brunswick Dam, June 30 to September 17, 2025.

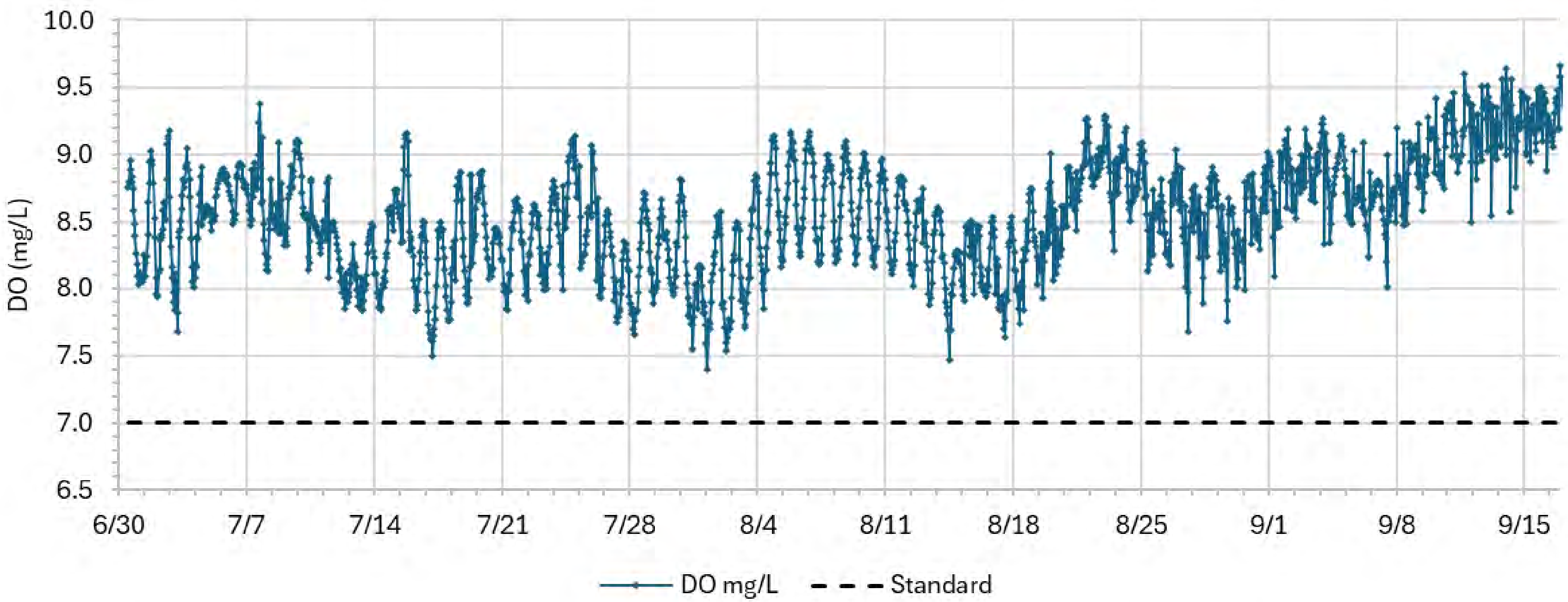
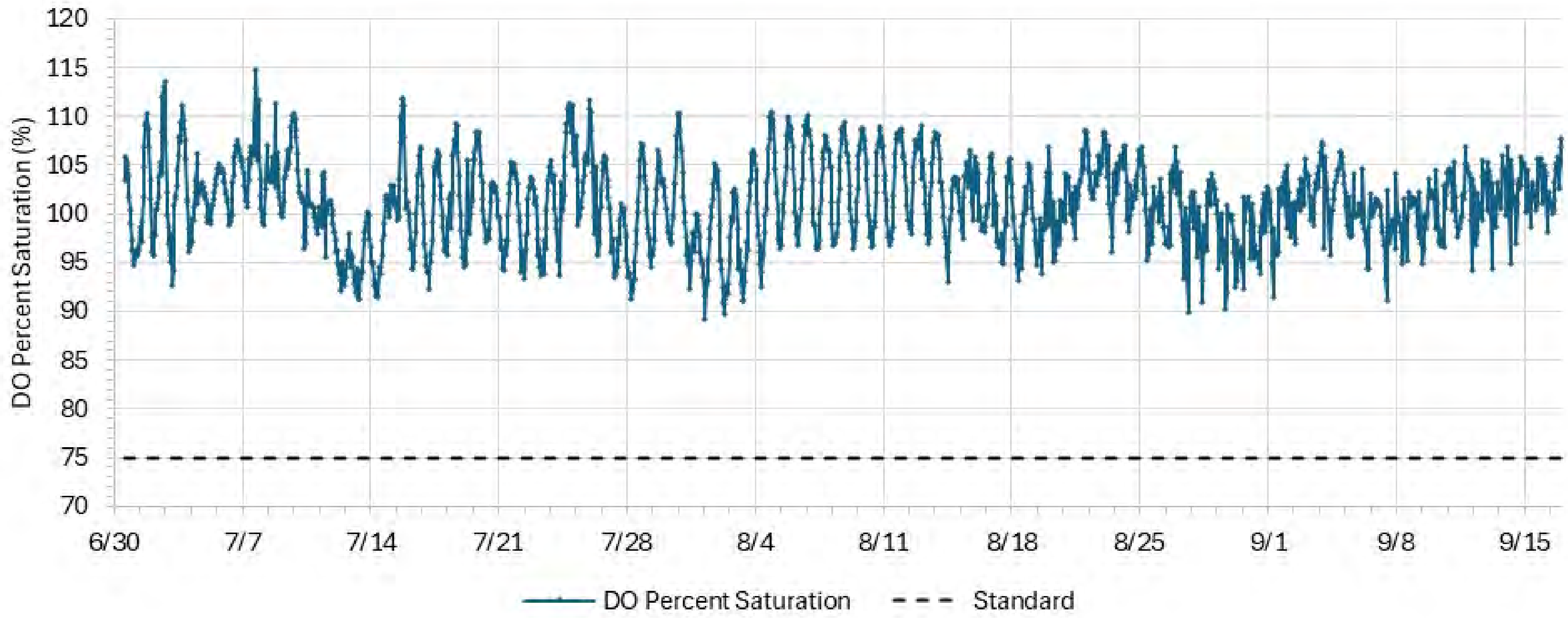


Figure 3.4-3: DO percent saturation (%) downstream of the Brunswick Dam, June 30 to September 17, 2025.



4 SUMMARY

BWPH completed an impoundment trophic state study, and a water temperature and DO study at the Brunswick Project between June and October 2025. At the deep area of the impoundment, total phosphorus, chlorophyll-a, pH, the DO concentration, and the DO percent saturation were in attainment with Class B standards. Color, total alkalinity, ions, metals, nutrients, and conductivity were also low. The impoundment did not thermally stratify. The highest water temperatures (between 24°C and 25°C) occurred during late July and early August. The high water transparency (greater than 2.0 m) and low chlorophyll-a and nutrient concentrations indicate that algal blooms were not an issue. The DO concentration and percent saturation were in attainment with Class B standards downstream of the Brunswick Dam.

The study demonstrates attainment of Class B standards at the Project, including during normal Project operations during summer low flow periods.

5 VARIANCES FROM THE FERC APPROVED STUDY PLAN

There were no variances from the FERC approved study plan.

6 REFERENCES

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APPENDIX A – AGENCY CONSULTATION RECORD

From:	Rachel Russo
To:	Paye, Laura
Cc:	Scarzello, Michael; Kirk Smith; Andy Qua
Subject:	RE: Brunswick Project (P-2284) Water Quality Study Site Consultation
Date:	Monday, August 4, 2025 1:58:00 PM
Attachments:	2025 Brunswick Water Quality Study Monitoring Sites.pdf

Hi Laura,

Attached is a revised version of the site summary document addressing your 2 questions. The updated document includes a map showing the approximate water depths recorded during the reconnaissance survey that was done to identify the deep spot in the impoundment for the trophic state study. There is also an added statement confirming that Kleinschmidt staff completed the annual training on May 30, 2025, with Ryan Burton of the MDEP Lake Assessment Section.

Thanks,
Rachel

Dr. Rachel S. Russo
Scientist
Kleinschmidt
O: 207.416.1229
Follow us on LinkedIn

From: Paye, Laura <Laura.Paye@maine.gov>
Sent: Thursday, July 31, 2025 3:02 PM
To: Rachel Russo <Rachel.Russo@KleinschmidtGroup.com>
Cc: Scarzello, Michael <michael.scarzello@brookfieldrenewable.com>; Kirk Smith <ksmith@gomezandsullivan.com>; Andy Qua <Andy.Qua@KleinschmidtGroup.com>
Subject: RE: Brunswick Project (P-2284) Water Quality Study Site Consultation

Hi Rachel,

Thank you, I have two clarifying questions so far that I did not see in this document or the RSP. (1) Was there reconnaissance done in the impoundment to determine where the deep spot was for the trophic state study? (2) Were sampling staff trained by MDEP and if so when did this training take place?

Thank you!
Laura

Laura Paye (she/her)
Hydropower Coordinator
Bureau of Land Resources
Maine Department of Environmental Protection
(207) 219-9563

From: Rachel Russo <Rachel.Russo@KleinschmidtGroup.com>
Sent: Monday, July 28, 2025 12:24 PM
To: Paye, Laura <Laura.Paye@maine.gov>
Cc: Scarzello, Michael <michael.scarzello@brookfieldrenewable.com>; Kirk Smith <ksmith@gomezandsullivan.com>; Andy Qua <Andy.Qua@KleinschmidtGroup.com>
Subject: Brunswick Project (P-2284) Water Quality Study Site Consultation

Good Afternoon Laura,

On behalf of Brookfield White Pine Hydro LLC, attached please find a summary document describing the Impoundment Trophic State Study and Downstream DO and Water Temperature Study monitoring locations for the 2025 Water Quality Study at the Brunswick Hydroelectric Project (FERC No. 2284). The study is being conducted in accordance with the Revised Study Plan that was distributed on December 2, 2024, and following standard MDEP hydropower water quality study protocols.

The attached document provides a short description of the monitoring sites along with photos and a map showing the sites in relation to project facilities.

Please forward this information to additional staff at MDEP as appropriate.

If you have any questions or comments, please feel free to contact me.

Thank you,
Rachel

Dr. Rachel S. Russo
Scientist
Kleinschmidt

O: 207.416.1229

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2025 Brunswick Project Water Quality Study

Impoundment Trophic State Study – Prior to beginning impoundment sampling, a reconnaissance level water depth survey of the Brunswick Project impoundment was conducted on June 23, 2025. A map illustrating the approximate water depths in the impoundment is provided in Figure 1. The monitoring site is approximately 0.5 miles upstream of the Brunswick Project dam at the boat barrier (Brunswick Impoundment in Figure 1, Figure 2, Photo 1). The water depth is approximately 34 feet (10 meters).

Kleinschmidt field staff completed the annual certification training with Ryan Burton of the MDEP Lake Assessment Section on May 30, 2025.

Figure 1. Approximate water depths in the Brunswick impoundment.

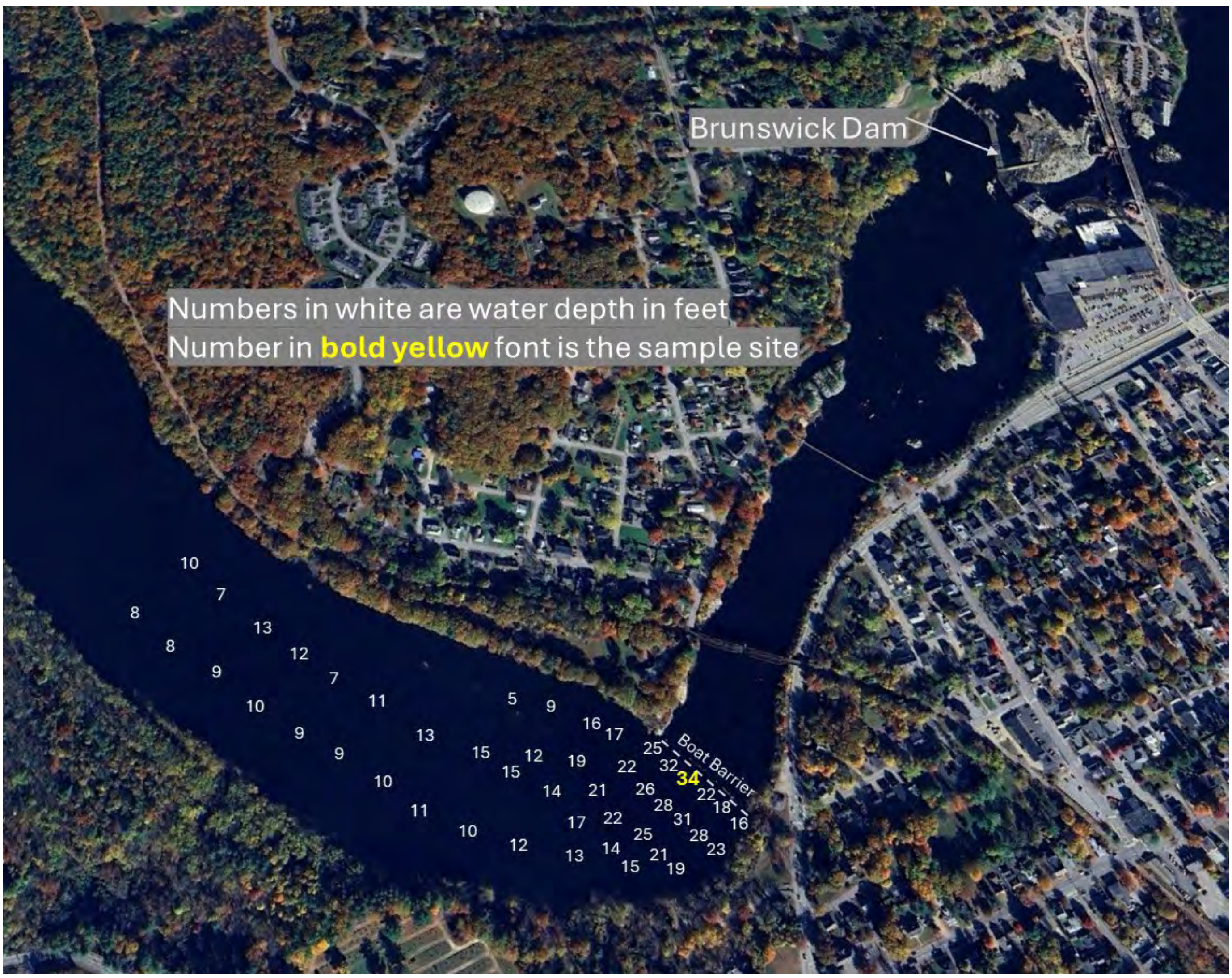

Photo 1. Impoundment trophic state study sampling site.

Downstream Water Temperature and DO Study – The monitoring site is approximately 850 feet downstream of the Brunswick Project powerhouse on river left (Brunswick Downstream in Figure 2, Photo 2). The water temperature and DO data collected at quarter points across a transect prior to data logger installation are shown in Table 1 below. The water temperature and DO were uniform across the transect, and there was no significant difference in the DO concentration across the quarter points. The data logger was installed on river left in a location representative of the main flow. This site was also selected because it is less likely to interfere with recreationists and angling.

Table 1. Transect data collected on June 30, 2025, downstream of the Brunswick Project.

Parameter	River Right	Center	River Left
Water Depth (feet)	4	14	10
Water Temperature (°C)	23.0	23.0	23.0
DO (mg/L)	8.8	8.8	8.8

Photo 2. Downstream DO and Water Temperature study monitoring site.

Figure 2. Impoundment and downstream monitoring sites for the 2025 Water Quality Study at the Brunswick Project.

From:	Seyfried, Jason
To:	Laura.Paye@maine.gov; james.pellerin@maine.gov; matt.buhyoff@noaa.gov; casey.clark@maine.gov; patrick_dockens@fws.gov
Cc:	Thone, Eli; Lesure, Kevin; Mapletoft, Thomas; Murphy,Kyle; Brown, Adam; Pocquette, Kayla; Scarzello, Michael; Dorman, Randy; Mcdonough, Patrick
Subject:	To Agencies | Brunswick Project (FERC No. 2284-ME) Headpond Drawdown Notification

Good morning,

I'm emailing as a courtesy to notify your agency that Brookfield White Pine Hydro will be drawing down the Brunswick Project (FERC No. 2284-ME) headpond (approximately 7 feet below normal) for a one-day duration tomorrow, Friday, August 15th to allow for the safe removal of woody debris from the downstream fishway. Once the debris is removed, the headpond will be slowly refilled and the project will resume normal operations. Please let me know if you have any questions.

Thank you,

Jay Seyfried
Senior Compliance Specialist | NEROC Compliance

T 207.755.5615
C 207.312.8323
jason.seyfried@brookfieldrenewable.com

From: Thone, Eli
To: Clark, Casey; Seyfried, Jason; Paye, Laura; Pellerin, James; matt.buhyoff@noaa.gov; Dockens, Patrick E
Cc: Lesure, Kevin; Mapletoft, Thomas; Murphy,Kyle; Brown, Adam; Pocquette, Kayla; Scarzello, Michael; Dorman, Randy; Mcdonough, Patrick; Hammer, Lars; Brown, Michael
Subject: RE: To Agencies | Brunswick Project (FERC No. 2284-ME) Headpond Drawdown Notification
Date: Tuesday, August 26, 2025 3:07:43 PM
Attachments: image002.png

Casey,

A drawdown of the headpond is needed to clear the debris which requires the shutdown of the upstream fishway. To minimize impacts to the upstream movement of fish, we have scheduled contractors to clear the blockage at times when the upstream fishway has been down for maintenance.. The plan moving forward will be to perform an extended drawdown of the headpond until the blockage can be cleared. This may take a few days to complete. During this time, the upstream fishway will be shut down.

The opening of the tainter gate is approximately 19 feet below the surface, this is a bottom opening gate. Below is a graph showing the flow through the gate going back to June 1st. As seen on the graph, there are brief periods when the gate has been closed to allow access below the spillway for the ongoing eel studies.

My estimate for the depth of the plunge pool below the gate is **6-8** ft deep. We are working on collecting bathmetry data in this area and can share it once it's available.

Thanks,

Eli Thone
Senior Operations Manager | Androscoggin River

C 207.747.8650
eli.thone@brookfieldrenewable.com

From: Clark, Casey <Casey.Clark@maine.gov>
Sent: Monday, August 25, 2025 12:23 PM
To: Seyfried, Jason <Jason.Seyfried@brookfieldrenewable.com>; Paye, Laura <Laura.Paye@maine.gov>; Pellerin, James <James.Pellerin@maine.gov>; matt.buhyoff@noaa.gov; Dockens, Patrick E <patrick_dockens@fws.gov>
Cc: Thone, Eli <Eli.Thone@brookfieldrenewable.com>; Lesure, Kevin <Kevin.Lesure@brookfieldrenewable.com>; Mapletoft, Thomas <Thomas.Mapletoft@brookfieldrenewable.com>; Murphy,Kyle <Kyle.Murphy@brookfieldrenewable.com>; Brown, Adam <Adam.Brown@brookfieldrenewable.com>; Pocquette, Kayla <Kayla.Pocquette@brookfieldrenewable.com>; Scarzello, Michael <Michael.Scarzello@brookfieldrenewable.com>; Dorman, Randy <Randy.Dorman@brookfieldrenewable.com>; Mcdonough, Patrick <Patrick.McDonough@brookfieldrenewable.com>; Hammer, Lars <Lars.Hammer@maine.gov>; Brown, Michael <Michael.Brown@maine.gov>
Subject: RE: To Agencies | Brunswick Project (FERC No. 2284-ME) Headpond Drawdown Notification

Hello Jay,

I spoke with Adam last week and it sounds like Brookfield was unsuccessful in removing the woody debris from the downstream fishway. Adam's weekly fish passage update confirmed this is the case. Please respond with Brookfield's plan to address this issue at the site so we are all on the same page.

As an alternative downstream passage route Brookfield "will continue to pass a minimum of 100 cfs through Tainter Gate 1 until the downstream fishway can be unclogged". Can you provide a description of the depth of water at the tainter gate as 100 cfs water passes over the gate and depth of the plunge pool below the tainter gate when 100 cfs is being passed through Tainter Gate 1? Can you also provide a record of the actual amount of water being passed through the tainter gate?

Casey

Casey Clark (he/him)
Marine Resource Scientist
Maine Department of Marine Resources
(207) 350-9791

From: Seyfried, Jason <Jason.Seyfried@brookfieldrenewable.com>
Sent: Thursday, August 14, 2025 8:50 AM
To: Paye, Laura <Laura.Paye@maine.gov>; Pellerin, James <James.Pellerin@maine.gov>; matt.buhyoff@noaa.gov; Clark, Casey <Casey.Clark@maine.gov>; Dockens, Patrick E <patrick_dockens@fws.gov>
Cc: Thone, Eli <Eli.Thone@brookfieldrenewable.com>; Lesure, Kevin <Kevin.Lesure@brookfieldrenewable.com>; Mapletoft, Thomas <Thomas.Mapletoft@brookfieldrenewable.com>; Murphy,Kyle <Kyle.Murphy@brookfieldrenewable.com>; Brown, Adam <Adam.Brown@brookfieldrenewable.com>; Pocquette, Kayla <Kayla.Pocquette@brookfieldrenewable.com>; Scarzello, Michael <Michael.Scarzello@brookfieldrenewable.com>; Dorman, Randy <Randy.Dorman@brookfieldrenewable.com>; Mcdonough, Patrick <Patrick.McDonough@brookfieldrenewable.com>
Subject: To Agencies | Brunswick Project (FERC No. 2284-ME) Headpond Drawdown Notification

Good morning,

I'm emailing as a courtesy to notify your agency that Brookfield White Pine Hydro will be drawing down the Brunswick Project (FERC No. 2284-ME) headpond (approximately 7 feet below normal) for a one-day duration tomorrow, Friday, August 15th to allow for the safe removal of woody debris from the downstream fishway. Once the debris is removed, the headpond will be slowly refilled and the project will resume normal operations. Please let me know if you have any questions.

Thank you,

Jay Seyfried
Senior Compliance Specialist | NEROC Compliance

T 207.755.5615
C 207.312.8323
jason.seyfried@brookfieldrenewable.com

From:	Seyfried, Jason
To:	Paye, Laura; Pellerin, James (James.Pellerin@maine.gov); "Matt Buhyoff - NOAA Federal"; "Clark, Casey"; Dockens, Patrick E
Cc:	Brown, Adam; Lesure, Kevin; Thone, Eli; Mapletoft, Thomas; Murphy,Kyle; Pocquette, Kayla; Scarzello, Michael; Dorman, Randy; Mcdonough, Patrick
Subject:	To Agencies | Brunswick Project (FERC No. 2284-ME) Headpond Drawdown Notification Update

Good morning, the Brunswick Project downstream fishway blockage was successfully unplugged, the headpond is slowly refilling and normal operations will resume. Thanks, have a good weekend.

From: Seyfried, Jason
Sent: Tuesday, September 23, 2025 4:04 PM
To: Paye, Laura <laura.paye@maine.gov>; Pellerin, James (James.Pellerin@maine.gov) <james.pellerin@maine.gov>; 'Matt Buhyoff - NOAA Federal' <matt.buhyoff@noaa.gov>; 'Clark, Casey' <casey.clark@maine.gov>; Dockens, Patrick E <patrick_dockens@fws.gov>
Cc: Brown, Adam <Adam.Brown@brookfieldrenewable.com>; Lesure, Kevin <Kevin.Lesure@brookfieldrenewable.com>; Thone, Eli <Eli.Thone@brookfieldrenewable.com>; Mapletoft, Thomas <Thomas.Mapletoft@brookfieldrenewable.com>; Murphy,Kyle <Kyle.Murphy@brookfieldrenewable.com>; Pocquette, Kayla <Kayla.Pocquette@brookfieldrenewable.com>; Scarzello, Michael <Michael.Scarzello@brookfieldrenewable.com>; Dorman, Randy <Randy.Dorman@brookfieldrenewable.com>; Mcdonough, Patrick <Patrick.McDonough@brookfieldrenewable.com>
Subject: To Agencies | Brunswick Project (FERC No. 2284-ME) Headpond Drawdown Notification

Good afternoon,

I’m emailing to notify your agency that Brookfield White Pine Hydro will be drawing down the Brunswick Project (FERC No. 2284-ME) headpond (approximately 7 feet below normal) next Wednesday and Thursday, October 1st and 2nd to allow for the safe removal of woody debris from the downstream fishway. Please note that the upstream fishway will also dewatered at this time. Once the debris is removed, the headpond will be slowly refilled and the project will resume normal operations. Please let me know if you have any questions.

Thank you,

Jay Seyfried
Senior Compliance Specialist | NEROC Compliance

T 207.755.5615
C 207.312.8323
jason.seyfried@brookfieldrenewable.com

APPENDIX B: TAILWATER BENTHIC MACROINVERTEBRATE STUDY

TAILWATER BENTHIC MACROINVERTEBRATE STUDY
INITIAL STUDY REPORT
BRUNSWICK HYDROELECTRIC PROJECT
FERC NO. 2284

Submitted by:

Brookfield White Pine Hydro LLC
150 Main Street
Lewiston, ME 04240

Prepared by:

NORMANDEAU ASSOCIATES
ENVIRONMENTAL CONSULTANTS

January 2026

Brookfield

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LIST OF ABBREVIATIONS AND DEFINITIONS

BWPH	Brookfield White Pine Hydro LLC
CFR	Code of Federal Regulations
cfs	Cubic feet per second
EPT	Ephemeroptera, Plecoptera, Tricoptera
FERC	Federal Energy Regulatory Commission
HBI	Hilsenhoff Biotic Index
H’	Shannon Diversity Index
ILP	Integrated Licensing Process
ISR	Initial Study Report
MDEP	Maine Department of Environmental Protection
MW	Megawatt
NYSDEC	New York State Department of Environmental Conservation
PAD	Pre-Application Document
PSP	Proposed Study Plan
RSP	Revised Study Plan
SD1	Scoping Document 1
SD2	Scoping Document 2
SPD	Study Plan Determination

1 INTRODUCTION

Brookfield White Pine Hydro LLC (BWPH or Licensee) is licensed by the Federal Energy Regulatory Commission (FERC or Commission) to operate the 19-megawatt (MW) Brunswick Hydroelectric Project (Project) (FERC No. 2284). The Project is located on the Androscoggin River in the towns of Topsham and Brunswick, Maine. The Project straddles the border between Cumberland and Sagadahoc counties. The original license was issued on February 9, 1979, and expires on February 28, 2029.

BWPH is using FERC's Integrated Licensing Process (ILP) as established in Title 18 Code of Federal Regulations (CFR), Part 5. BWPH filed a Pre-Application Document (PAD) and Notice of Intent (NOI) to seek a new license for the Project on February 21, 2024. The PAD provides a description of the Project, including its structures, operations, and potentially affected resources. BWPH distributed the PAD and NOI simultaneously to Federal and state resource agencies, local governments, Native American tribes, members of the public, and others thought to be interested in the relicensing proceeding. Following the filing of the PAD, FERC prepared and issued Scoping Document 1 (SD1) on April 16, 2024. FERC also held agency and public scoping meetings and a site visit on May 7, 2024. The FERC Process Plan and Schedule provided agencies and interested parties an opportunity to file comments on the PAD and SD1 and request studies by June 20, 2024. FERC issued Scoping Document 2 (SD2) on July 29, 2024. BWPH filed a Proposed Study Plan (PSP) on August 2, 2024, and held study plan meetings on August 28 and October 9, 2024. The Revised Study Plan (RSP) was filed in accordance with the ILP schedule on December 2, 2024. FERC issued a Study Plan Determination (SPD) on December 30, 2024.

Specific to water quality resources, in the RSP BWPH proposed to conduct a Tailwater Benthic Macroinvertebrate Study, which was approved without modification in the SPD. This Initial Study Report (ISR) presents the results of the study, including the goals and objectives, methods, results, summary, and variances (if any) from the FERC approved study plan.

2 GOALS AND OBJECTIVES

The goal of this study was to determine if the river reach downstream of the Project is attaining Class B aquatic habitat and life criteria.

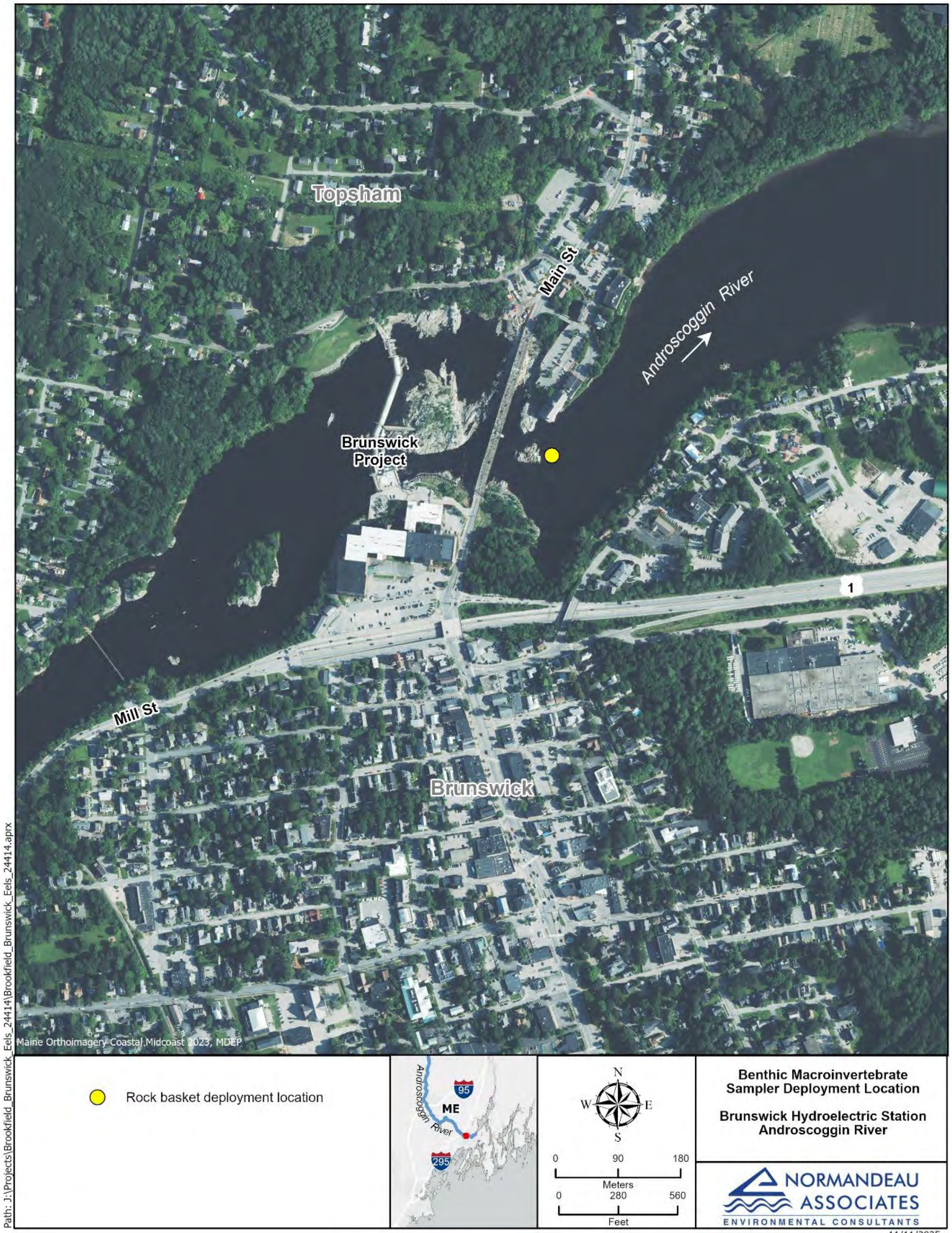
The study objective was to determine the composition of the benthic macroinvertebrate community within the tailrace reach.

3 PROJECT DESCRIPTION AND STUDY AREA

The Brunswick dam and powerhouse span the Androscoggin River immediately above the U.S. Route 201 bridge connecting Topsham and Brunswick, ME, at a site originally known as Brunswick Falls. The drainage area at the Project is 3,437 square miles while the average annual inflow to the Project is approximately 7,018 cubic feet per second (cfs). Water discharges through the powerhouse into a tailrace with a maximum depth of approximately 12 feet, a width of approximately 96 feet, and a length of approximately 300 feet. The tailrace is formed in excavated rock and has a U-shape cross section. The normal tailwater elevation is 2.5 feet, msl. Downstream of the Project, the river is tidally influenced for total river flows up to approximately 35,000 cfs.

The Tailwater Benthic Macroinvertebrate Study area was established in the reach of the Androscoggin River downstream of the Brunswick dam and powerhouse and the U.S. Route 201 bridge. Rock baskets were placed within 1,000 ft of Brunswick dam, at a location containing representative habitat and flow below the tailrace island (Figure 3-1).

Figure 3-1: Macroinvertebrate Rock Basket Deployment Location Downstream of the Brunswick Project Tailrace



4 METHODOLOGY

Benthic macroinvertebrate community sampling downstream of the Project was conducted following the MDEP's Methods for Biological Sampling and Analysis of Maine's Rivers and Streams (MDEP 2014) which presents the standard practices and procedures that have been adopted by MDEP to acquire benthic macroinvertebrate data for purposes of aquatic life classification attainment evaluation.

As described in the RSP, a set of three rock baskets were deployed at a sampling location downstream of the Project dam in the tailwater and within representative benthic macroinvertebrate habitat. An additional rock basket was deployed in the event one of the primary samplers was compromised during the deployment period. Samplers were filled with 7.25 ± 0.5 kg of clean, washed cobble graded to a uniform diameter range of 3.8-7.6 cm. Rock baskets were deployed during the late summer low-flow period from July 1 to September 30 specified in the MDEP protocol and remained in the river for the required 28 days (± 4 days). At the time of deployment, baskets were oriented parallel to stream flow and were placed at locations where there was a high degree of certainty that they would remain watered for the duration of the study period and were outside of any potential bank effects (Figure 4-1).

Figure 4-1: Rock Baskets Deployed at Sampling Location Downstream of Brunswick Dam, July 28 2025

At the completion of the exposure period, samplers were approached from the downstream side and collected by carefully lifting them into an aquatic sampling net of 500-micron mesh size (Figure 4-2). Following collection, the contents of the basket and net were placed in a 500-micron sieve bucket. The rock basket wires were carefully washed into the bucket to collect all specimens. Each rock was then visually inspected, and the surface washed clean into the sieve bucket. On completing the wash down, the contents of each individual rock basket were placed in double-labeled jars and preserved with a 70% solution of ethyl alcohol. Habitat and water quality measurements were collected at the time of deployment and retrieval at both sampling locations. Habitat parameters evaluated were those shown on the physical habitat data sheet included in the MDEP protocol. These included substrate composition, canopy coverage, land use, and terrain characteristics. Water quality measurements included velocity, temperature, specific conductance, dissolved oxygen, pH, and total dissolved solids. Also noted were the dates of exposure.

Figure 4-2: Rock Basket Retrieval Method Downstream of Brunswick Dam, August 26, 2025.

Benthos samples were sent to Normandeau's benthic taxonomy laboratory located in Stowe, Pennsylvania. Three of four samplers were randomly selected, sorted, and identified, following laboratory methods described by MDEP (2014). Samples were analyzed using stereo-zoom and compound microscopes. Organisms were identified and enumerated to the lowest practical taxon, generally genus and species, dependent on their age and condition using published taxonomic keys. Chironomidae (midges) larvae were slide mounted after being prepared in a clearing solution and identified using a compound microscope. Worms were also slide-mounted and identified using a compound microscope.

The results from the benthic taxonomy lab are entered into an MDEP excel template and provided to MDEP for use in their linear discriminant analysis. The following metrics were calculated to provide insight on macroinvertebrate samples collected downstream of Brunswick:

- **Total Number of Taxa**: The number of genera identified.
- **Number of EPT Taxa**: Number of genera in the insect orders Ephemeroptera (mayflies), Plecoptera (stoneflies) and Trichoptera (caddisflies), collectively referred to as the "EPT" taxa. These three groups of benthic insects are considered particularly sensitive to pollution.
- **Number of Ephemeroptera Taxa**: The number genera classified as mayflies.
- **Number of Plecoptera Taxa**: The number genera classified as stoneflies.
- **Number of Trichoptera Taxa**: The number genera classified as caddisflies.
- **Percent EPT**: The percentage of the total number of specimens in a sample representing individuals classified as mayflies, stoneflies or caddisflies.
- **Percent Ephemeroptera**: The percentage of the total number of specimens that are mayfly nymphs.
- **Number of Intolerant/Intermediate/Tolerant Taxa**: The number of genera considered to be sensitive (tolerance values = 0 – 3), intermediate (tolerance values = 4-6) and tolerant (tolerance values 7-10) to environmental perturbation.

- **Percent Intolerant/Intermediate/Tolerant specimens**: The percentage of sample specimens considered to be sensitive (tolerance values = 0 – 3), intermediate (tolerance values = 4-6) and tolerant (tolerance values 7-10) to environmental perturbation.
- **Percent Dominant Taxon**: The percent abundance of the single most abundant taxon.
- **Hilsenhoff Biotic Index (HBI)**: A weighted average of the tolerance values of all taxa present. Organisms are assigned a tolerance value from 0 to 10 indicating their sensitivity to organic pollutants (0 being most sensitive, 10 being most tolerant). HBI is calculated as:
    - HBI= $(\Sigma n_i \times a_i)/N$
        - Where:
            - n = number of specimens in taxa i
            - a = tolerance value of taxa i
            - N = total number of specimens in sample

- **Shannon Diversity Index (base e)**: This metric compares the distribution of individuals among all taxa present in a sample. Shannon Diversity (H') is calculated as $H' = \Sigma\, p_i \ln p_i$, where p_i is the proportion of the total number of individuals occurring in taxon i. Maximum diversity is obtained when the numbers of individuals are equally distributed among taxa. A value near zero indicates community dominance by a small number of taxa. Higher values indicate that the numbers of individuals are evenly distributed.

5 RESULTS

5.1 Habitat and Macroinvertebrate Collections

Macroinvertebrate samplers were deployed at the sampling location downstream of Project during low tide on July 28, 2025 and were retrieved 29 days later on August 26, 2025. Recorded physical and habitat parameters at the time of deployment and retrieval are summarized in Table 5-1. In general, aquatic habitat in the area downstream of the Project was primarily a mix of sand (<1/8 in.) and bedrock, with an even distribution of boulder (<10 in.) and rubble (3-10 in.) substrates. Canopy cover was open (0-25% shaded), with 90% of daily direct sun.

Table 5-1: Physical and Habitat Characteristics at Time of Deployment and Retrieval of Rock Basket Samplers Downstream of Brunswick Dam.

Parameter	*Sample Location*	
	Deployment	**Retrieval**
Date-Time	7/28/2025 – 11:21	8/26/2025-13:35
No. Samplers	3	3
Coordinates	43.92051, -69.96495	
Land Use (500 m radius US)	Urban	
Terrain (500 m radius US)	Hilly	
Canopy Cover (upstream view)	Open (0-25% shaded)	
Physical Bottom Characteristics	Sand (<1/8”) - 40% Bedrock - 30% Boulders (<10”) - 15% Rubble (3”-10”) – 15%	
Channel Width (m)	137	
Time	11:21	13:20
Site Depth (cm)	91.44	94.5
Flow (cm/s)	8.99	6.1
Dissolved O_2 (mg/L)	7.87	8.34
Temperature (ºC)	24.5	23.8
pH	7.02	7.62
SPC (µS/cm)	78.4	93.2
TDS (ppm)	51	61
Observations		
Fish	Small bait fish and sturgeon breaching	
Algae/Macrophytes	Minimal	
Habitat Quality	Good in appearance	
Dams/Impoundments	Downstream of Brunswick Dam	
Discharges	Powerhouse, Downstream of Route 201 Bridge	
Nonpoint stressors	Impervious surfaces and urbanization, storm water runoff. Ongoing Route 201 bridge construction as potential nonpoint stress.	

5.2 Macroinvertebrate Metrics

Three of four benthos samples were selected, sorted and identified to the lowest discernable taxon level (typically genus). Subsampling was employed at a 1:4 ratio as each sample included greater than 500 individuals. Per MDEP protocols, the same subsample ratio was applied to all samples (Appendix A).

The total number of specimens enumerated from rock basket samplers deployed within the tidal tailwater region downstream of Brunswick Dam ranged from 224 to 322 individuals (Table 5-2). The cumulative total of 825 specimens represented a total of 38 genus-level taxonomic classifications. When examined by replicate, the number of genera observed among the three rock basket samples ranged between 20 and 28.

Among the 38 total taxa identified from the tidal tailwater region downstream of Brunswick Dam, 14 were identified as belonging to EPT (Ephemeroptera [5], Plecoptera [1], or Trichoptera [8]) families. EPT species, often more sensitive to environmental stressors, are informative on a river's biological condition and accounted for 20.7% of the total number or organisms downstream of Brunswick. Mayfly species accounted for 7.2% of the total number of specimens observed (Table 5-2). Twenty-eight of the 38 genus level taxa were assigned a tolerance value based on the HI values from the MDEP Macroinvertebrate Taxa List. Six genera of the 28 identified were identified as intolerant, representing 5.6% of all specimens. Genera identified as tolerant (n = 9) represented 50.8% of all specimens. The Hilsenhoff Biotic Index value (HBI) was 6.9, supporting a finding of "Fairly Poor" water quality and indicative of increased organic pollution (Hilsenhoff 1987).

The dominant taxon produced among all three replicates was a midge (*Dicrotendipes neomodestus*), a species with high tolerance for environmentally stressed conditions. This species represented 26.7% of all specimens enumerated from the samplers set downstream of Brunswick Dam. The Shannon Diversity index score of 2.59 trends towards balance in the distribution of individuals among all taxa present.

Table 5-2: Summary of Macroinvertebrate Metrics for Rock Basket Samplers Collected from the Tailwater Downstream of Brunswick, August 2025.

Metric	Replicate			
	1	2	3	All
Total Number of Individuals	224	322	279	825
Total Number of Taxa (genus level)	25	28	20	38
Number of EPT Taxa (genus level)	9	11	8	14
Number of Ephemeroptera Taxa (genus level)	4	4	3	5
Number of Plecoptera Taxa (genus level)	0	1	0	1
Number of Trichoptera Taxa (genus level)	5	6	5	8
Percent EPT Specimens	22.8%	25.2%	14.0%	20.7%
Percent Ephemeroptera Specimens	11.6%	6.8%	3.9%	7.2%
Number of Intolerant Taxa (genus level)	3	5	2	6
Number of Intermediate Taxa (genus level)	9	11	5	13
Number of Tolerant Taxa (genus level)	7	7	8	9
Percent Intolerant Organisms	6.3%	7.8%	2.5%	5.6%
Percent Intermediate Organisms	23.2%	20.8%	6.1%	16.5%
Percent Tolerant Organisms	47.3%	43.8%	61.6%	50.8%
Percent Dominant Taxon (genus level)	33.0%	17.4%	32.3%	26.7%
Hilsenhoff Biotic Index	6.60	6.60	7.52	6.90
HBI Water Quality Rating	Fairly Poor	Fairly Poor	Poor	Fairly Poor
Shannon Diversity (base e)	2.41	2.71	2.16	2.59

5.3 Water Quality Classification Standards

The statutory class of the Androscoggin River downstream of Brunswick is Class B. Class B waters must meet standards ensuring they are suitable for the designated uses of drinking water supply after treatment, agriculture, fishing, recreation in and on water, industrial process and cooling water supply, navigation, habitat for fish and other aquatic life (the habitat must be characterized as unimpaired), and hydroelectric power generation, except as prohibited under Title 12, section 403. The dissolved oxygen content of Class B waters may not be less than 7 parts per million or 75% of saturation, whichever is higher.

A full listing of taxonomic classifications and abundance values for each of the three replicates from the downstream sampling location as well as all the physical data collected during deployment and retrieval of the samplers were provided to MDEP on October 22, 2025. The determination as to whether the macroinvertebrate community sampled downstream of Brunswick meets the aquatic life criteria for that section of the Androscoggin River will be informed based on the outcome of MDEP's aquatic life statistical decision models. Given the tidal nature of habitat downstream of Brunswick Dam, MDEP may apply professional judgement for adjustment of the resulting classification attainment decision (MDEP 2014). BWPH provided taxonomic and habitat information to the MDEP on October 22, 2025 (Appendix B).

6 SUMMARY

Rock basket samplers were successfully deployed at representative habitat within the 1,000 foot reach downstream of Brunswick Dam following the deployment and retrieval methodology outlined by MDEP (2014). Samplers were installed on July 28 and retrieved on August 26 (a deployment duration of 29 days). Taxonomic samples were processed by Normandeau and resulted in a total number of specimens from the tidal tailwater region downstream of Brunswick Dam of 825 individuals. The number of organisms per sampler ranged from 224 to 322 individuals, readily attaining the minimum average number of organisms per sampler identified by MDEP in their sampling criteria. The cumulative total of 825 specimens represented a total of 38 genus-level taxonomic classifications.

BWPH provided taxonomic and habitat information to MDEP on October 22, 2025. BWPH is currently awaiting the results of MDEP's linear discriminant analysis for the determination of attainment of water quality standards for the reach downstream of Brunswick Dam as sampled during 2025 (Appendix B).

7 VARIANCES FROM THE FERC APPROVED STUDY PLAN

The Tailwater Benthic Macroinvertebrate Study was conducted following the methodology outlined in the RSP and approved by FERC without modification in their SPD.

8 REFERENCES

MDEP. 2022. Sampling Protocol for Hydropower Studies. April 10, 2022

MDEP 2014. Methods for Biological Sampling and Analysis of Maine's Rivers and Streams. Prepared by: Davies, S. P. and Tsomides, L. DEP LW0387-C2014. Latest Revision: 2014

Hilsenhoff, W.L. 1987. An improved biotic index of stream pollution. The Great Lakes Entomologist 20: 31-36.

APPENDIX A. TAXONOMIC LISTING FOR MACROINVERTEBRATE SAMPLES COLLECTED DOWNSTREAM OF BRUNSWICK DAM DURING AUGUST 2025.

	Taxon			No. identified from sample		
Maine Code	Taxon Name	Stage	Comment	Rep 1	Rep 2	Rep 3
03010102	*Dugesiidae*			26	10	43
08020202009	*Nais*					1
08020202014001	*Stylaria fossularis*			2		
10010104013	*Amnicola*			7	34	17
10010204035	*Ferrissia*					1
10010201021	*Fossaria*				1	
10010202027	*Physa*			15	42	21
10010101001	*Valvata*			1		
09030111001	*Arrenurus*				1	
09020401007011	*Acerpenna pygmaea*			6	9	
09020412040	*Caenis*					1
09020402015	*Maccaffertium*			18	10	2
09020402014	*Stenacron*			1	1	8
09020411038	*Tricorythodes*			1	2	
09020207	*Perlodidae*				1	
09020609	*Brachycentridae*			1		
09020604015	*Cheumatopsyche*				1	1
09020618072	*Ceraclea*			4		
09020607026	*Hydroptila*			13	17	3
09020618074	*Nectopsyche*				3	1
09020618078	*Oecetis*			6	33	19
09020607028	*Oxyethira*				2	
09020603010	*Polycentropus*			1	2	4
09021104032	*Dineutus*				1	
09021011001004	*Ablabesmyia mallochi*			19	31	45
09021011036	*Corynoneura*			1		
#N/A	*Cricotopus/Orthocladius complex sp.*			4	14	3
09021011085152	*Dicrotendipes neomodestus*			74	56	90
09021011008022	*Labrundinia pilosella*				1	3
09021011094166	*Microtendipes pedellus group*				2	
09021011012027	*Nilotanypus fimbriatus*			1		
09021011102182	*Polypedilum flavum*				4	
09021011102185	*Polypedilum illinoense group*				4	
09021011056103	*Psectrocladius psilopterus group*			1	5	3
09021011078	*Pseudochironomus*			6	2	
09021011061	*Synorthocladius*			9	14	6
09021011076	*Tanytarsus*			5	14	7
09021011065113	*Tvetenia vitracies*			1		
09021016057	*Hemerodromia*			1	5	

Total Benthos	**224**	**322**	**279**
Total OTUs	**25**	**29**	**20**
Total spp.			

APPENDIX B. MDEP CLASSIFICATION ATTAINMENT REPORT FOR SAMPLE LOCATION DOWNSTREAM OF BRUNSWICK DURING AUGUST 2025.

BWPH provided taxonomic and habitat information to MDEP on October 22, 2025. BWPH is currently awaiting the results of MDEP's linear discriminant analysis for the determination of attainment of water quality standards for the reach downstream of Brunswick Dam as sampled during 2025.

APPENDIX C: COMPUTATIONAL FLUID DYNAMICS MODELING STUDY SUMMARY

Computational Fluid Dynamics and Two-Dimensional Hydraulic Modeling Study Summary

The goal of this study is to determine the flow field conditions and how they may be affecting migratory fish behavior and movements in the vicinity of the Project forebay/downstream fishway entrance, the Project tailrace/near the entrance of the upstream fish passage facility, and in the channel downstream of the spillway. The information from this study will be coupled with the *Upstream and Downstream Passage Alternatives Study* to evaluate potential modifications to the upstream and downstream fish passage facilities at the Project.

The objective of this study is to develop a series of layered drawings that show velocity magnitude and orientation under various operational conditions. The results of the modeling will demonstrate velocities and flow orientations in the vicinity of the Project's upstream and downstream fish passage facility entrances, as well as in the channel downstream of the spillway.

Study Progress Summary

Task 1: Collect Field Data

Water surface elevations and water depths were collected in the Project impoundment (including the forebay/downstream fishway entrance) and tailrace portions of the study area on June 25-27, 2025. Data collection was completed in the channel downstream of the spillway, as well as the Project impoundment to fill in data gaps on September 16-17, 2025. These data were used to create bathymetric maps of the study areas as described in Task 2. Water column velocities/profiles were also collected for use during model validation.

Task 2: Compile Model Input Datasets

Utilizing existing GIS elevation data and the bathymetric data collected in Task 1, a three-dimensional surface of the study area riverbed was constructed (Figure C-1). Project drawings and elevations/field measurements collected in Task 1 were used to develop three-dimensional representations of the intake, fish passage structures, and other pertinent Project facilities to adequately model the flow field conditions that exist in the vicinity of the upstream and downstream fish passage facility entrances, as well as in the channel below the spillway (Figure C-2).

Task 3: Develop and Validate Three-Dimensional CFD Model

This task is underway and anticipated to be completed in the first quarter of 2026. The input files developed in Task 2 are being used to build two three-dimensional CFD models (i.e., Forebay Model, Tailrace Model). The Forebay Model and Tailrace Model will each include a large-scale model and a small-scale model to evaluate a range of flow conditions.

Task 4: Develop and Validate 2D Model

This task is underway and anticipated to be completed in the first quarter of 2026. The input files developed in Task 2 are being used to build a 2D hydraulic model of the spillway channel area.

Task 5: Conduct Model Production Runs

This task is coupled with the *Upstream and Downstream Passage Alternatives Study* and will be conducted after the upstream and downstream passage alternatives have been finalized in consultation with stakeholders. It is anticipated that this task will occur over the course of the first and second quarters of 2026.

Model scenarios evaluated may include differing flow magnitudes, water levels, structure layouts, and/or operating conditions. The scenarios will be developed in conjunction with stakeholders. The results of these model runs will provide a better understanding of the hydraulics in the vicinity of the upstream and downstream fish passage facility entrances, as well as in the channel below the spillway.

Task 6: Report Findings

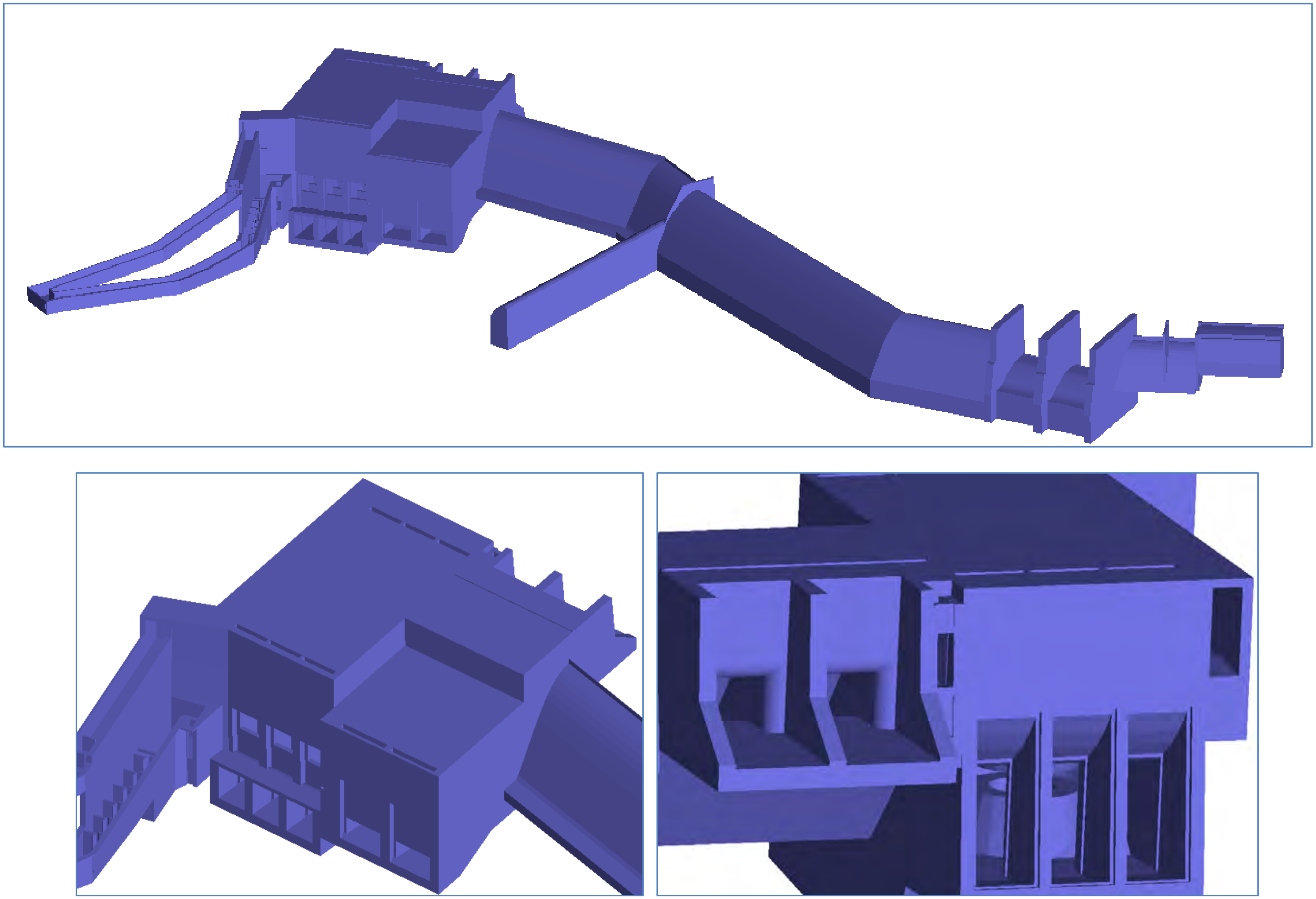
A draft report that summarizes data collection efforts, model development and validation will be developed and made available during the second quarter of 2026 to stakeholders. A final report will be included in the USR containing results of model production runs developed in consultation with stakeholders (January 2027).

Variances from Study Plan and Schedule

There have been no variances from the FERC approved study plan.

Figure C-1: Three-Dimensional Surface – Riverbed

Figure C-2: Three-Dimensional Surface – Project Structures Overview



APPENDIX D: UPSTREAM AND DOWNSTREAM FISH PASSAGE ALTERNATIVES STUDY SUMMARY

Upstream and Downstream Fish Passage Alternatives Study Summary

The goal of this study is to determine conceptual options and expected performance for improved upstream and downstream passage that will reduce delay and increase passage efficiency for American Eel, Blueback Herring, Alewives, American Shad, and Atlantic Salmon. As detailed in the RSP, the Upstream and Downstream Passage Alternatives Study is a multi-year study that will extend into 2026.

Task 1: Phase 1-Alternatives Analysis

This task entails the development of an interim report that will identify upstream and downstream passage alternatives that will be evaluated as part of this study. The alternatives to be evaluated will be identified based on review of applicable Project-specific information, findings from previous radio telemetry studies conducted at the Project, information from other projects in the region with similar configurations, review of current agency design guidelines, a literature review of existing and new upstream and downstream passage technologies, and consultation with resource agencies.

To date, BWPH has developed screening matrices and conceptual sketches for upstream and downstream fish passage alternatives (2 matrices total) based on the initial informational gathering and review of agency design guidelines. The upstream and downstream passage matrices include a general description of each alternative, evaluation criteria, relative comparison of costs, and operational considerations. A follow-up resource agency meeting is scheduled for January 2026, to review the initial list of alternatives with the goal of obtaining concurrence on the list of alternatives for further detailed evaluation.

Once the list of alternatives is finalized, the Phase 1 Alternative Analysis Report will be developed in the first quarter of 2026. The report will include the final screening matrices and conceptual sketches for each alternative.

Task 2: Phase 2-Feasibility Assessment

This task is still outstanding. Once BWPH and resource agencies have identified the set of alternatives to be evaluated, BWPH will conduct a feasibility assessment of each alternative based on their potential application at the Project. This task will also incorporate the Computational Fluid Dynamics (CFD) model as well as Diadromous Fish Behavior, Movement, and Project Interactions Study results. BWPH anticipates this task will occur over the course of the second and third quarters of 2026.

The feasibility analysis will include a ranking of alternatives (e.g., feasible, potentially feasible, not feasible), pros/cons of the alternatives, and order-of-magnitude cost estimates for installation, operation, and maintenance.

Task 3: Report

This task is still outstanding. A study report will be developed that provides the results of the alternatives analysis, resource agency consultation, and the feasibility assessment. Conceptual engineering designs of the most feasible alternatives will be provided. BWPH anticipates commencing report development during the fourth quarter of 2026. The final study report will be included in the USR.

Task 4: Resource Agency Consultation

This task is ongoing. The RSP details various consultation opportunities over the course of the study. BWPH is scheduled to meet with resource agencies on January2026 to gather feedback on the initial list of alternatives described in the screening matrices.

The Phase 1 Alternative Analysis Report will be provided to resource agencies for their review and comment in the first quarter of 2026. A consultation meeting will be held to discuss the report findings.

The feasibility assessment will be informed by the results of the CFD model. Model scenarios evaluated may include differing flow magnitudes, structure layouts, and/or operational conditions. The final set of model scenarios will be developed in consultation with the agencies during the first and second quarters of 2026.

BWPH will provide a report to resource agencies detailing the results of the feasibility assessment and will convene a meeting to discuss the results of the study.

Variances from Study Plan and Schedule

There have been no variances from the FERC approved study plan.

APPENDIX E: VISUAL SURVEYS OF UPSTREAM AMERICAN EEL MOVEMENTS

VISUAL SURVEYS OF UPSTREAM AMERICAN EEL MOVEMENTS

INITIAL STUDY REPORT

BRUNSWICK HYDROELECTRIC PROJECT

FERC NO. 2284

Submitted by:

Brookfield White Pine Hydro LLC
150 Main Street
Lewiston, ME 04240

Prepared by:

NORMANDEAU ASSOCIATES
ENVIRONMENTAL CONSULTANTS

January 2026

Brookfield

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LIST OF ABBREVIATIONS AND DEFINITIONS

BWPH	Brookfield White Pine Hydro LLC
C	Celsius
CFR	Code of Federal Regulations
CPUE	Catch Per Unit of Effort
cfs	Cubic feet per second
FERC	Federal Energy Regulatory Commission
GPS	Global Positioning System
ILP	Integrated Licensing Process
ISR	Initial Study Report
MDMR	Maine Department of Marine Resources
ME	Maine
MW	Megawatt
NOI	Notice of Intent
PAD	Preliminary Application Document
PSP	Preliminary Study Plan
Project	Brunswick Hydroelectric Project (FERC No. 2284)
RSP	Revised Study Plan
RM	River Mile
SD1	Scoping Document 1
SD2	Scoping Document 2
SPD	Study Plan Determination
USFWS	United States Fish and Wildlife Service

1 INTRODUCTION

Brookfield White Pine Hydro LLC (BWPH or Licensee) is licensed by the Federal Energy Regulatory Commission (FERC or Commission) to operate the 19-megawatt (MW) Brunswick Hydroelectric Project (Project) (FERC No. 2284). The Project is located on the Androscoggin River in the towns of Topsham and Brunswick, Maine. The Project straddles the border between Cumberland and Sagadahoc counties. The original license was issued on February 9, 1979, and expires on February 28, 2029.

BWPH is using FERC's Integrated Licensing Process (ILP) as established in Title 18 Code of Federal Regulations (CFR), Part 5. BWPH filed a Pre-Application Document (PAD) and Notice of Intent (NOI) to seek a new license for the Project on February 21, 2024. The PAD provides a description of the Project, including its structures, operations, and potentially affected resources. BWPH distributed the PAD and NOI simultaneously to Federal and state resource agencies, local governments, Native American tribes, members of the public, and others thought to be interested in the relicensing proceeding. Following the filing of the PAD, FERC prepared and issued Scoping Document 1 (SD1) on April 16, 2024. FERC also held agency and public scoping meetings and a site visit on May 7, 2024. The FERC Process Plan and Schedule provided agencies and interested parties an opportunity to file comments on the PAD and SD1 and request studies by June 20, 2024. FERC issued Scoping Document 2 (SD2) on July 29, 2024. BWPH filed a Proposed Study Plan (PSP) on August 2, 2024, and held study plan meetings on August 28 and October 9, 2024. The Revised Study Plan (RSP) was filed in accordance with the ILP schedule on December 2, 2024. FERC issued a Study Plan Determination (SPD) on December 30, 2024.

Specific to aquatics and fisheries resources, in the RSP, BWPH proposed to conduct a Visual Surveys of Upstream American Eel Movements Study, which was approved with modification in the SPD. This Initial Study Report (ISR) presents the results of the study, including the goals and objectives, methods, results, summary, and variances (if any) from the FERC approved study plan.

2 GOALS AND OBJECTIVES

The goal of the study was to determine the presence and abundance of American Eel at the Project and evaluate the need and potential location of an upstream eel passage system. The objectives for the study were to:

- Conduct systematic visual surveys of American Eel presence/abundance at the Project and identify where they concentrate when staging in pools or attempt to ascend wetted structures;
- Install temporary eel traps/ramps to operate one nighttime period per week in association with each of the systematic visual surveys; and
- Identify potential locations that may be viable for a permanent eel trap/pass structure.

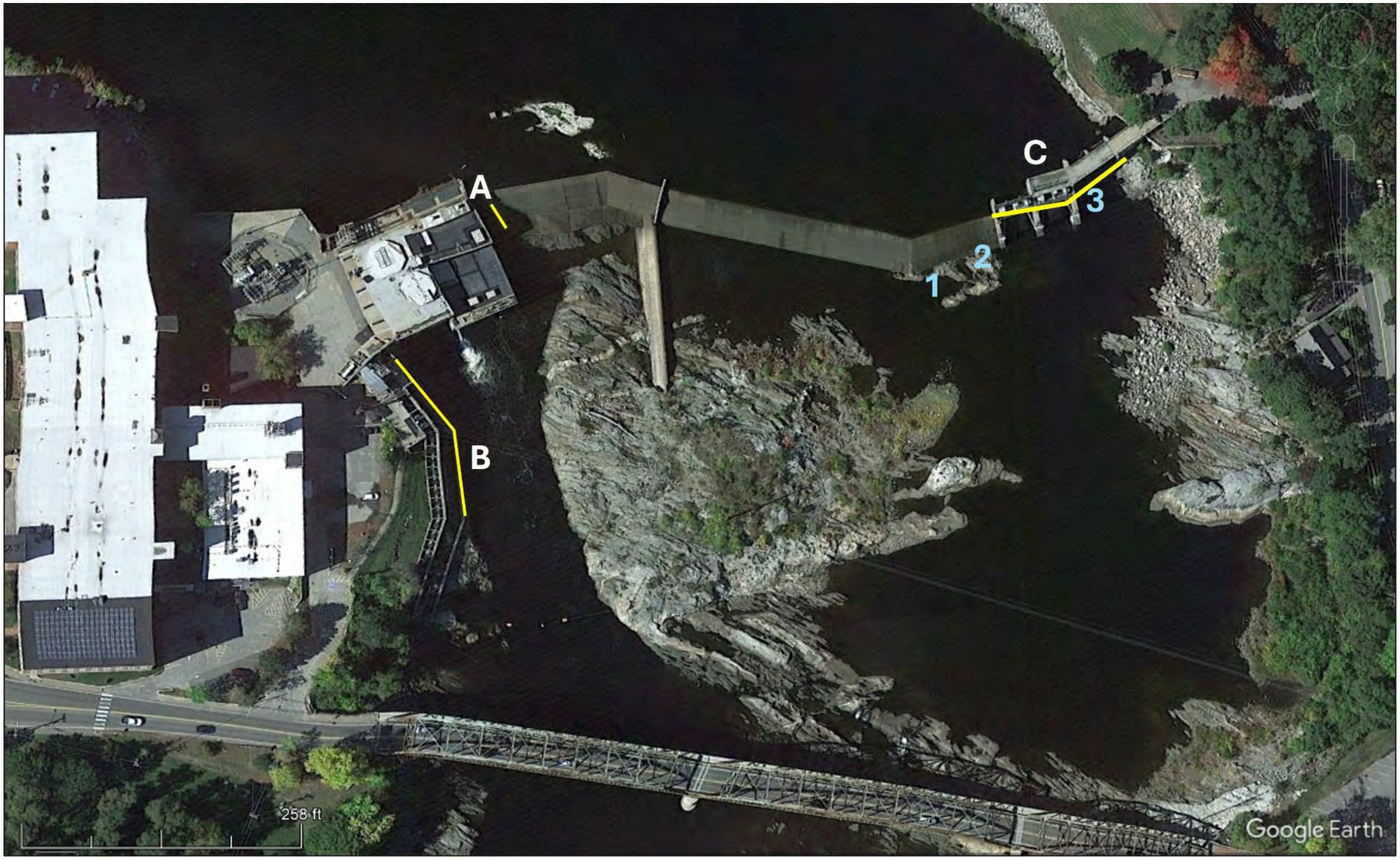
3 PROJECT DESCRIPTION AND STUDY AREA

The Project is located on the Androscoggin River at the head-of-tide at approximately river mile (RM) 6 in the Towns of Brunswick and Topsham, ME. The Project straddles the border between Cumberland and Sagadahoc counties. The Project dam is the first dam on the mainstem of the Androscoggin River. The dam and powerhouse span the Androscoggin River immediately above the U.S. Route 201 bridge connecting Topsham and Brunswick, ME, at a site originally known as Brunswick Falls. The drainage area at the Project is 3,437 square miles while the average annual inflow to the Project is approximately 7,018 cubic feet per second (cfs).

The Project consists of a 4.5-mile-long, 175-acre impoundment; an 830-foot-long and 40-foot-high concrete gravity dam with a gate section containing two Tainter gates and an emergency spillway; an intake and a powerhouse containing three turbine-generating units with an authorized rating of 19.0 megawatt (MW). The Project also has a vertical slot upstream fishway, a downstream fish bypass, a 21-foot-high fish barrier wall between the dam and Shad Island, and a 3-foot-high by 20-foot-long concrete fish barrier weir across Granney Hole Stream in Topsham.

The study area for the Visual Surveys of Upstream American Eel Movements Study included the downstream face of the dam and associated Project structures as well as adjacent aquatic habitat in the powerhouse tailrace and the spillway bypass area in the vicinity of the Tainter gate structures. The relative locations of designated visual survey locations A (i.e., the area overlooking the ogee overflow spillway adjacent to the powerhouse), B (i.e., the entrance and lower section of the existing upstream fishway up through the 180 degree turn pool), and C (i.e., the deck structure on the Topsham side of the river overlooking the Tainter gate structures) and interim ramp locations 1, 2, and 3 are presented in Figure 3-1.

Figure 3-1: Planned Visual Survey Locations (A-C) and Prospective Interim Trap Locations (1-3) at the Brunswick Project During the Visual Survey of Upstream American Eel Movements Study.



4 STUDY METHODOLOGY

4.1 Nighttime Visual Surveys

Three vantage points were identified in the RSP to permit the collection of visual eel observation data at Brunswick Dam. Surveys were conducted once per week over a 12-week period beginning in early-June through late August and initiated at least 30 minutes after sunset. To prevent personnel from being positioned downstream of the Project dam and spillway during the nighttime viewing hours, the three vantage points were established at safely accessible locations along existing Project structures (i.e. walkways behind railings) and included: A) the area overlooking the ogee overflow spillway adjacent to the powerhouse, B) the entrance and lower section of the existing upstream fishway up through the 180 degree turn pool, and C) the deck structure on the Topsham side of the river overlooking the Tainter gate structures (Figure 3-1). Field personnel were equipped with spotlights fitted with red light filters and binoculars to facilitate observations during each of the surveys. Nighttime visual survey events were conducted concurrent with the deployment of temporary ramp/trap structures (see Section 4.2) and as a result, the specific timing of each weekly event required advance coordination with BWPH operations staff to ensure a water management plan and lock-out tag-out protocol were in place to facilitate installation of the temporary traps.

For each survey date, the duration and timing, water temperature, and observations of eels (i.e., presence/absence, abundance, notable behavior, and distribution among pre-defined size classes) were recorded. Information related to weather, lunar cycle, and notes related to observations of Project operations (i.e., generation and spill) were also recorded for each survey. Descriptions of leakage and other physical conditions of potential migration pathways were noted.

4.2 Temporary Eel Ramps/Traps

In the December 30, 2024 SPD, FERC recommended that BWPH supplement findings from the visual surveys (see Section 4.1) and consult with the resource agencies to identify at least three locations at which to install temporary eel ramps/traps. The temporary eel ramps were operated once weekly, concurrent with each visual survey. Temporary eel ramps were installed during the daylight hours prior to each nighttime survey and viewed (as allowable from vantage points defined in Section 4.1) during the survey. The temporary eel ramps were removed the following day during daylight hours and the total catch of eels was recorded at each location.

BWPH and Normandeau staff met onsite with representatives from the Maine Department of Marine Resources (MDMR) on May 30, 2025. At that time, three prospective locations for the placement of the temporary eel ramps were identified in the portion of the spillway bypass area in the vicinity of the Tainter gate structures.

Temporary eel ramps deployed downstream of Brunswick were manufactured by Lakeside Engineering and consisted of an adjustable aluminum ramp with ABS plastic formed in a V-shaped hybrid pattern and covered to prevent any predation (Figure 4-1). The adjustable ramp section was 5.5 feet long and 18 inches wide. A collection bucket with a screened overflow and lid was installed to capture any climbing eels. Water for attraction and ramp conveyance flows was supplied by a ½ horsepower submersible pump installed in the headpond. A manifold on the upper deck of the Tainter gate structure served to distribute the water via a pair of ¾ inch hoses to each temporary eel ramp. At each temporary eel trap, one hose supplied directional nozzles providing refresh water to the collection tank and conveyance flow to the ramp surface while the second hose provided supplemental attraction flow at the ramp entrance.

Figure 4-1: Images of the Temporary Eel Ramps Manufactured by Lakeside Engineering and Installed Downstream of the Project During the Visual Surveys of Upstream American Eel Movements Study Showing Installed Set-up (left image), Refresh and Conveyance Flow Nozzles (center image) and Holding Tank (right image).

5 RESULTS

5.1 River and Operational Conditions

Total river flow, as distributed between turbine generation and spill flow at the Project during the 12-week upstream American eel survey period (second week of June through last week of August 2025), is presented in Figure 5-1. Overall spill flow (including fishway flows, downstream bypass, Tainter gates, and overtopping of dam crest) was greatest at the onset of the 12-week study period and reduced through the summer. Similarly, the station attained full generation across all three units during the first study week then alternated turbine operation (either Unit 1 online or Units 2 and/or 3 online). Inflow dropped below the maximum station capacity flow of 7,475 cfs on June 11 and remained below that level for the remainder of the 12-week survey period. During all nighttime visual survey events, headpond elevation was below dam crest elevation (39.4 msl). Survey crews noted observations indicating small amounts of observable flow over the spillway structure that was associated with slight overtopping at full pond.

5.2 Nighttime Visual Surveys

Nighttime visual surveys were conducted once weekly over the 12-week period beginning on June 11 and ending on August 26, 2025. Survey timing and associated operational and environmental conditions including unit generation, spill flow, weather conditions, water temperature, air temperature, and percent moon illumination are presented in Table 5-1. In general, nighttime visual surveys at the Project were initiated between 20:00 and 22:00 and were completed within 1 to 1.5 hours. Figure 5-2 summarizes the number of survey events meeting various environmental and operational conditions. Most surveys occurred on dates when water temperature was greater than 22 ºC and weather conditions at the time of survey were clear or cloudy. Survey events were uniformly divided among dates where the percentage moon illumination ranged from 0-25%, 25-50%, 50-75% or 75-100%. Tidal conditions for most survey events consisted of ebb flows. At least one turbine was online during most survey events. Approximately 100 cfs was passed through the river right Tainter gate during all survey events while overflow spill conditions were limited to only two dates.

Table 5-2 provides the recorded visual estimates of eel abundance among the three survey vantage points (i.e., A, B, and C) by survey date and size class along with cumulative estimates for the 12-week study period. Across all nighttime visual survey events and vantage points, over 35,000 juvenile American eels were estimated downstream of the Project. Juvenile eels were observed on all 12 survey dates with observations peaking during late-June/early-July and again during late-July. Cumulative juvenile eel estimates then declined from late July through August. Based on the observed estimates, approximately 98% of eels were less than 6-inches in length whereas eels in the 6–12-inch range and those greater than 12 inches made up approximately 2% of the total estimated. Abundance estimates are also presented graphically in Figure 5-3. Figure 5-4 presents observed abundance in relation to local atmospheric pressure, air temperature, daily rainfall amounts, lunar illumination, station inflow, and tidal conditions. A full list of juvenile eel abundance estimates by survey date and location is provided as Appendix A.

Vantage Point A: Overflow Spillway Adjacent to Powerhouse

There were no observations of juvenile eels from the area overlooking the ogee overflow spillway adjacent to the powerhouse (i.e., vantage point A) over the duration of the 12-week survey period. Field observations during the June 26 and July 2 survey dates noted the presence of spill flow across the overflow dam section, inhibiting the ability of surveyors to identify any eels which may have been present along the dam face. This area required all visual observations to be conducted from a distance (approx. 100 ft) as well as the use of spotlights and binoculars. During most surveys, this area of the spillway was dry with minimal to no leakage to attract eels.

Vantage Point B: Lower Section of the Existing Upstream Fishway

An estimated 912 juvenile eels were observed from vantage point B over the 12-week study period. Most eels (~70%) observed along the lower upstream fishway were recorded during the first two survey events (Figure 5-2) which corresponded to a period of generally decreasing Project flow (Figure 5-4). The relative spatial positioning of juvenile eel observations from vantage point B (by survey date) is presented in Figure 5-5 and the relative abundance of juvenile eels within that spatial distribution is presented in Figure 5-6. Juvenile eels were observed actively swimming and climbing on wetted rocks in the reaches downstream of the fish ladder and within the fish ladder pools as well as ascending wetted concrete parts of the fishway structure (Figure 5-7). Most large juvenile eels (i.e., those > 12 inches) were observed at this location, primarily in the reach downstream of the fishway (Table 5-3).

Vantage Point C: Tainter Gate Area

Over the 12-week survey period, approximately 97% of all juvenile eels observed at the Project were observed from vantage point C in the vicinity of the Tainter gates on the spillway side of the Project (Table 5-2; Figure 5-3). Juvenile eels were observed on all sampled dates throughout the 12-week survey period with peak activity occurring in late June/early July and again during late July/early August. Most eels (98% of the total) observed from vantage point C were less than 6 inches in total length (Table 5-2). During peak abundance, juvenile eels were observed climbing on wetted bedrock and concrete portions of the river-left spillway and areas of leakage through the left Tainter gate that remained closed (river right Tainter gate was passing approximately 100 cfs during all surveys). The relative spatial positioning of juvenile eel observations from vantage point C (by survey date) is presented in Figure 5-8 and the relative abundance of juvenile eels within that spatial distribution is presented in Figure 5-9. Figure 5-10 highlights the areas of concentration where juvenile eels were observed using leakage to ascend wetted rock and bedrock sections of the river left Tainter gate and spillway abutting the river left shoreline.

Table 5-1: Operational and Environmental Conditions for Each Brunswick Juvenile Eel Nighttime Visual Survey During 2025.

Survey Date	Start Time (hh:mm)	Survey Duration (hh:mm)	Weather	Water Temp (ºC)	Air Temp	Moon Percent Illum.	Unit 1 (cfs)	Unit 2 (cfs)	Unit 3 (cfs)	Spill Observed at Survey Area A	Spill Observed at Survey Area C	Spill at Tainter Gates
6/11/2025	21:25	0:59	Clear	19.1	18.8	100	4,537	1,333	1,304	No	No	Yes
6/19/2025	21:20	1:25	Mostly Clear	20.7	22.8	36	4,018	0	0	No	No	Yes
6/26/2025	21:10	1:38	Mostly Cloudy	23.5	15.6	4	0	1,422	1,394	*Yes	*Yes	Yes
7/2/2025	21:00	1:10	Mostly Clear	25.6	22.2	52	4,167	475	0	*Yes	*Yes	Yes
7/10/2025	20:58	1:00	Cloudy	24.3	17.8	100	0	1,368	1,349	No	No	Yes
7/17/2025	20:48	0:57	Mostly Clear	26.2	23.9	50	4,598	0	0	No	No	Yes
7/23/2025	20:45	1:01	Mostly Clear	25.0	19.4	11	0	1,359	1,015	No	No	Yes
7/30/2025	20:35	0:59	Mostly Cloudy	27.0	22.8	36	0	1,339	1,073	No	No	Yes
8/6/2025	20:26	0:59	Cloudy	25.4	18.8	94	0	1,375	1,084	No	No	Yes
8/12/2025	20:18	1:08	Clear	26.7	24.4	84	0	1,341	0	No	No	Yes
8/19/2025	20:13	0:42	Mostly Cloudy	24.4	16.7	12	0	1,355	0	No	No	Yes
8/26/2025	20:14	0:53	Mostly Clear	24.5	19.4	14	0	1,003	0	No	No	Yes

*Indicates that the headpond level was below dam crest elevation (39.4), but survey crew noted observable flow over the spillway structure. This represented minimal overtopping, leakage or small amounts of water being blown over the spillway from a mostly full headpond.

Table 5-2: Nighttime Visual Survey Eel Counts by Vantage Point (A, B, or C) and Size Class (0-6”, 6-12”, or >12”) at Brunswick During 2025

Date	Vantage Point A				Vantage Point B				Vantage Point C				Total Count
	0-6"	6-12"	>12"	Total	0-6"	6-12"	>12"	Total	0-6"	6-12"	>12"	Total	
6/11/2025	0	0	0	0	393	60	0	453	70	1	1	72	525
6/19/2025	0	0	0	0	210	0	1	211	500	0	0	500	711
6/26/2025	0	0	0	0	76	1	0	77	6,000	200	0	6,200	6,277
7/2/2025	0	0	0	0	0	0	0	0	9,800	500	0	10,300	10,300
7/10/2025	0	0	0	0	0	0	0	0	630	1	0	631	631
7/17/2025	0	0	0	0	14	0	0	14	1,250	0	0	1,250	1,264
7/23/2025	0	0	0	0	15	0	1	16	3,300	0	0	3,300	3,316
7/30/2025	0	0	0	0	131	0	1	132	6,700	0	0	6,700	6,832
8/6/2025	0	0	0	0	0	0	6	6	4,250	0	0	4,250	4,256
8/12/2025	0	0	0	0	0	1	1	2	1,550	25	1	1,576	1,578
8/19/2025	0	0	0	0	0	0	0	0	81	0	0	81	81
8/26/2025	0	0	0	0	0	0	1	1	13	1	1	15	16
Total	**0**	**0**	**0**	**0**	**839**	**62**	**11**	**912**	**34,144**	**728**	**3**	**34,875**	**35,787**

Figure 5-1: Total Inflow at Brunswick by Conveyance Route and Turbine Operational Status for the 12-Week Upstream American Eel Survey Period (June to August 2025).

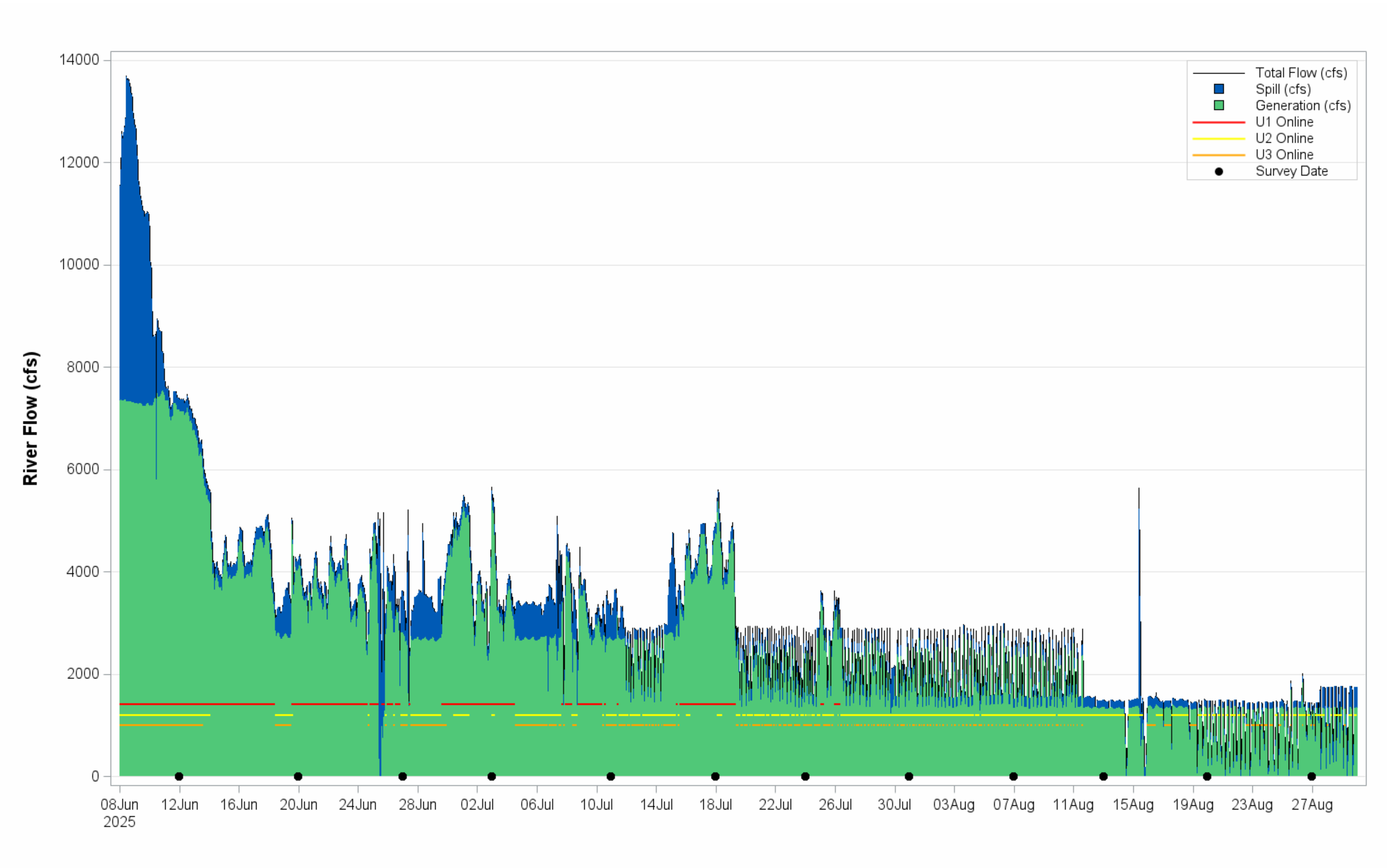


Figure 5-2: Nighttime Visual Survey Event Counts Among Water Temperature, Weather, Moon Illumination, Tidal Conditions and Operational Conditions at Brunswick During 2025.

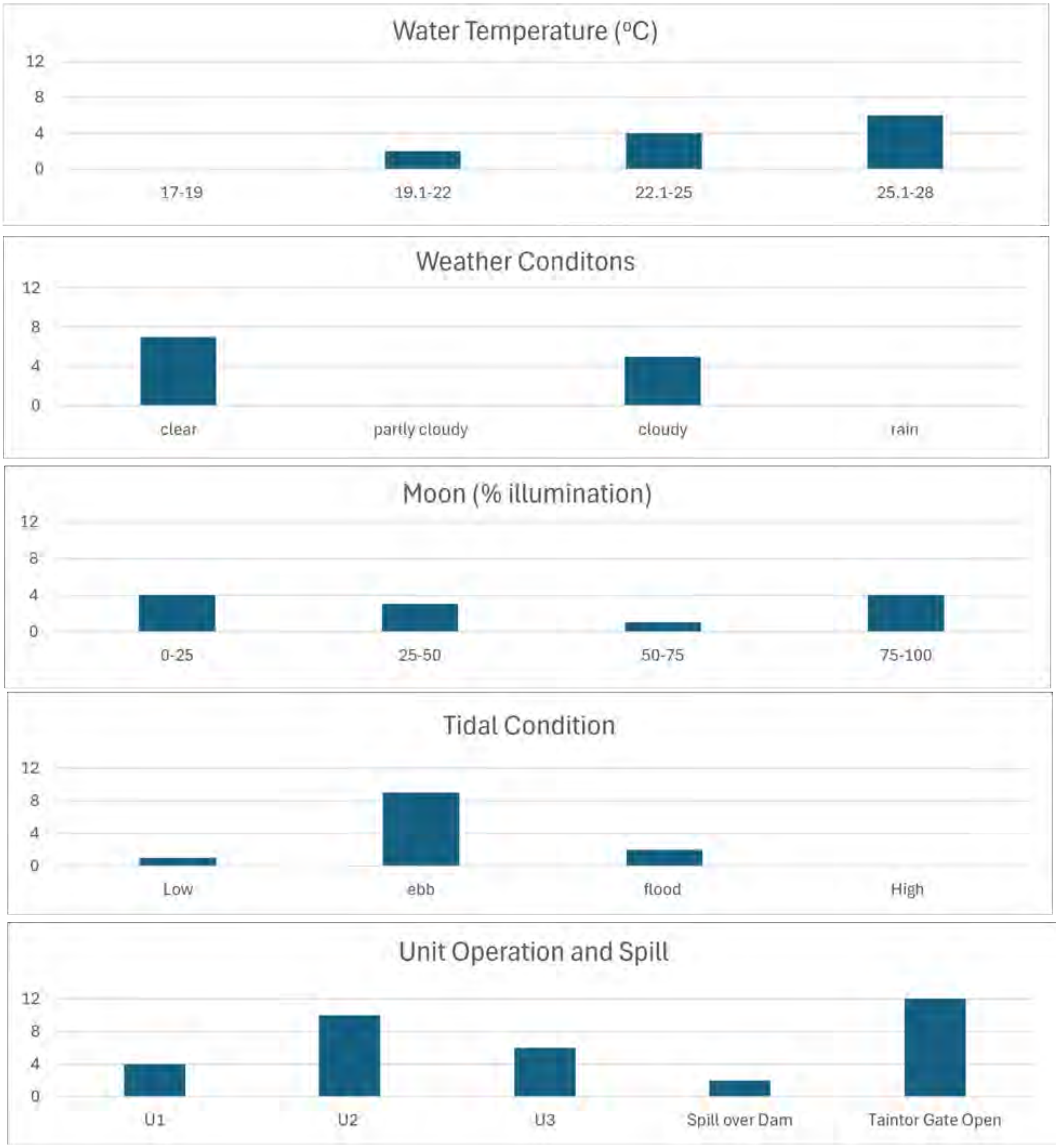


Figure 5-3: Weekly and Cumulative Estimated Juvenile Eel Abundance During the 12-Week Survey Period by Vantage Point at Brunswick During 2025.

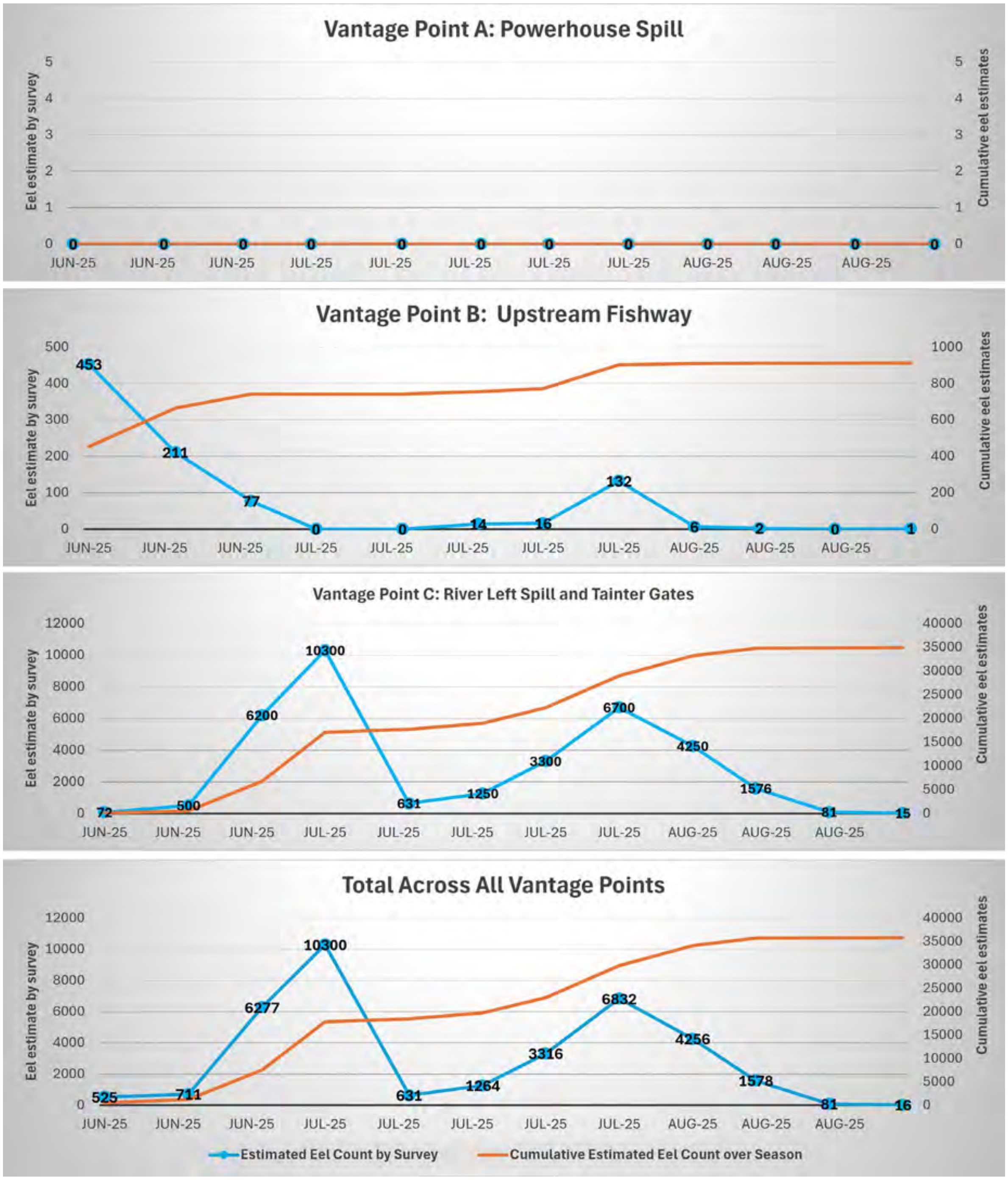


Figure 5-4: Weekly Estimated Juvenile Eel Abundance by Survey Date and Relative to a Series of Recorded Environmental Conditions Over the 12Week Study Period at Brunswick during 2025.

Continued (Figure 5-4)

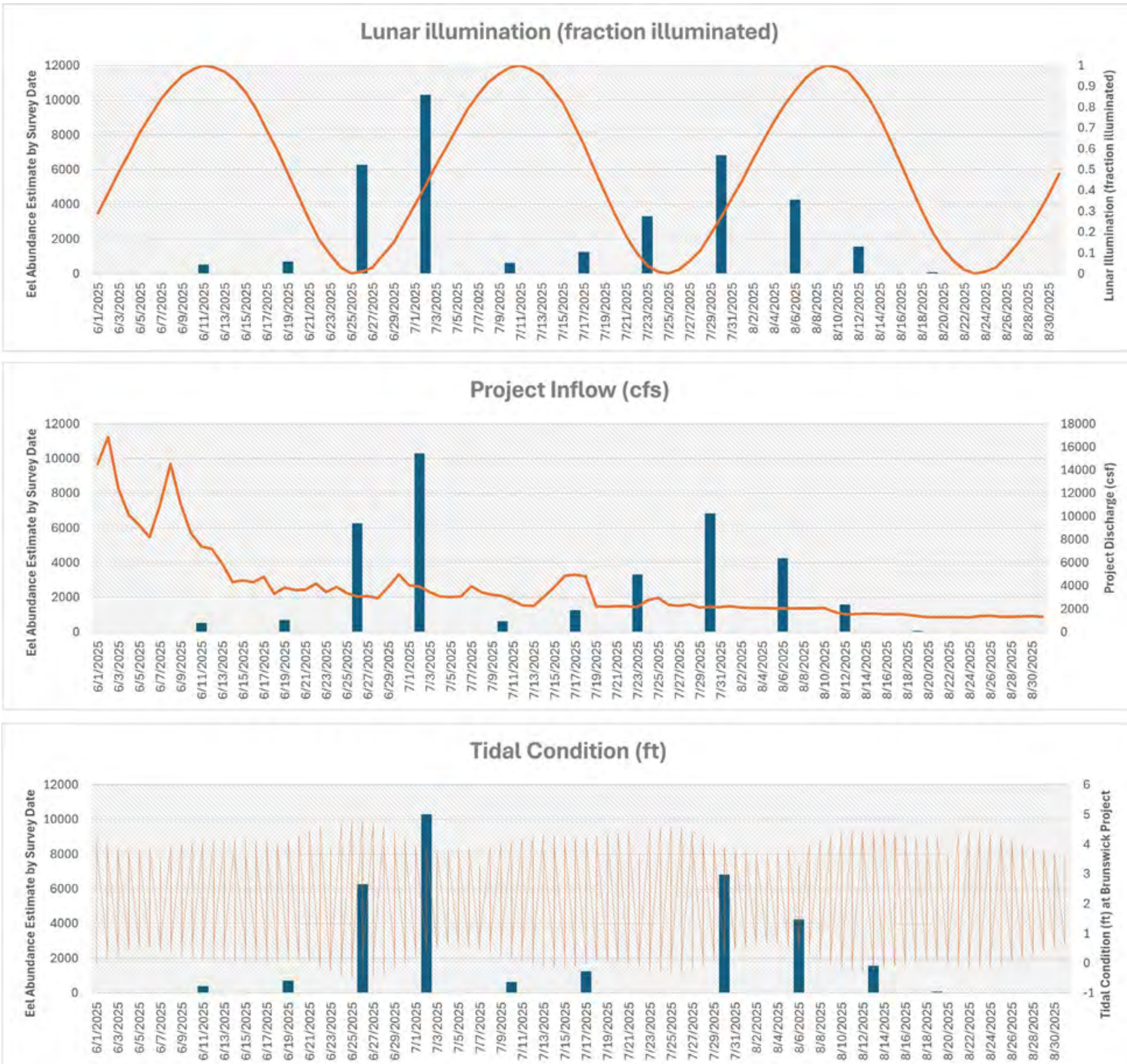


Figure 5.5: Eel Observation Locations from Vantage Point B at the Brunswick Upstream Fishway During the 12-Week Survey Period.

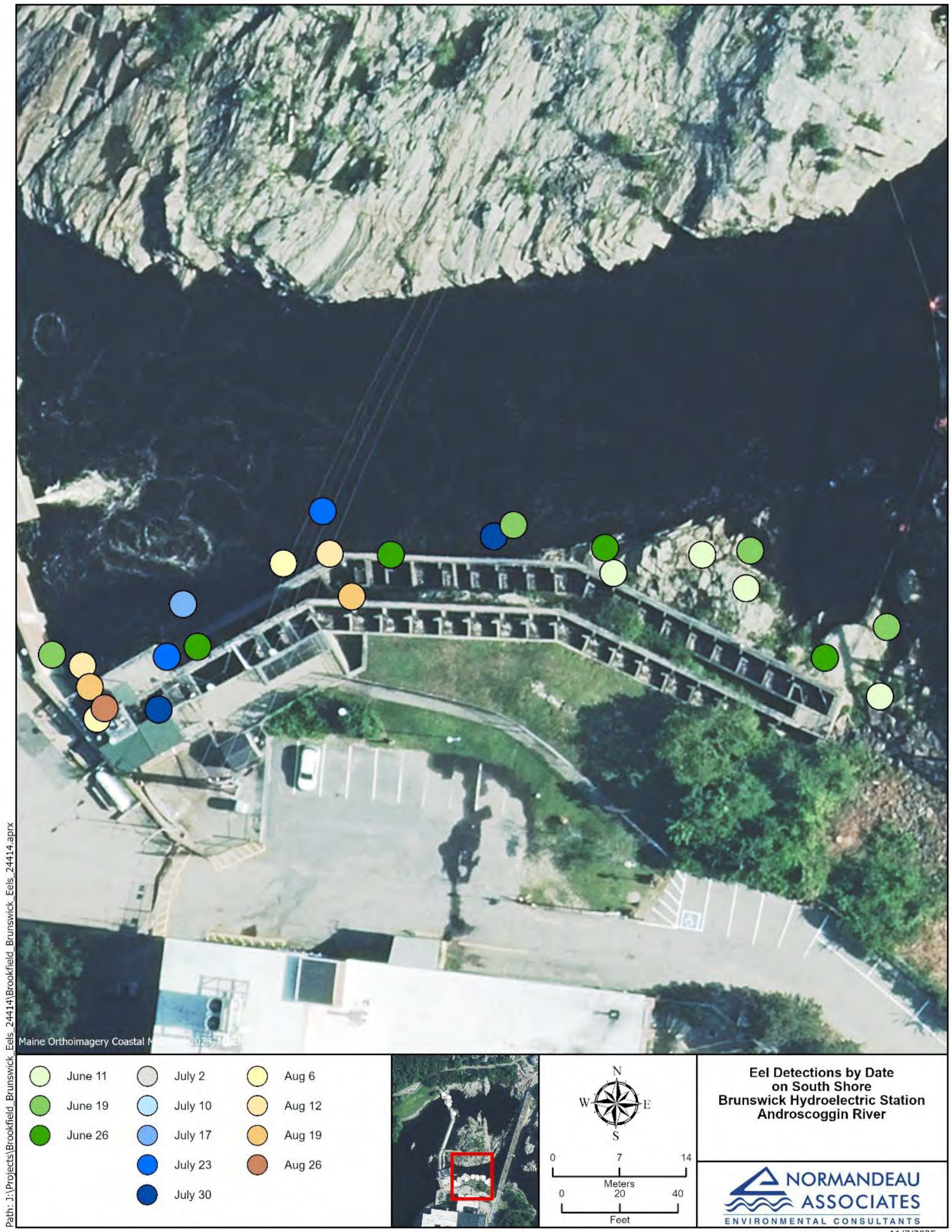


Figure 5.6: Relative Abundance of Juvenile Eel Observation Locations from Vantage Point B at the Brunswick Upstream Fishway During the 12-Week Survey Period.

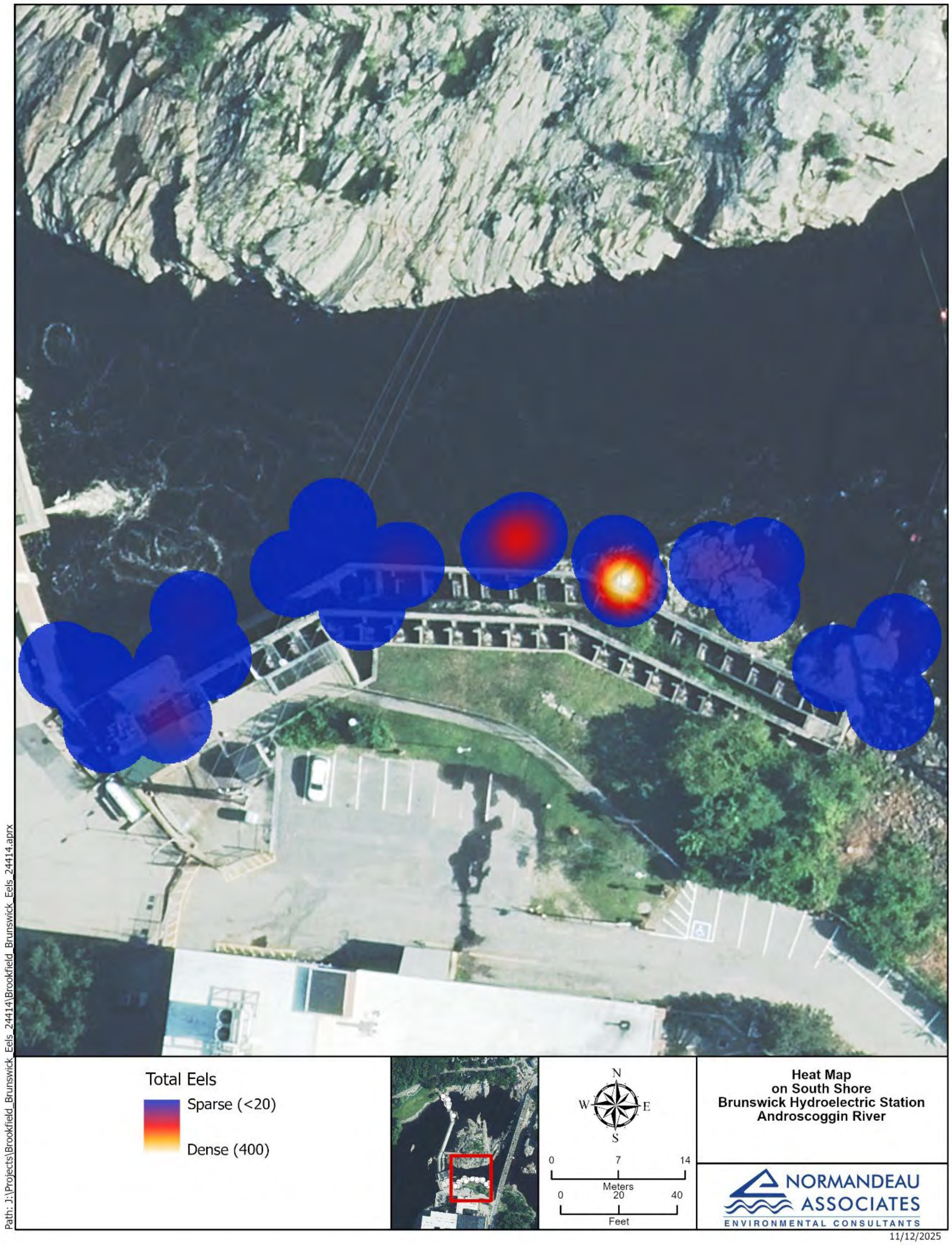


Figure 5-7: Juvenile American Eels Observed Swimming Along Rocks Downstream of the Brunswick Upstream Fishway (top image) and Attempting to Ascend Wetted Concrete Portions of the Upstream Fishway Structure at Brunswick (bottom image).

Continued (Figure 5-7)

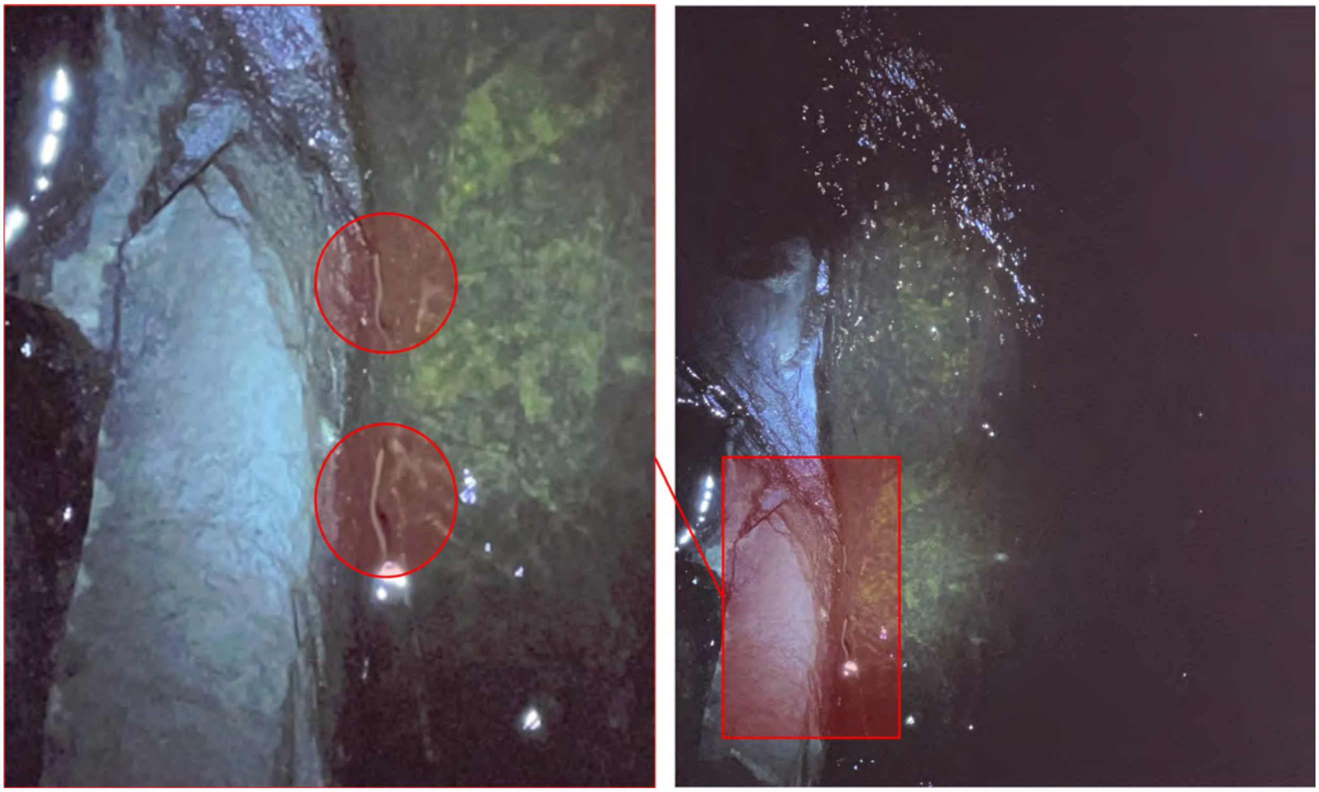


Figure 5.8: Eel Observation Locations from Vantage Point C at the Brunswick Tainter Gate Area During the 12-Week Survey Period.

Figure 5.9: Relative Abundance of Juvenile Eel Observation Locations from Vantage Point C at the Brunswick Tainter Gate Area During the 12-Week Survey Period.

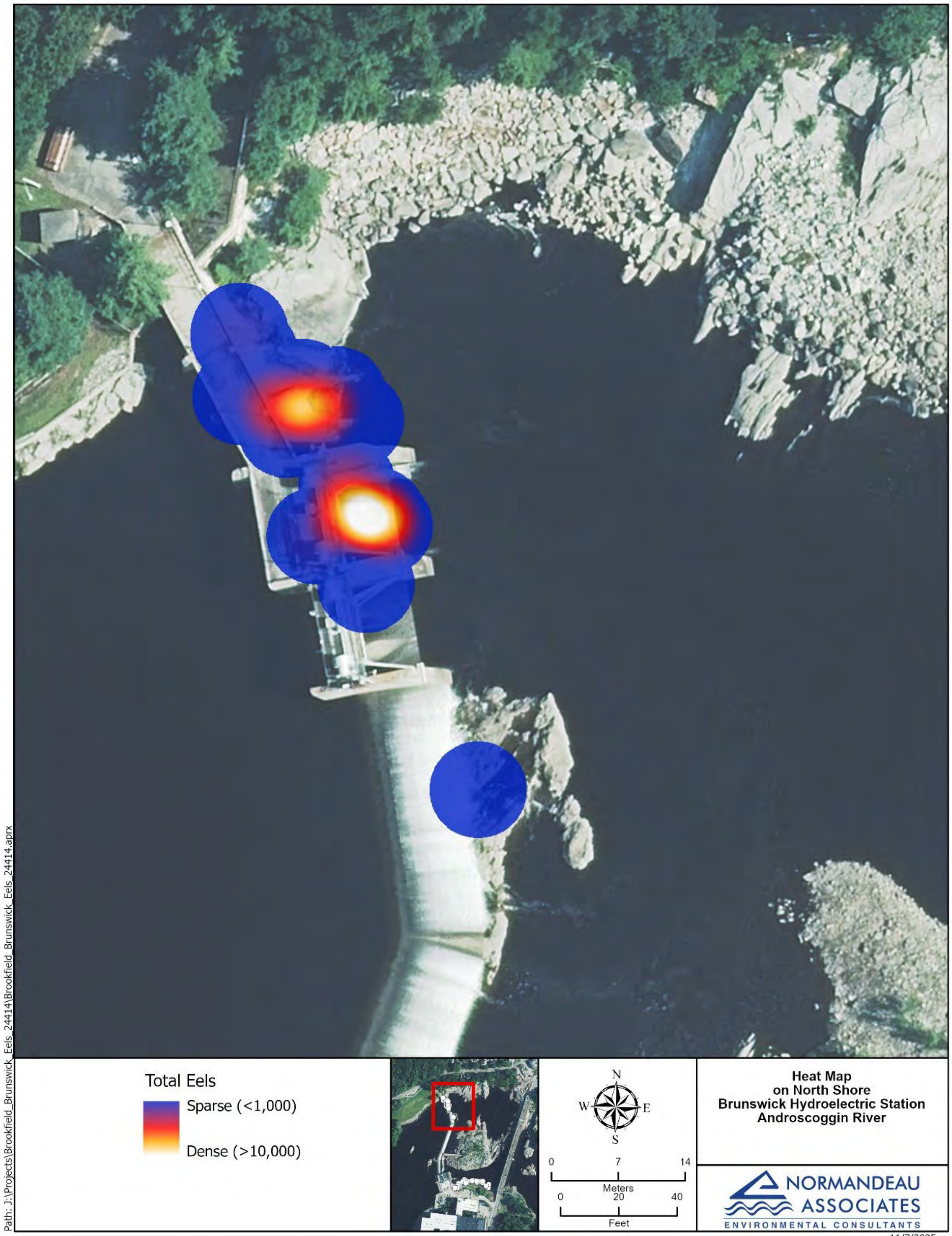


Figure 5.10: Relative Locations of Areas with Highest Juvenile Eel Abundance as Observed from Vantage Point C Downstream of Brunswick.

5.3 Interim Eel Traps

Temporary eel ramps were initially installed on June 19, 2025, at two of the three locations that were identified downstream of the Project during the May 30, 2025 resource agency consultation visit. No installation of the temporary eel ramps occurred in conjunction with the June 11 nighttime visual survey due to elevated inflow at the Project which eliminated safe access to the spillway bypass region. Two temporary eel ramps were installed on ledge habitat located along the toe of the overflow section of Brunswick Dam located adjacent to the river side of the Tainter gate structure (Figure 5-11). Upon further evaluation in the field, the third location identified during the May 30, 2025 site visit was determined to be too steep and slippery to safely install and maintain a temporary eel ramp (Figure 5-12). During the initial sampling event (i.e., coinciding with the June 19 nighttime survey), despite confirmation of operation following the initial install, the ¾ inch supply water hoses to both ramps compressed against the safety railing at some point overnight, resulting in non-operational traps and no catch on the morning of June 20. For the remaining 10 survey weeks, the temporary eel ramps were installed the afternoon prior to the nighttime survey and checked and removed from service the next morning with no operational issues.

Eels captured in each of the two temporary eel ramps were individually quantified by size class at the end of each collection period and were released upstream. In situations where the overnight catch was represented by large quantities of juvenile eels, a volumetric approach to estimate abundance was used in lieu of manually counting individual eels. On these occasions, either a small dip net holding approximately 250 eels or a 16 oz container (holding~ 450 eels) were used to provide an estimate of catch. This approach allowed for eel catch to be quantified while reducing stress or potential mortality associated with an extended handling time.

The total catch and associated estimates of catch per unit effort (CPUE) for juvenile eels per hour by date, trap, and size class are provided in Table 5-3. Weekly catch ranged from zero (Trap 1, August 26-27) to 5,400 juvenile eels (Trap 2, July 2-3) with Trap 2, the one immediately adjacent to the open Tainter gate, collecting a total of 21,169 eels and Trap 1 collecting 1,316 over the 12-week study. Nearly all of the juvenile eels collected in the temporary eel ramps were classified as less than 6 inches in length (Table 5-4) with a minimal component of the total catch comprised of 6–12-inch eels and no individuals collected were greater than 12 inches. Catch rates reflected total catch with Trap 2 having a high CPUE of 279 eels per hour on July 2-3 and a low of 3 eels per hour on August 19-20. The CPUE for Trap 1 reached a high of 17 eels per hour on July 23-24 and recorded 0 eels per hour during the final survey week in late August. Trends in relative abundance in the temporary eel ramp catch followed those observed for the nighttime survey events with numbers increasing into early-July and again in late-July before tailing off through August (Figure 5-13).

Table 5-3: Total Catch and Catch Per Unit of Effort (CPUE) for Juvenile American Eels by Sample Date, Size Class and Trap Location at Brunswick During 2025

Trap ID	Set Date Time	Pull Date Time	Hours Fished	Catch[1]				CPUE (fish/hour)			
1 or 2				0-6"	6-12"	>12"	Total	0-6"	6-12"	>12"	Total
1	6/11/2025	-	Temporary eel ramp not deployed due to flow conditions								
1	6/19/2025 14:20	6/20/2025 10:56	20.6	No catch-water supply issues							
1	6/26/2025 14:30	6/27/2025 11:25	20.9	289	0	0	289	14	0	0	14
1	7/2/2025 12:35	7/3/2025 8:55	20.3	174	2	0	176	9	0	0	9
1	7/10/2025 13:30	7/11/2025 10:18	20.8	19	0	0	19	1	0	0	1
1	7/17/2025 12:35	7/18/2025 10:02	21.5	39	0	0	39	2	0	0	2
1	7/23/2025 12:20	7/24/2025 9:48	21.5	356	0	0	356	17	0	0	17
1	7/30/2025 12:25	7/31/2025 9:22	21.0	105	0	0	105	5	0	0	5
1	8/6/2025 13:20	8/7/2025 9:45	20.4	283	0	0	283	14	0	0	14
1	8/12/2025 12:15	8/13/2025 10:00	21.8	43	0	0	43	2	0	0	2
1	8/19/2025 11:22	8/20/2025 9:41	22.3	6	0	0	6	0	0	0	0
1	8/26/2025 11:55	8/27/2025 10:25	22.5	0	0	0	0	0	0	0	0
2	6/11/2025	-	Temporary eel ramp not deployed due to flow conditions								
2	6/19/2025 14:43	6/20/2025 10:30	19.8	No catch- water supply issues							
2	6/26/2025 14:45	6/27/2025 12:35	21.8	3,400	300	0	3,700	156	14	0	169
2	7/2/2025 14:00	7/3/2025 9:22	19.4	5,300	100	0	5,400	274	5	0	279
2	7/10/2025 13:50	7/11/2025 11:00	21.2	3,150	0	0	3,150	149	0	0	149
2	7/17/2025 13:05	7/18/2025 10:30	21.4	1,350	0	0	1,350	63	0	0	63
2	7/23/2025 12:50	7/24/2025 10:34	21.7	2,475	0	0	2,475	114	0	0	114
2	7/30/2025 12:55	7/31/2025 10:15	21.3	3,150	0	0	3,150	148	0	0	148
2	8/6/2025 14:05	8/7/2025 10:15	20.2	1,125	0	0	1,125	56	0	0	56
2	8/12/2025 12:40	8/13/2025 10:35	21.9	675	0	0	675	31	0	0	31
2	8/19/2025 11:50	8/20/2025 9:51	22.0	62	2	0	64	3	0	0	3
2	8/26/2025 12:13	8/27/2025 10:35	22.4	80	0	0	80	4	0	0	4
Total catch over 12-week study period				22,081	404	0	22,485				

[1] Volumetric measurements were used to quantify eels in Trap 2 from June 27-28 through August 12-13.

Table 5-4: Minimum, Mean, and Maximum Total Catch and Catch Per Unit of Effort (CPUE)for Juvenile American Eels by Size Class and Trap Location at Brunswick During 2025

	Total Catch 0-6" eels			CPUE (no./hr) for 0-6 inch eels		
Trap ID	Minimum	Mean	Maximum	Minimum	Mean	Maximum
1	0	131	356	0	6	17
2	62	2,077	5,300	3	100	274

	Total Catch 6-12 inch eels			CPUE (no./hr) for 6-12 inch eels		
Trap ID	Minimum	Mean	Maximum	Minimum	Mean	Maximum
1	0	0	2	0	0	0
2	0	40	300	0	2	14

	Total Catch 12+ inch eels			CPUE (no./hr) for 12+ inch eels		
Trap ID	Minimum	Mean	Maximum	Minimum	Mean	Maximum
1	0	0	0	0	0	0
2	0	0	0	0	0	0

Figure 5.11: Location of Temporary Eel Ramps 1 and 2 Downstream of the Brunswick Dam and Adjacent to the Tainter Gate Structure.

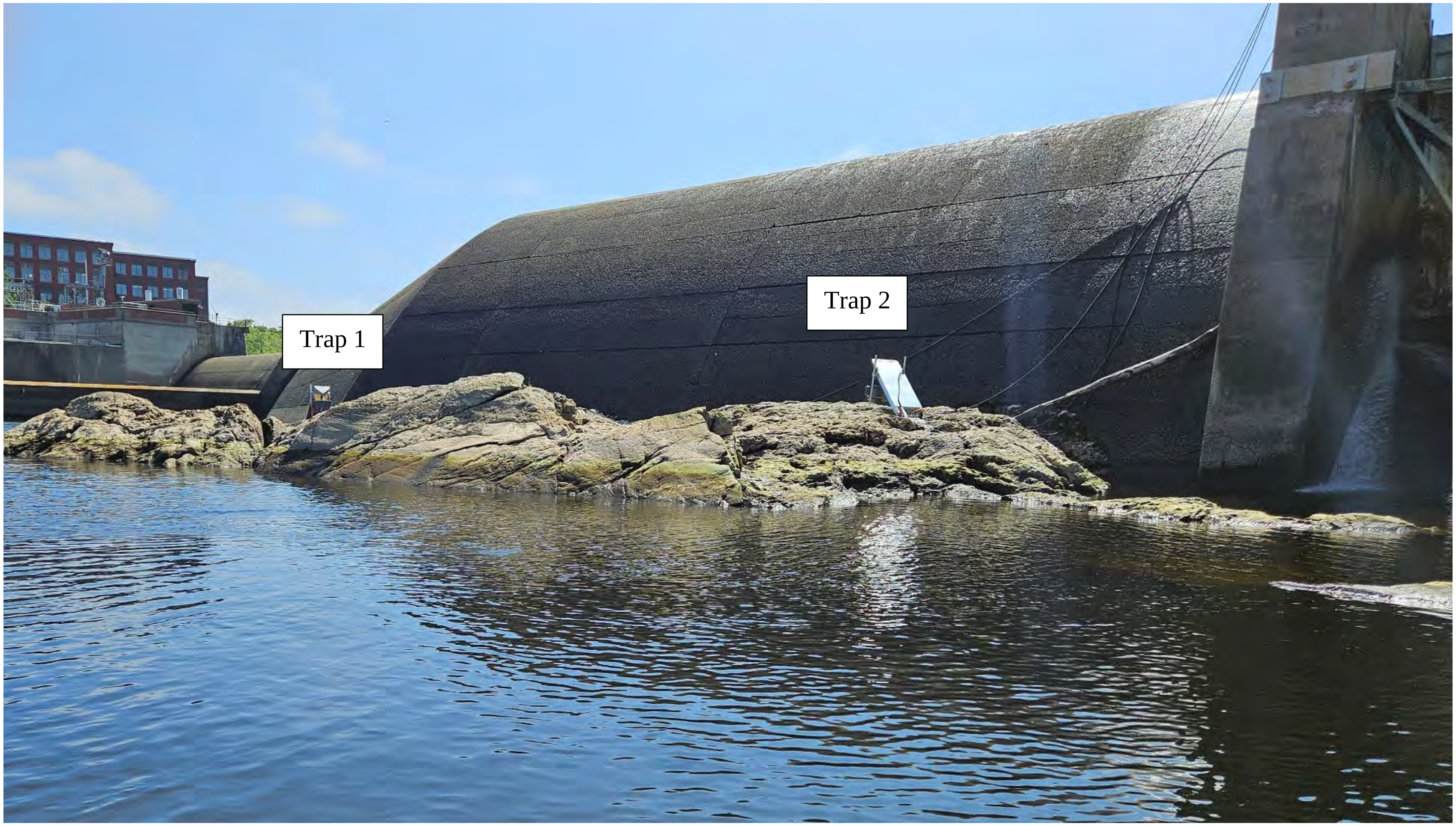
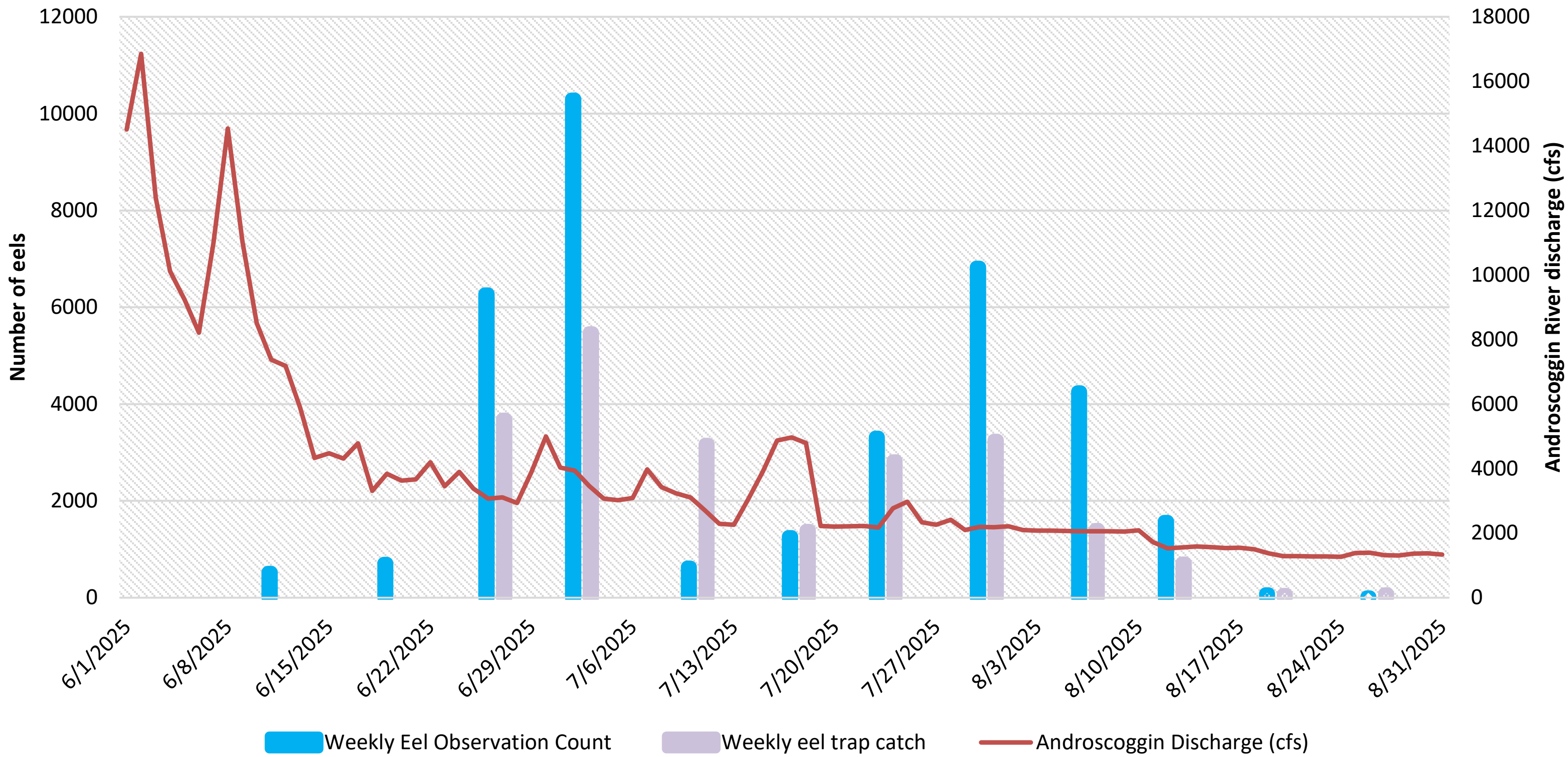


Figure 5.12: Temporary Eel Ramp Location No. 3 Identified During the May 30, 2025 Agency Site Visit but Determined to be Inaccessible for the Safe Install and Operation of a Collection Ramp.

Figure 5.13: Twelve Week Brunswick Juvenile American Eel Sampling Period Showing Project Inflow and Estimated Numbers of Individuals Observed During Visual Nighttime Surveys and Associated Temporary Eel Ramp Collections During 2025.



6 DISCUSSION

The goal of the Visual Surveys of Upstream American Eel Movements Study was to determine presence and abundance of American eels downstream of the Project and to evaluate potential locations that may be suitable for a permanent upstream eel passage structure. To facilitate the evaluation of potential permanent siting locations for upstream eel passage, a combination of nighttime surveys and temporary traps were conducted over a 12-week period at pre-designated locations. These activities were intended to collect information on where juvenile eels were staging and attempting to volitionally ascend at the Project on both a spatial and temporal scale. The information collected during the 2025 passage season provides insight into identifying potential locations for a future permanent eel trap/pass structure.

Nighttime surveys were conducted weekly from three predetermined vantage points: A) the area overlooking the ogee overflow spillway adjacent to the powerhouse, B) the entrance and lower section of the existing upstream fishway up through the 180-degree turn pool, and C) the deck structure on the Topsham side of the river overlooking the Tainter gate structures. Following onsite consultation with MDMR, temporary eel ramps were deployed along the spillway on the river side of the Tainter gate structure and represented areas that were difficult to observe through the visual survey methods due to their distance from the fixed vantage points.

Surveys were initiated during the second week of June and were conducted once weekly through the last week of August. Although the full set of nighttime visual surveys were conducted as scheduled, elevated inflow in early June prevented safe access below the spillway for the deployment of temporary eel ramps during the first survey week. Overall, a total of 58,272 juvenile eels were either estimated during the nighttime visual surveys or enumerated during the temporary eel ramp deployments and nearly all eels observed or enumerated were less than six inches in length. Juvenile eels were observed at the Project on all survey dates although abundance varied both spatially and temporally. During the initial nighttime visual survey on June 11, a greater proportion of the observed eels were located within or downstream of the upstream fishway (i.e., vantage point B) whereas for the remaining eleven surveys, far more eels were observed from the deck structure overlooking the Tainter gate structures (i.e., vantage point C). There were no eels observed during any of the twelve survey dates from vantage point A overlooking the ogee overflow spillway adjacent to the powerhouse.

Regarding seasonal trends, the patterns observed during both the visual nighttime surveys and temporary eel ramps indicated the highest relative abundance of downstream juvenile eels occurring during late-June to early-July and then again from late July to early-August. The observational estimates and ramp counts did not visually appear to sync with most of the environmental factors considered (i.e. atmospheric pressure, air temperature, inflow, or tidal conditions). Several of the major count events did occur following periods of rainfall and survey dates with the highest observed eel estimates (July 2 - July 30) occurred during periods of lower lunar illumination percentage. Specific to the survey area encompassing the lower upstream fishway, the highest estimated counts of observed eels occurred during the onset of the 12-week survey period characterized by the highest generation discharge during the study period.

Observations collected during the 2025 study are representative of the Project areas visible from the three predefined visual nighttime vantage points and two temporary eel ramp locations. Juvenile eels were most readily observed in calmer water or along visible wetted surfaces associated with either natural leakage associated with Project structures (i.e., Tainter gates) or intentional attraction “leakage” (i.e., attraction flows provided at the temporary eel ramps). Observational counts made during the visual nighttime surveys of the ledge habitat along the base of the overflow spill section where the two temporary eel ramps were deployed were relatively low compared with those from areas of more permanent leakage associated with the Tainter gates. Similarly, catch counts from Trap 2 (adjacent to the Tainter gate) numbered in the thousands during several weeks whereas counts from Trap 1 (located further away from the permanent leakage/attraction flow associated with the Tainter gate) were consistently lower. These observations emphasize how areas with flow attract eels and the importance of leakage or lower velocity/volume flows in the vicinity of attraction as upstream pathways.

As demonstrated during this 2025 study, juvenile eels are present in significant numbers downstream of the Project during the expected upstream passage period (e.g., June to August). Observations made during this study suggest that the greatest relative abundance of individuals is located on the spillway side of the river with large concentrations interacting with areas of permanent leakage flow associated with the Tainter gates. Deployment of the temporary eel traps demonstrated the ability to attract juvenile eels through the introduction of artificial "leakage" flows onto ledge habitat downstream of the overflow spillway with the highest trap catches observed in closer proximity to spillway pool habitat being directly fed continuously by the 100 cfs supplied through the open Tainter gate.

7 VARIANCES FROM THE FERC APPROVED STUDY PLAN

The Visual Surveys of Upstream American Eel Movements Study was conducted following the methodologies identified in the RSP and modifications requested by FERC in their SPD. A few variances between the proposed and final study approach are noted here:

- FERC recommended the temporary eel ramps be deployed for one day during each of the twelve sample weeks and concurrent with execution of the visual nighttime surveys. Spill conditions during the first week of nighttime observations (the week of June 8, 2025) prevented safe access into the spillway bypass reach and as a result no eel ramp installation occurred in conjunction with that week's nighttime survey.
- The temporary eel ramp sample event during week two of the twelve-week sampling period was complicated by a failure of the water supply lines feeding the ramp conveyance and attraction flows and as a result, no viable sample data was collected from either trap during that week.
- Three potential locations for deployment of temporary eel ramps were identified during the May 30, 2025 resource agency site visit. However, upon a more detailed inspection in the field, the third location on the shoreline side of the Tainter gate structure was determined to be too steep and slippery to safely deploy and service an eel ramp. It is important to note that the staff conducting the nighttime visual surveys using spotlights and binoculars indicated that approach readily produced observations of small eels attempting to ascend at that location.

APPENDIX A – JUVENILE EEL OBSERVATIONAL COUNTS BY DATE, LOCATION, AND SIZE CLASS

Observation Number	Date	Time	Latitude	Longitude	Eels by size class			Count
					0-6"	6-12"	>12"	
1	11-Jun	21:49	43.92025	-69.96690	350	50	0	400
2	11-Jun	21:52	43.92027	-69.96680	30	10	0	40
3	11-Jun	21:54	43.92023	-69.96680	10	0	0	10
4	11-Jun	21:57	43.92013	-69.96660	3	0	0	3
5	11-Jun	22:15	43.92207	-69.96800	50	1	1	52
6	11-Jun	22:20	43.92203	-69.96800	20	0	0	20
7	19-Jun	21:45	43.92016	-69.96770	0	0	1	1
8	19-Jun	21:55	43.92029	-69.96710	160	0	0	160
9	19-Jun	22:02	43.92027	-69.96680	30	0	0	30
10	19-Jun	22:06	43.92020	-69.96660	20	0	0	20
11	19-Jun	20:18	43.92200	-69.96800	350	0	0	350
12	19-Jun	10:32	43.92193	-69.96790	150	0	0	150
13	26-Jun	21:44	43.92017	-69.96750	1	0	0	1
14	26-Jun	21:50	43.92026	-69.96720	35	0	0	35
15	26-Jun	21:58	43.92027	-69.96700	30	1	0	31
16	26-Jun	22:08	43.92017	-69.96670	10	0	0	10
17	26-Jun	22:38	43.92202	-69.96790	6,000	200	0	6,200
18	2-Jul	21:56	43.92202	-69.96800	4,600	200	0	4,800
19	2-Jul	22:10	43.92192	-69.96780	5,200	300	0	5,500
20	10-Jul	21:46	43.92209	-69.96800	600	0	0	600
21	10-Jul	21:58	43.92166	-69.96770	30	1	0	31
22	17-Jul	21:08	43.92021	-69.96750	17	0	0	17
23	17-Jul	21:30	43.92203	-69.96800	400	0	0	400
24	17-Jul	21:38	43.92190	-69.96790	850	0	0	850
25	23-Jul	21:05	43.92016	-69.96750	15	0	0	15
26	23-Jul	21:11	43.92030	-69.96730	0	0	1	1
27	23-Jul	21:32	43.92203	-69.96790	300	10	0	310
28	23-Jul	21:38	43.92195	-69.96790	3,000	0	0	3,000
29	30-Jul	20:53	43.92011	-69.96750	60	0	0	60
30	30-Jul	20:58	43.92054	-69.96710	70	0	0	70
31	30-Jul	21:02	43.92054	-69.96710	1	0	1	2
32	30-Jul	21:21	43.92214	-69.96730	700	0	0	700
33	30-Jul	21:28	43.92192	-69.96790	6,000	0	0	6,000
34	6-Aug	20:42	43.92010	-69.96760	0	0	2	2
35	6-Aug	20:44	43.92010	-69.96760	0	0	3	3
36	6-Aug	20:50	43.92025	-69.96740	0	0	1	1
37	6-Aug	21:11	43.92203	-69.96790	250	0	0	250
38	6-Aug	21:20	43.92191	-69.96780	4,000	0	0	4,000
39	12-Aug	20:40	43.92015	-69.96760	0	0	1	1
40	12-Aug	20:46	43.92026	-69.96730	0	1	0	1
41	12-Aug	21:10	43.92204	-69.96790	350	25	0	375
42	12-Aug	21:20	43.92192	-69.96780	1,200	0	0	1,200
43	19-Aug	20:26	43.92013	-69.96760	0	0	1	1
44	19-Aug	20:30	43.92022	-69.96730	0	0	1	1
45	19-Aug	20:47	43.92201	-69.96790	6	0	0	6
46	19-Aug	20:52	43.92191	-69.96790	75	0	0	75

Observation Number	Date	Time	Latitude	Longitude	Eels by size class			Count
					0-6"	6-12"	>12"	
47	26-Aug	20:32	43.92011	-69.96760	0	0	1	1
48	26-Aug	20:57	43.92209	-69.96800	3	0	0	3
49	26-Aug	21:04	43.92186	-69.96780	10	0	0	10

APPENDIX F: DIADROMOUS FISH BEHAVIOR, MOVEMENT, AND PROJECT INTERACTION STUDY

DIADROMOUS FISH BEHAVIOR, MOVEMENT AND PROJECT INTERATION STUDY, PHASE I

INITIAL STUDY REPORT

BRUNSWICK HYDROELECTRIC PROJECT

FERC NO. 2284

Submitted by:

Brookfield White Pine Hydro LLC
150 Main Street
Lewiston, ME 04240

Prepared by:

NORMANDEAU ASSOCIATES
ENVIRONMENTAL CONSULTANTS

January 2026

Brookfield

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LIST OF ABBREVIATIONS AND DEFINITIONS

ATS	Advanced Telemetry Systems
AWS	Attraction Water System
BWPH	Brookfield White Pine Hydro LLC
CFR	Code of Federal Regulations
cfs	Cubic Feet Per Second
cm	Centimeter
FERC	Federal Energy Regulatory Commission
GNSS	Global Navigation Satellite System
GPS	Global Positioning System
JSATS	Juvenile Salmon Acoustic Telemetry System
kHz	Kilohertz
M	Meter
ME	Maine
MW	Megawatt
NOAA	National Oceanic and Atmospheric Administration
NOI	Notice of Intent
PAD	Preliminary Application Document
PNNL	Pacific Northwest National Laboratory
PRI	Pulse Rate Interval
PSP	Preliminary Study Plan
RM	River Mile
RSP	Revised Study Plan
SD1	Scoping Document 1
SD2	Scoping Document 2
SPD	Study Plan Determination
TOA	Time of Arrival
YAPS	Yet Another Positioning Solver

1 INTRODUCTION

Brookfield White Pine Hydro LLC (BWPH or Licensee) is licensed by the Federal Energy Regulatory Commission (FERC) to operate the 19-megawatt (MW) Brunswick Hydroelectric Project (Project) (FERC No. 2284). The Project is located on the Androscoggin River in the towns of Topsham and Brunswick, Maine. The Project straddles the border between Cumberland and Sagadahoc counties. The original license was issued on February 9, 1979, and expires on February 28, 2029.

BWPH is using FERC's Integrated Licensing Process (ILP) as established in Title 18 Code of Federal Regulations (CFR), Part 5. BWPH filed a Pre-Application Document (PAD) and Notice of Intent (NOI) to seek a new license for the Project on February 21, 2024. The PAD provides a description of the Project, including its structures, operations, and potentially affected resources. BWPH distributed the PAD and NOI simultaneously to Federal and state resource agencies, local governments, Native American tribes, members of the public, and others thought to be interested in the relicensing proceeding. Following the filing of the PAD, FERC prepared and issued Scoping Document 1 (SD1) on April 16, 2024. FERC also held agency and public scoping meetings and a site visit on May 7, 2024. The FERC Process Plan and Schedule provided agencies and interested parties an opportunity to file comments on the PAD and SD1 and request studies by June 20, 2024. FERC issued Scoping Document 2 (SD2) on July 29, 2024. BWPH filed a Proposed Study Plan (PSP) on August 2, 2024, and held study plan meetings on August 28 and October 9, 2024. The Revised Study Plan (RSP) was filed in accordance with the ILP schedule on December 2, 2024. FERC issued a Study Plan Determination (SPD) on December 30, 2024.

An evaluation of Juvenile Salmon Acoustic Telemetry System (JSATS) technology was conducted in support of the relicensing of the Brunswick Hydroelectric Project (Project), Federal Energy Regulatory Commission (FERC or Commission) No. 2284, as identified in the RSP This report describes the Licensee's implementation, data collection, and any variances from the study plan and schedule for the Phase I of the Diadromous Fish Behavior, Movement, and Project Interaction Study as described in the RSP.

2 GOAL AND OBJECTIVES

The goal of this study was to assess the Project's potential effects on select migratory diadromous fish species (i.e., Alosines and sea lamprey) behavior in the Project tailrace and the proximal downstream reach. As described in the RSP, the Project Interaction Study design is a two-phase approach whereby Phase I (i.e., this study report) sought to:

1. Determine whether JSATS is an appropriate tool to address the study goal when considering the hydro-morphological conditions of the Androscoggin River and the downstream study area as influenced by the Project facilities and its operations, and
2. Validate the detection ranges obtained using the JSATS system to inform the technical and financial aspects necessary for an adequate study design to address the overall goal and objectives to evaluate fish behavior downstream of the Project.

The RSP provides a basic framework for Phase II of the Project Interaction Study, and BWPH indicated that the information collected during the 2025 Phase I assessment will be used to inform the overall study design for the latter phase. The Phase II methodology framework originally provided in the RSP has been updated based on findings from the 2025 Phase I evaluation and the revised Phase II study plan is provided herein as Appendix A.

3 PROJECT DESCRIPTION AND STUDY AREA

The Project is located on the Androscoggin River at the head-of-tide at approximately river mile (RM) 6 in the Towns of Brunswick and Topsham, ME. The Project straddles the border between Cumberland and Sagadahoc counties. The Project dam is the first dam on the mainstem of the Androscoggin River. The dam and powerhouse span the Androscoggin River immediately above the U.S. Route 201 bridge connecting Topsham and Brunswick, ME, at a site originally known as Brunswick Falls. The drainage area at the Project is 3,437 square miles while the average annual inflow to the Project is approximately 7,018 cubic feet per second (cfs).

The Project consists of a 4.5-mile-long, 175-acre impoundment; an 830-foot-long and 40-foot-high concrete gravity dam with a gate section containing two Tainter gates and an emergency spillway; an intake and a powerhouse containing three turbine-generating units with an authorized rating of 19.0 megawatt (MW). The Project also has a vertical slot upstream fishway, a downstream fish bypass, a 21-foot-high fish barrier wall between the dam and Shad Island, and a 3-foot-high by 20-foot-long concrete fish barrier weir across Granney Hole Stream in Topsham.

The study area for Phase I of the Project Interaction Study included the section of the Androscoggin River located immediately downstream of the Brunswick dam and powerhouse, extending downstream towards the Route 196 Bridge.

4 STUDY METHODOLOGY

4.1 Background

Phase I sought to determine the feasibility of utilizing JSATS to monitor tagged fish in the riverine environment downstream of the Project. The JSATS technology was developed by the Pacific Northwest National Laboratory (PNNL) and National Oceanic and Atmospheric Administration (NOAA) to monitor the behavior, movement, habitat use, and survival of juvenile salmonids migrating out from freshwater in the Pacific Northwest. PNNL notes that JSATS has been previously used to (1) estimate route-specific dam passage, (2) observe predator–prey interactions, and (3) evaluate fish behavior in dam tailraces using high-accuracy, high-efficiency 3-D tracking.

The JSATS system is comprised of three major components: acoustic transmitters, receivers, and the associated management/processing software. Each transmitter produces a signal at a fixed interval by inducing high-frequency (416.7 kHz) vibrations (signals) in the water. Submerged hydrophones will receive the signals and convert them to an electrical impulse which is relayed to the receiver. The receiver identifies the signal as a unique identification code and then logs them along with the ID of the receiving hydrophone, time and date of the detection, and any other information relayed by the transmitter (e.g., pressure).

When a tagged fish swims within the detection range of multiple JSATS receivers, each receiver will record the unique identifier of the tag and the time of detection. By analyzing the time it takes for the signal to travel from the transmitter to multiple receivers, a technique known as Time of Arrival (TOA), the system can trilaterate the position of a tagged fish. Data from multiple receivers can be collected and processed to reconstruct a fish's travel path over time. This data can then be used to inform on behavior, movement patterns, and response to environmental changes. This requires that multiple receivers within the study array can detect the same emitted pulse by the transmitter, while each receiver can have a variable detection capacity due to the background noise existing at its position.

4.2 Phase I Methodology

The RSP identified six different pilot deployment locations covering a range of flow and channel/infrastructure morphology in the vicinity of the Project powerhouse and dam which included the (1) the Project tailrace in the vicinity of the powerhouse discharge and existing fishway entrance, (2) near the mid-point of the excavated tailrace channel, (3) an area below the existing Frank J. Wood Bridge and downstream of the confluence of the Project tailrace and spillway bypass, (4) an area downstream of the ledge habitat located at the outlet of the spillway bypass area, (5) the spillway bypass area in the vicinity of the Tainter gate structures, and (6) the center channel at a point approximately 500 meters downstream of the powerhouse discharge (Figure 4-1). Performance information was collected at each pilot deployment location with the specific methodologies used dependent on whether the area was determined in the field to be suitable for evaluation for the potential collection of two-dimensional (2D) positional data or one-dimensional (1D) presence/absence data.

To evaluate JSATS hydrophones for 2D positional pilot deployment locations, an array of five hydrophones (ATS model SR3001) was deployed in a manner which maximized the likelihood of successful trilateration of tag positions. This was accomplished by deploying receivers in a grid pattern to create multiple areas between receivers in the shape of triangles. The array of triangles was positioned in a way that would maximize the likelihood that theoretical tagged fish moving freely throughout the array would have signal transmissions detected by at least three receivers. The time of arrival of the tag transmission at each detecting receiver allowed for trilateration during processing of the data. All coordinates for the JSATS hydrophones were recorded using an EOS Arrow Global Navigation Satellite System (GNSS) receiver with accuracy within one centimeter (cm).

Following receiver deployment in the field, an acoustic transmitter (ATS model SS400) was maintained on a weighted line alongside a boat and driven through the 2D array of five receivers for several minutes. Concurrently with passage of the test transmitters through the receiver array, high accuracy GPS points were collected once per second using an EOS Arrow GNSS receiver to create a continuous GPS track of the known position of the test tag over time. This process was repeated twice at each 2D array deployment. The resulting data sets consisting of detection information logged by each of the five receiver units and the positional data for the receiver locations and transmitter track were evaluated using the R-package YAPS (Yet Another Positioning Solver). YAPS uses maximum likelihood analysis of a state-space model applied directly to TOA data in combination with a movement model to estimate transmitter positions. Output presented for this Phase I assessment consists of the track duration (minutes), expected number of transmissions (based on a 3 second pulse rate interval [PRI]), number of detections meeting the three-receiver criteria for determining position, and the corresponding percentage of all detections meeting the three-receiver criteria and providing a position. In addition, the YAPS estimated transmitter positions are compared to the GPS recorded transmitter track collected during the field survey. The performance of each individual receiver within the array was also evaluated with the intent of understanding placement effects on units in the vicinity of the Project and how that may impact the final study design proposed for Phase II.

To evaluate JSATS hydrophones at a 1D presence/absence pilot deployment location intended to serve as a "gate" (i.e., provide insight into the movement of a tagged individual through a section of river located downstream of the dam), a set of three acoustic receivers (affixed to moorings) were deployed at quarter points across the channel. The same acoustic transmitter was maintained alongside a boat and driven through the receiver area for a period of several minutes and a boat track was conducted to represent a range of distances and positions relative to the installed hydrophones. The test transmitter track was documented using high accuracy GPS point coordinates collected once per second using an EOS Arrow GNSS receiver to create a continuous track of known positions for the test tag over time. The intent of this testing was to define the detection range as well as to evaluate the detection rate as a function of the distance from the hydrophone. To accomplish this, the relative position of all tag transmission (including those detected and undetected by the receivers) was determined using the time-stamped GPS track, the known 3-second PRI, and the set of recorded detections. Distance from the receiver for each transmission was calculated as the straight line between the known receiver position and the transmitter track position at the time of signal. The full set of transmissions (detected and undetected) were then binned into distance categories and the rate of detection was evaluated. The detection rate was defined as the ratio of the number of detections recorded by a hydrophone to the number of transmissions from a transmitter during a known duration of time.

$$\text{Detection Efficiency (\%)} = \frac{No.Detections}{No.Transmissions}$$

To assess the effectiveness of this 1D coverage for the purposes of serving as a "gate" to denote the passage of tagged fish moving upstream or downstream through the region, the probability of detecting at least 5 transmissions during a one-minute period was determined using the binomial formula:

$$P(x \geq 5) = 1 - \sum_{k=0}^{4} \binom{n}{k} p^k (1-p)^{n-k}$$

Where:

- $P(x \geq 5)$ = the probability of hearing at least five transmissions
- p = the field measured probability of hearing a tag at the site

- n = the number of transmissions per unit of time (assumes 20 potentially detectable transmissions – i.e., fish carrying tag with a 3.0 second PRI and taking one minute to move through range of receiver gate)
- k = the number of detections being considered in the sum

A similar approach was employed to evaluate 1D coverage within the spillway bypass area in the vicinity of the Tainter gate structures. Crew access to that reach was limited to periods when the Tainter gates were closed and as a result testing at that location consisted of two components: a boat-based “tag drag” allowing for collection of geo-referenced tag transmissions and a shore-based test tag deployment to validate detectability. The boat-based tag drag was conducted at the time of receiver deployment and was performed under a no flow condition (to allow for safe crew access on the water upstream of the ledge habitat located at the outlet of the spillway bypass area). The shore-based detection information was collected with a Tainter gate open. Results from the boat-based effort provided information on range and detection efficiency. Results from the shore-based effort provide a simple binary response of tag detected or not detected.

Figure 4–1: Relative Locations of Pilot Deployment Locations 1 through 6 Evaluated at Brunswick During Phase I of the Project Interaction Study

5 JSATS RECEIVER EVALUATION

The initial evaluation of JSATS receivers downstream of the Project took place between July 8-10, 2025. Operating conditions at the time of data collection at each pilot deployment location are presented in Table 5-1. In general, data collections during the early July sampling were conducted under Project discharge conditions in the range of 2,900 – 3,600 cfs with most of the discharge occurring via the powerhouse turbines. A single sample area (Location 3) was revisited for collection of 2D data during early September. Flow conditions on that date were low with a total Project discharge of approximately 200 cfs (100 cfs via spill and 100 cfs via the upstream fishway and associated AWS).

Table 5–1: Summary of Project Operations at the Time of Test Transmitter Data Collection at Each Pilot Deployment Location Evaluated in the Vicinity of Brunswick During Phase I of the Project Interaction Study

Pilot Deployment Location	Tag Evaluation		Unit(s) Online	Discharge (cfs)	
	Date	Time		Turbine	Spill
1	7/8/2025	1100	2,3	2,697	966
2	7/8/2025	1300	2,3	2,670	580
3	7/9/2025	1400	1	2,674	205
4	7/9/2025	1100	1	3,070	205
	9/10/25	1300	None	None	100
5	7/10/2025	1200	1,2,3	2,860	100
		2100	2,3	2,719	658
6	7/9/2025	1500	1	2,917	205

Of the six pilot deployment locations identified in the RSP, four were assessed for the suitability for collection of 2D positional data and two were evaluated for collection of 1D presence/absence data. Table 5-2 provides positional and receiver information for each location associated with the set of pilot deployment locations.

Table 5–2: Receiver Information for the Six Pilot Deployment Locations Evaluated in the Vicinity of Brunswick During Phase I of the Project Interaction Study

Pilot Deployment Location	Evaluation Methodology	Receiver ID	Receiver Serial No.	Latitude	Longitude
1	2D	1A	23045	43°55'12.93"N	69°58'3.36"W
		1B	20079	43°55'13.73"N	69°58'3.71"W
		1C	25159	43°55'13.30"N	69°58'2.29"W
		1D	23047	43°55'13.06"N	69°58'1.92"W
		1E	23044	43°55'13.70"N	69°58'1.91"W
2	2D	2A	23047	43°55'13.05"N	69°58'1.56"W
		2B	20079	43°55'13.70"N	69°58'1.53"W
		2C	25159	43°55'13.43"N	69°58'0.45"W
		2D	23044	43°55'13.00"N	69°57'59.40"W
		2E	23045	43°55'13.94"N	69°58'0.11"W
3[a]	2D	3A	23045	43°55'13.05"N	69°57'57.59"W
		3B	23044	43°55'13.48"N	69°57'55.85"W
		3C	25159	43°55'12.57"N	69°57'55.05"W
		3D	20079	43°55'11.64"N	69°57'53.98"W
		3E	23047	43°55'12.80"N	69°57'53.22"W
3[b]	2D	3A	24115	43°55'13.12"N	69°57'57.09"W
		3B	25154	43°55'13.66"N	69°57'56.62"W
		3C	25156	43°55'12.82"N	69°57'55.33"W
		3D	24113	43°55'11.90"N	69°57'54.19"W
		3E	25158	43°55'12.55"N	69°57'53.92"W
4	2D	4A	23044	43°55'14.14"N	69°57'57.23"W
		4B	20079	43°55'14.88"N	69°57'56.87"W
		4C	23045	43°55'14.32"N	69°57'56.14"W
		4D	25159	43°55'13.58"N	69°57'56.52"W
		4E	23047	43°55'14.84"N	69°57'55.79"W
5	1D	5A	23047	43°55'18.47"N	69°58'1.93"W
6	1D	6A	23045	43°55'18.39"N	69°57'44.61"W
		6B	23044	43°55'19.42"N	69°57'46.07"W
		6C	25159	43°55'20.53"N	69°57'47.14"W

Location 3 - a = July; b = September sampling

5.1 Pilot Deployment Location No. 1

Pilot deployment location 1 was located within the Project tailrace in the vicinity of the powerhouse discharge and existing fishway entrance (Figure 4-1) and was targeted for the collection of 2D data during the Phase I evaluation. The array at this location consisted of five independent receivers (Figure 5-1) and those receivers were installed near to the riverbed at depths of 7.2 (1A), 5.3 (1B), 7.4 (1C), 6.7 (1D) and 6.1 (1E) meters.

Table 5-3 provides a summary of tag transmission detections during each of the two test events as well as the minimum, maximum and average tag distance for each positive detection relative to each fixed receiver. The two separate test events conducted at location 1 were around four minutes in duration, resulting in a total of 88 potential detections (based on the 3.0 second PRI) for Trial 1 and 85 potential detections for Trial 2. Although the observed transmitter detection distances among the five fixed receivers ranged up to 70 m during the two tag trials, the median distance of a positive detection was less, ranging between 14 and 26 m. The measured detection rates among individual fixed receivers during the two test events ranged between 14.8 to 72.7%. Among fixed receivers, the detection frequency was highest during both test tag trials at 1A (i.e., closest to fishway entrance). The detection frequency was poorest at 1B and 1E, with both of those stations located near the vertical bedrock substrate located along the river left side of the tailrace channel.

The relative location of each acoustic tag transmission (as recorded by GPS) is provided in Figure 5-1 When the full five-receiver array deployed in the upper section of the Project tailrace is considered, concurrent detections across three or more receivers were recorded for 38% and 46% of the total number of test transmissions (Trial 1 and 2, respectively) providing an estimated 8-9 detections per minute for a 3.0 second PRI. The observed incidence of missed transmissions (i.e., a transmission not detected at any of the five fixed receivers) was relatively low, 12.5% and 1.2% for Trials 1 and 2, respectively. In general, acoustic tag transmissions originating from locations along the river right side of the upper tailrace channel demonstrated a higher occurrence of simultaneous detection at three or more of the fixed receiver locations.

Figure 5-2 provides a visual of the full GPS track recorded during each of the two transmitter tests with an overlay of the "fish track" as determined via trilateration of test transmitter detection positions derived from YAPS. As evidenced by the truncated, misshapen, or missing segments of YAPS tracks within the upper section of the fixed receiver array installed for Phase I testing at location 1, the accuracy for estimates of test transmitter positions within that region was poor. Table 5-4 provides a more detailed look at the contribution of individual fixed receivers to the detection sets for transmissions recorded concurrently at three or more locations. The low contribution rate for test transmission detections at 1B likely had a negative influence on the performance of YAPS within the upper portion of the Project tailrace. Although multiple test tag transmissions within this area were regularly detected on three or more of the fixed receivers (see blue dots; Figure 5-1), the true position of the test transmitter was regularly outside of the footprint of the desired detecting "triangle" of receivers for that sub-region (i.e., 1A, 1B, and 1C) leading to a reduction in accuracy. An increase in detection probability (i.e., an increase in the number and decrease in the spacing of receivers) will be required to improve the accuracy of YAPS positions in this region during implementation of any Phase II study.

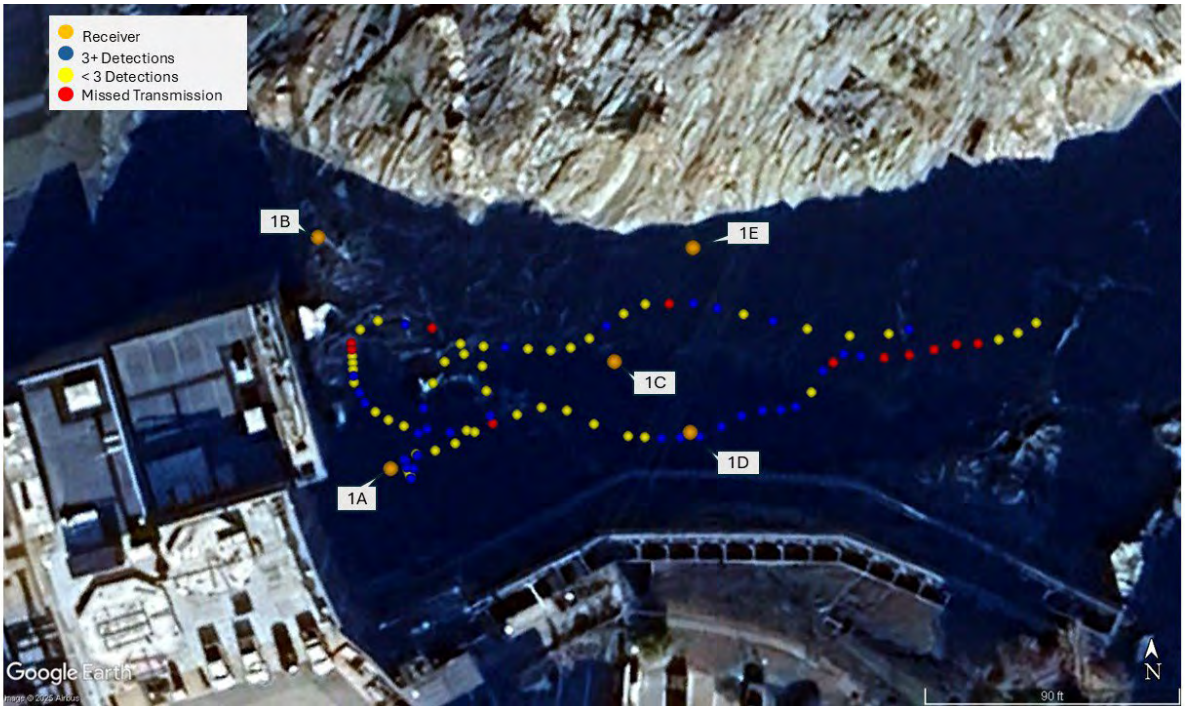
Table 5–3: Summary of Detection Testing at Pilot Deployment Location 1 During Phase I of the Project Interaction Study at Brunswick

	Receiver ID	**1A**	**1B**	**1C**	**1D**	**1E**
Trial 1	***No. Transmissions***	88	88	88	88	88
	No. Transmissions Detected	64	13	48	34	22
	Overall Detection Rate	72.7%	14.8%	54.5%	38.6%	25.0%
	Min Detect Range (m)	3.2	13.0	2.8	1.6	6.3
	Max Detect Range (m)	70.3	29.4	33.9	37.4	40.9
	Median Detect Range (m)	15.3	25.6	20.4	18.3	18.7
Trial 2	***No. Transmissions***	85	85	85	85	85
	No. Transmissions Detected	53	14	46	55	30
	Overall Detection Rate	62.4%	16.5%	54.1%	64.7%	35.3%
	Min Detect Range (m)	4.2	16.8	4.1	0.3	4.7
	Max Detect Range (m)	46.6	28.9	22.2	29.5	27.1
	Median Detect Range (m)	23.5	26.3	14.0	17.5	14.4

Table 5–4: Contribution of Fixed Location Receivers at Pilot Deployment Location 1 to the Subset of Detections Containing Three or More Concurrent Test Transmitter Detections as Recorded During Trail 1 and 2 During Phase I of the Project Interaction Study at Brunswick

Receiver ID	Trial 1	Trial 2
1A	100.0%	74.4%
1B	24.2%	23.1%
1C	84.8%	79.5%
1D	69.7%	87.2%
1E	45.5%	53.8%

Figure 5–1: Receiver Placement and Relative Locations of Test Tag Transmissions (Trial 1: Upper Panel, Trial 2: Lower Panel) During Field Evaluation at Pilot Deployment Location 1 During Phase I of the Project Interaction Study at Brunswick



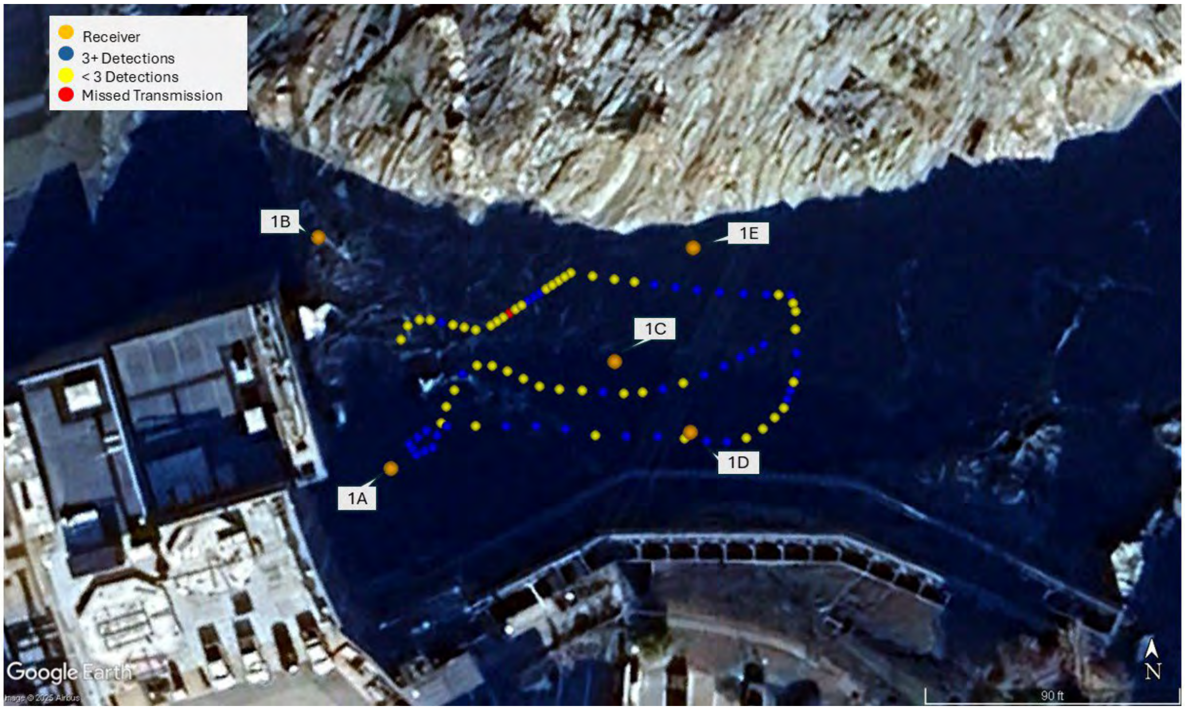
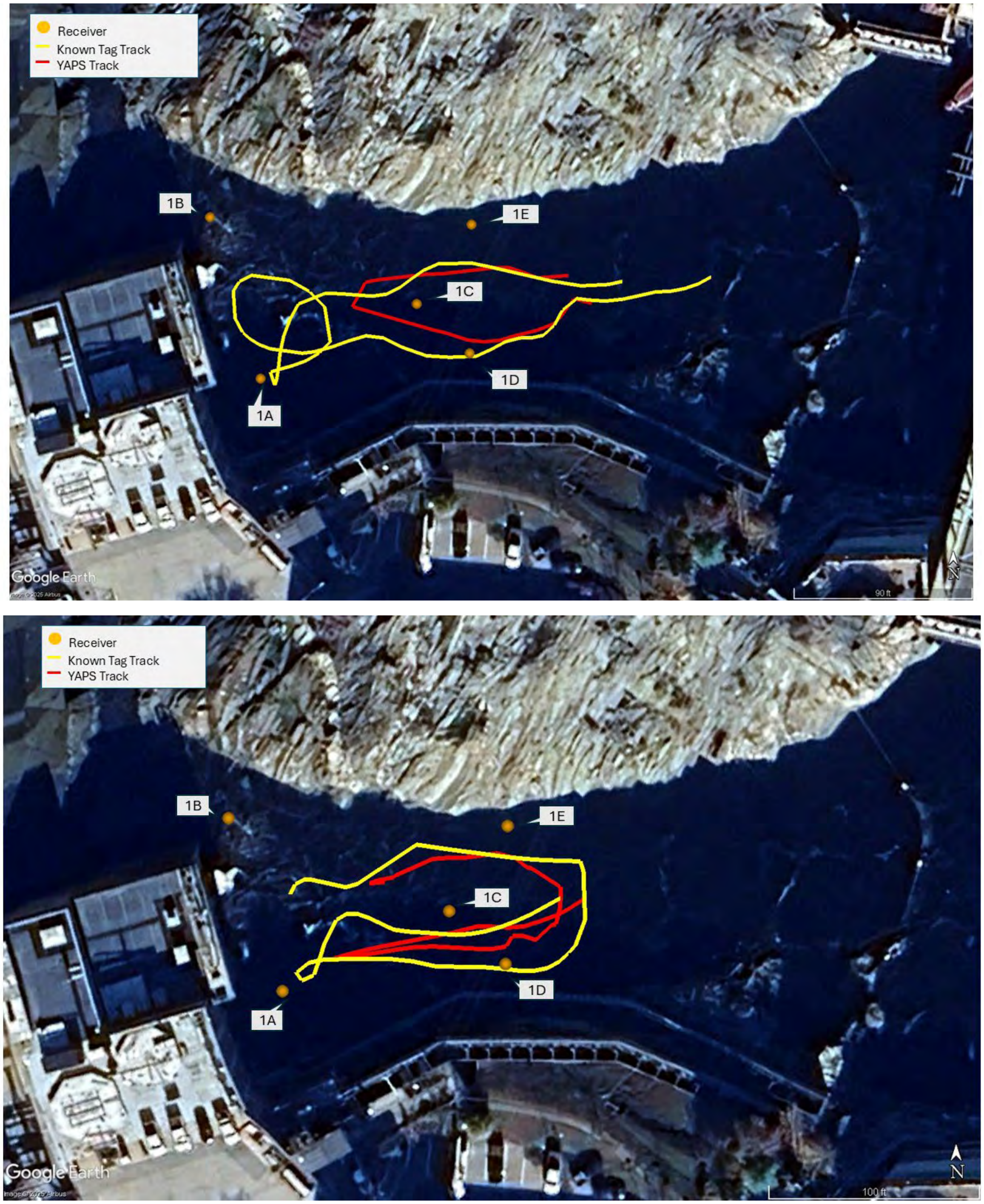


Figure 5–2: Known Test Transmitter Track (Yellow Line) and Resulting YAPS Positional Estimates (Red Line) for Trials 1 (Upper Panel) and 2 (Lower Panel) at Pilot Deployment Location 1 During Phase I of the Project Interaction Study at Brunswick



5.2 Pilot Deployment Location No. 2

Pilot deployment location 2 was located near the mid-point of the excavated tailrace channel (Figure 4-1) and was targeted for the collection of 2D data during the Phase I evaluation. The array at this location consisted of five independent receivers (Figure 5-3) and those receivers were installed near to the riverbed at depths of 6.9 (2A), 5.5 (2B), 5.9 (2C), 3.8 (2D) and 2.5 (2E) meters.

Table 5-5 provides a summary of tag transmission detections during each of the two test events as well as the minimum, maximum and average tag distance for each positive detection relative to each fixed receiver. The two separate test events conducted at Location 2 were around four minutes in duration, resulting in a total of 92 potential detections (based on the 3.0 second PRI) for Trial 1 and 72 potential detections for Trial 2. The maximum observed transmitter detection distance among the five fixed receivers was between 38 and 41 m during the two test trials. The median distance of a positive detection was less, ranging between 12 and 30 m. The measured detection rates among individual fixed receivers during the two test events ranged between 31.9 to 68.5%. Among fixed receivers, the detection frequency was highest during both test tag trials at 2C (i.e., the point at center channel and within the middle of the five-receiver array). The detection frequency was poorest at receiver location 2D, located on river right in shallower conditions towards the downstream end of the five-receiver array.

The relative location of each acoustic tag transmission (as recorded by GPS) is provided in Figure 5-3. When the full five-receiver array deployed in the lower section of the Project tailrace is considered, concurrent detections across three or more receivers were recorded for 54% and 39% of the total number of test transmissions (Trial 1 and 2, respectively) providing an estimated 8-11 detections per minute for a 3.0 second PRI. The observed incidence of missed transmissions (i.e., a transmission not detected at any of the five fixed receivers) was relatively low, 6.5% and 9.7% for Trials 1 and 2, respectively. In general, acoustic tag transmissions originating towards the lower end of Location 2 demonstrated a higher occurrence of simultaneous detection at three or more of the fixed receiver locations than those closer to Location 1.

Figure 5-4 provides a visual of the full GPS track recorded during each of the two transmitter tests with an overlay of the “fish track” as determined via trilateration of test transmitter detection positions derived from YAPS. The positions derived from YAPS for the test transmitter during Trial 1 provide a good fit to the known transmitter path as recorded by GPS during the test drag. The median distance between the GPS location and YAPS derived estimate during Trial 1 was 1.6 m. When considering the median distance between known and calculated transmitter positions, it should be noted that, an unquantified degree of error is introduced into the test transmitter positions due to (1) flow effects which deflected the test transmitters slightly out of a vertical position with the GPS unit on the boat, and (2) a degree of horizontal movement for the fixed hydrophones on the temporary anchor systems employed during this study.

The line fit between the known transmitter path as recorded by GPS and the positions derived from YAPS for Trial 2 does not provide as good a fit as was observed during Trial 1. Like observations towards the upstream end of Location 1 (see Section 5.1), Trial 2 at Location 2 contains a truncated pathway section within the calculated YAPS track. Table 5-4 provides a more detailed look at the contribution of individual fixed receivers to the detection sets for transmissions recorded concurrently at three or more locations. The low contribution rate for test transmission detections at 2A and 2B likely had a negative influence on the performance of YAPS within the upper portion of the array at Location 2. Although multiple test tag transmissions within this area were regularly detected on three or more of the fixed receivers (see blue dots; Figure 5-3), the true position of the test transmitter relative to the detecting receivers was regularly outside of the footprint of the desired detecting “triangle” of receivers for that sub-region (i.e., 2A, 2B, and 2C) leading to a reduction in accuracy. Similar to the observations for the upper section of the tailrace, an increase in detection probability (i.e., an increase in the number and decrease in the spacing of receivers) will be required to improve the accuracy of YAPS positions in this region during implementation of any Phase II study.

Table 5–5: Summary of Detection Testing at Pilot Deployment Location 2 During Phase I of the Project Interaction Study at Brunswick.

Receiver ID		2A	2B	2C	2D	2E
Trial 1	***No. Transmissions***	92	92	92	92	92
	No. Transmissions Detected	58	41	63	40	43
	Overall Detection Rate	63.0%	44.6%	68.5%	43.5%	46.7%
	Min Detect Range (m)	3.5	4.4	1.9	9.4	3.3
	Max Detect Range (m)	49.1	45.6	23.7	46.2	42.7
	Median Detect Range (m)	22.1	30.5	13.9	25.2	23.8
Trial 2	***No. Transmissions***	72	72	72	72	72
	No. Transmissions Detected	32	34	38	23	26
	Overall Detection Rate	44.4%	47.2%	52.8%	31.9%	36.1%
	Min Detect Range (m)	11.4	5.8	4.3	13.1	13.3
	Max Detect Range (m)	43.9	39.5	21.8	47.4	39.0
	Median Detect Range (m)	23.0	16.5	12.4	19.0	23.0

Table 5–6: Contribution of Fixed Location Receivers at Pilot Deployment Location 2 to the Subset of Detections Containing Three or More Concurrent Test Transmitter Detections as Recorded During Trail 1 and 2 During Phase I of the Project Interaction Study at Brunswick

Receiver ID	Trial 1	Trial 2
2A	80.0%	53.6%
2B	60.0%	57.1%
2C	96.0%	82.1%
2D	68.0%	71.4%
2E	72.0%	67.9%

Figure 5–3: Receiver Placement and Relative Locations of Test Tag Transmissions (Trial 1: Upper Panel, Trial 2: Lower Panel) During Field Evaluation at Pilot Deployment Location 2 During Phase I of the Project Interaction Study at Brunswick

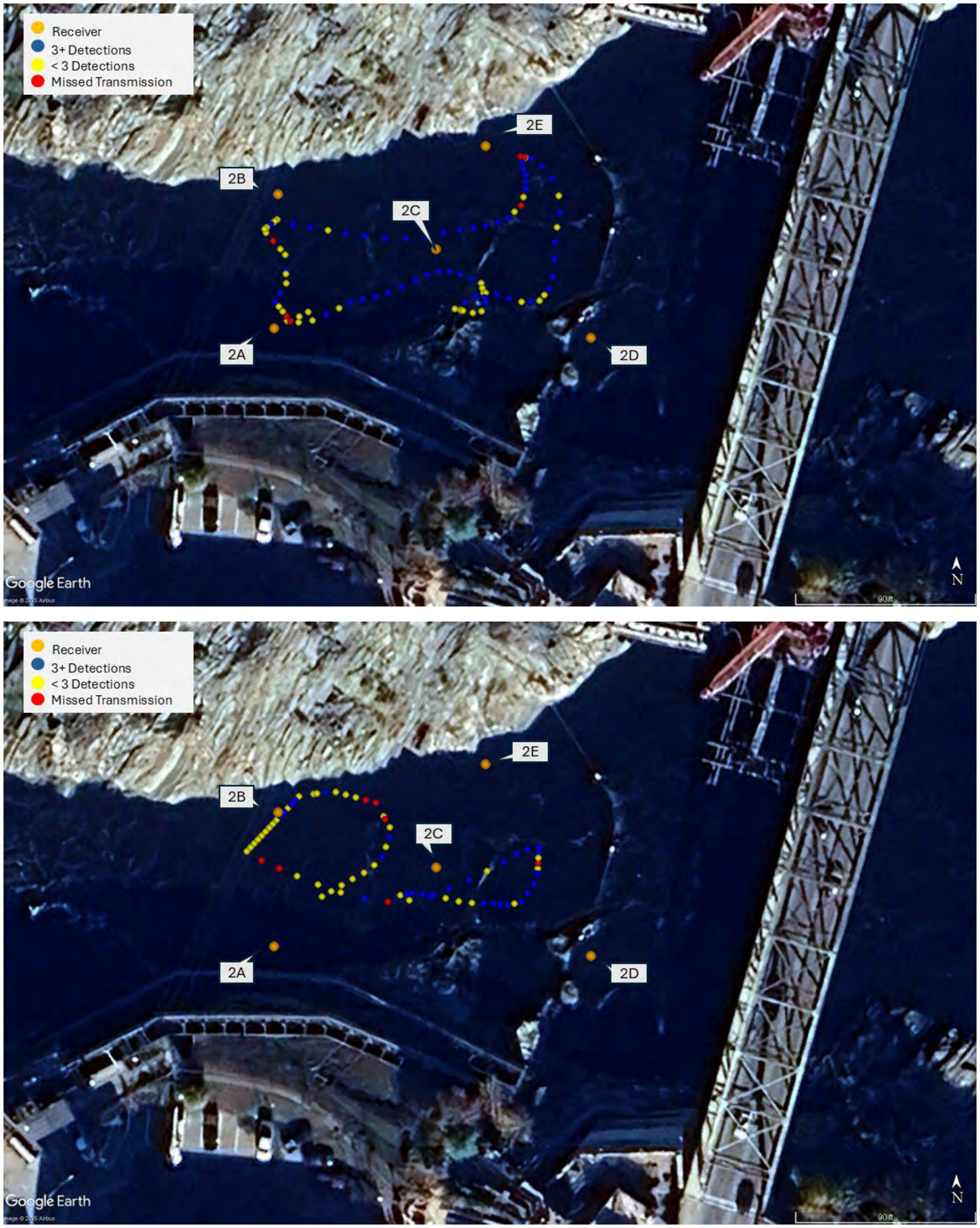
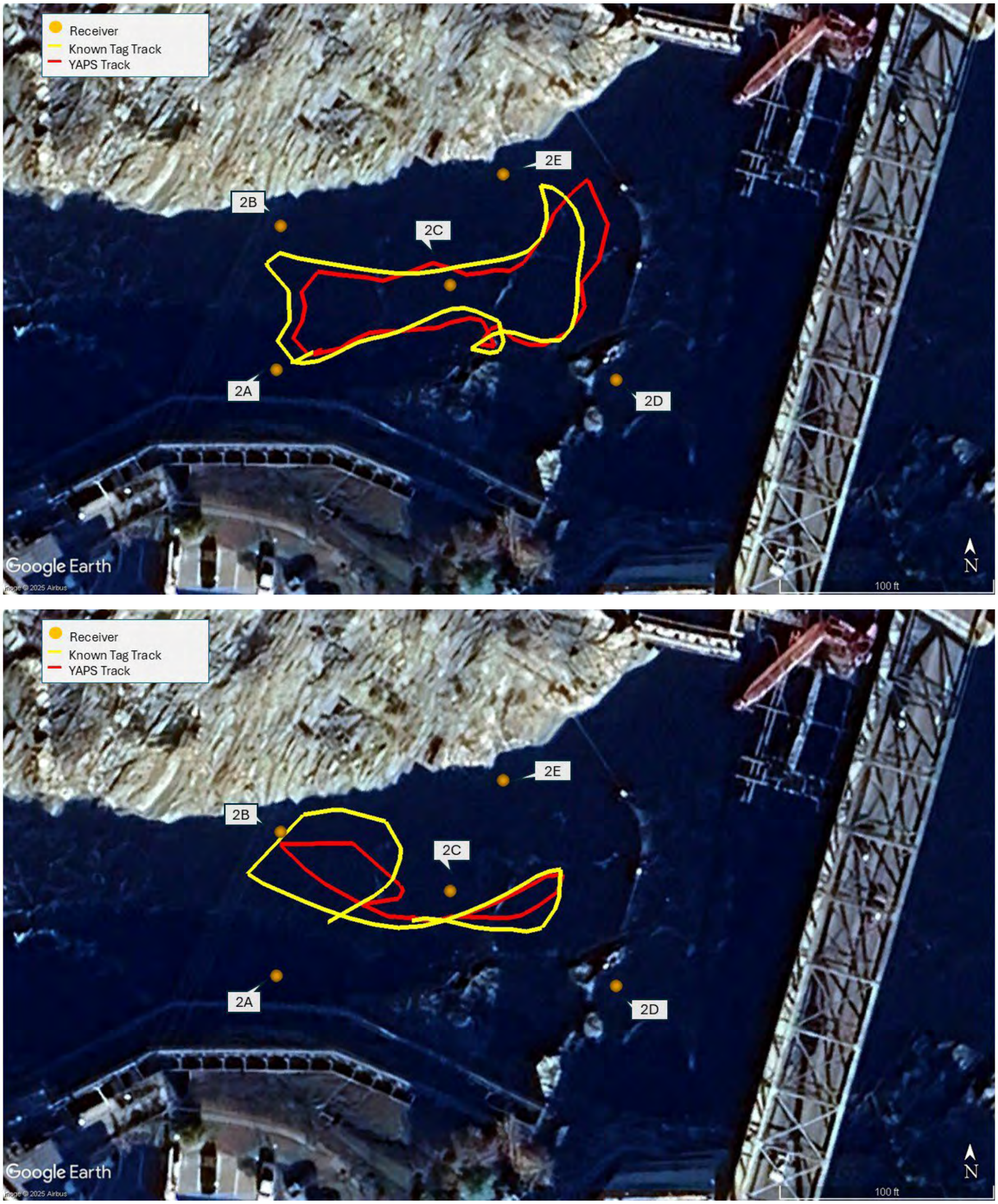


Figure 5–4: Known Test Transmitter Track (Yellow Line) and Resulting YAPS Positional Estimates (Red Line) for Trials 1 (Upper Panel) and 2 (Lower Panel) at Pilot Deployment Location 2 During Phase I of the Project Interaction Study at Brunswick



5.3 Pilot Deployment Location No. 3

Pilot deployment location 3 was located within the area below the existing Frank J. Wood Bridge and downstream of the confluence of the Project tailrace and spillway bypass (Figure 4-1) and was targeted for the collection of 2D data during the Phase I evaluation. Collection of Phase I JSATS data was conducted over two sampling events at pilot deployment location 3. The YAPS model informed using detection data for test tags collected during the initial July sampling event failed to converge and as a result, could not provide positional estimates of transmitter positions for comparison to the known test tracks. A second attempt at collection of viable acoustic detection data was conducted at Location 3 during early September and when modeled with YAPS was able to produce positional estimates. Information from both sampling events is provided below.

5.3.1 July Data Collection

The array installed at this location during July consisted of five independent receivers (Figure 5-5) installed near to the riverbed at depths of 4.3 (3A), 5.4 (3B), 4.0 (3C), 7.8 (3D) and 7.3 (3E) meters.

Table 5-7 provides a summary of tag transmission detections during each of the two test events as well as the minimum, maximum and average tag distance for each positive detection relative to each fixed receiver. The two separate test events conducted at Location 3 were each around six minutes in duration, resulting in a total of 122 potential detections (based on the 3.0 second PRI) for Trial 1 and 123 potential detections for Trial 2. The maximum observed transmitter detection distance among the five fixed receivers was 112 m during the two test trials. The median distance of a positive detection was less, ranging between 18 and 68 m. The measured detection rates among individual fixed receivers during the two test events ranged between 20.5 to 56.6%. Among fixed receivers, the detection frequency was highest during both test tag trials at 3A, 3B, and 3C (i.e., the units located in the upper half of the five-receiver array) and lowest at 3D and 3E (i.e., the units located at the base of the five-receiver array).

The relative location of each acoustic tag transmission (as recorded by GPS) is provided in Figure 5-5. When the full five-receiver array deployed at the confluence of the Project tailrace and spillway bypass is considered, concurrent detections across three or more receivers were recorded for only 28% of the total number of test transmissions (Trial 1 and 2, both) providing an estimated six detections per minute for a 3.0 second PRI. The observed incidence of missed transmissions (i.e., a transmission not detected at any of the five fixed receivers) was comparable to rates observed at successful tests at Locations 1 and 2 further upstream in the tailrace channel, 7.4% and 8.6% for Trials 1 and 2, respectively. In general, acoustic tag transmissions originating from points towards the lower end of Location 3 demonstrated a higher occurrence of simultaneous detection at three or more of the fixed receiver locations. However, the relatively low concurrent detection rates of test transmitters by the set of receivers forming the footprint of the desired detection "triangle" led to a failure of the YAPS model to converge and produce viable transmitter positions.

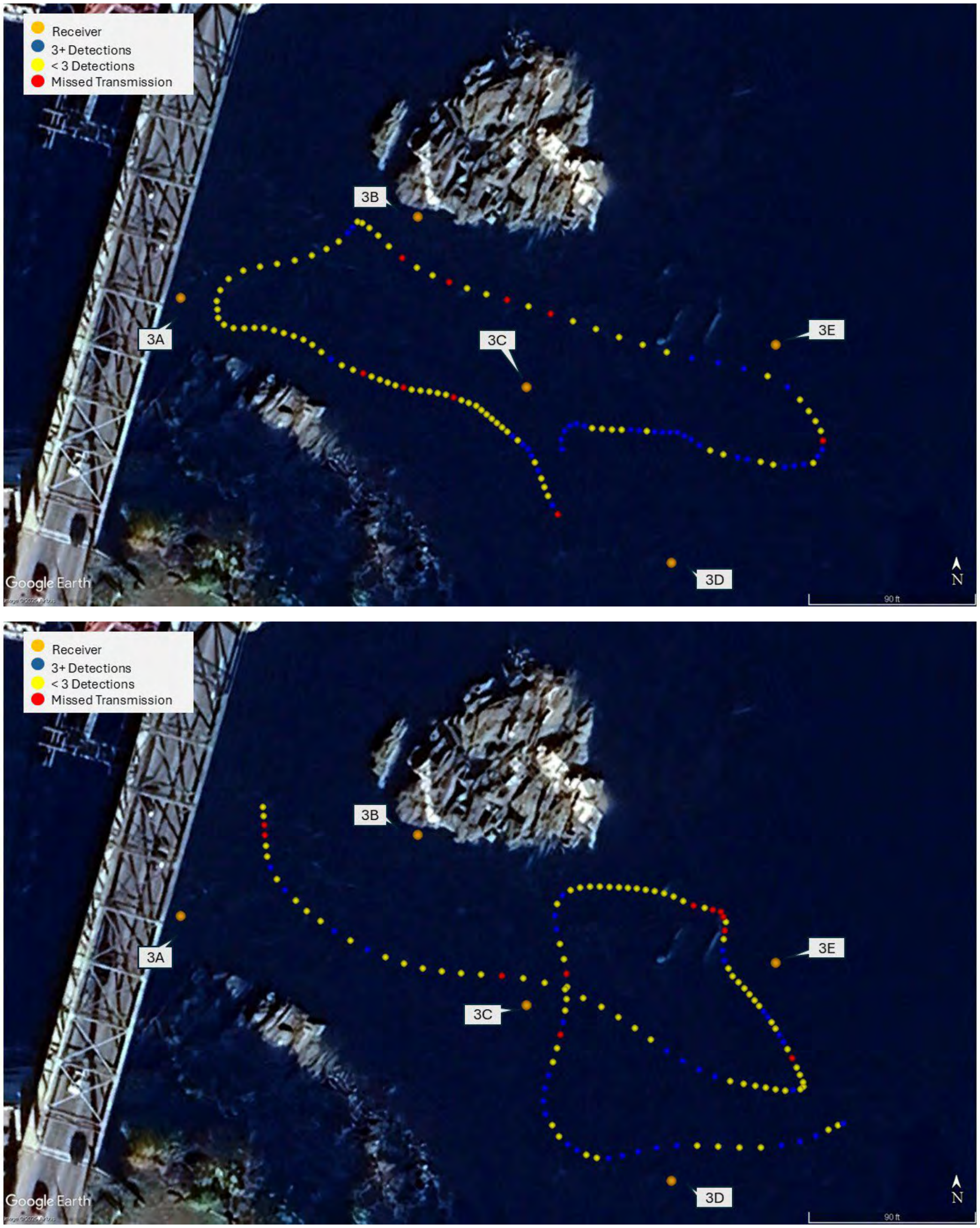
Table 5–7: Summary of Detection Testing at Pilot Deployment Location 3 During Phase I of the Project Interaction Study at Brunswick (July 2025 Data Collection Event)

	Receiver ID	**3A**	**3B**	**3C**	**3D**	**3E**
Trial 1	***No. Transmissions***	122	122	122	122	122
	No. Transmissions Detected	52	69	62	36	25
	Overall Detection Rate	42.6%	56.6%	50.8%	29.5%	20.5%
	Min Detect Range (m)	4.7	4.8	8.5	20.5	2.9
	Max Detect Range (m)	106.4	69.3	49.5	42.2	68.7
	Median Detect Range (m)	64.0	33.7	19.6	28.0	17.5
Trial 2	***No. Transmissions***	123	123	123	123	123
	No. Transmissions Detected	46	50	59	39	41
	Overall Detection Rate	37.4%	40.7%	48.0%	31.7%	33.3%
	Min Detect Range (m)	15.7	19.2	3.6	6.6	3.0
	Max Detect Range (m)	112.1	85.2	53.9	47.7	36.9
	Median Detect Range (m)	67.5	43.5	25	27.9	18.3

Table 5–8: Contribution of Fixed Location Receivers at Pilot Deployment Location 3 to the Subset of Detections Containing Three or More Concurrent Test Transmitter Detections as Recorded During Trail 1 and 2 During Phase I of the Project Interaction Study at Brunswick (July Data Collection Event)

Receiver ID	**Trial 1**	**Trial 2**
3A	80.0%	71.4%
3B	60.0%	68.6%
3C	71.4%	68.6%
3D	65.7%	54.3%
3E	45.7%	54.3%

Figure 5–5: Receiver Placement and Relative Locations of Test Tag Transmissions (Trial 1: Upper Panel, Trial 2: Lower Panel) During Field Evaluation at Pilot Deployment Location 2 During Phase I of the Project Interaction Study at Brunswick (July 2025 Data Collection Event)



5.3.2 September Data Collection

The array installed at this location during September consisted of five independent receivers (Figure 5-6) installed near to the riverbed at depths of 4.3 (3A), 4.3 (3B), 3.9 (3C), 5.4 (3D) and 3.5 (3E) meters.

Table 5-9 provides a summary of tag transmission detections during each of the two test events as well as the minimum, maximum and average tag distance for each positive detection relative to each fixed receiver. The two separate test events conducted at location 3 during September were each approximately six minutes in duration, resulting in a total of 126 potential detections (based on the 3.0 second PRI) for Trial 1 and 115 potential detections for Trial 2. Although the observed transmitter detection distances among the five fixed receivers ranged up to 106 m during the two tag trials, the median distance of a positive detection was less, ranging between 24 and 62 m. The measured detection rates among individual fixed receivers during the two test events ranged between 73.0 to 93.0%. Among fixed receivers, the detection frequency was highest during both test tag trials at 3A located at the upstream shoreline corner of the array. The detection frequency was poorest at 1B and 1E, with both of those stations located near the vertical bedrock substrate located along the river left side of the tailrace channel.

The relative location of each acoustic tag transmission (as recorded by GPS) is provided in Figure 5-6. When the full five-receiver array is considered, concurrent detections across three or more receivers were recorded for 91% and 96% of the total number of test transmissions (Trial 1 and 2, respectively) providing an estimated 18-19 detections per minute for a 3.0 second PRI. There were no incidences of missed transmissions (i.e., a transmission not detected at any of the five fixed receivers) during either Trial 1 or 2. It is likely that the low flow conditions present during this September evaluation were favorable for the high detection rates.

Figure 5-7 provides a visual of the full GPS track recorded during each of the two transmitter tests with an overlay of the “fish track” as determined via trilateration of test transmitter detection positions derived from YAPS. The contribution of individual fixed receivers to the detection sets for transmissions recorded concurrently at three or more locations is summarized in Table 5-10 and demonstrates high detection rates for available transmissions (i.e., 75.5 to 93.6%). The high occurrence of transmissions across multiple receivers and within the footprint of the desired detecting “triangle” of receivers for each sub-region (e.g., 3A, 3B, and 3C or 3C, 3D, and 3E) lead to a high degree of accuracy for the positional estimates generated by YAPS relative to the known transmission locations.

Table 5–9: Summary of Detection Testing at Pilot Deployment Location 3 During Phase I of the Project Interaction Study at Brunswick (September 2025 Data Collection Event)

	Receiver ID	**3A**	**3B**	**3C**	**3D**	**3E**
Trial 1	***No. Transmissions***	126	126	126	126	126
	No. Transmissions Detected	107	103	95	105	101
	Overall Detection Rate	84.9%	81.7%	75.4%	83.3%	80.2%
	Min Detect Range (m)	5.0	1.4	8.8	5.5	0.7
	Max Detect Range (m)	92.6	92.5	53.0	78.7	73.1
	Median Detect Range (m)	61.7	60	33.8	27.2	24.0
Trial 2	***No. Transmissions***	115	115	115	115	115
	No. Transmissions Detected	107	103	91	101	84
	Overall Detection Rate	93.0%	89.6%	79.1%	87.8%	73.0%
	Min Detect Range (m)	0.9	4.9	4.8	5.1	3.5
	Max Detect Range (m)	106.4	105.0	64.9	80.8	76.6
	Median Detect Range (m)	53.9	52.9	25.6	28.4	30.5

Table 5–10: Contribution of Fixed Location Receivers at Pilot Deployment Location 3 to the Subset of Detections Containing Three or More Concurrent Test Transmitter Detections as Recorded During Trail 1 and 2 during Phase I of the Project Interaction Study at Brunswick (September Data Collection Event)

Receiver ID	Trial 1	Trial 2
3A	91.3%	93.6%
3B	86.1%	90.9%
3C	79.1%	81.8%
3D	86.1%	90.9%
3E	83.5%	75.5%

Figure 5–6: Receiver Placement and Relative Locations of Test Tag Transmissions (Trial 1: Upper Panel, Trial 2: Lower Panel) During Field Evaluation at Pilot Deployment Location 3 During Phase I of the Project Interaction Study at Brunswick (September 2025 Data Collection Event)

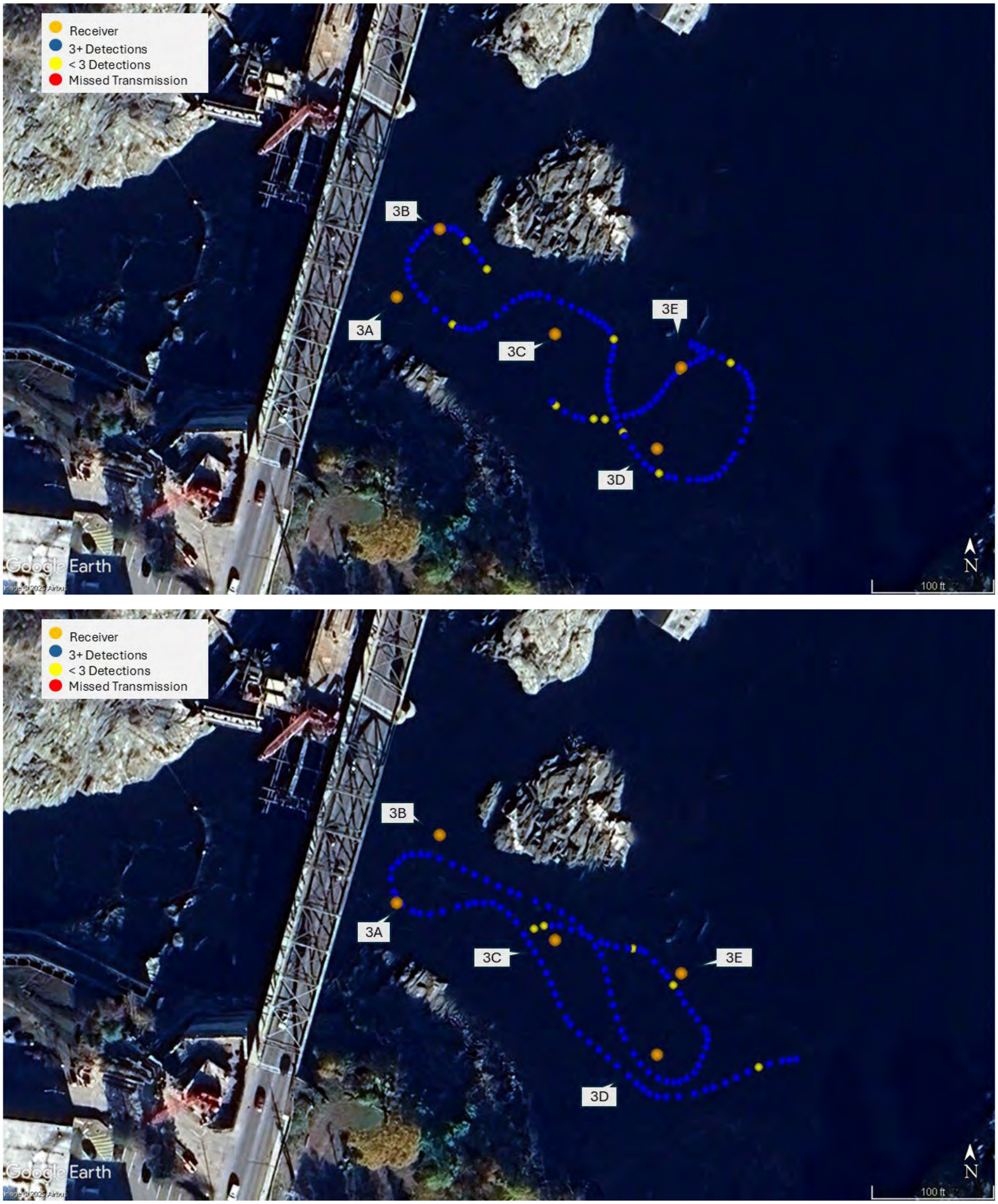
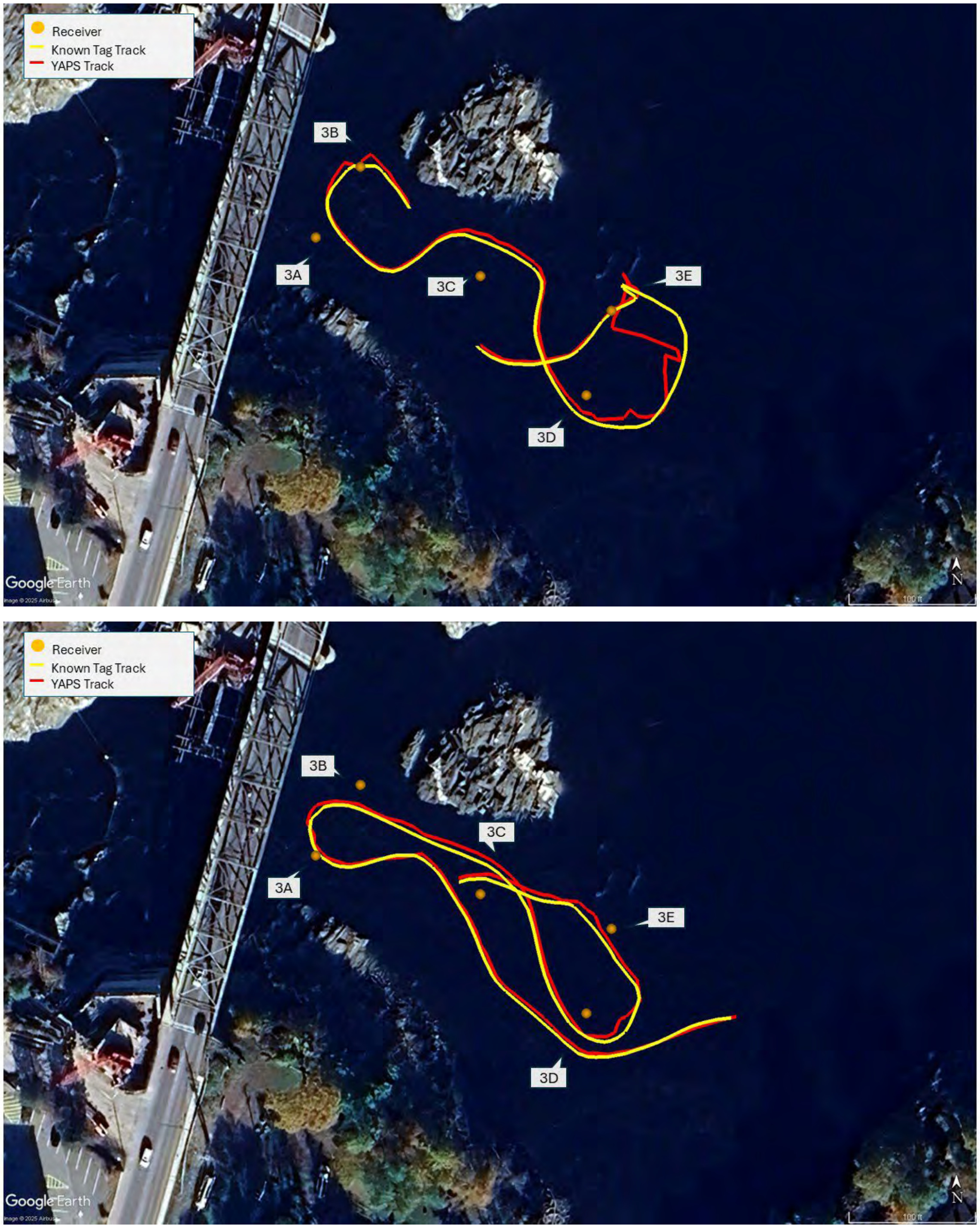


Figure 5–7: Known Test Transmitter Track (Yellow Line) and Resulting YAPS Positional Estimates (Red Line) for Trials 1 (Upper Panel) and 2 (Lower Panel) at Pilot Deployment Location 3 During Phase I of the Project Interaction Study at Brunswick (September Data Collection Event)



5.4 Pilot Deployment Location No. 4

Pilot deployment location 4 was located within an area downstream of the ledge habitat located at the outlet of the spillway bypass area (Figure 4-1) and was targeted for the collection of 2D data during the Phase I evaluation. The array at this location consisted of five independent receivers (Figure 5-8) installed near to the riverbed at depths of 3.9 (4A), 5.6 (4B), 3.7 (4C), 3.4 (4D) and 4.3 (4E) meters.

Table 5-11 provides a summary of tag transmission detections during each of the two test events as well as the minimum, maximum and average tag distance for each positive detection relative to each fixed receiver. The two separate test events conducted at Location 4 ranged in duration from approximately 5.5 to four minutes in duration, resulting in a total of 109 potential detections (based on the 3.0 second PRI) for Trial 1 and 83 potential detections for Trial 2. Although the observed transmitter detection distances among the five fixed receivers ranged up to 50 m during the two tag trials, the average distance of a positive detection was less, with median values ranging from 10 to 27 m. The measured detection rates among individual fixed receivers during the two test events ranged between 17.4 to 48.2%. Among fixed receivers, the detection frequency was highest during both test tag trials at 4E (i.e., located near to substrate associated with the downstream of that test array and near to the base of the spillway ledge area). The detection frequency was poorest at 4D, located towards the center of the channel and furthest away from the rest of the detection array focused on the area near the base of the spillway ledge.

The relative location of each acoustic tag transmission (as recorded by GPS) is provided in Figure 5-8 When the full five-receiver array deployed downstream of the ledge habitat located at the outlet of the spillway bypass area is considered, concurrent detections across three or more receivers were recorded for only 9% and 18% of the total number of test transmissions (Trial 1 and 2, respectively) providing an estimated 2-4 detections per minute for a 3.0 second PRI. The observed incidence of missed transmissions (i.e., a transmission not detected at any of the five fixed receivers) was among the highest rates observed, 14.7% and 13.2% for Trials 1 and 2, respectively.

Figure 5-9 provides a visual of the full GPS track recorded during each of the two transmitter tests with an overlay of the “fish track” as determined via trilateration of test transmitter detection positions derived from YAPS. As evidenced by the truncated (Trial 1) or misshapen/missing (Trial 2) segments of YAPS tracks within the upper section of the fixed receiver array installed for Phase I testing at location 4, the accuracy for estimates of test transmitter positions within that region was poor. Table 5-12 provides a more detailed look at the contribution of individual fixed receivers to the detection sets for transmissions recorded concurrently at three or more locations. Although the contribution of fixed location receivers at Location 4 to the subset of detections containing three or more concurrent test transmitter detections was decent (average ~70%), the overall number of transmissions detected by three or more receivers simultaneously was very low (see Figure 5-9; as noted above these represented only 9% - 18% of the total number of test transmissions for each trial). Field crew observations during the deployment and testing of JSATS equipment in Location 4 noted uneven bottom substrate with large boulders and ledge outcroppings. Due to the line-of-sight nature of acoustic telemetry and the uneven bottom conditions through this reach, the collection of viable transmitter data in this region will be a significant challenge.

Table 5–11: Summary of Detection Testing at Pilot Deployment Location 4 During Phase I of the Project Interaction Study at Brunswick

	Receiver ID	**4A**	**4B**	**4C**	**4D**	**4E**
Trial 1	***No. Transmissions***	109	109	109	109	109
	No. Transmissions Detected	26	22	36	19	48
	Overall Detection Rate	23.9%	20.2%	33.0%	17.4%	44.0%
	Min Detect Range (m)	8.0	2.2	3.4	1.7	5.6
	Max Detect Range (m)	36.6	42.1	33.8	28.9	38.0
	Median Detect Range (m)	21.3	23.7	16	10.2	26.6
Trial 2	***No. Transmissions***	83	83	83	83	83
	No. Transmissions Detected	27	23	30	17	40
	Overall Detection Rate	32.5%	27.7%	36.1%	20.5%	48.2%
	Min Detect Range (m)	1.6	1.5	0.4	0.6	4.5
	Max Detect Range (m)	38.6	45.6	27.8	32.3	50.2
	Median Detect Range (m)	14.1	25.6	19.2	9.9	23.9

Table 5–12: Contribution of Fixed Location Receivers at Pilot Deployment Location 4 to the Subset of Detections Containing Three or More Concurrent Test Transmitter Detections as Recorded during Trail 1 and 2 During Phase I of the Project Interaction Study at Brunswick

Receiver ID	Trial 1	Trial 2
4A	60.0%	60.0%
4B	40.0%	66.7%
4C	80.0%	66.7%
4D	60.0%	60.0%
4E	100.0%	73.3%

Figure 5–8: Receiver Placement and Relative Locations of Test Tag Transmissions (Trial 1: Upper Panel, Trial 2: Lower Panel) During Field Evaluation at Pilot Deployment Location 4 During Phase I of the Project Interaction Study at Brunswick

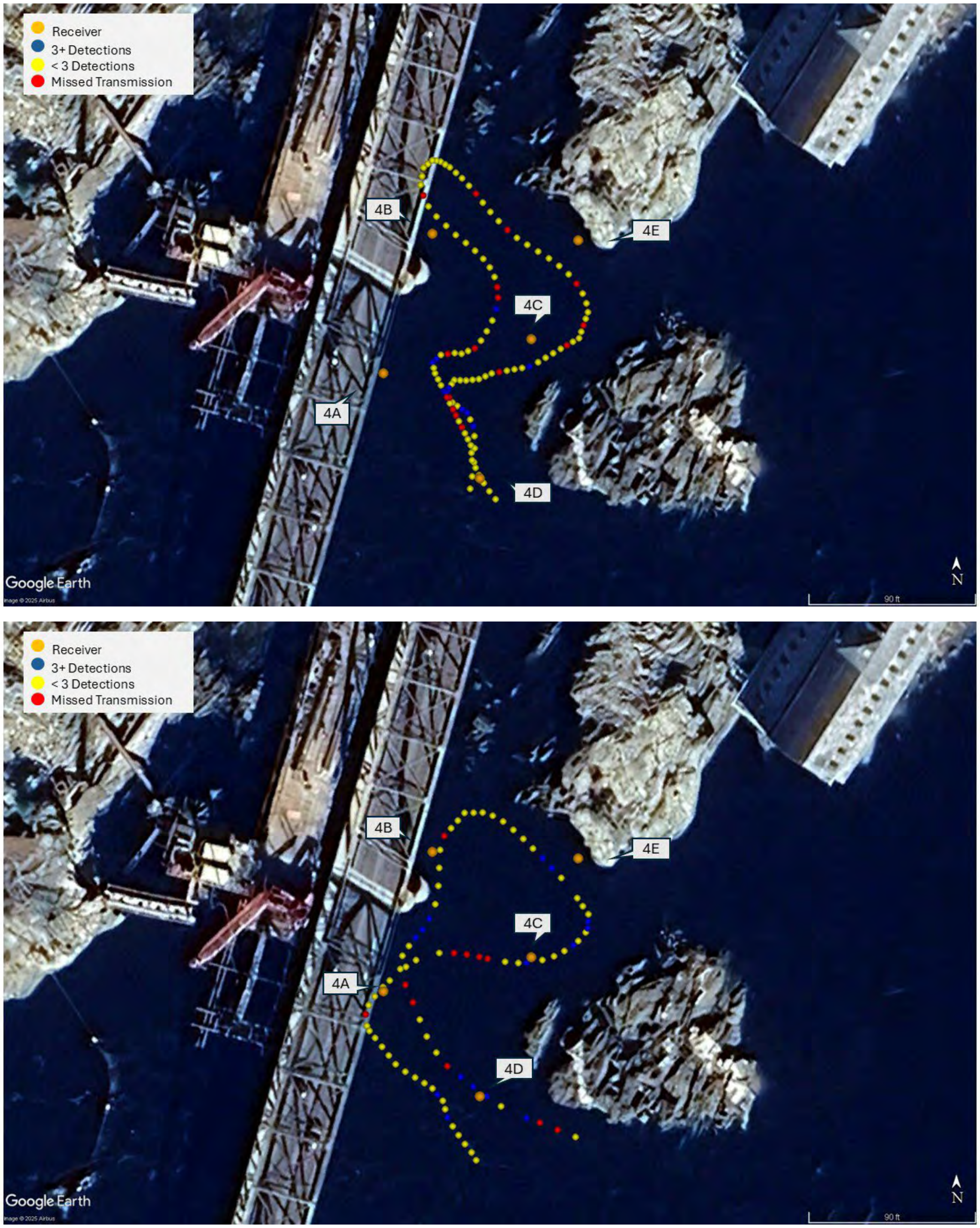
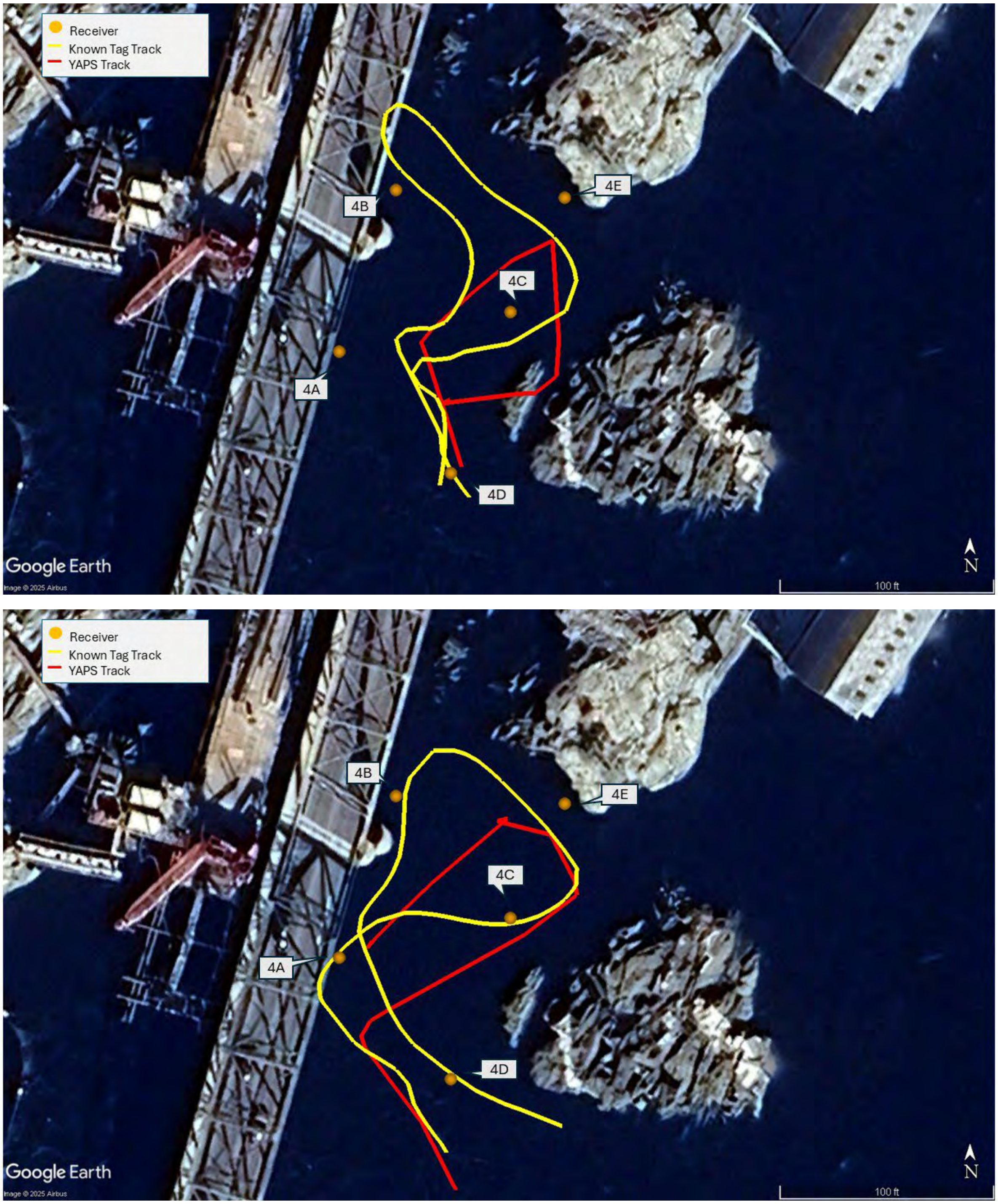


Figure 5–9: Known Test Transmitter Track (Yellow Line) and Resulting YAPS Positional Estimates (Red Line) for Trials 1 (Upper Panel) and 2 (Lower Panel) at Pilot Deployment Location 4 During Phase I of the Project Interaction Study at Brunswick



5.5 Pilot Deployment Location No. 5

Pilot deployment location 5 was located within the spillway bypass area in the vicinity of the Tainter gate structures (Figure 4-1) and was targeted for the collection of 1D data during the Phase I evaluation. Testing at this location was conducted using a single receiver (Figure 5-10). The receiver was placed within the pool habitat located downstream of the Tainter gate section with gates closed to allow for safe crew access. Testing at this location consisted of two components: a boat-based "tag drag" allowing for collection of geo-referenced tag transmissions and a shore-based test tag deployment to validate detectability. The boat-based tag drag was conducted at the time of receiver deployment and was performed under a no flow condition (to allow for safe crew access on the water upstream of the ledge habitat located at the outlet of the spillway bypass area. The shore-based detection information was collected with a Tainter gate open and passing nearly 700 cfs.

Table 5-13 provides a summary of tag transmission detections during the boat-based test event as well as minimum, maximum and average tag distance for each positive detection relative to the fixed receiver. The test transmitter was towed around the receiver for over twelve minutes, resulting in a total of 259 potential detections (based on the 3.0 second PRI). The relative location of each boat-based transmitter detection (as recorded by GPS) is provided in Figure 5-10. Transmitter detection distances ranged up to 64 m with an average distance of a positive detection of 32 m. The measured detection rate during the boat-based test event was 27.0% (providing an estimated 5 detections per minute for a 3.0 second PRI).

Acoustic detections rely on an uninterrupted line-of-sight between receiver and transmitter and as a result, in-water obstructions related to bottom topography or other natural or engineered features may potentially influence detection rates. Table 5-14 presents the boat based observed detection rates of the JSATS SS400 transmitter at incremental distances away from the fixed location receiver installed at location 5 and demonstrates a decrease in detection efficiency as distance from the receiver increases.

In addition to the boat-based data collection, the test transmitter was cast from the Tainter gate structure into the downstream pool habitat with flow conditions present and tag transmissions were recorded during each attempt.

Table 5–13: Summary of Detection Testing at Pilot Deployment Location 5 During Phase I of the Project Interaction Study at Brunswick

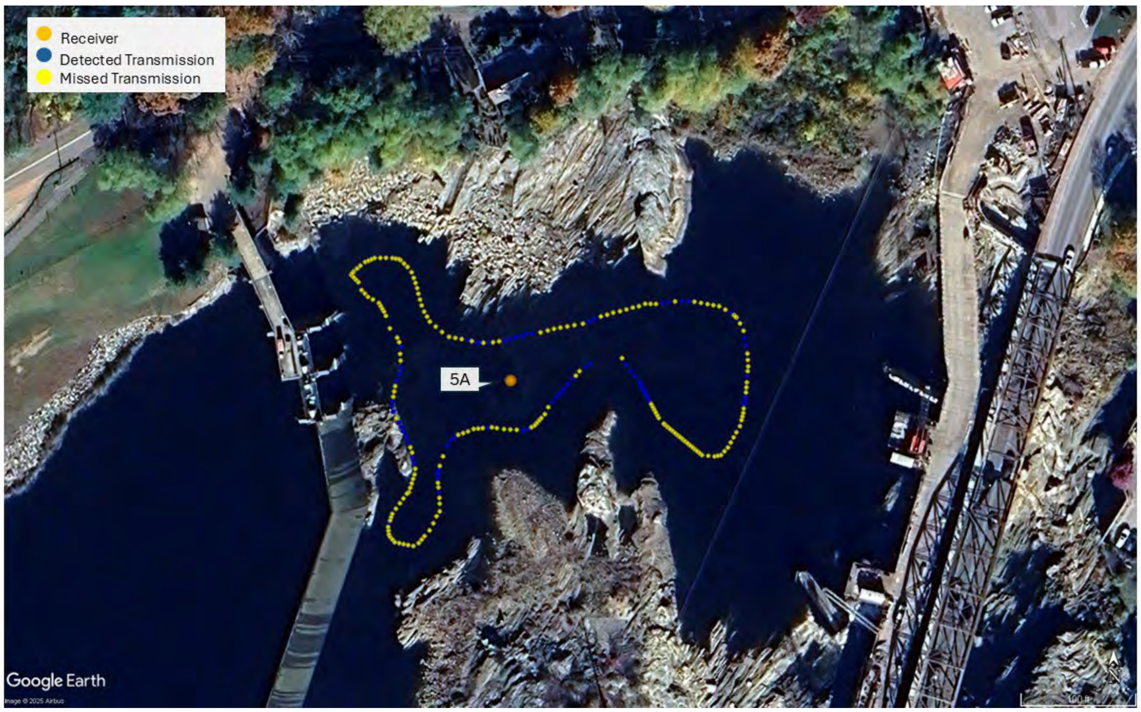
Receiver ID	**5A**
No. Transmissions	259
No. Transmissions Detected	70
Overall Detection Rate	27.0%
Min Detect Range (m)	11.6
Max Detect Range (m)	64.4
Mean Detect Range (m)	31.6

Table 5–14: Summary of Observed Detection Range Intervals for Boat-Based Testing at Pilot Deployment Location 5 During Phase I of the Project Interaction Study at Brunswick

Distance to Receiver (m)	Detection Percentage 5A
0-25	40.7%
25-50	25.0%
50-75	18.3%

*Based on a 3.0 second PRI

Figure 5–10: Receiver Placement and Locations of Recorded (Blue) and Missed (Yellow) Test Tag Transmissions During the Boat-Based Field Evaluation at Pilot Deployment Location 5 During Phase I of the Project Interaction Study at Brunswick



5.6 Pilot Deployment Location No. 6

Pilot deployment location 6 was located within the center channel at a point approximately 500 meters downstream of the powerhouse discharge (Figure 4-1) and was targeted for the collection of 1D data during the Phase I evaluation. Pilot deployment location 6 was characterized by relatively deep, low-velocity water. Depths along the sampling line at this location ranged between 6 to 20 feet during data collection and due to the tidal nature of this reach, are expected to see a range of flow rates and water depths during those daily cycles.

Testing at this location was conducted using a series of three acoustic receivers (Figure 5-11). Table 5-15 provides a summary of tag transmission detections during the test event as well as minimum, maximum and average tag distance for each positive detection relative to each fixed receiver. The test event conducted at location 6 was eight minutes and fifteen seconds in duration, resulting in a total of 166 potential detections (based on the 3.0 second PRI) and the relative location of each transmitter detection (as recorded by GPS) is provided on Figure 5-11. Transmitter detection distances for the three fixed receivers ranged up to 115 m with an average distance of a positive detection between 43 and 58 m. The measured detection rates during the test event ranged between 38.6 to 42.2% when considering a single receiver and was 74.1% when the full three-receiver array was considered (providing an estimated 15 detections per minute for a 3.0 second PRI). When only the two outermost fixed receivers are considered (6A and 6C), the detection rate decreased to 63.3% (providing an estimated 13 detections per minute for a 3.0 second PRI)

Acoustic detections rely on an uninterrupted line-of-sight between receiver and transmitter and as a result, in-water obstructions related to bottom topography or other natural or engineered features may potentially influence detection rates. Figure 5-12 presents the observed detection rates of the JSATS SS400 transmitter at incremental distances away from each of the three fixed location receivers installed at location 6 during the Phase I testing at Brunswick. The median detection rate was comparable across each of the five distance categories considered (0-25, 25-50, 50-75, 75-100, and >100m) and ranged from a low of 36% when the transmitter was within 25-50 m of the receiver to 48% when the transmitter was within 50-75 m of the receiver.

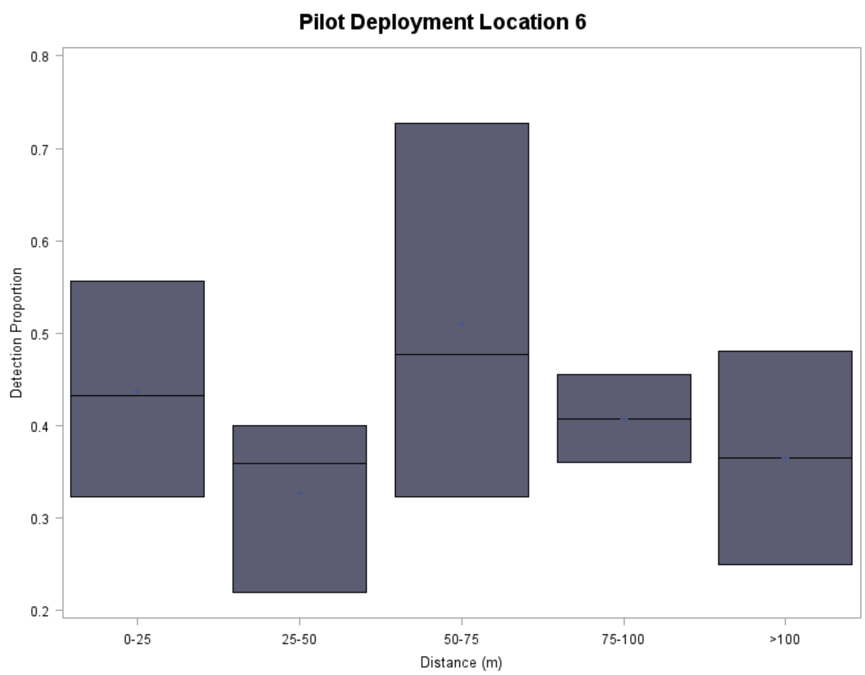
When estimated using the full three-receiver array, the probability of detecting at least five transmissions over a 60-second period is 0.999. The performance of the two-receiver array (i.e., considering only fixed locations 6A and 6C) matches the three-receiver probability of 0.999. When the detection rate for the poorest performing fixed receiver is considered (i.e., 6A, which had an overall detection rate of 38.6%), the probability of detecting at least five transmissions within a 60-second period is reduced to 0.846.

Table 5–15: Summary of Detection Testing at Pilot Deployment Location 6 During Phase I of the Project Interaction Study at Brunswick

Receiver ID	**6A**	**6B**	**6C**	**6A-6B-6C**
No. Transmissions	166	166	166	166
No. Transmissions Detected	64	70	70	123
Overall Detection Rate	38.6%	42.2%	42.2%	74.1%
Min Detect Range (m)	9.1	11.0	7.6	-
Max Detect Range (m)	115.3	69.6	111.6	-
Mean Detect Range (m)	58.1	42.9	50.3	-

Figure 5–11: Receiver Placement and Locations of Recorded (Blue) and Missed (Yellow) Test Tag Transmissions During Field Evaluation at Pilot Deployment Location 6 During Phase I of the Project Interaction Study at Brunswick

Figure 5–12: Observed Test Tag Transmission Detection Rates (P25, Median and P75) for 25 m Proximity Bands (0-25, 25-50, 50-75, 75-100, and >100 m) Around ATS Receivers Installed at Pilot Deployment Location 6 During Phase I of the Project Interaction Study at Brunswick



6 DISCUSSION

A feasibility study to assess the use of JSATS for a future evaluation of diadromous fish movements in the vicinity of Brunswick Dam was conducted in support of the ongoing FERC relicensing. This Phase I evaluation consisted of a field survey to determine the functionality (as measured by detection range and rate) of JSATS receivers at different locations in the vicinity of the dam. The Phase I assessment was completed during the 2025 field season and the findings presented in this report have been used to update the proposed Phase II field methodology for the evaluation of distribution and movement of selected diadromous fish species in the tailrace and downstream river reach (see Appendix A of this report).

Within the RSP, BWPH identified the Project tailwater and proximal downstream section of the Androscoggin as the overall target study reach encompassing the existing fishway entrance and adjacent waters where potential fishway modifications or new fishway entrances may be installed. Figure 6-1 highlights the "primary detection zone" which was the spatial area focused on during the Phase I feasibility assessment for the collection of 2D data. Pilot deployment locations 1, 2, 3, and 4 were sampled to provide insight into the 2D performance of JSATS receivers in that region. In addition, sampling at pilot deployment locations 5 and 6 was conducted to evaluate the feasibility of collecting 1D (i.e., presence/absence) information for tagged fish located in the spillway bypass area in the vicinity of the Tainter gate structures and at a representative "gate" location located along the mainstem of the Androscoggin River downstream of the dam.

6.1 2D Feasibility

Sampling to assess the collection of 2D data was initially conducted at Locations 1, 2, 3, and 4 during early July and was coordinated with BWPH to occur at a time when river flows would permit safe boat access into the immediate tailrace channel and shoreline access into the spillway bypass area (i.e., a maximum powerhouse discharge of 3,000 cfs and minimum spillway flow). Inflow at the Project exceeded station capacity for the duration of May and first half of June (Figure 6-2). A subsequent sampling event was conducted at Location 3 during early September to provide an additional data set to address a convergence issue with the positional modeling conducted with the July data. As outlined in Sections 5.1 through 5.4, temporary hydrophone arrays were installed at each of the four 2D pilot deployment locations with the intent of quantifying (1) transmitter detectability, (2) read range, and (3) suitability of recorded data to convert time-stamped detections to positional locations.

The primary detection zone targeted for evaluation of 2D feasibility (Figure 6-1) consists of the excavated tailrace channel immediately downstream of the powerhouse and the area in the vicinity of the existing Frank J. Wood Bridge and downstream of ledge habitat located at the outlet of the spillway bypass area where outflow from the tailrace and spillway converge. Field observations of this region characterized the excavated tailrace channel as constricted, relatively high velocity, deep water with laminar flows moving from upstream to downstream (Figure 6-3). The downstream river channel widens when moving from the excavated tailrace channel to the convergence area of the tailrace and spillway bypass area flows. In general, water depths in this region are slightly shallower than those further upstream near the powerhouse and flow velocities are slightly reduced due to the widening of the channel. Bottom substrate in the convergence area appears far more uneven than further upstream with the presence of ledge outcroppings and large boulders, particularly on river left nearer to the ledge habitat located at the outlet of the spillway bypass (Figure 6-4). Brunswick Dam is located at the head-of-tide of the Androscoggin River and as a result the entirety of the primary detection zone will be subject to daily tidal cycle fluctuations (Figure 6-5). The mean daily swing in tailwater elevation at Brunswick during May-June, 2025 was 3.3 feet (range = 1.1 to 5.9 ft; Figure 6-5).

6.1.1 Transmitter Detectability

The quartile range for the observed detection rate of tag transmissions by individual receivers across both tag drag tests and at each of the four 2D evaluation locations are presented in Figure 6-6. As evidenced by the overlap between the upper and lower bounds of the box plot notches for most locations there were not significant differences in the median detection rate for a single receiver. The median detection rate observed during July was greater at Location 2 (i.e., lower portion of the tailrace channel) than the other three locations (i.e., Locations 1, 3, and 4). The median detection rate observed at Location 3 during September was significantly higher than that observed at any of the other four sampling locations as assessed during July, very likely a function of the much lower river flow at the time of data collection. With an assumed median detection rate of 0.4, an active transmitter within read range of a given receiver should be recorded eight times per minute (assuming a 3.0 second PRI).

6.1.2 Transmitter Read Range

Quartile values for positive detection distances of tag transmissions at each of the four 2D evaluation locations are presented in Figure 6-7 (pooled test drags and fixed receivers). As evidenced by the overlap between the upper and lower bounds of the box plot notches for Locations 1, 2, and 4, there was no significant difference among the median measured distance for positive tag detections. During the July sampling, the median detection distance at Location 3 (i.e., the river right side of the downstream portion of the primary detection zone) was greater than those observed at Locations 1 and 2 in the excavated tailrace channel or Location 4 in the area downstream of ledge habitat located at the outlet of the spillway bypass. Similar to the observations for patterns in detection efficiency noted above, the median detection distance at Location 3 was greatest during the September sampling event which was characterized by low flow conditions. Numerous factors are identified in the literature which may influence acoustic detection range variability including turbidity, temperature, surface conditions, depth, water flow, bathymetry and substrate obstruction (Kessel et al. 2013).

6.1.3 Detection Data Suitability

The “fish tracks” produced by YAPS during the pilot testing at Locations 1, 2, 3, and 4 were visually assessed for their “fit” against the known transmitter track (Table 6-1). Test tracks assembled using data collected within the excavated tailrace channel (i.e., Locations 1 and 2) showed reduced quality when moving from the lower tailrace to the upper tailrace. As described in Sections 5.1 and 5.2, it is suspected that reductions in the fit of the estimated fish track developed in YAPS from the known transmitter track as recorded by GPS was likely influenced by the reduced occurrence of detections at some receiver locations which prevented the concurrent (i.e., minimum of three) detections. As noted above, velocity and turbulence can reduce the effective range of acoustic receivers and the region immediately downstream of the turbine discharge is prone to these conditions. A reduction in the spacing of fixed receivers in this region should increase the detection rate and provide a more robust dataset of concurrent transmission detections for the development of behavioral fish tracks in this reach. A reduction in receiver spacing from that used during this Phase I evaluation (20-35 m at Locations 1 and 2) to 10-12 m (i.e., conservatively estimated as the 25th percentile of distances at which known tag transmissions were recorded at these two locations) should improve the quality of detection data.

Collection of Phase I data from the convergence area of the tailrace and spillway bypass flows (i.e., Locations 3 and 4) were more challenging under the more robust river flow conditions present during the July sampling (versus low flow conditions sampled at Location 3 during September). Observations made at Location 3 during the September sampling event demonstrate the high degree of accurate positioning that can be attained using JSATS when in-river conditions support increased range and detection rates for the receiver array. Despite having comparable receiver spacing to that deployed during the September sampling, in-river conditions present during July reduced the frequency of concurrent receiver detections of single transmissions to a level which resulted in an inability of the positioning model to provide meaningful output. In contrast, the receiver spacing at Location 4 (under the same July river conditions) was approximately half of that at Location 3 and due to difficulties in obtaining concurrent receiver detections of single transmissions due to bottom topography, resulted in low quality fish positioning output. A reduction in receiver spacing at Location 3 from that used during this Phase I evaluation (35-50 m) to 18-20 m (i.e., conservatively estimated as the 25th percentile of distances at which known tag transmissions were recorded at these two locations) should improve the quality of detection data. Bottom topography within the region downstream of the ledge habitat located at the outlet of the spillway bypass area is likely to hinder the effective collection of data to support 2D positional determination of JSAT transmitters.

Figure 6–1: Relative Locations of Sampling Regions Identified in the RSP for Assessment During Phase I: Primary Detection Zone (Orange Shading; 2D Data Acquisition), 1D Spillway Region (Green Shading), and Gate Receivers (Red Line)

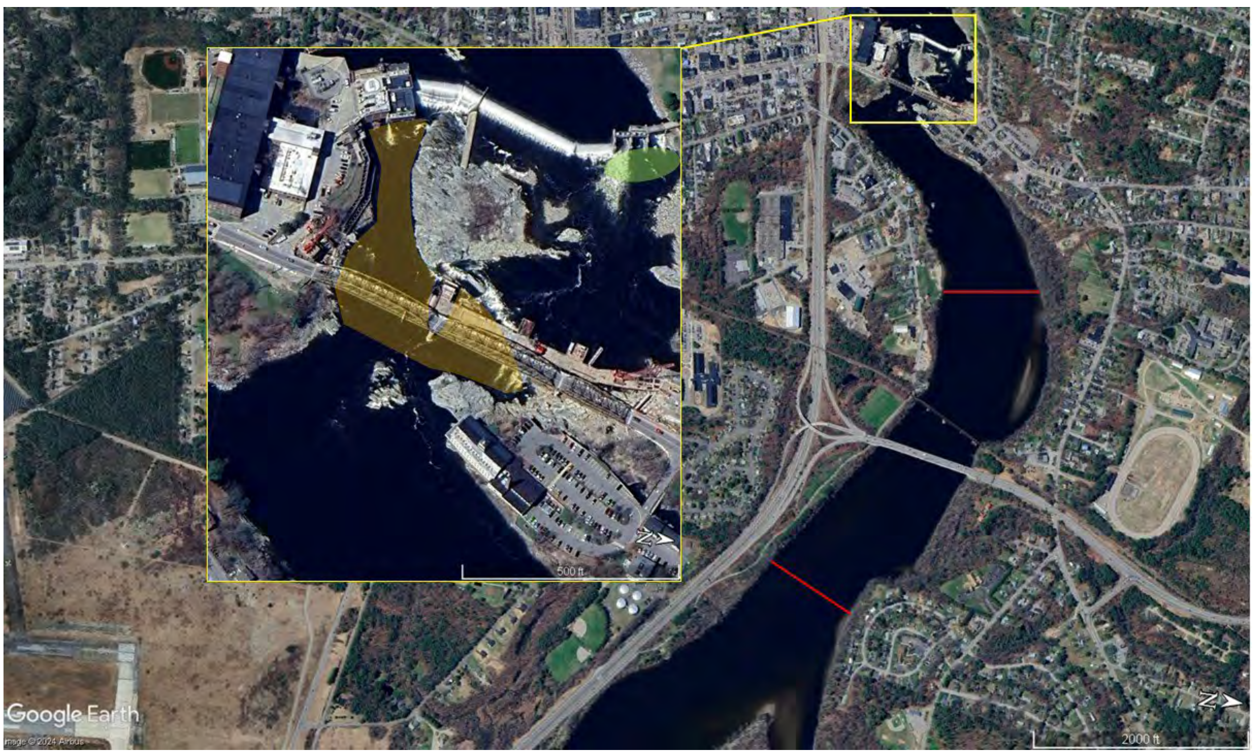


Figure 6–2: Brunswick Project Inflow (cfs) for the Period May 1 to July 15, 2025

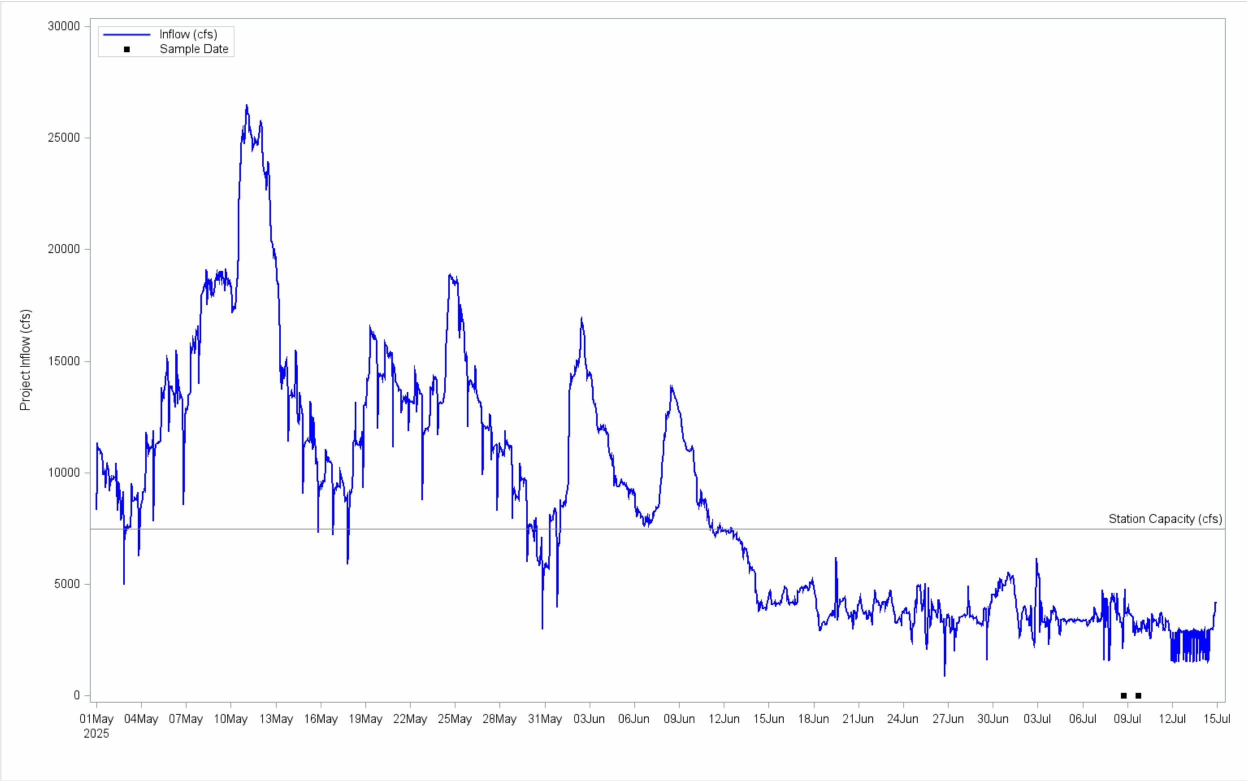


Figure 6–3: View of the Brunswick Excavated Tailrace Channel Region Sampled During Phase I of the Project Interaction Study

Figure 6–4: View of the Region Downstream of the Ledge Habitat Located at the Outlet of the Brunswick Spillway Bypass Area Sampled During Phase I of the Project Interaction Study

Figure 6–5: Brunswick Project Tailrace Elevation (ft) for the Fish Passage Period of May 1 to July 15, 2025

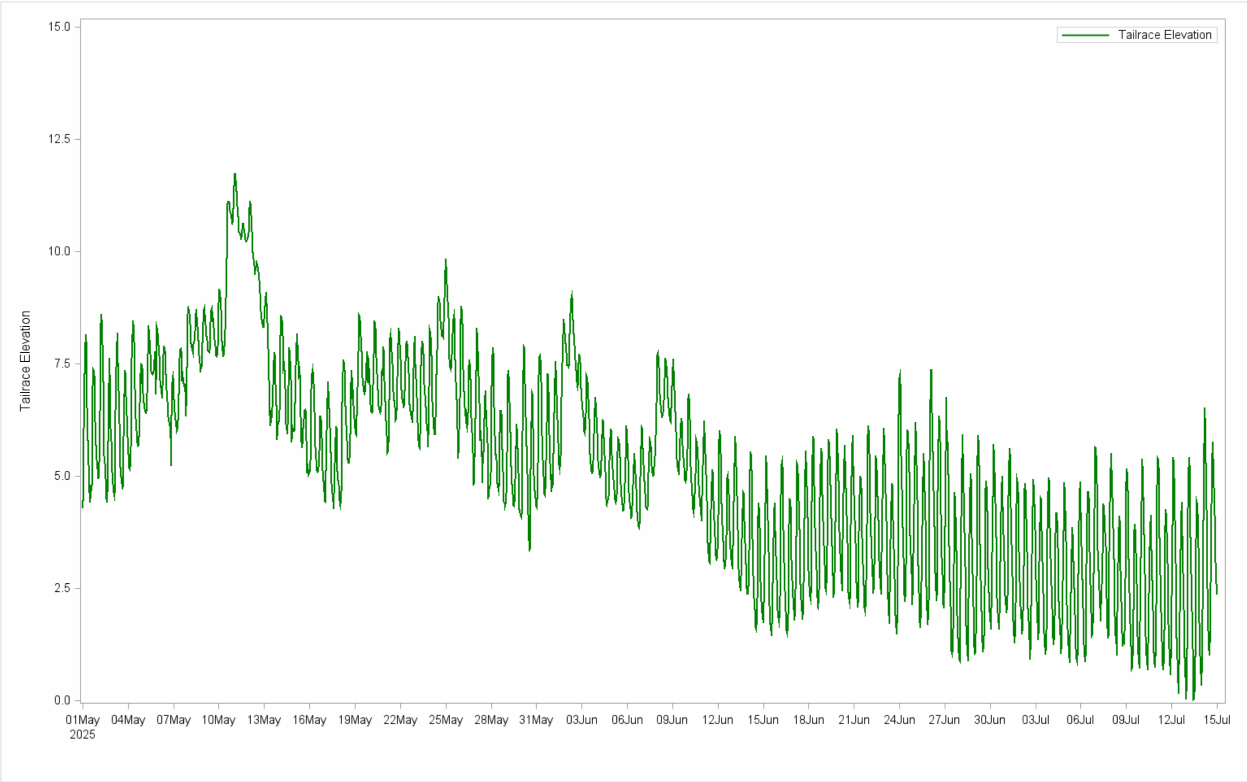
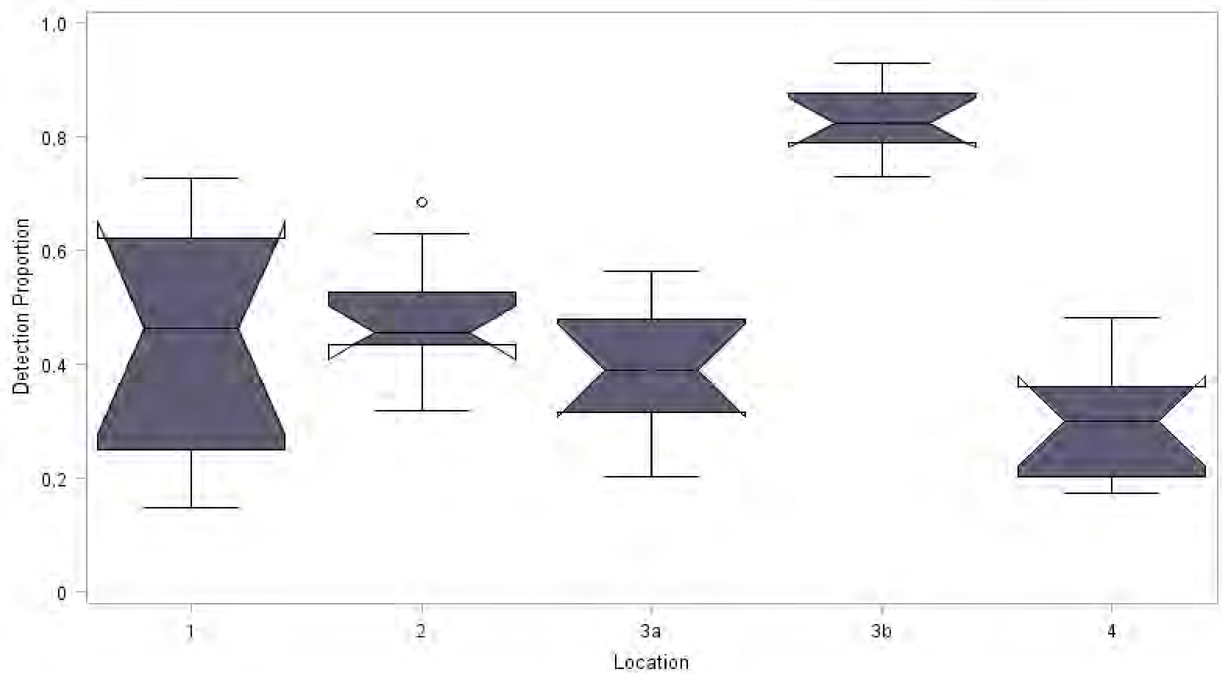
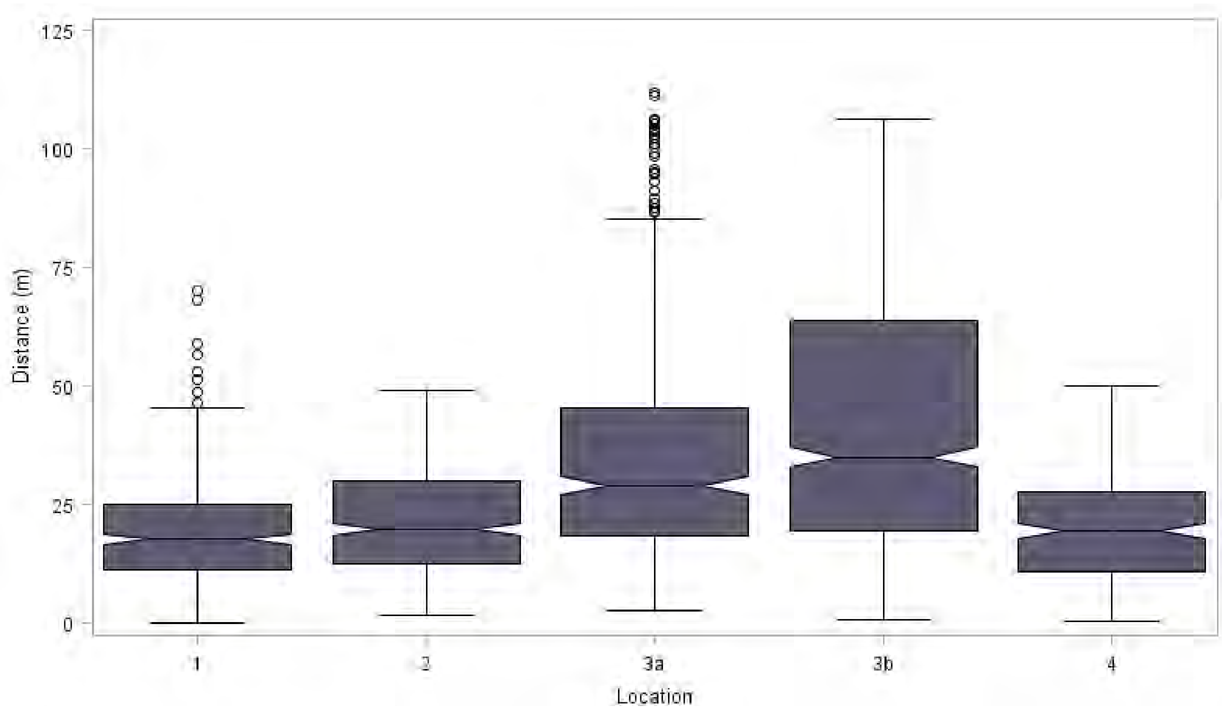


Figure 6–6: Notched Box Plot Showing the Point Values Median, 25th and 75th Percentiles, and Upper and Lower Bounds for Detection Proportion for JSATS Transmitters Evaluated Downstream of Brunswick During Phase I of the Project Interaction Study



3a = July sampling event; 3b = September sampling event

Figure 6–7: Notched Box Plot Showing the Point Values Median, 25th and 75th Percentiles, and Upper and Lower Bounds for Detection Distance (m) for JSATS Transmitters Evaluated Downstream of Brunswick During Phase I of the Project Interaction Study



3a = July sampling event; 3b = September sampling event

Table 6–1: Summary of Detection Testing at Pilot Deployment Location 4 During Phase I of the Project Interaction Study at Brunswick

Location	Test Trial	Visual YAPS Trends	Recommendation
1	1	Reduced quality line fit particularly in upstream portion of test area	Reduce receiver spacing to maximize likelihood of concurrent detections; Pilot receiver spacing distances of 25-35 m between units at upstream end and 10-15 m at downstream end
	2	Reduced quality line fit particularly in upstream portion of test area	
2	1	Good line fit from YAPS to mirror boat track	Consider reduced receiver spacing; Pilot receiver spacing distances of 20-25m produced reasonable positional estimates
	2	Moderate line fit from YAPS to mirror boat track, better at downstream end of test area	
3a	1	Model failure due to low concurrent detection rates	Reduce receiver spacing to maximize likelihood of concurrent detections; Pilot receiver spacing distances of 35 to 50 m between units during July
	2	Model failure due to low concurrent detection rates	
3b	1	Excellent line fit from YAPS to mirror boat track	
	2	Excellent line fit from YAPS to mirror boat track	
4	1	Reduced quality line fit particularly for river left portion of test area (downstream of ledge)	Pilot receiver spacing distances of 17 to 24 m; bottom substrate may not be conducive to line of site data acquisition required for 2D
	2	Reduced quality line fit particularly for river left portion of test area (downstream of ledge)	

6.2 1D Feasibility

6.2.1 Spillway Bypass Area

Data collection at pilot deployment location 5 provided assurance that the installation of an ATS JSATS receiver within the spillway bypass area should provide the minimal level of detection data required to determine the presence of an individually tagged fish. Under leakage conditions (~100 cfs), the single SR3001 receiver demonstrated detection rates of 40.7, 25.0, and 18.3% for tag transmissions within 0-25, 25-50, and 50-75 m. This results in an estimated 4-9 detections per minute (assuming a 3.0 second PRI) which is sufficient (when taken in the context of the full time series of detections for an individual) to determine presence in the spillway bypass area. The spacing of two or more receivers at a distance of 25 m should provide adequate coverage under reasonable spill flows. The performance of these units in the spillway bypass area under high flows is unknown but will likely be significantly impacted by acoustic noise and turbulence associated with water cascading over the dam and through the reach.

6.2.2 "Gate" Receivers

Data collection at pilot deployment location 6 provided assurance that the installation of ATS JSATS receivers at mainstem locations will be effective for the collection of detection data required to identify the passage of an individually tagged fish. Under the assumption that five detections within a 60 second period would be sufficient to identify an individually tagged fish as present at a "gate", it was determined that the overall detection rate for a three-receiver array resulted in a detection probability of 0.999. This level of detection efficiency was matched by a two-receiver array and was lowest for a single receiver (0.846). When estimated using a three-, two-, or one-receiver array, the probability of detecting at least ten transmissions over a 60-second period is 0.982, 0.842, and 0.102, respectively. Based on these observations, cross-river locations selected to serve as "gates" during Phase II which are similar to Location 6 (i.e., ~175 m in width and free of significant obstructions) should be sufficiently covered by the installation of a two-receiver array. Wider locations should consider the addition of a third receiver and due to the line-of-site nature of acoustic telemetry, areas with significant in-channel obstructions or highly variable bottom profiles should be avoided.

7 VARIANCES FROM THE FERC APPROVED STUDY PLAN

Phase I of the Project Interaction Study was conducted following the methodologies identified in the RSP. A few discrepancies between the proposed and final study approach are noted here:

- Due to availability, field evaluations were conducted using only an ATS model SS400 transmitter (rather than the model SS300 and SS400 identified in the RSP). Side by side field evaluation of both models was conducted during similar pilot testing at the Lawrence Hydroelectric Project on the Merrimack River, Massachusetts and did not show a major difference in detectability between the two models[1].
- The methodology identified in the RSP to assess the detection range and rate for 1D locations relied on the deployment of transmitters at fixed locations for a duration of time. In lieu of that, geo-referenced transmitter locations were recorded as tags were actively moved around the receiver area to better simulate the active swimming of live fish. The same methodology (i.e., the percentage of detected transmissions relative to the total number of known transmissions for a set period of time) was used to estimate the detection efficiency during the Phase I analysis.

[1] FERC Accession No. 20250428-5247

8 REFERENCES

Kessel, S.T., S.J. Cooke, M.R. Heupel, N.E. Hussey, C.A. Simpfendorfer, S. Vagle, and A.T. Fisk. 2013. A review of detection rang testing in aquatic passive acoustic telemetry studies. Reviews in Fisheries Biology and Fisheries. DOI 10.1007/s11160-013-9328-4

APPENDIX A – UPDATED REVISED STUDY PLAN FOR THE BRUNSWICK PROJECT INTERACTION STUDY

BWPH filed their Revised Study Plan with FERC on December 2, 2024, which included the proposed methodologies for Phase I and a framework for the eventual fish tagging and movement study to be conducted during Phase II of the Diadromous Fish Behavior, Movement, and Project Interaction Study. The methodologies provided here have been updated to reflect the findings from the Phase I study conducted during 2025 to determine whether JSATS is an appropriate tool to address the goal of the Project Interaction Study when considering the hydro-morphological conditions of the Androscoggin River and the downstream study area as influenced by the Project facilities and its operations. The following methodologies will be used during the execution of Phase II of the Project Interaction Study at Brunswick, anticipated to be completed during spring 2026.

PHASE II: GOALS AND OBJECTIVES

The goal of the Project Interaction Study is to assess the Project's potential effects on select migratory (i.e., Alosines and Sea Lamprey) fish species behavior in the tailrace and proximal downstream reach. Phase II of the Brunswick Project Interaction Study specifically seeks to:

- Assess the distribution and movement of select migratory fish species (i.e., Alosines and Sea Lamprey) in the tailrace and downstream river reach.
- Assess Alosine and Sea Lamprey movement near the existing fishway entrance and near potential alternative fishway entrance locations.
- Determine the extent of fish (i.e., Alosines and Sea Lamprey) behavioral modification due to Project induced passage delay.

PHASE II: ACOUSTIC EQUIPMENT AND DEPLOYMENT APPROACH

The field evaluations conducted during Phase I of the Project Interaction Study provided insight into the performance of ATS JSATS receivers at Brunswick. The proposed study design presented here has considered all information collected during the Phase I evaluation conducted during 2025.

Transmitters

A combination of ATS model SS300 and SS400 transmitters will be used during Phase II of this study. The SS300 transmitter weighs 3.0 g, measures 11 x 5 x 3 mm, and will operate for 23 days when set at a 3.0 second burst interval. The SS400 transmitter weighs 2.0 g, measures 15 x 3 mm, and will operate for 48 days at a 3.0 second burst interval (Table A-1). Based on the attributes of each tag type (i.e., sensor capabilities and battery duration), both the SS300 and SS400 transmitters will be incorporated into the Brunswick Phase II study design.

Table A-1. Attribute Summary for the ATS SS300 and SS400 Acoustic JSATS Transmitters

Transmitter Parameter	Transmitter Model	
	SS300	SS400
Weight (mg)	300	200
Dimensions (mm)	10.7x5.0x2.8	15.0x3.3
Duration (days)		
@ 3 seconds	23	48
@ 5 seconds	37	71
@ 10 seconds	68	111
Pressure Sensor	Yes	No
Fish Attachment	Abdominal Incision	Abdominal Injection

Receivers

The Phase I evaluation assessed the performance of the ATS model SR3001 JSATS compatible receiver. The ATS SR3001 receiver provided viable estimates of detection range and rate across a suite of deployment conditions. The results of the Phase I evaluation support the use of the ATS SR3001[2] receiver for evaluation of fish movement downstream of Brunswick. Physical conditions and equipment performance during the Phase I assessment downstream of the dam was used to determine the spatial extent and resolution types (i.e., 2D versus 1D [present/absent]) of data collections that can be realistically accomplished during Phase II.

Deployment Approach

Following the conservative spacing recommendations developed from review of the detection range/rates for JSATS receivers deployed during Phase I (see 6.1.3 of the Project Interaction Study Report), a total of 46 fixed location receivers would be required to monitor the full spatial scale of the tailrace and downstream region identified in the RSP prior to the execution of the Phase I field assessment. Figure A-1 presents the theoretical fixed receiver layout required to provide high resolution coverage of the excavated tailrace channel and the river right portion of the convergence area of the tailrace and spillway bypass flows. Field observations during Phase I noted that bottom topography within the region downstream of the ledge habitat located at the outlet of the spillway bypass area [i.e., river left portion of the convergence area of the tailrace and spillway bypass flows] is likely to hinder the effective collection of data to support 2D positional determination of JSAT transmitters and as a result, that area has been excluded.

BWPH understands the resource agencies interest in providing a robust "real time" accounting of tagged fish positions within the full tailrace and the proximal downstream reach. However, the logistical and financial considerations of installing and maintaining a 46-receiver array of this magnitude are considerably challenging. As a result, a reduced array to provide information specific to movement near the existing fishway entrance and potential alternative fishway entrance locations along the river right shoreline is presented in Figure A-2. BWPH proposes to scale the spatial extent of the 2D array from the theoretical area presented in Figure A-1 to the 16 fixed location receivers identified in Figure A-2. The two downstream receiver "gate" locations identified for the full array and bracketing the tagged fish release locations on the upstream and downstream side have been retained along with the pair of receivers to provide 1D coverage of the spillway bypass pool. An additional pair of "gates" positioned just downstream of the 2D array have been added to provide input on fish which are "approaching" the tailrace area. In addition, a single receiver

[2] Note that the ATS model SR3017 should provide the same performance as the ATS model SR3001with the difference being that the SR3017 is designed to be a shore-based and cabled model whereas the SR3001 is autonomous.

to provide 1D information on the presence of fish entering the area on the north side of the powerhouse and downstream of the ogee spillway section at that location has been added to inform on fish presence in that region. When all proposed receivers included as part of the "reduced" array are considered, a total of 28 fixed location receivers are included in the study.

Receivers comprising any 2D array in the Brunswick tailrace will need to be installed in a manner which eliminates their ability to change position during the study and also provide overlap among all units to maximize the likelihood of multiple detections of any single tag transmission. Based on observations of substrate and flow conditions downstream of the Brunswick powerhouse, this will require the use of SCUBA divers to install custom bottom mounts to house each fixed location SR3001 ATS receiver (Figure A-3). If conditions are suitable, ATS model SR3017[3] receivers may be used, and those hydrophones will be affixed to project structures in locations where conditions permit. However, the tidal nature of this site and potential for debris scour along project structures (i.e., the upstream fishway) may limit the effectiveness and longevity of these units.

Receivers will be installed during late-April or early-May, dependent on river conditions and prior to the release of any tagged fish. The full receiver set will be maintained through June. As noted above, receivers installed as part of the 2D array in the powerhouse tailrace will require the use of divers to install the bottom mounts, affix the ATS receivers prior to the onset of the study, and remove equipment at the completion of the study. To safely accomplish these tasks, river conditions during each of these individual steps will need to be such that inflow can be wholly passed downstream via the left spillway section and two Tainter gates (i.e., no flow over the right spillway section which discharges into the tailrace or the three turbine units). Ideally, the full set of bottom mounts will be affixed to the substrate in advance of the fish passage season at the predetermined locations identified in Figure A-2 and "dummy" PVC receivers will be installed in the mount tubes. Prior to the release of test fish, divers will substitute the "dummy" receivers with programmed ATS SR3001 receivers. Temporary installation of the dummy receivers will provide insight into the physical conditions each receiver will be installed at and help determine in advance of the study which areas may be at a greater risk of equipment damage. To ensure receiver coverage in the 2D zone will meet the study needs (i.e., high probability of simultaneous detection of a tag transmission by three or more receivers), range testing will be conducted. Following the movement of a geo-referenced test transmitter through the array zone, receivers will be returned to the surface, downloaded, and data will be evaluated for positional fit of estimated tag positions to the known boat track. If necessary, additional receivers may be added to the 2D zone based on results of the pre-study range test findings.

[3] ATS model SR3017 is equivalent to the ATS model SR3001 evaluated during Phase I. The difference is that the hydrophone component of the SR3017 is cabled, allowing the user to deploy it fixed to an in-water structure and power/interact from shore. The SR3001 is autonomous.

Figure A-1. Full Theoretical Acoustic Receiver Installation for Phase II of the Project Interaction Study at Brunswick

Figure A-2. Proposed Acoustic Receiver Installation for Phase II of the Project Interaction Study at Brunswick

Figure A-3. Bottom Mount/Housing for ATS SR3001 JSATS Receivers to be Diver Installed During Phase II of the Project Interaction Study at Brunswick

PHASE II: TARGET FISH SPECIES, SAMPLE SIZE DETERMINATION, AND TAGGING

The target fish species, sample sizes for each, and the proposed methodology for procuring and releasing study fish during Phase II of the Brunswick Project Interaction Study are summarized here.

<u>Target Fish Species</u>

To address resource agency requests relative to upstream fish passage at Brunswick, BWPH will assess three alosine species (American Shad, Alewife, and Blueback Herring) and Sea Lamprey during the Phase II evaluation.

<u>Sample Sizes</u>

This study seeks to evaluate the movement and behavior of selected migratory fish species in the Project tailrace and proximal downstream reach to inform on the spatial and temporal distribution of those individuals relative to their positioning near the existing fishway entrance or potential alternative fishway entrance locations. The study is not intended to evaluate the effectiveness of upstream passage through the existing fishway. To inform an appropriate sample size for each adult alosine species (i.e., American shad and river herring), BWPH has assumed a comparison of time spent among four general regions (sitting linearly from the existing fishway entrance downstream beyond the current turn pool [see Array design in Figure A-2]). Assuming the use of a one-way ANOVA to compare the average time spent across the four general regions (with the intent of informing on which region yields the greatest level of activity), a power analysis was conducted using G*Power. The power analysis conducted for a one-way ANOVA indicated that the minimum sample size to account for four regions and yield a statistical power of at least 0.8 at a significance level of $\alpha = 0.5$ and a medium size effect of 0.25 is 180 fish per alosine species.

The power analysis conducted here for the adult alosine species does not take into consideration losses attributable to either fallback (i.e., downstream movement away from the study area following tagging and prior to entering the monitored reach) or predation. To account for those factors, the sample sizes for American shad and river herring should be adjusted by a total loss rate of 0.498 and 0.605, respectively. Where the total loss rate is calculated as:

$$\text{Total Loss Rate} = 1 - (1\text{-}F) * (1\text{-}P)$$

Where F = the species assumed fallback rate and P = the species assumed predation rate. Fallback and predation rates for both alosine species were estimated as part of study plans developed for the similar Lawrence Project (i.e., both Projects are the first mainstem dam) at 21% and 33% fallback and 50% and 25% predation for river herring and shad, respectively. The 2022 Brunswick upstream alosine radio telemetry study supports the fallback rate proposed for American shad as 29% of study fish tagged during that effort were classified as fallback (Normandeau 2023). When adjusted by the species-specific total loss rates attributable to fallback and predation, a total of 290 river herring and 270 American shad will be tagged.

With regards to sea lamprey, BWPH will mirror the sample size reported by Peterson et al. (2022) for the Milford Dam study of 150 individuals.

Fish Collection and Tagging

Previous upstream passage evaluations of alosine species at the Project have relied on hook and line sampling for the collection of adult American Shad in the Androscoggin River downstream of the dam and the trap facility at the existing upstream fishway for river herring. In the USFWS, NMFS, and MDMR study requests for Upstream Fish Passage Effectiveness for Sea Lamprey, the resource agencies indicated that test fish should be captured at the existing Brunswick fishway facilities. Based on previous studies and agency suggestions, the most reliable source for river herring and Sea Lamprey will be the existing fishway. As with previous studies, American Shad will need to be collected by angling downstream of the dam. The presence of listed species and critical habitat immediately downstream of the Project provides additional challenges for alternative methods of collection (e.g., netting, electrofishing, etc.).

River herring and Sea Lamprey obtained from the trap/truck facility at Brunswick will be dip netted directly from the sorting tank. Following netting, each fish will be visually assessed to ascertain their suitability for tagging. Any individuals exhibiting excessive scale loss or other signs of significant stress will be deemed unfit for tagging and released. Individuals deemed acceptable will be measured (total length, nearest mm). River herring will be tagged proportional to the relative abundance of the two species (i.e., Alewife and Blueback Herring) on each tagging date[4]. Individuals will be transported via a trailered tank to the public boat launch located approximately one mile downstream of Brunswick.

Following rod and reel capture, American Shad will be immediately placed in a large, onboard, flow-through live well and the crew will navigate the boat to a safe shoreline location for tagging. Each fish will be visually assessed to ascertain their suitability for tagging. Any individuals exhibiting excessive scale loss or other signs of significant stress will not be considered and will be released back into the river untagged. Individuals deemed acceptable for tagging will be quickly measured (total length, nearest mm), and sex will be determined (when possible) by gently expressing eggs or milt from running-ripe fish.

[4] Species determination for adult river herring will be performed visually in the field secondarily to the priority of efficient tagging. Any tagged individuals for which a species is not quickly determinable from external characteristics (i.e., eye size, body depth, etc.) will be classified as “river herring”

Following tagging, tagged shad will be immediately released back into the Androscoggin River and the coordinates and date/time of release will be recorded.

The target total number of transmitters by species and type are presented in Table A-2. A percentage of individuals will be tagged using the ATS model SS400 transmitter which can quickly and effectively be injected into any of the target species using a hollow needle. This will minimize the duration of time test fish are out of the water and subjected to handling and tagging. A subset of each fish species will be tagged using the ATS model SS300 transmitter for the purpose of collecting pressure readings associated with each detection record. The use of these transmitters in a subset of test fish will allow for the evaluation of depth and provide a more robust evaluation of fish positions for individuals which ascend upstream into the receiver array within the Project tailrace and proximal downstream reach.

Tagging methodologies will be similar for the SS300 and SS400 transmitters, with the SS300 transmitters being inserted via a small abdominal incision and the SS400 transmitters being injected into the abdominal cavity via a hollow needle. All incisions/injections will be allowed to heal independent of the use of sutures.

Table A-2. Sample sizes by Target Fish Species and Transmitter Type for Phase II of the Project Interaction Study

Target Species	Total No. Tagged	Transmitter Model	
		SS300	SS400
River Herring*	345	145	145
American Shad	200	135	135
Sea Lamprey	100	50	100

* River Herring will be tagged proportional to the relative abundance of the two species (i.e., Alewife and Blueback Herring) on each tagging date.

PHASE II: DATA ANALYSIS AND REPORTING

Following the completion of data downloads from each individual hydrophone, data analysis will proceed in two different ways, depending on whether the hydrophone is included in the 2D array or one of the several 1D checkpoints

Data files from hydrophones representing the 1D detection locations will be grouped as appropriate with any other hydrophones included in a particular "gate" location and then filtered to leave only the relevant information. Any detections for transmitter identification codes not included in the study will be removed as erroneous data. Additionally, detections will be filtered based on the release time of each fish to ensure that only valid detections are only retained representing the time after a particular fish was released. Data will then be arranged chronologically to provide insight into how individual fish moved up or down the river over time following initial release. For the subset of fish determined to have moved upstream to a point inside the bounds of the 2D array in the tailrace, a more robust analysis will be initiated to determine fish positions via the 2D analysis.

Data files from hydrophones comprising the 2D array in the powerhouse tailrace will be imported into R statistical software for analysis using a "time of arrival" methodology which will determine the X-Y position of a fish for each of the pings that are emitted from its transmitter at a three second PRI. For the full duration of residence time for a fish present within the bounds of the 2D array in the powerhouse tailrace, a latitude and longitude will be determined as long as three or more receivers successfully detected a single transmission. For each fish that spends time within the 2D array, positions over time will be determined and available for mapping within predetermined subsections of the tailrace. For individuals carrying the SS300 transmitter with pressure sensor, fish depth will be estimated based on the recorded pressure reading associated with each tag transmission. For this subset of fish, data will be available to evaluate based on X-Y-Z positions. The full set of successfully determined positions of tagged fish representing the four species will be assessed to reveal patterns of movement and/or zones of preferred residency within the tailrace.

Acoustic data will be presented in two formats: bin densities and density plots. Bin densities will provide the percentage of tagged fish that were detected in each of the bins of space in the 2D array region. Bins will be provided by dividing the 2D array area into a uniform square grid (Figure A-3 provides an example 3m square grid). The exact grid spacing will be determined following review of the positional error of tag positions estimated during pre-study tag testing during spring 2025. The percentage of tagged fish detected in each bin will be recorded (by species) over the duration of the study and the percentage will be displayed on a color scale overlaid on the grid map. The use of bins will reduce the potential for a single fish to skew the results as its presence in an area is only counted a single time. This will provide insight into the spatial use of the 2D array area by test fish, rather than the amount of time spent in a particular area.

Density plots will be developed to present positions of tagged fish in the 2D array area and incorporate a temporal component of the detection data. Since these will include multiple detections for an individual, there is potential for data presented in this manner to be skewed by individual fish which may spend long periods of time in certain areas. Data will be examined and presented by species in this manner.

PHASE II: SCHEDULE, LEVEL OF EFFORT, AND ESTIMATED COST

Phase II of the Project Interaction Study will be conducted during spring 2026. Findings will be compiled and provided as part of the Updated Study Report filing in January 2027. The cost for Phase II of the Project Interaction Study as currently designed is approximately $680,000.

APPENDIX G: FISH ASSEMBLAGE STUDY

FISH ASSEMBLAGE SURVEY
INITIAL STUDY REPORT
BRUNSWICK HYDROELECTRIC PROJECT
FERC NO. 2284

Submitted by:

Brookfield White Pine Hydro LLC
150 Main Street
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Prepared by:

Gomez and Sullivan Engineers

January 2026

Brookfield

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LIST OF ABBREVIATIONS AND DEFINITIONS

Brookfield	Brookfield Renewable
BWPH	Brookfield White Pine Hydro LLC
Licensee	Brookfield White Pine Hydro, LLC
Project	Brunswick Hydroelectric Project (FERC No. 2284)
C	Celsius
CFR	Code of Federal Regulations
Commission	Federal Energy Regulatory Commission
CPUE	Catch per unit effort
FERC	Federal Energy Regulatory Commission
ft	Feet/foot
g	Gram
ISR	Initial Study Report
ILP	Integrated Licensing Process
ME	Maine
MDIFW	Maine Department of Inland Fisheries and Wildlife
MW	Megawatt
µS/cm2	Microsiemens Per Centimeter Squared
mi	Mile
mg/L	Milligrams per liter
mm	Millimeter
NOI	Notice of Intent
PAD	Pre-Application Document
PSP	Proposed Study Plan
RTK	Real-Time Kinematic
RSP	Revised Study Plan
SD1	Scoping Document 1

1 INTRODUCTION

Brookfield White Pine Hydro LLC (BWPH or Licensee) is licensed by the Federal Energy Regulatory Commission (FERC or Commission) to operate the 19-megawatt (MW) Brunswick Hydroelectric Project (Project) (FERC No. 2284). The Project is located on the Androscoggin River in the towns of Topsham and Brunswick, Maine. The Project straddles the border between Cumberland and Sagadahoc counties. The original license was issued on February 9, 1979, and expires on February 28, 2029.

BWPH is using FERC's Integrated Licensing Process (ILP) as established in Title 18 Code of Federal Regulations (CFR), Part 5. BWPH filed a Pre-Application Document (PAD) and Notice of Intent (NOI) to seek a new license for the Project on February 21, 2024. The PAD provides a description of the Project, including its structures, operations, and potentially affected resources. BWPH distributed the PAD and NOI simultaneously to Federal and state resource agencies, local governments, Native American tribes, members of the public, and others thought to be interested in the relicensing proceeding. Following the filing of the PAD, FERC prepared and issued Scoping Document 1 (SD1) on April 16, 2024. FERC also held agency and public scoping meetings and a site visit on May 7, 2024. The FERC Process Plan and Schedule provided agencies and interested parties with an opportunity to file comments on the PAD and SD1 and request studies by June 20, 2024. FERC issued Scoping Document 2 (SD2) on July 29, 2024. BWPH filed a Proposed Study Plan (PSP) on August 2, 2024, and held study plan meetings on August 28 and October 9, 2024. The Revised Study Plan was filed in accordance with the ILP schedule on December 2, 2024. FERC issued a Study Plan Determination (SPD) on December 30, 2024.

Specific to fisheries resources, BWPH proposed in the RSP to conduct a Fish Assemblage Study, which was approved without modification in the SPD. This Initial Study Report (ISR) presents the results of the study, including the goals and objectives, methods, results, summary, and variances (if any) from the FERC approved study plan.

1.1 Background and Existing Information

Yoder et al. (2006) conducted a fish assemblage study in the Androscoggin and Kennebec rivers, which included electrofishing sampling sites in the Project impoundment. Electrofishing surveys were performed at two sites within the Project impoundment (1.5 and 4.3 RM upstream of the dam). Researchers found 12 fish species in the Project impoundment: Chain Pickerel, White Sucker, Golden Shiner, Common Shiner, Spottail Shiner, Fallfish, American Eel, Banded Killifish, Smallmouth Bass, and Redbreast Sunfish. In addition, young-of-year Alewife and American Shad were sampled at the upstream site but were absent at the downstream impoundment site. While they were not found within the Project impoundment, additional non-native species of concern were found upstream; Northern Pike (5.5 mi), Black Crappie (26.4 mi), and Rock Bass (132.6 mi).

1.2 Goals and Objectives

The goals of this study are to provide information on the current fish assemblage in Project waters and provide supplemental information on the bass fishery within the Project impoundment. The objectives are to:

- Document species presence and relative abundance via standardized fisheries surveys,
- Collect length and weight information on Largemouth Bass and Smallmouth Bass, and,
- Document the locations and elevations of bass nests, if observed.

2 METHODOLOGY

A fisheries survey was conducted on June 23rd and 24th of 2025 at the Project. The Project impoundment was sampled via boat electrofishing and seine netting. Sampling was performed under MDIFW Scientific Fish Collectors Permit, issued on May 12th, 2025.

For all samples, fish captured were weighed (nearest gram) and measured (standard length to the nearest mm). Abundant small fish (e.g., < 100mm) were batch processed by sorting by species and size class, and min/max length and batch weight were documented. Post larval fish less than 25 mm were not included in data processing.

During fish sampling the following was additionally documented:

- Date/time of sampling start and stop
- Coordinates for the start and end points
- Time the electrofisher was engaged (seconds), or the number of seine hauls completed at a site
- Water temperature (°C)
- Specific conductivity (µS/cm2)
- Dominant substrate (Wentworth Scale)
- Characterization of large wood debris observed (e.g., abundant, moderately present, minimal, or absent)
- Percentage of transect or haul area with aquatic vegetation
- Percentage of transect or haul area with overhanging shoreline cover

2.1 Fish Survey Sites

The locations of all fish survey sites are shown in Figure 2.1-1.

2.1.1 Seine Netting Surveys

Four sites within the Project impoundment were sampled using a 100-foot-long by 6-foot-deep seine net with 3/8-inch mesh. One end of the net was anchored to the shore while the other end was brought out straight toward mid-channel via boat, then back in a 90-degree arc back to the shore. The net was then dragged in to shore to corral fish. Site characteristics for each site included:

- SN01 – this site was located along river right, ~ 0.66 miles upstream from the Project dam. The survey site had a silty substrate with a small patch of cobbles (see Photo 2.1.1-1).
- SN02 – this site was located along river left, ~ 3.22 miles upstream from the Project dam. The survey site had a silty substrate.
- SN03 – this site was located along river right, ~3.23 miles upstream from the Project dam. The survey site had a substrate of silt and cobble.

- SN04 – this site was located river left, ~1.35 miles upstream of the Project dam at the confluence of island channels, next to River Road.

2.1.2 Boat Electrofishing Surveys

Approximately 3,400 feet of shoreline was sampled using daytime boat electrofishing with a Smith Root E-Cat and an APEX electrofishing unit. Two areas of shoreline were sampled in the impoundment, one near each bank (see Figure 2.1-1). During the surveys, the APEX was set to output pulsed direct current at 650V and a 10% duty cycle.

- EF01 (River Right) – One 1,945-foot-long section of shoreline was sampled (see Photo 2.1.2-1).
- EF02 (River Left) – One 1,488-foot-long section of shoreline

2.2 Bass Spawning Beds

During the electrofishing and seining efforts two crew members were used as designated spotters to observe for any bass nests along the impoundment shoreline during travel between fish survey sites. Additionally, approximately 1,490 yards of shoreline on both sides of the river were searched upstream of SN02. The locations, elevations, and water depth of bass nests were documented, as well as whether there was any adult bass guarding the nest(s). The locations and elevations of bass nests were measured using a Real-Time Kinematic (RTK) GPS.

2.3 Analysis

Catch per unit effort (CPUE) was analyzed for each primary sampling location and calculated separately for each species and gear type. Six primary sampling locations were analyzed: Two electrofishing sites (EF01 and EF02), and four seine netting sites (SN01-SN04). Electrofishing is expressed as fish per minute of sampling. Seine net CPUE is expressed as fish per net haul.

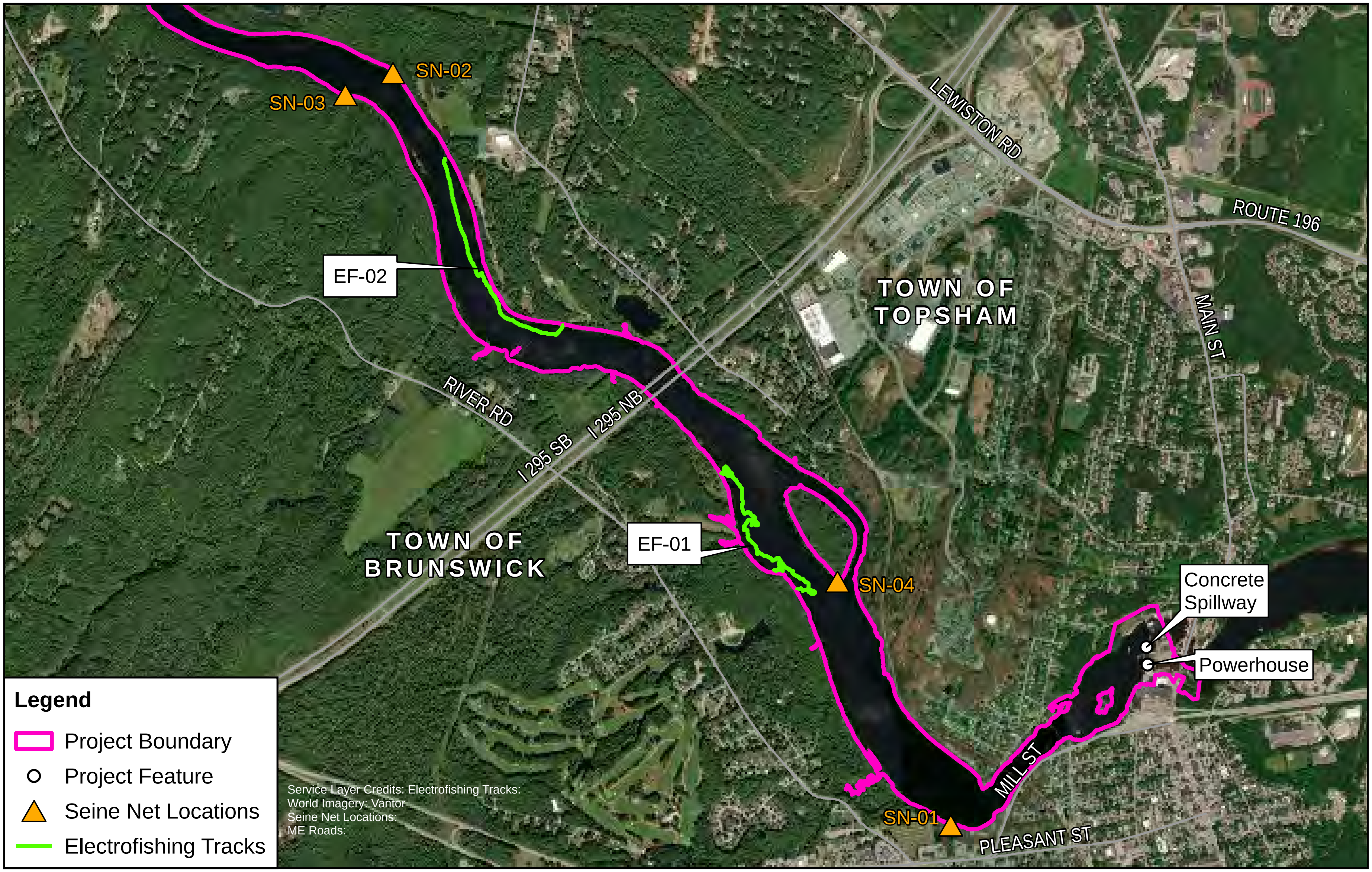

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Figure 2.1-1:
Electrofishing Tracks and Seine Net Sampling Locations

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Photo 2.1.1-1: View from Seine Net Site 01

Photo 2.1.2-1: View from Electrofishing Site 01

3 RESULTS

3.1 Field Fish Survey Results

The fish survey was performed on June 23-24, 2025. Weather conditions were consistently sunny with air temperatures in the 80-90 °F range for the duration of the survey. The water clarity across all survey sites was slightly tannin-stained with a light tea color. Two electrofishing fishing transects were completed; EF01 included 1,757 seconds of sampling time, and EF02 included 2,554 seconds of sampling time. One net haul was completed at each seine net survey location.

Water quality measurements were taken at each survey site in the Project impoundment throughout the surveying period. One measurement was taken at the beginning of each survey at each respective site. The average water temperature across all sites was 23.8 °C, ranging from 23.0 °C to 24.6 °C (Table 3.1-1) The average dissolved oxygen measured was 8.52 mg/L, ranging from 8.10 mg/L to 9.32 mg/L (Table 3.1-1). The average specific conductivity across all sites was 72.2 µS/cm², ranging from 71.1 µS/cm² to 73.1 µS/cm² (Table 3.1-1).

A total of 211 fish and 12 species were collected during the survey. The dominant cyprinid forage species identified were the Eastern Silvery Minnow, Common Shiner, and Fallfish, in order of relative abundance. Smallmouth bass were the primary gamefish identified within the study area. Two diadromous fish species were observed in the fish community included American Eel and Sea Lamprey. All raw individual fish data, including length and weight for each fish captured, are provided in Appendix A, and all batched fish data, including count, batched weight, minimum and maximum length, are provided in Appendix B. Species compositions per survey site are shown in Table 3.1-3 through Table 3.1-4. Photographs of redbreast sunfish and white sucker used for species confirmation are provided in Appendix C.

CPUE for species caught in each survey location is shown in Table 3.1-5 through Table 3.1-6.

Table 3.1-1: Water Quality Conditions and Dominant Substrate Measured During Fish Surveys (June 23-24, 2025)

Site	Temp (C)	Dissolved Oxygen (mg/L)	Specific Conductivity (µS/cm²)	Dominant Substrate	Large Woody Debris	Percent of Shoreline with Overhanging Shoreline Cover	Percent of Area with Aquatic Vegetation
SN01	23.50	9.32	71.10	Silt	Minimal	0%	5%
SN02	24.60	8.82	73.10	Silt	Absent	5%	5%
SN03	24.30	8.41	73.00	Silt/Cobble	Absent	70%	12%
SN04	23.60	8.41	73.00	Silt	Absent	15%	20%
EF01	23.50	9.30	71.10	Silt	Minimal	60%	20%
EF02	23.00	8.10	72.00	Cobble	Abundant	70%	10%

Table 3.1-2: Species Composition and Total Number of Fish Caught Across All Survey Sites and Collection Methods in the Project Impoundment

Species	Scientific Name	Catch (n)	Biomass (g)
American Eel	*Anguilla rostrata*	3	422
Banded Killifish	*Fundulus diaphanus*	1	1
Common Shiner	*Luxilus cornutus*	32	135
Eastern Silvery Minnow	*Hybognathus regius*	103	277
Fallfish	*Semotilus corporalis*	29	95.5
Pumpkinseed Sunfish	*Lepomis gibbosus*	5	483
Redbreast Sunfish	*Lepomis auritus*	2	317
Sea Lamprey	*Petromyzon marinus*	2	682
Smallmouth Bass	*Micropterus dolomieu*	19	2,155
Spottail Shiner	*Notropis hudsonius*	4	15
White Sucker	*Catostomus commersonii*	2	3,594
Yellow Perch	*Perca flavescens*	2	17

Table 3.1-3: Species Composition across Electrofishing Sites (EF01-EF02)

Species	Catch (n)	Biomass (g)
American Eel	3	422
Common Shiner	30	127
Eastern Silvery Minnow	103	277
Fallfish	11	39.5
Pumpkinseed Sunfish	3	217
Redbreast Sunfish	2	317
Sea Lamprey	1	2
Smallmouth Bass	10	1438
White Sucker	5	3594
Yellow Perch	2	17

Table 3.1-4: Species Composition Across Seine Netting Sites (SN01-SN04)

Species	Catch (n)	Biomass (g)
Banded Killifish	1	1
Common Shiner	2	8
Fallfish	18	56
Pumpkinseed Sunfish	5	266
Sea Lamprey	1	680
Smallmouth Bass	10	717
Spottail Shiner	2	7

Table 3.1-5: CPUE and Relative Abundance Across Seine Net Locations (SN01-SN04)

Species	SN01		SN02		SN03		SN04		Total	
	n	CPUE (fish/haul)	n	CPUE (fish/haul)	n	CPUE (fish/haul)	n	CPUE (fish/haul)	n	Relative Abundance
Banded Killifish	0	0	0	0	0	0	1	1	1	0.03
Common Shiner	0	0	0	0	0	0	2	2	2	0.05
Fallfish	0	0	0	0	0	0	18	18	18	0.46
Pumpkinseed Sunfish	4	4	0	0	0	0	1	1	5	0.13
Sea Lamprey	0	0	1	1	0	0	0	0	1	0.03
Smallmouth Bass	5	5	1	1	4	4	0	0	10	0.26
Spottail Shiner	1	1	0	0	0	0	1	1	2	0.05

Table 3.1-6: CPUE and Relative Abundance of Fish Captured Electrofishing River Left and Right of The Impoundment (EF01-EF02)

Species	EF01		EF02		Total	
	n	CPUE (fish/min)	n	CPUE (fish/min)	n	Relative Abundance
American Eel	1	0.03	2	0.05	3	0.02
Common Shiner	30	1.02	0	0.00	30	0.17
Eastern Silvery Minnow	103	3.52	0	0.00	103	0.60
Fallfish	9	0.31	2	0.05	11	0.06
Pumpkinseed Sunfish	0	0.00	3	0.07	3	0.02
Redbreast Sunfish	0	0.00	2	0.05	2	0.01
Sea lamprey	0	0.00	1	0.02	1	0.01
Smallmouth Bass	1	0.03	9	0.21	10	0.06
Spottail Shiner	0	0.00	2	0.05	2	0.01
White Sucker	3	0.10	2	0.05	5	0.03
Yellow Perch	0	0.00	2	0.05	2	0.01

3.2 Bass Nests Field Survey Results

The field survey took place through June 23-24, 2025. As recorded from operations data at the Project dam, the average headpond elevation was 39.25 feet during the survey.[1] During the survey, weather conditions were sunny and clear. The average surface water temperature throughout the survey was 23.8 °C, dissolved oxygen was 8.52 mg/L.

A total of two bass nests were observed during the survey (Figure 3.2-1). No fish were recorded to be present in or around the nest. Bass nest 01 (BN-01, Photo 3.2-1) had a recorded depth of 2.20 ft, and bass nest 02 (BN-02) had a recorded depth of 3.50 ft. During the seine net and electrofishing surveys a total of 20 smallmouth bass were captured. No bass nests were observed in the fish survey areas where bass were captured. Table 3.2-1 below summarizes the field observations and elevation data collected for each nest location.

During the Black Bass Spawning season (May 1 through June 30) the Project impoundment had a minimum headpond elevation of 38.5 feet, maximum of 42.7 feet, and an average of 40.1 feet. Statistical analysis of the headpond elevations during the 2025 spawning season shows that on average the headpond elevation was above 38.71 feet 99% of the time (Figure 3.2-2). This data suggests that during the 2025 spawning season, project operations would not have had an impact on bass nests in the impoundment. At BN01 with the highest elevation of 37.60-feet, ~ 0.9-feet of water would have remained above the bass nest at the lowest headpond water surface elevation measured in the Project headpond during the 2025 spawning season. Actual water depths were likely greater than indicated by Project headpond water level readings because there is a hydraulic control in the impoundment that is located a short distance upstream of the Project dam. This hydraulic control would have retained higher water levels at the locations of the bass nests relative to the water levels recorded at the Project dam.

Table 3.2-1: Observed Bass Nest Locations

Nest Number	Bass Observed	Depth (ft)	Elevation (ft, NGVD29)
BN-01	No	2.2	37.60
BN-02	No	3.5	36.53

[1] All elevations use the National Geodetic Vertical Datum of 1929, unless otherwise noted.

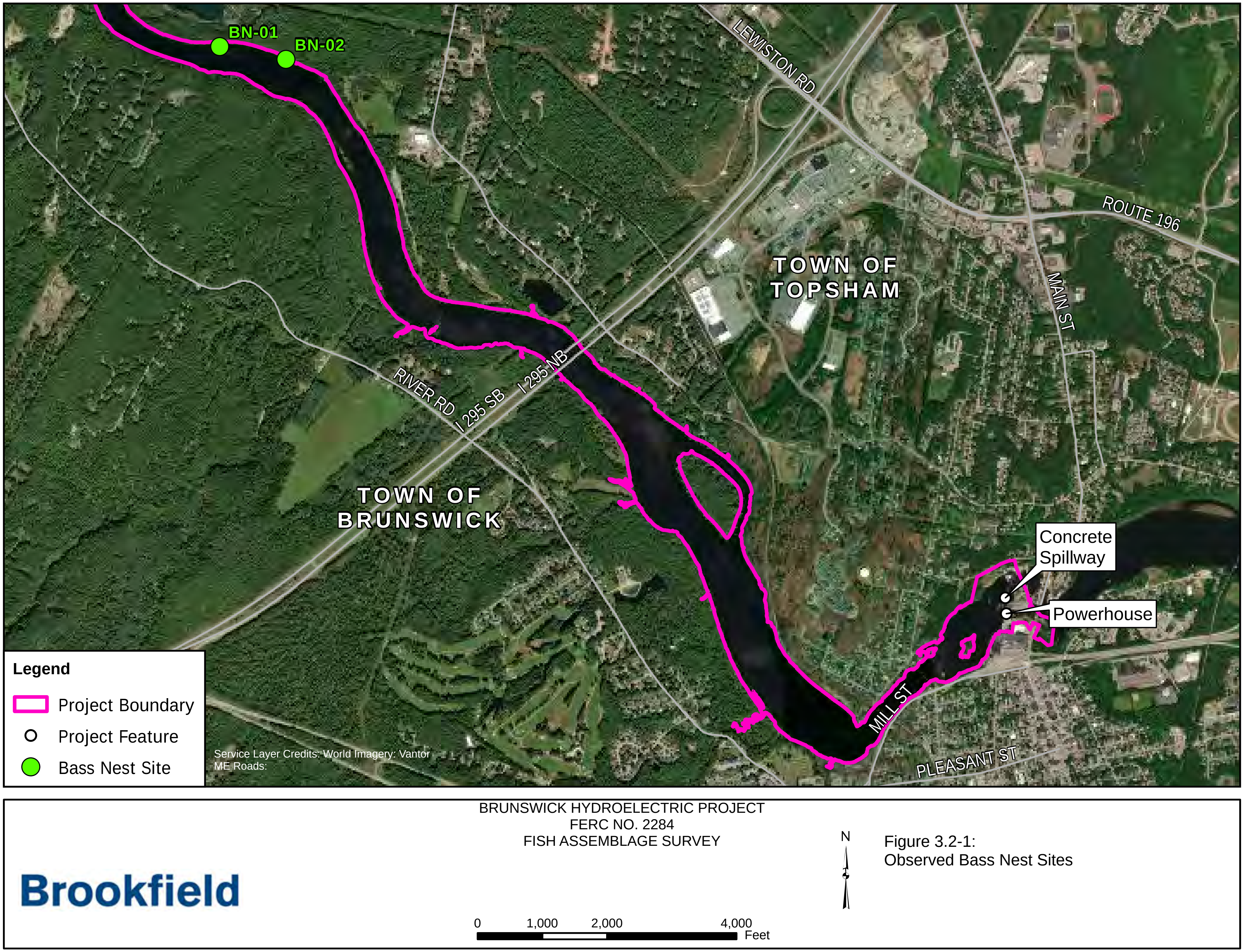

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Figure 3.2-1:
Observed Bass Nest Sites

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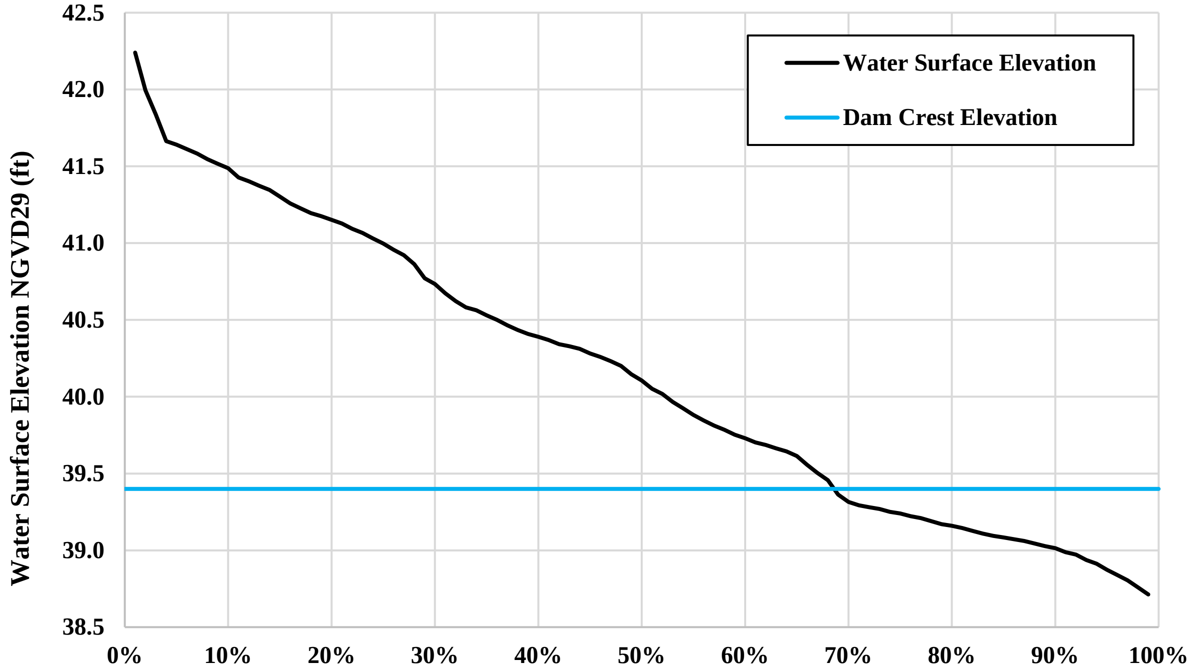
Photo 3.2-1: View of Bass Nest 01

Figure 3.2-2: Brunswick Project Impoundment Water Surface Exceedance During the Black Bass Spawning Season (May 1 – June 30, 2025)



4 SUMMARY

In June 2025, a fish assemblage survey and a visual bass nest survey were performed at the Project impoundment. This fish assemblage survey effectively characterized the fish community in the Project impoundment, documenting 12 species using boat electrofishing, and seine netting. The dominant species in terms of abundance captured were as follows: Eastern Silvery Minnow, Common Shiner, Fallfish, and Smallmouth Bass. Since the 2007 survey was completed in the Project impoundment, four new species were identified during this survey, including Sea Lamprey, Eastern Silvery Minnow, Yellow Perch, and Pumpkinseed Sunfish. Two species previously documented in the impoundment (Golden Shiner, and Chain Pickerel), along with young-of-year Alewife and American Shad were not found in the June 2025 survey. Juvenile alosines would not be expected to be present and susceptible to sampling until late summer or fall.

The bass nest survey documented locations of two bass nests, presumably from Smallmouth Bass based upon the nest locations and substrates (rocky and hard substrate in clear and shallow water) and because Smallmouth Bass were the only black bass species captured during this and prior surveys.

5 VARIANCES FROM THE FERC APPROVED STUDY PLAN

The Fish Assemblage Study was conducted following the methodologies identified in the RSP. A few discrepancies between the proposed and final study approach are noted here:

- The methodology in the RSP stipulated that the fish assemblage survey be completed during early June. However, unusually high flows in early June postponed the survey to late June (June 23-24).

- The methodology in the RSP requested to use a seine net with a 1/4 -inch mesh size. Due to availability, a seine net was used with a 3/8 -inch mesh size. The mesh sized used performed sufficiently for the needs of this study and is not believed to have caused any difference in catch rate success due to the similar size between the originally planned mesh size and the size used.

- Length measurements were not collected for the few American eel and juvenile Sea Lamprey collected, as these species are difficult to handle (without anesthetic) to get an accurate length. Weights were collected in a manner consistent with the study plan. This variance did not affect any of the calculations of CPUE, relative abundance, or biomass for these species.

- The RSP methodology originally called for deploying the seine net at a 180-degree arc between two shoreline points to corral fish. Due to water depth and insufficient area along the shoreline at each site, the net was instead extended toward mid-channel and returned to shore at a 90-degree angle to adapt to the site conditions.

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APPENDIX A – BRUNSWICK FISH ASSEMBLAGE SURVEY 2025 – INDIVIDUAL FISH DATA

Location	Gear Type	Species	Length (mm)	Weight (g)
EF02	Boat Electrofishing	American Eel	-	112
EF02	Boat Electrofishing	American Eel	-	40
EF02	Boat Electrofishing	Fallfish	85	7
EF02	Boat Electrofishing	Fallfish	65	3.5
EF02	Boat Electrofishing	Pumpkinseed Sunfish	185	143
EF02	Boat Electrofishing	Pumpkinseed Sunfish	145	68
EF02	Boat Electrofishing	Pumpkinseed Sunfish	65	6
EF02	Boat Electrofishing	Redbreast Sunfish	170	117
EF02	Boat Electrofishing	Redbreast Sunfish	200	200
EF02	Boat Electrofishing	Sea Lamprey	-	2
EF01	Boat Electrofishing	Smallmouth Bass	370	698
EF02	Boat Electrofishing	Smallmouth Bass	320	430
EF02	Boat Electrofishing	Smallmouth Bass	250	243
EF02	Boat Electrofishing	Smallmouth Bass	90	9
EF02	Boat Electrofishing	Smallmouth Bass	115	16
EF02	Boat Electrofishing	Smallmouth Bass	82	8
EF02	Boat Electrofishing	Smallmouth Bass	76	5
EF02	Boat Electrofishing	Smallmouth Bass	100	11
EF02	Boat Electrofishing	Smallmouth Bass	85	9
EF02	Boat Electrofishing	Smallmouth Bass	87	9
EF02	Boat Electrofishing	Spottail Shiner	65	4
EF02	Boat Electrofishing	Spottail Shiner	70	4
EF01	Boat Electrofishing	White Sucker	400	845
EF01	Boat Electrofishing	White Sucker	420	930
EF01	Boat Electrofishing	White Sucker	350	575
EF02	Boat Electrofishing	White Sucker	327	394
EF02	Boat Electrofishing	White Sucker	400	850
EF02	Boat Electrofishing	Yellow Perch	87	8
EF02	Boat Electrofishing	Yellow Perch	95	9
SN04	Seine Netting	Banded Killifish	57	1
SN04	Seine Netting	Common Shiner	78	5
SN04	Seine Netting	Common Shiner	73	3
SN04	Seine Netting	Fallfish	92	8
SN04	Seine Netting	Fallfish	57	1
SN01	Seine Netting	Pumpkinseed Sunfish	122	35
SN01	Seine Netting	Pumpkinseed Sunfish	40	1
SN01	Seine Netting	Pumpkinseed Sunfish	132	55
SN01	Seine Netting	Pumpkinseed Sunfish	165	103

Location	Gear Type	Species	Length (mm)	Weight (g)
SN04	Seine Netting	Pumpkinseed Sunfish	145	72
SN02	Seine Netting	Sea Lamprey	630	680
SN01	Seine Netting	Smallmouth Bass	85	9
SN01	Seine Netting	Smallmouth Bass	83	8
SN01	Seine Netting	Smallmouth Bass	80	7
SN01	Seine Netting	Smallmouth Bass	255	235
SN01	Seine Netting	Smallmouth Bass	140	42
SN02	Seine Netting	Smallmouth Bass	197	99
SN03	Seine Netting	Smallmouth Bass	78	5
SN03	Seine Netting	Smallmouth Bass	72	4
SN03	Seine Netting	Smallmouth Bass	280	303
SN03	Seine Netting	Smallmouth Bass	74	5
SN01	Seine Netting	Spottail Shiner	70	4
SN04	Seine Netting	Spottail Shiner	65	3

APPENDIX B – BRUNSWICK FISH ASSEMBLAGE SURVEY 2025 – BATCHED FISH DATA

Location	Gear Type	Count	Species	Min length (mm)	Max length (mm)	Weight (g)
EF01	Boat Electrofishing	18	Common Shiner	57	83	82
EF01	Boat Electrofishing	8	Common Shiner	51	74	23
EF01	Boat Electrofishing	4	Common Shiner	69	77	22
EF01	Boat Electrofishing	100	Eastern Silvery Minnow	52	73	266
EF01	Boat Electrofishing	3	Eastern Silvery Minnow	57	66	11
EF01	Boat Electrofishing	7	Fallfish	52	69	20
EF01	Boat Electrofishing	2	Fallfish	55	64	9
SN04	Seine Netting	16	Fallfish	52	65	47

APPENDIX C – REPRESENTATIVE IMAGES OF SAMPLED FISH SPECIES

Redbreast Sunfish (*Lepomis auritus*)

White Sucker (*Catostomus commersonii*)

APPENDIX H: EVALUATION OF STRANDING RISK/BATHYMETRY STUDY

EVALUATION OF STRANDING RISK/BATHYMETRY STUDY
INITIAL STUDY REPORT
BRUNSWICK HYDROELECTRIC PROJECT
FERC NO. 2284

Submitted by:

Brookfield White Pine Hydro LLC
150 Main Street
Lewiston, ME 04240

Prepared by:

Gomez and Sullivan Engineers

January 2026

Brookfield

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LIST OF ABBREVIATIONS AND DEFINITIONS

BWPH	Brookfield White Pine Hydro LLC
CFR	Code of Federal Regulations
cfs	Cubic feet per second
Commission	Federal Energy Regulatory Commission
FERC	Federal Energy Regulatory Commission
ILP	Integrated Licensing Process
ISR	Initial Study Report
Licensee	Brookfield White Pine Hydro, LLC
LIDAR	Light Detection and Ranging
MDMR	Maine Department of Marine Resources
msl	Mean Sea Level
NMFS	National Marine Fisheries Service
NOI	Notice of Intent
PAD	Pre-Application Document
Project	Brunswick Hydroelectric Project (FERC No. 2284)
PSP	Proposed Study Plan
RSP	Revised Study Plan
SD1	Scoping Document 1
SD2	Scoping Document 2
SPD	Study Plan Determination
USFWS	United States Fish and Wildlife Service

1 INTRODUCTION

Brookfield White Pine Hydro LLC (BWPH or Licensee) is licensed by the Federal Energy Regulatory Commission (FERC or Commission) to operate the 19-megawatt (MW) Brunswick Hydroelectric Project (Project) (FERC No. 2284). The Project is located on the Androscoggin River in the towns of Topsham and Brunswick, Maine. The Project straddles the border between Cumberland and Sagadahoc counties. The original license was issued on February 9, 1979, and expires on February 28, 2029.

BWPH is using FERC's Integrated Licensing Process (ILP) as established in Title 18 Code of Federal Regulations (CFR), Part 5. BWPH filed a Pre-Application Document (PAD) and Notice of Intent (NOI) to seek a new license for the Project on February 21, 2024. The PAD provides a description of the Project, including its structures, operations, and potentially affected resources. BWPH distributed the PAD and NOI simultaneously to Federal and state resource agencies, local governments, Native American tribes, members of the public, and others thought to be interested in the relicensing proceeding. Following the filing of the PAD, FERC prepared and issued Scoping Document 1 (SD1) on April 16, 2024. FERC also held agency and public scoping meetings and a site visit on May 7, 2024. The FERC Process Plan and Schedule provided agencies and interested parties an opportunity to file comments on the PAD and SD1 and request studies by June 20, 2024. FERC issued Scoping Document 2 (SD2) on July 29, 2024. BWPH filed a Proposed Study Plan (PSP) on August 2, 2024, and held study plan meetings on August 28 and October 9, 2024. The Revised Study Plan (RSP) was filed in accordance with the ILP schedule on December 2, 2024. FERC issued a Study Plan Determination (SPD) on December 30, 2024.

Specific to fisheries resources, the RSP BWPH proposed to conduct an Evaluation of Stranding Risk and Bathymetry Study, which was approved without modification in the SPD. This Initial Study Report (ISR) presents the results of the study, including the goals and objectives, methods, results, summary, and variances (if any) from the RSP.

2 GOALS AND OBJECTIVES

The study evaluates the risk of fish becoming stranded in areas of the river channel immediately below the spillway due to changing river flows or Project operations. The goal of this study is to evaluate the effect of Project operations on diadromous fish. The objective of the study is to identify which areas and under which operational scenarios pose the greatest risk for the stranding of fish in the Project area.

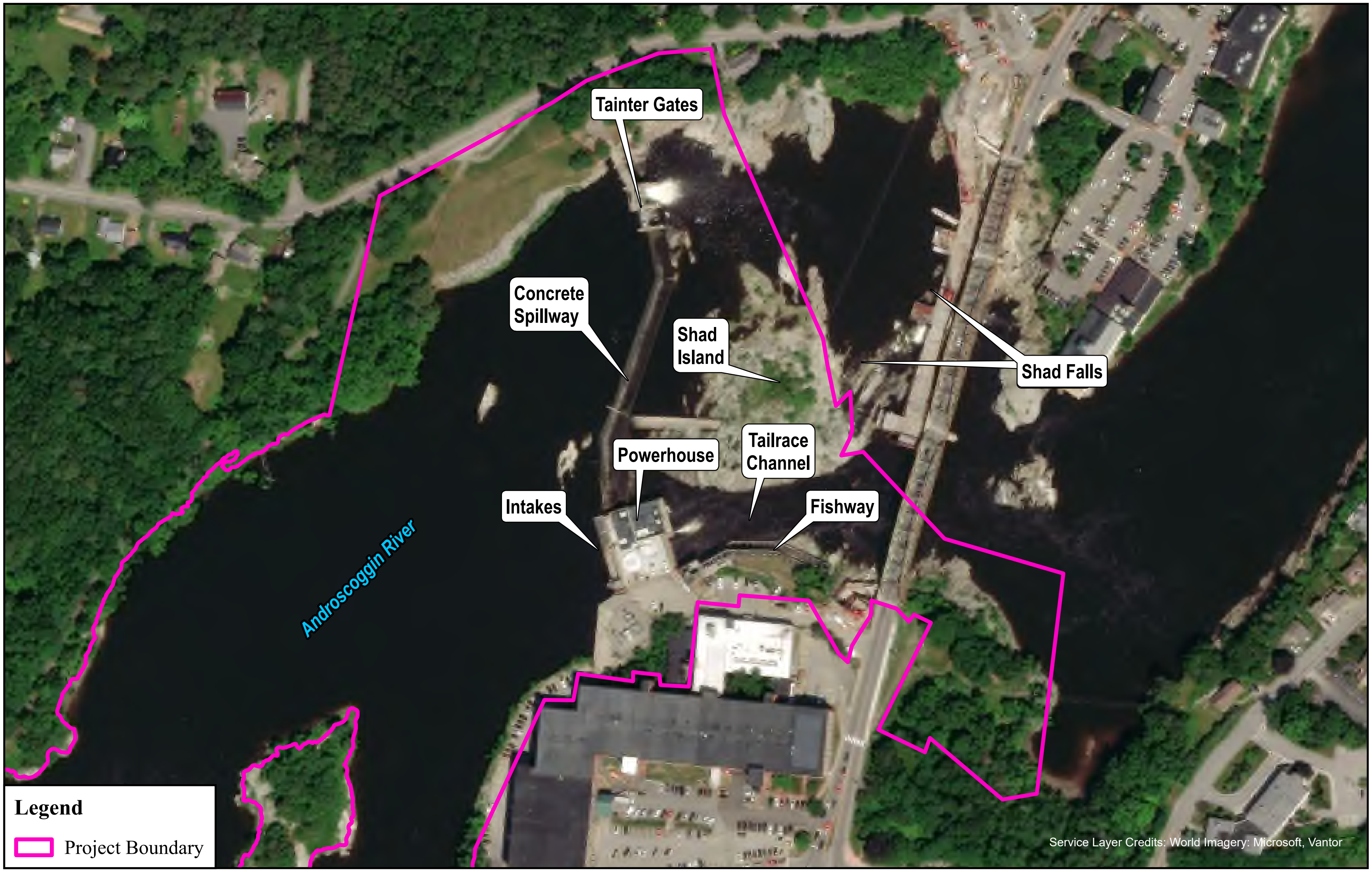
3 BACKGROUND INFORMATION

The Project operates in a run of river mode and consists of a 510 foot-long uncontrolled spillway section with a crest elevation of 39.4 feet, msl, an 80 foot-long gate section with two 32.5 foot-wide by 22 foot-high Tainter gates with sill elevations of 20.0 feet, msl, a 48-foot-wide emergency spillway section with a crest elevation of 39.4 feet, msl, and 57 foot-long, non-overflow section with a top elevation of 55 feet, msl. The outflow from the spillway is functionally divided into two sections, divided by a 2 foot-wide concrete pier on the spillway, located directly above a 21 foot-high and 170 foot-long concrete retaining wall that extends in the downstream direction (eastward) away from the face of the spillway to Shad Island (Figure 3-1).

The river right spillway section is adjacent to the powerhouse and approximately 188 feet-long. The current license allows for the installation of wooden flashboards that are 2.6 feet-high on this section of the spillway. These flashboards are designed to limit spill that flows toward the tailrace channel. A portion of this spill in this location lands directly into the excavated tailrace channel, and another portion of it lands on exposed bedrock adjacent to the tailrace channel at an elevation of approximately 2 feet, msl, and subject to partial inundation with high tides. There is minimal ponding or retention of water in this area when spill is present, although it is prone to accumulating debris under certain spill conditions.

The river left spillway section has an open 322-foot-long spillway crest without flashboards, the two Tainter gates, and the 48-foot-wide emergency spillway section. All these structures discharge into a large pool on the river left side of Shad Island, towards the Topsham side of the river. This area is generally comprised of a large, relatively well-connected pool. Various documents list the outflow of the pool as being impounded by natural bedrock ledges (i.e., "Shad Falls") that span the river left channel between the Topsham shore and Shad Island, timber crib structures, or a cement capped wall. A 3-foot-high by 20-foot-wide cement weir blocks off a secondary high-water channel on the Topsham shore known as "Granny Hole Stream" which is located under Bowden Mills Island Road, with a crest elevation of 18 feet, msl.

A variety of resident and migratory freshwater and estuarine fish species are known to occur downstream of the Project including ESA listed: Atlantic Salmon, Atlantic Sturgeon, and Shortnose Sturgeon.



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BRUNSWICK HYDROELECTRIC PROJECT
EVALUATION OF STRANDING RISK/BATHYMETRY
FERC NO 2284

0 125 250 500 Feet

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Figure 3-1
Project Facilities and Features

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4 METHODOLOGY

4.1 Operational Data Review

Prior to conducting the field investigation, a desktop literature review was performed to gather information on the typical sequencing of spillway gate operations, frequency of annual spill operations at the Project, cycling of units, tidal influences, available LIDAR, and topographic information. This information helped to determine the inflow and operational conditions under which stranding could occur in the areas downstream of the Project spillway. Based on the data review, BWPH identified relevant scenarios for evaluation during demonstration flow events.

4.2 Field Survey

BWPH coordinated demonstration flow events that were attended by a study team that consisted of representatives from BWPH and Maine Department of Marine Resources (MDMR) personnel. The flow events and field survey occurred over the entirety of the river left channel, from the base of the spillway and Tainter Gates, along Shad Island and to the downstream extent of Shad Falls where pools regained connectivity to the tidally influenced downstream reaches of river (See Figure 3-1). The demonstration flows were performed during the time that adult river herring are expected to be present at the site (typically mid-May to early-June), which provided an opportunity to observe adult river herring, should they become stranded. BWPH provided each potential flow and operational scenario identified above and members of the study team observed and characterized potential stranding sites visually from vantage points during the spill and Tainter gate flow scenarios, and by entering the reach and taking measurements after spilling operations ceased.

Physical measurements of the stranding features were recorded. These included the approximate surface area, maximum pool depth, outlet channel: length, width, depth, and descriptive characteristics of connectivity to other pools. The physical measurements of a pool were collected relative to a water surface "full to the brim" beyond which further inundation would cause a pool to become fully connected and part of the larger adjacent section of river. In the case that a pool had drained below this level when surveyed (i.e. water drained out through channels or crevices below the brim), the measurements were taken relative to an estimated maximum water surface level. Key stranding areas were photographed.

The potential stranding hazard for each pool was evaluated based upon the size and depth of a pool and how readily fish could exit the pool as it became disconnected from the area that fish would egress to (either the tailrace or main river left channel pool) based upon exit channel width and length, sinuosity, and presence of obstructions. For example, a basin that drains completely through a single wide channel will not retain fish but one that drains through a channel obstructed by cobbles may retain large fish. These factors were considered to give each pool a rating of the relative risk of fish becoming trapped and stranded as the water surface height first dropped below the "full to the brim" level. Pools with shallow/obstructed outlets were generally assigned "High" stranding potential ratings, except for areas where fish may not try to enter due to assumed behaviors. Pools with deep/unobstructed outlets were generally assigned "Low" stranding potential ratings. Due to safety access concerns, the study team could not enter the river left channel and observe exactly what flow each pool became connected or isolated.

The potential for egress was characterized for three size classes of fish that are broadly representative of the sizes and behaviors of fish that are vulnerable to stranding at the site.

- Large fish: characterized by adult sturgeons
- Medium fish: characterized by adult salmon
- Small fish: characterized by adult and juvenile river herring, juvenile American eel

Due to the potential for the presence of ESA listed sturgeons or Atlantic Salmon in the study area, the survey crew made an explicit intent to search for, identify, document, and protect any sturgeons or salmon that may be affected by the study, and document any other fish species or other aquatic life that were notably impacted or stranded during the study.

4.3 Topographical and Bathymetric Survey of Stranding Areas

After completing field surveys of identified operations and spill scenarios, BWPH conducted a bathymetric and topographic survey of the area below the spillway. This included a survey of important exposed features using a GPS/RTK or Total Station Unit as needed due to conditions encountered on site. A bathymetry survey was performed in the study area with spot measurements of depths in critical stranding areas, in pools, and in hydraulic control features. The survey also documented the conditions and elevations of the ledges spanning between Shad Island and Topsham where background documents suggest a timber crib structure was once present. The goal of the topographic survey was to provide documentation to inform any future Protection, Mitigation, or Enhancement measures if stranding was documented to be an issue at the site.

5 RESULTS

5.1 Operational Data Review

River flows are typically high during the spring passage season, and whenever station capacity is exceeded, remaining flow is directed into the river left channel (i.e. over the spillway or through the Tainter gates). Additionally, although there is no minimum flow requirement in the river left channel under the existing license, BWPH voluntarily provides a 100 cubic feet per second (cfs) minimum flow through a Tainter gate from May 1 until July 1st to diminish the risk of stranding fish in the river left channel.

Consequently, BWPH chose to evaluate stranding risk in the river left channel under the following four flow scenarios:

- Moderate Spill Scenario: A full apron of spill, several thousand cfs to simulate a typical spring flow in excess of station capacity to water and connect all potential areas but well below flood stage or peak annual flows.

- Low Spill Scenario: Approximately six inches of spill (several hundred cfs) would provide a period of time for fish to ingress/egress under a second flow regime that presents different hydraulic characteristics as might be found under naturally diminishing flows.

- 100 cfs: Provided through a Tainter gate with no spill over the dam crest to simulate BWPH's voluntary minimum flow provision and demonstrate which pools may be connected/disconnected.

- No Flow: The Tainter gates are closed and spill is ceased to provide no intentional inflow (beyond leakage or groundwater).

5.2 Field Survey

The field survey/flow demonstration to assess potential stranding conditions occurred on May 30th, 2025, between the hours of 8:00 am and 1:00 pm. The survey was attended by representatives from BWPH, Gomez and Sullivan Engineers, D.P.C. (BWPH's licensing consultant), and MDMR (collectively, "the study team").

The environmental conditions allowed for a period when the study could be scheduled in May when river herring and other anadromous species would likely be present in the vicinity of the Project. This allowed for the documentation of actual fish presence and behavior observations beyond expert opinion and speculation. The flow demonstration was conducted as planned and no river herring, Atlantic or Shortnose Sturgeon, Atlantic Salmon, or American Shad were observed in the river left channel above Shad Falls during the survey. American Shad, river herring and Sea Lamprey were observed in several of the pools below Shad Falls. A selection of photos from the field effort have been included in Appendix A.

5.2.1 Environmental and Operation Conditions

The weather during the flow demonstration was sunny and warm. Inflow to the Project was approximately 7,000 cfs as controlled by releases from upstream hydropower projects. The Tainter gates were in proper working condition throughout the duration of the study, and the generating units were online and available for control of pond level.

5.2.2 Flow Scenarios

During the flow demonstration, a total of four flow scenarios were observed in sequence. The series started with a moderate spilling flow, then decreased for the remaining flow scenarios. The details of the individual flows are as follows:

Moderate Spill

Approximately 4,000 cfs was spilled over the entire length of the spillway. Substantial amounts of water were flowing through and over all the area and pools identified in this study. Most of the flow was through the center of the river left channel, with little to no sinuosity observed. There were no disconnected pools observed at this flow.

Low Spill

The station generation was ramped up, causing the headpond to fall to the point of spilling approximately 6-inches (~450-700 cfs) across the entire length of the spillway. The spill was provided for approximately 60 minutes after the flow decrease was initiated, allowing water levels a chance to stabilize. There were no disconnected pools observed at this flow, although egress from pools around Shad Island pools became limited.

100 cfs/Tainter Gates

Station generation was ramped up further, reducing river left channel flow to 100 cfs provided through a Tainter gate. The spill was provided for approximately 90 minutes after the flow decrease was initiated to allow flows to stabilize. Pools around Shad Island (Area 2) and below the spillway (Area 3) became disconnected, and egress from the river left channel was through one channel at the Shad Falls ledges (see Figure 5.2-1).

No Flow

Flow to the river left channel was cut off for ~2.5 hours (with minor leakage ~ 10cfs observed through the Tainter gates), and water levels in the river left channel were allowed to stabilize. Many of the small pools that were identified in areas 1-3 are disconnected or have limited egress.

5.2.3 Pools and Potential Stranding Areas

The river left channel is dominated by a single large pool that extends from the spillway and Taintor gates to the top of Shad Falls. This main pool is approximately 3 acres in surface area, contains considerable area greater than 10 feet in depth, and comprises most of the surface area, linear length, and water volume of the river left channel. This main pool can become stranded under a no-inflow scenario but at least represents a significant habitat unit for fish to move about. The main pool provided sufficient egress for all fish at the 100 cfs scenario and even provided marginal egress conditions for American Shad and Atlantic Salmon sized fish and adequate egress for small fish under the leakage-only scenario.

During the on-the-ground survey under no-flow conditions, 15 distinct and relatively small potential stranding pools (excluding the main pool of the river left channel) were documented. Due to safety concerns, the field survey team was not able to be in the river left channel and observe exactly what flow was required to connect or isolate each pool. All 15 pools had been fully connected at the medium spill scenario. Based on the surface height above the nearby main channel and the outlet channel depth (Table 5.2-1), most of the pools were likely connected or just barely disconnected under the low-spill scenario. It is expected that most were disconnected at the 100 cfs scenario. All 15 were disconnected at the no-flow scenario.

The 15 pools were consolidated into 3 main areas of interest. Area 1 includes five pools below the Shad Falls ledges. Area 2 includes five pools on the northern side of Shad Island. Area 3 includes five small pools immediately below the spillway, near the Tainter gate. The location of these Areas is shown in Figure 5.2-1. A specific description of the pools in each Area at low flow is given in Table 5.2-1. The pools in Area 1 were evaluated relative to egress and connectivity to the tailrace where fish are then free to the rest of the river. The pools in Area 2 and 3 were evaluated relative to egress and connectivity to the main pool of the river left channel. The primary channel retained egress at all flow scenarios through the low-flow outfall over Shad Falls, depicted in Figure 5.2-1.

The highest priority pools for stranding concerns are those at the base of or along the face of Shad Falls (Area 1). These are the furthest downstream pools, ending at the area of tidal influence, and are the most easily accessed by fish traveling in an upstream direction. The pools in Area 1 retain inflow and outflow at the moderate and low spill scenarios. At the voluntary 100 cfs minimum flow scenario or no flow, large-bodied fish such as sturgeon, salmon, or shad would likely become trapped in most of these pools. Most of these pools have sufficient egress for small-bodied fish such as adult river herring and other resident fish during the 100 cfs scenario and the leakage only scenario. These pools all have through-flow and are part of the main flow to a varying degree when connected, making them an attractive area for migratory fish to pass into or through.

Area 2 is an assortment of pools and pockets located at the upstream side of Shad Island. These areas are a distance back from the spillway and do not have through-flow, only serving as a slower water habitat when connected to the main channel during times of spill. These pockets became connected at the moderate spill scenario, but lost egress at the low spill scenario. At the low flow/no flow scenarios, most of the Area 2 pools were completely disconnected, and any sturgeon, salmon, and shad in these pockets would likely be trapped. Since these pools are slower water habitat fish may be less likely to be present in these small pockets when flows are dropping.

Area 3 is a small bedrock outcrop below the spillway and adjacent to the Taintor gates. This bedrock ledge was covered by spill during the moderate and low spill scenarios but became disconnected and began to dry when spill stopped. The proximity of these pools to the spillway may make them an attractive area for upstream oriented fish to reside when connected, especially sea lamprey which are fond of attaching to bedrock outcrops. However, all the pools in Area 3 were small, and due to the improbability of large-bodied fish residing in these small pockets even at higher flows, large fish are unlikely to become stranded here, only small-bodied fish like river herring when spill is ceased.

The southern (tailrace) side of Shad Island was surveyed for stranding pools as well. Two pools were located but at an estimated elevation of 10 – 15 feet above the tailrace. These pools would only become connected at higher river flows than was observed, possibly only in flood conditions and well outside of operational capacity. These pools were therefore not considered further for the stranding evaluation.

5.2.4 Observations of Fish

Fish observations can be broken into two regions: Above and Below Shad Falls. The area above Shad Falls, which includes the area immediately below the spillway and Tainter gates, the Area 2 and Area 3 pools, and the main river left channel pool and channel. One juvenile American Eel and one juvenile Smallmouth Bass were observed in one of the Area 2 pools. No other fish were observed in any of the other areas above Shad Falls, despite careful observation around the spillway and Tainter gates during the spill and flow scenarios, and while walking the shoreline.

Area 1 comprised the pools at and below Shad Falls. In this area several hundred river herring as well as 10 – 20 American Shad and small numbers of Sea Lamprey and Smallmouth Bass were encountered during the no-flow scenario. During the no-flow scenario a small number of fish were observed in one fully disconnected pool half-way up the falls and stranded (pool 1-2). The vast majority of the fish were observed in a plunge pool directly below the low-flow outlet over Shad Falls (pool 1-4). These fish had plenty of volume, depth, and flow available to them for survival during our observations at the no-flow (leakage only) scenario. The outlet channel was relatively shallow (0.8 ft) and could present a behavioral barrier to sturgeon and shad for egress but it is a wide smooth bedrock chute that is not obstructed at higher flows. The river herring were not deemed to be stranded but rather appeared to still be intent on traveling upstream and were even regularly traversing the outlet channel in both directions during the no-flow scenario.

There were no Atlantic Salmon or Sturgeon (adult or juvenile) observed during the field survey.

Table 5.2-1: Description and Characteristics of Potential Stranding Areas as Observed at No River Left Channel Flow

Pool	Pool Size		Outlet Channel Size (ft)				Stranding Potential*		
Area 1 – Shad Falls									
Pool	Approx. Area (sq ft)	Max Depth (ft)	Length	Width	Depth	Height Above Nearby Main Channel	Large Fish	Medium Fish	Small Fish
1-1	250	0.8	No defined outlet channel			Est. 8 ft above tailrace	Low	Low	Low
1-2	1,200	4.0	12	10	1	5	High	High	High
1-3	240	2.6	5	6	1	1	High	Low	Low
1-4	4,200	5.5	10	5.5	0.8	1	High	Medium	Low
1-5	546	3.0	No defined outlet channel, wide shallow bedrock			2	Low	Low	Low
Area 2 – Shad Island									
Pool	Pool Size		Outlet Channel Size (ft)				Stranding Potential*		
	Approx. Area (sq ft)	Max Depth (ft)	Length	Width	Depth	Height Above Nearby Main Channel	Large Fish	Medium Fish	Small Fish
2-1	252	1.0	4	3	1.2	0.6	Medium	Low	Low
2-2	1,320	1.5	3	3	1.1	2.3	Medium	Low	Low
2-3	800	1.2	14	6	0.7	2.8	High	High	Low
2-4	592	4.0	4	12	0.3	0.8	High	High	Low
2-5	546	3.6	6	12	0.8	1.5	High	High	Low
Area 3 – Spillway Ledges									
Pool	Pool Size		Outlet Channel Size (ft)				Stranding Potential*		
	Approx. Area (sq ft)	Max Depth (ft)	Length	Width	Depth	Height Above Nearby Main Channel	Large Fish	Medium Fish	Small Fish
3-1	190	0.3	No defined outlet channel			2.0	Low	Low	Low
3-2	27	1.0	No defined outlet channel			0.5	Low	Low	Low
3-3	144	1.8	No defined outlet channel			2.0	Low	Low	Medium
3-4	72	1.0	No defined outlet channel			1.7	Low	Low	Low
3-5	23	0.5	No defined outlet channel			1.0	Low	Low	Low

**Note: The potential stranding hazard for each pool was evaluated based upon the physical characteristics of the pools and whether fish could enter the pool based on their presumed behaviors. Not all potential stranding pools are anticipated to be frequently accessed by migratory fish (e.g., Areas 2 and 3) as discussed in the text. Therefore, a "High" rating for stranding potential does not necessarily indicate that stranding occurs in these areas.*

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0 60 120 240 Feet

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Figure 5.2-1:
Locations of Potential Stranding Areas

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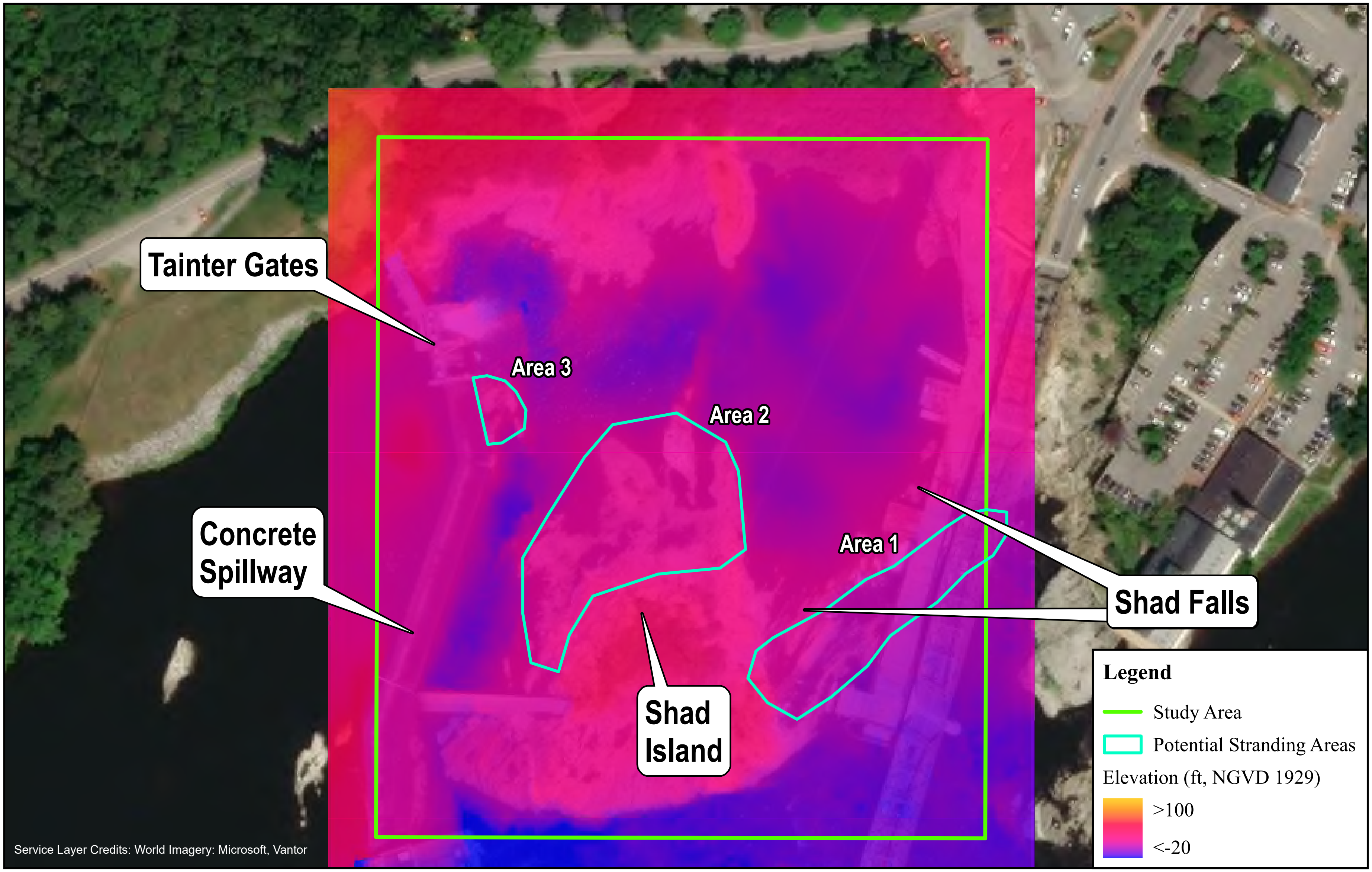
5.3 Topographical and Bathymetric Survey of Stranding Areas

Results of the topographical and bathymetric survey of the river left channel area show that the main channel has an area of approximately 3.4 acres, with depths ranging from ~2-20 feet. Most depths in the channel, including immediately adjacent to the spillway wall were 10-12 feet. In general, the crest of the Shad Falls ledges was 10-12 feet (NAVD88) elevation. The low flow outfall crest heights were at 7-9 feet in elevation. A bathymetric and topographic map of the river left channel is shown in Figure 5.3-1.

The concrete weir that blocks “Granny Hole Stream” was not located during survey efforts. Given the observations above and below Shad Falls, fish do not appear to be using this as a route to enter the river left channel. Changes to Shad Falls or Bowden Mill Island should consider the possible impacts to flows into or bed elevations of this side channel.



GOMEZ AND SULLIVAN ENGINEERS

BRUNSWICK HYDROELECTRIC PROJECT
EVALUATION OF STRANDING RISK/BATHYMETRY
FERC NO 2284

0 70 140 280 Feet

N

Figure 5.3-1
Topographic and Bathymetric Map of River Left Channel

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6 SUMMARY

A stranding flow demonstration study was performed in compliance with the RSP and in consultation with MDMR. This study highlights areas where diadromous and resident fish may become stranded after significant spill events in the river left channel. The primary locations with the potential to strand fish were below Shad Falls and on the northern edge of Shad Island. The pools below the Shad Falls ledges retain adequate depth and inflow for fish to survive for a period of time but lack egress for large fish such as sturgeon, adult salmon, and shad during the no-flow scenario. All of the pools below the falls where upstream migrating anadromous fish would be expected to access are suspected to have adequate egress under the 100 cfs scenario but were not directly observed due to safety access concerns. These pools are readily accessed from the mainstem by fish traveling upstream so are likely to be frequented by fish. Some of the pools around Shad Island pose a mild risk to migratory fish, but their position back away from the spillway reduces the likelihood of any concentration of fish being present in them.

The Shad Falls ledges appear adequate at excluding non-anguillid fish from moving upstream into the river left channel under normal spring/summer flow conditions. This was evidenced by the observation of a large number of migratory fish below the ledges but not a single adult anadromous fish above them. Evidence of both a concrete cap to level the crest of the falls as well as drilling and blasting to steepen the downstream face was found. These measures appear to be adequate in their current form to prevent upstream passage of migratory anadromous fish into this channel. In the unlikely event that individuals of anadromous fish pass the falls and ascend into the river left channel, the 100 cfs voluntary minimum flow that BWPH provides appears to provide a continuous route of adequate egress from the main river left channel pool back to the tailrace and main channel downstream. Fish that enter the river left channel during downstream passage via spill and the Tainter gates are not likely to become stranded in the comparably small surface area of the minor pools documented above the falls that can become disconnected with changing flows.

BWPH will discuss with the resource agencies whether PME measures are needed with regard to the limited potential for stranding effects at the Project. If deemed necessary, a list of potential PME measures will be included in the Updated Study Report.

7 VARIANCES FROM FERC APPROVED STUDY PLAN

There were no variances from the FERC approved study plan.

APPENDIX A – PHOTOGRAPHS OF STUDY AREA

LIST OF PHOTOS

Photo 1: View of river left channel at end of low spill scenario

Photo 2: View of Shad Falls ledges at end of low spill scenario

Photo 3: View of voluntary 100 cfs minimum flow provision

Photo 4: View of Area 3 pools during voluntary 100 cfs minimum flow scenario

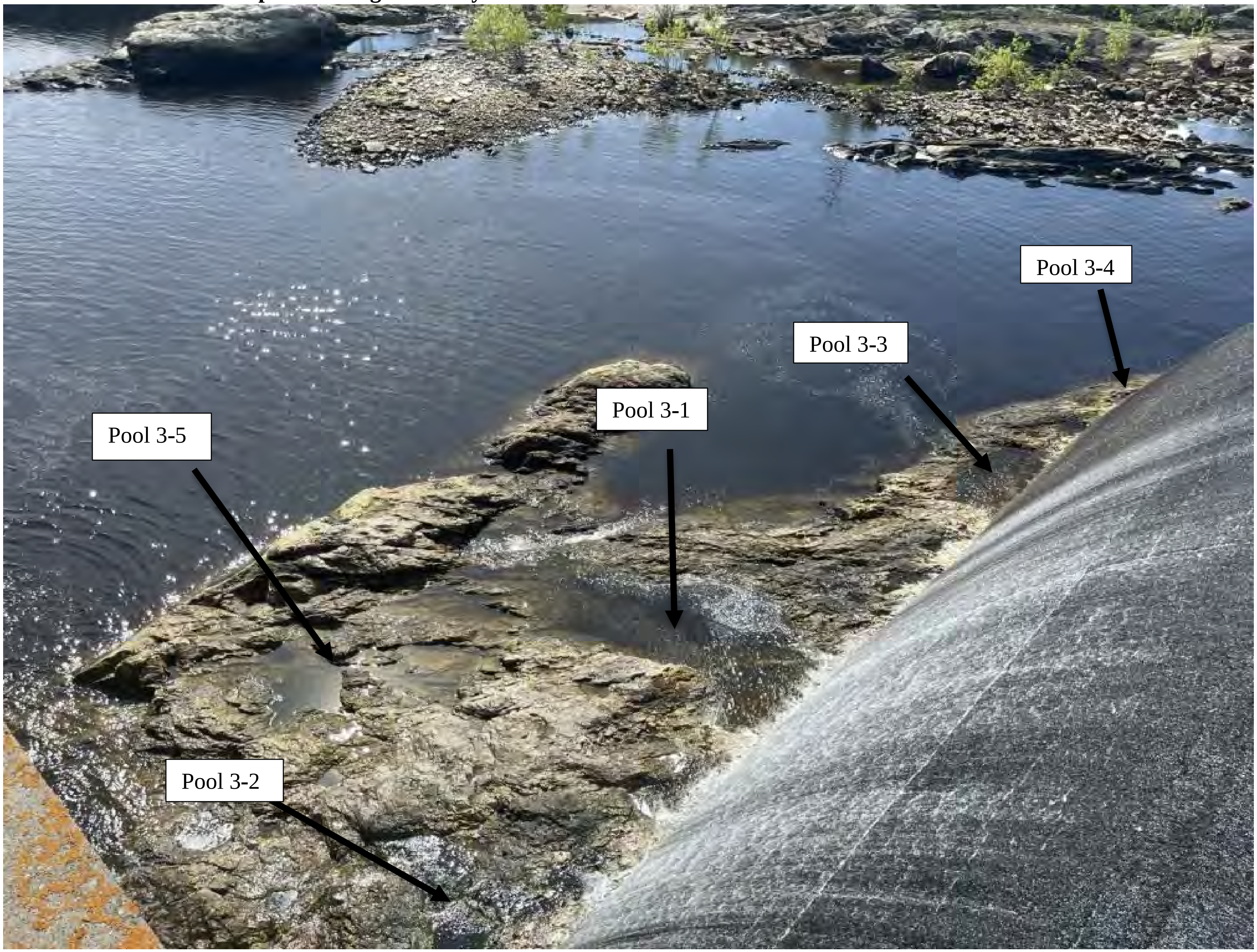

Photo 5: View of Shad Island during voluntary 100 cfs minimum flow scenario

Photo 6: View of Area 2 pools and Shad Falls ledges at 100 cfs minimum flow scenario

Photo 7: View of a potential stranding pool in Area 1 immediately below low flow outfall at no flow scenario

APPENDIX I: MUSSEL SURVEY

FRESHWATER MUSSEL SURVEY
INITIAL STUDY REPORT
BRUNSWICK HYDROELECTRIC PROJECT
FERC NO. 2284

Submitted by:

Brookfield White Pine Hydro LLC
150 Main Street
Lewiston, ME 04240

Prepared by:

Gomez and Sullivan Engineers

January 2026

Brookfield

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LIST OF ABBREVIATIONS AND DEFINITIONS

Brookfield	Brookfield Renewable
BWPH	Brookfield White Pine Hydro LLC
°C	Celsius
CFR	Code of Federal Regulations
cfs	Cubic feet per second
CPUE	Catch per unit effort
Commission	Federal Energy Regulatory Commission
°F	Degrees Fahrenheit
FERC	Federal Energy Regulatory Commission
ft	Feet/foot
g	Gram
GPS	Global Positioning System
ILP	Integrated Licensing Process
ISR	Initial Study Report
Licensee	Brookfield White Pine Hydro, LLC
ME	Maine
m	Meter
m^2	Square meter
min	Minute
min/m^2	Minutes per square meter
$individuals/m^2$	Individuals per square meter
mm	Millimeter
MW	Megawatt
NGVD	National Geodetic Vertical Datum
NOI	Notice of Intent
PAD	Pre-Application Document
Project	Brunswick Hydroelectric Project (FERC No. 2284)
PSP	Proposed Study Plan
RSP	Revised Study Plan
SD1	Scoping Document 1
SD2	Scoping Document 2
SPD	Study Plan Determination
USGS	United States Geological Survey

1 INTRODUCTION

Brookfield White Pine Hydro LLC (BWPH or Licensee) is licensed by the Federal Energy Regulatory Commission (FERC or Commission) to operate the 19-megawatt (MW) Brunswick Hydroelectric Project (Project) (FERC No. 2284). The Project is located on the Androscoggin River in the towns of Topsham and Brunswick, Maine. The Project straddles the border between Cumberland and Sagadahoc counties. The original license was issued on February 9, 1979, and expires on February 28, 2029.

BWPH is using FERC's Integrated Licensing Process (ILP) as established in Title 18 Code of Federal Regulations (CFR), Part 5. BWPH filed a Pre-Application Document (PAD) and Notice of Intent (NOI) to seek a new license for the Project on February 21, 2024. The PAD provides a description of the Project, including its structures, operations, and potentially affected resources. BWPH distributed the PAD and NOI simultaneously to Federal and state resource agencies, local governments, Native American tribes, members of the public, and others thought to be interested in the relicensing proceeding. Following the filing of the PAD, FERC prepared and issued Scoping Document 1 (SD1) on April 16, 2024. FERC also held agency and public scoping meetings and a site visit on May 7, 2024. The FERC Process Plan and Schedule provided agencies and interested parties an opportunity to file comments on the PAD and SD1 and request studies by June 20, 2024. FERC issued Scoping Document 2 (SD2) on July 29, 2024. BWPH filed a Proposed Study Plan (PSP) on August 2, 2024, and held study plan meetings on August 28 and October 9, 2024. The Revised Study Plan was filed in accordance with the ILP schedule on December 2, 2024. FERC issued a Study Plan Determination (SPD) on December 30, 2024.

Specific to freshwater mussel resources, in the RSP, BWPH proposed to conduct a Freshwater Mussel Survey, which was approved without modification in the SPD. This Initial Study Report (ISR) presents the results of the study, including the goals and objectives, methods, results, summary, and variances (if any) from the FERC approved study plan.

1.1 Background

No known systematic bivalve surveys have been conducted within the Project area. Current mussel distributions are unknown. Mussel surveys upstream and downstream of the Project area in the lower Androscoggin River have documented nine of Maine's ten species: Triangle Floater, Brook Floater, Tidewater Mucket, Eastern Elliptio, Eastern Lampmussel, Eastern Pearlshell, Eastern Floater, Creeper, and Alewife Floater (Nedeau et al. 2000).

1.2 Study Goals and Objectives

The goals and objectives of this study are to provide information regarding the distribution, size, and assemblage of freshwater mussels using aquatic habitats in the Project Area. The objective of the study is to document mussel populations and potential host fish species that may be affected by Project operations.

2 STUDY APPROACH AND METHODOLOGIES

2.1 Study Sites and Methods

The study area included the mainstem Androscoggin River from the Brunswick Dam boater barrier up to the influence of the Pejepscot Hydroelectric Project (approximately 4.5 miles). Sites downstream of the impoundment boat barrier and downstream of the dam were not sampled due to safety concerns for the surveyors. Within this reach 40 sites were sampled, sites were generally evenly spaced while ensuring a wide range of habitats were sampled (Figure 2.0-1).

All surveys were performed by a qualified mussel biologist and associated field staff.[1] The survey methodology consisted of a semi-quantitative cell timed search, implementing visual and tactile inspection of the substrate using a mask and snorkel. Survey efforts focused on shallow shoreline habitats. At the first site, square cells were placed and two surveyors each searched a 25 m^2 cell, for a total of 50 m^2 area. Given the high densities of mussels observed at that site, and the visible dense mussel beds observed along much of the shore, the methodology was updated to a single 6.25 m^2 cell (2.5 x 2.5m) searched by both surveyors at each site to ensure that the area was sufficiently searched to deplete the mussels in the cells. Two sites had such high densities that the cell size was limited to 1.0 m^2.

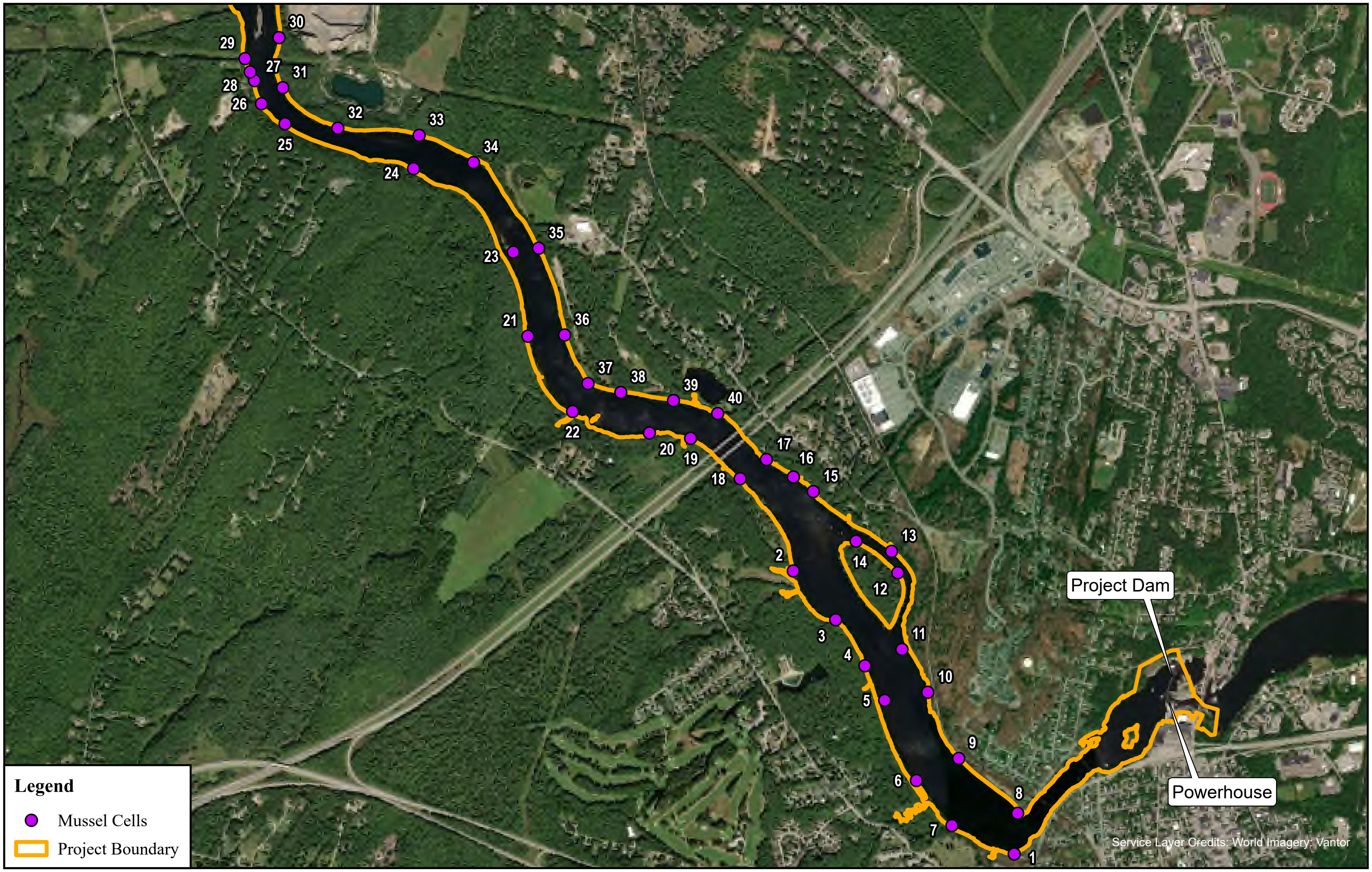
The cells were searched from the downstream edge to the upstream edge to allow suspended material to be flushed by the current. At each cell GPS coordinates, substrate composition percentage (Wentworth Scale), the percent cover by woody debris and macrophytes, cell dimensions, cell search time, depth at center of the cell, water clarity, and counts of live mussels and shell identified to species. For live mussels, lengths were recorded for the first 50 individuals of each species at the first site, and then 25 individuals of each species at each subsequent site. This effort was sufficient to characterize length distribution within the population while reducing unnecessary handling of mussels (Gerritsen and McGarth 2007). Representative photographs were taken for each species showing the dorsal and lateral view of the shell. Fresh dead and relic shells were retained for each species found. Any invasive bivalves found in the cells were to be identified and quantified as well but were not present.

To assess the sufficiency of the survey effort, a species richness curve was calculated from the mussel abundance data at each site using the R package iNEXT (Hsieh et al. 2016). The function iNEXT was used to calculate a rarefaction curve, which is a type of richness curve that accounts for differences in sampling effort across sites, to estimate species richness based on the data collected and extrapolate estimates for further sampling to assess how they differ. The analysis was performed using an incidence-based approach (e.g., species accumulation vs. the number of sites).

2.2 Survey Dates and Conditions

The survey was conducted July 28-30th, between 9am and 6:30pm. The weather conditions were partly cloudy and 75-85°F. Water clarity was good and all sites had noticeable current, helping keep cells clear of resuspended material. Discharge was around 2,000 cfs near Auburn, Maine (USGS-01059000) during the survey. The headpond elevation, as recorded at the dam, ranged from approximately 38.5 to 39.3 ft, NGVD 1929 during the survey.

[1] Qualified surveyors and field staff from Gomez and Sullivan Engineers included B. van Ee, J. Green, and M. Umstead.



GOMEZ AND SULLIVAN ENGINEERS

FRESHWATER MUSSEL SURVEY 2025
BRUNSWICK HYDROELECTRIC PROJECT
FERC NO. 2284

0 1,100 2,200 4,400 Feet

N

Figure 2.0-1:
Map of Mussel Survey Study Sites

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3 RESULTS

3.1 Mussel Community

The survey covered 312.75 m^2 of habitat with a total search effort of 1,059 minutes, and an average effort of 3.39 min/m^2. Cell area and effort was variable across sites, as some sites contained very dense mussel communities which required a smaller area to accurately sample and naturally required a search effort above the targeted baseline of 0.5 min/m^2 (Table 3.1-1). In total, 4,644 live freshwater mussels from four species were found during the survey, Eastern Elliptio (*Elliptio complanata*), Alewife Floater (*Utterbackiana implicata*), Triangle Floater (*Alasmidonta undulata*), and Eastern Lampmussel (*Lampsilis radiata*), giving a CPUE of 4.39 individuals/min (Table 3.1-1). Only two out of the 40 sites (22 and 32) had no live freshwater mussels, with the average density of freshwater mussels across sites being 14.8 individuals/m^2. Of the 4,644 live individuals 99.3% were Eastern Elliptio, 0.43% Alewife Floater, 0.15% Triangle Floater, and 0.15% Eastern Lampmussel. Species photos are included in Appendix A, representative site photos are provided in Appendix B, and mussel length data collected are provided in Appendix C.

The freshwater mussel population was dominated primarily by Eastern Elliptio with 4,610 live individuals, making up 99.3% of live individuals (Table 3.1-1). Eastern Elliptio was only absent from two sites (22 and 32). Density ranged across cells where present from 0.16 to 131 individuals/m^2. Eastern Elliptio ranged from 15 to 109 mm in length (Table 3.1-2).

Alewife Floater was second most abundant species, with a total of 20 live individuals from 11 total sites (Table 3.1-1). Density where present ranged from 0.01 to 0.12 individuals/m^2, and length ranged from 41mm to 100mm (Table 3.1-2). Triangle Floater had seven live individuals from six sites, and ranged from 20 to 34 mm (Table 3.1-1; Table 3.1-2). Eastern Lampmussel had seven live individuals from five sites, and ranged from 28 to 84 mm (Table 3.1-1; Table 3.1-2).

Numerous shell middens were found along the shore that were examined for mussel species. The middens contained all four species found live during the survey, though the middens were less dominated by Eastern Elliptio with a greater portion of Alewife Floater, Triangle Floater, and Eastern Lampmussel. A single Eastern Floater shell was also found in a shell midden, though no live individuals were found during the survey. No invasive bivalves were found during the survey.

3.2 Survey Effort Analysis

Based on the incidences of each species at each site, the species richness curve developed becomes asymptotic around 20 sites sampled and has completely leveled out by the 40 sites that were sampled (Figure 3.2-1). The curve and extrapolated results indicate that increased effort beyond the 40 sites sampled would not have been likely to result in additional species documented. Therefore, the sampling effort performed was sufficient.

3.3 Mussel Habitat

Sediment within the cells was dominated by silt (44.4% of survey area), with cobble (23.0%) second most abundant. Gravel (12.5%) and sand (13.2%) were also commonly present, with bedrock (4.9%) and boulder (2.0%) also present. Woody debris was present with 2.0% of sediment covered at 3 sites and macrophytes covered 11.8% of cell area and at 22 sites. Depth at the center of the cells ranged from 20 to 170 cm, with an average of 63.4 cm.

The cells with the highest density (60-131 individuals/m^2) were dominated by silt (80-100%), and most also had macrophytes. Eastern elliptio densities were greater in the surrounding silt that within the macrophyte patches, being present at most sites between the shoreline and near-shore weed beds in high density, often in 20-40cm of water. The cells with 3-4 species present contained a mix of cobble, gravel, and sand, with only one diverse cell containing silt. Cells with two species present contained a variety of substrate conditions from 100% silt to an even mix of cobble, gravel, and sand.

3.4 Host Species Presence

Each mussel species documented by this survey effort has multiple known resident host fish species that were documented in the impoundment in 2025 during the Fish Assemblage Study (Table 3.4-1; Table 3.4-2). American Shad, Alewife, Blueback Herring, and Atlantic Salmon are also passed upstream of the dam. Pumpkinseed is a host fish common to all mussel species present. Except for American Eel and Alewife, all the identified host fish in the Project area would be supported by naturally reproducing resident populations.

Table 3.1-1: Summary of the Mussel Survey Results

Site	Cell Dimensions (m)	Cell Area (m^2)	Searching Duration (min)	Search Effort (min/m^2)	Depth at Center (cm)	Boulder (%)	Cobble (%)	Gravel (%)	Sand (%)	Silt/Mud (%)	Bedrock (%)	Woody Debris (%)	Macrophytes (%)	Eastern Elliptio	Alewife Floater	Triangle Floater	Eastern Lampmussel	Density (individual/m^2)
1	two 5 x 5	50	40	0.8	55	0	34	33	33	0	0	0	18	224	7	3	1	4.7
2	5 x 5	25	63	2.5	120	0	0	0	30	70	0	0	10	931	0	0	0	37.2
3	5 x 5	25	26	1.0	60	0	90	0	0	0	10	0	20	52	0	0	0	2.1
4	2.5 x 2.5	6.25	40	6.4	80	0	0	0	20	80	0	0	10	620	0	0	0	99.2
5	2.5 x 2.5	6.25	26	4.2	160	0	0	0	0	100	0	20	10	130	0	0	1	21.0
6	2.5 x 2.5	6.25	26	4.2	50	0	0	0	0	100	0	0	20	319	0	0	0	51.0
7	2.5 x 2.5	6.25	26	4.2	20	0	0	0	10	100	0	0	40	33	0	0	0	5.3
8	2.5 x 2.5	6.25	20	3.2	60	0	60	30	10	0	0	0	0	16	0	0	0	2.6
9	2.5 x 2.5	6.25	26	4.2	40	0	0	0	0	100	0	0	5	222	0	0	0	98.7
10	2.5 x 2.5	6.25	26	4.2	170	50	20	0	0	30	0	0	0	35	0	0	0	5.6
11	2.5 x 2.5	6.25	15	2.4	30	0	20	20	0	0	60	0	0	29	0	0	0	4.6
12	2.5 x 2.5	6.25	26	4.2	70	0	0	0	0	100	0	0	30	140	0	0	0	22.4
13	2.5 x 2.5	6.25	26	4.2	50	0	0	0	0	100	0	10	5	38	0	0	0	6.1
14	2.5 x 2.5	6.25	26	4.2	60	0	50	20	30	0	0	0	20	173	0	0	0	27.7
15	2.5 x 2.5	6.25	26	4.2	60	0	0	0	0	100	0	0	40	249	1	0	0	40.0
16	2.5 x 2.5	6.25	26	4.2	50	0	0	0	20	80	0	0	40	128	0	0	0	20.5
17	2.5 x 2.5	6.25	26	4.2	70	0	0	0	0	20	80	0	0	1	0	0	0	0.2
18	2.5 x 2.5	6.25	26	4.2	40	0	60	20	20	0	0	0	0	78	1	1	0	12.8
19	2.5 x 2.5	2.25	26	11.6	70	0	0	0	0	100	0	0	10	157	0	0	0	69.8
20	2.5 x 2.5	6.25	26	4.2	60	0	50	0	0	50	0	0	30	76	0	0	0	12.2
21	1 x 1	1	15	15.0	30	0	0	0	0	100	0	0	0	60	0	0	0	60.0
22	2.5 x 2.5	6.25	26	4.2	90	0	0	0	0	100	0	0	0	0	0	0	0	0.0
23	2.5 x 2.5	6.25	26	4.2	25	0	34	33	33	0	0	0	0	66	3	1	0	11.2
24	2.5 x 2.5	6.25	26	4.2	120	0	17	17	16	0	50	0	0	31	2	0	0	5.3
25	2.5 x 2.5	6.25	26	4.2	70	40	40	20	0	0	0	0	0	15	0	0	0	2.4
26	2.5 x 2.5	6.25	26	4.2	50	0	50	25	25	0	0	0	0	65	2	1	1	11.0
27	2.5 x 2.5	6.25	26	4.2	40	0	67	33	0	0	0	0	0	14	0	0	0	2.2
28	2.5 x 2.5	6.25	26	4.2	70	0	0	75	25	0	0	0	0	17	1	0	0	2.9
29	2.5 x 2.5	6.25	26	4.2	20	0	37	33	33	0	0	0	10	21	1	0	0	3.5
30	2.5 x 2.5	6.25	26	4.2	20	0	50	25	25	0	0	0	0	9	0	0	0	1.4
31	2.5 x 2.5	6.25	26	4.2	50	0	0	25	75	0	0	0	0	6	0	0	0	1.0
32	2.5 x 2.5	6.25	26	4.2	40	0	30	35	35	0	0	0	0	0	0	0	0	0.0
33	2.5 x 2.5	6.25	26	4.2	40	0	30	20	0	50	0	0	20	125	0	0	0	20.0
34	2.5 x 2.5	6.25	26	4.2	60	0	15	15	70	0	0	0	30	85	1	0	0	13.8
35	2.5 x 2.5	6.25	26	4.2	110	0	60	0	0	40	0	0	20	49	0	0	0	7.8
36	2.5 x 2.5	6.25	26	4.2	90	0	50	0	0	50	0	0	33	42	0	0	0	6.7
37	2.5 x 2.5	6.25	26	4.2	90	0	50	0	0	50	0	0	25	80	1	1	3	13.6
38	2.5 x 2.5	6.25	20	3.2	75	0	0	0	0	100	0	50	0	31	0	0	0	5.0
39	2.5 x 2.5	6.25	20	3.2	50	0	0	0	0	100	0	0	0	112	0	0	1	18.1
40	1 x 1	1	20	20.0	30	0	0	0	0	100	0	0	20	131	0	0	0	131.0

Table 3.1-2: Summary of the Mussel Lengths

Species	Min of Length (mm)	Max of Length (mm)	Average of Length (mm)	Individuals Measured
Alewife Floater	41	100	71	20
Eastern Elliptio	15	109	66	878
Eastern Lampmussel	28	84	65	7
Triangle Floater	20	34	27	7

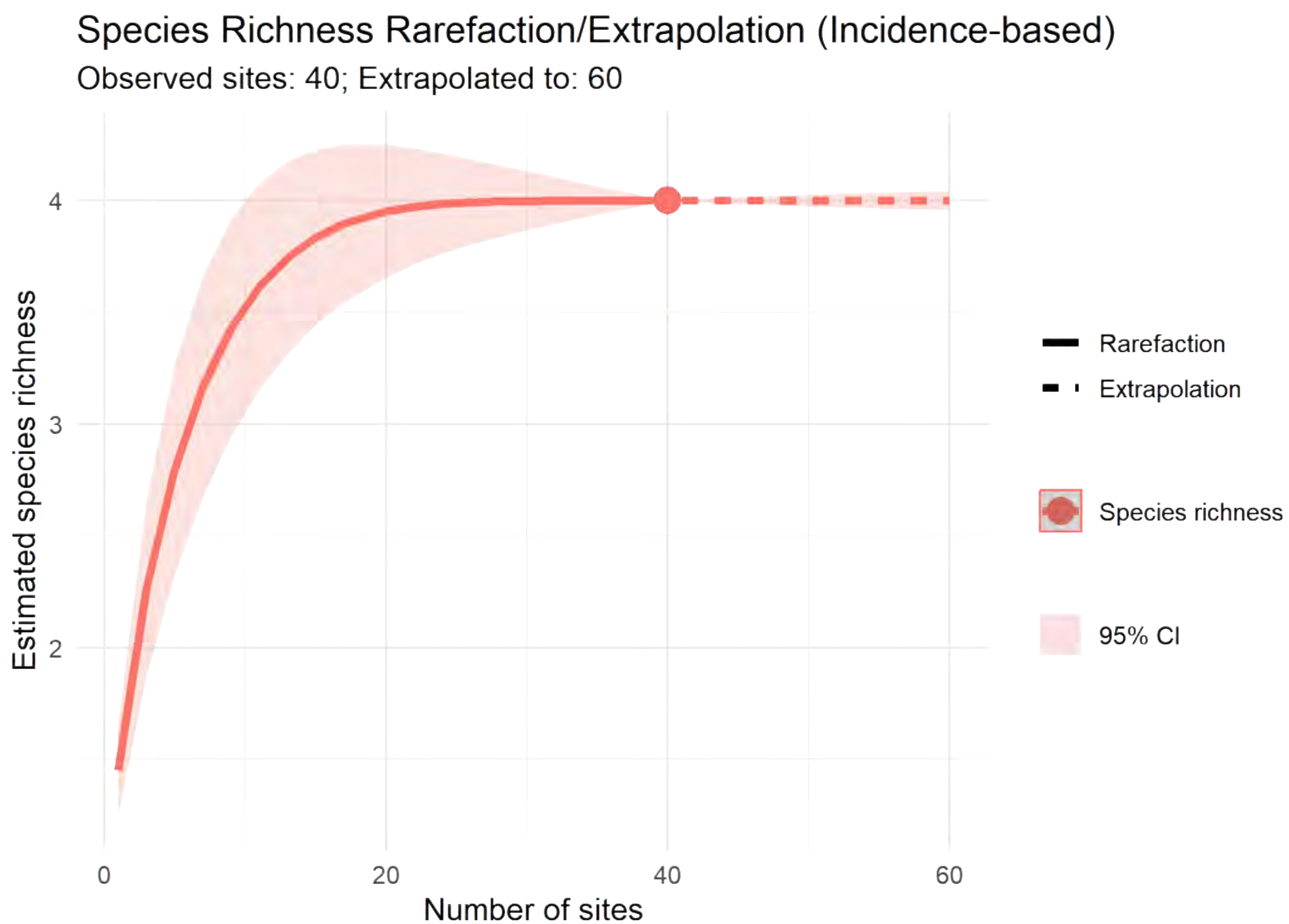
Table 3.4-1: Species Composition and Total Number of Fish Caught Across All Survey Sites and Collection Methods in the Project Impoundment

Species	Scientific Name	Catch (n)	Biomass (g)
American Eel	*Anguilla rostrata*	3	422
Banded Killifish	*Fundulus diaphanus*	1	1
Common Shiner	*Luxilus cornutus*	32	135
Eastern Silvery Minnow	*Hybognathus regius*	103	277
Fallfish	*Semotilus corporalis*	29	95.5
Pumpkinseed Sunfish	*Lepomis gibbosus*	5	483
Redbreast Sunfish	*Lepomis auritus*	2	317
Sea Lamprey	*Petromyzon marinus*	2	682
Smallmouth Bass	*Micropterus dolomieu*	19	2,155
Spottail Shiner	*Notropis hudsonius*	4	15
White Sucker	*Catostomus commersonii*	2	3,594
Yellow Perch	*Perca flavescens*	2	17

Table 3.4-2: Freshwater Mussel Species Present in the Impoundment, Species Conservation Status, and Known Fish Host Present

Species	Maine Status	Global Status	Host Fish Species Present	Citation
Eastern Elliptio	S5-Secure	S5-Secure	Yellow Perch, Banded Killifish, Pumpkinseed, American Eel	Young 1911, Waters et al. 2005, Lellis et al. 2013, Nedeau et al. 2000, NatureServe 2025
Alewife Floater	S4- Apparently Secure	S5-Secure	White Sucker, Pumpkinseed, Alewife	Johnson 1946, Davenport and Warmuth 1965, Nedeau et al. 2000, NatureServe 2025
Triangle Floater	S4- Apparently Secure	S4- Apparently Secure	Pumpkinseed, Fallfish, White Sucker	Waters et al. 1998, Nedeau et al. 2000, NatureServe 2025
Eastern Lampmussel	S5-Secure	S5-Secure	Yellow Perch, Smallmouth Bass, Pumpkinseed Sunfish	Nedeau et al. 2000, NatureServe 2025
Eastern Floater	S5-Secure	S5-Secure	White Sucker, Pumpkinseed Sunfish	Nedeau et al. 2000, NatureServe 2025

Figure 3.2-1 Species Richness Curve



4 CONCLUSIONS AND DISCUSSION

The study area supports a robust freshwater mussel population, dominated by Eastern Elliptio. Live mussels were found at 38 out of 40 sites. The two sites that did not have live mussels were located near the inflow of small tributaries and appeared to become unstable as sediment scours at higher flows. The five most dense sites (≥60 individuals/m^2) had 100% silt sediment composition, often with patches of macrophytes, though not all high silt sites had high density. At many of the sites, the Eastern Elliptio population was in shallow water (20-40 cm) between the shoreline and weed beds, indicating that the current water level regime has been supporting these extensive shallow-water populations.

Alewife Floater, Triangle Floater, and Eastern Lampmussel were also present in the population, but make up less than 1% of individuals sampled. Eastern Floater was identified by a shell located in a muskrat midden, though no live individuals were found. All five of these species have populations that are thought to be secure and have a broad range through the Atlantic Slope. The six most diverse sites had 3-4 species present, with substrate consisting of a mix of cobble, gravel, and sand; only one had silt present. While diverse in species, they typically exhibited lower mussel density (4.6-13.6 individuals/m^2) compared to other sites in the study area where fewer species were residing. All the species found with live individuals had multiple year classes present, and the Eastern Elliptio population showed recent recruitment with individuals ranged from 15-109 mm. All species have multiple known fish hosts present in the study area, with pumpkinseed serving as a potential host for all mussel species present.

5 VARIANCES FROM THE FERC APPROVED STUDY PLAN

Some aspects of the study methods varied from the FERC approved plan due to the unanticipated high density of mussels present within the study area. In the study plan it was stated that, for each site, the first 50 individuals of each species would be measured to assess the size distribution present. It is typically rare to find 50 individuals at a single site, let alone 50 individuals from a single species, but most sites had greater than 50 Eastern Elliptio. Eastern Elliptio are typically between 15 and 125 mm, with a conservative size class bin of 2 mm we estimated that 55 size classes could be present. To accurately sample the length-frequency distribution of the population, an estimated 550 individuals would need to be measured based on the rough rule of the number of size classes multiplied by 10 (Gerritsen and McGrath 2007). This study significantly exceeded that target by measuring 878 Eastern Elliptio. This adjustment in the methods allowed for necessary data to be collected while reducing time out of the water and handling the mussels and allowed for greater effort focused on searching each cell. This variance did not affect the results of the study.

6 REFERENCES

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APPENDIX A – SPECIES PHOTOS

A1. Lateral view of a live Eastern Elliptio

A2. Dorsal view of a live Eastern Elliptio

A3. Lateral view of an Eastern Elliptio shell showing hinge teeth

A4. Dorsal view of an Eastern Elliptio shell

A5. Lateral view of an Alewife Floater

A5. Dorsal view of an Alewife Floater

A6. Lateral view of an Alewife Floater shell showing the lack of hinge teeth

A7. Dorsal view of an Alewife Floater shell

A8. Lateral view of a Triangle Floater

A9. Dorsal view of a Triangle Floater

A10. Lateral view of a Triangle Floater shell showing the hinge teeth

A11. Dorsal view of a Triangle Floater shell

A12. Lateral view of an Eastern Lampmussel

A13. Dorsal view of an Eastern Lampmussel

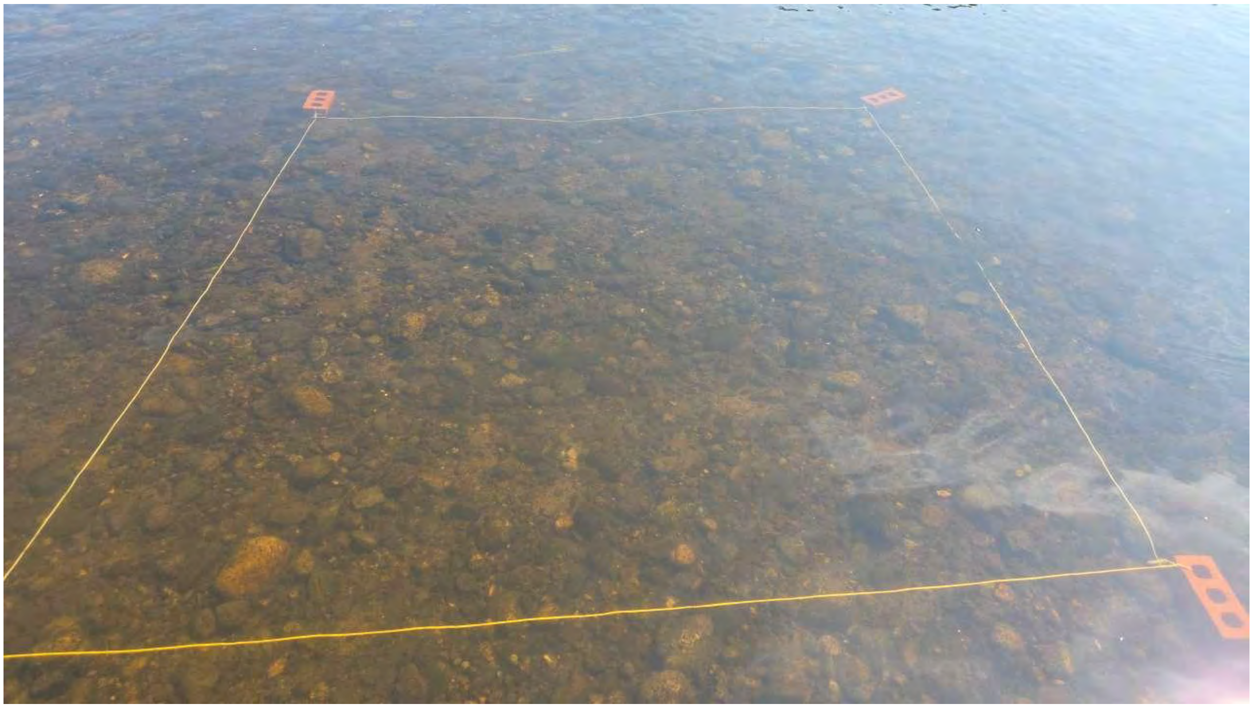
A14. Lateral view of an Eastern Lampmussel shell showing hinge teeth

A15. Dorsal view of an Eastern Lampmussel shell

A16. Lateral view of an Eastern Floater shell showing the lack of hinge teeth and lack of thickening of the anterior ventral shell margin

A17. Dorsal view of an Eastern Floater with umbo sculpturing visible

APPENDIX B – SITE PHOTOS



B1. Cell with a mix of cobble, gravel, and sand

B2. Cell with a mix of cobble, gravel, and sand

B3. Cell with silt and macrophytes

B4. Cell with silt and macrophytes

B5. Cell with pockets of substrate over bedrock

B6. A dense mussel community between a macrophyte bed and shore

B7. Cell 22 at the mouth of a tributary with very loose silt substrate and no mussels

APPENDIX C – MUSSEL LENGTHS

Site	Species	Length (mm)
Site 1	Eastern Elliptio	71
Site 1	Eastern Elliptio	77
Site 1	Eastern Elliptio	65
Site 1	Eastern Elliptio	99
Site 1	Eastern Elliptio	62
Site 1	Eastern Elliptio	81
Site 1	Eastern Elliptio	76
Site 1	Eastern Elliptio	76
Site 1	Eastern Elliptio	58
Site 1	Eastern Elliptio	61
Site 1	Eastern Elliptio	78
Site 1	Eastern Elliptio	43
Site 1	Eastern Elliptio	57
Site 1	Eastern Elliptio	74
Site 1	Eastern Elliptio	80
Site 1	Eastern Elliptio	61
Site 1	Eastern Elliptio	62
Site 1	Eastern Elliptio	70
Site 1	Eastern Elliptio	73
Site 1	Eastern Elliptio	82
Site 1	Eastern Elliptio	71
Site 1	Eastern Elliptio	65
Site 1	Eastern Elliptio	71
Site 1	Eastern Elliptio	71
Site 1	Eastern Elliptio	71
Site 1	Alewife Floater	80
Site 1	Alewife Floater	86
Site 1	Alewife Floater	70
Site 1	Alewife Floater	77
Site 1	Triangle Floater	20
Site 1	Eastern Lampmussel	78
Site 1	Eastern Elliptio	68
Site 1	Eastern Elliptio	72
Site 1	Eastern Elliptio	20
Site 1	Eastern Elliptio	31
Site 1	Eastern Elliptio	36
Site 1	Eastern Elliptio	55
Site 1	Eastern Elliptio	69
Site 1	Eastern Elliptio	25
Site 1	Eastern Elliptio	48

Site 1	Eastern Elliptio	52
Site 1	Eastern Elliptio	62
Site 1	Eastern Elliptio	83
Site 1	Eastern Elliptio	84
Site 1	Eastern Elliptio	72
Site 1	Eastern Elliptio	84
Site 1	Eastern Elliptio	56
Site 1	Eastern Elliptio	72
Site 1	Eastern Elliptio	74
Site 1	Eastern Elliptio	59
Site 1	Eastern Elliptio	72
Site 1	Eastern Elliptio	57
Site 1	Eastern Elliptio	57
Site 1	Eastern Elliptio	89
Site 1	Eastern Elliptio	79
Site 1	Eastern Elliptio	98
Site 1	Triangle Floater	20
Site 1	Alewife Floater	74
Site 1	Triangle Floater	34
Site 1	Alewife Floater	62
Site 1	Alewife Floater	48
Site 2	Eastern Elliptio	39
Site 2	Eastern Elliptio	50
Site 2	Eastern Elliptio	55
Site 2	Eastern Elliptio	64
Site 2	Eastern Elliptio	91
Site 2	Eastern Elliptio	90
Site 2	Eastern Elliptio	91
Site 2	Eastern Elliptio	87
Site 2	Eastern Elliptio	69
Site 2	Eastern Elliptio	76
Site 2	Eastern Elliptio	70
Site 2	Eastern Elliptio	84
Site 2	Eastern Elliptio	59
Site 2	Eastern Elliptio	57
Site 2	Eastern Elliptio	69
Site 2	Eastern Elliptio	69
Site 2	Eastern Elliptio	73
Site 2	Eastern Elliptio	74
Site 2	Eastern Elliptio	59
Site 2	Eastern Elliptio	76

Site 2	Eastern Elliptio	72
Site 2	Eastern Elliptio	58
Site 2	Eastern Elliptio	90
Site 2	Eastern Elliptio	56
Site 2	Eastern Elliptio	81
Site 3	Eastern Elliptio	56
Site 3	Eastern Elliptio	56
Site 3	Eastern Elliptio	89
Site 3	Eastern Elliptio	77
Site 3	Eastern Elliptio	60
Site 3	Eastern Elliptio	61
Site 3	Eastern Elliptio	71
Site 3	Eastern Elliptio	85
Site 3	Eastern Elliptio	72
Site 3	Eastern Elliptio	77
Site 3	Eastern Elliptio	74
Site 3	Eastern Elliptio	64
Site 3	Eastern Elliptio	62
Site 3	Eastern Elliptio	74
Site 3	Eastern Elliptio	70
Site 3	Eastern Elliptio	55
Site 3	Eastern Elliptio	81
Site 3	Eastern Elliptio	47
Site 3	Eastern Elliptio	49
Site 3	Eastern Elliptio	59
Site 3	Eastern Elliptio	80
Site 3	Eastern Elliptio	65
Site 3	Eastern Elliptio	55
Site 3	Eastern Elliptio	64
Site 3	Eastern Elliptio	63
Site 4	Eastern Elliptio	66
Site 4	Eastern Elliptio	79
Site 4	Eastern Elliptio	71
Site 4	Eastern Elliptio	72
Site 4	Eastern Elliptio	55
Site 4	Eastern Elliptio	81
Site 4	Eastern Elliptio	47
Site 4	Eastern Elliptio	49
Site 4	Eastern Elliptio	59
Site 4	Eastern Elliptio	80
Site 4	Eastern Elliptio	65

Site 4	Eastern Elliptio	55
Site 4	Eastern Elliptio	64
Site 4	Eastern Elliptio	63
Site 4	Eastern Elliptio	62
Site 4	Eastern Elliptio	53
Site 4	Eastern Elliptio	68
Site 4	Eastern Elliptio	55
Site 4	Eastern Elliptio	34
Site 4	Eastern Elliptio	39
Site 4	Eastern Elliptio	71
Site 4	Eastern Elliptio	67
Site 4	Eastern Elliptio	68
Site 4	Eastern Elliptio	66
Site 4	Eastern Elliptio	67
Site 4	Eastern Elliptio	72
Site 5	Eastern Elliptio	78
Site 5	Eastern Elliptio	82
Site 5	Eastern Elliptio	66
Site 5	Eastern Elliptio	83
Site 5	Eastern Elliptio	68
Site 5	Eastern Elliptio	74
Site 5	Eastern Elliptio	83
Site 5	Eastern Elliptio	63
Site 5	Eastern Elliptio	109
Site 5	Eastern Elliptio	95
Site 5	Eastern Elliptio	83
Site 5	Eastern Elliptio	75
Site 5	Eastern Elliptio	60
Site 5	Eastern Elliptio	62
Site 5	Eastern Elliptio	54
Site 5	Eastern Elliptio	68
Site 5	Eastern Elliptio	51
Site 5	Eastern Elliptio	66
Site 5	Eastern Elliptio	66
Site 5	Eastern Elliptio	47
Site 5	Eastern Elliptio	49
Site 5	Eastern Elliptio	59
Site 5	Eastern Elliptio	80
Site 5	Eastern Elliptio	65
Site 5	Eastern Elliptio	55
Site 5	Eastern Lampmussel	84

Site 6	Eastern Elliptio	55
Site 6	Eastern Elliptio	92
Site 6	Eastern Elliptio	66
Site 6	Eastern Elliptio	51
Site 6	Eastern Elliptio	83
Site 6	Eastern Elliptio	74
Site 6	Eastern Elliptio	52
Site 6	Eastern Elliptio	85
Site 6	Eastern Elliptio	45
Site 6	Eastern Elliptio	69
Site 6	Eastern Elliptio	71
Site 6	Eastern Elliptio	62
Site 6	Eastern Elliptio	59
Site 6	Eastern Elliptio	67
Site 6	Eastern Elliptio	61
Site 6	Eastern Elliptio	74
Site 6	Eastern Elliptio	67
Site 6	Eastern Elliptio	55
Site 6	Eastern Elliptio	75
Site 6	Eastern Elliptio	60
Site 6	Eastern Elliptio	62
Site 6	Eastern Elliptio	54
Site 6	Eastern Elliptio	68
Site 6	Eastern Elliptio	51
Site 6	Eastern Elliptio	47
Site 7	Eastern Elliptio	48
Site 7	Eastern Elliptio	25
Site 7	Eastern Elliptio	67
Site 7	Eastern Elliptio	84
Site 7	Eastern Elliptio	65
Site 7	Eastern Elliptio	65
Site 7	Eastern Elliptio	59
Site 7	Eastern Elliptio	55
Site 7	Eastern Elliptio	55
Site 7	Eastern Elliptio	70
Site 7	Eastern Elliptio	79
Site 7	Eastern Elliptio	60
Site 7	Eastern Elliptio	51
Site 7	Eastern Elliptio	75
Site 7	Eastern Elliptio	85
Site 7	Eastern Elliptio	62

Site 7	Eastern Elliptio	59
Site 7	Eastern Elliptio	67
Site 7	Eastern Elliptio	61
Site 7	Eastern Elliptio	74
Site 7	Eastern Elliptio	67
Site 7	Eastern Elliptio	55
Site 7	Eastern Elliptio	75
Site 7	Eastern Elliptio	60
Site 7	Eastern Elliptio	62
Site 8	Eastern Elliptio	68
Site 8	Eastern Elliptio	66
Site 8	Eastern Elliptio	71
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Site 8	Eastern Elliptio	85
Site 8	Eastern Elliptio	64
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Site 8	Eastern Elliptio	70
Site 8	Eastern Elliptio	75
Site 8	Eastern Elliptio	69
Site 8	Eastern Elliptio	69
Site 8	Eastern Elliptio	65
Site 8	Eastern Elliptio	52
Site 8	Eastern Elliptio	86
Site 8	Eastern Elliptio	92
Site 9	Eastern Elliptio	79
Site 9	Eastern Elliptio	60
Site 9	Eastern Elliptio	74
Site 9	Eastern Elliptio	60
Site 9	Eastern Elliptio	61
Site 9	Eastern Elliptio	54
Site 9	Eastern Elliptio	55
Site 9	Eastern Elliptio	64
Site 9	Eastern Elliptio	72
Site 9	Eastern Elliptio	30
Site 9	Eastern Elliptio	65
Site 9	Eastern Elliptio	60
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Site 9	Eastern Elliptio	80
Site 9	Eastern Elliptio	69
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Site 9	Eastern Elliptio	71
Site 9	Eastern Elliptio	54
Site 9	Eastern Elliptio	85
Site 9	Eastern Elliptio	64
Site 9	Eastern Elliptio	54
Site 10	Eastern Elliptio	84
Site 10	Eastern Elliptio	70
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Site 10	Eastern Elliptio	62
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Site 11	Eastern Elliptio	76
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Site 11	Eastern Elliptio	50
Site 11	Eastern Elliptio	52
Site 11	Eastern Elliptio	63
Site 11	Eastern Elliptio	62
Site 11	Eastern Elliptio	63
Site 11	Eastern Elliptio	61
Site 11	Eastern Elliptio	67
Site 11	Eastern Elliptio	65
Site 11	Eastern Elliptio	56
Site 11	Eastern Elliptio	50
Site 12	Eastern Elliptio	74
Site 12	Eastern Elliptio	66
Site 12	Eastern Elliptio	81
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Site 12	Eastern Elliptio	72
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Site 12	Eastern Elliptio	52
Site 12	Eastern Elliptio	81
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Site 12	Eastern Elliptio	73
Site 12	Eastern Elliptio	83
Site 12	Eastern Elliptio	49
Site 12	Eastern Elliptio	51
Site 12	Eastern Elliptio	53
Site 12	Eastern Elliptio	54
Site 12	Eastern Elliptio	80
Site 12	Eastern Elliptio	69
Site 12	Eastern Elliptio	76
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Site 12	Eastern Elliptio	65
Site 12	Eastern Elliptio	69
Site 12	Eastern Elliptio	63

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Site 13	Eastern Elliptio	80
Site 13	Eastern Elliptio	74
Site 13	Eastern Elliptio	81
Site 13	Eastern Elliptio	50
Site 13	Eastern Elliptio	94
Site 13	Eastern Elliptio	79
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Site 13	Eastern Elliptio	63
Site 13	Eastern Elliptio	66
Site 13	Eastern Elliptio	72
Site 13	Eastern Elliptio	76
Site 13	Eastern Elliptio	80
Site 13	Eastern Elliptio	61
Site 13	Eastern Elliptio	60
Site 13	Eastern Elliptio	53
Site 13	Eastern Elliptio	62
Site 13	Eastern Elliptio	75
Site 13	Eastern Elliptio	75
Site 13	Eastern Elliptio	61
Site 13	Eastern Elliptio	62
Site 13	Eastern Elliptio	70
Site 13	Eastern Elliptio	62
Site 13	Eastern Elliptio	65
Site 13	Eastern Elliptio	72
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Site 14	Eastern Elliptio	73
Site 14	Eastern Elliptio	83
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Site 14	Eastern Elliptio	59
Site 14	Eastern Elliptio	95
Site 14	Eastern Elliptio	60
Site 14	Eastern Elliptio	62
Site 14	Eastern Elliptio	79
Site 14	Eastern Elliptio	60
Site 14	Eastern Elliptio	70
Site 14	Eastern Elliptio	74
Site 14	Eastern Elliptio	83
Site 14	Eastern Elliptio	82

Site 14	Eastern Elliptio	80
Site 14	Eastern Elliptio	48
Site 14	Eastern Elliptio	58
Site 14	Eastern Elliptio	76
Site 14	Eastern Elliptio	63
Site 14	Eastern Elliptio	86
Site 14	Eastern Elliptio	52
Site 14	Eastern Elliptio	83
Site 14	Eastern Elliptio	74
Site 14	Eastern Elliptio	81
Site 14	Eastern Elliptio	50
Site 15	Eastern Elliptio	91
Site 15	Eastern Elliptio	66
Site 15	Eastern Elliptio	83
Site 15	Eastern Elliptio	49
Site 15	Eastern Elliptio	65
Site 15	Eastern Elliptio	56
Site 15	Eastern Elliptio	60
Site 15	Eastern Elliptio	82
Site 15	Eastern Elliptio	98
Site 15	Eastern Elliptio	80
Site 15	Eastern Elliptio	88
Site 15	Eastern Elliptio	67
Site 15	Eastern Elliptio	62
Site 15	Eastern Elliptio	70
Site 15	Eastern Elliptio	80
Site 15	Eastern Elliptio	72
Site 15	Eastern Elliptio	55
Site 15	Eastern Elliptio	60
Site 15	Eastern Elliptio	65
Site 15	Eastern Elliptio	71
Site 15	Eastern Elliptio	80
Site 15	Eastern Elliptio	48
Site 15	Eastern Elliptio	58
Site 15	Eastern Elliptio	76
Site 15	Eastern Elliptio	63
Site 15	Alewife Floater	84
Site 16	Eastern Elliptio	49
Site 16	Eastern Elliptio	49
Site 16	Eastern Elliptio	56
Site 16	Eastern Elliptio	56

Site 16	Eastern Elliptio	61
Site 16	Eastern Elliptio	70
Site 16	Eastern Elliptio	70
Site 16	Eastern Elliptio	75
Site 16	Eastern Elliptio	82
Site 16	Eastern Elliptio	79
Site 16	Eastern Elliptio	77
Site 16	Eastern Elliptio	89
Site 16	Eastern Elliptio	90
Site 16	Eastern Elliptio	100
Site 16	Eastern Elliptio	90
Site 16	Eastern Elliptio	91
Site 16	Eastern Elliptio	71
Site 16	Eastern Elliptio	52
Site 16	Eastern Elliptio	60
Site 16	Eastern Elliptio	52
Site 16	Eastern Elliptio	49
Site 16	Eastern Elliptio	65
Site 16	Eastern Elliptio	56
Site 16	Eastern Elliptio	60
Site 16	Eastern Elliptio	82
Site 17	Eastern Elliptio	70
Site 18	Eastern Elliptio	81
Site 18	Eastern Elliptio	62
Site 18	Eastern Elliptio	56
Site 18	Eastern Elliptio	77
Site 18	Eastern Elliptio	60
Site 18	Eastern Elliptio	54
Site 18	Eastern Elliptio	71
Site 18	Eastern Elliptio	86
Site 18	Eastern Elliptio	22
Site 18	Eastern Elliptio	76
Site 18	Eastern Elliptio	75
Site 18	Eastern Elliptio	44
Site 18	Eastern Elliptio	65
Site 18	Eastern Elliptio	44
Site 18	Eastern Elliptio	48
Site 18	Eastern Elliptio	75
Site 18	Eastern Elliptio	63
Site 18	Eastern Elliptio	66
Site 18	Eastern Elliptio	70

Site 18	Eastern Elliptio	77
Site 18	Eastern Elliptio	69
Site 18	Eastern Elliptio	74
Site 18	Eastern Elliptio	81
Site 18	Eastern Elliptio	81
Site 18	Eastern Elliptio	57
Site 18	Triangle Floater	25
Site 18	Alewife Floater	100
Site 19	Eastern Elliptio	80
Site 19	Eastern Elliptio	70
Site 19	Eastern Elliptio	60
Site 19	Eastern Elliptio	59
Site 19	Eastern Elliptio	50
Site 19	Eastern Elliptio	68
Site 19	Eastern Elliptio	78
Site 19	Eastern Elliptio	74
Site 19	Eastern Elliptio	81
Site 19	Eastern Elliptio	81
Site 19	Eastern Elliptio	57
Site 19	Eastern Elliptio	97
Site 19	Eastern Elliptio	83
Site 19	Eastern Elliptio	56
Site 19	Eastern Elliptio	60
Site 19	Eastern Elliptio	62
Site 19	Eastern Elliptio	59
Site 19	Eastern Elliptio	77
Site 19	Eastern Elliptio	60
Site 19	Eastern Elliptio	54
Site 19	Eastern Elliptio	71
Site 19	Eastern Elliptio	86
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Site 20	Eastern Elliptio	74
Site 20	Eastern Elliptio	60
Site 20	Eastern Elliptio	86
Site 20	Eastern Elliptio	73
Site 20	Eastern Elliptio	65
Site 20	Eastern Elliptio	84
Site 20	Eastern Elliptio	79

Site 20	Eastern Elliptio	61
Site 20	Eastern Elliptio	82
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Site 20	Eastern Elliptio	68
Site 20	Eastern Elliptio	68
Site 20	Eastern Elliptio	58
Site 20	Eastern Elliptio	69
Site 20	Eastern Elliptio	67
Site 20	Eastern Elliptio	69
Site 20	Eastern Elliptio	70
Site 20	Eastern Elliptio	85
Site 20	Eastern Elliptio	68
Site 20	Eastern Elliptio	78
Site 20	Eastern Elliptio	74
Site 20	Eastern Elliptio	81
Site 20	Eastern Elliptio	81
Site 20	Eastern Elliptio	57
Site 20	Eastern Elliptio	97
Site 21	Eastern Elliptio	80
Site 21	Eastern Elliptio	79
Site 21	Eastern Elliptio	50
Site 21	Eastern Elliptio	31
Site 21	Eastern Elliptio	35
Site 21	Eastern Elliptio	42
Site 21	Eastern Elliptio	39
Site 21	Eastern Elliptio	48
Site 21	Eastern Elliptio	94
Site 21	Eastern Elliptio	78
Site 21	Eastern Elliptio	60
Site 21	Eastern Elliptio	66
Site 21	Eastern Elliptio	64
Site 21	Eastern Elliptio	69
Site 21	Eastern Elliptio	51
Site 21	Eastern Elliptio	44
Site 21	Eastern Elliptio	54
Site 21	Eastern Elliptio	67
Site 21	Eastern Elliptio	78
Site 21	Eastern Elliptio	70
Site 21	Eastern Elliptio	80
Site 21	Eastern Elliptio	79
Site 21	Eastern Elliptio	61

Site 21	Eastern Elliptio	82
Site 21	Eastern Elliptio	70
Site 21	Eastern Elliptio	68
Site 23	Eastern Elliptio	74
Site 23	Eastern Elliptio	52
Site 23	Eastern Elliptio	47
Site 23	Eastern Elliptio	71
Site 23	Eastern Elliptio	84
Site 23	Eastern Elliptio	54
Site 23	Eastern Elliptio	66
Site 23	Eastern Elliptio	95
Site 23	Eastern Elliptio	89
Site 23	Eastern Elliptio	64
Site 23	Eastern Elliptio	64
Site 23	Eastern Elliptio	42
Site 23	Eastern Elliptio	33
Site 23	Eastern Elliptio	46
Site 23	Eastern Elliptio	53
Site 23	Eastern Elliptio	44
Site 23	Eastern Elliptio	51
Site 23	Eastern Elliptio	51
Site 23	Eastern Elliptio	73
Site 23	Eastern Elliptio	84
Site 23	Eastern Elliptio	81
Site 23	Eastern Elliptio	40
Site 23	Eastern Elliptio	48
Site 23	Eastern Elliptio	94
Site 23	Eastern Elliptio	78
Site 23	Eastern Elliptio	60
Site 23	Triangle Floater	28
Site 23	Alewife Floater	74
Site 23	Alewife Floater	89
Site 23	Alewife Floater	58
Site 24	Eastern Elliptio	56
Site 24	Eastern Elliptio	50
Site 24	Eastern Elliptio	44
Site 24	Eastern Elliptio	66
Site 24	Eastern Elliptio	64
Site 24	Eastern Elliptio	42
Site 24	Eastern Elliptio	43
Site 24	Eastern Elliptio	61

Site 24	Eastern Elliptio	65
Site 24	Eastern Elliptio	61
Site 24	Eastern Elliptio	55
Site 24	Eastern Elliptio	57
Site 24	Eastern Elliptio	88
Site 24	Eastern Elliptio	70
Site 24	Eastern Elliptio	53
Site 24	Eastern Elliptio	65
Site 24	Eastern Elliptio	84
Site 24	Eastern Elliptio	54
Site 24	Eastern Elliptio	66
Site 24	Eastern Elliptio	95
Site 24	Eastern Elliptio	89
Site 24	Eastern Elliptio	64
Site 24	Eastern Elliptio	64
Site 24	Eastern Elliptio	42
Site 24	Alewife Floater	44
Site 24	Alewife Floater	74
Site 25	Eastern Elliptio	54
Site 25	Eastern Elliptio	70
Site 25	Eastern Elliptio	59
Site 25	Eastern Elliptio	53
Site 25	Eastern Elliptio	54
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Site 25	Eastern Elliptio	74
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Site 26	Eastern Elliptio	64
Site 26	Alewife Floater	71
Site 26	Alewife Floater	41
Site 26	Triangle Floater	31
Site 26	Eastern Lampmussel	69
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Site 28	Alewife Floater	51
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Site 39	Eastern Elliptio	85
Site 39	Eastern Elliptio	75
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Site 40	Eastern Elliptio	65
Site 40	Eastern Elliptio	72

APPENDIX J: RECREATION STUDY

RECREATION STUDY
INITIAL STUDY REPORT
BRUNSWICK HYDROELECTRIC PROJECT
FERC NO. 2284

Submitted by:

Brookfield White Pine Hydro LLC
150 Main Street
Lewiston, ME 04240

Prepared by:

Gomez and Sullivan Engineers

January 2026

Brookfield

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LIST OF ABBREVIATIONS AND DEFINITIONS

ADA	Americans with Disabilities
Brookfield	Brookfield Renewable
BWPH	Brookfield White Pine Hydro LLC
CFR	Code of Federal Regulations
cfs	Cubic feet per second
Commission	Federal Energy Regulatory Commission
FERC	Federal Energy Regulatory Commission
FOMB	Friends of Merrymeeting Bay
ILP	Integrated Licensing Process
ISR	Initial Study Report
Licensee	Brookfield White Pine Hydro, LLC
MDOT	Maine Department of Transportation
ME	Maine
msl	Mean Sea Level
MW	Megawatt
NOI	Notice of Intent
PAD	Pre-Application Document
PME	Protection, Mitigation, and Enhancement Measures
Project	Brunswick Hydroelectric Project (FERC No. 2284)
PSP	Proposed Study Plan
RSP	Revised Study Plan
SD	Scoping Document
SPD	Study Plan Determination
Topsham Hydro	Topsham Hydro Partners Limited Partnership

1 INTRODUCTION

Brookfield White Pine Hydro LLC (BWPH or Licensee) is licensed by the Federal Energy Regulatory Commission (FERC or Commission) to operate the 19-megawatt (MW) Brunswick Hydroelectric Project (Project) (FERC No. 2284). The Project is located on the Androscoggin River in the towns of Topsham and Brunswick, Maine. The Project straddles the border between Cumberland and Sagadahoc counties. The original license was issued on February 9, 1979, and expires on February 28, 2029.

BWPH is using FERC's Integrated Licensing Process (ILP) as established in Title 18 Code of Federal Regulations (CFR), Part 5. BWPH filed a Pre-Application Document (PAD) and Notice of Intent (NOI) to seek a new license for the Project on February 21, 2024. The PAD provides a description of the Project, including its structures, operations, and potentially affected resources. BWPH distributed the PAD and NOI simultaneously to Federal and state resource agencies, local governments, Native American tribes, members of the public, and others thought to be interested in the relicensing proceeding. Following the filing of the PAD, FERC prepared and issued Scoping Document 1 (SD1) on April 16, 2024. FERC also held agency and public scoping meetings and a site visit on May 7, 2024. The FERC Process Plan and Schedule provided agencies and interested parties an opportunity to file comments on the PAD and SD1 and request studies by June 20, 2024. FERC issued Scoping Document 2 (SD2) on July 29, 2024. BWPH filed a Proposed Study Plan (PSP) on August 2, 2024, and held study plan meetings on August 28 and October 9, 2024. The Revised Study Plan (RSP) was filed in accordance with the ILP schedule on December 2, 2024. FERC issued a Study Plan Determination (SPD) on December 30, 2024.

Specific to recreation resources, BWPH proposed in the RSP to conduct a Recreation Study, which FERC approved without modification in the SPD. This Initial Study Report (ISR) presents the results of the study, including the goals and objectives, methods, results, summary, and variances (if any) from the FERC-approved study plan.

2 GOALS AND OBJECTIVES

The goal of this study is to assess existing recreational access and opportunity within and adjacent to the Project[1] and evaluate whether there is a need for additional and/or enhanced recreational access and opportunities. The objectives of the study are as follows:

- Identify, describe, and photo document each site, including a description of the site's condition and accessibility;
- Characterize existing recreational use of the sites;
- Assess user perceptions of the sites; and
- Assess whether there is a need to enhance recreation opportunities and access at the Project.

[1] As information on the Pejepscot Dam Recreation Area was gathered as part of the recent FERC relicensing of the Pejepscot Hydroelectric Project in 2023 (FERC No. 4784), BWPH did not perform additional study at the site.

3 PROJECT DESCRIPTION AND STUDY AREA

3.1 Project Area Recreation

The Project impoundment extends approximately 4.5 miles upstream from the Brunswick Dam to the tailwater of the Pejepscot Hydroelectric Project. At elevation 39.4 feet mean sea level (msl), the impoundment has a surface area of 175 acres, a gross storage capacity of 125 acre-feet, and approximately 11.5 miles of shoreline. The impoundment and areas downstream of the Project support many recreational activities, including boating, fishing, wildlife viewing, picnicking, and trail activities.

The PAD provides an overview of recreational opportunities in the Project region as well as in the Project vicinity. Recreational access to the Project area is provided by local municipalities and organizations as well as by BWPH. Recreation sites required by the FERC license (i.e., Project recreation sites) include the following BWPH access areas :

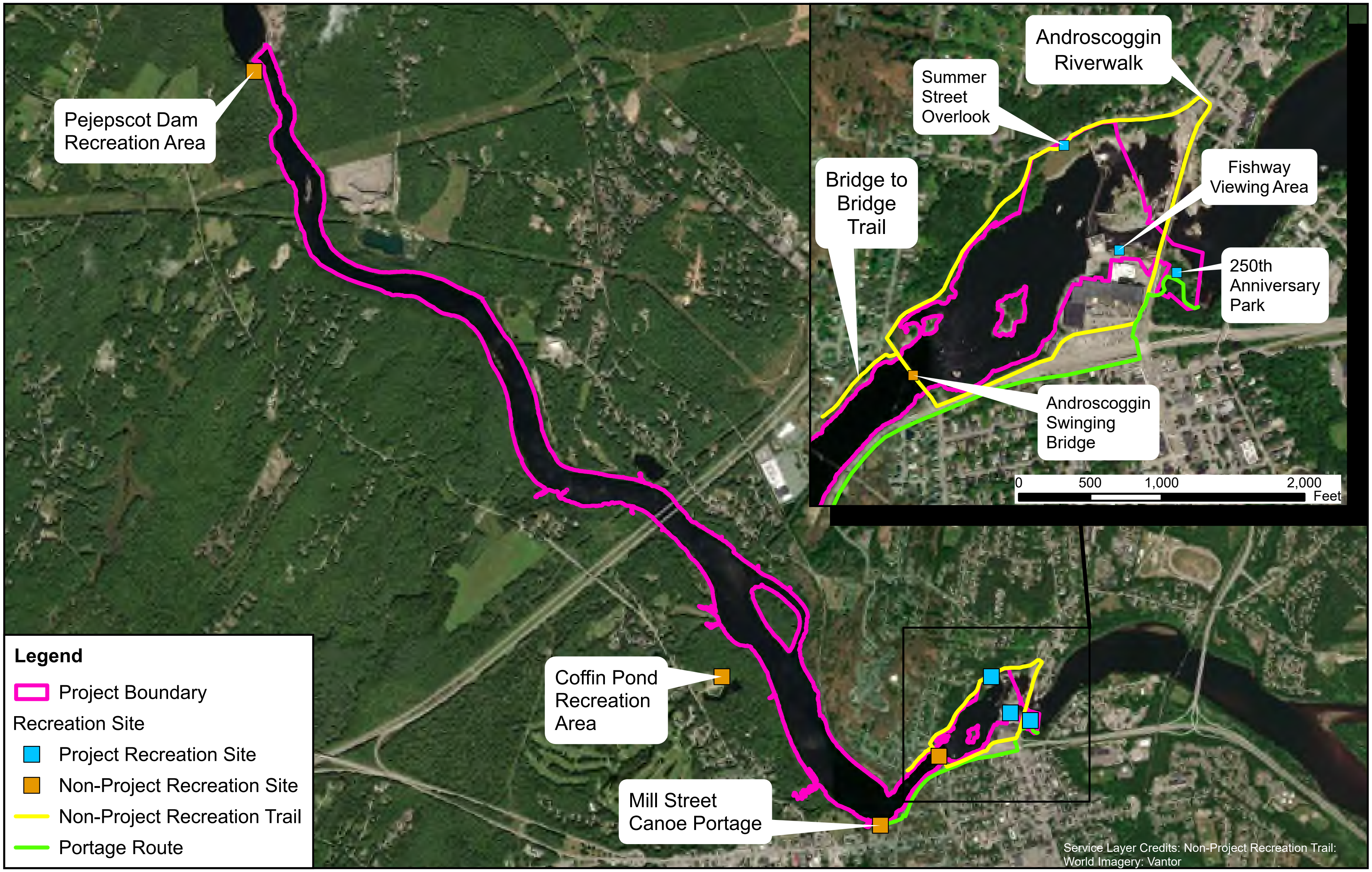
- 250th Anniversary Park, located in Brunswick downstream of the Project adjacent to the Frank J. Wood Bridge. The site provides trails, viewing areas, benches, shoreline access, and a natural put-in area for hand carry boats as part of the canoe portage route.
- The Fishway Viewing Area, located at the Project fishway. The site provides views of the fishway and a viewing room with windows providing underwater views of the fishway.
- The Summer Street Overlook, set on a small hill in Topsham adjacent to the Project dam. The site provides scenic views of the river, Shad and Goat Islands, the Project dam, the Frank J. Wood Bridge, and historic buildings in Brunswick.

Recreation sites providing public access within and adjacent to the Project boundary that are not required as part of the Project license (i.e., non-Project recreation sites) include the Pejepscot Dam Recreation Area, Coffin Pond Recreation Area, Mill Street Canoe Portage, Androscoggin Swinging Bridge, Androscoggin Riverwalk, and Bridge to Bridge Trail. Project and non-Project recreation sites within and adjacent to the Project boundary are depicted in Figure 3.1-1.

Maine Department of Transportation (MDOT) is in the process of replacing the Frank J. Wood Bridge, which carries Maine Street/ME Route 201 across the Androscoggin River immediately downstream of the Project dam. Construction activities are expected to continue into late 2026. Recreational enhancements planned as part of the bridge replacement include improvements to the ME Route 201 right-of-way adjacent to 250th Anniversary Park, development of a new park in Topsham near the bridge abutment, and sidewalks on both sides of the bridge with viewing bump-outs, dedicated bike lanes, and lighting (MDOT, n.d.).

3.2 Study Area

The study area includes existing recreational facilities within and adjacent to the Project boundary.



Brookfield

Brunswick Hydroelectric Project (FERC No. 2284)

0 0.25 0.5 1 Miles

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Figure 3.1-1:
Existing Project Area Recreation Sites

Path: D:\Brookfield\02456\GIS\Maps\PAD\PAD.aprx

4 METHODOLOGY

The following sections discuss the methodology for the data gathering and analysis performed for this study. Study results are discussed in Section 5.0.

4.1 Field Inventory and Condition Assessment

BWPH conducted a field assessment of existing formal public recreation sites in the study area on July 21 and July 22, 2025. The following information was recorded for each included site:

- A description of the site and any associated amenities;
- The location of the site relative to the Project boundary;
- The type of recreation opportunities provided (e.g., canoe access, picnicking, etc.);
- The type of access (e.g., vehicle, pedestrian) and estimated parking capacity;
- Photographic documentation of the site and associated amenities; and
- An assessment of the accessibility and condition of the site and amenities, including identification of barrier-free facilities.

Site and amenity conditions were assigned using the following designations:

- Good condition: the facility or amenity is functional and well-maintained; no maintenance or repair is required;
- Fair condition: the facility or amenity exhibits signs of wear but is generally serviceable; maintenance and/or minor repair is required; and
- Poor condition: the facility or amenity is no longer performing its intended purpose; major repair or replacement is required.

Parking capacity in non-delineated lots was estimated using the following dimensions:

- A standard parking space is 9 feet wide and 18 feet long; and
- A parking space for a trailered vehicle is 12 feet wide and 40 feet long.

4.2 User Survey

BWPH solicited information on recreational use and user perceptions of existing formal public recreation sites in the study area via a user survey. The survey was conducted online to allow for continuous access during the recreation season. Temporary signs (depicted in Figure 4.2-1) with a brief description of the survey purpose and a link and QR code (quick response code) directing users to the online survey were posted at each formal recreation site in the study area. Signs were strategically located at each site to maximize visibility, monitored by field technicians when onsite for other studies, and repaired or replaced as needed throughout the study season. The survey was open for responses during the primary open water recreation period (Memorial Day through Columbus Day). The survey instrument is included in Appendix A. The survey was designed to gather information on general visitor characteristics; use patterns including activities engaged in, mode of transportation, number of visits per year, and seasonality of use; and visitor perceptions of various site parameters, including overall site condition, adequacy of site amenities, perception of crowding, and whether the site serves user needs/interests.

To offset or reduce impacts of bridge construction activities, BWPH provided the survey link and QR code to the towns of Brunswick and Topsham to allow the towns to disseminate a survey link to residents and user groups familiar with the Project area recreation sites and to post the information in appropriate locations. A correspondence record is provided in Appendix B.

4.3 Impoundment Boat Access Evaluation

BWPH conducted a desktop assessment of existing opportunities and the potential need for trailered boat access to the Project impoundment. This evaluation included a literature review and outreach to local recreation organizations with knowledge of boating conditions and opportunity in the Project impoundment. BWPH solicited information on opportunities and needs for trailered boat access via a structured interview form, included in Appendix C. The form was sent to the following stakeholders on May 9, 2025:

- Town of Brunswick
- Town of Topsham
- Brunswick-Topsham Land Trust
- Trout Unlimited, Sebago Lake Chapter
- Trout Unlimited, Merrymeeting Bay Chapter
- Appalachian Mountain Club
- American Whitewater
- Friends of Merrymeeting Bay (FOMB)
- Androscoggin River Watershed Council

The May 9, 2025 interview form transmittal requested responses by May 30, 2025. Follow-up emails were sent to organizations from which a response was not received on June 2, 2025, requesting responses by June 13, 2025. A correspondence record is provided in Appendix B.

Figure 4.2-1: User Survey Sign

5 RESULTS

5.1 Existing Recreation Facilities

Results of the recreation field inventory and condition assessment are presented below. Photographic documentation of study area recreation sites is provided in Appendix D. An overview map showing the location of existing recreation facilities in the study area relative to the Project boundary is provided in Figure 3.1-1.

5.1.1 Project Facilities

5.1.1.1 250th Anniversary Park

Description

250th Anniversary Park is located on the south shore of the Androscoggin River, approximately 800 feet downstream of the Project dam. Figure 5.1.1.1-1 provides an aerial overview of the site. The site is on lands owned by the State of Maine, the Town of Brunswick, and BWPH. The parcel owned by BWPH is leased to the Town of Brunswick. Per the terms of the lease, BWPH is responsible for all signage required by FERC, while the Town of Brunswick is responsible for all other operations and maintenance.

The main feature of the facility is a trail that winds approximately 900 feet from the park entrance at the intersection of Maine Street and Route 1 to the Androscoggin River shoreline downstream of the Project dam. Benches are situated along the trail and at overlooks throughout the park. The trail begins as a brick paver trail leading from the intersection of Maine Street and Route 1 to the main park entrance, which is marked with a large sign. From the main entrance, the trail is compacted gravel, approximately 5 feet wide, and lined in places with a pipe handrail. The trail follows along Maine Street before sloping downhill toward an overlook area. A crosswalk and secondary entrance provides access to the park across from the historic Fort Andross Mill Complex. Benches and a granite monolith are located along the trail in this initial segment, which provides views of the Fort Andross Mill Complex and the Frank J. Wood bridge. A sign along the gravel trail identifies the Brunswick Hydroelectric Project and states that the site is maintained by FPL Energy (prior owner/licensee). Approximately 520 feet along the trail from the site entrance is an overlook area with two benches and views of the Frank J. Wood bridge, the Androscoggin River, and the Bowdoin Mill Complex in Topsham. An informal footpath descends the steep, rocky embankment to rock outcroppings at the shoreline.

The wide gravel trail continues approximately 75 feet beyond the overlook area to a wooden and brick staircase (“upper staircase”) leading down to a relatively level area containing an interpretive plaque and two benches. A grass slope next to the stairs shows use as an alternate route to the area with the plaque. Additional informal footpaths extend from the level area to the shoreline, although the footpaths at the time of the site inventory were steep, ill-defined, and difficult to follow.

From the upper staircase, a narrow earthen path leads downhill to a second wooden and brick staircase (“lower staircase”). The lower staircase leads down to a flat, rocky area strewn with driftwood. The path continues again as a narrow earthen (primitive) path leading to the shoreline. This natural shoreline area serves as the Project portage route put-in; the portage route is discussed in Section 5.1.3.

Informal footpaths continue along the shoreline beyond the BWPH-owned parcel, eventually leading up a rocky trail to a small waterfall created by a stormwater outflow on state-owned land.

There is no dedicated parking area for 250th Anniversary Park. Across Maine Street a lot is provided for the Fishway Viewing Area (see Section 5.1.1.2). Public street parking for approximately 20 standard vehicles is available along Cabot Street and Bow Street across Maine Street from the park.

Site Condition

The park facilities and amenities are generally in fair condition. The gravel trail along the entrance of the park shows evidence of moderate rill erosion, with gullies up to 1.5 inches deep. Graffiti and splintering are present on many of the benches, and minor litter is present near the benches. In several areas, grass has been compacted by foot traffic. Both sets of stairs are in good condition, although vegetation is encroaching on the lower staircase. The primitive section of trail from the lower staircase to the shoreline access is in good condition. There is no sign in compliance with 18 C.F.R. § 8.2 (“Part 8 sign”) at the site.

Designated accessible parking is present in the vicinity of the site, and accessible routes to the park entrance are provided via crosswalks. The section of trail leading to the bench nearest the park entrance meets Americans with Disabilities Act (ADA) standards for an accessible route. The remainder of the trail, leading to the benches overlooking the river, interpretive plaque, and shoreline access, does not meet ADA standards due to steep slopes, uneven surfaces, and stairs.

5.1.1.2 Fishway Viewing Area

Description

The Fishway Viewing Area is located on the south shore of the Androscoggin River, adjacent to the Project’s fishway, and is open to the public Wednesdays through Sundays from May 1 through June 30 from 1:00 pm to 5:00 pm. Figure 5.1.1.2-1 provides an aerial overview of the site. The site is owned and operated by BWPH and is within the Project boundary. The site is accessible off Maine Street/Route 201, where a sign marks the site entrance and parking lot (described below). From the parking lot, visitors follow an asphalt path through a grass area to the viewing area, which is surrounded by chain link fencing. Additional site identification signage is posted on the fence at the gated entrance to the viewing area. The viewing area itself consists of an outdoor concrete platform and an indoor viewing room. The concrete platform provides views of the fishway from above. Concrete stairs lead from the platform down to the viewing/counting room, which provides backlit informational signs, a whiteboard with information on fish species and passage numbers, and two windows with underwater views into the fishway.

Dedicated parking for the Fishway Viewing Area is provided just off Maine Street and has capacity for 8 standard vehicles, including one designated accessible space. At the time of the site visit, the parking area was in use as a staging area for construction on the Frank J. Wood Bridge.

Site Condition

At the time of the site inventory, the entrance sign was partially obscured by vegetation and construction equipment. The parking area appeared to be in good or fair condition; however, as noted above, the area was in use for construction staging and was therefore not fully evaluated. The access path and fishway area were generally in fair condition. Minor cracks were present on the access path, a painted mural on the wall of the viewing area was wearing away, and the fishway viewing room windows showed an accumulation of algae and biofilm. There is no Part 8 sign onsite.

Designated accessible parking is provided at the site, and the path from the parking area to the viewing area entrance meets ADA standards for an accessible route. However, at the gated site entrance a 4” curb separates the asphalt path from the concrete platform providing access to the viewing area, and the viewing room is accessible only via the concrete staircase. The viewing area itself is therefore not considered to be barrier-free. The accessible path from the parking area to the fishway viewing area provides limited views of the fishway.

5.1.1.3 Summer Street Overlook

Description

Summer Street Overlook is located on the north shore of the Androscoggin River, adjacent to the left dam abutment, within the Project boundary on land owned by BWPH. Figure 5.1.1.3-1 provides an aerial overview of the site. The site is licensed to the Town of Topsham for construction and operation of a multi-use trail (the Androscoggin Riverwalk). Per the license agreement, Topsham is responsible for operations and maintenance of the recreational facilities on the site.

The site sits atop a hill overlooking the Androscoggin River and consists of a gravel pull-in for parking; access to the Androscoggin Riverwalk; a trash receptacle and dog waste station; a rock bench; interpretive signage; and views of the river, dam, and the Town of Brunswick. The Androscoggin Riverwalk, described in Section 5.1.2.5, follows along the Summer Street sidewalk in the site vicinity. At the entrance to the overlook site, the Androscoggin Riverwalk/Summer Street sidewalk departs from the road, follows along the edge of the gravel parking area, and reconnects with the Summer Street sidewalk on the other end of the site, providing a 60-inch-wide asphalt path through the overlook area. To the west of the overlook the Androscoggin Riverwalk continues along the Summer Street sidewalk for approximately 100 feet before veering south to connect to Swinging Bridge Park, described in Section 5.1.2.4. The eastern portion of the parking area is separated from the path and amenities by a guardrail and a grassed area, and bollards on the eastern and western ends of the path prevent vehicular access. Access from the parking area to the path is provided on the west side of the overlook where the guardrail ends. The bench, interpretive sign, trash receptacle, and dog waste station are located along the path on the east side of the overlook. A chain link fence approximately 40 feet downhill from the path runs parallel to the shoreline for approximately 230 feet from the eastern edge of the grassed area. The fence is topped with barbed wire and posted with no trespassing signs. A locked gate prevents vehicular access to the western side of the grass area where the fencing is not present. An informal footpath runs downslope from the locked gate along the fence and connects to the Androscoggin Riverwalk west of the overlook. The semicircular gravel parking area provides capacity for approximately 8 standard vehicles.

Site Condition

The site and amenities are generally in good condition. The grass along the alternative trail route has been compacted in some areas. No damage or graffiti was observed at the amenities. No Part 8 sign is present at the site.

No designated accessible parking is provided at the site, and the route from the parking area to the Riverwalk is not ADA-compliant as grass is not considered a firm and stable surface. The overlook area and associated section of the Androscoggin Riverwalk are barrier-free, including the trash receptacles and interpretive signage.

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FERC NO. 2528

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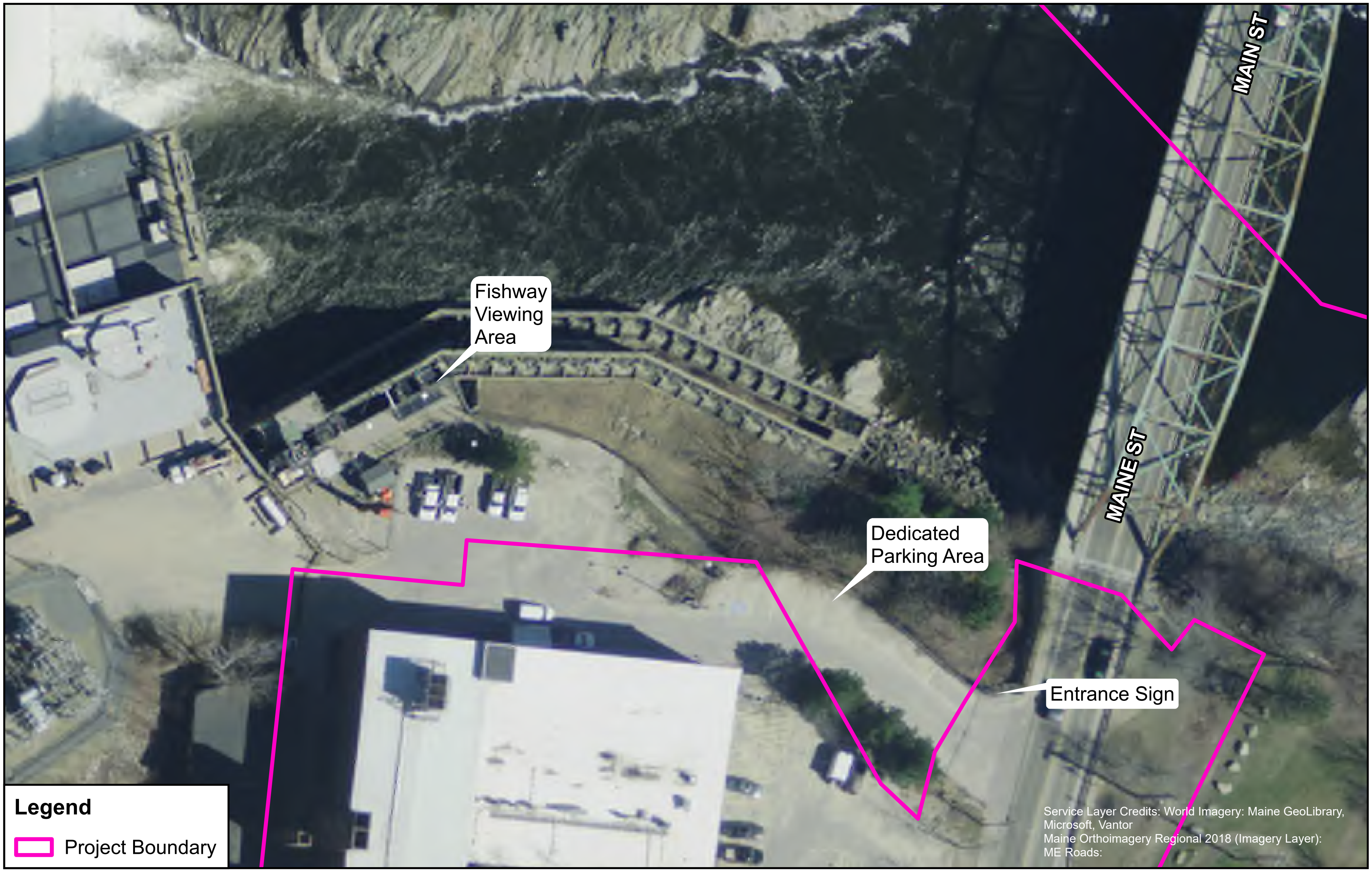
Figure 5.1.1.1-1:
250th Anniversary Park

Path: D:\Brookfield\02456\GIS\Maps\studies\rec_study\rec_study.aprx



GOMEZ AND SULLIVAN ENGINEERS

CATARACT HYDROELECTRIC PROJECT
INITIAL STUDY REPORT
FERC NO. 2528

0 25 50 100 Feet

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Figure 5.1.1.2-1:
Fishway Viewing Area

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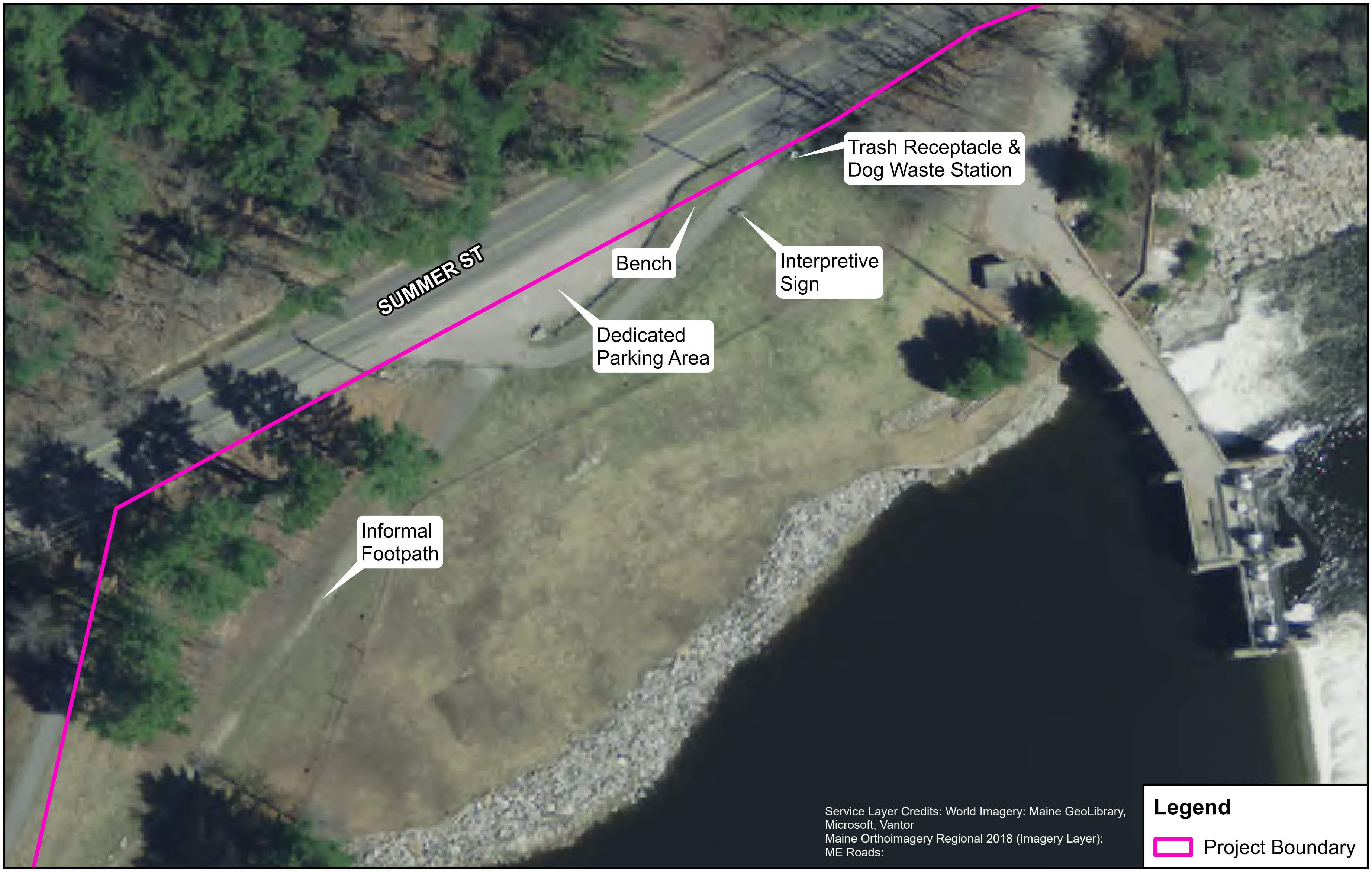

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Figure 5.1.1.3-1:
Summer Street Overlook

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5.1.2 Non-Project Facilities

5.1.2.1 Pejepscot Dam Recreation Area

Description

Pejepscot Dam Recreation Area, also known as the Pejepscot Fishing Park, is located off River Road in Brunswick, outside of the Project boundary. The site provides recreational access to the river above and below Pejepscot Dam, views of the dam and appurtenant facilities, boat take-out and put-in opportunities above and below the dam, and a trail for portaging around the dam. The site is accessed via a long gravel access road and consists of a small parking area with capacity for approximately three vehicles, angler access above and below the dam, and a portage facility. The site is owned and operated by Topsham Hydro Partners Limited Partnership (Topsham Hydro), a Brookfield company, as part of the Pejepscot Hydroelectric Project (FERC No. 4784) and was studied extensively as part of the relicensing of that project. FERC issued a new license for the Pejepscot project on September 21, 2023. The access road and parking area were regraded and re-crowned in 2024 (Topsham Hydro, 2024).

Site Condition

As noted above, the site was studied as part of the relicensing of the Pejepscot Hydroelectric Project. FERC issued a new license for the Pejepscot project on September 21, 2023. Topsham Hydro filed a Final Recreation Management Plan including provisions for site improvements and ongoing site maintenance on January 25, 2024. FERC approved the plan with modifications on March 29, 2024. Topsham Hydro submitted photographic documentation of completion of the required site improvements on December 2, 2024.

5.1.2.2 Coffin Pond Recreation Area

Description

Coffin Pond Recreation area is located on the south shore of the Androscoggin River and is owned and operated by the Town of Brunswick. The site is not within the Project boundary. The site is accessed from River Road and consists of a gravel parking area, picnic areas, playgrounds, restrooms, concessions, hiking trails, youth fishing access, and a small pond for swimming and ice skating. The parking area provides capacity for approximately 45 standard vehicles, including two designated accessible spaces. The playground is separated from the parking area by a row of boulders, and the pond area is separated from the remaining facilities by a chain link fence. A fee is required for access to the pond, restroom, and concessions areas, but the remaining facilities do not require a fee. The fee at the time of the site visit ranged from $5 to $9 depending on town residence and age. The site is open from 10 am to 5 pm daily.

Site Condition

The site is generally in good condition. An accessible route leads from the parking area to the playground and picnic area, which includes accessible picnic tables and trash receptacles.

5.1.2.3 Mill Street Canoe Portage

Description

Mill Street Canoe Portage is located on the south side of the Androscoggin River off Route 1 (Mill Street), outside of the Project boundary. The site provides hand-carry boat access just upstream of the

Project boat barrier and functions as the Project's portage take-out. The site is owned by MDOT and is operated by the Town of Brunswick. BWPH assisted the Town in development of the site.

The site provides a precast concrete plank boat ramp with asphalt approach, a gravel parking area, benches, a trash receptacle, a dog waste station, and informal shoreline access. The boat ramp provides access for hand-carry boats. A locked bollard at the top of the ramp prevents trailered boat access. Signage near the boat ramp marks the beginning of the portage route, discussed in Section 5.1.3. The parking area provides capacity for 16 standard vehicles, including one designated accessible space.

The site is closed to the public by locking the gate at the entrance when the Project boat barrier is not in place (typically from October 31 through June 15).

Site Condition

The site is generally in good condition except for the boat launch, which is in fair condition. The subbase beneath the concrete planks appears eroded, planks have become displaced, and sediment deposition is present on the planks; however, the launch is adequate for its intended purpose (the launching of hand-carry boats). The parking area, amenities, and trail are in good condition. An accessible route leads from the designated accessible parking space to the boat launch.

5.1.2.4 Androscoggin Swinging Bridge

Description

The Androscoggin Swinging Bridge is a historic pedestrian suspension bridge that runs across the Androscoggin River between the towns of Topsham and Brunswick approximately 1,600 feet upstream of the Project dam. The bridge is also part of the Androscoggin Riverwalk, as described below. A small park at the southern bridge abutment, owned by the State of Maine and operated by the Town of Brunswick, provides access to the bridge, parking, signage, and benches. The park is outside the Project boundary. Another park at the northern bridge abutment, owned and operated by the Town of Topsham, also provides access to the bridge, parking, benches, trash receptacles, and interpretive signage. Informal footpaths lead to the shoreline from both parks. Signage at both parks prohibits swimming.

Parking on the Brunswick side of the bridge is provided in a paved lot with 5 lined spaces, including one designated accessible space. On the Topsham side, parking is provided in a paved lot with 7 lined spaces, including one designated accessible space.

Site Condition

The bridge and parks are generally in good condition. Accessible routes lead from the Brunswick and Topsham parking areas to the Androscoggin Riverwalk crossing the pedestrian bridge, which also meets ADA standards.

5.1.2.5 Androscoggin Riverwalk

Description

The Androscoggin Riverwalk is 1.25-mile paved multi-use trail connecting the Towns of Brunswick and Topsham via the Androscoggin Swinging Bridge and the Frank J. Wood Bridge. Amenities are provided at the parks along the trail (i.e., Summer Street Overlook and Androscoggin Swinging Bridge) and include trash receptacles, dog waste stations, benches, and interpretive signage.

Parking for the Riverwalk is provided at Androscoggin Swinging Bridge (on both the Topsham and Brunswick sides), Summer Street Overlook, a lot across Cabot Street near the Frank J. Wood Bridge, and a public lot in Topsham near the intersection of Maine and Summer Streets.

Site Condition

The trail is generally in good condition and meets ADA requirements for accessibility.

5.1.2.6 Bridge to Bridge Trail

Description

The Bridge to Bridge Trail is a short (less than a quarter mile) multi-use trail along the Topsham side of the Androscoggin River, just upstream of the Androscoggin Riverwalk. The trail extends from Front Street to the Androscoggin Swinging Bridge along Bridge Street. The trail is paved and is generally separated from Bridge Street by a strip of grass or vegetated area. Parking for the trail is available at the Androscoggin Swinging Bridge, described in Section 5.1.2.4.

Site Condition

The trail is generally in good condition and meets ADA requirements for accessibility.

5.1.3 Portage Route

Boat access around the Project dam is provided via a designated portage route, depicted in Figure 3.1-1. The portage take-out is located at Mill Street Canoe Portage, described in Section 5.1.2.3. From the take-out, the portage route crosses a grassy area between the Mill Street Canoe Portage driveway and the Androscoggin River before reaching Mill Street. At Mill Street, users turn north and follow the sidewalk for approximately 70 feet, cross Mill Street to Cumberland Street, and follow north along the south side of Mill Street to Maine Street. At Maine Street, users turn north and follow the west side of Maine Street across US Highway 1 to the Fort Andross Mill Complex, then cross Maine Street at the secondary entrance to 250th Anniversary Park, described in Section 5.1.1.1. Users then follow the trail through 250th Anniversary Park to the put-in. The total distance of the route is approximately 0.9 miles.

A sign at Mill Street Canoe Portage directs boaters from the boat ramp to Mill Street, where additional signage directs users along existing sidewalks to Maine Street and north towards 250th Anniversary Park. Sidewalks and crosswalks serve the entire route from Mill Street Canoe Portage to 250th Anniversary Park. Photos of the route and associated signage are provided in Appendix D.

The sign at Mill Street Canoe Portage was found during the site inspection to be weathered, and the route across the Mill Street Canoe Portage lawn was not clearly marked. Signage at and along Mill Street was found to be in good condition and to adequately guide boaters to Maine Street and north towards Anniversary Park; however, there is no signage beyond the intersection of Mill and Maine Streets to direct boaters into and through 250th Anniversary Park to the put-in. Both the take-out and put-in are adequate for launching hand-carry boats.

5.2 Recreational User Survey

As discussed in Section 4.2, BWPH conducted a survey of recreational users at Project area recreation sites throughout the study period. The survey solicited information regarding user characteristics and use patterns, as well as user opinions on various aspects of the recreation sites. The survey instrument is included in Appendix A. In total, 328 surveys were completed.

5.2.1 Project Facilities

5.2.1.1 250th Anniversary Park

A total of 45 survey responses pertaining to 250th Anniversary Park were submitted during the study season. As shown in Figure 5.2.1-1, 93 percent of respondents reside in Maine, 85 percent of whom live in Topsham and Brunswick. Table 5.2.1-1 depicts various visitor characteristics and use patterns. As shown, the average age of respondents visiting the site was 46 years. The average group size was 2.3 people, and the average number of visits per year was 11. Figure 5.2.1-2 depicts responses regarding the mode of transportation used to travel to the site. As depicted, 73 percent of respondents traveled to the site on foot, 20 percent traveled by personal vehicle, and 7 percent traveled on bicycle.

As depicted in Figure 5.2.1-3, spring, summer, and fall are the primary recreation seasons at 250th Anniversary Park, with 71-87 percent of respondents indicating that they visit the site during those seasons. Figure 5.2.1-4 depicts activities respondents reported engaging in at the site. As shown, sightseeing/nature watching, walking/running/hiking, and fishing were the most popular recreational activities, followed by picnicking. Two respondents reported using the site for portaging.

When asked to rate how crowded the site was during their most recent visit, respondents indicated the site was moderate (53%), nearly empty (38%), or empty (9%), as depicted in Figure 5.2.1-5.

Respondents were asked to rate various attributes of the site using a 5-point scale from poor to excellent; responses are depicted in Figure 5.2.1-6. As shown, most respondents rated site condition positively or neutrally, and adequacy of amenities negatively or neutrally. Respondents were then asked whether the site meets their interests; 60 percent of respondents responded affirmatively. Respondents were asked to explain any low ratings of the site's attributes or other feedback pertaining to 250th Anniversary Park. Responses varied. Common themes included appreciation for the park and its potential and suggestions for improved site access such as parking and shoreline access, impacts of nearby construction, site maintenance and addition of trash cans, and vegetation maintenance. Verbatim responses are included in Appendix E.

5.2.1.2 Fishway Viewing Area

A total of 15 survey responses pertaining to the Fishway Viewing Area were submitted during the study season. As shown in Figure 5.2.1-7, 93 percent of respondents reside in Maine, 84 percent of whom live in Topsham and Brunswick. Table 5.2.1-2 depicts various visitor characteristics and use patterns. As shown, the average age of respondents visiting the site was 57 years. The average group size was 2.5 people, and the average number of visits per year was 13. Figure 5.2.1-8 depicts responses regarding the mode of transportation used to travel to the site. As depicted, 73 percent of respondents traveled to the site on foot, 20 percent traveled by personal vehicle, and 7 percent traveled on bicycle.

As depicted in Figure 5.2.1-9, 47-73 percent of respondents indicated that they visit the site during spring, summer, and fall; however, as noted in Section 5.1.1.2, the Fishway Viewing Area is open to the public only from May 1 through June 30. Figure 5.2.1-10 depicts activities respondents reported engaging in at the site. As shown, sightseeing/nature watching was the most popular recreational activity, followed by walking/running/hiking, fishing, and other (unspecified) activities.

When asked to rate how crowded the site was during their most recent visit, respondents indicated the site was moderate (20%), nearly empty (53%), or empty (27%), as depicted in Figure 5.2.1-11.

Respondents were asked to rate various attributes of the site using a 5-point scale from poor to excellent; responses are depicted in Figure 5.2.1-12. As shown, most respondents rated site condition and adequacy of amenities neutrally or negatively. Respondents were then asked whether the site meets their interests; 80 percent of respondents responded negatively. Respondents were asked to explain any low ratings of the site's attributes or other feedback pertaining to this recreational facility. Responses varied. Common themes included negative feedback about site signage, hours of operation, and the fishway itself. Verbatim responses are included in Appendix E.

5.2.1.3 Summer Street Overlook

A total of 19 survey responses pertaining to the Summer Street Overlook were submitted during the study season. As shown in Figure 5.2.1-13, 100 percent of respondents reside in Maine, 94 percent of whom live in Topsham and Brunswick. Table 5.2.1-3 depicts various visitor characteristics and use patterns. As shown, the average age of respondents visiting the site was 49 years. The average group size was 2.1 people, and the average number of visits per year was 173. Figure 5.2.1-14 depicts responses regarding the mode of transportation used to travel to the site. As depicted, 83 percent of respondents traveled to the site on foot and 17 percent traveled by personal vehicle.

As depicted in Figure 5.2.1-15, spring, summer, and fall are the primary recreation seasons at the Summer Street Overlook, with 84-95 percent of respondents indicating that they visit the site during each of those seasons, and 63 percent of respondents indicating they visit the site in the winter. Figure 5.2.1-16 depicts activities respondents reported engaging in at the site. As shown, walking/running/hiking and sightseeing/nature watching were the most popular activities at the site, followed by picnicking.

When asked to rate how crowded the site was during their most recent visit, most respondents indicated the site was moderate (53%) nearly empty (26%), or empty (16%), as depicted in Figure 5.2.1-17.

Respondents were asked to rate various attributes of the site using a 5-point scale from poor to excellent; responses are depicted in Figure 5.2.1-18. As shown, most respondents rated site condition and adequacy of amenities positively or neutrally. Respondents were then asked whether the site meets their interests; 63 percent of respondents responded affirmatively. Respondents were asked to explain any low ratings of the site's attributes or other feedback pertaining to this recreational facility. Responses varied. Common themes included appreciation for the natural setting and trail, suggestions for additional seating, and suggestions for a site redesign to improve aesthetics and enlarge the area accessible to the public. Verbatim responses are included in Appendix E.

Table 5.2.1-1: Visitor Characteristics and Use Patterns, 250th Anniversary Park

Calculated Statistic	Age of Respondent	People Per Group	Visits per Year
Lowest	19.0	1.0	1.0
Average	45.7	2.3	10.8
Highest	83.0	12.0	50.0

Table 5.2.1-2: Visitor Characteristics and Use Patterns, Fishway Viewing Area

Calculated Statistic	Age of Respondent	People Per Group	Visits per Year
Lowest	21.0	1.0	1.0
Average	56.6	2.5	12.6
Highest	83.0	5.0	100.0

Table 5.2.1-3: Visitor Characteristics and Use Patterns, Summer Street Overlook

Calculated Statistic	Age of Respondent	People Per Group	Visits per Year
Lowest	32.0	1.0	1.0
Average	48.6	2.1	172.6
Highest	82.0	5.0	700.0

Figure 5.2.1-1: Place of Residence, Cities in Maine, 250th Anniversary Park

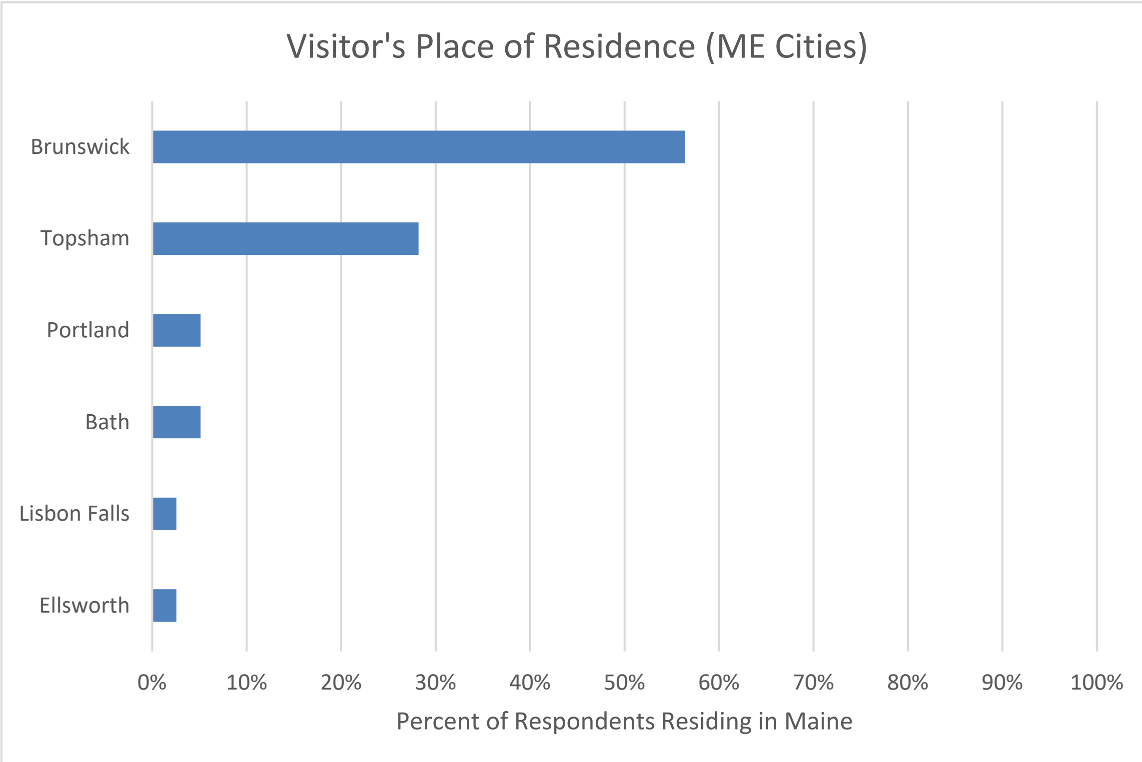


Figure 5.2.1-2: Mode of Transportation, 250th Anniversary Park

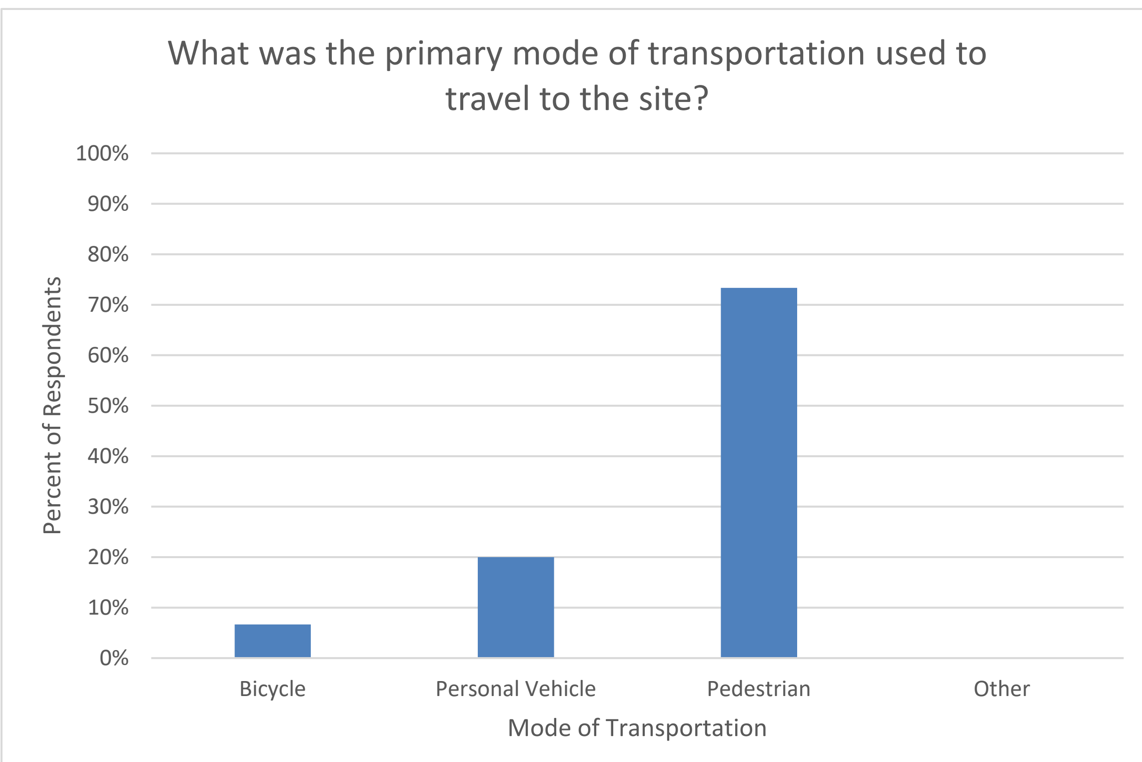


Figure 5.2.1-3: Seasonality of Visits, 250th Anniversary Park

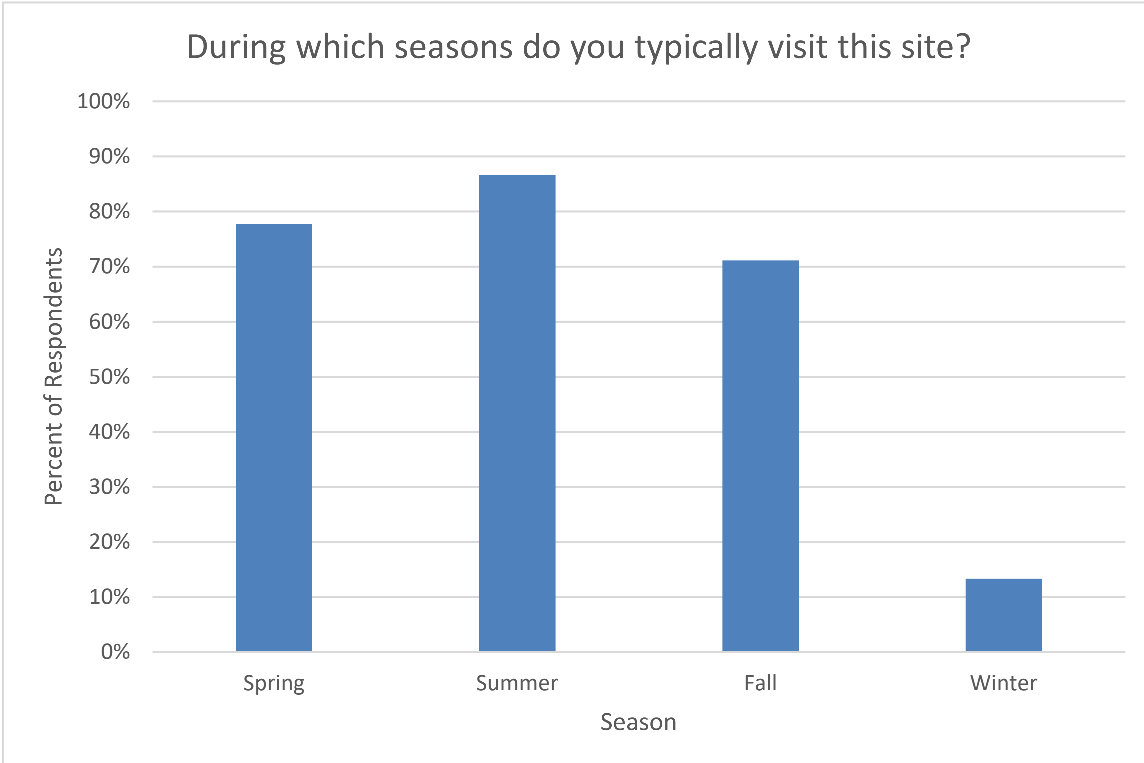


Figure 5.2.1-4: Recreational Activities, 250th Anniversary Park

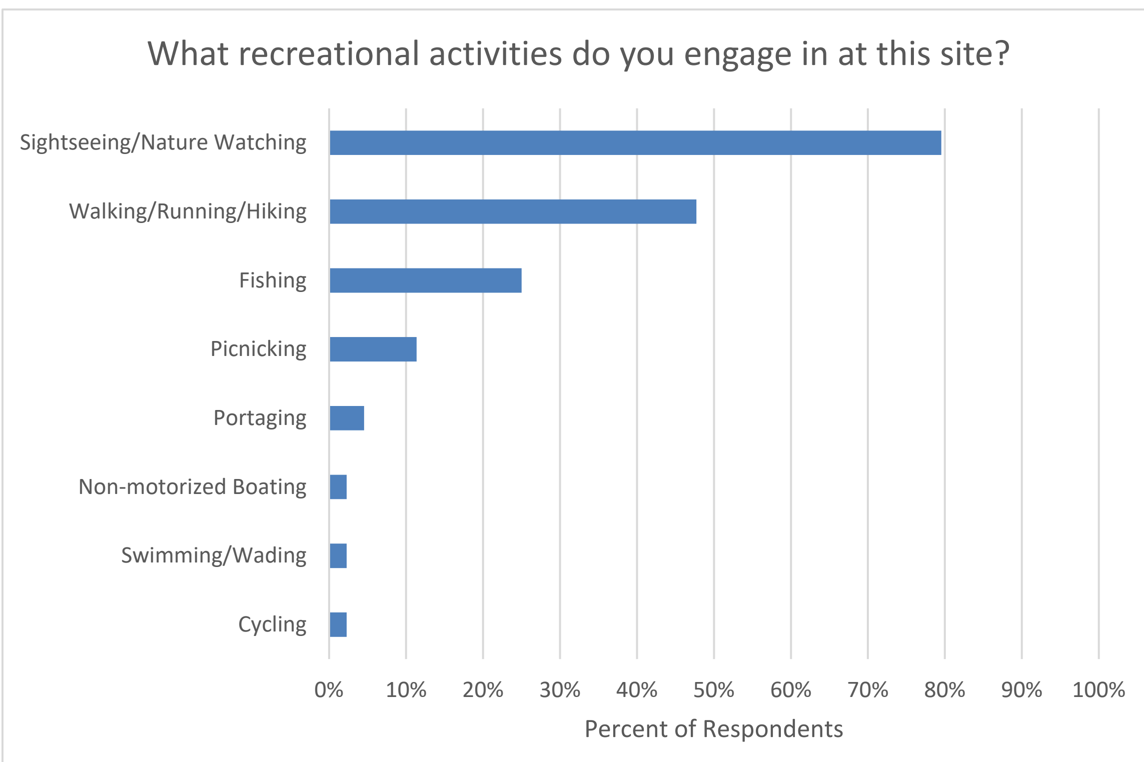


Figure 5.2.1-5: Use Perceptions, 250th Anniversary Park

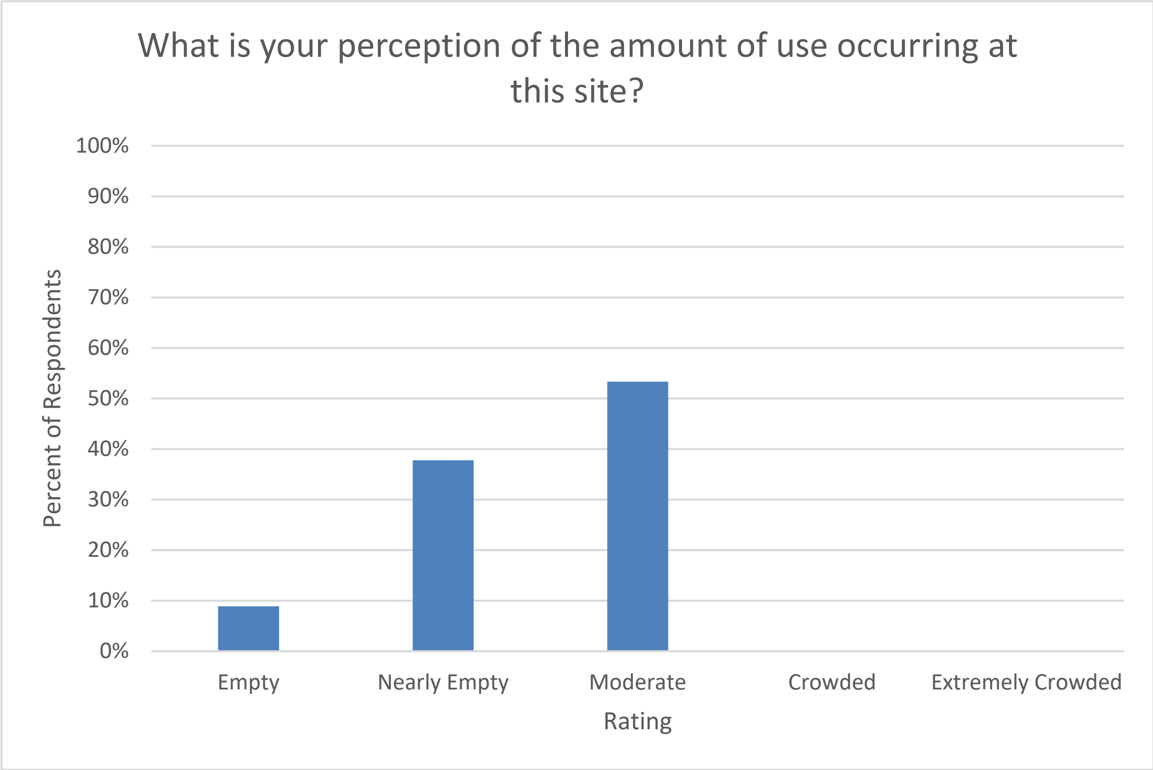


Figure 5.2.1-6: Attribute Ratings, 250th Anniversary Park

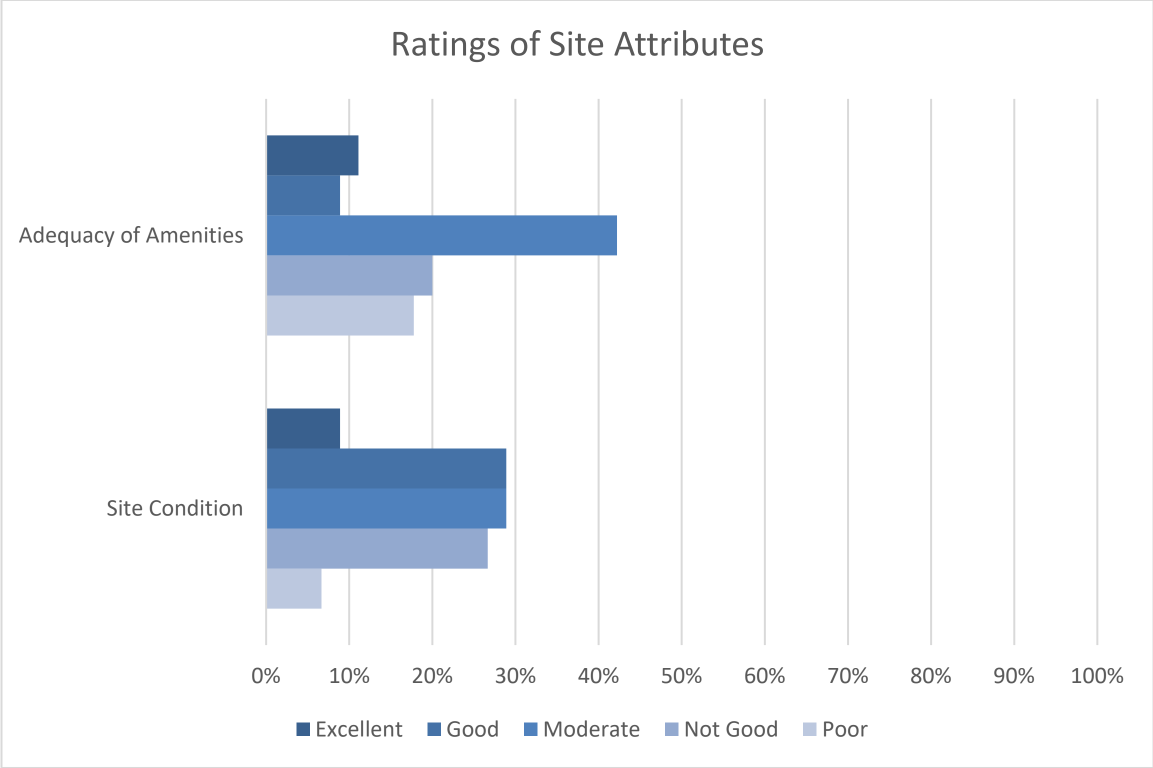


Figure 5.2.1-7: Place of Residence, Cities in Maine, Fishway Viewing Area

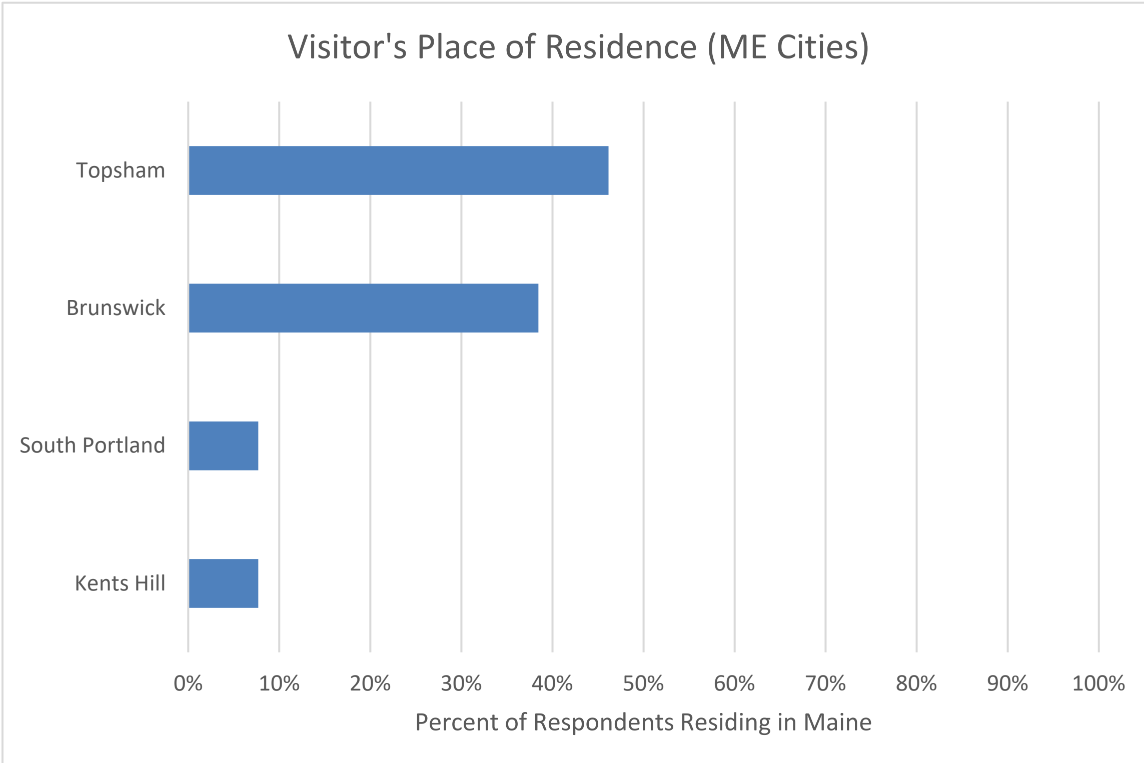


Figure 5.2.1-8: Mode of Transportation, Fishway Viewing Area

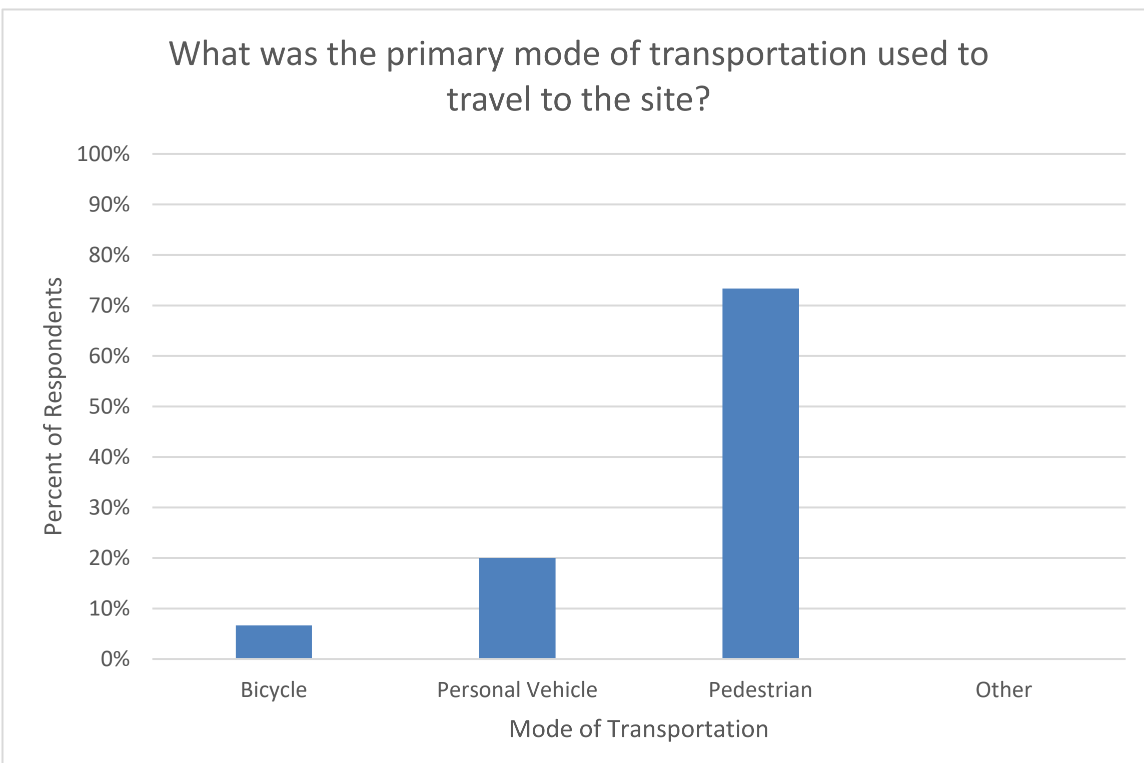


Figure 5.2.1-9: Seasonality of Visits, Fishway Viewing Area

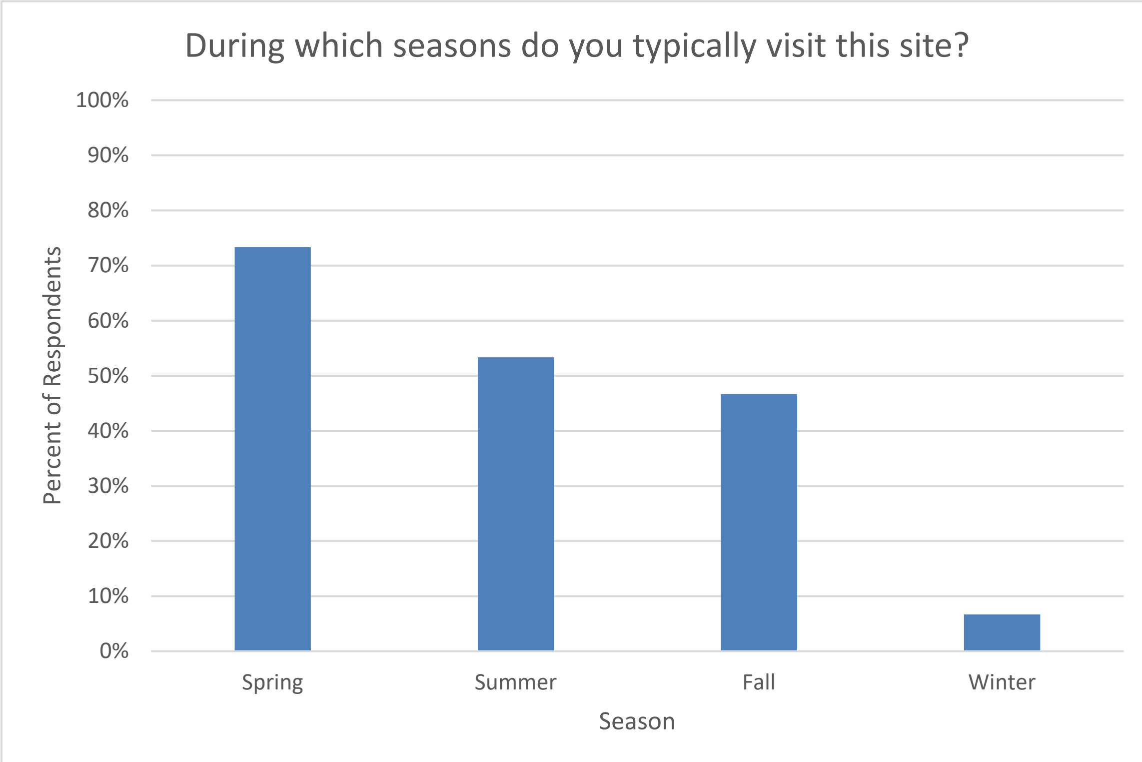


Figure 5.2.1-10: Recreational Activities, Fishway Viewing Area

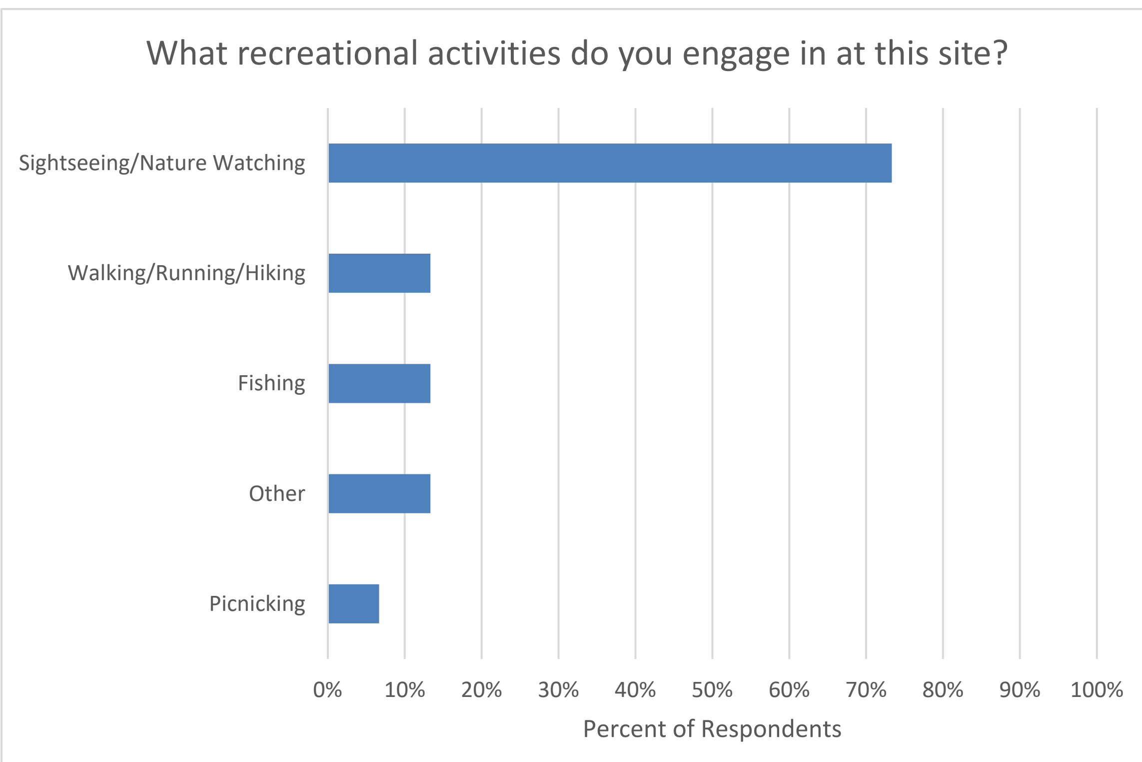


Figure 5.2.1-11: Use Perceptions, Fishway Viewing Area

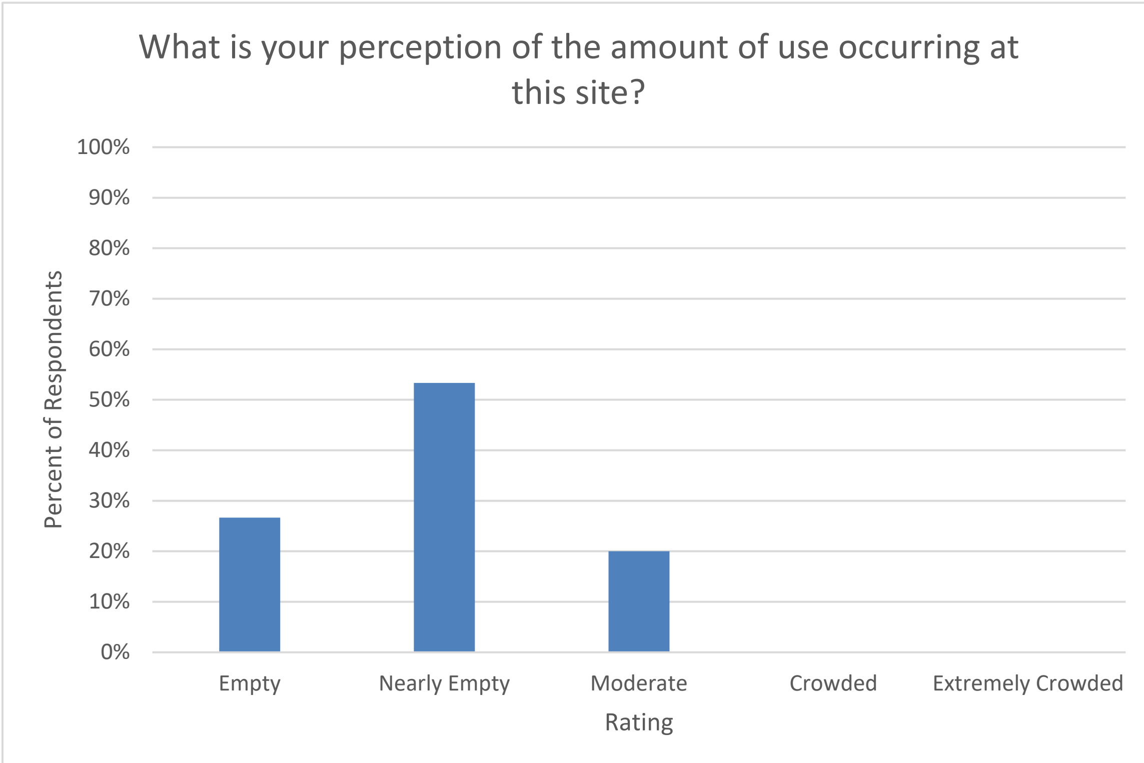


Figure 5.2.1-12: Attribute Ratings, Fishway Viewing Area

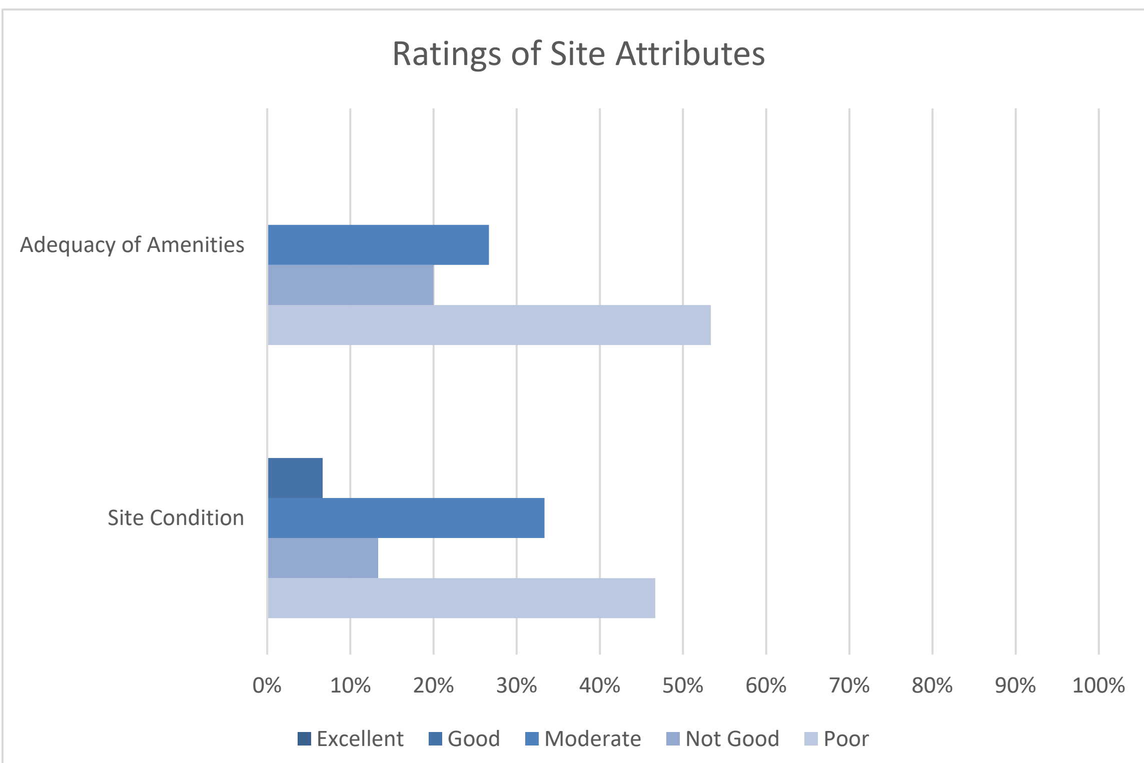


Figure 5.2.1-13: Place of Residence, Cities in Maine, Summer Street Overlook

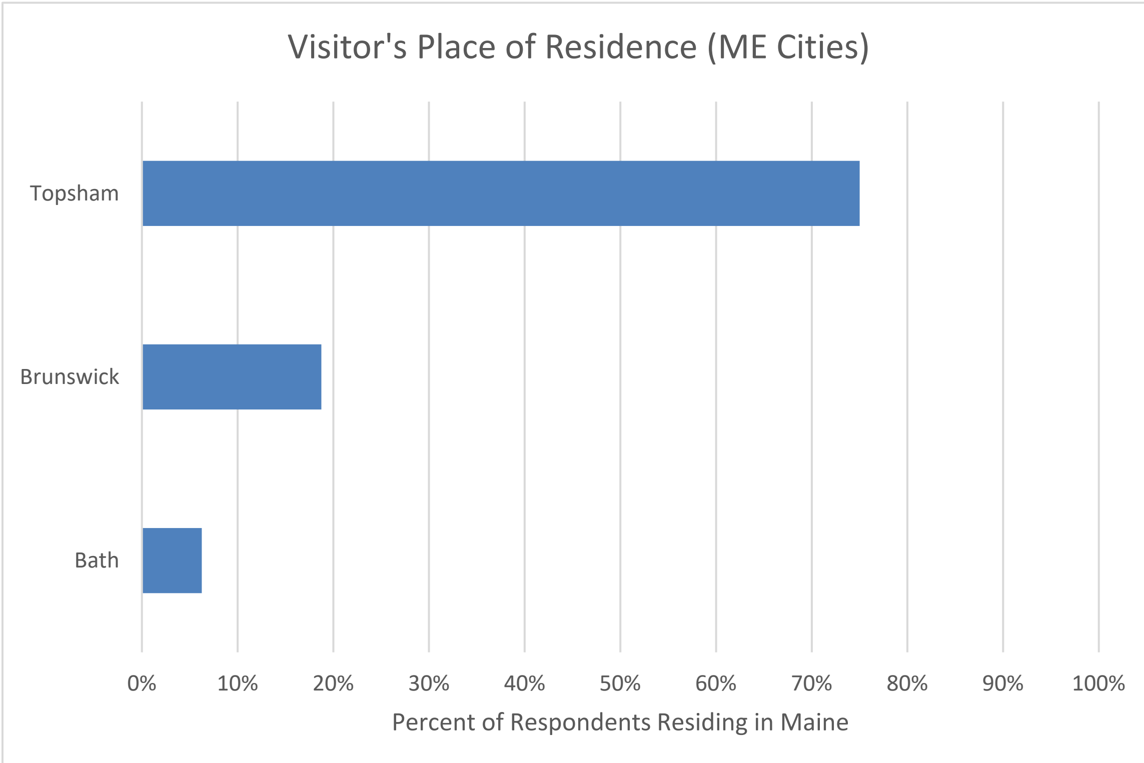


Figure 5.2.1-14: Mode of Transportation, Summer Street Overlook

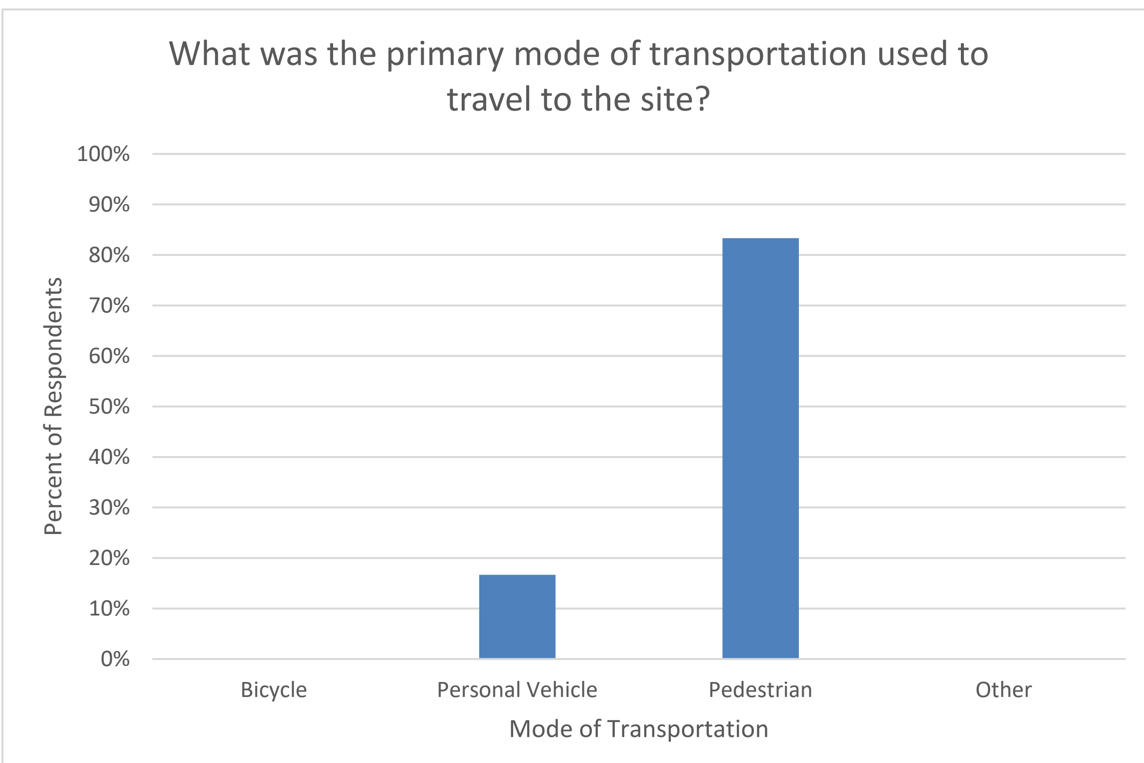


Figure 5.2.1-15: Seasonality of Visits, Summer Street Overlook

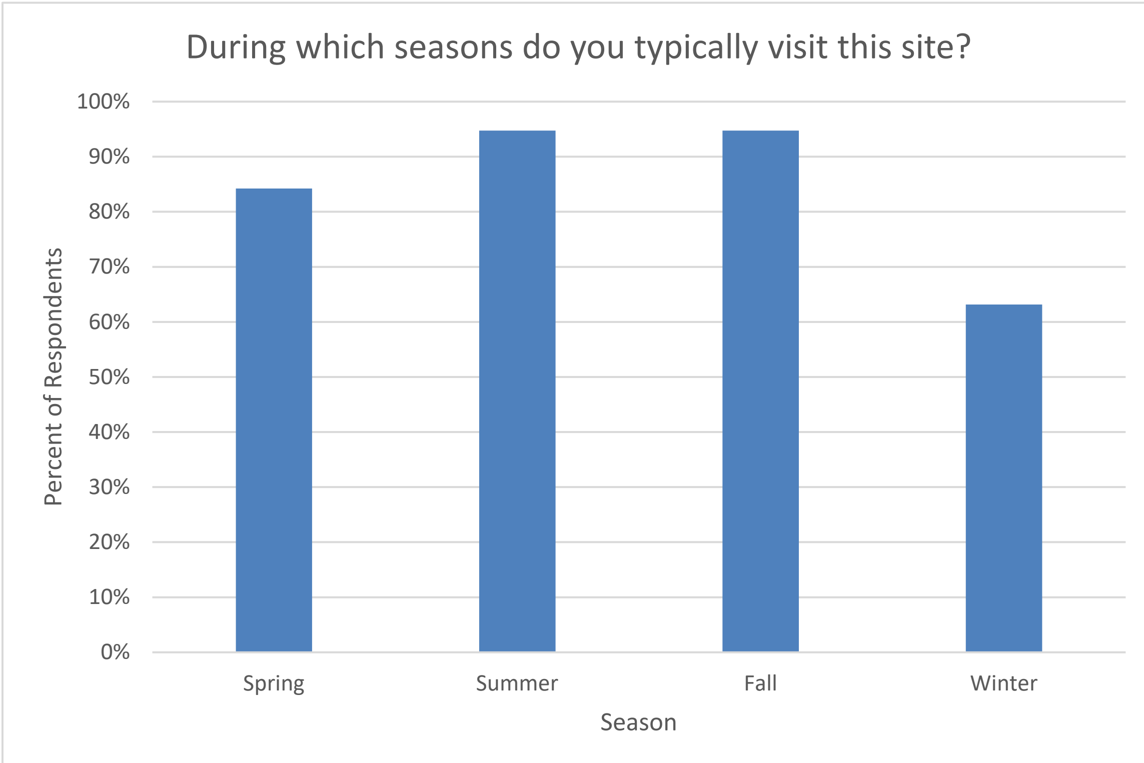


Figure 5.2.1-16: Recreational Activities, Summer Street Overlook

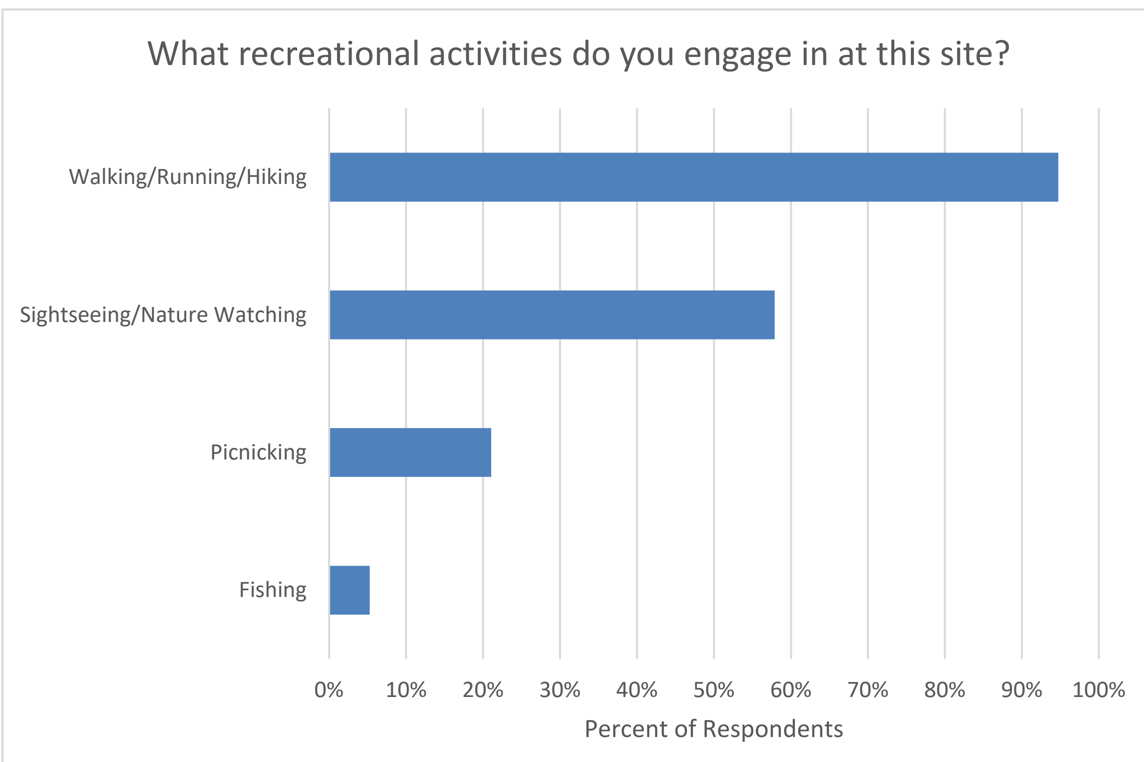


Figure 5.2.1-17: Use Perceptions, Summer Street Overlook

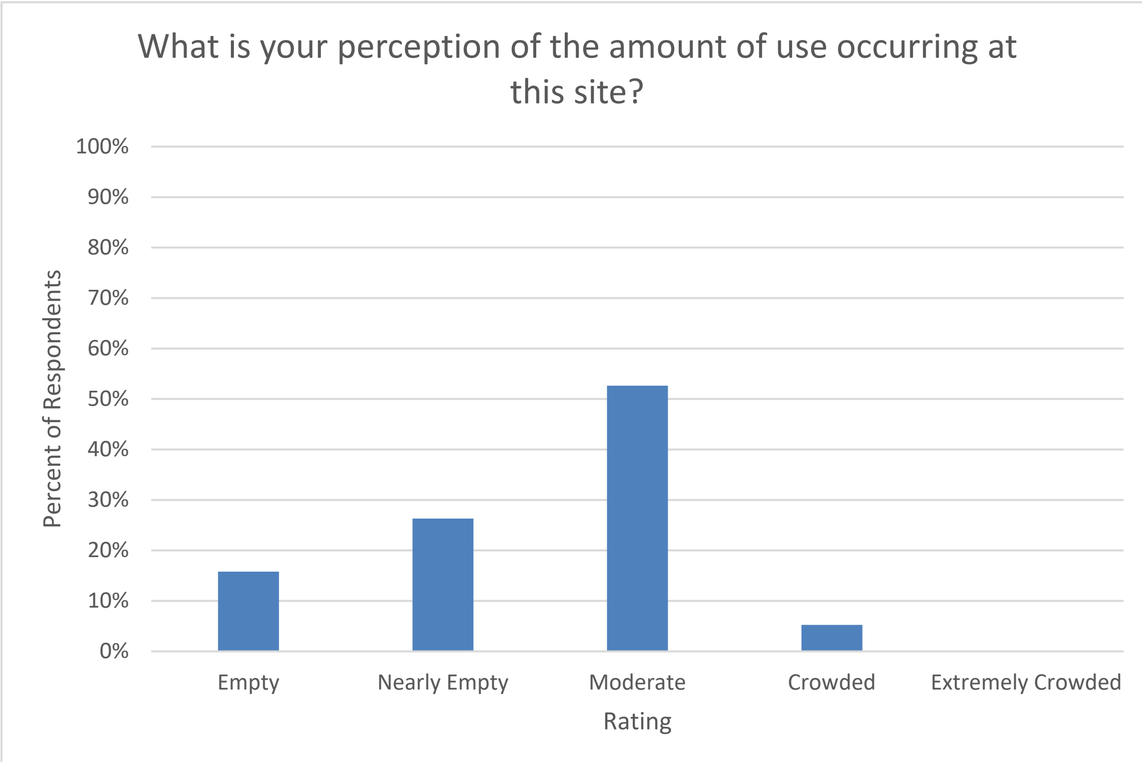
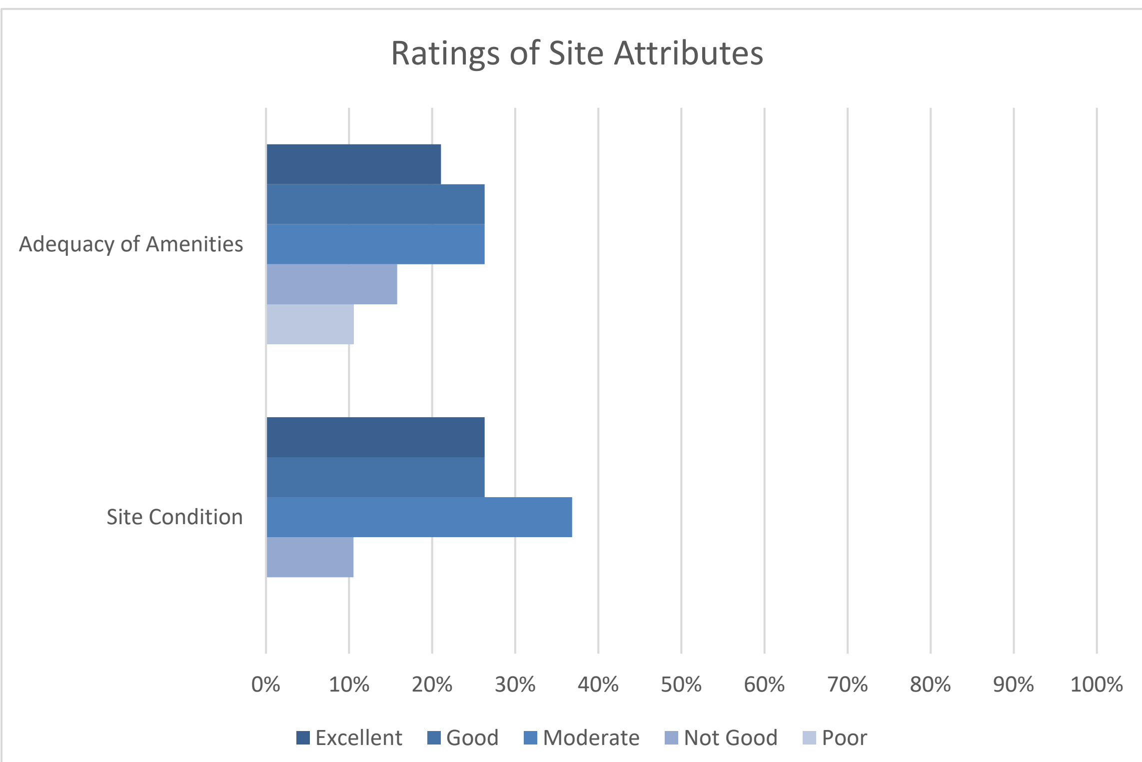


Figure 5.2.1-18: Attribute Ratings, Summer Street Overlook



5.2.2 Non-Project Facilities

5.2.2.1 Coffin Pond Recreation Area

A total of 20 survey responses pertaining to the Coffin Pond Recreation Area were submitted during the study season. As shown in Figure 5.2.2-1, 95 percent of respondents reside in Maine, 95 percent of whom live in Brunswick. Table 5.2.2-1 depicts various visitor characteristics and use patterns. As shown, the average age of respondents visiting the site was 43 years. The average group size was 2.5 people, and the average number of visits per year was 82. Figure 5.2.2-2 depicts responses regarding the mode of transportation used to travel to the site. As depicted, 55 percent of respondents traveled to the site on foot and 45 percent traveled by personal vehicle.

As depicted in Figure 5.2.2-3, spring, summer, and fall are the primary recreation seasons at the Coffin Pond Recreation Area, with 70-95 percent of respondents indicating that they visit the site during each of those seasons, and 60 percent indicating they visit the site in winter. Figure 5.2.2-4 depicts activities respondents reported engaging in at the site. As shown, walking/running/hiking, and sightseeing/nature watching were the most popular activities at the site, followed by fishing, swimming/wading, picnicking, other activities, non-motorized boating, and cycling.

When asked to rate how crowded the site was during their most recent visit, most respondents indicated the site was moderate (60%) or nearly empty (30%), as depicted in Figure 5.2.2-5.

Respondents were asked to rate various attributes of the site using a 5-point scale from poor to excellent; responses are depicted in Figure 5.2.2-6. As shown, most respondents rated site condition and adequacy of amenities positively or neutrally. Respondents were then asked whether the site meets their interests; 75 percent of respondents responded affirmatively. Respondents were asked to explain any low ratings of the site's attributes or other feedback pertaining to this recreational facility. Responses varied. Common themes included appreciation for the site and requests for improved maintenance of the trails and other amenities. Verbatim responses are included in Appendix E.

5.2.2.2 Mill Street Canoe Portage

A total of 16 survey responses pertaining to the Mill Street Canoe Portage were submitted during the study season. As shown in Figure 5.2.2-7, 93 percent of respondents reside in Maine, 77 percent of whom live in Brunswick. Table 5.2.2-2 depicts various visitor characteristics and use patterns. As shown, the average age of respondents visiting the site was 49 years. The average group size was 1.9 people, and the average number of visits per year was 10. Figure 5.2.2-8 depicts responses regarding the mode of transportation used to travel to the site. As depicted, 50 percent of respondents traveled to the site by personal vehicle, 44 percent traveled on foot, and 6 percent traveled on bicycle.

As depicted in Figure 5.2.2-9, spring, summer, and fall are the primary recreation seasons at the Mill Street Canoe Portage, with 75-94 percent of respondents indicating that they visit the site during each of those seasons. Figure 5.2.2-10 depicts activities respondents reported engaging in at the site. As shown, non-motorized boating, sightseeing/nature watching, walking/running/hiking, and fishing were the most popular activities at this site, followed by picnicking, other activities, and swimming/wading. One respondent reported using the site for portaging.

When asked to rate how crowded the site was during their most recent visit, respondents indicated the site was moderate (31%), nearly empty (56%), or empty (13%), as depicted in Figure 5.2.2-11.

Respondents were asked to rate various attributes of the site using a 5-point scale from poor to excellent; responses are depicted in Figure 5.2.2-12. As shown, most respondents rated site condition and adequacy of amenities positively or neutrally. Respondents were then asked whether the site meets their interests; 56 percent of respondents responded affirmatively. Respondents were asked to explain any low ratings of the site's attributes or other feedback pertaining to this recreational facility. Responses varied. Common themes included requests to install the boat barrier earlier in the season and remove it later, open the park independent of boat barrier status, provide access for motorboats, and improve pedestrian safety along Mill Street. Verbatim responses are included in Appendix E.

5.2.2.3 Androscoggin Swinging Bridge

A total of 105 survey responses pertaining to the Androscoggin Swinging Bridge were submitted during the study season. As shown in Figure 5.2.2-13, 69 percent of respondents reside in Maine, 80 percent of whom live in Topsham and Brunswick. Table 5.2.2-3 depicts various visitor characteristics and use patterns. As shown, the average age of respondents visiting the site was 50 years. The average group size was 2.2 people, and the average number of visits per year was 39. Figure 5.2.2-14 depicts responses regarding the mode of transportation used to travel to the site. As depicted, 48 percent of respondents traveled to the site on foot, 48 percent traveled by personal vehicle, and 3 percent traveled on bicycle.

As depicted in Figure 5.2.2-15, spring, summer, and fall are the primary recreation seasons at the Androscoggin Swinging Bridge, with 61-91 percent of respondents indicating that they visit the site during each of those seasons, and 32 percent indicating that they visit the site in winter. Figure 5.2.2-16 depicts activities respondents reported engaging in at the site. As shown, walking/running/hiking and sightseeing/nature watching were the most popular activities at this site, followed by picnicking and cycling.

When asked to rate how crowded the site was during their most recent visit, respondents indicated the site was nearly empty (18%), moderate (75%), or crowded (7%), as depicted in Figure 5.2.2-17.

Respondents were asked to rate various attributes of the site using a 5-point scale from poor to excellent; responses are depicted in Figure 5.2.2-18. As shown, most respondents rated site condition and adequacy of amenities positively or neutrally. Respondents were then asked whether the site meets their interests; 92 percent of respondents responded affirmatively. Respondents were asked to explain any low ratings of the site's attributes or other feedback pertaining to this recreational facility. Responses varied. Common themes included appreciation of the park and trails, requests for additional or improved parking and amenities, and improved pedestrian safety along Mill Street. Verbatim responses are included in Appendix E.

5.2.2.4 Androscoggin Riverwalk

A total of 53 survey responses pertaining to the Androscoggin Riverwalk were submitted during the study season. As shown in Figure 5.2.2-19, 90 percent of respondents reside in Maine, 87 percent of whom live in Topsham and Brunswick. Table 5.2.2-4 depicts various visitor characteristics and use patterns. As shown, the average age of respondents visiting the site was 57 years. The average group size was 1.9 people, and the average number of visits per year was 76. Figure 5.2.2-20 depicts responses regarding the mode of transportation used to travel to the site. As depicted, 68 percent of respondents traveled to the site on foot, 28 percent traveled by personal vehicle, and 4 percent traveled on bicycle.

As depicted in Figure 5.2.2-21, spring, summer, and fall are the primary recreation seasons at the Androscoggin Riverwalk, with 85-94 percent of respondents indicating that they visit the site during each of those seasons, and 58 percent indicating that they visit the site in winter. Figure 5.2.2-22 depicts activities respondents reported engaging in at the site. As shown, walking/running/hiking and sightseeing/nature watching were the most popular activities at the site, followed by cycling.

When asked to rate how crowded the site was during their most recent visit, respondents indicated the site was nearly empty (13%), moderate (77%), or crowded (9%), as depicted in Figure 5.2.2-23.

Respondents were asked to rate various attributes of the site using a 5-point scale from poor to excellent; responses are depicted in Figure 5.2.2-24. As shown, most respondents rated site condition and adequacy of amenities positively or neutrally. Respondents were then asked whether the site meets their interests; 83 percent of respondents responded affirmatively. Respondents were asked to explain any low ratings of the site's attributes or other feedback pertaining to this recreational facility. Responses varied. Common themes included appreciation for the facility and requests for trail extension and connectivity, trail improvements, invasive plant species removal, improved pedestrian safety along Mill Street, and additional or improved amenities. Verbatim responses are included in Appendix E.

5.2.2.5 Bridge to Bridge Trail

A total of 55 survey responses pertaining to the Bridge to Bridge Trail were submitted during the study season. As shown in Figure 5.2.2-25, 100 percent of respondents reside in Maine, 93 percent of whom live in Topsham and Brunswick. Table 5.2.2-5 depicts various visitor characteristics and use patterns. As shown, the average age of respondents visiting the site was 54 years. The average group size was 1.8 people, and the average number of visits per year was 107. Figure 5.2.2-26 depicts responses regarding the mode of transportation used to travel to the site. As depicted, 83 percent of respondents traveled to the site on foot, 15 percent traveled by personal vehicle, and 2 percent traveled on bicycle.

As depicted in Figure 5.2.2-27, spring, summer, and fall are the primary recreation seasons at the Bridge to Bridge Trail, with 95-100 percent of respondents indicating that they visit the site during each of those seasons, and 71 percent indicating that they visit the site in winter. Figure 5.2.2-28 depicts activities respondents reported engaging in at the site. As shown, walking/running/hiking and sightseeing/nature watching were the most popular activities at the site, followed by cycling and picnicking.

When asked to rate how crowded the site was during their most recent visit, respondents indicated the site was nearly empty (4%), moderate (87%), or crowded (9%), as depicted in Figure 5.2.2-29.

Respondents were asked to rate various attributes of the site using a 5-point scale from poor to excellent; responses are depicted in Figure 5.2.2-30. As shown, most respondents rated site condition and adequacy of amenities positively or neutrally. Respondents were then asked whether the site meets their interests; 87 percent of respondents responded affirmatively. Respondents were asked to explain any low ratings of the site's attributes or other feedback pertaining to this recreational facility. Responses varied. Common themes included appreciation for the facility and requests for vegetation management and invasive plant species control, trail extension and connectivity, and additional or improved amenities. Verbatim responses are included in Appendix E.

Table 5.2.2-1: Visitor Characteristics and Use Patterns, Coffin Pond Recreation Area

Calculated Statistic	Age of Respondent	People Per Group	Visits per Year
Lowest	14.0	1.0	1.0
Average	42.9	2.5	81.5
Highest	79.0	5.0	365.0

Table 5.2.2-2: Visitor Characteristics and Use Patterns, Mill Street Canoe Portage

Calculated Statistic	Age of Respondent	People Per Group	Visits per Year
Lowest	25.0	1.0	1.0
Average	49.1	1.9	10.0
Highest	74.0	4.0	50.0

Table 5.2.2-3: Visitor Characteristics and Use Patterns, Androscoggin Swinging Bridge

Calculated Statistic	Age of Respondent	People Per Group	Visits per Year
Lowest	16.0	1.0	0.0
Average	49.7	2.2	39.0
Highest	87.0	9.0	750.0

Table 5.2.2-4: Visitor Characteristics and Use Patterns, Androscoggin Riverwalk

Calculated Statistic	Age of Respondent	People Per Group	Visits to Site per Year
Lowest	9.0	1.0	0.0
Average	57.4	1.9	76.1
Highest	83.0	8.0	365.0

Table 5.2.2-5: Visitor Characteristics and Use Patterns, Bridge to Bridge Trail

Calculated Statistic	Age of Respondent	People Per Group	Visits per Year
Lowest	25.0	1.0	0.0
Average	53.9	1.8	107.0
Highest	82.0	7.0	365.0

Figure 5.2.2-1: Place of Residence, Cities in Maine, Coffin Pond Recreation Area

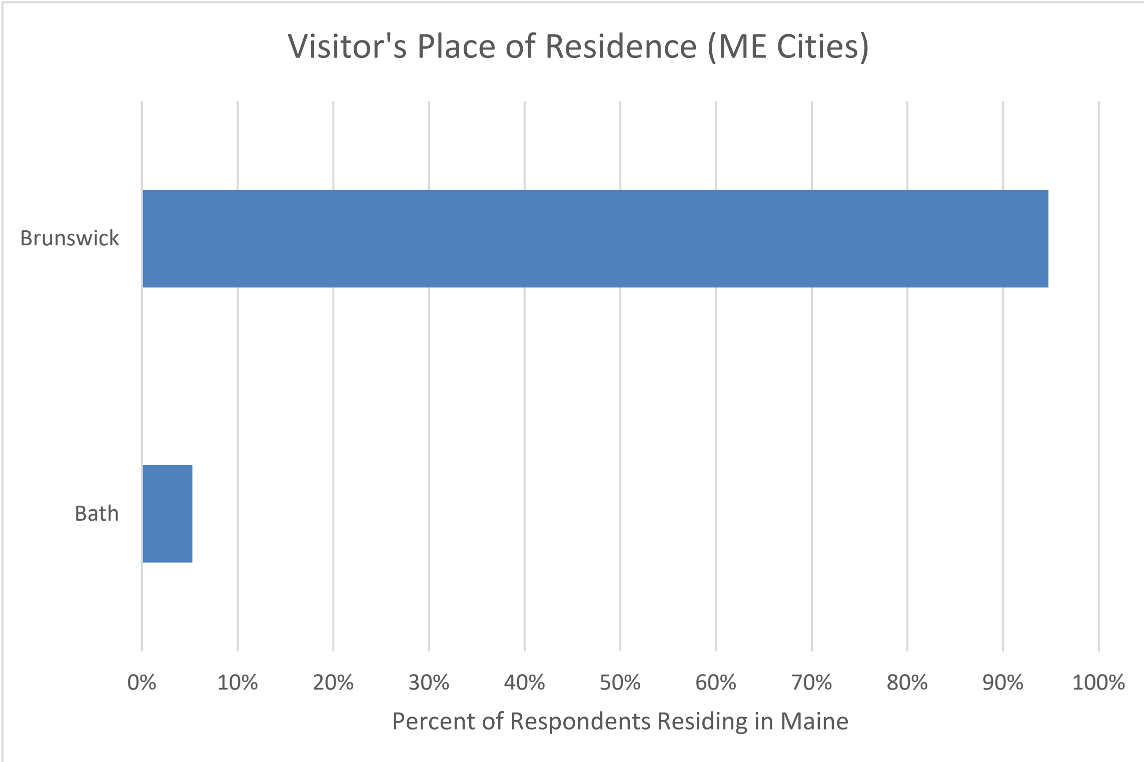


Figure 5.2.2-2: Mode of Transportation, Coffin Pond Recreation Area

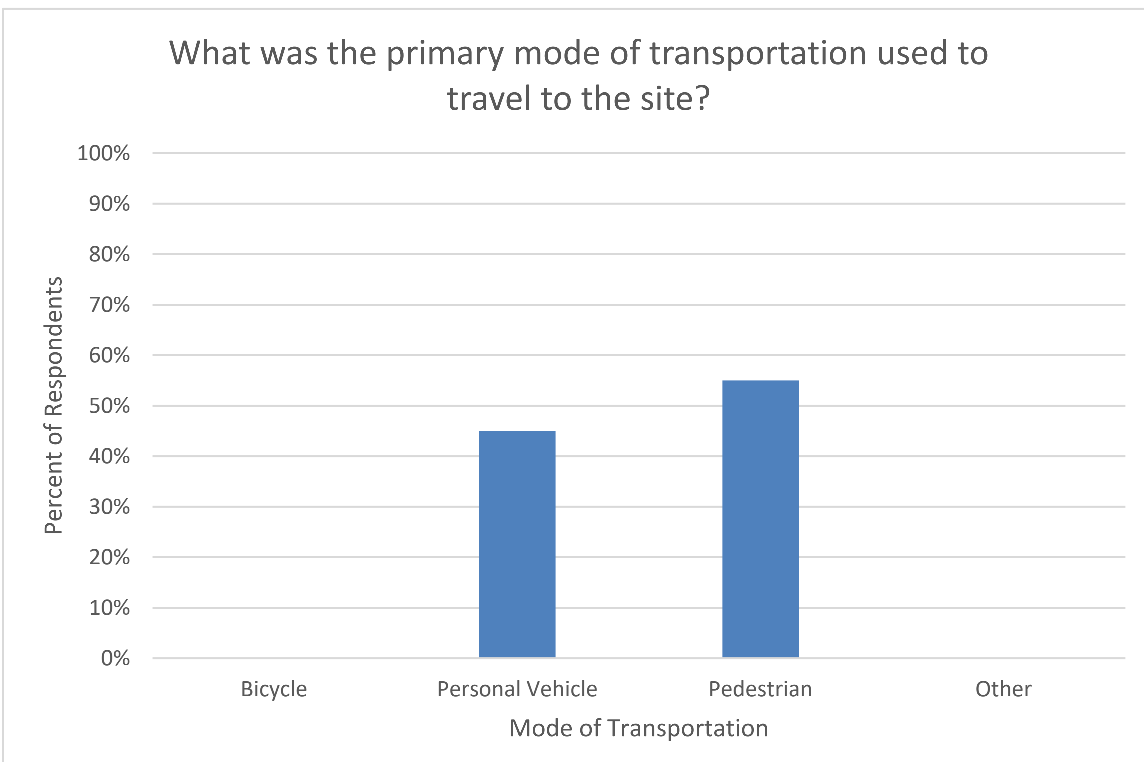


Figure 5.2.2-3: Seasonality of Visits, Coffin Pond Recreation Area

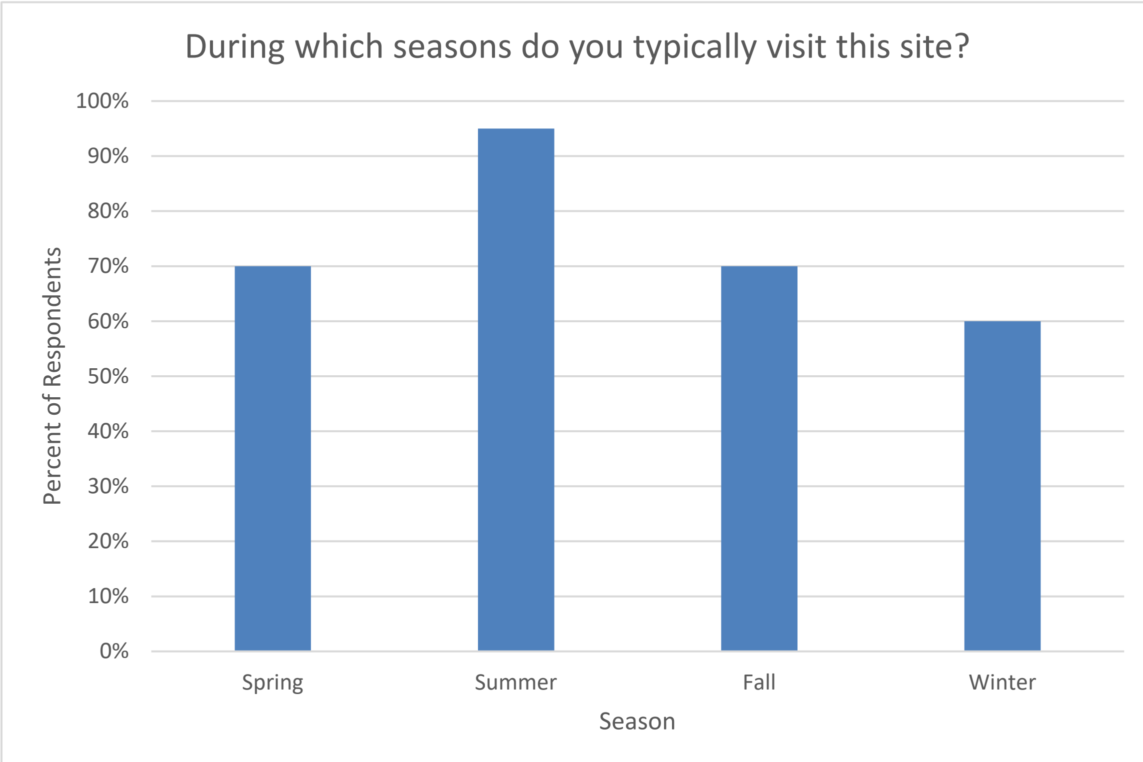


Figure 5.2.2-4: Recreational Activities, Coffin Pond Recreation Area

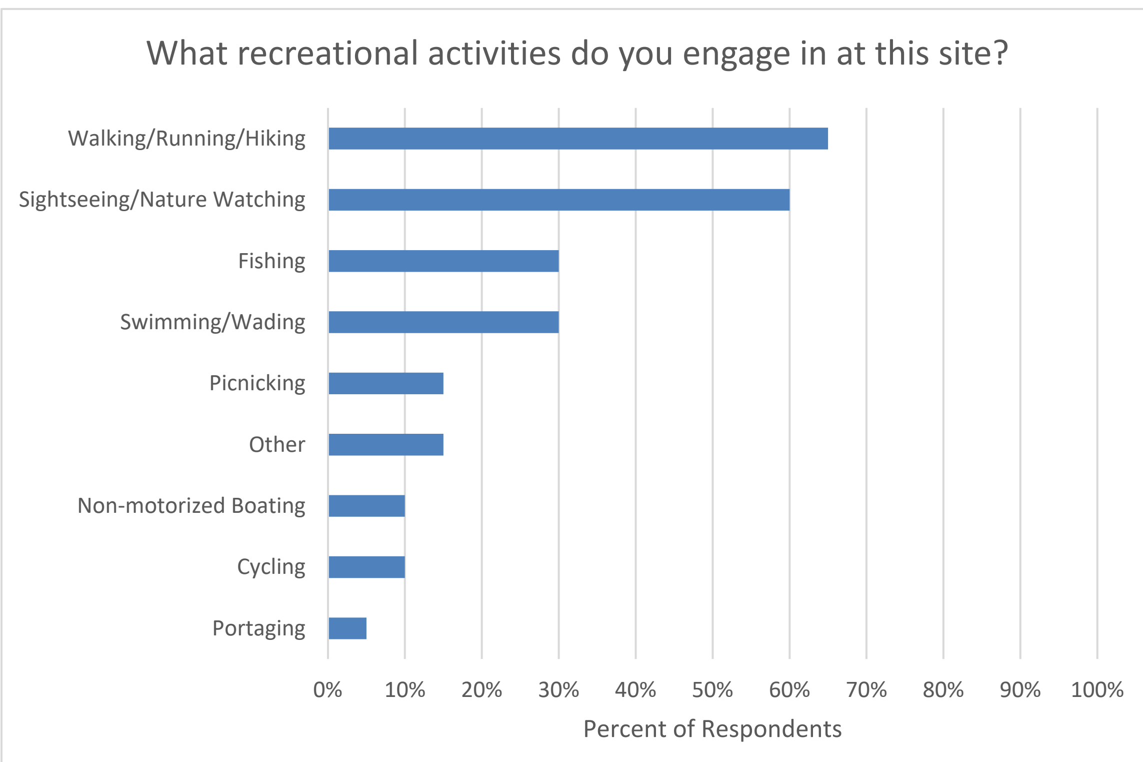


Figure 5.2.2-5: Use Perceptions, Coffin Pond Recreation Area

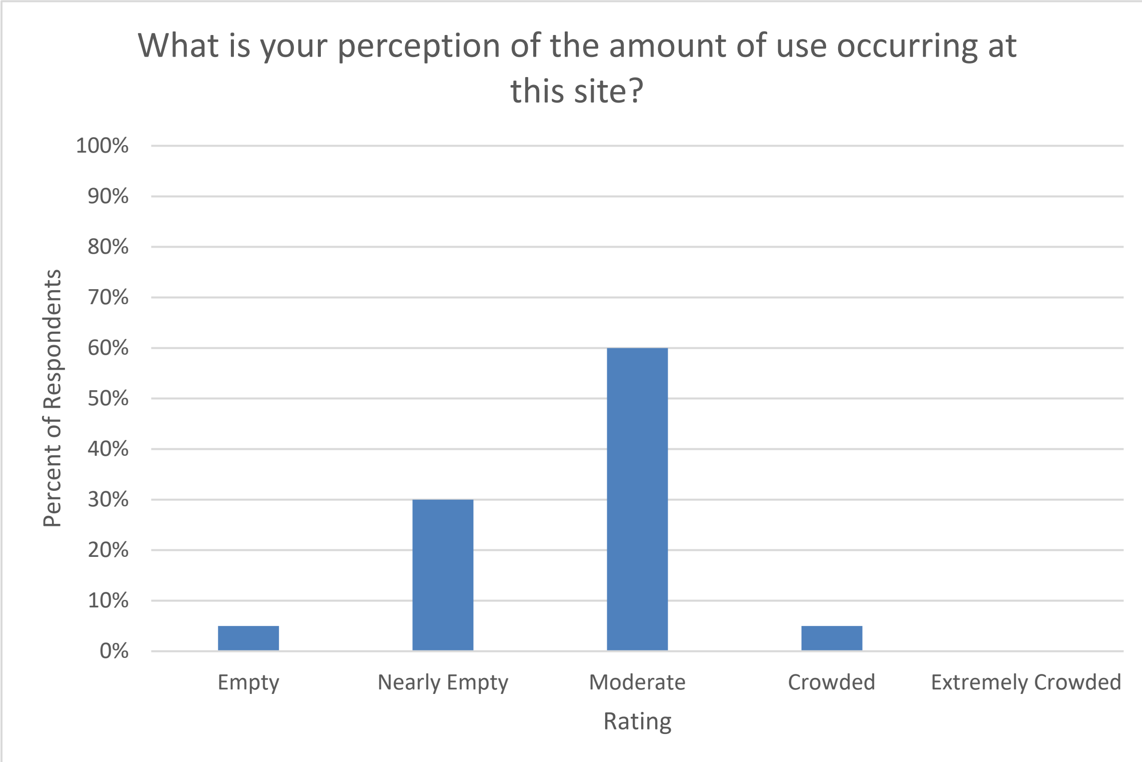


Figure 5.2.2-6: Attribute Ratings, Coffin Pond Recreation Area

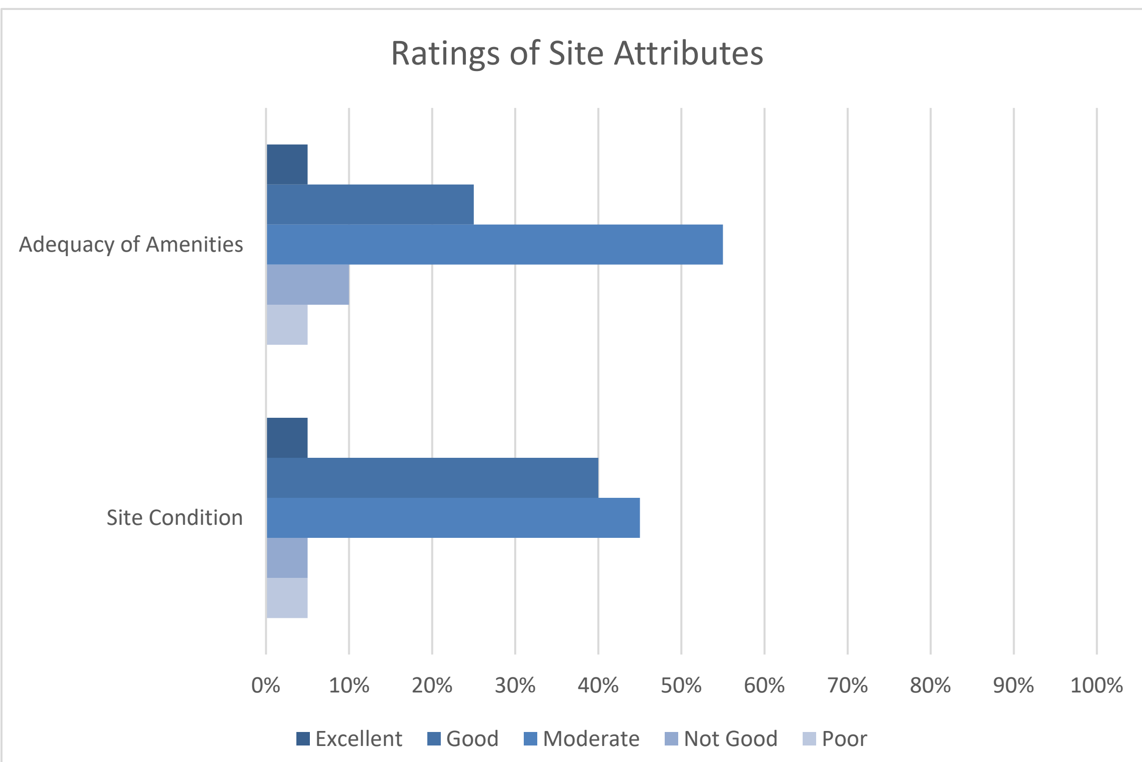


Figure 5.2.2-7: Place of Residence, Cities in Maine, Mill Street Canoe Portage

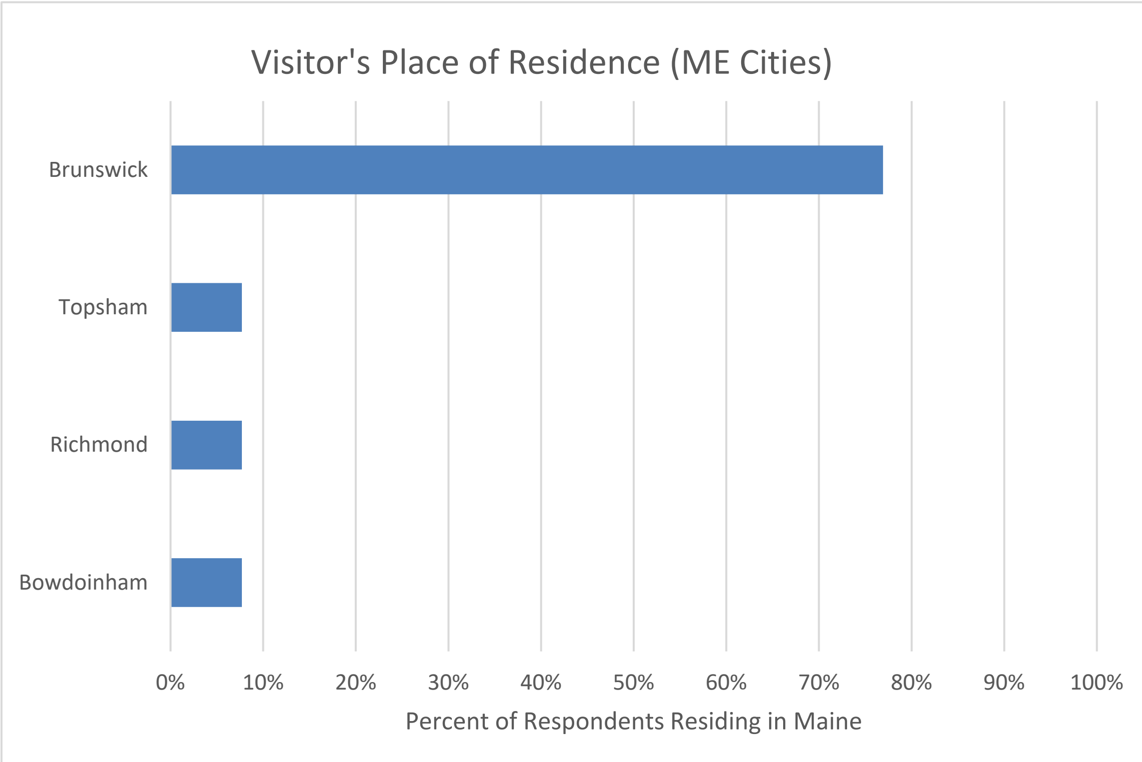


Figure 5.2.2-8: Mode of Transportation, Mill Street Canoe Portage

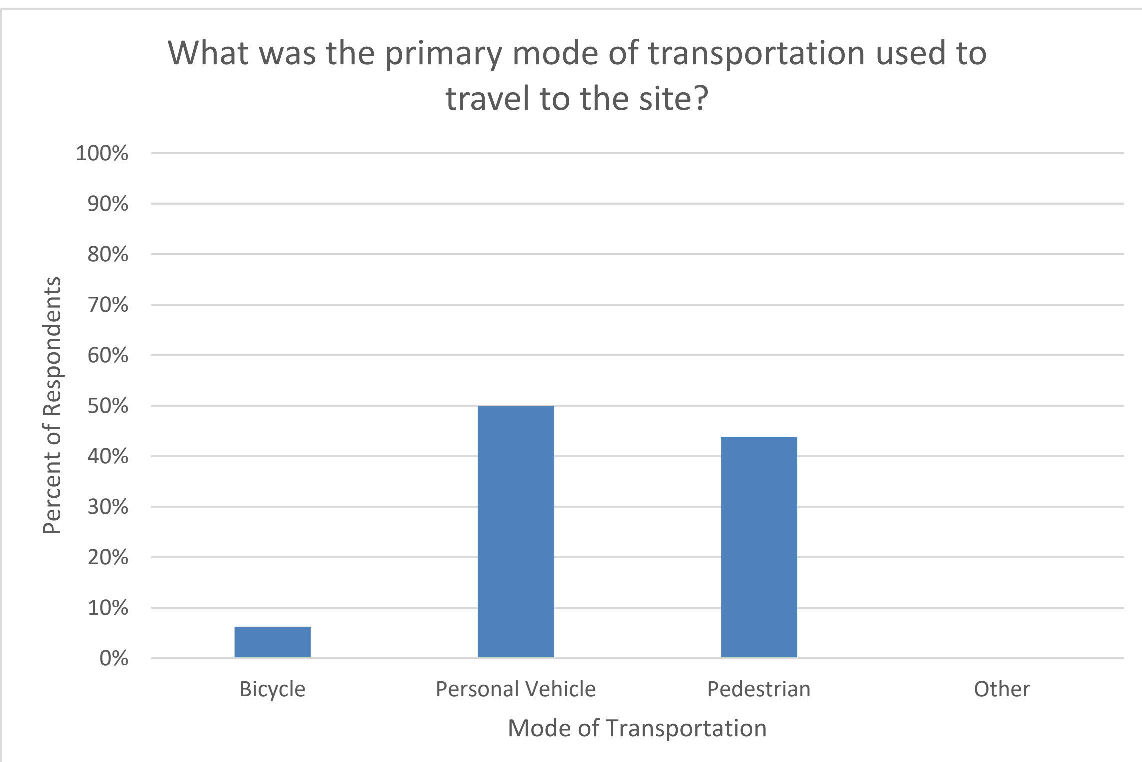


Figure 5.2.2-9: Seasonality of Visits, Mill Street Canoe Portage

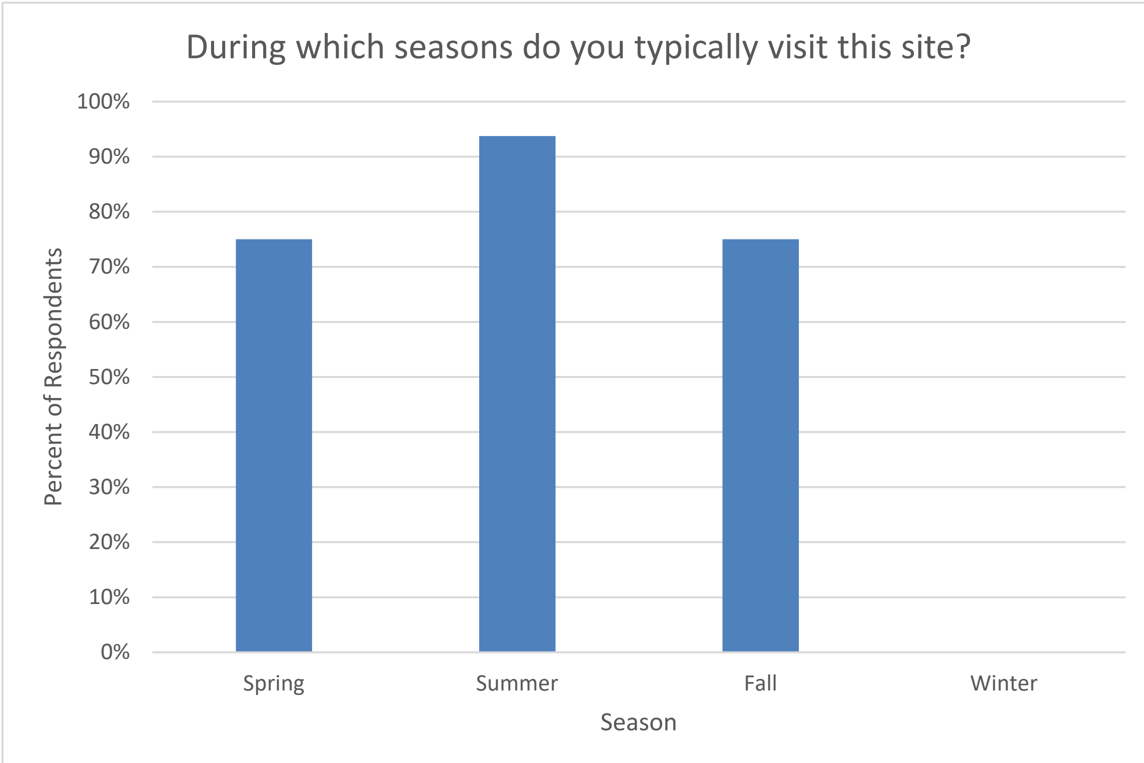


Figure 5.2.2-10: Recreational Activities, Mill Street Canoe Portage

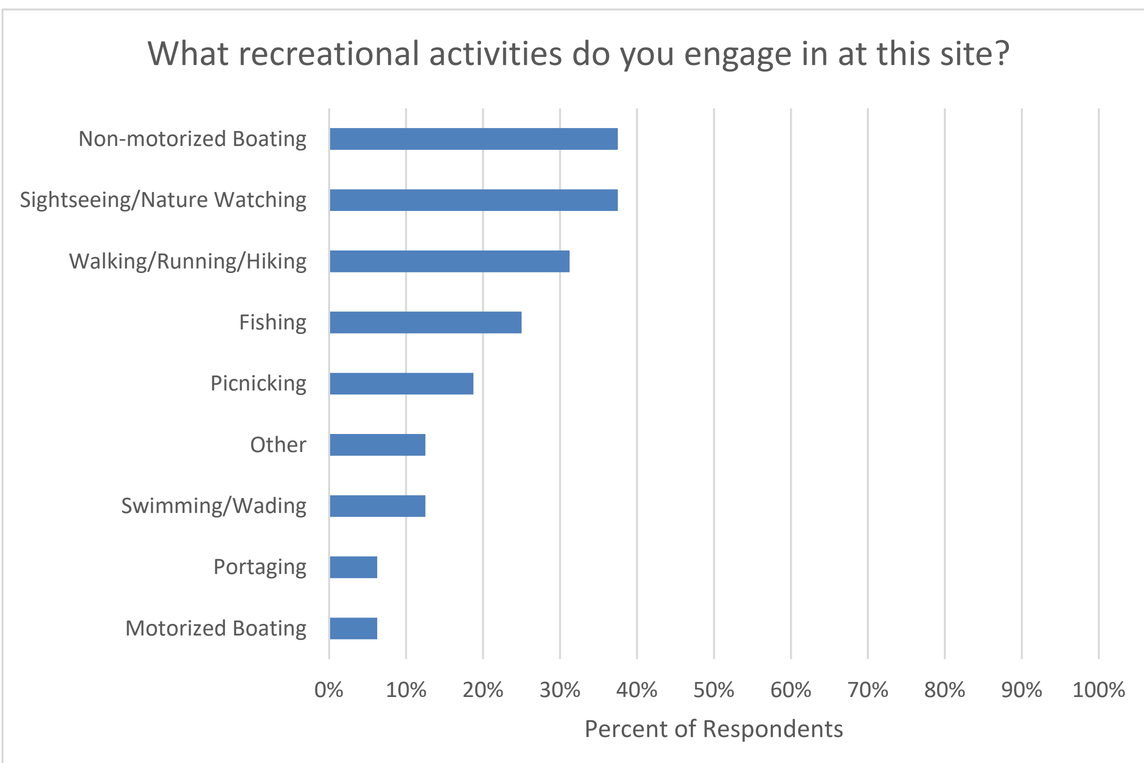


Figure 5.2.2-11: Use Perceptions, Mill Street Canoe Portage

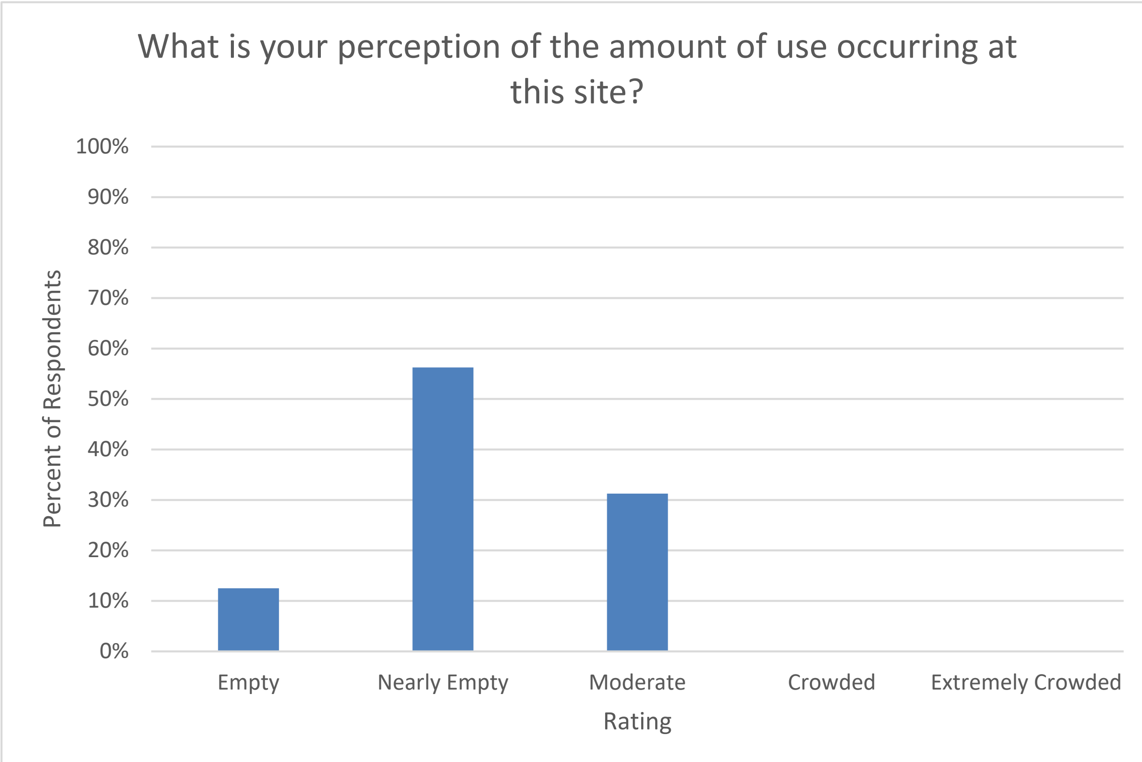


Figure 5.2.2-12: Attribute Ratings, Mill Street Canoe Portage

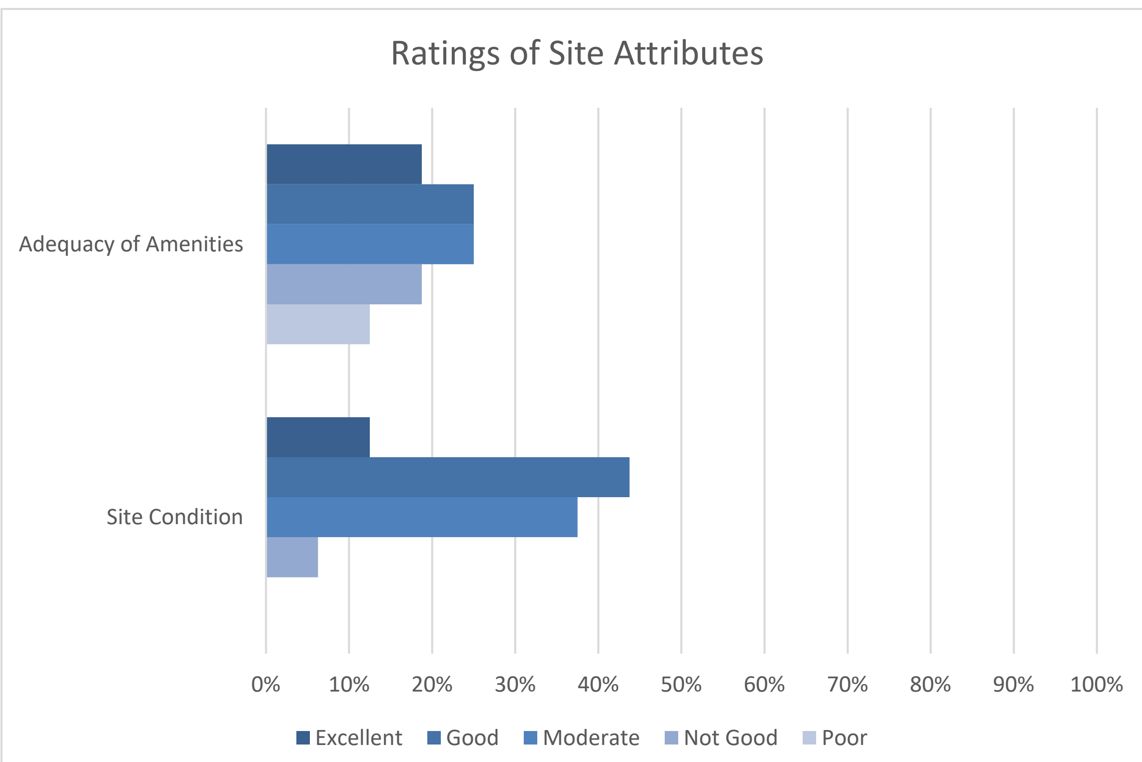


Figure 5.2.2-13: Place of Residence, Cities in Maine, Androscoggin Swinging Bridge

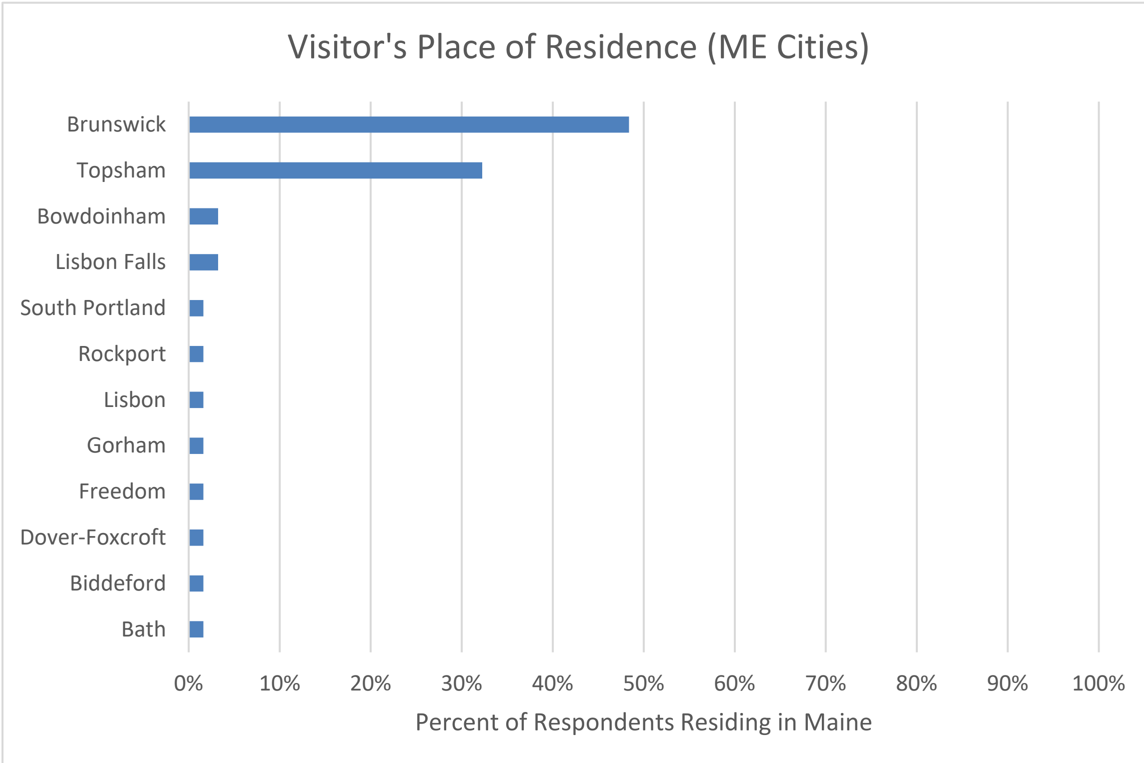


Figure 5.2.2-14: Mode of Transportation, Androscoggin Swinging Bridge

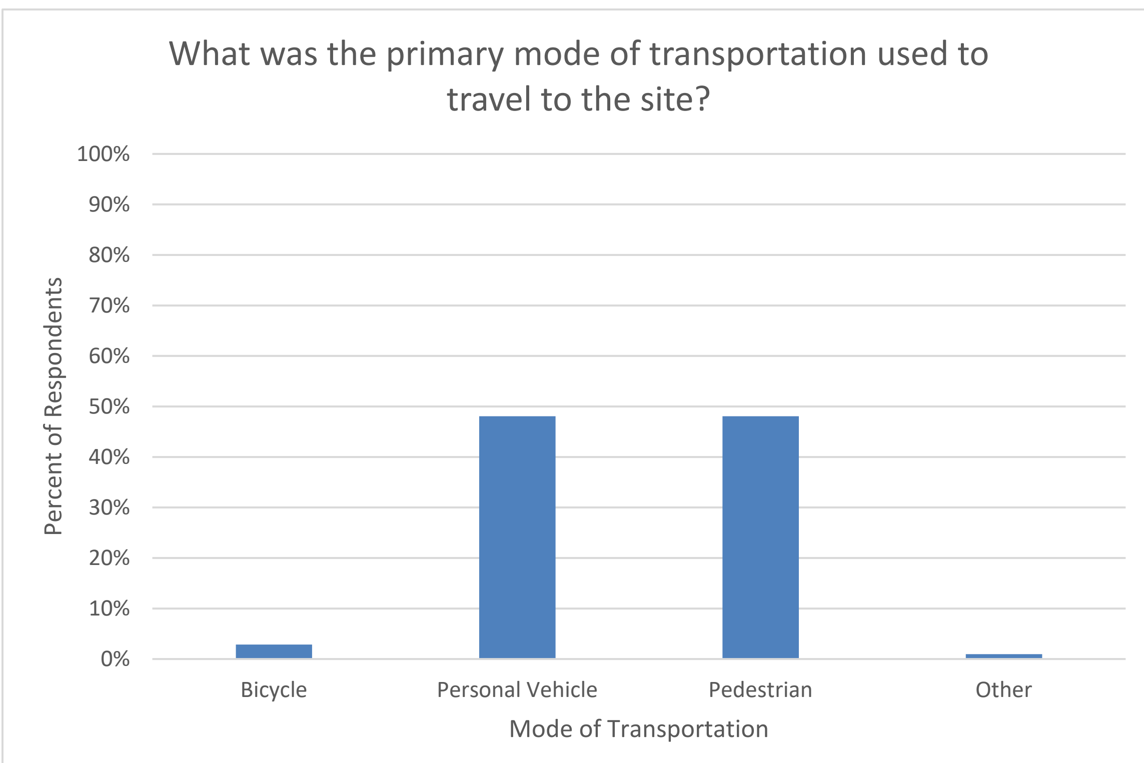


Figure 5.2.2-15: Seasonality of Visits, Androscoggin Swinging Bridge

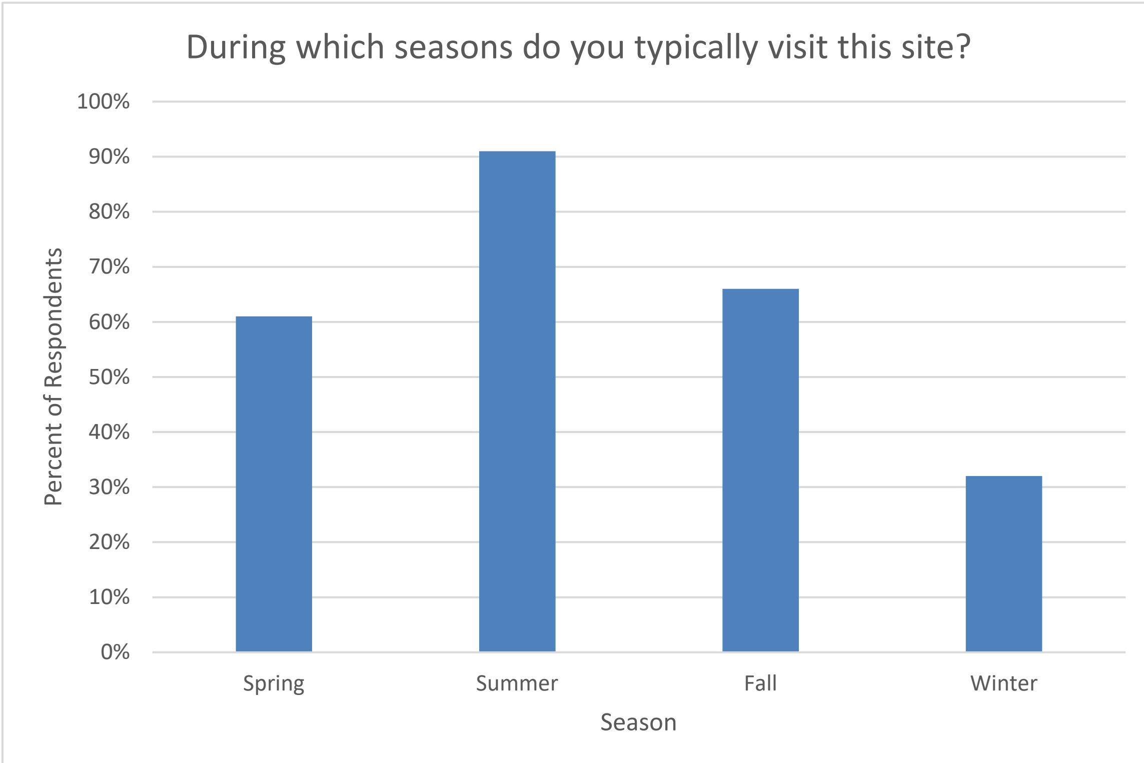


Figure 5.2.2-16: Recreational Activities, Androscoggin Swinging Bridge

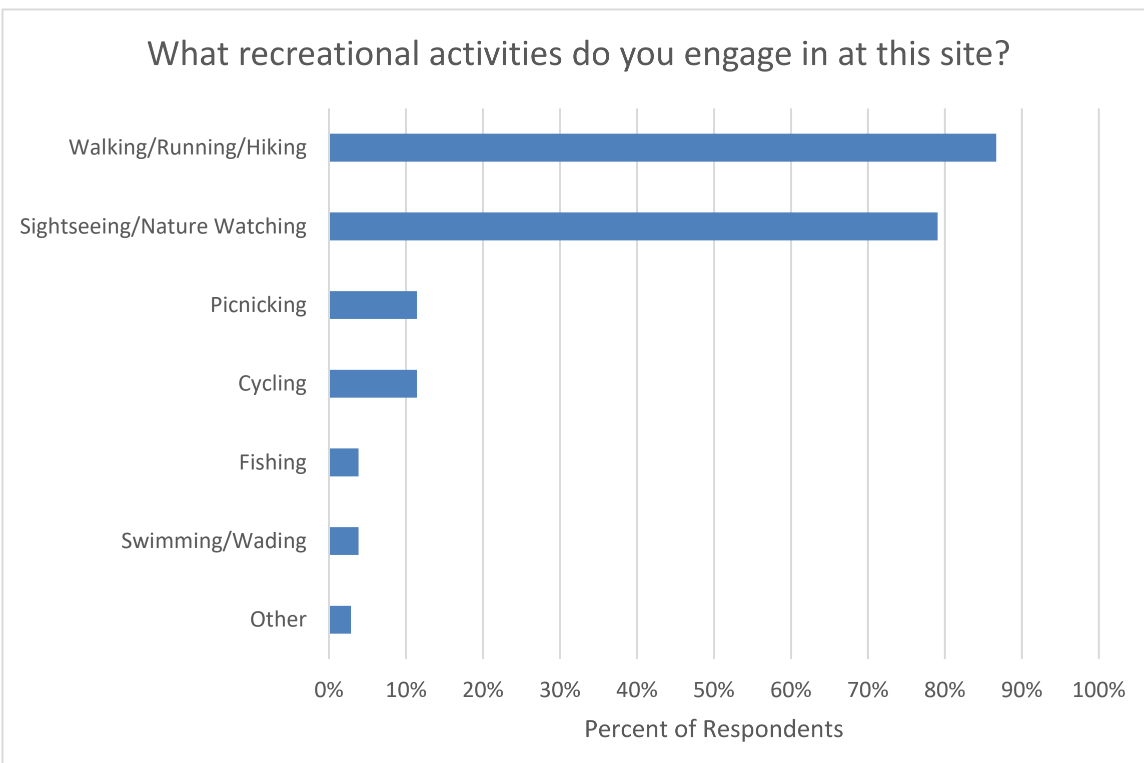


Figure 5.2.2-17: Use Perceptions, Androscoggin Swinging Bridge

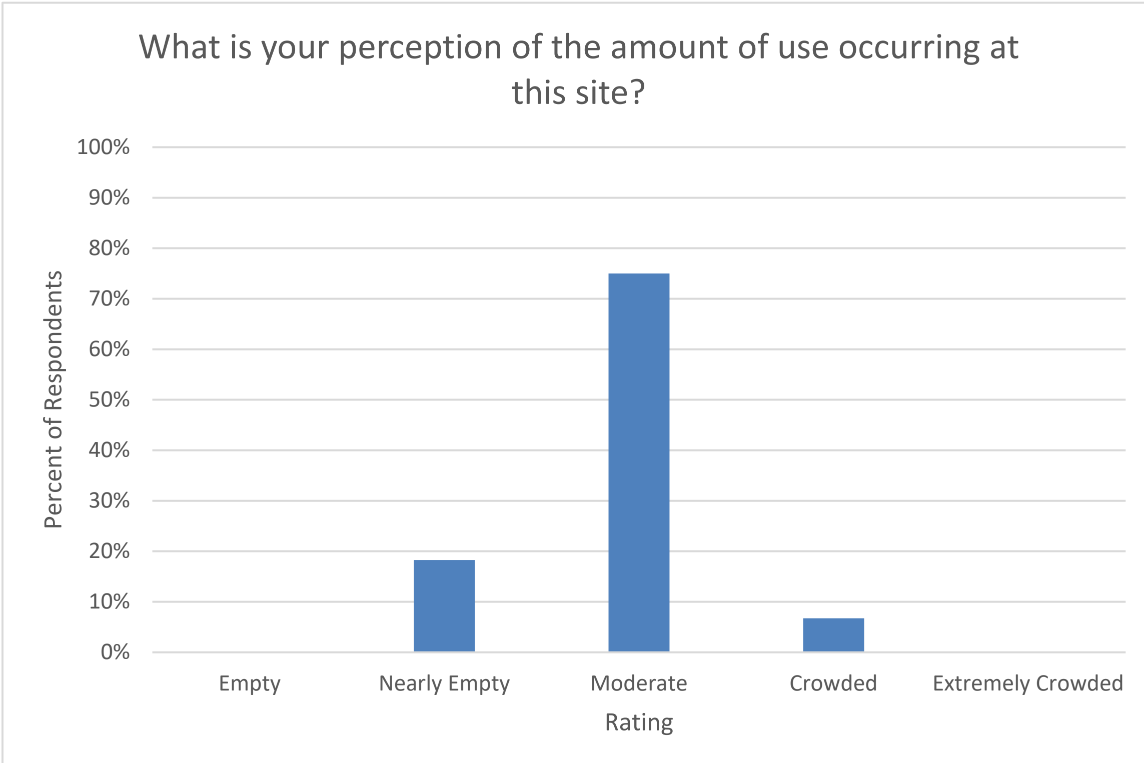


Figure 5.2.2-18: Attribute Ratings, Androscoggin Swinging Bridge

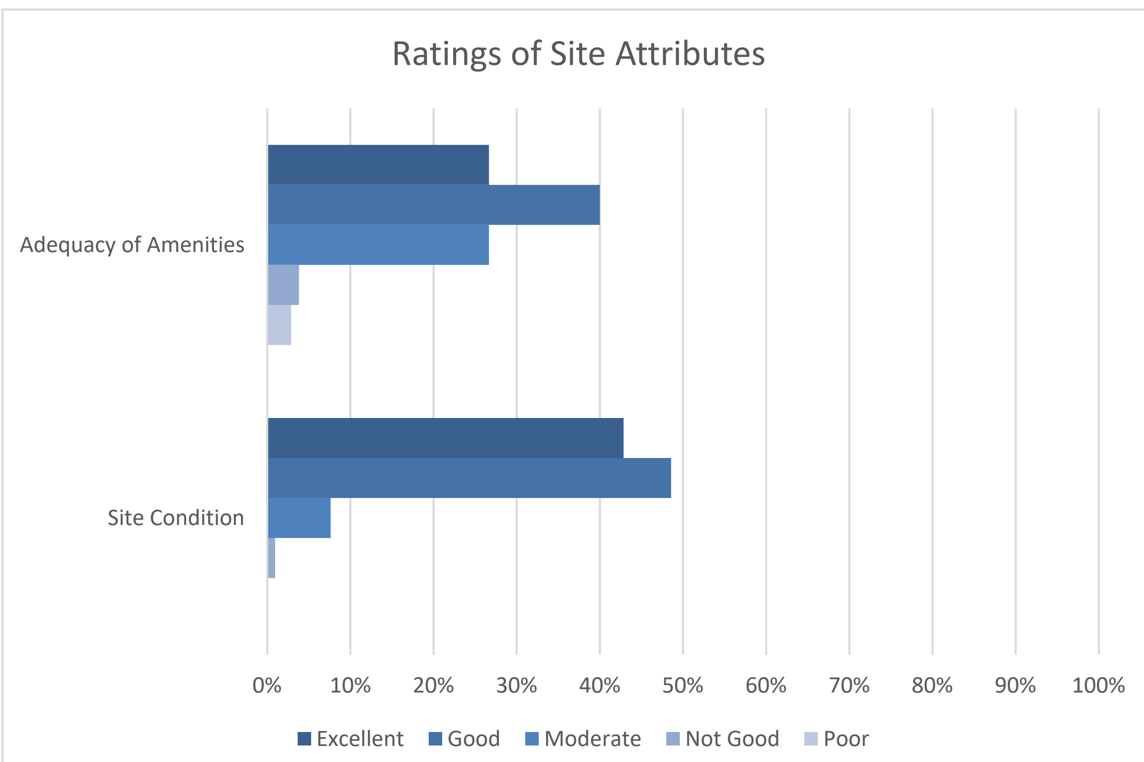


Figure 5.2.2-19: Place of Residence, Cities in Maine, Androscoggin Riverwalk

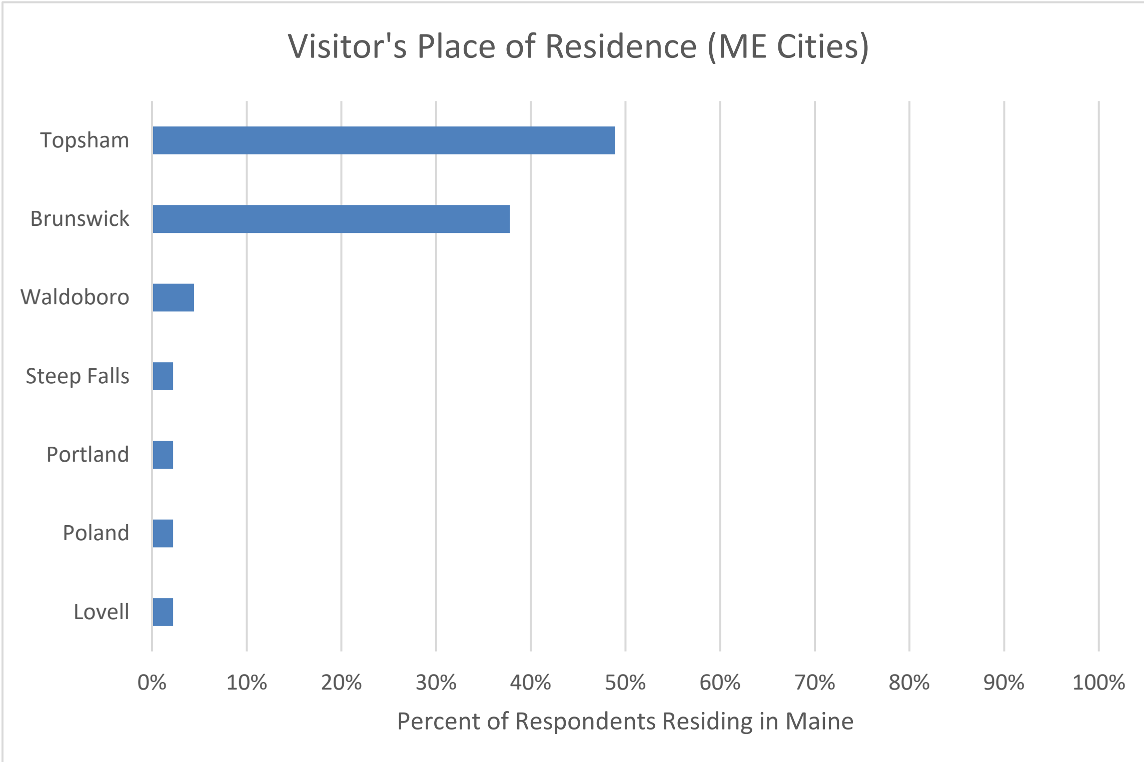


Figure 5.2.2-20: Mode of Transportation, Androscoggin Riverwalk

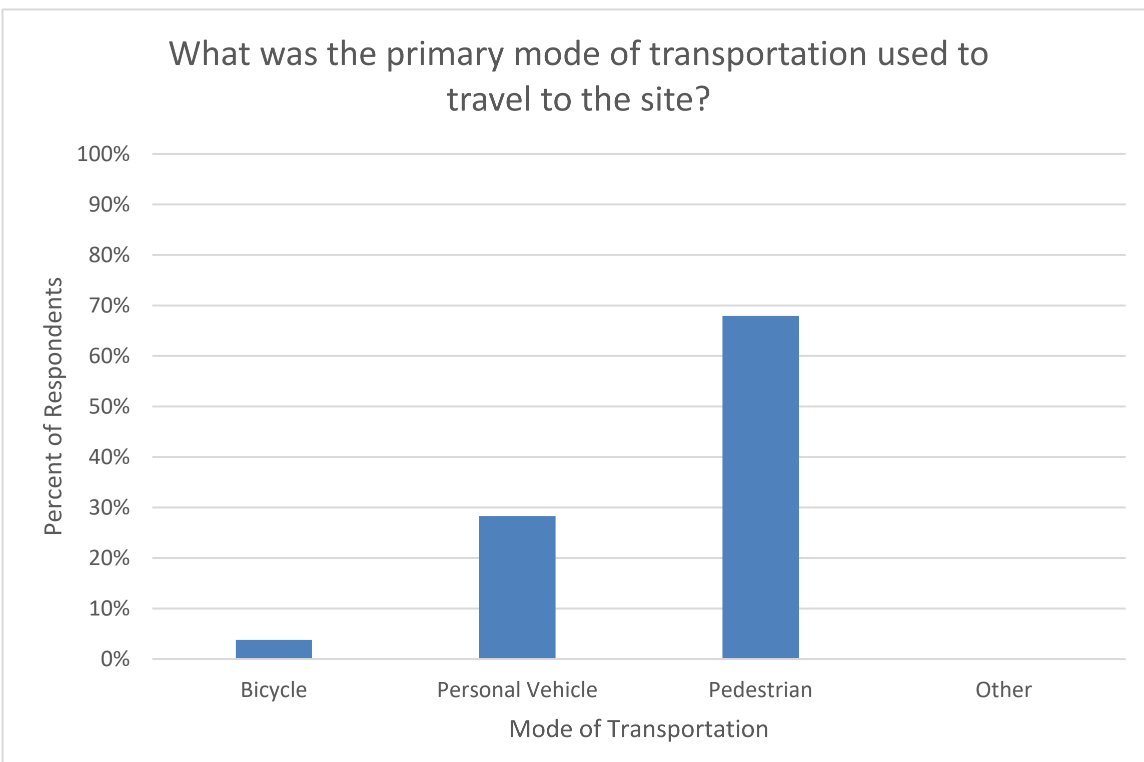


Figure 5.2.2-21: Seasonality of Visits, Androscoggin Riverwalk

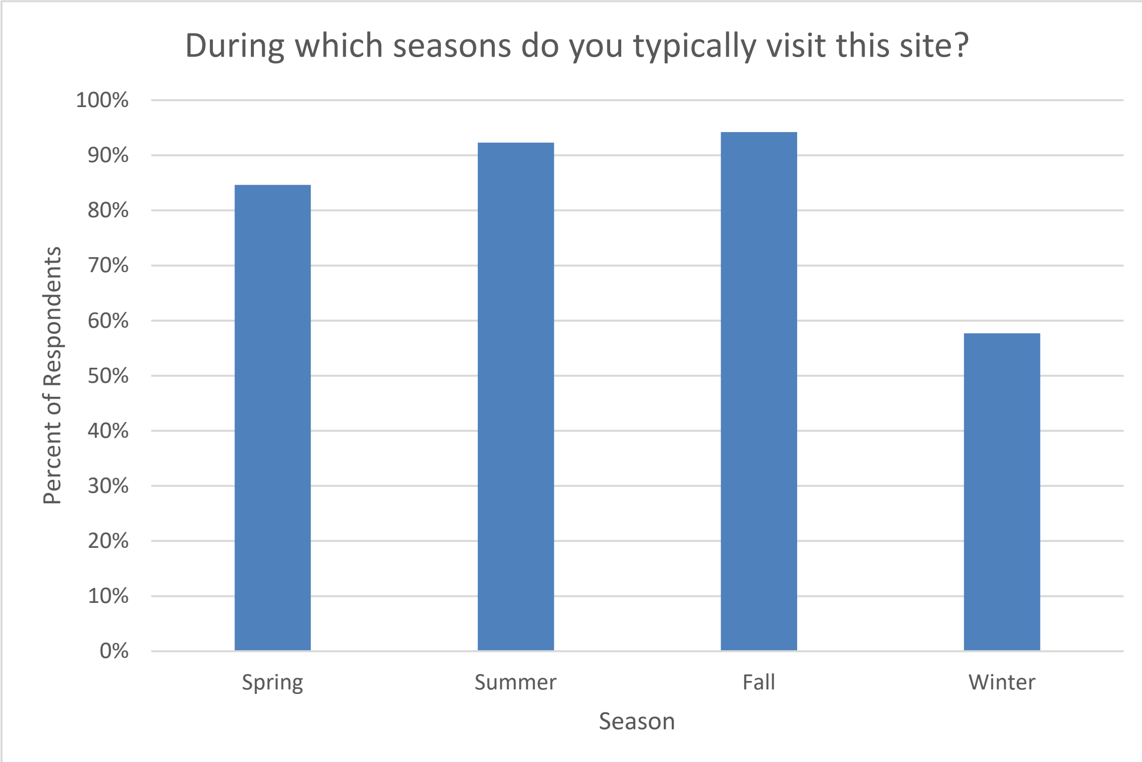


Figure 5.2.2-22: Recreational Activities, Androscoggin Riverwalk

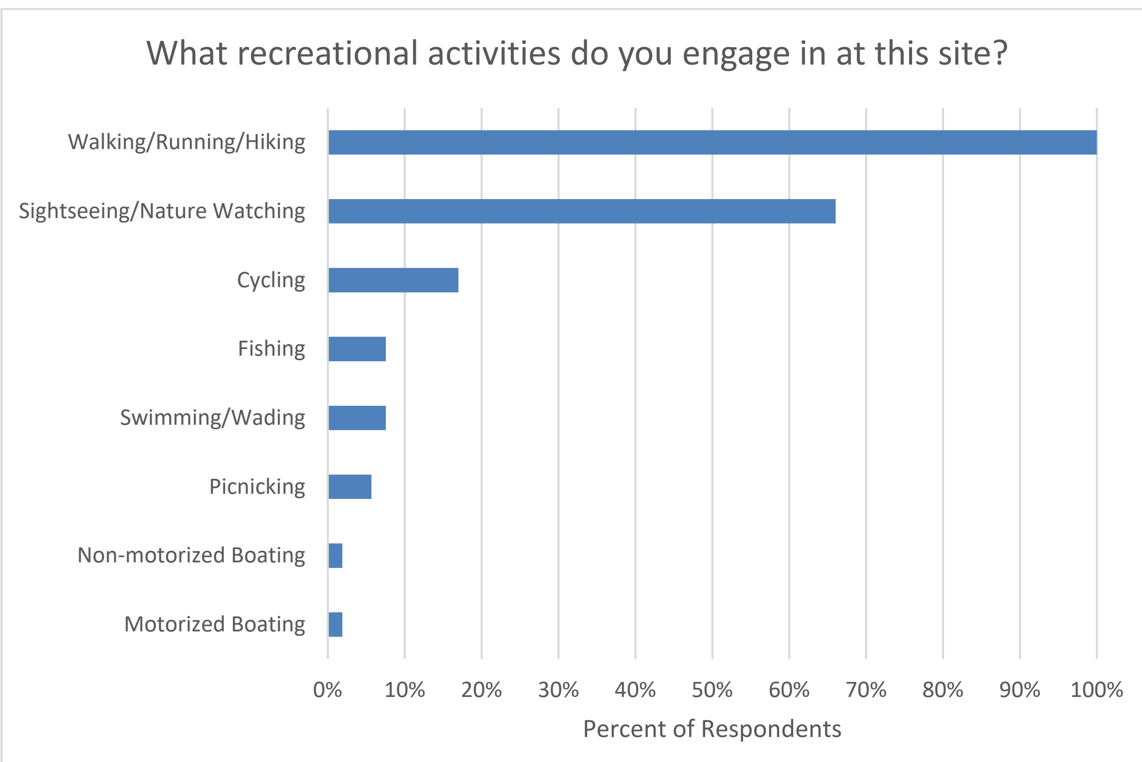


Figure 5.2.2-23: Use Perceptions, Androscoggin Riverwalk

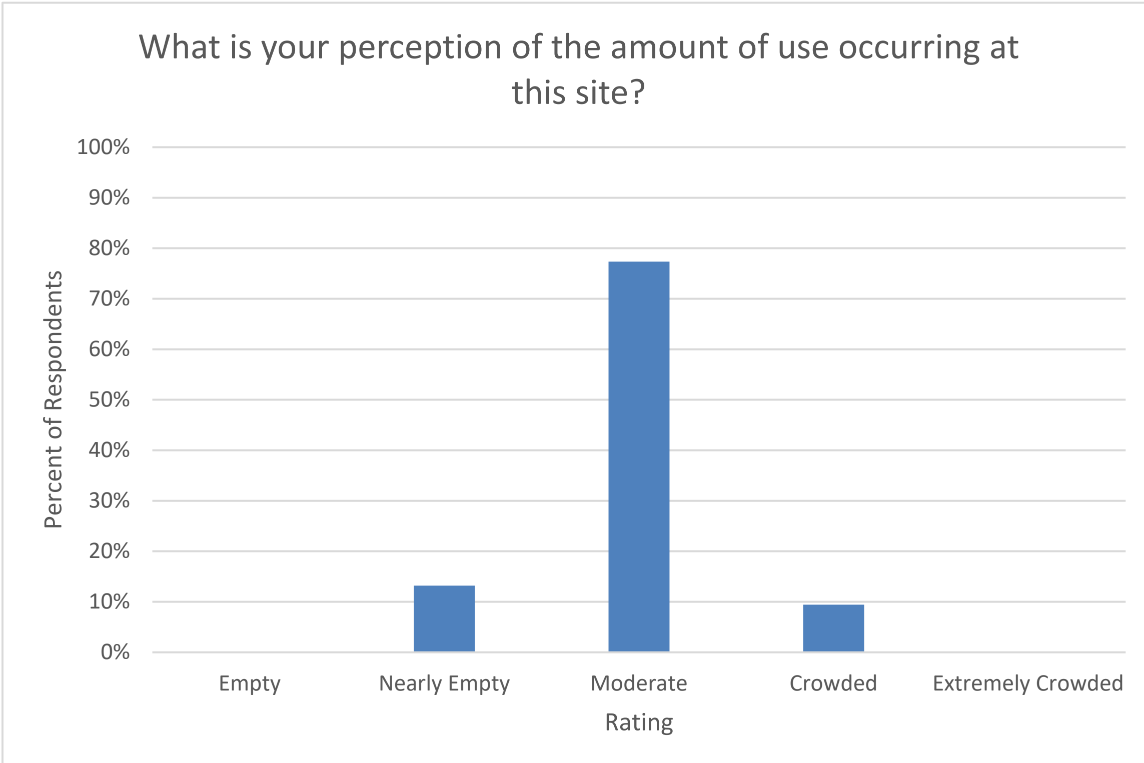


Figure 5.2.2-24: Attribute Ratings, Androscoggin Riverwalk

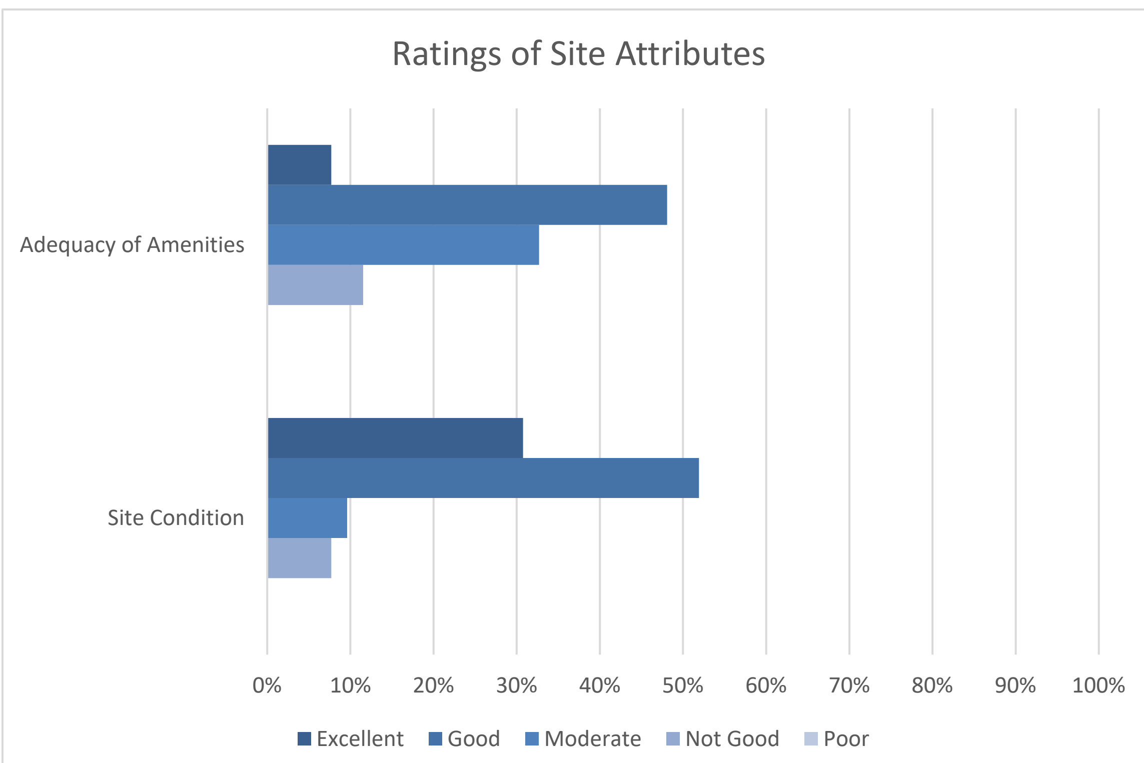


Figure 5.2.2-25: Place of Residence, Cities in Maine, Bridge to Bridge Trail

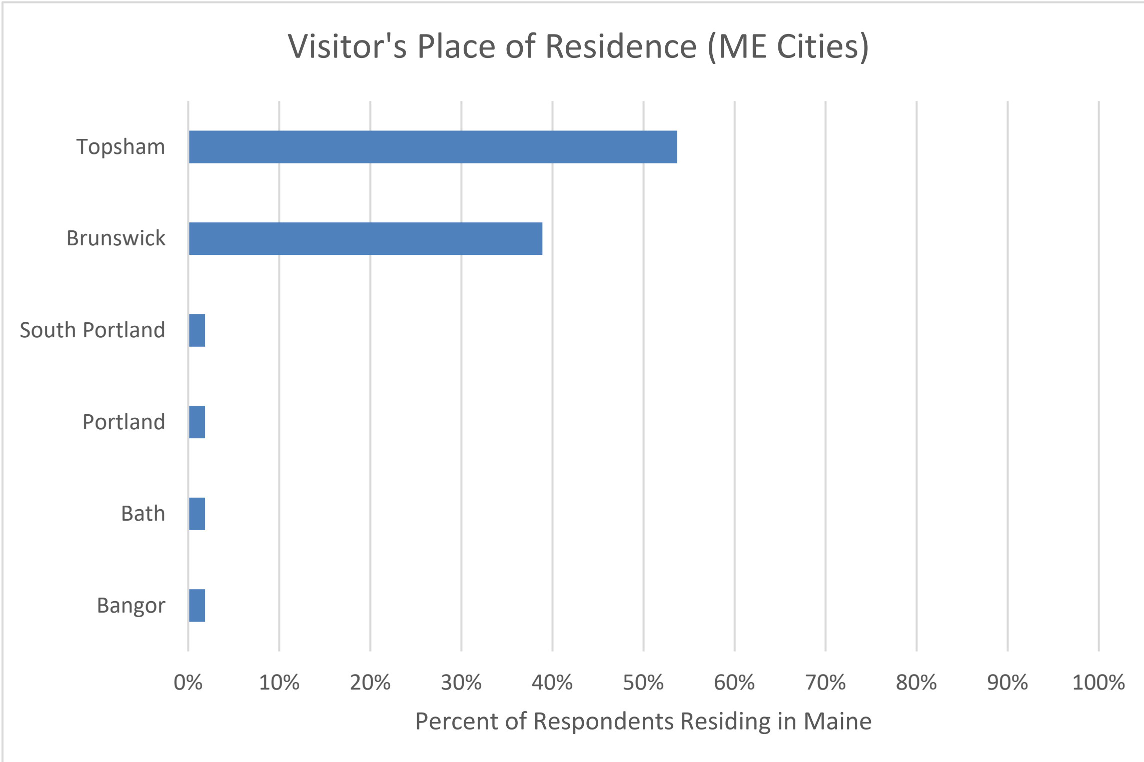


Figure 5.2.2-26: Mode of Transportation, Bridge to Bridge Trail

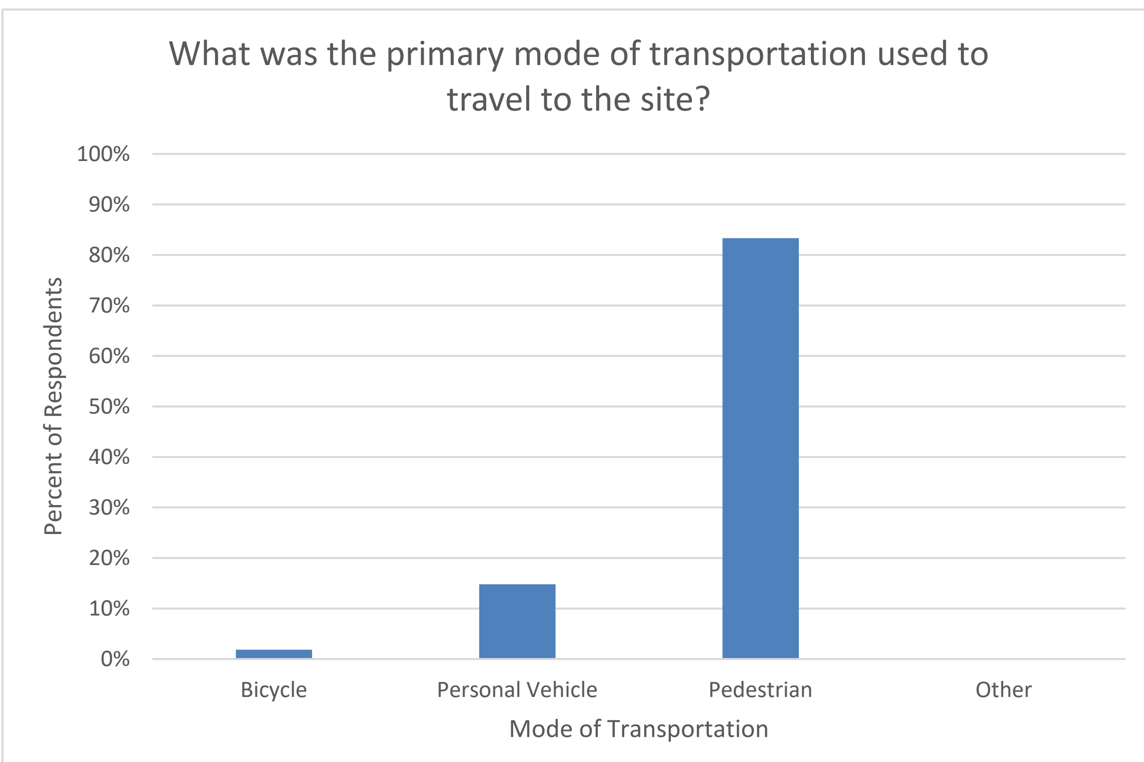


Figure 5.2.2-27: Seasonality of Visits, Bridge to Bridge Trail

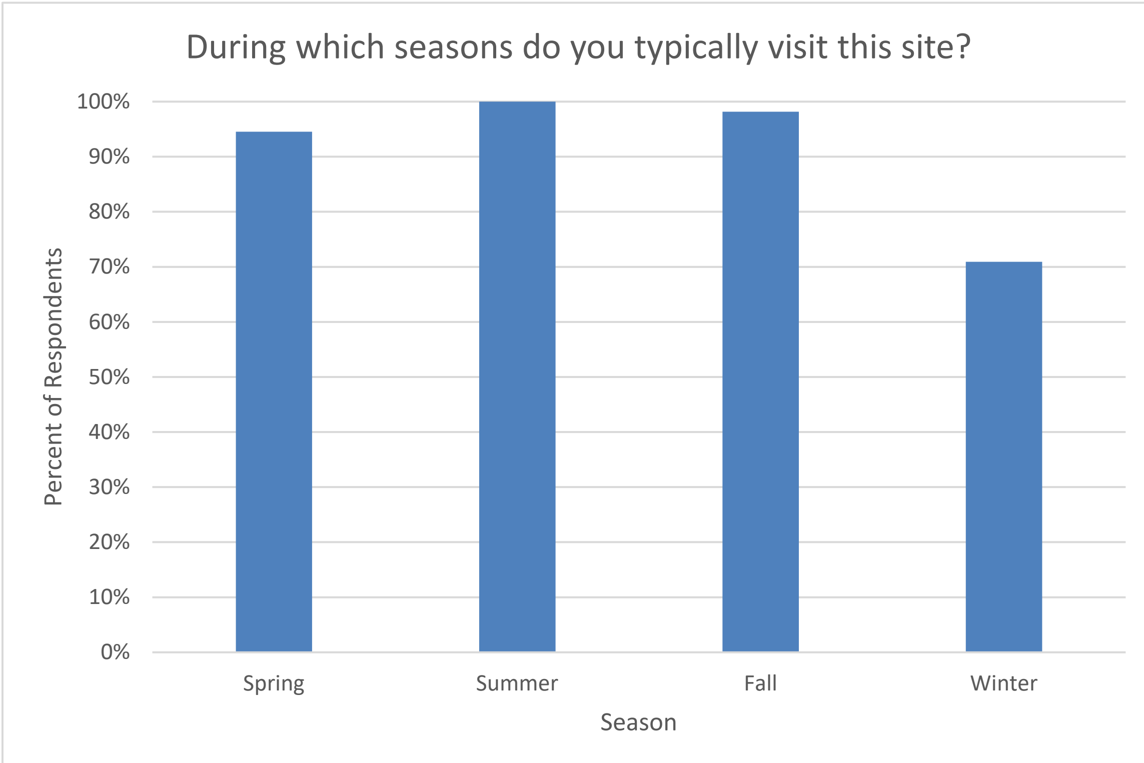


Figure 5.2.2-28: Recreational Activities, Bridge to Bridge Trail

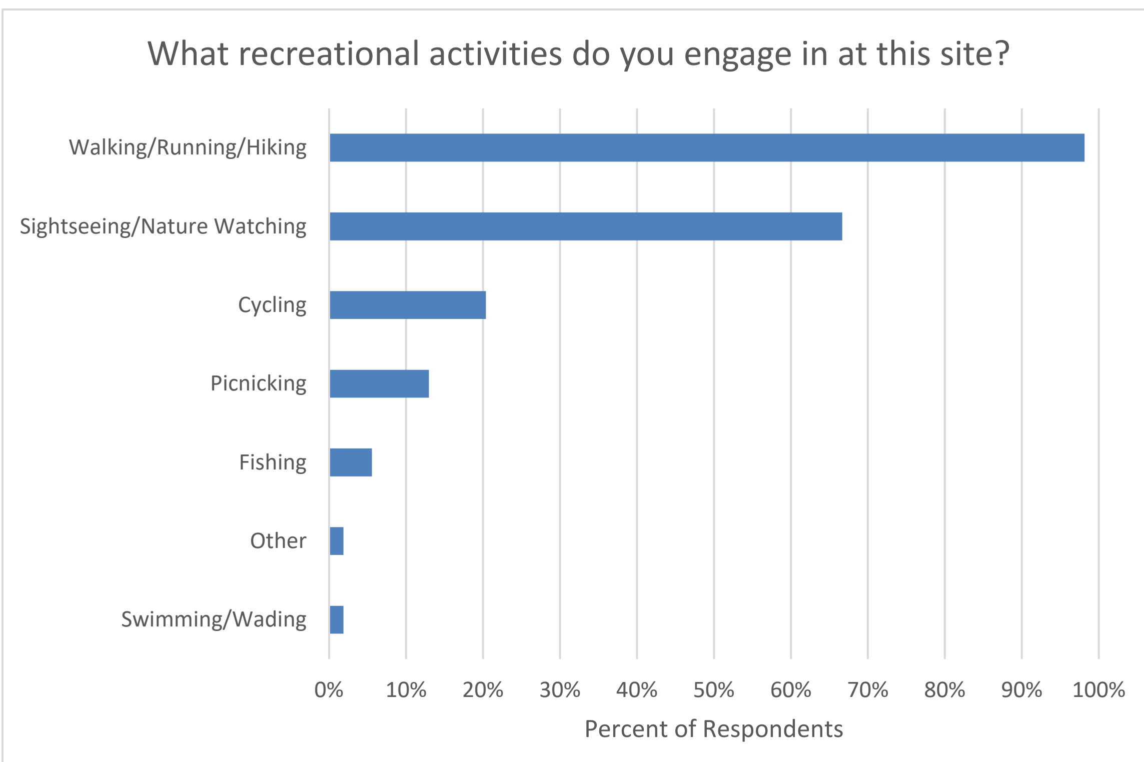


Figure 5.2.2-29: Use Perceptions, Bridge to Bridge Trail

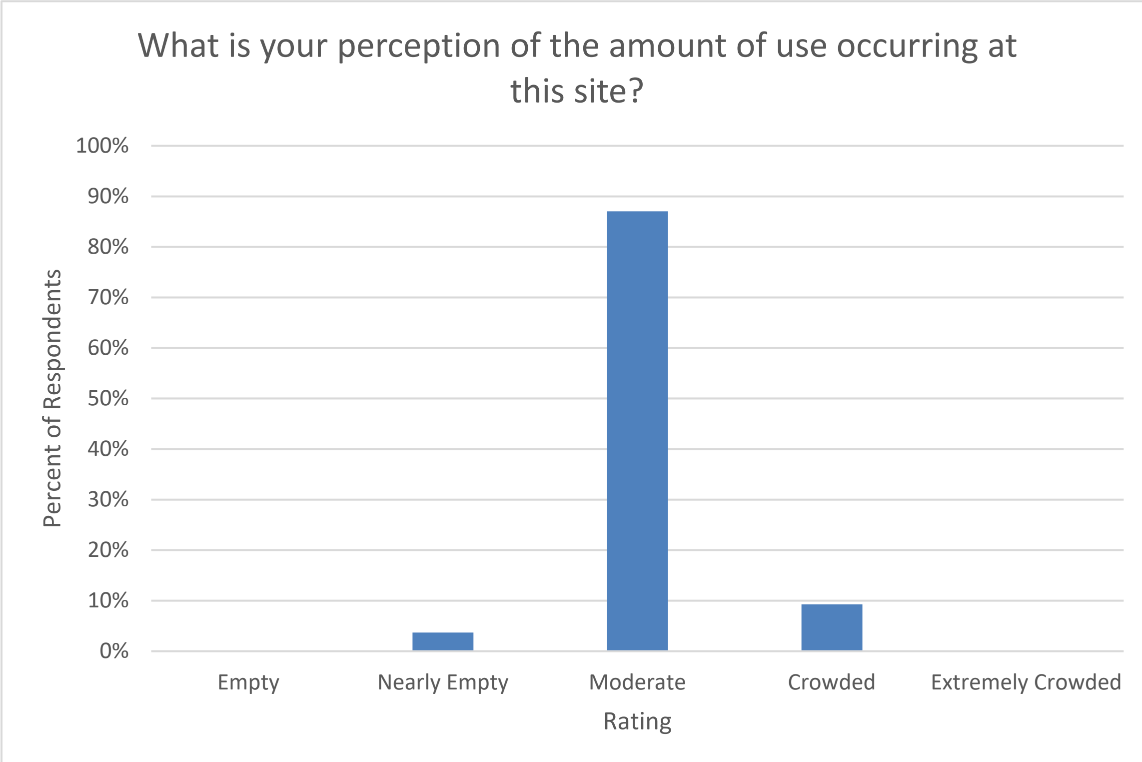
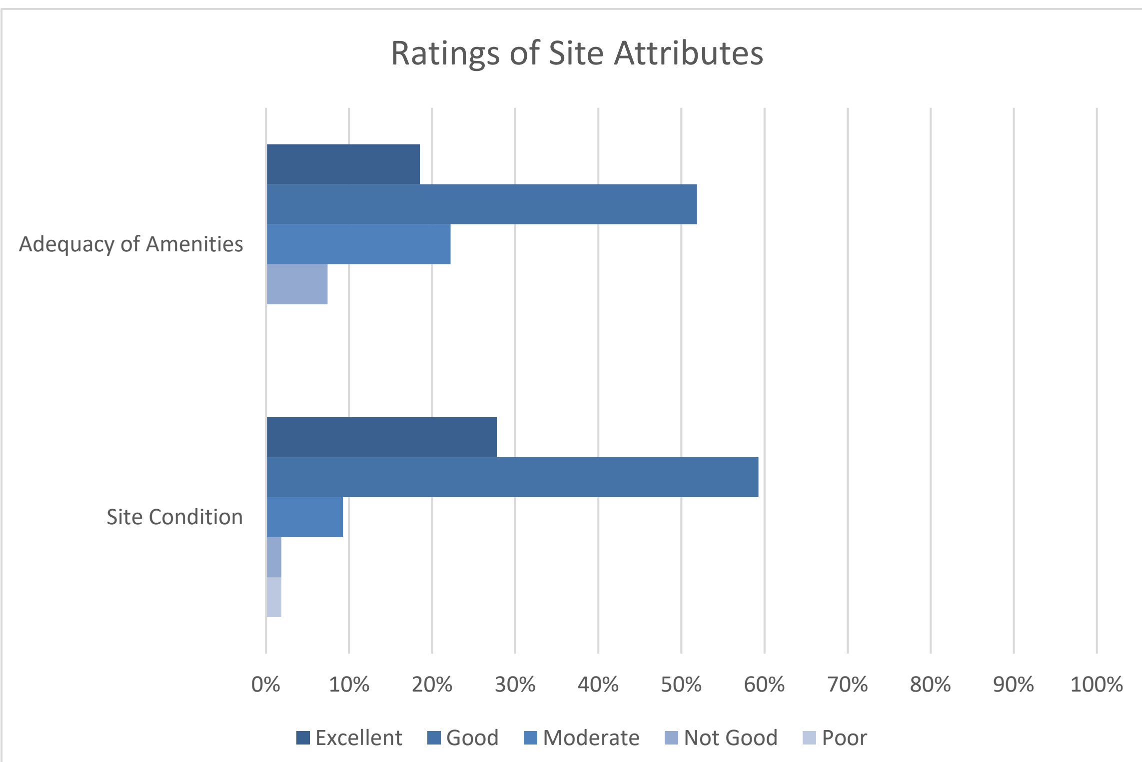


Figure 5.2.2-30: Attribute Ratings, Bridge to Bridge Trail



5.3 Impoundment Boat Access Evaluation

BWPH conducted a desktop assessment of existing opportunities and potential need for trailered boat access to the Project impoundment. This evaluation included a literature review and outreach to local recreation organizations with knowledge of boating conditions and opportunity in the Project impoundment. The following sections summarize the results.

5.3.1 Existing Boat Access

While hand-carry boat access to the Project impoundment is provided at Pejepscot Dam Recreation Area (described in Section 5.1.2.1) and Mill Street Canoe Portage (described in Section 5.1.2.3), there is currently no public trailered boat access to this section of the Androscoggin River.

The precast concrete boat ramp at Mill Street Canoe Portage is used for trailered boat access by the Town of Brunswick, generally as an emergency access, and by BWPH for Project-related operation and maintenance activities. Public use of the ramp for trailered boat access is blocked by a removable bollard. The bollard was erected at the request of the Town of Brunswick due to safety concerns over the proximity of the site to the Project boat barrier and shallow reservoir depths in the launch area (E. Deluca, personal communication, 3/13/25). The bollard is locked in place and is removed by Brookfield staff or Town emergency personnel when necessary for launching trailered boats.

Although there is no public trailered boat access to the Project impoundment, extensive access is available to the Androscoggin River upstream and downstream of the Project impoundment as well as to other bodies of water in the Project vicinity, including Merrymeeting Bay, Kennebec River, Cathance River, Harraseeket River, New Meadows Rivers, and Casco Bay. Figure 5.3.1-1 depicts public (non-commercial) trailered boat access locations within 10 miles of the Project[2]. As depicted, trailered boat access to the Androscoggin River upstream of the Project impoundment includes the following existing facilities within 10 miles of the Project:

- **Pejepscot Boat Ramp**: provides trailered boat access to the Androscoggin River approximately 6 miles northwest of the Project dam.
- **Miller Park/Papermill Trail**: provides barrier-free trailered boat access to the Sabattus River near its confluence with the Androscoggin River approximately 9 miles northwest of the Project dam. The site also provides restrooms and trail access.
- **Durham Boat Launch**: provides access to the Androscoggin River for small trailered boats approximately 10 miles northwest of the Project dam.

Trailered boat access to the Androscoggin River, Merrymeeting Bay, and Kennebec River downstream of the Project impoundment is provided at the following existing facilities within 10 miles of the Project:

- **Water Street Boat Landing**: provides trailered boat access to the Androscoggin River approximately 1 mile south of the Project impoundment. The site provides extensive parking, a dock, access to the Androscoggin River Bicycle Path, restrooms, and barrier-free access.

[2] Based on a desktop review of readily available online information. The information presented may not represent all available launches and may include launches unsuitable for launching trailered boats.

- **Bay Bridge Landing Wetland Park**: provides trailered boat access to Merrymeeting Bay, approximately 6 miles east of the Project dam. The site also provides trails and barrier-free access.

- **North End Boat Launch**: provides trailered boat access to the Kennebec River approximately 8 miles east of the Project dam. The site provides barrier-free access with two launch lanes, extensive parking, and a loading dock.

- **Morse Cove Boat Launch**: provides trailered boat access to the Kennebec River approximately 9 miles east of the Project dam. The site provides barrier-free access, parking, and a loading dock.

- **South End Boat Launch**: provides trailered boat access to the Kennebec River approximately 8 miles east of the Project dam. The site provides barrier-free access with two launch lanes, extensive parking, and a loading dock.

Trailered boat access to other bodies of water within 10 miles of the Project include the following public facilities:

- **Maquoit Landing** (Wharton Point Landing): provides trailered boat access to Maquoit Bay, approximately 4 miles southwest of the Project dam.

- **Mere Point Boat Launch**: provides trailered boat access to Northern Casco Bay, approximately 7 miles south of the Project dam. The site provides paved parking for 55 vehicles with trailers, two boat launch ramps and a dock, restrooms, and barrier-free access.

- **Princes Point Landing**: provides trailered boat access to the New Meadows River, Long Reach, and Harpswell Sound, approximately 6 miles southeast of the Project dam.

- **Cathance River Boat Ramp**: provides barrier-free trailered boat access to the Cathance River approximately 8 miles east of the Project dam.

- **Sawyer Park**: provides trailered boat access to the New Meadows River approximately 6 miles east of the Project dam. The site also provides picnic areas, a dock, parking for 40 vehicles (including 33 vehicles with trailers), and restrooms.

- **New Meadows Lake Boat Ramp**: provides trailered boat access to the New Meadows River approximately 6 miles east of the Project dam.

- **Town Landing Boat Launch**: provides trailered boat access to the New Meadows River approximately 6 miles east of the Project dam, just across the river from Sawyer Park boat ramp.

- **Porters Landing Public Boat Launch**: provides hand-carry boat access to the Harraseeket River approximately 8 miles southwest of the Project dam. The site provides parking and loading docks.

- **Lookout Point Landing**: provides trailered boat access to Middle Bay approximately 8 miles south of the Project dam.

- **Bethel Point Landing**: provides trailered boat access to Quahog Bay approximately 9 miles southeast of the Project dam.

- **Holbrook Street Landing**: provides trailered boat access to Casco Bay approximately 9 miles southeast of the Project dam.

- **Hildreth Road Landing**: provides trailered boat access to Casco Bay approximately 7 miles south of the Project dam.

In addition to the above-listed public facilities, several commercial marinas provide trailered boat access and docking facilities in the Project vicinity.

Use of the two trailered boat launches upstream of the Project impoundment (Pejepscot Boat Ramp and Durham Boat Ram) was evaluated within the past 5 years as part of the relicensing of the hydroelectric projects with which each launch is affiliated (Pejepscot Project and Lewiston Falls Project[3], respectively). Both launches were found to be utilized at well under site capacity, with relatively low usage for launching of trailered boats. Pejepscot Boat Ramp was found to be used at approximately 25 percent of site capacity on average non-peak weekends from Memorial Day weekend through Columbus Day weekend. Peak use observed was on Labor Day when the site was used at 50 percent of parking capacity. Motorized boating accounted for just 16 percent of site use, estimated at 517 recreation days (Topsham Hydro Partners, 2020). Durham Boat Launch was found to be used at approximately 21 percent of capacity on average non-peak weekends from Memorial Day weekend through Labor Day weekend. Peak utilization observed was 32 percent of parking capacity. Boating, including both motorized and non-motorized use, accounted for 26 percent of site use, estimated at 687 recreation days. Just 15 percent of vehicles observed at the site were towing a boat trailer (BWPH, 2020).

5.3.2 Outreach

5.3.2.1 Structured Interviews

As discussed in Section 4.3, BWPH solicited information on existing opportunities and potential need for trailered boat access to the Project impoundment from local recreation organizations via a structured interview form. Responses were received from representatives of the following organizations:

- Town of Brunswick
- Town of Topsham
- Maine Council of Trout Unlimited[4]
- Trout Unlimited, Merrymeeting Bay Chapter
- FOMB

Completed interview forms and the correspondence record are included in Appendix B. Respondents generally are local residents and/or officials familiar with the Project area. Most are familiar with the Project impoundment and existing recreational facilities providing access to it and have personally boated on the impoundment. Only one respondent had not personally boated on the Project impoundment, but that respondent is familiar with the river upstream and downstream from the impoundment. All respondents are aware of others having boated on the Project impoundment. Respondents report having used or being aware of others having used a variety of hand-carry and small trailered boats on the

[3] Lewiston Falls Hydroelectric Project (FERC No. 2302).
[4] The representative of the Sebago Lake Chapter indicated that he would respond on behalf of the Maine Council of Trout Unlimited (see Appendix B).

impoundment, generally at low to medium flows typically encountered during the boating season (late spring/early summer to autumn).

When asked if the Project impoundment provides a satisfactory boating experience for trailered boats, most answered in the negative and cited the lack of a public boat launch serving trailered boats as the reason. FOMB stated that the impoundment is “marginal” for trailered boats due to shallow depths and submerged obstacles.

When asked if there are features unique to the Project impoundment that make it more appealing for trailered boat use than the upstream or downstream sections of the Androscoggin River, three of the five respondents answered in the affirmative. Reasons included a productive smallmouth bass fishery, large northern pike, and relative lack of development allowing for sightseeing and wildlife viewing opportunities. FOMB responded in the negative, and the Town of Topsham indicated that other launches in the vicinity are acceptable for launching trailered boats.

When asked if there are safety concerns for the use of trailered boats unique to the Project impoundment, most responses focused on safety concerns specific to the use of the Mill Street Canoe Portage boat launch, including the launch’s proximity to the boat barrier, strong currents just downstream from the launch, and the shallow depths at the launch site. Only one respondent identified hazards specific to the impoundment; namely, shallow depths and unmarked submerged hazards near the I-295 bridge.

When asked if trailered boat access to the Project impoundment is warranted, all respondents responded affirmatively. Reasons included increased fishing opportunities, additional access for commercial guide services, and the need for emergency access[5]. The Town of Brunswick indicated that the Town regularly receives complaints regarding the lack of trailered boat access to the Project impoundment.

Structured interview respondents in cases provided additional feedback and suggested Protection, Mitigation, and Enhancement (PME) measures; however, the goal of this evaluation as discussed in Section 2 and Section 4.3 was to assess existing opportunities and potential need for trailered boat access to the Project impoundment and evaluate whether there is a need for additional and/or enhanced access. BWPH will consider suggested PME measures as appropriate during preparation of the FERC license application.

[5] Note that emergency access is currently provided for at Mill Street Canoe Portage.

GOMEZ AND SULLIVAN ENGINEERS

CATARACT HYDROELECTRIC PROJECT
INITIAL STUDY REPORT
FERC NO. 2528

N

0 1.5 3 6 Miles

Figure 5.3.1-1:
Existing Public Trailered Boat Access within 10 Miles of the Project

Path: D:\Brookfield\02456\GIS\Maps\studies\rec_study\rec_study.aprx

6 SUMMARY

The results of the Recreation Facilities And Use Assessment provide a comprehensive assessment of recreational opportunities in the Project area. Primary data collection methods for the study included a field inventory and condition assessment, recreational user surveys, and an impoundment boat access evaluation based on outreach and literature review. The methodology provided updated information on recreation sites and amenities in the study area, including the sites' operation, current condition, parking capacity, activities supported, accessibility, and general use patterns, as well as user perceptions of various site attributes.

Several existing recreation sites provide public access within and abutting the Project boundary. Three Project recreation sites (250th Anniversary Park, Summer Street Overlook, and the Fishway Viewing Area) provide access and views adjacent to and immediately downstream of the Project dam. These facilities provide sightseeing, picnicking, wildlife viewing, fishing, paddling, and trail-based opportunities. In addition, several non-Project recreation sites provide access along the Project impoundment, including Pejepscot Dam Recreation Area, Coffin Pond Recreation Area, Mill Street Canoe Portage, Androscoggin Swinging Bridge, Androscoggin Riverwalk, and Bridge to Bridge Trail. These sites provide additional sightseeing, picnicking, wildlife viewing, fishing, paddling, and trail-based opportunities, as well as playgrounds and a small pond for swimming and ice skating. A designated portage route connects Mill Street Canoe Portage and 250th Anniversary Park, allowing for hand-carry boat access upstream and downstream of the Project dam.

During the field inventory all Project recreation sites were found to be in good or fair condition. Minor maintenance and repair issues were identified at 250th Anniversary Park, including trail erosion, graffiti, littering, and vegetation encroachment. At the Fishway Viewing Area, construction activities related to the replacement of the Frank J. Wood Bridge had closed the parking area and obscured the entrance signage. Some minor maintenance issues were also identified in the viewing room. Summer Street Overlook was found to be in good condition. Non-Project recreation sites were generally found to be in good overall condition. The portage route was found to be generally well marked except for the upstream extent within Mill Street Canoe Portage and the downstream extent from the intersection of Mill and Maine Streets to the put-in within 250th Anniversary Park.

Recreational user survey responses characterized use of the Project and non-Project sites in the study area. Responses indicate that most Project area recreation site users are local residents. Average visits per year ranged from 10 to 173, with respondents engaging primarily in sightseeing, nature watching, and trail-based activities. Picnicking, fishing, and non-motorized boating were also popular activities. Most sites are primarily accessed on foot, although access by personal vehicle was still relatively common. Few respondents report traveling to the sites by bicycle. Users generally found all Project area recreation sites to be moderately well utilized but not crowded, although Mill Street Canoe Portage and the Fishway Viewing Area were found by most users to be nearly empty.

User perceptions of the adequacy of site amenities and overall site condition varied considerably between the various sites, and users provided a wide range of suggestions for improving all sites within the Project area; however, most respondents found that the Project area recreation sites met their recreational needs. The exception was the Fishway Viewing Area, which respondents found to be difficult to locate and often closed. This may in part be due to construction of the Frank J. Wood Bridge, which impacted the site entrance and parking area during the study season, and limitations on when the site is open to the public.

Few survey respondents identified a need for motorized boat access to the Project impoundment. Access for hand-carry boats is provided at the upstream and downstream extents of the Project impoundment. Access for trailered boats is available at 20 public boat launches within 10 miles of the Project, including three public boat launches providing access to comparable stretches of river upstream of the Project impoundment and the Water Street Boat Landing less than a mile from the Project dam. Previous studies indicate that at least two of the three upstream launches see relatively low usage for trailered boat launching and have ample capacity for existing and likely future demand.

Although structured interview respondents state that there is a need for trailered boat access to the Project impoundment, the relatively low usage of the nearby upstream launches and the extensive opportunity provided downstream indicate otherwise. Ample access for trailered boats is provided in the Project vicinity. Additional trailered boat access would therefore likely be underutilized, and adding trailered/motorized access would be detrimental to the non-motorized user experience.

7 VARIANCES FROM THE FERC APPROVED STUDY PLAN

BWPH conducted the study in accordance with the approved study plan with no variances.

8 REFERENCES

Brookfield White Pine Hydro, LLC (BWPH). 2023. Lewiston Falls Hydroelectric Project (FERC No. 2302) Relicensing Study Report. March 2, 2023. FERC Accession Number 20230302-5205.

Maine Department of Transportation (MDOT). No Date. Frank J. Wood Bridge Replacement Project. [Online] URL: https://www.maine.gov/dot/major-projects/frank-j-wood-bridge. Accessed on 9/25/2025.

Topsham Hydro Partners Limited Partnership (Topsham Hydro). 2020. Recreation Facilities Inventory and Public Recreation Use Assessment, Pejepscot Hydroelectric Project (FERC No. 4784). July 10, 2020. FERC Accession Number 20200710-5191.

Topsham Hydro Partners Limited Partnership (Topsham Hydro). 2024. Pejepscot Project, FERC No. 4784-ME; Recreation Management Plan Facility Improvement Photo Documentation. December 2, 2024. FERC Accession Number 20241202-5053.

APPENDIX A – USER SURVEY

APPENDIX A – USER SURVEY

Brunswick Hydroelectric Project Recreation Survey

Brookfield White Pine Hydro LLC owns and operates the Brunswick Hydroelectric Project, which is licensed by the Federal Energy Regulatory Commission (FERC). The current operating license for the Project expires on February 28, 2029. Brookfield White Pine Hydro will file its application with FERC for a new license for continued Project operation no later than February 28, 2027.

As part of this relicensing project, Brookfield White Pine Hydro is conducting resource studies to enable FERC to prepare its environmental review document and develop a new operating license. The purpose of this survey is to gather information regarding participation in outdoor recreation activities in the Brunswick Hydroelectric Project vicinity.

Next

Page 1 of 3

Site Selection

Recreation Sites near the Brunswick Hydroelectric Project

Using the map provided above, please select the recreation site for which you would like to provide feedback.*

◯ 250th Anniversary Park	◯ Fishway Viewing Area	◯ Summer Street Overlook
◯ Coffin Pond Recreation Area	◯ Mill Street Canoe Portage	◯ Bridge to Bridge Trail
◯ Androscoggin Riverwalk	◯ Swinging Bridge Park	

Have you previously participated in this survey effort for the selected site?*

Yes

No

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What is your age?

What is your ZIP code?

On what date did you last visit the selected site?*

MM/DD/YYYY

How many people were in your group, including yourself?

What mode of transportation did you use to reach this site?

- ○ Motor Vehicle
- ○ Bicycle
- ○ Walking
- ○ Other

What recreational activities do you engage in at this site?

Select all that apply

- ☐ Walking/Running/Hiking
- ☐ Sightseeing/Nature Watching
- ☐ Picnicking
- ☐ Fishing
- ☐ Swimming/Wading
- ☐ Cycling
- ☐ Portaging
- ☐ Launching a Nonmotorized Boat
- ☐ Launching a Motorized Boat
- ☐ Other

Approximately how many times per year do you typically visit this site for recreational purposes?

During which seasons do you typically visit this site?

Select all that apply

- ☐ Spring
- ☐ Summer
- ☐ Fall
- ☐ Winter

Please rate the overall condition of this site.

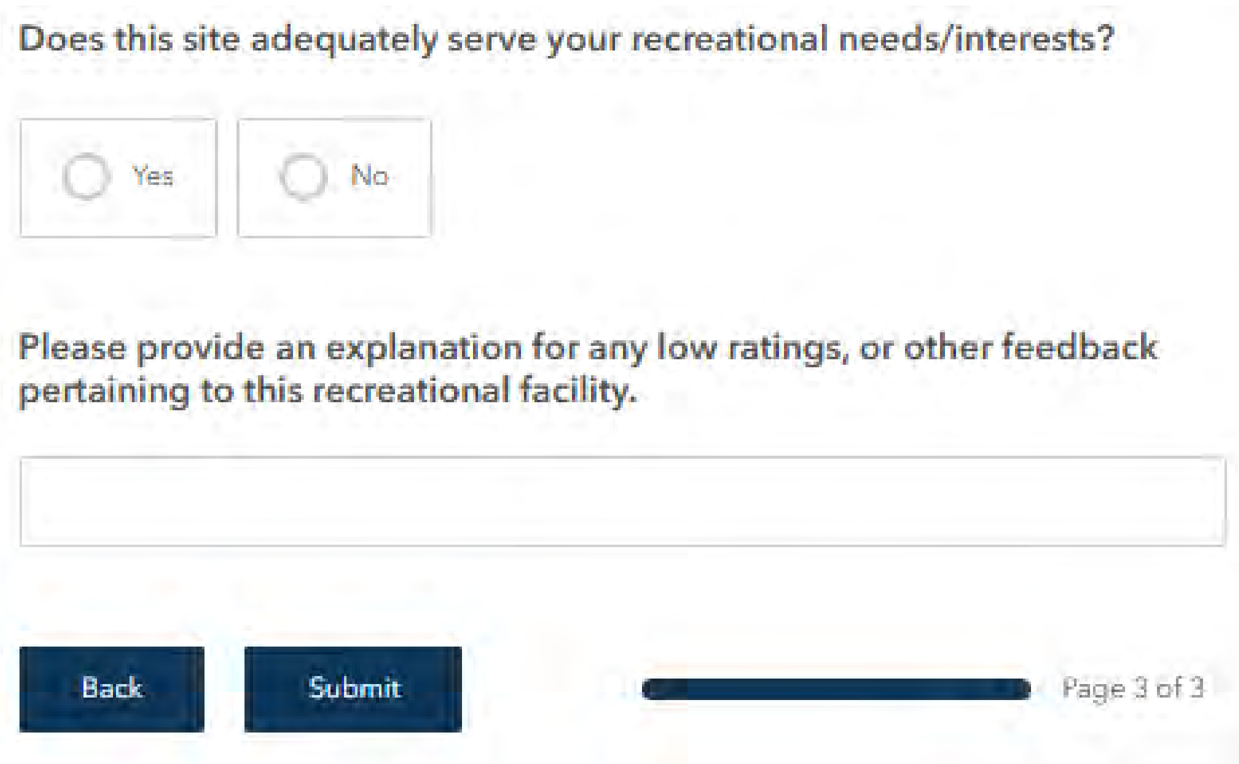
- ○ 1 (Poor)
- ○ 2 (Not Good)
- ○ 3 (Moderate)
- ○ 4 (Good)
- ○ 5 (Excellent)

Please rate the adequacy of facilities or amenities provided at this site (e.g., parking, boat launch, signs, etc.).

- ○ 1 (Poor)
- ○ 2 (Not Good)
- ○ 3 (Moderate)
- ○ 4 (Good)
- ○ 5 (Excellent)

What is your perception of the amount of use occurring at this site?

- ○ Empty
- ○ Nearly Empty
- ○ Moderate
- ○ Crowded
- ○ Extremely Crowded



Does this site adequately serve your recreational needs/interests?

Yes

No

Please provide an explanation for any low ratings, or other feedback pertaining to this recreational facility.

Back

Submit

Page 3 of 3

APPENDIX B – CORRESPONDENCE RECORD

Town of Brunswick

From:	Melanie Rheaume
To:	"jhenze@brunswickme.org"
Cc:	"tfarrell@brunswickme.org"; Scarzello, Michael; Kirk Smith
Subject:	Brunswick Hydroelectric Project Recreation Survey
Date:	Tuesday, April 22, 2025 2:04:00 PM
Attachments:	Brunswick Project Rec Survey Site Map.JPG image001.png

Julia Henze, Brunswick Town Manager:

Brookfield White Pine Hydro (BWPH) is planning to conduct an online recreation user survey at the Brunswick Hydroelectric Project as part of the relicensing of the Project with the Federal Energy Regulatory Commission (FERC). Signs directing visitors to the survey will be posted at Project and select non-Project recreation sites per the Revised Study Plan filed with FERC on December 2, 2024. The Project recreation sites included in the survey effort are as follows:

- 250th Anniversary Park
- Fishway Viewing Area
- Summer Street Overlook

In addition to the above FERC-approved Project recreation sites, BWPH has proposed to include the following non-Project recreation sites providing public recreational access within or adjacent to the Project boundary:

- Coffin Pond Recreation Area
- Mill Street Canoe Portage
- Androscoggin Swinging Bridge
- Androscoggin Riverwalk
- Bridge to Bridge Trail

The locations of the above sites are depicted in the attached figure. The online survey will be open from Memorial Day weekend through Columbus Day and will be advertised at the selected sites via temporary signage, pending permission to post the signs at sites not owned by BWPH. The signs will be 9"x12" and mounted on temporary fencing posts at strategic locations at each site to capture visitors' attention. BWPH will periodically inspect signs and repair or replace missing or damaged signs as necessary.

BWPH respectfully requests permission from the Town of Brunswick to erect signage at the above-listed sites for which the Town has ownership and/or operational responsibility. Based on available information, we understand that to include 250th Anniversary Park, Coffin Pond Recreation Area, Mill Street Canoe Portage, Androscoggin Swinging Bridge, and the Androscoggin Riverwalk within the Town boundary.

In addition to advertising the survey onsite, BWPH has committed to providing a link to the survey to the Towns of Brunswick and Topsham to allow for posting and dissemination of the survey to residents and user groups familiar with the recreation sites. BWPH is in the process of finalizing the survey and will provide the link prior to Memorial Day weekend.

Please call or email me with any questions or concerns. We would appreciate a response within the next two weeks if possible to allow time for planning and procuring the appropriate signs and supplies.

Thank you,

Melanie Rheaume
Recreation/Land Use Planner
Gomez and Sullivan Engineers, DPC
PO Box 2179 | Henniker, NH 03242
O: (603) 428-4960 | D: (716) 402-6773
mrheaume@gomezandsullivan.com
GOMEZ AND SULLIVAN ENGINEERS

Melanie Rheaume
Recreation/Land Use Planner
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PO Box 2179 | Henniker, NH 03242
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mrheaume@gomezandsullivan.com
GOMEZ AND SULLIVAN ENGINEERS


Summer Street Overlook
Androscoggin Riverwalk
Bridge to Bridge Trail
Fishway Viewing Area
250th Anniversary Park
Swinging Bridge Park
0 500 1,000 2,000 Feet
Coffin Pond Recreation Area
Mill Street Canoe Portage
Service Layer Credits: World Imagery: Maxar

From:	Melanie Rheaume
To:	"jhenze@brunswickme.org"
Cc:	"tfarrell@brunswickme.org"; "Scarzello, Michael"; Kirk Smith
Subject:	RE: Brunswick Hydroelectric Project Recreation Survey
Date:	Tuesday, May 6, 2025 8:52:00 AM
Attachments:	image001.png

Hi Julia,

Thanks for taking the time to chat with me this morning about this and for granting us permission to post the signs. As discussed, we anticipate installing the signs the week before Memorial Day weekend and removing them just after Columbus Day. Field technicians will check sign conditions regularly, but if you notice or hear of any issues, please don't hesitate to reach out to me.

We'll also email you a link to the survey once it's finalized and accepting responses.

Thank you,

Melanie Rheaume
O: (603) 428-4960 | D: (716) 402-6773 | mrheaume@gomezandsullivan.com

From:	Melanie Rheaume
To:	jhenze@brunswickme.org
Cc:	Scarzello, Michael; Kirk Smith
Subject:	Brunswick Hydroelectric Project - Impoundment Boat Access Evaluation
Date:	Friday, May 9, 2025 11:49:00 AM
Attachments:	image001.png Brunswick Impoundment Boat Access Questionnaire.docx

Julia,

As you know, Brookfield White Pine Hydro (BWPH) is in the process of relicensing its Brunswick Hydroelectric Project with the Federal Energy Regulatory Commission (FERC). The Project is located on the Androscoggin River in Brunswick and Topsham, Maine. As part of this relicensing project, BWPH is conducting resource studies to enable FERC to prepare its environmental review document and develop a new operating license, including a Recreation Study to evaluate recreational opportunities in the Project area. One component of the Recreation Study includes an evaluation of trailered boat launching access to the Brunswick Project impoundment (i.e., the section of the Androscoggin River between the Pejepscot and Brunswick dams). We have compiled the attached questionnaire to solicit information from representatives of local recreation organizations with knowledge of boating conditions and opportunity in the Project impoundment. To participate in the evaluation, please respond to the questionnaire and return to me by May 30, 2025.

Feel free to consult with colleagues in compiling your response; however, please refrain from forwarding the questionnaire to others for completion. If there is an organization or an individual with knowledge specific to the Project impoundment who you feel should be included in this assessment, please send me the suggested contact and reason why you believe they might have valuable input. We are currently reaching out to the following groups for information: Town of Brunswick, Town of Topsham, Brunswick-Topsham Land Trust, American Whitewater, Androscoggin River Watershed Council, Appalachian Mountain Club, Friends of Merrymeeting Bay, and Trout Unlimited (Sebago Lake and Merrymeeting Bay Chapters).

Please let me know if you need more time to compile your responses, and feel free to contact me if you have any questions.

Thank you,

Melanie Rheaume
Recreation/Land Use Planner
Gomez and Sullivan Engineers, DPC
PO Box 2179 | Henniker, NH 03242
O: (603) 428-4960 | D: (716) 402-6773
mrheaume@gomezandsullivan.com

GOMEZ AND SULLIVAN ENGINEERS

From:	Julia Henze
To:	Melanie Rheaume
Cc:	Scarzello, Michael; Kirk Smith
Subject:	EXTERNAL EMAIL -RE: Brunswick Hydroelectric Project - Impoundment Boat Access Evaluation
Date:	Monday, May 12, 2025 11:22:30 AM
Attachments:	image001.png image002.png

Good morning Melanie,

Thank you for sending this questionnaire. Could you please also send one to Tom Farrell, our Director of Parks and Recreation? He has worked for the Town for over 40 years and his input will be very valuable.

Tom's email is tfarrell@brunswickme.gov.

Thanks so much!

Julia

Julia AC Henze
Town Manager
P: 207.725.6659
F: 207.725.6663

Brunswick maine
85 Union Street
Brunswick | ME 04011
www.brunswickme.gov

From:	Melanie Rheaume
To:	Julia Henze; tfarrell@brunswickme.org
Cc:	Scarzello, Michael; Kirk Smith
Subject:	RE: EXTERNAL EMAIL -RE: Brunswick Hydroelectric Project - Impoundment Boat Access Evaluation
Date:	Monday, May 12, 2025 12:44:00 PM
Attachments:	image002.png image003.png Brunswick Impoundment Boat Access Questionnaire.docx

Julia and Tom,

My apologies – Julia and I had discussed including Tom on this boating questionnaire when we last spoke, but it slipped my mind when I sent the email. I am re-sending now to include Tom.

As we are reaching out to several organizations for responses, I request that you coordinate to provide one consolidated response on behalf of the Town of Brunswick.

Thank you both,

Melanie Rheaume
O: (603) 428-4960 | D: (716) 402-6773 | mrheaume@gomezandsullivan.com

From:	Melanie Rheaume
To:	jhenze@brunswickme.org
Cc:	Scarzello, Michael; Kirk Smith; tfarrell@brunswickme.org
Subject:	RE: Brunswick Hydroelectric Project Recreation Survey
Date:	Friday, May 16, 2025 2:55:00 PM
Attachments:	image001.png Brunswick Hydro_Rec Survey_QR Code.png

Julia,

The Brunswick Hydroelectric Project online user survey will kick off next week to ensure we capture Memorial Day Weekend visitors. We plan on installing the signs early in the week - right now it's looking like they'll be installed on Monday, but that may shift if needed. We will continue to monitor the signs throughout the season, but if you notice or hear of anything amiss, please let me know.

As promised, BWPH is also providing a link to the survey to the Towns of Brunswick and Topsham to allow for posting and dissemination of the survey to residents and user groups familiar with the recreation sites. The link is as follows: https://arcg.is/1LWSvq0. I have also attached a QR code in case you prefer that format.

The survey will be open for responses through Columbus Day (and we'll remove the signs soon after). I have opened the survey a little early so that you can preview it before posting the link publicly. Unfortunately we can't revise the survey at this point, as doing so may change the link and QR code, but it's consistent with surveys we've used for other relicensing studies and I think you'll find that it captures the information necessary to satisfy the study plan.

Please let me know if you have any questions, and thanks again for all your help to date on this study.

Thank you,

Melanie Rheaume
O: (603) 428-4960 | D: (716) 402-6773 | mrheaume@gomezandsullivan.com

From:	Tom Farrell
To:	Melanie Rheaume; Julia Henze
Cc:	Scarzello, Michael; Kirk Smith
Subject:	EXTERNAL EMAIL -RE: Brunswick Hydroelectric Project Recreation Survey
Date:	Saturday, May 17, 2025 11:08:35 AM
Attachments:	image002.png image003.png

Hello Melanie,

I understand in speaking with the Town Manager that you had a question regarding the Mill Street Canoe Portage facility pertaining to the rationale for bollards at the launch site as well as other questions regarding the impoundment area and access points above the dam. I recommend that you contact me with your questions at your convenience. My contact information appears below.

Thomas M. Farrell, Director
Parks and Recreation Dept
P: *207.725.6656*
F: *207.725.0148*
E: *tfarrell@brunswickme.gov*

Brunswick maine
220 Neptune Drive
Brunswick | ME 04011
www.brunswickme.gov

From:	Melanie Rheaume
To:	"Tom Farrell"
Cc:	Scarzello, Michael; Kirk Smith; Julia Henze
Subject:	RE: EXTERNAL EMAIL -RE: Brunswick Hydroelectric Project Recreation Survey
Date:	Monday, May 19, 2025 8:35:00 AM
Attachments:	image001.png image002.png

Tom,

Thank you for reaching out. You should have received an email with a questionnaire regarding trailered boat access to the impoundment. I'd appreciate it if you could begin by filling out the questionnaire with any information you have, and then can follow up with additional questions as needed. As we're reaching out to several entities for that information, the questionnaire is designed to guide the process and compile a record of available information.

Thanks in advance for your help with this study,

Melanie Rheaume
O: (603) 428-4960 | D: (716) 402-6773 | mrheaume@gomezandsullivan.com

From:	Melanie Rheaume
To:	Julia Henze; tfarrell@brunswickme.org
Cc:	Scarzello, Michael; Kirk Smith
Subject:	RE: EXTERNAL EMAIL -RE: Brunswick Hydroelectric Project - Impoundment Boat Access Evaluation
Date:	Monday, June 2, 2025 9:30:00 AM
Attachments:	Brunswick Impoundment Boat Access Questionnaire.docx image001.png image002.png

Good morning, Julia and Tom,

Just checking in on the questionnaire regarding trailered boat access to the Brunswick Project impoundment. If you intend to respond to the questionnaire, please do so by June 13th or reach out to me if you have questions or need more time.

Thank you,

Melanie Rheaume
O: (603) 428-4960 | D: (716) 402-6773 | mrheaume@gomezandsullivan.com

From: Tom Farrell
To: Melanie Rheaume; Julia Henze
Cc: Scarzello, Michael; Kirk Smith
Subject: RE: EXTERNAL EMAIL -RE: Brunswick Hydroelectric Project - Impoundment Boat Access Evaluation
Date: Monday, June 2, 2025 10:28:48 AM
Attachments: image003.png
image004.png
image005.png

You don't often get email from tfarrell@brunswickme.gov. Learn why this is important

Hello Melanie,

It is our intention to complete the survey and submit it by the June 13th deadline. I will reach out and contact you directly if we feel the need to do so.

Thank you,
Tom

Thomas M. Farrell, Director
Parks and Recreation Dept
P: *207.725.6656*
F: *207.725.0148*
E: *tfarrell@brunswickme.gov*

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220 Neptune Drive
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From: Tom Farrell
To: Melanie Rheaume; Julia Henze
Cc: Scarzello, Michael; Kirk Smith
Subject: RE: EXTERNAL EMAIL -RE: Brunswick Hydroelectric Project - Impoundment Boat Access Evaluation
Date: Friday, June 13, 2025 1:16:06 PM
Attachments: image003.png
image004.png
image005.png

Some people who received this message don't often get email from tfarrell@brunswickme.gov. Learn why this is important

Hi Melanie,

We are in the process of getting some additional information to inform our response to the questionnaire. We would look to submit our final responses no later than next Friday June 20th.

Thanks,
Tom

Thomas M. Farrell, Director
Parks and Recreation Dept
P: *207.725.6656*
F: *207.725.0148*
E: *tfarrell@brunswickme.gov*

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220 Neptune Drive
Brunswick | ME 04011
www.brunswickme.gov

From:	Tom Farrell
To:	Melanie Rheaume; Julia Henze
Cc:	Scarzello, Michael; Kirk Smith
Subject:	RE: EXTERNAL EMAIL -RE: Brunswick Hydroelectric Project - Impoundment Boat Access Evaluation
Date:	Thursday, June 19, 2025 3:46:42 PM
Attachments:	image001.png image002.png image003.png Brunswick Impoundment Boat Access Questionnaire.pdf

Hello Melanie,

Please see the Town of Brunswick's response below. In answering the questions, I used both the information that I have received over my career here as Director of Parks and Recreation for the Town of Brunswick from members of the town's marine resources staff, environmental planning staff, police and fire department personnel and local community members/residents as well as my own personal boating experiences in the impoundment areas above and below the Brunswick Dam.

Please let me know if you have any questions.

Best regards,
Tom

Thomas M. Farrell, Director
Parks and Recreation Dept
P: *207.725.6656*
F: *207.725.0148*
E: *tfarrell@brunswickme.org*

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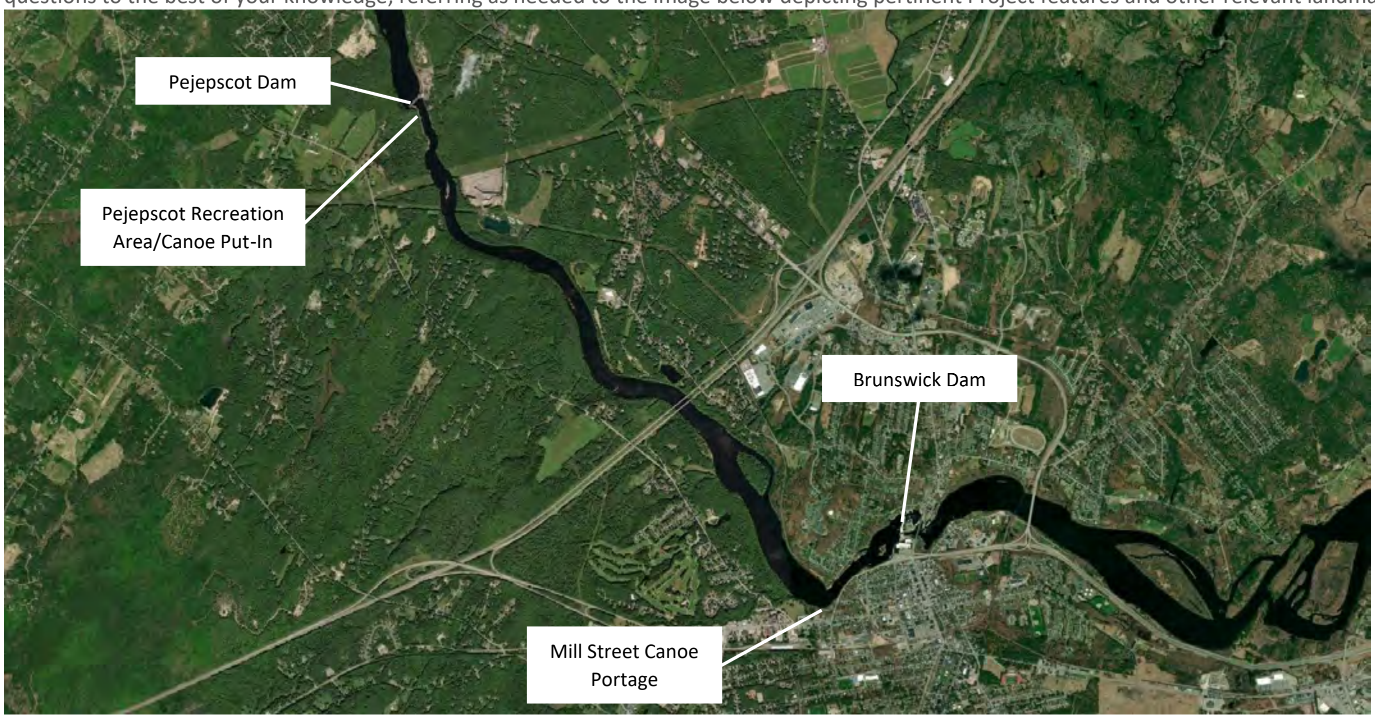
Brunswick Hydroelectric Project (FERC No. 2284) Relicensing
Recreation Study – Brunswick Impoundment Boat Access Questionnaire

Brookfield White Pine Hydro (BWPH) is in the process of relicensing its Brunswick Hydroelectric Project with the Federal Energy Regulatory Commission (FERC). The Project is located on the Androscoggin River in Brunswick and Topsham, Maine. As part of this relicensing project, BWPH is conducting resource studies to enable FERC to prepare its environmental review document and develop a new operating license, including a Recreation Study to evaluate recreational opportunities in the Project area. One component of the Recreation Study includes an evaluation of trailered boat launching access to the Brunswick Project impoundment (i.e., the section of the Androscoggin River between the Pejepscot and Brunswick dams).

You have been identified as a person who may be able to assist with initial information gathering for this assessment. Please respond to the following questions to the best of your knowledge, referring as needed to the image below depicting pertinent Project features and other relevant landmarks.



1. Contact Information (for internal use only):

Name: Thomas M. Farrell

Phone number: —Office # (207) 725-6656 extension 4201 Cell# (207) 798-0175

Email address: tfarrell@brunswickme.gov

2. Please describe your history with and/or interest in boating on the Androscoggin River and specifically on the Brunswick Project impoundment:

I have been employed as Parks and Recreation Director for the Town of Brunswick since 1984. There has long been a desire to provide motorized boating access to this section of the river. The Town already provided as part of the FERC review process with two potential locations on town property where such access could possibly be accommodated. The two parcels are located off River Road one at our Lamb Park parcel and the other at our Coffin Pond Recreation Area property. Providing motorized boating access is the most significant request we receive annually from fisherman who desire a boat launch between these two dams that will provide all time motorized access to the river.

I too have used the river personally on several occasions and have only been able to gain access via canoe at the Mill Street Canoe Portage site. Given the Mill Street Canoe Portage site and its proximity to the Brookfield boat barriers immediately downstream from this launch motorized access has not been permitted. This is due to the possibility of larger boats having difficulty getting underway due to motors not starting or cutting out after launch and having the boats caught in the current quickly leading to the head pond and downstream dam. Both the Lamb Park parcel, and Coffin Pond properties are much further upstream giving the operator of a disabled boat adequate time to get safely to land before encountering the quick currents just below the Mill Street Portage site.

During the spring, summer and fall boating seasons the number one complaint fielded by our park rangers when they visit the Mill Street Canoe Portage site daily is why there is no safe public access for motorized boats between Brunswick and Pejepscot Dams.

Below Brunswick Dam at 250th Anniversary Park on town land and other land leased to the town by Brookfield there is a need for improved hand carry boat access to the water. The anniversary park property is the put back in location for canoeists taking out at the Mill Street Canoe Portage upstream of Brunswick Dam needing to portage around it. The Town of Brunswick has also completed a Millstreet Streetscape Plan that includes improved widening of pedestrian facilities between the take out and put in locations which would also improve public portage around the dam but has not been in a position to date to fund these improvements. ADA access improvements are also needed at Anniversary Park to provide full access to the water there. The Brookfiled owned portion of the park could also benefit from an invasive species removal effort and opening of views to the river.

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The town also owns and maintains two public boat access locations just below Brunswick Dam. The first is a gravel launch used by hand carry boaters and provides access to ice fisherman during the winter smelt fishing season. This property could benefit from improved access to accommodate both user groups. Further downstream the town maintains a second launch that includes a removable steel piling system which are installed and removed annually after ice out and before ice in each year. The wooden float system there includes a motorized launch float system as well as a lower profile launch system used by the Maine Coast Rowing Association made up of competitive and recreational rowers. The facility is immediately adjacent to the Androscoggin River Bicycle & Pedestrian Path a 2.6 mile riverfront trail.

3. ~~H~~ave you personally boated on the Brunswick Project impoundment? (yes/no): Yes several times.

   If yes, please answer the following questions:

   Approximately how many times have you boated on the Brunswick Project impoundment in the past 5 years? 10

   What type and length boat did you use? I used a 16 foot canoe

   What boat launch did you use? Mill Street Canoe Portage and below the dam have used the Water Street Boat Landing.

   During what months have you boated on the Brunswick Project impoundment? June through October

   Please quantify (in cubic feet per second) or characterize (e.g., very high, high, medium, low, extremely low) the river flows at which you have boated on the Brunswick Project impoundment: I will only launch my canoe at the Mill Street Canoe Portage during medium to low river flows due to its proximity to the Brookfield boat barriers immediately adjacent to this launch.

   Launching a boat below the dam I have typically done during the same June through October timeframe during medium to low river flows. This lower section of the river offers access to a fishery that includes diadromous fish, as well as Atlantic and shortnosed sturgeon. These fish breaching the water in May and June bring many community members as well as people from the region riverside and on the water to view the annual spectacle.

4. Are you aware of others having boated on the Brunswick Project impoundment? (yes/no): Yes

   If yes, please answer the following questions:

Formatted: Normal, Indent: Left: 0.38", Space Before: 2 pt, After: 2 pt, No widow/orphan control, Don't adjust space between Latin and Asian text, Don't adjust space between Asian text and numbers, Tab stops: 0.38", Left + 9.19", Right

What type(s) and length(s) boats are you aware of boaters using? Boaters between Brunswick and Pejepscot Dams typically use kayaks paddleboards, or canoes. I have not seen motorized boats on this section of the river as there is no place for people with such craft to safely launch.

People using 14 to 22 foot motorized boats are seen accessing the river below the Brunswick Dam throughout the boating season for fishing, recreational boating, duck hunting, etc. Both Sections above and below the Brunswick Dam are great for wildlife watching and many boaters are seen on the water early morning to view such wildlife.

What boat launch(es) do they use? Mill Street Canoe Portage

During what months do they boat on the Brunswick Project impoundment? People have been seen on the river in non-motorized craft as early as April and as late as December.

Please quantify (in cubic feet per second) or characterize (e.g., very high, high, medium, low, extremely low) the river flows at which you know others to have boated on the Brunswick Project impoundment: People have gained access to the river during all river flows from very high to very low. The gate at the Mill Street Canoe Portage is not installed until Brookfield installs the boat barriers. As of today's date June 19th, the barriers have still yet to be installed and the Town of Brunswick receives complaints regularly because they are not yet in the river.

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5. To your knowledge, does the Brunswick Project impoundment provide a satisfactory boating experience for trailered boats? Please explain your answer: Above the Brunswick Dam there is no motorized access available to people who seek to use the river with such craft. This is the single largest and most immediate need in the impoundment area above the Brunswick Dam to provide motorized boating access for people seeking to gain access to the part of the river that currently has none.

6. Are there features unique to the Brunswick Project impoundment that make it more appealing for trailered boat use than upstream or downstream sections of the Androscoggin River? (yes/no): Yes, there is a prolific smallmouth bass fishery between the Pejepscot and Brunswick Dams. Pike are also present in this section as well as other species. Below Brunswick Dam there is a larger variety of fish species due to the tidal nature of that section of the river. Smelt and striped bass are sought after by many anglers below Brunswick Dam.

If yes, please describe any unique features specific to the reach:

The section of the river just below Pejepscot Dam is unique being as close to an urban area as it is located. Precipitous cliffs and ledge characterize this section and the balance of the run of the river downstream is undeveloped giving the boater experience a more rural feel.

7. Are there safety concerns for the use of trailered boats unique to the Brunswick Project impoundment? (yes/no): Yes

   If yes, please describe any concerns specific to the reach:
   Currently there is no trailered launch to this section of the river and motorized access is badly needed. The only point of public boating access is restricted to non-motorized craft at Mill Street Canoe Portage. Motorized access should be provided further upstream away from the boat barriers and town owned land is available at two possible locations for such a project.

8. Do you feel that trailered boat access to the Brunswick Project impoundment is warranted? (yes/no): Yes

   Please explain your answer:
   As stated previously, it is the single largest complaint that the Town receives annually from people seeking such access to this section of the river.

9. Are you aware of any locations currently providing trailered boat access to the Brunswick Project impoundment? (yes/no): No

   If yes, please describe the location: Town owned lands are available for such a facility and should be evaluated for such access.

Thank you for your time and input.

Town of Topsham

From:	Melanie Rheaume
To:	"mwaltz@topshammaine.com"
Cc:	"pleduc@topshammaine.com"; Scarzello, Michael; Kirk Smith
Subject:	Brunswick Hydroelectric Project Recreation Survey
Date:	Tuesday, April 22, 2025 2:04:00 PM
Attachments:	image001.png Brunswick Project Rec Survey Site Map.JPG

Mark Waltz, Topsham Town Manager:

Brookfield White Pine Hydro (BWPH) is planning to conduct an online recreation user survey at the Brunswick Hydroelectric Project as part of the relicensing of the Project with the Federal Energy Regulatory Commission (FERC). Signs directing visitors to the survey will be posted at Project and select non-Project recreation sites per the Revised Study Plan filed with FERC on December 2, 2024. The Project recreation sites included in the survey effort are as follows:

- 250^{th} Anniversary Park
- Fishway Viewing Area
- Summer Street Overlook

In addition to the above FERC-approved Project recreation sites, BWPH has proposed to include the following non-Project recreation sites providing public recreational access within or adjacent to the Project boundary:

- Coffin Pond Recreation Area
- Mill Street Canoe Portage
- Androscoggin Swinging Bridge
- Androscoggin Riverwalk
- Bridge to Bridge Trail

The locations of the above sites are depicted in the attached figure. The online survey will be open from Memorial Day weekend through Columbus Day and will be advertised at the selected sites via temporary signage, pending permission to post the signs at sites not owned by BWPH. The signs will be 9”x12” and mounted on temporary fencing posts at strategic locations at each site to capture visitors’ attention. BWPH will periodically inspect signs and repair or replace missing or damaged signs as necessary.

- BWPH respectfully requests permission from the Town of Topsham to erect signage at the above-listed sites for which the Town has ownership and/or operational responsibility. Based on available information, we understand that to include Summer Street Overlook, the Bridge to Bridge Trail, and the Androscoggin Swinging Bridge and Androscoggin Riverwalk within the Town boundary.

In addition to advertising the survey onsite, BWPH has committed to providing a link to the survey to the Towns of Topsham and Brunswick to allow for posting and dissemination of the survey to residents and user groups familiar with the recreation sites. BWPH is in the process of finalizing the survey and will provide the link prior to Memorial Day weekend.

Please call or email me with any questions or concerns. We would appreciate a response within the next two weeks if possible to allow time for planning and procuring the appropriate signs and supplies.

Thank you,

Melanie Rheaume
Recreation/Land Use Planner
Gomez and Sullivan Engineers, DPC
PO Box 2179 | Henniker, NH 03242
O: (603) 428-4960 | D: (716) 402-6773
mrheaume@gomezandsullivan.com

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Summer Street Overlook
Androscoggin Riverwalk
Fishway Viewing Area
Bridge to Bridge Trail
250th Anniversary Park
Swinging Bridge Park
0 500 1,000 2,000
Feet
Coffin Pond Recreation Area
Mill Street Canoe Portage
Service Layer Credits: World Imagery: Maxar

From:	Mark Waltz
To:	Melanie Rheaume
Cc:	Pam Leduc; Scarzello, Michael; Kirk Smith; Dennis Cox; Jeffrey Emerson
Subject:	RE: Brunswick Hydroelectric Project Recreation Survey
Date:	Tuesday, April 22, 2025 4:30:15 PM
Attachments:	image001.png

Hi Melanie –

Feel free to install your Topsham signs. We have the following requests:

- That they are removed prior to plowing season, but it sounds like they will be gone long before that.
- Sign locations don't damage pavement or and are not in an area which will interfere with mowing.
- If they are being driven into the ground with anything other than a temporary grade stake, please be sure to have "dig safed" to insure utilities are not damaged
- If you want someone from the Town to scout the sign locations with your contractor, feel free to reach out.

Thanks,

Mark

Mark M. Waltz
Town Manager
Town of Topsham
100 Main Street
Topsham, ME 04086
(207) 725-5821, ext. 2110
mwaltz@topshammaine.com

From:	Melanie Rheaume
To:	"Mark Waltz"
Cc:	"Pam Leduc"; Scarzello, Michael; Kirk Smith; "Dennis Cox"; "Jeffrey Emerson"
Subject:	RE: Brunswick Hydroelectric Project Recreation Survey
Date:	Wednesday, April 23, 2025 12:36:00 PM
Attachments:	image001.png image003.png image005.png

Mark,

Thank you for the prompt response. We can certainly meet those requests with one exception: it may be difficult to place the signs in a visible area without interfering somewhat with mowing. However, the signs are on temporary posts that could easily be moved and put back for mowing (see photo below for example post). I'm thinking of the Summer Street Overlook in particular – I'm not sure where we could put the sign that would grab users attention without being on the mowed area. We would prefer to put the sign close to the paved path but on the grass, similar to the placement of the No Motor Vehicles and interpretive signage (see red arrow in image below for potential placement).

Do you think that will work, or should we look into alternatives?

Thank you,

Melanie Rheaume
O: (603) 428-4960 | D: (716) 402-6773 | mrheaume@gomezandsullivan.com

From:	Mark Waltz
To:	Melanie Rheaume
Cc:	Pam Leduc; Scarzello, Michael; Kirk Smith; Dennis Cox; Jeffrey Emerson
Subject:	RE: Brunswick Hydroelectric Project Recreation Survey
Date:	Wednesday, April 23, 2025 2:05:04 PM
Attachments:	image002.png image003.png image004.png

Hi Melanie –

Understood and yes, we can make that work.

Thanks,

Mark

Mark M. Waltz
Town Manager
Town of Topsham
100 Main Street
Topsham, ME 04086
(207) 725-5821, ext. 2110
mwaltz@topshammaine.com

From:	Melanie Rheaume
To:	"Mark Waltz"
Cc:	Pam Leduc; Scarzello, Michael; Kirk Smith; Dennis Cox; Jeffrey Emerson
Subject:	RE: Brunswick Hydroelectric Project Recreation Survey
Date:	Wednesday, April 23, 2025 2:45:00 PM
Attachments:	image001.png image002.png image003.png

Mark,

That's great, thank you. I'll be in touch before Memorial Day with the link to the survey. We anticipate installing the signs the week before Memorial Day weekend and removing them just after Columbus Day. Field technicians will check the signs regularly, but if you notice or hear of any issues with the signs, please don't hesitate to reach out to me.

Thank you,

Melanie Rheaume
O: (603) 428-4960 | D: (716) 402-6773 | mrheaume@gomezandsullivan.com

From:	Melanie Rheaume
To:	Mark Waltz
Cc:	Scarzello, Michael; Kirk Smith
Subject:	Brunswick Hydroelectric Project - Impoundment Boat Access Evaluation
Date:	Friday, May 9, 2025 11:49:00 AM
Attachments:	Brunswick Impoundment Boat Access Questionnaire.docx image001.png

Mark,

As you know, Brookfield White Pine Hydro (BWPH) is in the process of relicensing its Brunswick Hydroelectric Project with the Federal Energy Regulatory Commission (FERC). The Project is located on the Androscoggin River in Brunswick and Topsham, Maine. As part of this relicensing project, BWPH is conducting resource studies to enable FERC to prepare its environmental review document and develop a new operating license, including a Recreation Study to evaluate recreational opportunities in the Project area. One component of the Recreation Study includes an evaluation of trailered boat launching access to the Brunswick Project impoundment (i.e., the section of the Androscoggin River between the Pejepscot and Brunswick dams). We have compiled the attached questionnaire to solicit information from representatives of local recreation organizations with knowledge of boating conditions and opportunity in the Project impoundment. To participate in the evaluation, please respond to the questionnaire and return to me by May 30, 2025.

Feel free to consult with colleagues in compiling your response; however, please refrain from forwarding the questionnaire to others for completion. If there is an organization or an individual with knowledge specific to the Project impoundment who you feel should be included in this assessment, please send me the suggested contact and reason why you believe they might have valuable input. We are currently reaching out to the following groups for information: Town of Brunswick, Town of Topsham, Brunswick-Topsham Land Trust, American Whitewater, Androscoggin River Watershed Council, Appalachian Mountain Club, Friends of Merrymeeting Bay, and Trout Unlimited (Sebago Lake and Merrymeeting Bay Chapters).

Please let me know if you need more time to compile your responses, and feel free to contact me if you have any questions.

Thank you,

Melanie Rheaume
Recreation/Land Use Planner
Gomez and Sullivan Engineers, DPC
PO Box 2179 | Henniker, NH 03242
O: (603) 428-4960 | D: (716) 402-6773
mrheaume@gomezandsullivan.com

GOMEZ AND SULLIVAN ENGINEERS

From:	Melanie Rheaume
To:	Mark Waltz
Cc:	Pam Leduc; Scarzello, Michael; Kirk Smith
Subject:	RE: Brunswick Hydroelectric Project Recreation Survey
Date:	Friday, May 16, 2025 2:55:00 PM
Attachments:	Brunswick Hydro_Rec Survey_QR Code.png image001.png image002.png image003.png

Mark,

The Brunswick Hydroelectric Project online user survey will kick off next week to ensure we capture Memorial Day Weekend visitors. We plan on installing the signs early in the week - right now it's looking like they'll be installed on Monday, but that may shift if needed. We will continue to monitor the signs throughout the season, but if you notice or hear of anything amiss, please let me know.

As promised, BWPH is also providing a link to the survey to the Towns of Brunswick and Topsham to allow for posting and dissemination of the survey to residents and user groups familiar with the recreation sites. The link is as follows: https://arcg.is/1LWSvq0. I have also attached a QR code in case you prefer that format.

The survey will be open for responses through Columbus Day (and we'll remove the signs soon after). I have opened the survey a little early so that you can preview it before posting the link publicly. Unfortunately we can't revise the survey at this point, as doing so may change the link and QR code, but it's consistent with surveys we've used for other relicensing studies and I think you'll find that it captures the information necessary to satisfy the study plan.

Please let me know if you have any questions, and thanks again for all your help to date on this study.

Thank you,

Melanie Rheaume
O: (603) 428-4960 | D: (716) 402-6773 | mrheaume@gomezandsullivan.com

From:	Melanie Rheaume
To:	"Mark Waltz"
Cc:	Scarzello, Michael; Kirk Smith
Subject:	RE: Brunswick Hydroelectric Project - Impoundment Boat Access Evaluation
Date:	Monday, June 2, 2025 9:38:00 AM
Attachments:	image001.png Brunswick Impoundment Boat Access Questionnaire.docx

Good morning, Mark,

Just checking in on the questionnaire regarding trailered boat access to the Brunswick Project impoundment. If you intend to respond to the questionnaire, please do so by June 13th or reach out to me if you have questions or need more time.

Thank you,

Melanie Rheaume
O: (603) 428-4960 | D: (716) 402-6773 | mrheaume@gomezandsullivan.com

From: Melanie Rheaume
Sent: Friday, May 9, 2025 11:51 AM
To: Mark Waltz <mwaltz@topshammaine.com>
Cc: Scarzello, Michael <Michael.Scarzello@brookfieldrenewable.com>; Kirk Smith <ksmith@gomezandsullivan.com>
Subject: Brunswick Hydroelectric Project - Impoundment Boat Access Evaluation

Mark,

As you know, Brookfield White Pine Hydro (BWPH) is in the process of relicensing its Brunswick Hydroelectric Project with the Federal Energy Regulatory Commission (FERC). The Project is located on the Androscoggin River in Brunswick and Topsham, Maine. As part of this relicensing project, BWPH is conducting resource studies to enable FERC to prepare its environmental review document and develop a new operating license, including a Recreation Study to evaluate recreational opportunities in the Project area. One component of the Recreation Study includes an evaluation of trailered boat launching access to the Brunswick Project impoundment (i.e., the section of the Androscoggin River between the Pejepscot and Brunswick dams). We have compiled the attached questionnaire to solicit information from representatives of local recreation organizations with knowledge of boating conditions and opportunity in the Project impoundment. To participate in the evaluation, please respond to the questionnaire and return to me by May 30, 2025.

Feel free to consult with colleagues in compiling your response; however, please refrain from forwarding the questionnaire to others for completion. If there is an organization or an individual with knowledge specific to the Project impoundment who you feel should be included in this assessment, please send me the suggested contact and reason why you believe they might have valuable input. We are currently reaching out to the following groups for information: Town of Brunswick, Town of Topsham, Brunswick-Topsham Land Trust, American Whitewater, Androscoggin River Watershed Council, Appalachian Mountain Club, Friends of Merrymeeting Bay, and Trout

Unlimited (Sebago Lake and Merrymeeting Bay Chapters).

Please let me know if you need more time to compile your responses, and feel free to contact me if you have any questions.

Thank you,

Melanie Rheaume
Recreation/Land Use Planner
Gomez and Sullivan Engineers, DPC
PO Box 2179 | Henniker, NH 03242
O: (603) 428-4960 | D: (716) 402-6773
mrheaume@gomezandsullivan.com

GOMEZ AND SULLIVAN ENGINEERS

From:	Mark Waltz
To:	Melanie Rheaume
Cc:	Jeffrey Emerson
Subject:	Fw: Brunswick Hydroelectric Project - Impoundment Boat Access Evaluation
Date:	Thursday, June 5, 2025 10:13:24 AM
Attachments:	image001.png Brunswick Impoundment Boat Access Questionnaire.docx

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Hi Melanie -

Thanks for the follow up. Attached is the Town of Topsham's form.

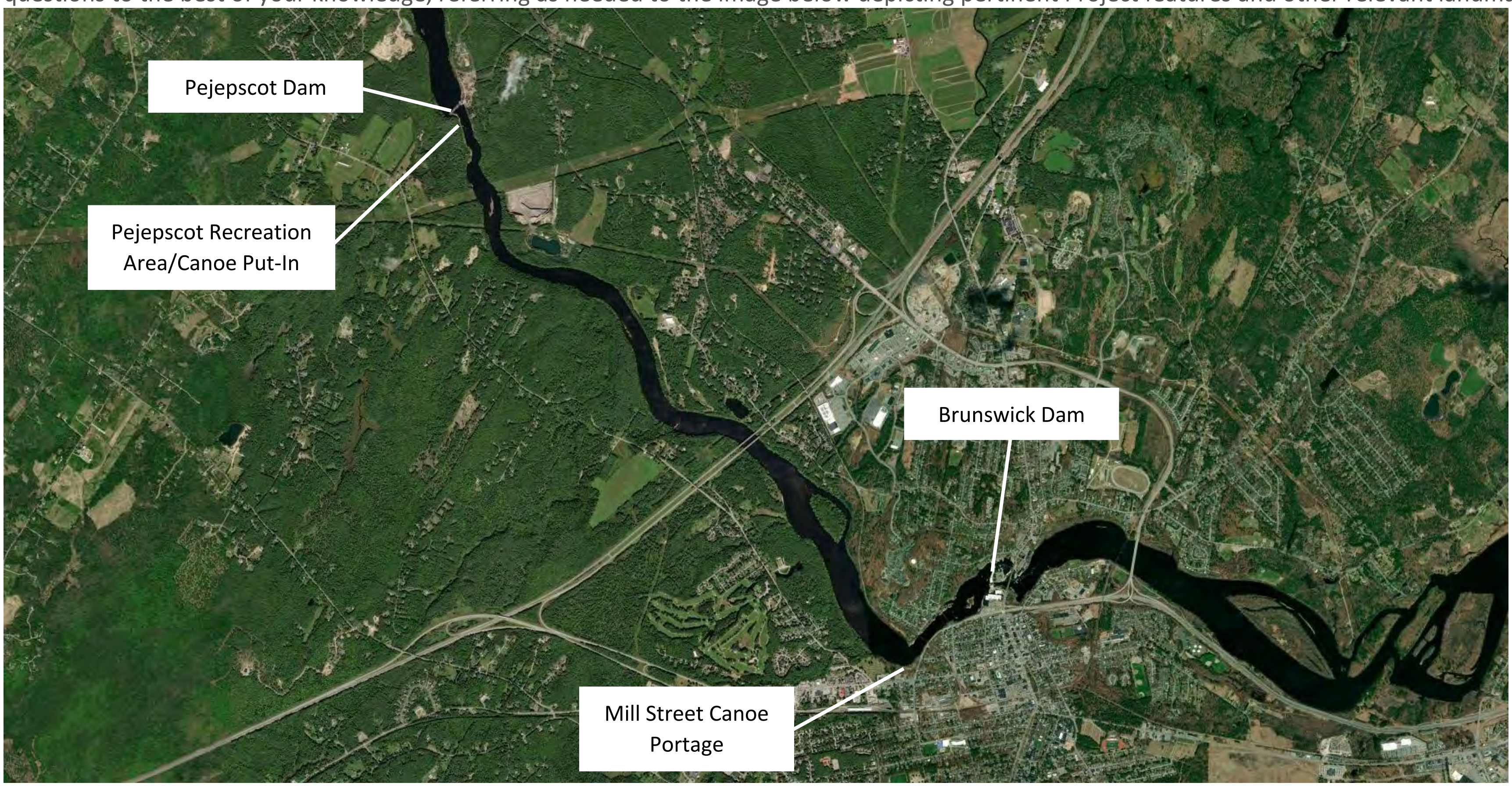
Thanks,
Mark

Mark M. Waltz
Town Manager
Town of Topsham
100 Main Street
Topsham, ME 04086
(207) 725-5821, ext. 2110
mwaltz@topshammaine.com

Brunswick Hydroelectric Project (FERC No. 2284) Relicensing
Recreation Study – Brunswick Impoundment Boat Access Questionnaire

Brookfield White Pine Hydro (BWPH) is in the process of relicensing its Brunswick Hydroelectric Project with the Federal Energy Regulatory Commission (FERC). The Project is located on the Androscoggin River in Brunswick and Topsham, Maine. As part of this relicensing project, BWPH is conducting resource studies to enable FERC to prepare its environmental review document and develop a new operating license, including a Recreation Study to evaluate recreational opportunities in the Project area. One component of the Recreation Study includes an evaluation of trailered boat launching access to the Brunswick Project impoundment (i.e., the section of the Androscoggin River between the Pejepscot and Brunswick dams).

You have been identified as a person who may be able to assist with initial information gathering for this assessment. Please respond to the following questions to the best of your knowledge, referring as needed to the image below depicting pertinent Project features and other relevant landmarks.



1. Contact Information (for internal use only):
   Name: Town of Topsham
   Phone number: 207-725-5821
   Email address: jemerson@topshammaine.com

2. Please describe your history with and/or interest in boating on the Androscoggin River and specifically on the Brunswick Project impoundment: Emergency access fire life safety and recovery

3. Have you personally boated on the Brunswick Project impoundment? no):Yes

   If yes, please answer the following questions:

   Approximately how many times have you boated on the Brunswick Project impoundment in the past 5 years?

   2-3 Times per year for department

   What type and length boat did you use? 16-18 ‘ Aluminum flat with jet drive OB

   What boat launch did you use? Mill Street

   During what months have you boated on the Brunswick Project impoundment? Weather permissible

   Please quantify (in cubic feet per second) or characterize (e.g., very high, high, medium, low, extremely low) the river flows at which you have boated on the Brunswick Project impoundment: Medium to low

4. Are you aware of others having boated on the Brunswick Project impoundment? (yes/no):

   If yes, please answer the following questions: YES

   What type(s) and length(s) boats are you aware of boaters using? Same

   What boat launch(es) do they use? Mill Street

During what months do they boat on the Brunswick Project impoundment? Weather permissible

Please quantify (in cubic feet per second) or characterize (e.g., very high, high, medium, low, extremely low) the river flows at which you know others to have boated on the Brunswick Project impoundment: Medium to low

5. To your knowledge, does the Brunswick Project impoundment provide a satisfactory boating experience for trailered boats? Please explain your answer: Mill St. is controlled access for emergency trailer boats, but is very shallow and a difficult launch

6. Are there features unique to the Brunswick Project impoundment that make it more appealing for trailered boat use than upstream or downstream sections of the Androscoggin River? (yes/no): Besides Mill Street, other launches seem acceptable

   If yes, please describe any unique features specific to the reach:

7. Are there safety concerns for the use of trailered boats unique to the Brunswick Project impoundment? (yes/no):

   If yes, please describe any concerns specific to the reach: Mill St. is controlled access for emergency trailer boats, but is very shallow and a difficult launch

8. Do you feel that trailered boat access to the Brunswick Project impoundment is warranted? (yes/no):

   Please explain your answer: Emergency access is warranted and necessary

9. Are you aware of any locations currently providing trailered boat access to the Brunswick Project impoundment? (yes/no): No, other than the controlled emergency access on Mill Street

   If yes, please describe the location:

Thank you for your time and input.

Brunswick-Topsham Land Trust

From:	Melanie Rheaume
To:	Lindsey@btlt.org
Cc:	Scarzello, Michael; Kirk Smith
Subject:	Brunswick Hydroelectric Project - Impoundment Boat Access Evaluation
Date:	Friday, May 9, 2025 11:51:00 AM
Attachments:	image001.png Brunswick Impoundment Boat Access Questionnaire.docx

Lindsey,

Brookfield White Pine Hydro (BWPH) is in the process of relicensing its Brunswick Hydroelectric Project with the Federal Energy Regulatory Commission (FERC). The Project is located on the Androscoggin River in Brunswick and Topsham, Maine. As part of this relicensing project, BWPH is conducting resource studies to enable FERC to prepare its environmental review document and develop a new operating license, including a Recreation Study to evaluate recreational opportunities in the Project area. One component of the Recreation Study includes an evaluation of trailered boat launching access to the Brunswick Project impoundment (i.e., the section of the Androscoggin River between the Pejepscot and Brunswick dams). We have compiled the attached questionnaire to solicit information from representatives of local recreation organizations with knowledge of boating conditions and opportunity in the Project impoundment. To participate in the evaluation, please respond to the questionnaire and return to me by May 30, 2025.

Feel free to consult with colleagues in compiling your response; however, please refrain from forwarding the questionnaire to others for completion. If there is an organization or an individual with knowledge specific to the Project impoundment who you feel should be included in this assessment, please send me the suggested contact and reason why you believe they might have valuable input. We are currently reaching out to the following groups for information: Town of Brunswick, Town of Topsham, Brunswick-Topsham Land Trust, American Whitewater, Androscoggin River Watershed Council, Appalachian Mountain Club, Friends of Merrymeeting Bay, and Trout Unlimited (Sebago Lake and Merrymeeting Bay Chapters).

Please let me know if you need more time to compile your responses, and feel free to contact me if you have any questions.

Thank you,

Melanie Rheaume
Recreation/Land Use Planner
Gomez and Sullivan Engineers, DPC
PO Box 2179 | Henniker, NH 03242
O: (603) 428-4960 | D: (716) 402-6773
mrheaume@gomezandsullivan.com

GOMEZ AND SULLIVAN ENGINEERS

From:	Melanie Rheaume
To:	Lindsey@btlt.org
Cc:	Scarzello, Michael; Kirk Smith
Subject:	RE: Brunswick Hydroelectric Project - Impoundment Boat Access Evaluation
Date:	Monday, June 2, 2025 9:31:00 AM
Attachments:	Brunswick Impoundment Boat Access Questionnaire.docx image001.png

Good morning, Lindsey,

Just checking in on the questionnaire regarding trailered boat access to the Brunswick Project impoundment. If you intend to respond to the questionnaire, please do so by June 13th or reach out to me if you have questions or need more time.

Thank you,

Melanie Rheaume
O: (603) 428-4960 | D: (716) 402-6773 | mrheaume@gomezandsullivan.com

---

From: Melanie Rheaume
Sent: Friday, May 9, 2025 11:53 AM
To: Lindsey@btlt.org
Cc: Scarzello, Michael <Michael.Scarzello@brookfieldrenewable.com>; Kirk Smith <ksmith@gomezandsullivan.com>
Subject: Brunswick Hydroelectric Project - Impoundment Boat Access Evaluation

Lindsey,

Brookfield White Pine Hydro (BWPH) is in the process of relicensing its Brunswick Hydroelectric Project with the Federal Energy Regulatory Commission (FERC). The Project is located on the Androscoggin River in Brunswick and Topsham, Maine. As part of this relicensing project, BWPH is conducting resource studies to enable FERC to prepare its environmental review document and develop a new operating license, including a Recreation Study to evaluate recreational opportunities in the Project area. One component of the Recreation Study includes an evaluation of trailered boat launching access to the Brunswick Project impoundment (i.e., the section of the Androscoggin River between the Pejepscot and Brunswick dams). We have compiled the attached questionnaire to solicit information from representatives of local recreation organizations with knowledge of boating conditions and opportunity in the Project impoundment. To participate in the evaluation, please respond to the questionnaire and return to me by May 30, 2025.

Feel free to consult with colleagues in compiling your response; however, please refrain from forwarding the questionnaire to others for completion. If there is an organization or an individual with knowledge specific to the Project impoundment who you feel should be included in this assessment, please send me the suggested contact and reason why you believe they might have valuable input. We are currently reaching out to the following groups for information: Town of Brunswick, Town of Topsham, Brunswick-Topsham Land Trust, American Whitewater, Androscoggin River Watershed Council, Appalachian Mountain Club, Friends of Merrymeeting Bay, and Trout

Unlimited (Sebago Lake and Merrymeeting Bay Chapters).

Please let me know if you need more time to compile your responses, and feel free to contact me if you have any questions.

Thank you,

Melanie Rheaume
Recreation/Land Use Planner
Gomez and Sullivan Engineers, DPC
PO Box 2179 | Henniker, NH 03242
O: (603) 428-4960 | D: (716) 402-6773
mrheaume@gomezandsullivan.com

GOMEZ AND SULLIVAN ENGINEERS

From:	Lindsey St. Peter
To:	Melanie Rheaume
Cc:	Scarzello, Michael; Kirk Smith
Subject:	EXTERNAL EMAIL -Re: Brunswick Hydroelectric Project - Impoundment Boat Access Evaluation
Date:	Wednesday, June 4, 2025 8:44:34 AM
Attachments:	image001.png

Good morning Melanie,

I will send this again to our staff member -- thank you for the reminder!

Best,

Lindsey

On Mon, Jun 2, 2025 at 9:33 AM Melanie Rheaume <mrheaume@gomezandsullivan.com> wrote:

Good morning, Lindsey,

Just checking in on the questionnaire regarding trailered boat access to the Brunswick Project impoundment. If you intend to respond to the questionnaire, please do so by June 13th or reach out to me if you have questions or need more time.

Thank you,

Melanie Rheaume

O: (603) 428-4960 | D: (716) 402-6773 | mrheaume@gomezandsullivan.com

Maine Council of Trout Unlimited

From:	Melanie Rheaume
To:	heinz@maine.rr.com
Cc:	Scarzello, Michael; Kirk Smith
Subject:	Brunswick Hydroelectric Project - Impoundment Boat Access Evaluation
Date:	Friday, May 9, 2025 11:50:00 AM
Attachments:	Brunswick Impoundment Boat Access Questionnaire.docx image001.png

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Steve,

Brookfield White Pine Hydro (BWPH) is in the process of relicensing its Brunswick Hydroelectric Project with the Federal Energy Regulatory Commission (FERC). The Project is located on the Androscoggin River in Brunswick and Topsham, Maine. As part of this relicensing project, BWPH is conducting resource studies to enable FERC to prepare its environmental review document and develop a new operating license, including a Recreation Study to evaluate recreational opportunities in the Project area. One component of the Recreation Study includes an evaluation of trailered boat launching access to the Brunswick Project impoundment (i.e., the section of the Androscoggin River between the Pejepscot and Brunswick dams). We have compiled the attached questionnaire to solicit information from representatives of local recreation organizations with knowledge of boating conditions and opportunity in the Project impoundment. To participate in the evaluation, please respond to the questionnaire and return to me by May 30, 2025.

Feel free to consult with colleagues in compiling your response; however, please refrain from forwarding the questionnaire to others for completion. If there is an organization or an individual with knowledge specific to the Project impoundment who you feel should be included in this assessment, please send me the suggested contact and reason why you believe they might have valuable input. We are currently reaching out to the following groups for information: Town of Brunswick, Town of Topsham, Brunswick-Topsham Land Trust, American Whitewater, Androscoggin River Watershed Council, Appalachian Mountain Club, Friends of Merrymeeting Bay, and Trout Unlimited (Sebago Lake and Merrymeeting Bay Chapters).

Please let me know if you need more time to compile your responses, and feel free to contact me if you have any questions.

Thank you,

Melanie Rheaume
Recreation/Land Use Planner
Gomez and Sullivan Engineers, DPC
PO Box 2179 | Henniker, NH 03242
O: (603) 428-4960 | D: (716) 402-6773
mrheaume@gomezandsullivan.com

GOMEZ AND SULLIVAN ENGINEERS

From:	Stephen Heinz
To:	Melanie Rheaume
Cc:	Scarzello, Michael; Kirk Smith; Charlie Spies; Matt Streeter
Subject:	EXTERNAL EMAIL -Re: Brunswick Hydroelectric Project - Impoundment Boat Access Evaluation
Date:	Friday, May 9, 2025 12:34:04 PM
Attachments:	image001.png Brunswick Impoundment Boat Access Questionnaire.docx

Hi Melanie,

I'll reply for Maine Council of Trout Unlimited.

Thanks,

Steve
207 781-4762 (voice/fax only)

From:	Stephen Heinz
To:	Melanie Rheaume
Cc:	Scarzello, Michael; Kirk Smith
Subject:	EXTERNAL EMAIL -Re: Brunswick Hydroelectric Project - Impoundment Boat Access Evaluation
Date:	Friday, May 23, 2025 9:10:48 AM
Attachments:	Brunswick Impoundment Boat Access Questionnaire - Heinz.docx image001.png

Melanie,

Completed survey form attached.

Thanks for the opportunity to comment.

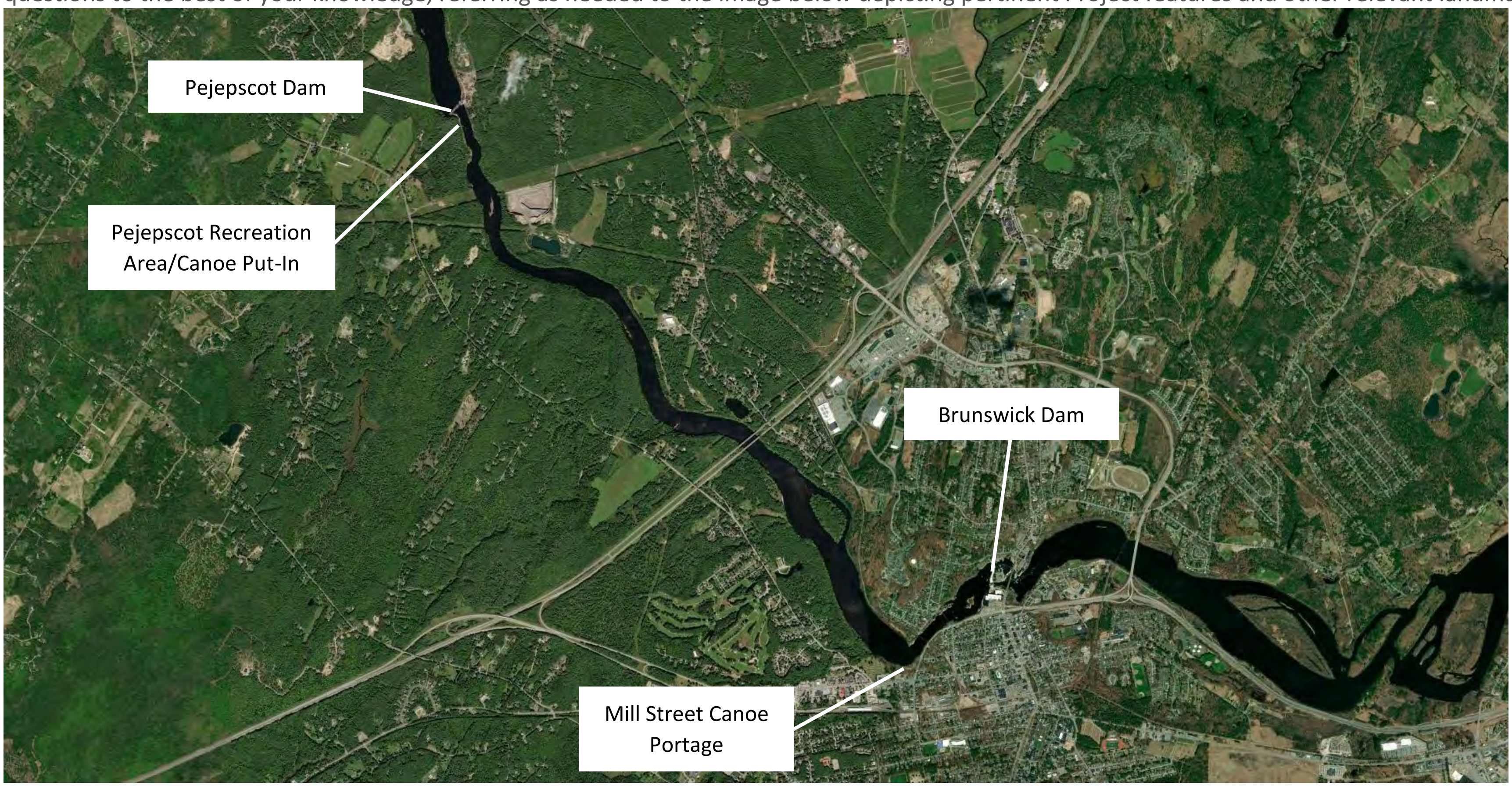
Sincerely,

Stephen G. Heinz
Long-time Androscoggin River boater/fisherman
207 781-4762 (voice/fax only)

Brunswick Hydroelectric Project (FERC No. 2284) Relicensing
Recreation Study – Brunswick Impoundment Boat Access Questionnaire

Brookfield White Pine Hydro (BWPH) is in the process of relicensing its Brunswick Hydroelectric Project with the Federal Energy Regulatory Commission (FERC). The Project is located on the Androscoggin River in Brunswick and Topsham, Maine. As part of this relicensing project, BWPH is conducting resource studies to enable FERC to prepare its environmental review document and develop a new operating license, including a Recreation Study to evaluate recreational opportunities in the Project area. One component of the Recreation Study includes an evaluation of trailered boat launching access to the Brunswick Project impoundment (i.e., the section of the Androscoggin River between the Pejepscot and Brunswick dams).

You have been identified as a person who may be able to assist with initial information gathering for this assessment. Please respond to the following questions to the best of your knowledge, referring as needed to the image below depicting pertinent Project features and other relevant landmarks.



1. Contact Information (for internal use only):

   Name: Stephen G. Heinz

   Phone number: 207 781-4762

   Email address: heinz@maine.rr.com

2. Please describe your history with and/or interest in boating on the Androscoggin River and specifically on the Brunswick Project impoundment: I have been boating on the Androscoggin River in the Brunswick vicinity from time to time since 1972. I boat the Worumbo impoundment multiple times every year, and the reach below Brunswick Dam most years.

3. Have you personally boated on the Brunswick Project impoundment? (~~yes~~/**no**):

   If yes, please answer the following questions:

   ~~Approximately how many times have you boated on the Brunswick Project impoundment in the past 5 years?~~

   ~~What type and length boat did you use?~~

   ~~What boat launch did you use?~~

   ~~During what months have you boated on the Brunswick Project impoundment?~~

   ~~Please quantify (in cubic feet per second) or characterize (e.g., very high, high, medium, low, extremely low) the river flows at which you have boated on the Brunswick Project impoundment:~~

4. Are you aware of others having boated on the Brunswick Project impoundment? (**yes**/~~no~~):

   If yes, please answer the following questions:

   What type(s) and length(s) boats are you aware of boaters using? canoes

   What boat launch(es) do they use? Mill Street Put-in

   During what months do they boat on the Brunswick Project impoundment? June - September

   Please quantify (in cubic feet per second) or characterize (e.g., very high, high, medium, low, extremely low) the river flows at which you know others to have boated on the Brunswick Project impoundment: 3000 to 5000 cfs are the flows that I prefer.

5. To your knowledge, does the Brunswick Project impoundment provide a satisfactory boating experience for trailered boats? Please explain your answer. No boat ramp there that I am aware of – no access for trailered boats.

6. Are there features unique to the Brunswick Project impoundment that make it more appealing for trailered boat use than upstream or downstream sections of the Androscoggin River? (**yes**/~~no)~~:

   If yes, please describe any unique features specific to the reach:

   Yes. Large northern pike that I'd like to target are known to be present in that impoundment that would be best pursued from motorboats. Smallmouth bass fishing is excellent there as well. Improved fish passage at Brunswick will improve the fishery due to greater availability of alewives as forage. Size quality will be amazing.

7. Are there safety concerns for the use of trailered boats unique to the Brunswick Project impoundment? (~~yes~~/**no**):

   If yes, please describe any concerns specific to the reach:

   None major or different from other Maine waters on impounded rivers.

8. Do you feel that trailered boat access to the Brunswick Project impoundment is warranted? (**yes**/~~no~~):

   Please explain your answer: Yes. Large northern pike are known to be present in that impoundment that would be best pursued from motorboats.

9. Are you aware of any locations currently providing trailered boat access to the Brunswick Project impoundment? (~~yes~~/**no**):

   If yes, please describe the location: Not that I know of.

ADDITIONAL NOTES:

1. **The paddling community has been the main user of the impoundment, and their needs should be respected by MDIFW limiting watercraft to less than 10 hp motors if/when a boat ramp is installed.**
2. **The question should not be why do we need a ramp to access the Brunswick impoundment, it should be why isn't there one there already.**
3. **Overdue provision of a boat ramp should NOT be at the expense of correcting known long-overdue fish passage deficiencies at the Brunswick Dam.**

Trout Unlimited, Merrymeeting Bay Chapter

From:	Melanie Rheaume
To:	"chipspies@gmail.com"
Cc:	Scarzello, Michael; Kirk Smith
Subject:	Brunswick Hydroelectric Project - Impoundment Boat Access Evaluation
Date:	Friday, May 9, 2025 11:49:00 AM
Attachments:	Brunswick Impoundment Boat Access Questionnaire.docx image001.png

Charles,

Brookfield White Pine Hydro (BWPH) is in the process of relicensing its Brunswick Hydroelectric Project with the Federal Energy Regulatory Commission (FERC). The Project is located on the Androscoggin River in Brunswick and Topsham, Maine. As part of this relicensing project, BWPH is conducting resource studies to enable FERC to prepare its environmental review document and develop a new operating license, including a Recreation Study to evaluate recreational opportunities in the Project area. One component of the Recreation Study includes an evaluation of trailered boat launching access to the Brunswick Project impoundment (i.e., the section of the Androscoggin River between the Pejepscot and Brunswick dams). We have compiled the attached questionnaire to solicit information from representatives of local recreation organizations with knowledge of boating conditions and opportunity in the Project impoundment. To participate in the evaluation, please respond to the questionnaire and return to me by May 30, 2025.

Feel free to consult with colleagues in compiling your response; however, please refrain from forwarding the questionnaire to others for completion. If there is an organization or an individual with knowledge specific to the Project impoundment who you feel should be included in this assessment, please send me the suggested contact and reason why you believe they might have valuable input. We are currently reaching out to the following groups for information: Town of Brunswick, Town of Topsham, Brunswick-Topsham Land Trust, American Whitewater, Androscoggin River Watershed Council, Appalachian Mountain Club, Friends of Merrymeeting Bay, and Trout Unlimited (Sebago Lake and Merrymeeting Bay Chapters).

Please let me know if you need more time to compile your responses, and feel free to contact me if you have any questions.

Thank you,

Melanie Rheaume
Recreation/Land Use Planner
Gomez and Sullivan Engineers, DPC
PO Box 2179 | Henniker, NH 03242
O: (603) 428-4960 | D: (716) 402-6773
mrheaume@gomezandsullivan.com

GOMEZ AND SULLIVAN
ENGINEERS

From:	Chip Spies
To:	Melanie Rheaume
Cc:	Scarzello, Michael; Kirk Smith; Tom Farrell; Julia Henze; Stephen Heinz; Charles Verrill; Thomas Walek; Toby J. McGrath; Bill Ferdinand; Minchak, Raymond E; Jeff Bush; Andrew Fisk; Vladimir Douhovnikoff; John Lichter
Subject:	EXTERNAL EMAIL -Re: Brunswick Hydroelectric Project - Impoundment Boat Access Evaluation
Date:	Friday, May 30, 2025 10:03:01 AM
Attachments:	image001.png submitted FTA and citizen response to Brunswick Impoundment Boat Access Questionnaire.docx

Melanie,

The completed survey is attached. I appreciate the opportunity to provide comments.

Sincerely,

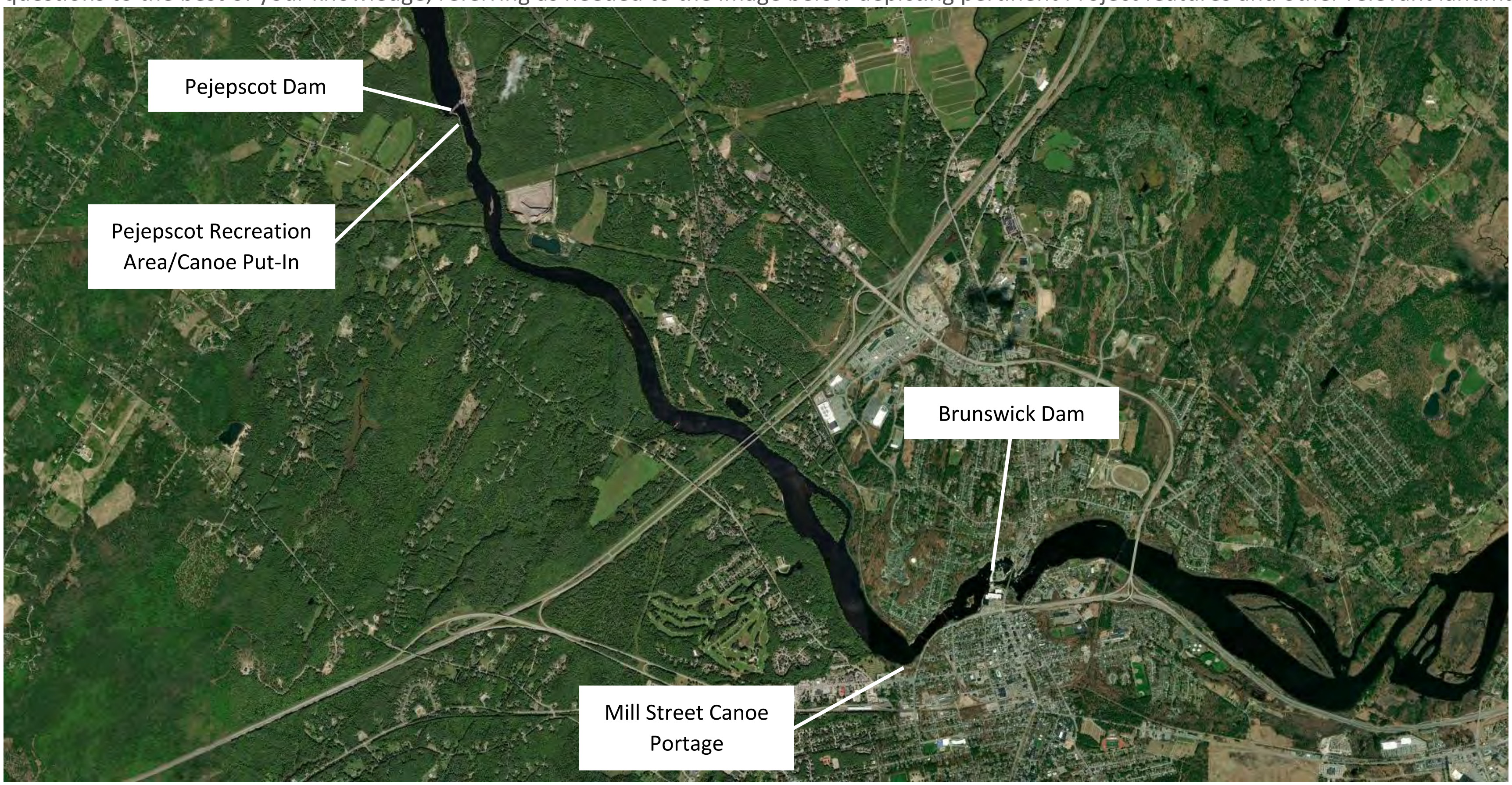
Chip Spies

On Fri, May 9, 2025 at 11:50 AM Melanie Rheaume <mrheaume@gomezandsullivan.com> wrote:

Brunswick Hydroelectric Project (FERC No. 2284) Relicensing
Recreation Study – Brunswick Impoundment Boat Access Questionnaire

Brookfield White Pine Hydro (BWPH) is in the process of relicensing its Brunswick Hydroelectric Project with the Federal Energy Regulatory Commission (FERC). The Project is located on the Androscoggin River in Brunswick and Topsham, Maine. As part of this relicensing project, BWPH is conducting resource studies to enable FERC to prepare its environmental review document and develop a new operating license, including a Recreation Study to evaluate recreational opportunities in the Project area. One component of the Recreation Study includes an evaluation of trailered boat launching access to the Brunswick Project impoundment (i.e., the section of the Androscoggin River between the Pejepscot and Brunswick dams).

You have been identified as a person who may be able to assist with initial information gathering for this assessment. Please respond to the following questions to the best of your knowledge, referring as needed to the image below depicting pertinent Project features and other relevant landmarks.



1. Contact Information (for internal use only):

   Name: Charles J. Spies

   Phone number: 207-837-3929

   Email address: chipspies@gmail.com

2. Please describe your history with and/or interest in boating on the Androscoggin River and specifically on the Brunswick Project impoundment: I am 40-year resident of the communities of Brunswick and Topsham where we raised our family. I am also the founder the Free the Andro Coalition which is focused on significantly improving migratory fish passage at the Brunswick Dam site. The Free the Andro Coalition is currently comprised of Merrymeeting Bay Trout Unlimited, Maine Rivers and American Rivers. It is working to find suitable solutions for improved fish passage with all interested parties.

   My wife and I live on Water Street in Brunswick, located at head-of tide and approximately one-quarter mile downstream from the Brunswick dam. We have been recreational users of the river above and below the dam for more than two decades. Our boating interests include fishing with kayaks and a small motorboat, rowing for exercise, and canoeing. We also swim in the river which meets Maine's Class B Water Quality Standards and spend time observing the many types of wildlife that use the river as a year-round home or try to migrate through the area as part of their life cycle. The defined impoundment for the dam as shown in Brookfield's Preliminary Application Document filed February 21, 2024, includes a large area above the dam and a limited downstream section. We access the downstream section of the defined impoundment from either of two Water Street landings that are a located quarter to ½ mile below the dam. These landings provide access to the lower end of the impoundment. But it is important to recognize that the influence of controlled flows at the hydro facility affect the downstream portion of the river for recreational use well beyond the defined boundary. This is a river after all.

3. Have you personally boated on the Brunswick Project impoundment? (yes/no):

   If yes, please answer the following questions: Yes

   Approximately how many times have you boated on the Brunswick Project impoundment in the past 5 years? I put in below the dam and travel up to the lower portion of the impoundment below the Frank J. Wood Bridge 20 to 30 times a year. Over the last five years I can comfortably say I have accessed this section over 100 times to fish or just view the river and its wildlife from the water. I have used the area above the dam less frequently as the current portage site is often closed due to river conditions and proximity to the floating boat barrier strung across the river by Brookfield.

   What type and length boat did you use?

Below the dam I use a 14-foot aluminum motorboat with a 15 HP engine, a 12-foot kayak, a 16-foot canoe, and a 12-foot rowing boat with a sliding seat. Above the dam we use 12-foot kayaks.

What boat launch did you use? Below the dam we use either the gravel launch located between 59 and 65 Water Street or the larger downstream launch with docking facilities at the public parking area located at the start of the bicycle/walking path (the "bikepath landing"). Above the dam we use the non-motorized boat just above the floating boat barrier.

During what months have you boated on the Brunswick Project impoundment?
April - November

Please quantify (in cubic feet per second) or characterize (e.g., very high, high, medium, low, extremely low) the river flows at which you have boated on the Brunswick Project impoundment: We use the CFS flow gauge located in Lewiston, Maine to understand actual and predicted real flows downstream at the Brunswick reach. We do not enter the river when flows are above approximately 13,000 CFS per the gauge and prefer flows of less than 10,000 CFS

4. Are you aware of others having boated on the Brunswick Project impoundment? (yes/no):
   If yes, please answer the following questions: Yes
   What type(s) and length(s) boats are you aware of boaters using?

Wide range of users below the dam from paddleboards to kayaks, to canoes, to motorboats between 12 and 22 feet and occasionally pontoon boats. On one occasion we saw two 14-16-foot sailboats tacking up and down. The Midcoast Rowing Association is very active and keeps many boats in a secure area near the lower landing. They row daily from May-October when river conditions allow and host regattas and provide lessons. We commonly see a dozen rowers on the river when daily conditions allow. We have seen commercial fishing boats, likely local lobsterman, seine in some places for catfish or other species. They would mark the area with a buoy, set out an attractant bait on the bottom and return a few days later to net fish. We believe they were catching bait for lobster traps.

When conditions permit and the landing is open, numerous canoes and kayaks can be observed above the dam.

What boat launch(es) do they use?
Most vessels below the dam launch from the "bike path" lower landing which has more parking and a launching dock facility.

Above the dam the only landing is for non-motorized vessels as described above.

During what months do they boat on the Brunswick Project impoundment?

We described our personal activity above, but we see boats on the water throughout the year. Duck hunters are active throughout the fall. If the central river channel is ice free, we see kayak paddlers with dry-suits sometimes using the area below the dam from December to March.

Please quantify (in cubic feet per second) or characterize (e.g., very high, high, medium, low, extremely low) the river flows at which you know others to have boated on the Brunswick Project impoundment:

Typically, 13,000 CFS or less is my personal estimate.

5. To your knowledge, does the Brunswick Project impoundment provide a satisfactory boating experience for trailered boats? Please explain your answer: Yes, below the dam. No above

6. Are there features unique to the Brunswick Project impoundment that make it more appealing for trailered boat use than upstream or downstream sections of the Androscoggin River? (yes/no):
   YES

7.

If yes, please describe any unique features specific to the reach: Below the dam there is a mean tidal flux of four feet with the channels remaining navigable at high and low tide and the current is not excessive below 13,000 CFS allowing many types of recreational boating and for many types of recreational pursuits as described in several sections above. The presence of diadromous fish such as river herring. below the dam that cannot, for the most part, continue above the dam contributes to fishing opportunities for predators that follow these fish like striped bass as well as small mouth bass, pike and others. Despite the tidal flux below the dam, the water is not brackish this far above the ocean. This phenomenon is rare and attractive given the ecosystem it supports. My understanding is that there are only 1,000 miles of salt free riverine tidal water of this kind in the world. The section is also a known spawning area for sturgeon. During May/June river users can spot as many as 50 Atlantic or Shortnosed sturgeon breaching per hour in the stretch of a quarter mile below the dam. A rare site for species that are listed as endangered (Shortnose) or threatened (Gulf of Maine Atlantic).

Above the dam is known as a very productive smallmouth bass fishery. It is also relatively undeveloped and allows for excellent wildlife viewing of birds such as Bald Eagles, osprey, and many others. We have spotted muskrats and beaver while paddling that. Section.

8. Are there safety concerns for the use of trailered boats unique to the Brunswick Project impoundment? (yes/no): Yes

   If yes, please describe any concerns specific to the reach:

   The launch above the dam for non-motorized boats is very close to the floating boat barrier managed by Brookfield which is designed to stop boats from getting too close to or running into the dam. There is also a sharp 90 degree turn in the river just below the launch, creating strong currents just below the landing. If a trailered motorboat had mechanical problems at the landing it could be in danger of striking and pinning against the boat barrier or worse if the barrier failed.

9. Do you feel that trailered boat access to the Brunswick Project impoundment is warranted? (yes/no): Yes

   Please explain your answer: Obviously, as discussed above, boats of many kinds have access to the impoundment from below the dam. However, access above the dam is limited to non-motorized vessels and the current location is not ideal for motorized vessels due to strong currents and proximity to the boat barrier. Having access further above the dam for motorized craft would add a tremendous opportunity for many types of recreationists, especially fisherman interested in the smallmouth bass fishery.

   In conversations with administrators at the Town of Brunswick (Town Manager and Director of Parks and Recreation), there are several publicly owned parcels of land upstream from the current non-motorized landing that could provide deep water access and appropriately safe distance from hazards to allow launching of motorized craft. This would avoid the risks presented at the existing landing, allow access through properties already controlled by the Town and open a whole new set of recreational opportunities for community members. Users would include residents and tourists to the area. They would also include Maine's licensed fishing guides which now use many portions of the Androscoggin River to take client's bass and pike fishing as well as wildlife viewing where motorized boat access is available. This new opportunity to access the upstream reach of the river will have positive economic impacts from both recreational users and commercially by enhancing business opportunities for professional guides serving those users.

   As a Brunswick resident, active user of the river and representative of the Free the Andro Coalition, I strongly encourage the consideration of the development of a safe, motorized boat access facility above the dam.

10. Are you aware of any locations currently providing trailered boat access to the Brunswick Project impoundment? (yes/no): No

If yes, please describe the location:

But the opportunity via public lands exists and is strongly encouraged.

Thank you for your time and input.

Appalachian Mountain Club

From:	Melanie Rheaume
To:	Mark Zakutansky
Cc:	Scarzello, Michael; Kirk Smith
Subject:	Brunswick Hydroelectric Project - Impoundment Boat Access Evaluation
Date:	Friday, May 9, 2025 11:50:00 AM
Attachments:	Brunswick Impoundment Boat Access Questionnaire.docx image001.png

Mark,

Brookfield White Pine Hydro (BWPH) is in the process of relicensing its Brunswick Hydroelectric Project with the Federal Energy Regulatory Commission (FERC). The Project is located on the Androscoggin River in Brunswick and Topsham, Maine. As part of this relicensing project, BWPH is conducting resource studies to enable FERC to prepare its environmental review document and develop a new operating license, including a Recreation Study to evaluate recreational opportunities in the Project area. One component of the Recreation Study includes an evaluation of trailered boat launching access to the Brunswick Project impoundment (i.e., the section of the Androscoggin River between the Pejepscot and Brunswick dams). We have compiled the attached questionnaire to solicit information from representatives of local recreation organizations with knowledge of boating conditions and opportunity in the Project impoundment. To participate in the evaluation, please respond to the questionnaire and return to me by May 30, 2025.

Feel free to consult with colleagues in compiling your response; however, please refrain from forwarding the questionnaire to others for completion. If there is an organization or an individual with knowledge specific to the Project impoundment who you feel should be included in this assessment, please send me the suggested contact and reason why you believe they might have valuable input. We are currently reaching out to the following groups for information: Town of Brunswick, Town of Topsham, Brunswick-Topsham Land Trust, American Whitewater, Androscoggin River Watershed Council, Appalachian Mountain Club, Friends of Merrymeeting Bay, and Trout Unlimited (Sebago Lake and Merrymeeting Bay Chapters).

Please let me know if you need more time to compile your responses, and feel free to contact me if you have any questions.

Thank you,

Melanie Rheaume
Recreation/Land Use Planner
Gomez and Sullivan Engineers, DPC
PO Box 2179 | Henniker, NH 03242
O: (603) 428-4960 | D: (716) 402-6773
mrheaume@gomezandsullivan.com

GOMEZ AND SULLIVAN ENGINEERS

From:	Melanie Rheaume
To:	Mark Zakutansky
Cc:	Scarzello, Michael; Kirk Smith
Subject:	RE: EXTERNAL EMAIL -RE: Brunswick Hydroelectric Project - Impoundment Boat Access Evaluation
Date:	Friday, May 9, 2025 3:34:00 PM
Attachments:	image001.png image002.png

Hi Mark,

Thanks for the response. I will use Eliza as the point of contact for this questionnaire moving forward.

Thank you,

Melanie Rheaume
O: (603) 428-4960 | D: (716) 402-6773 | mrheaume@gomezandsullivan.com

---

From: Mark Zakutansky <mzakutansky@outdoors.org>
Sent: Friday, May 9, 2025 2:27 PM
To: Melanie Rheaume <mrheaume@gomezandsullivan.com>
Cc: Scarzello, Michael <Michael.Scarzello@brookfieldrenewable.com>; Kirk Smith <ksmith@gomezandsullivan.com>
Subject: EXTERNAL EMAIL -RE: Brunswick Hydroelectric Project - Impoundment Boat Access Evaluation

Hi Melanie,

Can you please replace me as the AMC point of contact on this questionnaire with Eliza Townsend etownsend@outdoors.org, AMC's Maine Conservation Policy Director?

It will be much easier for AMC to participate with Eliza at helm and Eliza is proximate to the project.

Generally speaking, we are a non-motorized recreation organization, so trailed boat launches are not our traditional recreational access area, though Eliza can engage or choose not to.

Thank you,

Mark

Mark Zakutansky
Director of Conservation Policy Engagement
mzakutansky@outdoors.org
551.427.0974
Writing to you from **Bethlehem, PA**
Book time to meet with me

From:	Melanie Rheaume
To:	etownsend@outdoors.org
Cc:	Kirk Smith; Scarzello, Michael
Subject:	Brunswick Hydroelectric Project - Impoundment Boat Access Evaluation
Date:	Friday, May 9, 2025 3:36:00 PM
Attachments:	Brunswick Impoundment Boat Access Questionnaire.docx image001.png

Eliza,

Brookfield White Pine Hydro (BWPH) is in the process of relicensing its Brunswick Hydroelectric Project with the Federal Energy Regulatory Commission (FERC). The Project is located on the Androscoggin River in Brunswick and Topsham, Maine. As part of this relicensing project, BWPH is conducting resource studies to enable FERC to prepare its environmental review document and develop a new operating license, including a Recreation Study to evaluate recreational opportunities in the Project area. One component of the Recreation Study includes an evaluation of trailered boat launching access to the Brunswick Project impoundment (i.e., the section of the Androscoggin River between the Pejepscot and Brunswick dams). We have compiled the attached questionnaire to solicit information from representatives of local recreation organizations with knowledge of boating conditions and opportunity in the Project impoundment. To participate in the evaluation, please respond to the questionnaire and return to me by May 30, 2025.

Feel free to consult with colleagues in compiling your response; however, please refrain from forwarding the questionnaire to others for completion. If there is an organization or an individual with knowledge specific to the Project impoundment who you feel should be included in this assessment, please send me the suggested contact and reason why you believe they might have valuable input. We are currently reaching out to the following groups for information: Town of Brunswick, Town of Topsham, Brunswick-Topsham Land Trust, American Whitewater, Androscoggin River Watershed Council, Appalachian Mountain Club, Friends of Merrymeeting Bay, and Trout Unlimited (Sebago Lake and Merrymeeting Bay Chapters).

Please let me know if you need more time to compile your responses, and feel free to contact me if you have any questions.

Thank you,

Melanie Rheaume
Recreation/Land Use Planner
Gomez and Sullivan Engineers, DPC
PO Box 2179 | Henniker, NH 03242
O: (603) 428-4960 | D: (716) 402-6773
mrheaume@gomezandsullivan.com

GOMEZ AND SULLIVAN ENGINEERS

From:	Melanie Rheaume
To:	etownsend@outdoors.org
Cc:	Kirk Smith; Scarzello, Michael
Subject:	RE: Brunswick Hydroelectric Project - Impoundment Boat Access Evaluation
Date:	Monday, June 2, 2025 9:31:00 AM
Attachments:	Brunswick Impoundment Boat Access Questionnaire.docx image001.png

Good morning, Eliza,

Just checking in on the questionnaire regarding trailered boat access to the Brunswick Project impoundment. If you intend to respond to the questionnaire, please do so by June 13th or reach out to me if you have questions or need more time.

Thank you,

Melanie Rheaume
O: (603) 428-4960 | D: (716) 402-6773 | mrheaume@gomezandsullivan.com

From: Melanie Rheaume
Sent: Friday, May 9, 2025 3:39 PM
To: etownsend@outdoors.org
Cc: Kirk Smith <ksmith@gomezandsullivan.com>; Scarzello, Michael <Michael.Scarzello@brookfieldrenewable.com>
Subject: Brunswick Hydroelectric Project - Impoundment Boat Access Evaluation

Eliza,

Brookfield White Pine Hydro (BWPH) is in the process of relicensing its Brunswick Hydroelectric Project with the Federal Energy Regulatory Commission (FERC). The Project is located on the Androscoggin River in Brunswick and Topsham, Maine. As part of this relicensing project, BWPH is conducting resource studies to enable FERC to prepare its environmental review document and develop a new operating license, including a Recreation Study to evaluate recreational opportunities in the Project area. One component of the Recreation Study includes an evaluation of trailered boat launching access to the Brunswick Project impoundment (i.e., the section of the Androscoggin River between the Pejepscot and Brunswick dams). We have compiled the attached questionnaire to solicit information from representatives of local recreation organizations with knowledge of boating conditions and opportunity in the Project impoundment. To participate in the evaluation, please respond to the questionnaire and return to me by May 30, 2025.

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River Watershed Council, Appalachian Mountain Club, Friends of Merrymeeting Bay, and Trout Unlimited (Sebago Lake and Merrymeeting Bay Chapters).

Please let me know if you need more time to compile your responses, and feel free to contact me if you have any questions.

Thank you,

Melanie Rheaume
Recreation/Land Use Planner
Gomez and Sullivan Engineers, DPC
PO Box 2179 | Henniker, NH 03242
O: (603) 428-4960 | D: (716) 402-6773
mrheaume@gomezandsullivan.com

American Whitewater

From:	Melanie Rheaume
To:	Bob Nasdor
Cc:	Scarzello, Michael; Kirk Smith
Subject:	Brunswick Hydroelectric Project - Impoundment Boat Access Evaluation
Date:	Friday, May 9, 2025 11:50:00 AM
Attachments:	Brunswick Impoundment Boat Access Questionnaire.docx image001.png

Bob,

Brookfield White Pine Hydro (BWPH) is in the process of relicensing its Brunswick Hydroelectric Project with the Federal Energy Regulatory Commission (FERC). The Project is located on the Androscoggin River in Brunswick and Topsham, Maine. As part of this relicensing project, BWPH is conducting resource studies to enable FERC to prepare its environmental review document and develop a new operating license, including a Recreation Study to evaluate recreational opportunities in the Project area. One component of the Recreation Study includes an evaluation of trailered boat launching access to the Brunswick Project impoundment (i.e., the section of the Androscoggin River between the Pejepscot and Brunswick dams). We have compiled the attached questionnaire to solicit information from representatives of local recreation organizations with knowledge of boating conditions and opportunity in the Project impoundment. To participate in the evaluation, please respond to the questionnaire and return to me by May 30, 2025.

Feel free to consult with colleagues in compiling your response; however, please refrain from forwarding the questionnaire to others for completion. If there is an organization or an individual with knowledge specific to the Project impoundment who you feel should be included in this assessment, please send me the suggested contact and reason why you believe they might have valuable input. We are currently reaching out to the following groups for information: Town of Brunswick, Town of Topsham, Brunswick-Topsham Land Trust, American Whitewater, Androscoggin River Watershed Council, Appalachian Mountain Club, Friends of Merrymeeting Bay, and Trout Unlimited (Sebago Lake and Merrymeeting Bay Chapters).

Please let me know if you need more time to compile your responses, and feel free to contact me if you have any questions.

Thank you,

Melanie Rheaume
Recreation/Land Use Planner
Gomez and Sullivan Engineers, DPC
PO Box 2179 | Henniker, NH 03242
O: (603) 428-4960 | D: (716) 402-6773
mrheaume@gomezandsullivan.com

GOMEZ AND SULLIVAN ENGINEERS

From:	Melanie Rheaume
To:	Bob Nasdor
Cc:	Scarzello, Michael; Kirk Smith
Subject:	RE: Brunswick Hydroelectric Project - Impoundment Boat Access Evaluation
Date:	Monday, June 2, 2025 9:31:00 AM
Attachments:	Brunswick Impoundment Boat Access Questionnaire.docx image001.png

Good morning Bob,

Just checking in on the questionnaire regarding trailered boat access to the Brunswick Project impoundment. If you intend to respond to the questionnaire, please do so by June 13th or reach out to me if you have questions or need more time.

Thank you,

Melanie Rheaume
O: (603) 428-4960 | D: (716) 402-6773 | mrheaume@gomezandsullivan.com

---

From: Melanie Rheaume
Sent: Friday, May 9, 2025 11:52 AM
To: Bob Nasdor <bob@americanwhitewater.org>
Cc: Scarzello, Michael <Michael.Scarzello@brookfieldrenewable.com>; Kirk Smith <ksmith@gomezandsullivan.com>
Subject: Brunswick Hydroelectric Project - Impoundment Boat Access Evaluation

Bob,

Brookfield White Pine Hydro (BWPH) is in the process of relicensing its Brunswick Hydroelectric Project with the Federal Energy Regulatory Commission (FERC). The Project is located on the Androscoggin River in Brunswick and Topsham, Maine. As part of this relicensing project, BWPH is conducting resource studies to enable FERC to prepare its environmental review document and develop a new operating license, including a Recreation Study to evaluate recreational opportunities in the Project area. One component of the Recreation Study includes an evaluation of trailered boat launching access to the Brunswick Project impoundment (i.e., the section of the Androscoggin River between the Pejepscot and Brunswick dams). We have compiled the attached questionnaire to solicit information from representatives of local recreation organizations with knowledge of boating conditions and opportunity in the Project impoundment. To participate in the evaluation, please respond to the questionnaire and return to me by May 30, 2025.

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mrheaume@gomezandsullivan.com

GOMEZ AND SULLIVAN
ENGINEERS

Friends of Merrymeeting Bay (FOMB)

From:	Melanie Rheaume
To:	"edfomb@comcast.net"
Cc:	Scarzello, Michael; Kirk Smith
Subject:	Brunswick Hydroelectric Project - Impoundment Boat Access Evaluation
Date:	Friday, May 9, 2025 11:51:00 AM
Attachments:	Brunswick Impoundment Boat Access Questionnaire.docx image001.png

Ed,

Brookfield White Pine Hydro (BWPH) is in the process of relicensing its Brunswick Hydroelectric Project with the Federal Energy Regulatory Commission (FERC). The Project is located on the Androscoggin River in Brunswick and Topsham, Maine. As part of this relicensing project, BWPH is conducting resource studies to enable FERC to prepare its environmental review document and develop a new operating license, including a Recreation Study to evaluate recreational opportunities in the Project area. One component of the Recreation Study includes an evaluation of trailered boat launching access to the Brunswick Project impoundment (i.e., the section of the Androscoggin River between the Pejepscot and Brunswick dams). We have compiled the attached questionnaire to solicit information from representatives of local recreation organizations with knowledge of boating conditions and opportunity in the Project impoundment. To participate in the evaluation, please respond to the questionnaire and return to me by May 30, 2025.

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mrheaume@gomezandsullivan.com

GOMEZ AND SULLIVAN ENGINEERS

From:	Melanie Rheaume
To:	edfomb@comcast.net
Cc:	Scarzello, Michael; Kirk Smith
Subject:	RE: Brunswick Hydroelectric Project - Impoundment Boat Access Evaluation
Date:	Monday, June 2, 2025 9:31:00 AM
Attachments:	image001.png

Good morning, Ed,

Just checking in on the questionnaire regarding trailered boat access to the Brunswick Project impoundment. If you intend to respond to the questionnaire, please do so by June 13th or reach out to me if you have questions or need more time.

Thank you,

Melanie Rheaume
O: (603) 428-4960 | D: (716) 402-6773 | mrheaume@gomezandsullivan.com

From: Melanie Rheaume
Sent: Friday, May 9, 2025 11:52 AM
To: 'edfomb@comcast.net' <edfomb@comcast.net>
Cc: Scarzello, Michael <Michael.Scarzello@brookfieldrenewable.com>; Kirk Smith <ksmith@gomezandsullivan.com>
Subject: Brunswick Hydroelectric Project - Impoundment Boat Access Evaluation

Ed,

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mrheaume@gomezandsullivan.com

GOMEZ AND SULLIVAN ENGINEERS

From:	Ed Friedman
To:	Melanie Rheaume
Subject:	EXTERNAL EMAIL -Brunswick Impoundment Boat Access Questionnaire-FOMB
Date:	Monday, June 2, 2025 5:44:00 PM
Attachments:	Brunswick Impoundment Boat Access Questionnaire-FOMB.docx

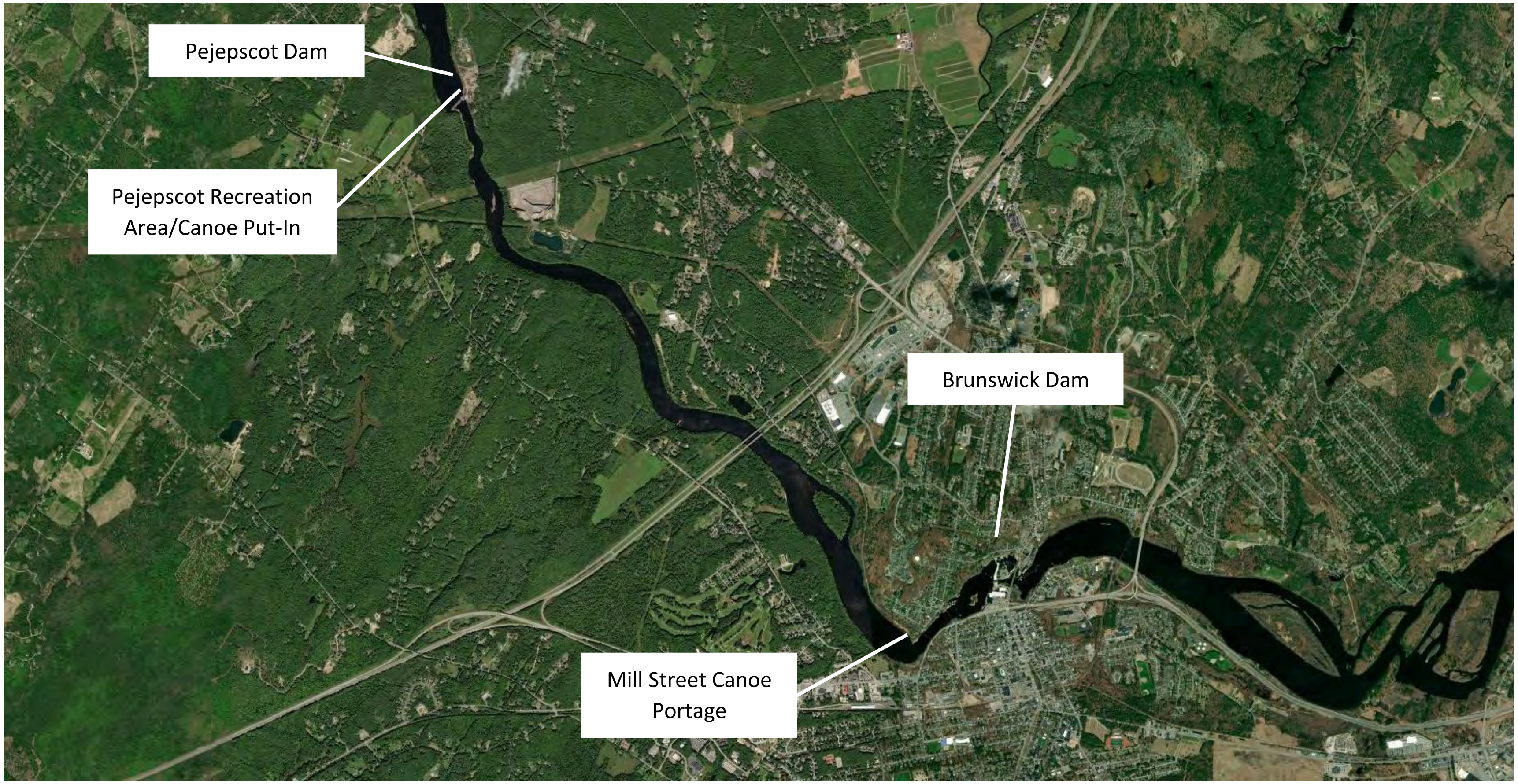
Here you go Melanie.

Ed

Brunswick Hydroelectric Project (FERC No. 2284) Relicensing
Recreation Study – Brunswick Impoundment Boat Access Questionnaire

Brookfield White Pine Hydro (BWPH) is in the process of relicensing its Brunswick Hydroelectric Project with the Federal Energy Regulatory Commission (FERC). The Project is located on the Androscoggin River in Brunswick and Topsham, Maine. As part of this relicensing project, BWPH is conducting resource studies to enable FERC to prepare its environmental review document and develop a new operating license, including a Recreation Study to evaluate recreational opportunities in the Project area. One component of the Recreation Study includes an evaluation of trailered boat launching access to the Brunswick Project impoundment (i.e., the section of the Androscoggin River between the Pejepscot and Brunswick dams).

You have been identified as a person who may be able to assist with initial information gathering for this assessment. Please respond to the following questions to the best of your knowledge, referring as needed to the image below depicting pertinent Project features and other relevant landmarks.



1. Contact Information (for internal use only):

   Name: Ed Friedman, Friends of Merrymeeting Bay

   Phone number: 207-666-3372

   Email address: edfomb@comcast.net

2. Please describe your history with and/or interest in boating on the Androscoggin River and specifically on the Brunswick Project impoundment: Have only put into the impoundment several times-always at Mill St. and specifically to access water sampling related sites. Have also put in at Pejepscot Boat Launch [also for sampling] and numerous times at Water St. for a variety of research and recreation.

3. Have you personally boated on the Brunswick Project impoundment? (yes/no):

   If yes, please answer the following questions:

   Approximately how many times have you boated on the Brunswick Project impoundment in the past 5 years? Once

   What type and length boat did you use? 12' aluminum skiff

   What boat launch did you use? Mill St.

   During what months have you boated on the Brunswick Project impoundment? Summer

   Please quantify (in cubic feet per second) or characterize (e.g., very high, high, medium, low, extremely low) the river flows at which you have boated on the Brunswick Project impoundment: Unknown

4. Are you aware of others having boated on the Brunswick Project impoundment? (yes/no):

   If yes, please answer the following questions:

   What type(s) and length(s) boats are you aware of boaters using? Kayaks

   What boat launch(es) do they use? Mill St.

During what months do they boat on the Brunswick Project impoundment? Summer

Please quantify (in cubic feet per second) or characterize (e.g., very high, high, medium, low, extremely low) the river flows at which you know others to have boated on the Brunswick Project impoundment: Unknown

5. To your knowledge, does the Brunswick Project impoundment provide a satisfactory boating experience for trailered boats? Please explain your answer: In my limited experience the Mill St. ramp is marginal for trailered boats and to my knowledge this is the only trailer access to the impoundment. Water depth is extremely shallow and old bridge or log piers just below the surface below I-29 are unmarked hazards.

6. Are there features unique to the Brunswick Project impoundment that make it more appealing for trailered boat use than upstream or downstream sections of the Androscoggin River? (yes/no):

   If yes, please describe any unique features specific to the reach:

7. Are there safety concerns for the use of trailered boats unique to the Brunswick Project impoundment? (yes/no):

   If yes, please describe any concerns specific to the reach: See #5

8. Do you feel that trailered boat access to the Brunswick Project impoundment is warranted? (yes/no):

   Please explain your answer: As far as I know people do enjoy fishing there.

9. Are you aware of any locations currently providing trailered boat access to the Brunswick Project impoundment? (yes/no):I assume Mill St. does but maybe I'm remembering vertical pipes no blocking the access? Other than that, none.

   If yes, please describe the location:

Thank you for your time and input.

Androscoggin River Watershed Council

From:	Melanie Rheaume
To:	Ferg Lea
Cc:	Scarzello, Michael; Kirk Smith
Subject:	Brunswick Hydroelectric Project - Impoundment Boat Access Evaluation
Date:	Friday, May 9, 2025 11:52:00 AM
Attachments:	Brunswick Impoundment Boat Access Questionnaire.docx image001.png

Ferg,

Brookfield White Pine Hydro (BWPH) is in the process of relicensing its Brunswick Hydroelectric Project with the Federal Energy Regulatory Commission (FERC). The Project is located on the Androscoggin River in Brunswick and Topsham, Maine. As part of this relicensing project, BWPH is conducting resource studies to enable FERC to prepare its environmental review document and develop a new operating license, including a Recreation Study to evaluate recreational opportunities in the Project area. One component of the Recreation Study includes an evaluation of trailered boat launching access to the Brunswick Project impoundment (i.e., the section of the Androscoggin River between the Pejepscot and Brunswick dams). We have compiled the attached questionnaire to solicit information from representatives of local recreation organizations with knowledge of boating conditions and opportunity in the Project impoundment. To participate in the evaluation, please respond to the questionnaire and return to me by May 30, 2025.

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GOMEZ AND SULLIVAN ENGINEERS

From:	Melanie Rheaume
To:	Ferg Lea
Cc:	Scarzello, Michael; Kirk Smith
Subject:	RE: Brunswick Hydroelectric Project - Impoundment Boat Access Evaluation
Date:	Monday, June 2, 2025 9:30:00 AM
Attachments:	Brunswick Impoundment Boat Access Questionnaire.docx image001.png

Good morning, Ferg,

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O: (603) 428-4960 | D: (716) 402-6773 | mrheaume@gomezandsullivan.com

From: Melanie Rheaume
Sent: Friday, May 9, 2025 11:53 AM
To: Ferg Lea <flea.arwc@gmail.com>
Cc: Scarzello, Michael <Michael.Scarzello@brookfieldrenewable.com>; Kirk Smith <ksmith@gomezandsullivan.com>
Subject: Brunswick Hydroelectric Project - Impoundment Boat Access Evaluation

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GOMEZ AND SULLIVAN ENGINEERS

APPENDIX C – STRUCTURED INTERVIEW FORM

Brunswick Hydroelectric Project (FERC No. 2284) Relicensing
Recreation Study – Brunswick Impoundment Boat Access Questionnaire

Brookfield White Pine Hydro (BWPH) is in the process of relicensing its Brunswick Hydroelectric Project with the Federal Energy Regulatory Commission (FERC). The Project is located on the Androscoggin River in Brunswick and Topsham, Maine. As part of this relicensing project, BWPH is conducting resource studies to enable FERC to prepare its environmental review document and develop a new operating license, including a Recreation Study to evaluate recreational opportunities in the Project area. One component of the Recreation Study includes an evaluation of trailered boat launching access to the Brunswick Project impoundment (i.e., the section of the Androscoggin River between the Pejepscot and Brunswick dams).

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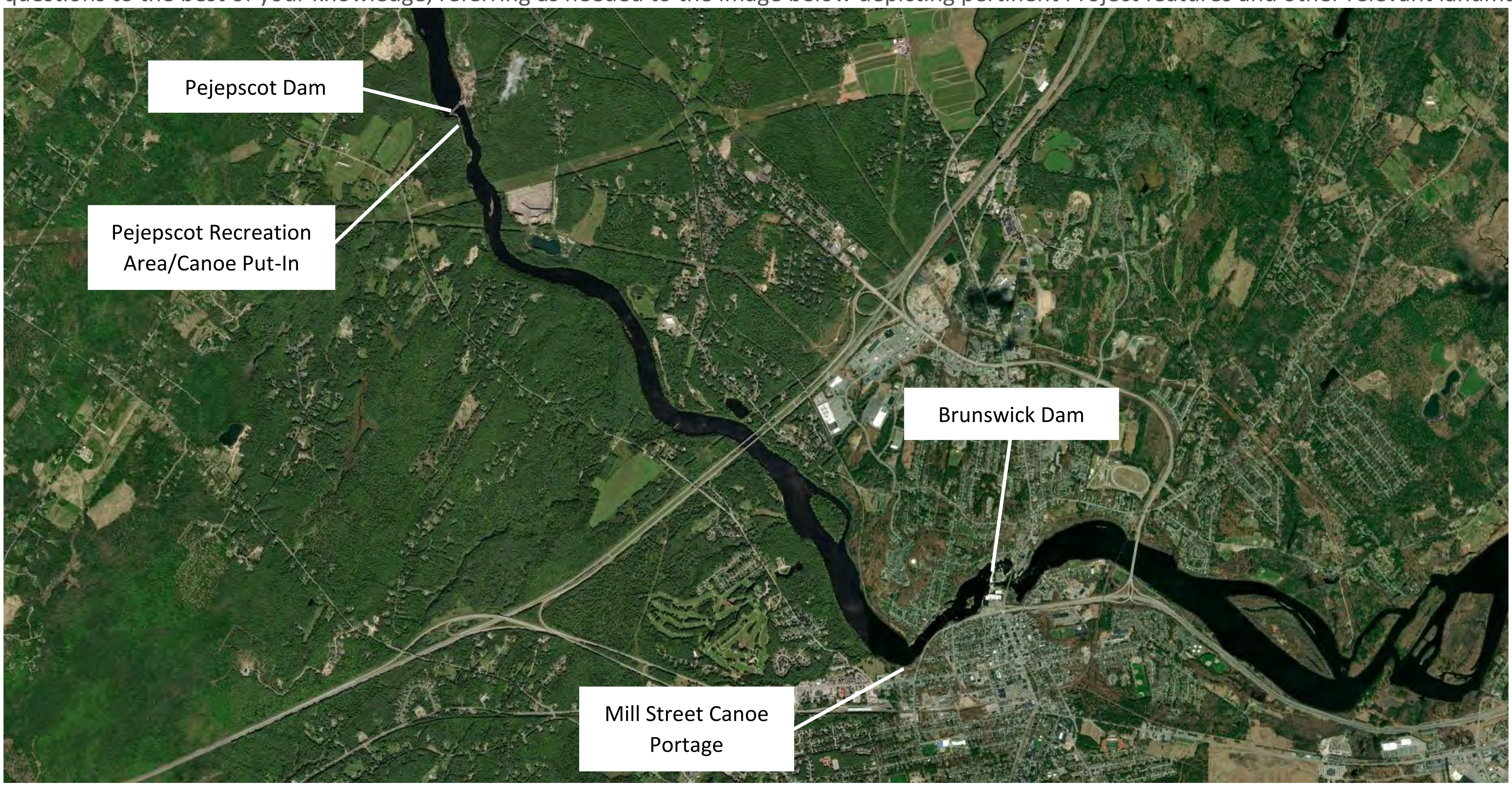


1. Contact Information (for internal use only):

   Name: ____

   Phone number: _______________________________________

   Email address: _______________________________________

2. Please describe your history with and/or interest in boating on the Androscoggin River and specifically on the Brunswick Project impoundment:____

   ____

   ____

   ____

3. Have you personally boated on the Brunswick Project impoundment? (yes/no): ____________

   If yes, please answer the following questions:

   Approximately how many times have you boated on the Brunswick Project impoundment in the past 5 years?__________________

   ____

   What type and length boat did you use? ____

   ____

   What boat launch did you use?____

   ____

   During what months have you boated on the Brunswick Project impoundment?______________________

   ____

   Please quantify (in cubic feet per second) or characterize (e.g., very high, high, medium, low, extremely low) the river flows at which you have boated on the Brunswick Project impoundment:__________________________________

4. Are you aware of others having boated on the Brunswick Project impoundment? (yes/no): ____________

   If yes, please answer the following questions:

   What type(s) and length(s) boats are you aware of boaters using? ___________________________

   ____

   What boat launch(es) do they use?____

   ____

   During what months do they boat on the Brunswick Project impoundment?________________________

   ____

Please quantify (in cubic feet per second) or characterize (e.g., very high, high, medium, low, extremely low) the river flows at which you know others to have boated on the Brunswick Project impoundment:______________________________

____

5. To your knowledge, does the Brunswick Project impoundment provide a satisfactory boating experience for trailered boats? Please explain your answer:______________________________

____

____

6. Are there features unique to the Brunswick Project impoundment that make it more appealing for trailered boat use than upstream or downstream sections of the Androscoggin River? yes/no):______________________________

   If yes, please describe any unique features specific to the reach:______________________________

____

____

7. Are there safety concerns for the use of trailered boats unique to the Brunswick Project impoundment? (yes/no):______________

   If yes, please describe any concerns specific to the reach:______________________________

____

____

8. Do you feel that trailered boat access to the Brunswick Project impoundment is warranted? (yes/no):______________

   Please explain your answer: ______________________________

____

____

9. Are you aware of any locations currently providing trailered boat access to the Brunswick Project impoundment? (yes/no):______________

   If yes, please describe the location: ______________________________

____

____

Thank you for your time and input.

APPENDIX D – RECREATION SITE PHOTOS

LIST OF PHOTOS

PROJECT RECREATION SITES

250th Anniversary Park

Photo 1: 250th Anniversary Park – Main Entrance

Source: Gomez and Sullivan Engineers, 10/09/2023

Photo 2: 250th Anniversary Park – Gravel Path and Obelisk

Source: Gomez and Sullivan Engineers, 7/21/2025

Photo 3: 250th Anniversary Park – Gravel Path to Overlook

Source: Gomez and Sullivan Engineers, 7/21/2025

Photo 4: 250th Anniversary Park – Signage and Overlook

Source: Gomez and Sullivan Engineers, 10/09/2023

Photo 5: 250th Anniversary Park – Overlook

Source: Gomez and Sullivan Engineers, 10/09/2023

Photo 6: 250th Anniversary Park – Informal Footpath from Overlook

Source: Gomez and Sullivan Engineers, 7/21/2025

Photo 7: 250th Anniversary Park – Upper Staircase

Source: Gomez and Sullivan Engineers, 7/21/2025250th

Photo 8: 250th Anniversary Park – Lower Staircase

Source: Gomez and Sullivan Engineers, 7/21/2025

Photo 9: 250th Anniversary Park – Primitive Trail from Lower Staircase

Source: Gomez and Sullivan Engineers, 7/21/2025

Photo 10: 250th Anniversary Park – Primitive Trail and Shoreline Access

Source: Gomez and Sullivan Engineers, 7/21/2025

Photo 11: 250th Anniversary Park – Shoreline Access/Portage Put-In

Source: Gomez and Sullivan Engineers, 7/21/2025

<u>Fishway Viewing Area</u>

Photo 12: Fishway Viewing Area – Parking Area Aerial

Source: Gomez and Sullivan Engineers, 7/21/2025

Photo 13: Fishway Viewing Area – Entrance Sign

Source: Google Maps Street View, accessed 11/18/2025

Photo 14: Fishway Viewing Area – View from Access Path

Source: Gomez and Sullivan Engineers, 7/21/2025

Photo 15: Fishway Viewing Area – Access Path

Source: Gomez and Sullivan Engineers, 7/21/2025

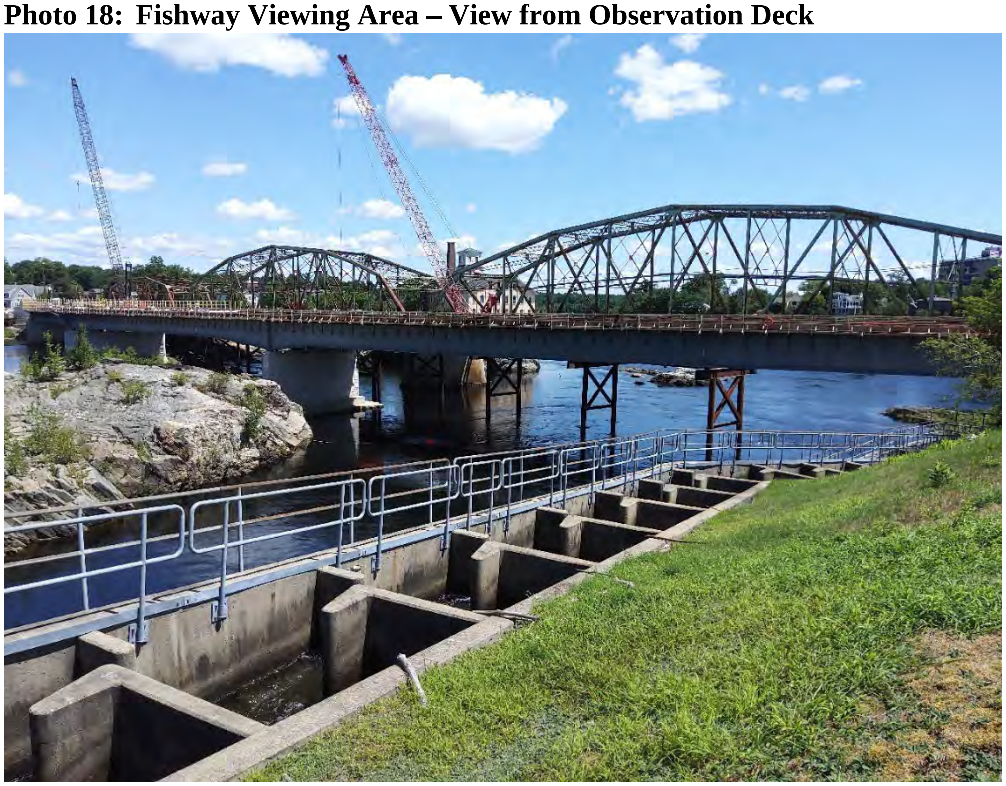
Photo 16: Fishway Viewing Area – Gated Entrance

Source: Gomez and Sullivan Engineers, 7/21/2025

Photo 17: Fishway Viewing Area – Observation Deck

Source: Gomez and Sullivan Engineers, 7/21/2025

Photo 18: Fishway Viewing Area – View from Observation Deck



Source: Gomez and Sullivan Engineers, 7/21/2025

Photo 19: Fishway Viewing Area – Entrance to Viewing Room

Source: Gomez and Sullivan Engineers, 7/21/2025

Photo 20: Fishway Viewing Area – Viewing Room

Source: Gomez and Sullivan Engineers, 7/21/2025

Photo 21: Fishway Viewing Area – Viewing Room

Source: Gomez and Sullivan Engineers, 7/21/2025

Photo 22: Fishway Viewing Area – Viewing Room Windows

Source: Gomez and Sullivan Engineers, 7/21/2025

Summer Street Overlook

Photo 23: Summer Street Overlook – Eastern Entrance

Source: Gomez and Sullivan Engineers, 7/21/2025

Photo 24: Summer Street Overlook – Parking Area

Source: Gomez and Sullivan Engineers, 7/21/2025

Photo 25: Summer Street Overlook – Path, Interpretive Sign, Rock Bench

Source: Gomez and Sullivan Engineers, 7/21/2025

Photo 26: Summer Street Overlook – Interpretive Sign

Source: Gomez and Sullivan Engineers, 7/21/2025

Photo 27: Summer Street Overlook – View from Parking Area

Source: Gomez and Sullivan Engineers, 7/21/2025

Photo 28: Summer Street Overlook – Path, View

Source: Gomez and Sullivan Engineers, 7/21/2025

Photo 29: Summer Street Overlook – Western Entrance

Source: Gomez and Sullivan Engineers, 7/21/2025

Photo 30: Summer Street Overlook – Gated Access, Informal Footpath

Source: Gomez and Sullivan Engineers, 7/21/2025

NON-PROJECT RECREATION SITES

<u>Pejepscot Dam Recreation Area</u>

Photo 31: Pejepscot Dam Recreation Area – Entrance

Source: Topsham Hydro, 2024

Photo 32: Pejepscot Dam Recreation Area – Parking Area

Source: Topsham Hydro, 2024

Photo 33: Pejepscot Dam Recreation Area – Portage Take-Out

Source: Topsham Hydro, 2024

Photo 34: Pejepscot Dam Recreation Area – Portage Trail

Source: Topsham Hydro, 2024

Photo 35: Pejepscot Dam Recreation Area – Portage Put-In

Source: Topsham Hydro, 2024

Photo 36: Pejepscot Dam Recreation Area – Portage Put-In

Source: Topsham Hydro, 2024

<u>Coffin Pond Recreation Area</u>

Photo 37: Coffin Pond Recreation Area – Entrance

Source: Gomez and Sullivan Engineers, 7/21/2025

Photo 38: Coffin Pond Recreation Area – Parking Area

Source: Gomez and Sullivan Engineers, 7/21/2025

Photo 39: Coffin Pond Recreation Area – Parking Area

Source: Gomez and Sullivan Engineers, 7/21/2025

Photo 40: Coffin Pond Recreation Area – Playground

Source: Gomez and Sullivan Engineers, 7/21/2025

Photo 41: Coffin Pond Recreation Area – Swimming Area

Source: Gomez and Sullivan Engineers, 7/21/2025

Photo 42: Coffin Pond Recreation Area – Concessions and Swimming Area

Source: Gomez and Sullivan Engineers, 7/21/2025

Photo 43: Coffin Pond Recreation Area – Picnic Area

Source: Gomez and Sullivan Engineers, 7/21/2025

Photo 44: Coffin Pond Recreation Area – Hiking Trail

Source: Gomez and Sullivan Engineers, 7/21/2025

Mill Street Canoe Portage

Photo 45: Mill Street Canoe Portage – Entrance and Site Identification Sign

Source: Gomez and Sullivan Engineers, 7/21/2025

Photo 46: Mill Street Canoe Portage – Site Entrance

Source: Gomez and Sullivan Engineers, 7/21/2025

Photo 47: Mill Street Canoe Portage – Upper Parking Area

Source: Gomez and Sullivan Engineers, 7/21/2025

Photo 48: Mill Street Canoe Portage – Lower Parking Area

Source: Gomez and Sullivan Engineers, 7/21/2025

Photo 49: Mill Street Canoe Portage – Accessible Parking

Source: Gomez and Sullivan Engineers, 7/21/2025

Photo 50: Mill Street Canoe Portage – Site Ownership and Rules Signage

Source: Gomez and Sullivan Engineers, 7/21/2025

Photo 51: Mill Street Canoe Portage – Boat Launch Approach

Source: Gomez and Sullivan Engineers, 7/21/2025

Photo 52: Mill Street Canoe Portage – Boat Launch

Source: Gomez and Sullivan Engineers, 7/21/2025

Photo 53: Mill Street Canoe Portage – Boat Launch

Source: Gomez and Sullivan Engineers, 7/21/2025

Photo 54: Mill Street Canoe Portage – Bench and River View

Source: Gomez and Sullivan Engineers, 7/21/2025

Photo 55: Mill Street Canoe Portage – Signage and Pet Waste Station

Source: Gomez and Sullivan Engineers, 7/21/2025

Photo 56: Mill Street Canoe Portage – Portage Route Signage

Source: Gomez and Sullivan Engineers, 7/21/2025

Photo 57: Mill Street Canoe Portage – Portage Route

Source: Gomez and Sullivan Engineers, 7/21/2025

Photo 58: Mill Street Canoe Portage – Portage Route Signage

Source: Gomez and Sullivan Engineers, 7/21/2025

Androscoggin Swinging Bridge

Photo 59: Androscoggin Swinging Bridge – Brunswick Side Entrance and Parking

Source: Gomez and Sullivan Engineers, 7/21/2025

Photo 60: Androscoggin Swinging Bridge – Brunswick Side Access Path

Source: Gomez and Sullivan Engineers, 7/21/2025

Photo 61: Androscoggin Swinging Bridge – Brunswick Side Entrance

Source: Gomez and Sullivan Engineers, 7/21/2025

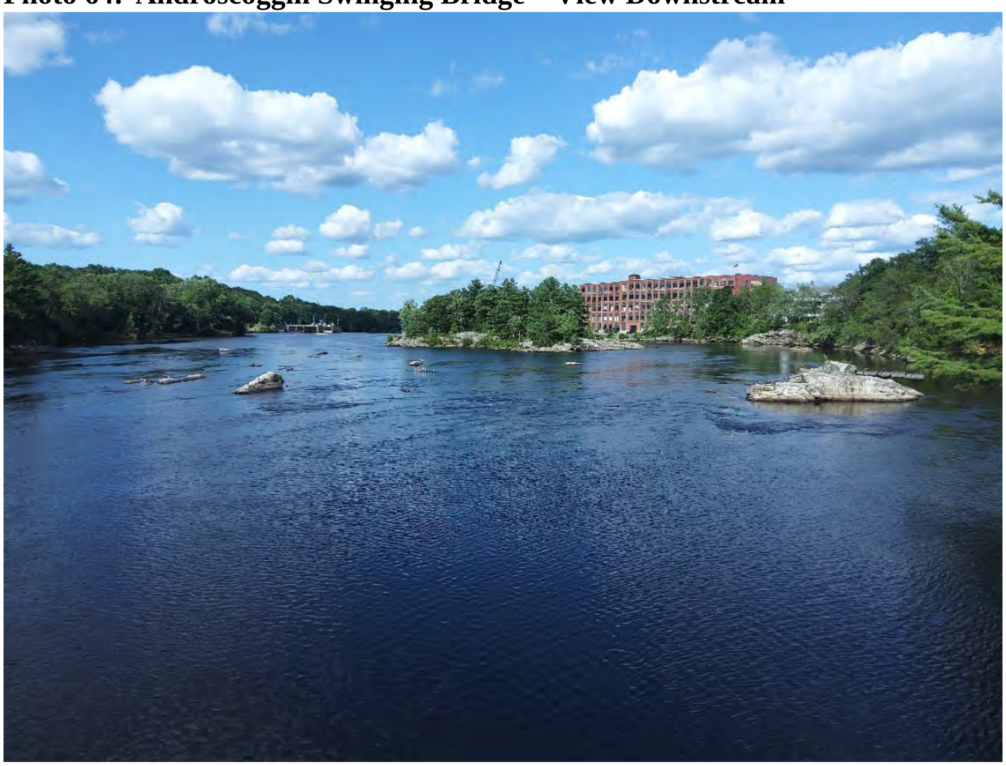
Photo 62: Androscoggin Swinging Bridge – Brunswick Side Access Path

Source: Gomez and Sullivan Engineers, 7/21/2025

Photo 63: Androscoggin Swinging Bridge – View Upstream

Source: Gomez and Sullivan Engineers, 7/21/2025

Photo 64: Androscoggin Swinging Bridge – View Downstream



Source: Gomez and Sullivan Engineers, 7/21/2025

Photo 65: Androscoggin Swinging Bridge – Topsham Side Bridge Entrance

Source: Gomez and Sullivan Engineers, 7/21/2025

Photo 66: Androscoggin Swinging Bridge – Topsham Side Entrance

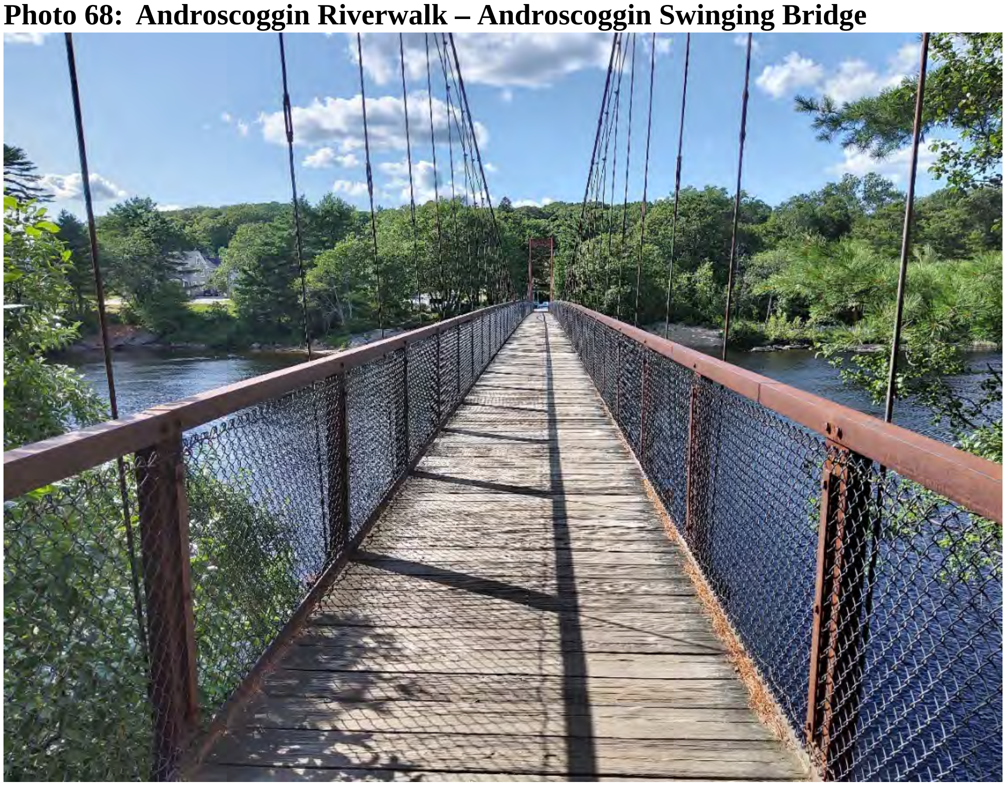
Source: Gomez and Sullivan Engineers, 7/21/2025

Photo 67: Androscoggin Swinging Bridge – Topsham Side Parking Area

Source: Gomez and Sullivan Engineers, 7/21/2025

Androscoggin Riverwalk

Photo 68: Androscoggin Riverwalk – Androscoggin Swinging Bridge



Source: Gomez and Sullivan Engineers, 7/21/2025

Photo 69: Androscoggin Riverwalk – Topsham Side, Northeast from Swinging Bridge

Source: Gomez and Sullivan Engineers, 7/21/2025

Photo 70: Androscoggin Riverwalk – Summer St Entrance

Source: Gomez and Sullivan Engineers, 7/21/2025

Photo 71: Androscoggin Riverwalk – Summer St Sidewalk

Source: Gomez and Sullivan Engineers, 7/21/2025

Photo 72: Androscoggin Riverwalk – Brunswick Side, East from Swinging Bridge

Source: Gomez and Sullivan Engineers, 7/21/2025

Bridge to Bridge Trail

Photo 73: Bridge to Bridge Trail – Entrance from Bridge St

Source: Gomez and Sullivan Engineers, 7/22/2025

Photo 74: Bridge to Bridge Trail – Trail and River View

Source: Gomez and Sullivan Engineers, 5/19/2025

Photo 75: Bridge to Bridge Trail – Trail, Bench, and River View

Source: Gomez and Sullivan Engineers, 5/19/2025

Photo 76: Bridge to Bridge Trail – Southwest from Androscoggin Swinging Bridge

Source: Gomez and Sullivan Engineers, 7/22/2025

OTHER

Portage Route

Photo 77: Portage Route – Entrance from Mill Street Canoe Portage Boat Launch

Source: Gomez and Sullivan Engineers, 7/21/2025

Photo 78: Portage Route – Route through Mill Street Canoe Portage

Source: Gomez and Sullivan Engineers, 7/21/2025

Photo 79: Portage Route – Route through Mill Street Canoe Portage, Joining Mill St

Source: Gomez and Sullivan Engineers, 7/21/2025

Photo 80: Portage Route – Mill St Signage, Sidewalk, and Crosswalk to Cumberland St

Source: Gomez and Sullivan Engineers, 7/21/2025

Photo 81: Portage Route – Crosswalk and Signage at Mill and Cumberland Sts

Source: Gomez and Sullivan Engineers, 7/21/2025

Photo 82: Portage Route – Mill St Signage and Sidewalk

Source: Gomez and Sullivan Engineers, 7/21/2025

Photo 83: Portage Route – Signage, Sidewalk, and Crosswalk at Mill and Cushing Sts

Source: Gomez and Sullivan Engineers, 7/21/2025

Photo 84: Portage Route – Signage, Sidewalk, and Crosswalk at Mill and Union Sts

Source: Gomez and Sullivan Engineers, 7/21/2025

Photo 85: Portage Route – Signage, Sidewalk, and Crosswalk at Mill and Maine Sts

Source: Gomez and Sullivan Engineers, 7/21/2025

Photo 86: Portage Route – Crosswalk at Maine St and US Route 1

Source: Gomez and Sullivan Engineers, 7/21/2025

Photo 87: Portage Route – Sidewalk and Crosswalk at Maine and Bow Sts

Source: Gomez and Sullivan Engineers, 7/21/2025

Photo 88: Portage Route – Sidewalk and Crosswalk at For Andross Parking Lot

Source: Gomez and Sullivan Engineers, 7/21/2025

Photo 89: Portage Route – Sidewalk along Maine St

Source: Gomez and Sullivan Engineers, 7/21/2025

Photo 90: Portage Route – Crosswalk at Maine St and 250th Anniversary Park

Source: Gomez and Sullivan Engineers, 7/21/2025

APPENDIX E – USER SURVEY VERBATIM RESPONSES

RECREATION USER SURVEY VERBATIM RESPONSES

250th Anniversary Park

- The site meets the needs, but could be improved greatly. More handicapped fishing availability.
- love the nature, don't want that to change. it's just not inviting at all and could use some public art and love. maybe a composting toilet?
- That new bridge looks bad juxtaposed against a beautiful location.
- Better parking facilities and stairs/ramps for access
- Trash collects in ways that are both dangerous (eg glass) and unsightly
- Construction contributes to low rankings
- The plans (with the bridge replacement) for this park will only increase it's use
- There is no parking, there are no trash cans, no trail/steps down to the river, only riprap which is difficult to traverse. What a pretty site, but has never been in good condition or well used.
- Park doesn't offer safe access to the river, seems neglected and overgrown, cut off from the town by traffic, unsafe to get to
- Fishing in the from the park can be treacherous and inaccessible. As part of improvement or development projects it would be great to have a structure to fish from that is safe for children and is accessible to those with disabilities.
- It needs to tell the story of the place, from Native Americans forward. And we need to take out the dam to set the river free to carry life
- This beautiful riverside site should receive investments to make it a cleaner, more enjoyable site. This could include picnic tables, trash cans, bathrooms, and expansion of the space by eradicating the invasive species that currently encroach.
- Wish there was swimming allowed! Also it is amazing to see all the sturgeon jumping in the early summer but sad that they are blocked from going further upriver from the dam. I think this site would be more enjoyable without the dam.
- Area is under construction, no parking, views from benches are obscured by overgrowth
- Sand path isn't entirely accessible to those who can't or struggle to walk; no public restrooms
- The site would be much more appealing if there was better water flow downstream all year, and if better fish passage existed at the dam
- would like better/easier qccess to the water
- The trail going to the water is really sketchy. The stairs are too high and an extra couple step are needed at the bottom. The brush towards the beach should be cleared to make it easier/safer to walk. Some beautification would be appreciated, too.
- overgrown with weeds
- Needs cleanup, the steps and access to the cove need work. Hoping it will get some proper cleanup and repairs when bridge construction gets close to ending
- Some of the steps are showing signs of wear
- So much potential for being a nice park. Needs bamboo cleared.
- Love how despite the construction, one had access to sidewalks and ped crossing signals.
- Far too many invasive plants. Especially bittersweet rhat crowds out the wooded areas and overgrows the path.
- we a safe sidewalk along route 1 between the walking bridge and new bridge. A safer portage path would be very helpful and a new fish ramp.
- Significant areas of invasive weeds. Zero pedestrian access to the river (only informal)
- Nice place to sit and watch the river.

Fishway Viewing Area

- Lacking signage
- No access
- The fish way is inadequately designed and does not pass the number of fish that require passage
- We want to visit but it is never open during the times listed on the sign. This was before the construction. I'd like to view the fish.
- Needs a better fish passage
- Ineffective solution for migrating fish species.
- Poorly designed and wrongly sited
- Fish ladder ineffective. Talked to other community members and was directed to studies which prove the fam is blocking vast majority of fish.
- Path down to water stops abruptly
- I would like to see FISH be able to migrate upstream. I would love to see salmon in this part of the river in my lifetime. Also, this survey is annoying. I visit most of the places on this map on a regular basis often. It is inconvenient to have to redo the survey for every site. You can do better.
- Seems closed, not accessible to the public, no hours posted, not advertised, looks abandoned.
- The fish ladder has been deemed ineffective (https://www.msn.com/en-us/society-culture-and-history/social-issues/conservation-group-aims-to-improve-fish-passage-on-the-androscoggin-river/ar-AA1xc8CI?ocid=BingNewsVerp). The dam itself and the hydroelectric equipment are a horrible eyesore. I recommend Brookfield's lease be withheld until substantial improvements are made to the fish ladder. Even better, get rid of the dam just like what's happening on the Kennebec.
- Hard to access, poor signage, and very few fish actually making it up the fishway. Other places have done wonders with improving fishways as evidenced by the numbers of people visiting and the numbers of fish making their way to their spawning grounds. This is way more than a recreational issue! It is an environmental issue first and foremost. You make money off the power of nature; it is way past time to fix this!

Summer Street Overlook

- Vacant area but it is rewilding and we live across the street and enjoy it
- We live across the street from this site and love the rewilding occurring here. Lots of nesting birds, turtles, bunnies… occurring
- The barded wire fence is an eyesore and the land between the parking lot and the water is not used. If fence was alone the waterline then picnic tables could be placed there and the lookout would be much more beautiful.
- swimming should be allowed at least to swinging bridge
- Area could be enlarged so more can use it by moving cyclone fence closer to the water. Perhaps adding some picnic tables.
- This overlook is sorely underutilized. There's a large lawn, large enough for a park right to the water's edge, but it's fenced off with "no access" signs. Seems an awful waste of a sizable space with a breathtaking view. I would suggest eliminating the fences, landscaping minimally, and adding a few picnic tables. I really think you would see the park utilized quite a bit
- Love the non invasive, native sumac which is regrowing at this site. Home and good to many bird species.
- It's, a pretty spot. I think some benches or picnic tables would be nice.

- More effective parking
- Love having the path to walk near the river.
- I think the fence should be moved closer to the water . Dog poop bag dispenser is jammed.
- Regarding "amenities" - it's within walking distance of me, and I don't use a boat, so parking and boat launches are not relevant to me. I think it could use a couple of benches along the walk, though
- poor seating options

<u>Coffin Pond Recreation Area</u>

- The boat launch is terrible. You cant back in a trailer. The upper river is good fishing and people should be able to get a small boat in this area to fish up river.
- I love the area and go often. It is busy when the swimming is available. The trails could use some love.
- I feel like the human amenities (the chlorinated pond) interfere with the natural beauty of the site. I appreciate the "hidden gem" nature of the trails in the back.
- The parking area, picnic area, drive, signage, trail conditions are dated and in need of maintenance. Additionally, the traffic around the area (cars driving by at excessive speeds through the area of the park, not stopping for pedestrians, etc) has been recently discussed with the town, representatives and neighbors. We'd love to see Coffin Pond area continue to be cared for, maintained and preserved for more generations- it's a fun and unique space in our community. I wish the town marketed.
- Trails could use maintaining, two spots without bridges, if they were maintained i believe they woild get more regular use. There are also many spots with trash and tents from homeless people living out there. Doesn't feel very safe.
- Needs more fish for the kids to catch
- The weeds/tall grass make it extremely difficult to fish and not get snagged on vegetation on the side. Trees make it nearly impossible to get to other locations around the pond, but other than those factors it's a great facility being dragged down by these issues.
- Trails ned maintenance (blow downs, etc) /could use some bridging
- Lovely area to walk, skate, sled and swim. I wish the pump could be fixed so people could swim here
- Facilities could use refreshing.
- I would love more trail to run on here!
- Pond is not open long.

<u>Mill Street Canoe Portage</u>

- A lot of trash washed up along the river bank, also the buoys still arent placed, and the canoe poetage is still closed fpr canoeing
- Please add crosswalks at pleasant street to access that side of mill street. It feels like frogger getting across the street. Very unsafe!
- It would be wonderful if there was a ramp to launch a small motorized boat.--6 hp--for fishing up river
- Please open the boat launch to motorboats. Please put the boater barriers in earlier and leave them in later. This is a common problem at Brookfield facilities
- This area needs to open in the spring and not the end of June!

- Wish swimming were permitted and safe (cleaner water) here. No parking until the Bowie's are across the river is a real pain. It would be great if you would just block the boat launch when it's not safe to be on the water, rather than the entire park.
- Nice space, but not easy to get to by foot. No sidewalk on that side of the street or cross walk from the other side. Rte 1 is super busy and dangerous to cross. I'd visit a lot more if it was more accessible by foot.
- It would be good to have signage as to when it is safe to kayak or canoe here. Also warnings about whether the water is safe for wading (contamination, dam openings and closings)
- Boat launch could use minor repair. Needs river side sidewalk all the way to swinging bridge to reduce risk of accidents crossing Mill St.
- Keep it simple, so it is enjoyable by all.

Androscoggin Swinging Bridge

- I'm concerned trust the bridge will receive maintenance
- More walking trails would be ideal
- A small playground near the swinging bridge would be AMAZING!!
- Parking is limited. There are no other amenities.
- Too many elicit actives occur after dark. Needs more lights, better traffic control and a food vendor
- Depends on the the season to how many people see
- The swinging bridge is a local and tourist attraction. The site deserves proper maintenance and restoration from past weather conditions.
- Super limited parking on the Brunswick side
- It's a rainy day, so not many visitors. We live in Tennessee, but have family history in Maine. Very very nice place.
- Gorgeous natural environment with many little paths and areas to explore. The suspension bridge is a great attraction to get people out to the park, but the real beauty here is the wildlife and climbable rocks. What a hidden gem on the side of the highway. We hope it stays in good condition and is taken care of for decades to come. Thank you.
- Would be nice if it was longer, but I walk through adjoining neighborhoods to get longer walks which works out pretty well,
- Wildlife and river views are always lovely. My favorite neighborhood walk.
- Needs trash cans
- We don't live in Maine, so we aren't regular users of this area, but would be if we lived nearby.
- More easily accessible parking on the Brunswick side
- It's good and clean. I felt safe.
- There needs to be a safer crossing of route 1 for pedestrians accessing the park. It feels very unsafe right now. Vehicles do not stop for the flashing yellow lights.
- Beautiful park, but the sidewalk along rte 1 is too narrow and often overgrown making it a bit dangerous doing the loop. Widening, cleaning up, and maybe a barrier separating the sidewalk from the road would be nice.
- Could have used a public bathroom, but didn't do the whole walking circuit so not sure if it already exists
- Nice little spot to see while renting an Air BnB in Topsham
- Very small parking lot

- The parking is very limited and hard to access off of route 1. Trash cans and other amenities would be nice. The bridge itself is great.
- I would like to be able to fish and consume fish from this area.
- It is a beautiful quiet place that is a destination for many local people. However, the natural plant life is being destroyed by the invasive bittersweet and the invasive Japanese not weed and something needs to be done about it. The trees are being strangled and they are falling and creating more work for the town that then has to remove the tree. The bitter suite is limiting the native flora and fauna that could potentially thrive here.
- Why not have a state sports and recreational project to create new, low impact sports and recreational activities playable ar each park and during pandemics like Covic-19 by almost everyone at almost any age and ability? It can be done. Don (worldbasenewsport@yahoo.com) ? It ca
- Path washed out, poor landscaping or lack there of, old signage
- none
- I love the walking bridge - I walk down here every as often as possible for morning sunlight.
- No parking available.
- Would be helpful to have restrooms for walkers, signage was good
- Its a fun bridge. Loved it.
- "Park" seems a strange name for a parking lot at one end, and a small grassy area with a couple of stone benches on the Topsham side. Signage on the bridge itself would be nice. Shrubs apparently planted deliberatel aren't being cared for.

Androscoggin Riverwalk

- Take out the dam. Town of Topsham does a terrific job taking care of the trail.
- There isn't outdoor gym equipment, there are invasive plants overtaking the wildlife, there are huge "no swimming" signs, there are no emergency safety call buttons.
- more access point to fish from off the path.
- The trail needs to be extended along the River on the Brunswick side. It is unsafe for that portion.
- Hope the path will connect easily and safely to the new bridge.
- During tourist season sometimes hard to access freely
- I really like the map and the images, but I was unable to locate one of the six parking locations on the map. Everything else was very clear.
- I love to run on the Riverwalk. I enjoy it's scenery and isolation from road traffic.
- I would love to see this extended if there is ever an opportunity. I would love to see educational signage near Swinging Bridge about not feeding the ducks.
- Needs more work to control invasive plant species
- Traffic control could be improved
- Given the profits Brookfield realizes from damming the Androscoggin River, I would love to see some of that used to put in bathrooms, permanent bike racks, expansion of the trail, and staff for the town to help manage the use of this public resource
- I love the river walk and walk it nearly every day. I do wish the dam was not there to allow the river to be free flowing and allow people to swim/recreate in the water.
- Need to eliminate all invasive species to stop spreading onto private property
- More parking would be nice
- Poison ivy warning would be helpful

- Brunswick side of the river walk sucks right now. It’s right next to the road. That side should be improved.
- Would be a good idea to put a sign up indicating that there’s a trail to walk when people unfamiliar with the area cross the walking bridge from the Brunswick side
- Riverwalk section from Bow/Cabot St. to the swinging bridge needs upgrade for safety.
- We love it
- invasive plant removal and native restoration would be good here
- A continuation of the walking path on the river would be amazing and would greatly increase the participation I believe
- I was in Brunswick for one day, and went for a jog. It was nice! Could’ve used the bathroom though.
- Will be much better once the new bridge is completed. It would also be good to provide a better sidewalk/routr along Rote 1 between Fort anndross and the pedestrian bridge.
- Sidewalk inadequate and in poor shape. Recommend substantial contribution from dam owner to support the riverwalk project to revitalize the area.
- Dangerous sidewalk, unprotected by guardrails, along Mill St in Brunswick. No wayfinding signage in Topsham or Brunswick. Views of the river obscured by weedy vegetation. Few places to sit.
- The walk along the Brunswick side of the river is a narrow sidewalk next to the road. I like to walk the loop of the swinging bridge, Topsham riverwalk and FJW Bridge, and the Brunswick side is unpleasant and dangerous. We need a much better walkway!
- A major point of interest. Pretty good signage
- Just a tourist from elsewhere but I love trails and river walks, whenever I travel I try to find the local ones, they highlight some of the best features of the area

Bridge to Bridge Trail

- this walk with my dog fills me with joy every time I do it
- Seeing invasive plant species
- Invasive species along path have killed trees. Without trees soil along path erodes and is actively eroding the path. Trash can needed on Brunswick side of swinging bridge. Sidewalk along Mill St. overgrown w invasive making sidewalk unsafe and narrow.
- There are several invasive species which seem to be kept in check. However I am seeing more poison ivy than I have before
- Very pleased with this area.
- Just passing through thought I’d stop and walk.
- There are a lot of invasive plants choking the path edges and strangling nearby trees. I’d love to help clear this if I knew how to connect.
- I would like to access the water conveniently.
- Love it - its a boon to the neighborhood and attracts people from all over to the historic bridge
- Additional trash cans along trail
- Love it!
- Loop trail needs completion on. Brunswick side of River.
- There are patches of poison ivy, if I'm not mistaken... i think i kept the dogs out of it but there was a man with his daughter who had no odea how to identify it. I know it's hard to eradicate (rent a goat and take it for walks). Warmknf signs might be in order. Thank you for the lovely condition of the parks.

- On 07/0725 The trash bin at the foot bridge was over flowing and in need of emptying. Cans and bottles strewn all over the ground next to it.
- Need a better connection between the bridge construction and the bridge to bridge trail. Crossing from Brunswick to Topsham and getting to the trail is pretty hard!
- This is a great walking path. I love that it's paved, there is parking at both ends, and has a trash can on both ends. It's really well kept up, too.
- Needs restrooms, we enjoy the topographical layout, find it soothing in hot weather.
- This section of the riverwalk loop has not been developed adequately to provide pedestrian safety and enjoyable views of the river. Work needs to be done on this walkway!
- Need to improve the sidewalk along mill street and extend it on the river side down to pleasant street to reduce the need to cross route 1 when walking there
- Woods could use some cleanup/remove invasive plants
- Removal of invasive plants species, especially bittersweet is drastically needed. There are few dead trees and beaches along the path that should be removed for safety reasons.
- Sanitary facilities, more parking, picnic tables
- I would like to see swimming encouraged in the lagoon adjacent the swinging bridge on the Topsham side. It is quite safe within the lagoon

APPENDIX K: HISTORIC ARCHITECTURAL SURVEY

[Due to potentially sensitive nature of the report contents, this report is being filed with the Commission under separate cover and is not being distributed to the public.]

APPENDIX L: PREHISTORIC AND HISTORIC ARCHEOLOGICAL SURVEY

[Due to the potentially sensitive nature of the report contents, these reports are being filed with the Commission under separate cover and are not being distributed to the public.]

APPENDIX M: INVASIVE PLANT SURVEY

INVASIVE PLANT SURVEY
INITIAL STUDY REPORT
BRUNSWICK HYDROELECTRIC PROJECT
FERC NO. 2284

Submitted by:

Brookfield White Pine Hydro LLC
150 Main Street
Lewiston, ME 04240

Prepared by:

Gomez and Sullivan Engineers

January 2026

Brookfield

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LIST OF ABBREVIATIONS AND DEFINITIONS

Brookfield	Brookfield Renewable
BWPH	Brookfield White Pine Hydro, LLC
CFR	Code of Federal Regulations
FERC	Federal Energy Regulatory Commission
GIS	Geographic Information System
ILP	Integrated Licensing Process
ISR	Initial Study Report
Licensee	Brookfield White Pine Hydro, LLC
MDACF	Maine Department of Agricultural, Conservation and Forestry
ME	Maine
MW	Megawatt
PAD	Pre-Application Document
Project	Brunswick Hydroelectric Project (FERC No. 2284)
PSP	Proposed Study Plan
SD1	Scoping Document 1
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Study

1 INTRODUCTION

Brookfield White Pine Hydro LLC (BWPH or Licensee) is licensed by the Federal Energy Regulatory Commission (FERC) to operate the 19-megawatt (MW) Brunswick Hydroelectric Project (Project) (FERC No. 2284). The Project is located on the Androscoggin River in the towns of Topsham and Brunswick, Maine. The Project straddles the border between Cumberland and Sagadahoc counties. The original license was issued on February 9, 1979, and expires on February 28, 2029.

BWPH is using FERC's Integrated Licensing Process (ILP) as established in Title 18 Code of Federal Regulations (CFR), Part 5. BWPH filed a Pre-Application Document (PAD) and Notice of Intent (NOI) to seek a new license for the Project on February 21, 2024. The PAD provides a description of the Project, including its structures, operations, and potentially affected resources. BWPH distributed the PAD and NOI simultaneously to Federal and state resource agencies, local governments, Native American tribes, members of the public, and others thought to be interested in the relicensing proceeding. Following the filing of the PAD, FERC prepared and issued Scoping Document 1 (SD1) on April 16, 2024. FERC also held agency and public scoping meetings and a site visit on May 7, 2024. The FERC Process Plan and Schedule provided agencies and interested parties with an opportunity to file comments on the PAD and SD1 and request studies by June 20, 2024. FERC issued Scoping Document 2 (SD2) on July 29, 2024. BWPH filed a Proposed Study Plan (PSP) on August 2, 2024, and held study plan meetings on August 28 and October 9, 2024. The Revised Study Plan was filed in accordance with the ILP schedule on December 2, 2024. FERC issued a Study Plan Determination (SPD) on December 30, 2024.

The United States Fish and Wildlife Service (USFWS) requested that BWPH conduct an invasive plant study within the currently licensed Project boundary and downstream to the vicinity of 250th Anniversary Park. FERC recommended in the SPD that BWPH conduct visual surveys of the impoundment and river shoreline to document the invasive plant species present in the Project boundary. This Initial Study Report (ISR) presents the results of the study, including the goals and objectives, methods, results, summary, and variances (if any) from the FERC SPD.

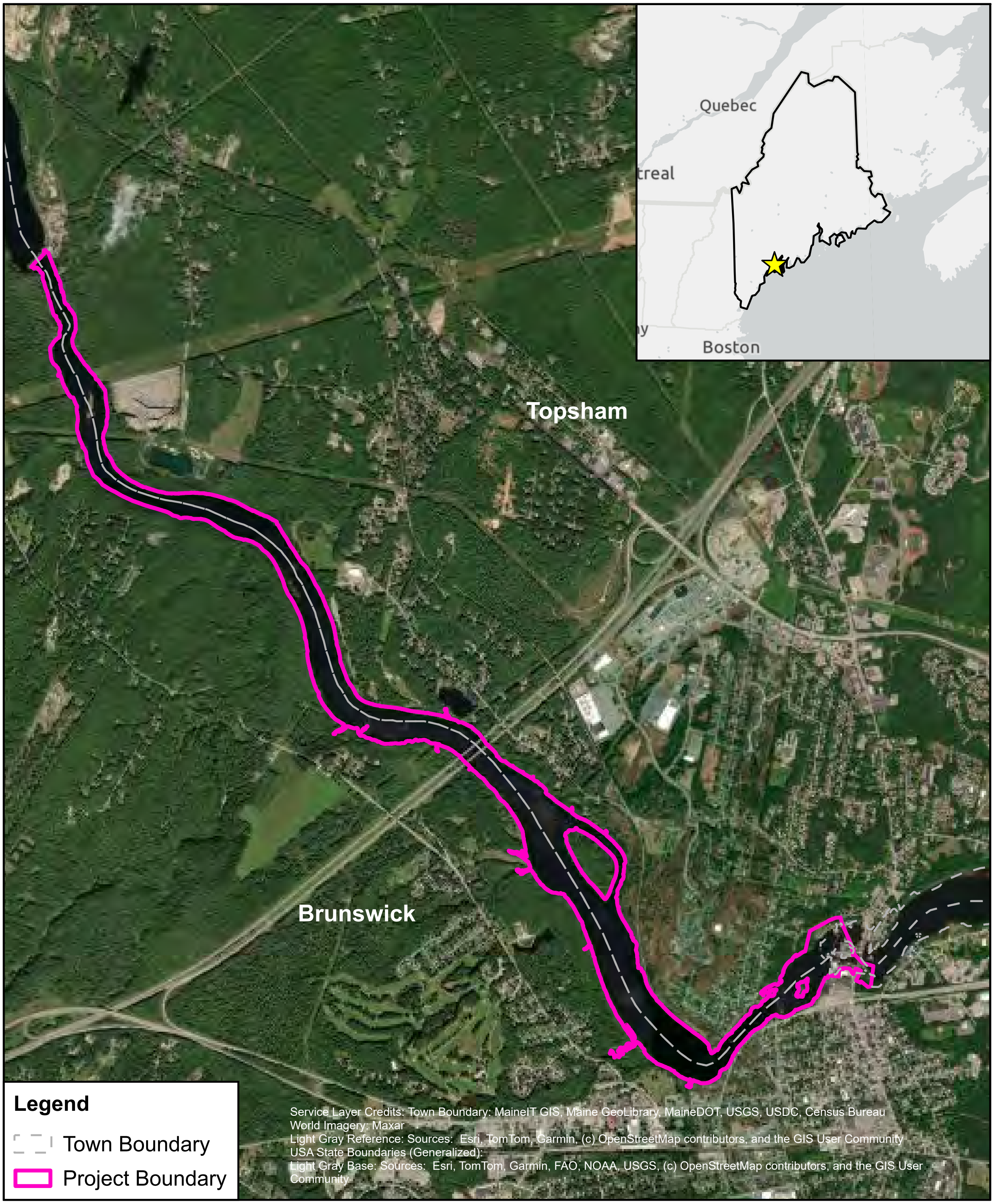
2 PROJECT AREA DESCRIPTION

The Brunswick Hydroelectric Project dam is located above the Main Street/U.S. Route 201 bridge in the Towns of Brunswick and Topsham, ME (Figure 2.0-1). The Project boundary is 348 acres in size and encloses the Project dam, intake, powerhouse, tailrace, and fishway. The Project boundary also includes approximately 4 miles of the Androscoggin River and essentially follows the impoundment shoreline and therefore encompasses limited terrestrial habitat. The invasive plant study area includes all areas within the Project boundary downstream to the vicinity of 250th Anniversary Park as well as a 10-foot buffer of the adjacent terrestrial areas. The total study area was a combined 363 acres of land and water.

3 GOALS AND OBJECTIVES

The goals of the invasive plant study are to collect baseline information and document invasive plants occurring at the Project.

The study objectives are to identify and map the location of invasive plant species within the study area and describe the distribution of each identified invasive plant species with the study area. The study area includes the land and water within the Project boundary, the 10-foot adjacent shoreline areas and downstream to the vicinity of 250th Anniversary Park (Figure 3.0-1).



Brunswick Hydroelectric Project (FERC No. 2284) Invasive Plant Survey

N

Figure 2.0-1: Project Location

Brookfield

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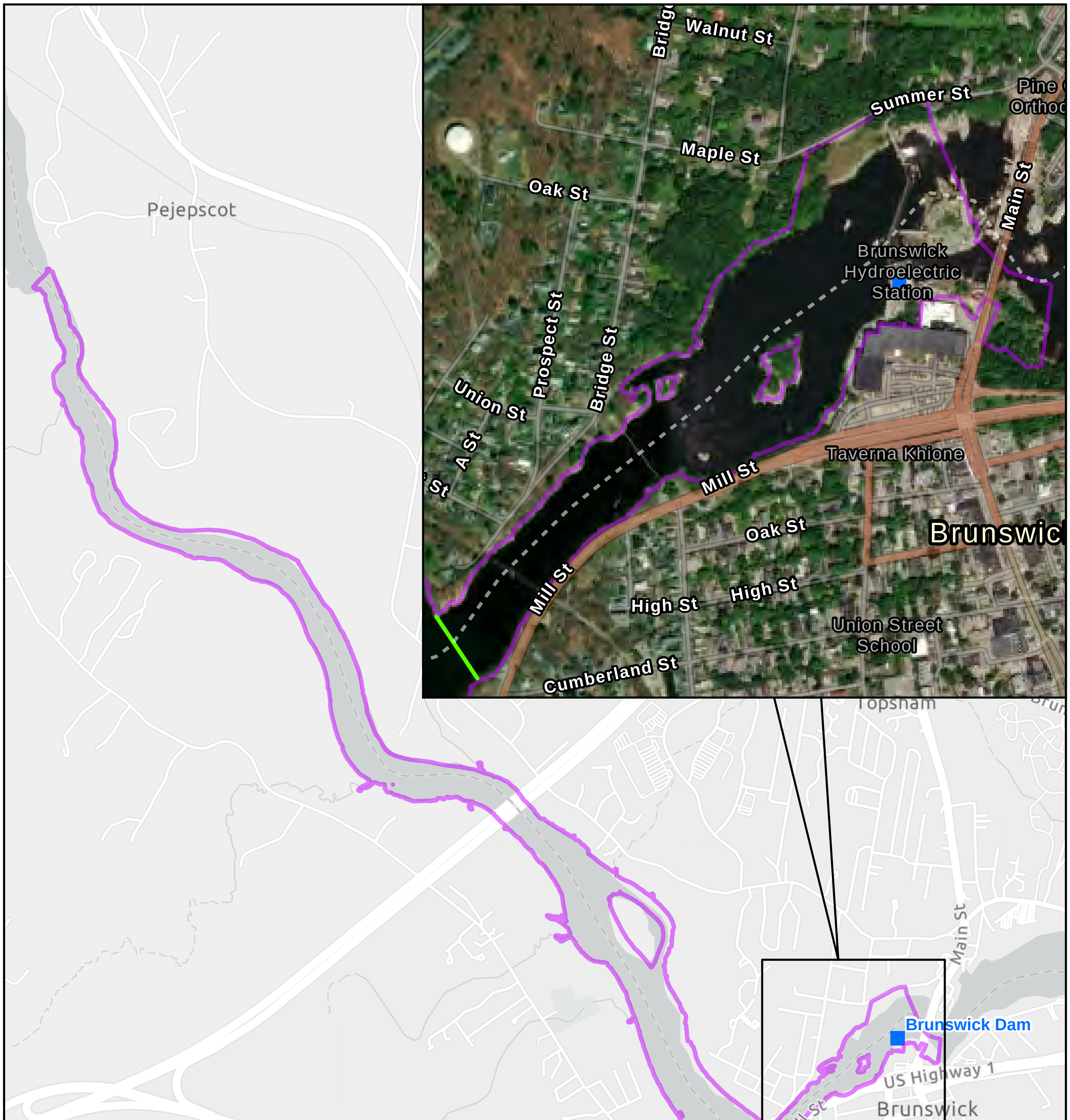

Legend

- Brunswick Dam
- Invasive Survey Area
- Boater Barrier

Service Layer Credits: Hybrid Reference Layer: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community
World Imagery: Maxar
Light Gray Reference: Sources: Esri, TomTom, Garmin, (c) OpenStreetMap contributors, and the GIS User Community
Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

Brunswick Hydroelectric
Project (FERC No. 2284)
Invasive Plant Survey

N

0 0.5 1
Miles

Figure 3.0-1:
Invasive Plant Survey Area

Brookfield

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4 METHODS

4.1 Study Design

The invasive plant study consisted of a visual assessment of the presence and density of invasive plant species and spatial data mapping. The target invasive plant species included all species on the Maine Department of Agricultural, Conservation and Forestry's (MDACF) Maine Natural Areas Program Advisory List of Invasive Plants (MDACF, 2019). Prior to the field mapping effort, a desktop assessment of the existing invasive plant species data was reviewed, and a field tablet was prepared with a reference map showing orthoimagery and the boundary of the study area.

Invasive plant species were classified into two cover types, Gross Areas and Infested Areas. Gross Areas delineated locations in which invasive plant species are broadly distributed with no discrete, easily identifiable boundary. In this study, Gross Areas contained two or more invasive species and had relatively consistent compositions and densities throughout. Invasive plant species stands that had 75% or less cover in an area were classified as Gross Areas. Gross Area boundaries were defined either by convenient landmarks (e.g., roads, lawn edges, the riverbank, or the Project boundary) or by changes in physiognomy or infestation density (e.g., from a shrub thicket to an emergent bed, or from a lightly infested area to a more densely infested area). Infested Area polygons delineate the perimeter of a single species infestation that are present in discrete, typically dense patches with easily identifiable boundaries. Stands of invasive plant species were only considered infested if the dominant invasive species had a percent cover of 76% cover or higher. These methods were adapted methods described in the U.S. Forest Service's *Field Guide: Invasive Plant Inventory, Monitoring, and Mapping Protocol* (2002). This document describes a repeatable approach to documenting and mapping invasive plant infestations for long-term monitoring and restoration planning.

4.2 Field Data Collection

Surveyors conducted the invasive plant study on July 22 – July 23, 2025. The survey crew consisted of three field biologists and technicians with experience identifying invasive terrestrial and aquatic plant species found in the State of Maine. The study area included all areas enclosed in the Brunswick Project boundary downstream to the vicinity of 250th Anniversary Park plus a 10-foot buffer from the Project boundary (363 acres). The study area was systematically searched by boat or on foot for the presence of invasive plants (terrestrial and aquatic). There is no boat access within the boater barrier, approximately 1/2 mile upstream of the dam, so this area was surveyed on foot as access and safety allowed. The field crew identified invasive plants to species if possible, using Crow and Hellquist (2006) and iNaturalist (2025). In addition, binoculars were used throughout the study to ensure that all areas were visually inspected.

Invasive plant abundance in both Gross and Infested Areas was recorded using the density coverage scale of 1 to 4, as follows:

1. Low (1-33% cover)
2. Medium (34-67% cover)
3. High (68-95%)
4. Monoculture (96-100%)

Field mapping was electronically recorded on a GPS equipped field tablet running ArcGIS software. The field crew mapped polygons of the observed invasive plant species throughout the study area. Each polygon was designated as a Gross Area or Infested Area based on its composition, density and distribution. The field crew recorded the following data for each mapped invasive polygon:

- Study date,
- Polygon Classification Type (Gross Area or Infested Area)
- Polygon ID number (i.e., GA01, IA01)
- Invasive plant species present,
- Relative abundance of each invasive plant observed in the Gross Area or Infested Area polygons per defined coverage scale,
- Associated cover type,
- Observed potential spreading vectors (e.g., recreation use, hydrology) and,
- Relevant site comments.

Representative photographs were collected to document site conditions. Maps were prepared of the study area showing the locations and extent of the mapped invasive plant species polygons and points as well as the designated cover type (Appendix B).

5 RESULTS

An invasive plant survey was conducted by field surveyors on July 22 and 23, 2025. Weather conditions during the survey were mostly sunny, with temperatures reaching approximately 80°F and light, variable winds from the north-northeast at 4 to 6 miles per hour. River flow data from the USGS monitoring station at Auburn (Station No. 01059000), located upstream of the survey area, indicated an average daily discharge of 1,480 cubic feet per second (cfs) on July 22 and 1,550 cfs on July 23 (USGS, 2025). Water conditions were calm with minimal current, and underwater visibility was clear, providing favorable conditions for the observation and identification of aquatic plant species.

5.1 Species Observed

A total of 15 invasive species from the MDACF Maine Natural Areas Program Invasive Plants List were observed within the study area (Table 5.1-1). Of these 15 species MDACF defined nine as “severely invasive”, five as “very invasive” and one species designated as “potentially invasive”.

The MDACF designed severely invasive species burning bush (*Euonymus alatus*) was observed growing outside of the 10-foot buffer near site GA-15.

In addition to the species on the MDACF Advisory List of Invasive Plants, surveyors also documented the following non-native species within the study area; common soapwort (*Saponaria officinalis*), Japanese creeper (*Parthenocissus tricuspidate*), purple crown vetch (*Securigera varia*) and common tansy (*Tanacetum vulgare*) (GoBotany, 2025).

No aquatic invasive plant species were observed in the study area. The native aquatic species present within the study area are provided in Table 5.1-2.

The most common MDACF invasive plant species observed within the study area were oriental bittersweet (*Celastrus orbiculatus)*, Morrow's honeysuckle (*Lonicera morrowii*) and purple loosestrife (*Lythrum salicaria*). A summary of the density and distribution of the invasive species is provided in Section 5.2.

There were numerous native plant species observed within the study area. The most common native tree and shrub species observed in the study area were silver maple (*Acer saccharinum*), white pine (*Pinus strobus*), eastern hemlock (*Tsuga canadensis*), basswood (*Tilia americana*), ash (*Fraxinus sp.),* silky dogwood (*Cornus amomum*), smooth alder (*Alnus serrulate*) and choke cherry (*Prunus virginiana*). The dominant native species observed in the herbaceous layer were sensitive fern (*Onoclea sensibilis*) and white meadowsweet (*Spiraea alba*), the other observed species included; poison ivy (*Toxicodendron radicans*), deer tongue (*Dichanthelium clandestinum*), Canada goldenrod (*Solidago canadensis*), joe pye weed, (*Eupatoriadelphus maculatus)*, swamp milkweed (*Asclepias incarnata*), cardinal flower (*Lobelia cardinalis*) and various unidentified sedges (C*arex sp.)* and grasses.

Table 5.1-1: Observed Target Invasive Plant Species from MDACF List

Common Name	Scientific Name	Invasive Ranking	Status in Maine
Autumn olive	*Elaeagnus umbellata*	Very invasive	Widespread
Bittersweet nightshade	*Solanum dulcamara*	Potential invasive	Widespread
Black locust	*Robinia pseudoacacia*	Severely invasive	Widespread
Common barberry	*Berberis vulgaris*	Very invasive	Widespread
Common buckthorn	*Rhamnus sp.*	Severely invasive	Widespread
Garlic mustard	*Alliaria petiolata*	Severely invasive	Widespread
Japanese barberry	*Berberis thunbergii*	Severely invasive	Widespread
Japanese knotweed	*Reynoutria japonica*	Severely invasive	Widespread
Morrow's honeysuckle	*Lonicera morrowii*	Severely invasive	Widespread
Multiflora rose	*Rosa multiflora*	Very invasive	Widespread
Norway maple	*Acer platanoides*	Very invasive	Widespread
Oriental bittersweet	*Celastrus orbiculatus*	Severely invasive	Widespread
Purple loosestrife	*Lythrum salicaria*	Very invasive	Widespread
Tartarian honeysuckle	*Lonicera tatarica*	Severely invasive	Widespread
Yellow iris	*Iris pseudacorus*	Severely invasive	Widespread

Table 5.1-2: Observed Native Aquatic Plant Species

Common Name	Scientific Name
Cattail	*Typha latifolia*
Clasping Pondweed	*Potamogeton perfoliatus*
Common Waterweed	*Elodea canadensis*
Fragrant Waterlily	*Nymphaea odorata*
Greater Water Starwort	*Callitriche heterophylla*
Large-leaf Pondweed	*Potamogeton amplifolius*
Pickerelweed	*Pontederia cordata*
Ribbon Pondweed	*Potamogeton epihydrus*
Stonewort	*Nitella spp.*
Watershield	*Brasenia schreberi*

5.2 Species Density and Distribution

The study area encompassed 363 acres of land and water. All invasive species were observed on land along the riverbank and roads and in the developed Project areas. There were no invasive species observed within aquatic beds. The overall percent coverage of invasive plants in the study area was Low (1% - 33% cover). Most of the invasive species are broadly distributed and were mapped as Gross Area polygons. On average, the mapped Gross Areas contained five invasive species that were dominated by herbaceous and scrub/shrub vegetation. Three Gross Areas (GA09, GA19, GA20) contained a single invasive plant species at a medium density coverage scale (34% - 67% cover). Two of these sites (GA19 and GA20) were developed spaces within the study area and GA09 was a mixed forest cover type. There were two Infested Areas mapped, and these were dense stands of Japanese Knotweed near developed areas.

Surveyors observed that invasive plant species were more prevalent on river left, where their coverage exceeded 25% on the Low-Density scale. In contrast, river right showed lower invasive species density, typically ranging between 10% and 20% on the same scale. These upland areas were comprised of deciduous forest, mixed forest, scrub/shrub and developed land cover types.

During the survey, there were a few inaccessible areas within the Project boundary, specifically, near the switchyard, tailrace channel and Tainter gates. Surveyors used binoculars to view these areas and were able to identify purple loosestrife (*Lythrum salicaria*). These inaccessible areas were not mapped.

Summaries the invasive species compositions and locations for Gross Areas and Infested Areas are provided in Appendix A. Maps showing the Gross Areas and Infested Areas are shown in Appendix B. Representative photographs of the study area were taken and included in Appendix C.

As previously stated, there were no invasive aquatic species observed during the study. Surveyors noted that river right supported a greater abundance of native aquatic plant beds compared to river left throughout the study area.

6 SUMMARY

The invasive plant study conducted for the Brunswick Hydroelectric Project (FERC No. 2284) documented the presence and distribution of invasive terrestrial plant species within a 363-acre study area encompassing the Project boundary and adjacent shoreline. The target invasive plant species for this survey included the species on MDACF's 2019 Maine Natural Areas Program list. Fifteen terrestrial invasive species from the MDACF invasive list were observed within the study area. No aquatic invasive species were found within the study area. The most frequently occurring invasive species were oriental bittersweet, Morrow's honeysuckle, and purple loosestrife. Overall, the density of invasive plants observed in the study area was low (1% - 33% cover). Invasive plant species were more commonly found on the north side of the river (river left), while native aquatic weed beds were more abundant on the south side (river right). All the invasive plant species identified within the study area are known to be widespread throughout the state of Maine. There were no variances from the FERC SPD.

7 VARIANCES FROM THE FERC APPROVED STUDY PLAN

The Invasive Plant Survey was conducted following the methodology outlined by FERC in their SPD.

8 REFERENCES

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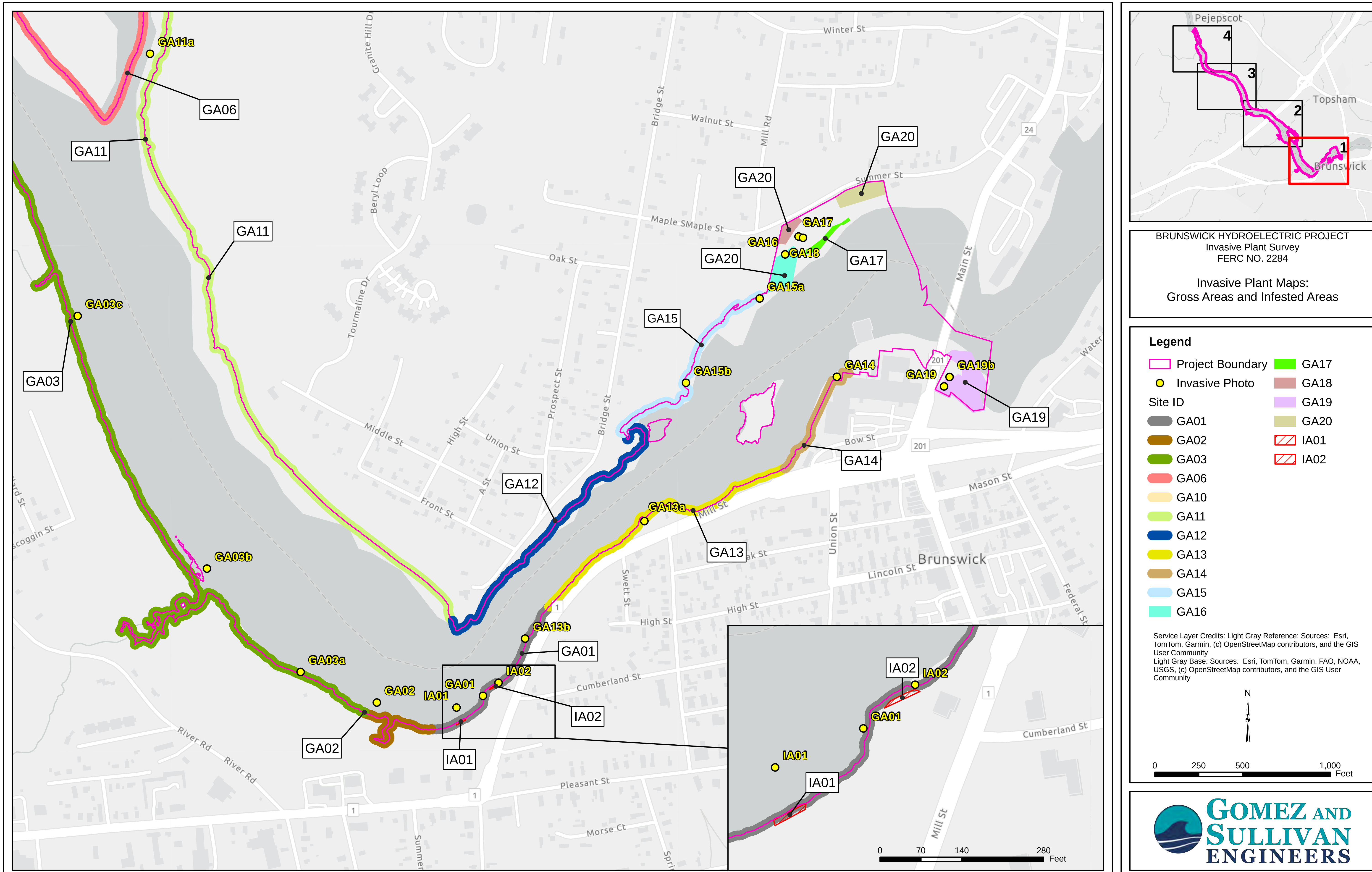
APPENDIX A – SUMMARY OF INVASIVE PLANT SPECIES OBSERVED IN THE BRUNSWICK HYDROELECTRIC PROJECT

Site ID	Cover Type	Density	Common Name	Scientific Name
GA-01	Deciduous Forest	Low	Norway maple	*Acer platanoides*
		Low	Common buckthorn	*Rhamnus sp.*
		Low	Purple loosestrife	*Lythrum salicaria*
		Low	Oriental bittersweet	*Celastrus orbiculatus*
		Low	Morrow’s honeysuckle	*Lonicera morrowii*
		Low	Multiflora rose	*Rosa multiflora*
		Low	Japanese barberry	*Berberis thunbergii*
		Low	Japanese knotweed	*Reynoutria japonica*
		Low	Yellow iris	*Iris pseudacorus*
		Low	Common barberry	*Berberis vulgaris*
GA-02	Deciduous Forest	Low	Oriental bittersweet	*Celastrus orbiculatus*
		Low	Purple loosestrife	*Lythrum salicaria*
GA-03	Deciduous Forest with dense shrub layer flood plan area	Low	Oriental bittersweet	*Celastrus orbiculatus*
		Low	Japanese barberry	*Berberis thunbergii*
		Low	Purple loosestrife	*Lythrum salicaria*
		Low	Morrow’s honeysuckle	*Lonicera morrowii*
		Low	Japanese knotweed	*Reynoutria japonica*
		Low	Yellow iris	*Iris pseudacorus*
		Low	Common buckthorn	*Rhamnus sp.*
		Low	Tartarian honeysuckle	*Lonicera tatarica*
GA-04	Scrub Shrub	Low	Purple loosestrife	*Lythrum salicaria*
		Low	Morrow’s honeysuckle	*Lonicera morrowii*
		Low	Common buckthorn	*Rhamnus sp.*
		Low	Oriental bittersweet	*Celastrus orbiculatus*
GA-05	Scrub Shrub	Low	Morrow’s honeysuckle	*Lonicera morrowii*
GA-06	Scrub Shrub	Low	Morrow’s honeysuckle	*Lonicera morrowii*
GA-07	Mixed Forest	Low	Morrow’s honeysuckle	*Lonicera morrowii*
		Low	Oriental bittersweet	*Celastrus orbiculatus*
		Low	Purple loosestrife	*Lythrum salicaria*
		Low	Japanese knotweed	*Reynoutria japonica*
GA-08	Mixed Forest	Low	Purple loosestrife	*Lythrum salicaria*
		Low	Morrow’s honeysuckle	*Lonicera morrowii*
		Low	Autumn olive	*Elaeagnus umbellata*
		Low	Oriental bittersweet	*Celastrus orbiculatus*
		Low	Common buckthorn	*Rhamnus sp.*
		Low	Purple loosestrife	*Lythrum salicaria*
		Low	Common soapwort	*Saponaria officinalis*
		Low	Multiflora rose	*Rosa multiflora*
GA-09	Mixed Forest	Low	Oriental bittersweet	*Celastrus orbiculatus*
		Low	Japanese knotweed	*Reynoutria japonica*
		Medium	Morrow’s honeysuckle	*Lonicera morrowii*
		Low	Purple loosestrife	*Lythrum salicaria*
		Low	Autumn olive	*Elaeagnus umbellata*
		Low	Japanese barberry	*Berberis thunbergii*
GA-10	Mixed Forest	Low	Common barberry	*Berberis vulgaris*

Site ID	Cover Type	Density	Common Name	Scientific Name
		High	Morrow’s honeysuckle	*Lonicera morrowii*
		Low	Purple loosestrife	*Lythrum salicaria*
GA-11	Deciduous Forest	Low	Japanese knotweed	*Reynoutria japonica*
		Low	Purple loosestrife	*Lythrum salicaria*
		Low	Tartarian honeysuckle	*Lonicera tatarica*
GA-12	Combined with GA-08			
GA-13	Mixed Forest	Low	Autumn olive	*Elaeagnus umbellata*
		Low	Common buckthorn	*Rhamnus sp.*
		Low	Japanese knotweed	*Reynoutria japonica*
		Low	Morrow’s honeysuckle	*Lonicera morrowii*
		Low	Oriental bittersweet	*Celastrus orbiculatus*
		Low	Purple loosestrife	*Lythrum salicaria*
GA-14	Developed Medium Density	Low	Black locust	*Robinia pseudoacacia*
		Low	Japanese barberry	*Berberis thunbergii*
		Low	Oriental bittersweet	*Celastrus orbiculatus*
		Low	Purple loosestrife	*Lythrum salicaria*
		Low	Common Tansy	*Tanacetum vulgare*
GA-15	Mixed Forest	Low	Black locust	*Robinia pseudoacacia*
		Low	Morrow’s honeysuckle	*Lonicera morrowii*
		Low	Multiflora Rose	*Rosa multiflora*
		Low	Oriental bittersweet	*Celastrus orbiculatus*
		Low	Purple loosestrife	*Lythrum salicaria*
GA-16	Deciduous Forest near trail	Low	Multiflora Rose	*Rosa multiflora*
		Low	Common buckthorn	*Rhamnus sp.*
		Low	Oriental bittersweet	*Celastrus orbiculatus*
		Low	Morrow’s honeysuckle	*Lonicera morrowii*
GA-17	Developed Open Space	Low	Purple loosestrife	*Lythrum salicaria*
GA-18	Deciduous Forest near trail	Low	Autumn olive	*Elaeagnus umbellata*
		Low	Oriental bittersweet	*Celastrus orbiculatus*
		Low	Multiflora rose	*Rosa multiflora*
		Low	Purple crown vetch	*Securigera varia*
GA-19	Deciduous Forest in 250 Anniversary Park	Medium	Japanese knotweed	*Reynoutria japonica*
		Low	Multiflora Rose	*Rosa multiflora*
		Low	Norway maple	*Acer platanoides*
		Low	Autumn olive	*Elaeagnus umbellata*
		Low	Black locust	*Robinia pseudoacacia*
		Low	Bittersweet nightshade	*Solanum dulcamara*
		Low	Oriental bittersweet	*Celastrus orbiculatus*
		Low	Purple loosestrife	*Lythrum salicaria*
		Low	Yellow iris	*Iris pseudacorus*
		Low	Common buckthorn	*Rhamnus sp.*
		Low	Morrow’s honeysuckle	*Lonicera morrowii*
		Low	Japanese creeper	*Parthenocissus tricuspidate*
GA-20	Deciduous Forest in area West of Tainter Gates	Medium	Norway maple	*Acer platanoides*
		Low	Morrow’s honeysuckle	*Lonicera morrowii*
		Low	Common buckthorn	*Rhamnus sp.*

Site ID	Cover Type	Density	Common Name	Scientific Name
		Low	Oriental bittersweet	*Celastrus orbiculatus*
		Low	Multiflora Rose	*Rosa multiflora*
		Low	Garlic mustard	*Alliaria petiolata*
		Low	Japanese knotweed	*Reynoutria japonica*
		Low	Purple loosestrife	*Lythrum salicaria*
IA-01	Deciduous Forest	High	Japanese knotweed	*Reynoutria japonica*
IA-02	Deciduous Forest	High	Japanese knotweed	*Reynoutria japonica*

APPENDIX B – INVASIVE PLANT MAPS: GROSS AREAS AND INFESTED AREAS



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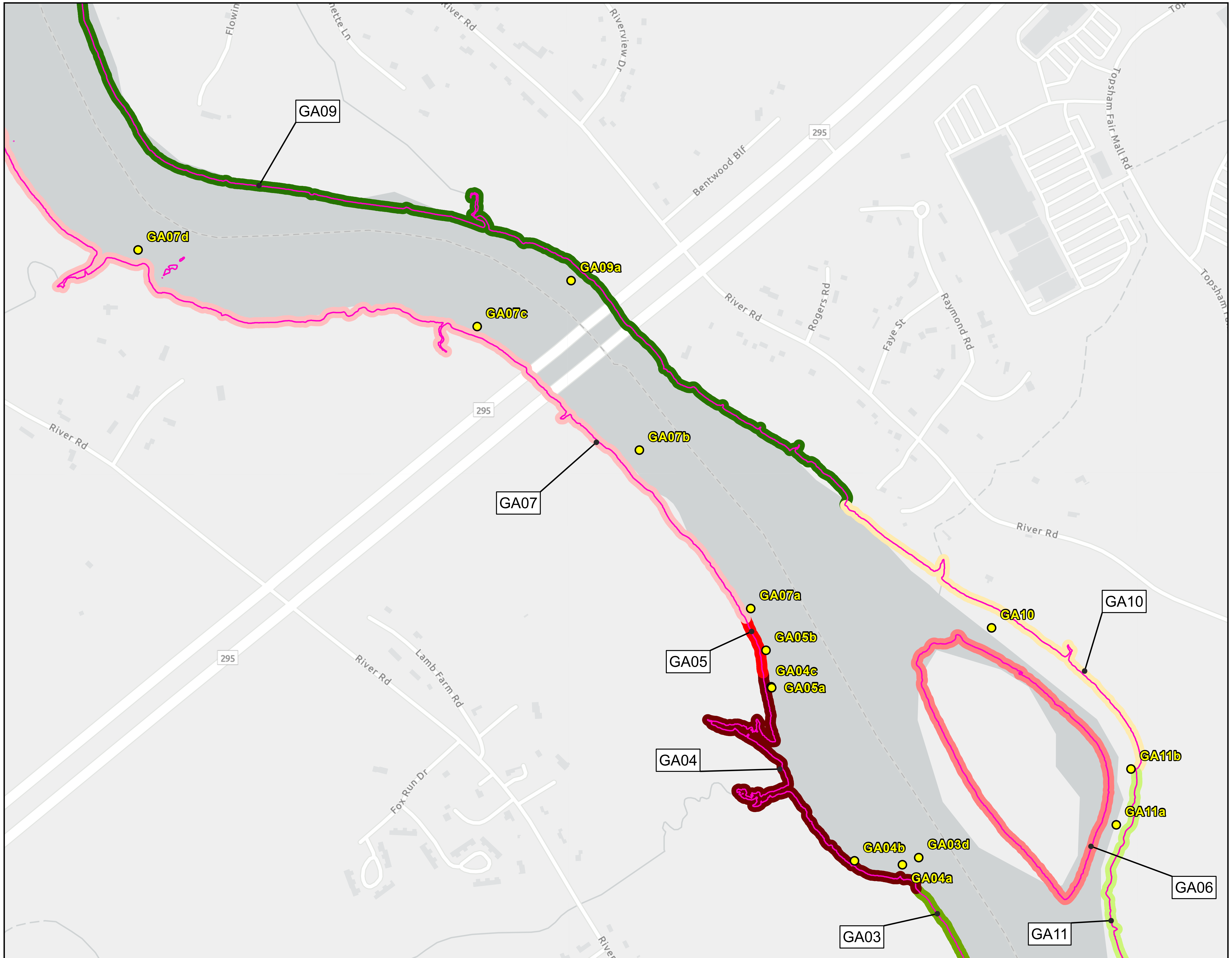

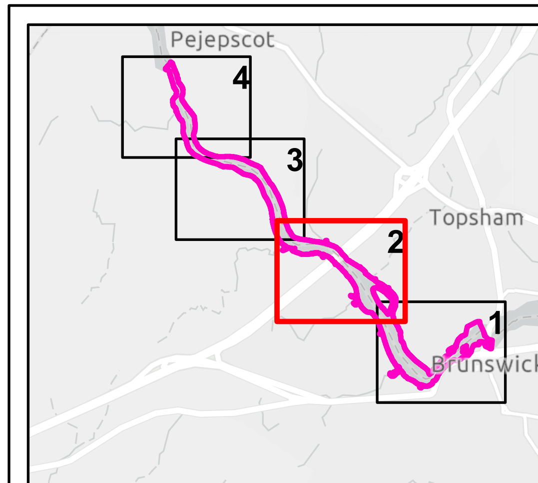

BRUNSWICK HYDROELECTRIC PROJECT
Invasive Plant Survey
FERC NO. 2284

Invasive Plant Maps:
Gross Areas and Infested Areas

Legend

- Project Boundary
- Invasive Photo

Site ID

- GA03
- GA04
- GA05
- GA06
- GA07
- GA09
- GA10
- GA11

Service Layer Credits: Light Gray Reference: Sources: Esri, TomTom, Garmin, (c) OpenStreetMap contributors, and the GIS User Community
Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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Feet

GOMEZ AND SULLIVAN ENGINEERS

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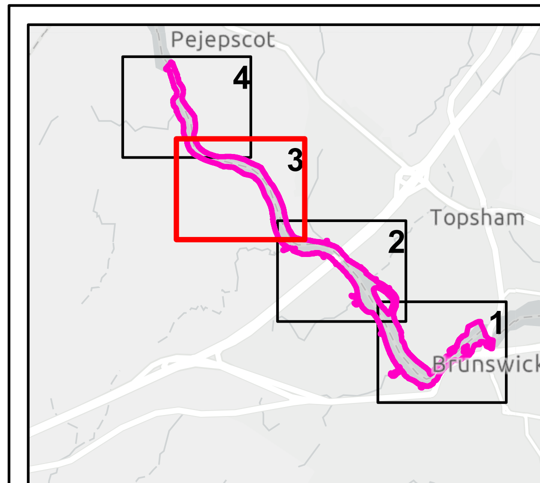

BRUNSWICK HYDROELECTRIC PROJECT
Invasive Plant Survey
FERC NO. 2284

Invasive Plant Maps:
Gross Areas and Infested Areas

Legend

- Project Boundary
- Invasive Photo

Site ID

- GA07
- GA08
- GA09

Service Layer Credits: Light Gray Reference: Sources: Esri, TomTom, Garmin, (c) OpenStreetMap contributors, and the GIS User Community
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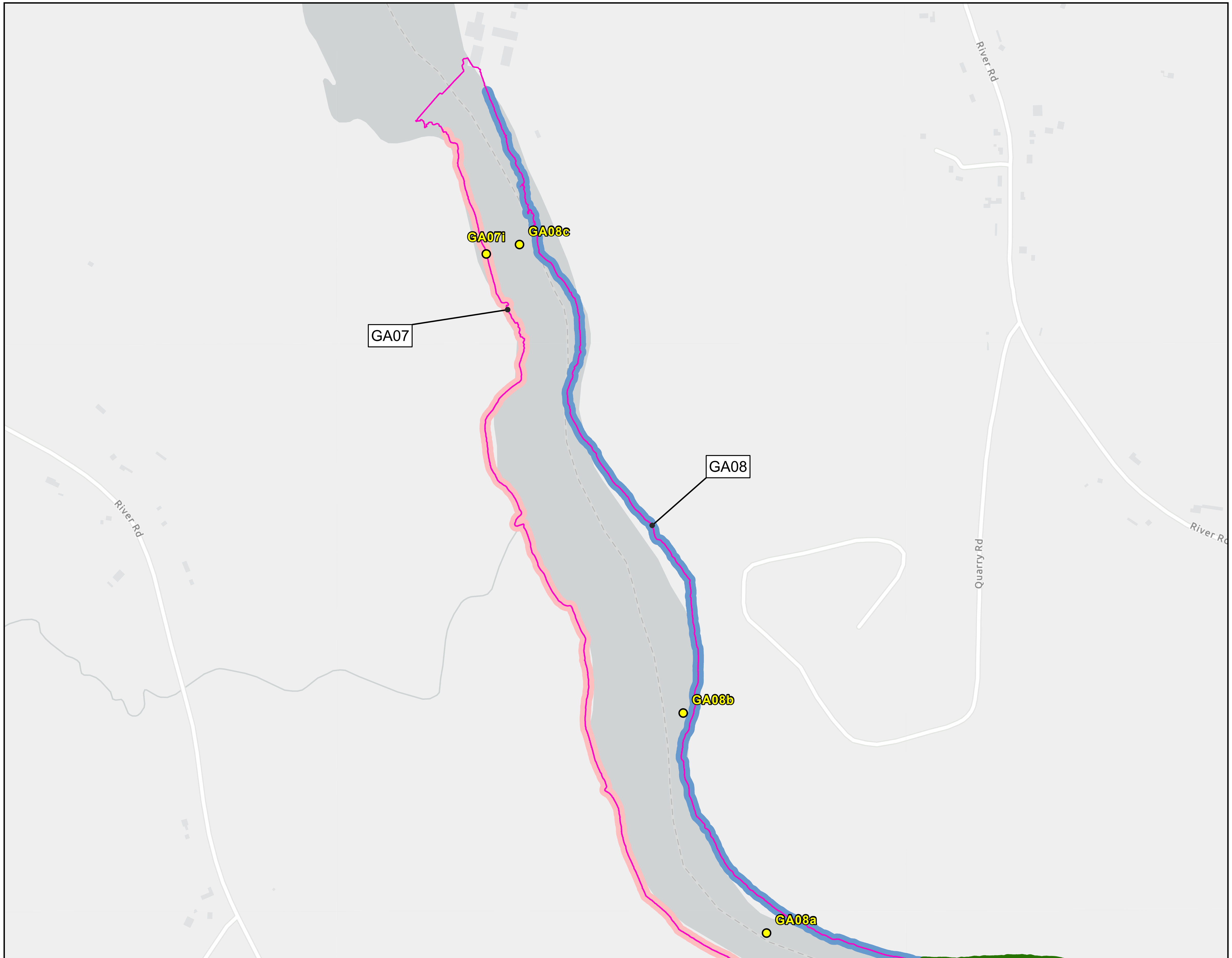

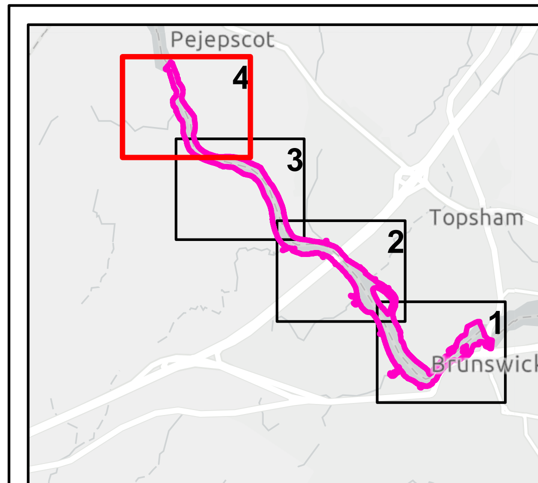

BRUNSWICK HYDROELECTRIC PROJECT
Invasive Plant Survey
FERC NO. 2284

Invasive Plant Maps:
Gross Areas and Infested Areas

Legend

Project Boundary
Invasive Photo
Site ID
GA07
GA08
GA09

Service Layer Credits: Light Gray Reference: Sources: Esri, TomTom, Garmin, (c) OpenStreetMap contributors, and the GIS User Community
Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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0 250 500 1,000 Feet

GOMEZ AND SULLIVAN ENGINEERS

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APPENDIX C – RESPRESENTATIVE PHOTOS OF STUDY AREA

Site GA 01 Photo A - Deciduous Forest with low density of Norway maple, common buckthorn, purple loosestrife, oriental bittersweet, Morrow’s honeysuckle, multiflora rose, Japanese barberry, Japanese knotweed, yellow iris and common barberry

Site GA 01 Photo B - Deciduous Forest with low density of Norway maple, common buckthorn, purple loosestrife, oriental bittersweet, Morrow's honeysuckle, multiflora rose, Japanese barberry, Japanese knotweed, yellow iris and common barberry

Site GA 01 Photo C - Deciduous Forest with low density of Norway maple, common buckthorn, purple loosestrife, oriental bittersweet, Morrow’s honeysuckle, multiflora rose, Japanese barberry, Japanese knotweed, yellow iris and common barberry

Site GA 02 Photo A - Deciduous Forest with low density of oriental bittersweet and purple loosestrife


Site GA 02 Photo B - Deciduous Forest with low density of oriental bittersweet and purple loosestrife

Site GA 02 Photo C - Deciduous Forest with low density of oriental bittersweet and purple loosestrife

Site GA 03 Photo A - Deciduous Forest with low density of Oriental bittersweet, Japanese barberry, purple loosestrife, Morrow’s honeysuckle, Japanese knotweed, yellow iris, common buckthorn and Tartarian honeysuckle


Site GA 03 Photo B - Deciduous Forest with low density of Oriental bittersweet, Japanese barberry, purple loosestrife, Morrow’s honeysuckle, Japanese knotweed, yellow iris, common buckthorn and Tartarian honeysuckle

Site GA 03 Photo C - Deciduous Forest with low density of Oriental bittersweet, Japanese barberry, purple loosestrife, Morrow’s honeysuckle, Japanese knotweed, yellow iris, Common buckthorn and Tartarian honeysuckle

Site GA 03 Photo D - Deciduous Forest with low density of Oriental bittersweet, Japanese barberry, purple loosestrife, Morrow's honeysuckle, Japanese knotweed, yellow iris, Common buckthorn and Tartarian honeysuckle

Site GA 04 Photo A – Scrub/shrub with low density of purple loosestrife, Morrow's honeysuckle, Common buckthorn and Oriental bittersweet

Site GA 04 Photo B – Scrub/shrub with low density of purple loosestrife, Morrow’s honeysuckle, Common buckthorn and Oriental bittersweet

Site GA 04 Photo C – Scrub/shrub with low density of purple loosestrife, Morrow’s honeysuckle, Common buckthorn and Oriental bittersweet

Site GA 04 Photo D – Scrub/shrub with low density of purple loosestrife, Morrow’s honeysuckle, Common buckthorn and Oriental bittersweet

Site GA 05 Photo A – Scrub/shrub with low density of Morrow’s honeysuckle


Site GA 05 Photo B – Scrub/shrub with low density of Morrow's honeysuckle

Note: No Photos of Site GA 06 were taken.

Site GA 07 Photo A - Mixed Forest with low density of Morrow’s honeysuckle, oriental bittersweet, purple loosestrife and Japanese knotweed

Site GA 07 Photo B - Mixed Forest with low density of Morrow’s honeysuckle, oriental bittersweet, purple loosestrife and Japanese knotweed


Site GA 07 Photo C - Mixed Forest with low density of Morrow’s honeysuckle, oriental bittersweet, purple loosestrife and Japanese knotweed

Site GA 07 Photo D - Mixed Forest with low density of Morrow’s honeysuckle, oriental bittersweet, purple loosestrife and Japanese knotweed


Site GA 07 Photo E - Mixed Forest with low density of Morrow’s honeysuckle, oriental bittersweet, purple loosestrife and Japanese knotweed

Site GA 07 Photo F - Mixed Forest with low density of Morrow’s honeysuckle, oriental bittersweet, purple loosestrife and Japanese knotweed

Site GA 07 Photo G - Mixed Forest with low density of Morrow’s honeysuckle, oriental bittersweet, purple loosestrife and Japanese knotweed

Site GA 07 Photo H - Mixed Forest with low density of Morrow’s honeysuckle, oriental bittersweet, purple loosestrife and Japanese knotweed

Site GA 07 Photo I - Mixed Forest with low density of Morrow’s honeysuckle, oriental bittersweet, purple loosestrife and Japanese knotweed

Site GA 08 Photo A - Mixed Forest with low density of purple loosestrife, Morrow’s honeysuckle, autumn olive, oriental bittersweet, common buckthorn, common soapwort and multiflora rose

Site GA 08 Photo B- Mixed Forest with low density of purple loosestrife, Morrow's honeysuckle, autumn olive, oriental bittersweet, common buckthorn, common soapwort and multiflora rose


Site GA 08 Photo C - Mixed Forest with low density of purple loosestrife, Morrow’s honeysuckle, autumn olive, oriental bittersweet, common buckthorn, common soapwort and multiflora rose

Site GA 09 Photo A - Mixed Forest with low density of Oriental bittersweet, Japanese knotweed, Purple loosestrife, Autumn olive, Japanese barberry and medium density of Morrow’s honeysuckle

Site GA 09 Photo B - Mixed Forest with low density of Oriental bittersweet, Japanese knotweed, Purple loosestrife, Autumn olive, Japanese barberry and medium density of Morrow's honeysuckle

Site GA 10 - Mixed Forest with low density of Common barberry, Purple loosestrife and high density of Morrow’s honeysuckle


Site GA 11 Photo A – Deciduous Forest with low density of Japanese knotweed, purple loosestrife and Tartarian honeysuckle

Site GA 11 Photo B – Deciduous Forest with low density of Japanese knotweed, purple loosestrife and Tartarian honeysuckle

Note: No Photos of Site GA 12 were taken.

Site GA 13 Photo A – Mixed Forest with low density of autumn olive, common buckthorn, Japanese knotweed, Morrow's honeysuckle, oriental bittersweet and purple loosestrife

Site GA 13 Photo B – Mixed Forest with low density of autumn olive, common buckthorn, Japanese knotweed, Morrow’s honeysuckle, oriental bittersweet and purple loosestrife


Site GA 14 Photo A - Developed Medium Density with low density of black locust, Japanese barberry, oriental bittersweet, purple loosestrife and common tansy


Site GA 14 Photo B - Developed Medium Density with low density of black locust, Japanese barberry, oriental bittersweet, purple loosestrife and common tansy

Site GA 15 Photo A – Mixed Forest with low density of black locust, Morrow's honeysuckle, multiflora rose, oriental bittersweet and purple loosestrife


Site GA 15 Photo B – Mixed Forest with low density of black locust, Morrow’s honeysuckle, multiflora rose, oriental bittersweet and purple loosestrife

Site GA 16 - Deciduous Forest with low density of multiflora rose, common buckthorn, oriental bittersweet and Morrow's honeysuckle

Site GA 17 - Developed Open Space with low density of purple loosestrife

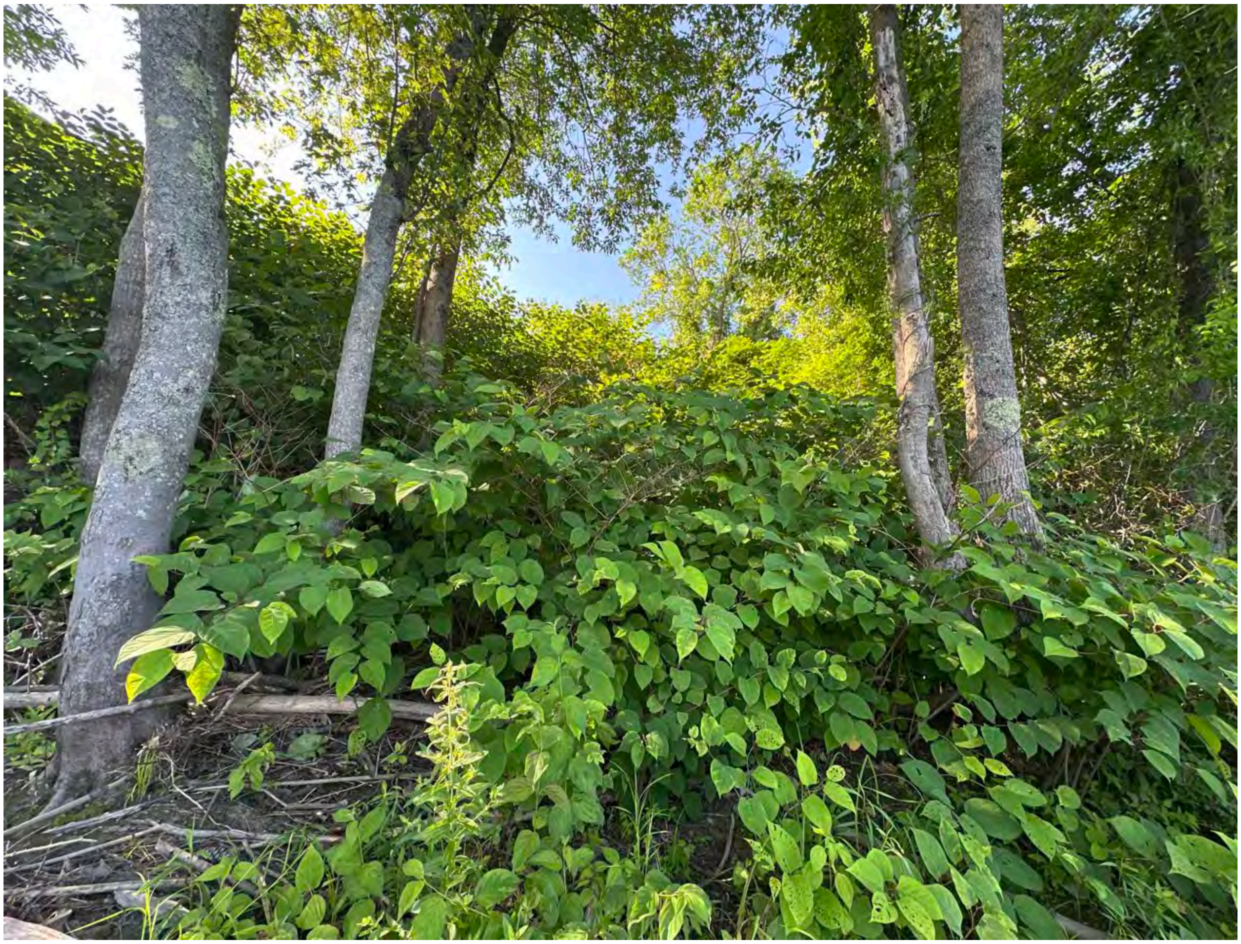

Site GA 18 - Deciduous Forest with low density of autumn olive, oriental bittersweet, multiflora rose And purple crown vetch

Site GA 19 Photo A - Deciduous Forest in 250 Anniversary Park with low density of Multiflora Rose, Norway maple, autumn olive, black locust, bittersweet nightshade, oriental bittersweet, purple loosestrife, yellow iris, common buckthorn, Morrow’s honeysuckle, Japanese creeper and medium density of Japanese knotweed

Site GA 19 Photo B - Deciduous Forest in 250 Anniversary Park with low density of Multiflora Rose Norway maple, autumn olive, black locust, bittersweet nightshade, oriental bittersweet, purple loosestrife, yellow iris, common buckthorn, Morrow’s honeysuckle, Japanese creeper and medium density of Japanese knotweed

Note: No Photos of Site GA 20 were taken

Site IA 01 - Deciduous Forest with high density of Japanese Knotweed



Site IA 02 - Deciduous Forest with high density of Japanese Knotweed