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March 31, 2023

Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, N.E.
Washington, D.C. 20426

Subject: 2022 Brunswick Project Fishway Report (FERC No. 2284) Article 30

Dear Secretary:

Brookfield White Pine Hydro LLC (BWHP) submits the attached annual fishway report in accordance with the Article 30 of the Brunswick Project FERC License. The attached fishway report was prepared by BWHP and presents fishway activities and operations at the Brunswick fishway during the 2022 fish migration season.

Please contact Adam Brown by e-mail (Adam.brown@brookfieldrenewable.com) or by phone (207) 313-1173 if you have any questions or comments.

Sincerely,

Kelly Maloney
Manager Licensing and Compliance

Cc: N. Stevens, S. Michaud, P. Mcdonough, E. Thone, A. Brown, M. Leblanc; BWPH

J. Rosset; USFWS
D. Tierney, M. Buhyoff; NMFS
M. Brown; MDMR
K. Olcott; MDEP
J. Perry; MDIFW

BWHP File: 2284/01

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2022 Report on the Operation of the Brunswick Fishway FERC No. 2284-ME

March 31, 2023

Prepared by
Brookfield White Pine Hydro LLC

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2022 Report on the Operation of the Brunswick Fishway FERC No. 2284-ME

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2022 Report on the Operation of the Brunswick Fishway FERC No. 2284-ME

INTRODUCTION

In 1979, licensee of the Brunswick Project was issued a new license for a term of fifty years. Within that license, Article 30 states:

> *Within six months from the date of the completion of construction of fish passage facilities, the licensee shall file with the commission "as built" drawings. The licensee shall also submit annual reports to the commission on results of the fish passage facility operation, including the numbers and species of fish counted and an assessment of the effectiveness of the facilities.*

In 1982, Central Maine Power Company (CMP) reconstructed a hydroelectric facility in Brunswick-Topsham, located at the first upstream dam on the river. During reconstruction, CMP built a vertical slot fishway with a trapping and sorting facility and a downstream passage capable of passing anadromous and resident target fish species.

The Brunswick upstream fishway is owned and maintained by Brookfield White Pine Hydro, LLC (BWPH) and, under prior agreement; Maine Department of Marine Resources (MDMR) personnel also operate the fishway each season during the peak of the herring and shad run. A formal agreement for shared operations of the fishway was in existence since December 1977 but was terminated by MDMR by letter dated November 21, 2016. Brookfield and MDMR have an interim informal agreement where MDMR voluntarily operates the fishway from May 1 to July 31 annually. An annual meeting to review operations of the lower Androscoggin River Projects fish passage facilities, including Brunswick, was hosted by MDMR on March 22, 2023.

DESCRIPTION OF FISH PASSAGE FACILITIES

Upstream Fish Passage - Description

Upstream fish passage at Brunswick is provided via a vertical slot fishway and is parallel to the tailrace and adjacent to the south side of the powerhouse. The fishway and associated trap and sort facility were installed in 1983. The fishway is 570 feet long and consists of 42 individual pools, each pool is eight feet six inches wide and ten feet long, with a one-foot drop between each and a 1:10 in a switchback configuration. The fishway is designed to pass American shad, river herring, and Atlantic salmon. The trapping facility, located at the upstream end of the fishway, provides MDMR or BWPH staff the opportunity to trap and truck (or volitionally pass) river herring, shad or Atlantic salmon, sort undesirable fish and also to collect data on migratory and resident fish species that use the fishway. As fish swim to the top of the fishway, fixed grating guides them past a viewing window and into a 500-gallon capacity fish hoist (trap). The hoist elevates the fish to overhead sorting tanks where MDMR or BWPH staff sort and either sluice into tanks for transport or pass fish upstream via a concrete exit flume leading to the headpond.

The fishway flows consists of approximately 30 cfs passing downstream through the fishway with an additional 70 cfs passed via a gravity fed pipe from the headpond to a diffusion area at the lower end of the fishway for a total flow of 100 cfs. An electric Rotork operator located at the fishway entrance is automated to pass all fishway flows (~100 cfs) over the entrance gate with an approximate 0.75 foot drop during all tidal levels with a .25 foot deadband so as to not operate inside of every 10 minutes.

Although the vertical slot fishway is designed to run volitionally, the Brunswick fishway is not operated in a volitional manor as to prevent the passage of invasive species.

A direct feed remote video monitoring system was installed in 2021. The camera allowed live-time video of the activity in front of the viewing window which allowed fish passage technicians to determine if a salmon is present and react as needed.

Downstream Fish Passage - Description

A downstream fishway consists of a 12 foot six inch high by 4 foot 8 inch wide weir and associated intake chamber leading to an eighteen inch pipe located in between Units 1 and 2. The pipe passes through the powerhouse and discharges into the tailrace.

BRUNSWICK FISHWAY MAINTENANCE AND OPERATION 2022

Personnel from the MDMR met with representatives of BWPH to review operations, safety procedures, problems occurring with the fishway and maintenance issues that remained from the fall of the 2021 season that required resolution prior to the startup of the fishway in May 2022.

Prior to the 2022 season, BWPH employees serviced the following items:

1) Cleared all fishway pools of debris
2) Adjusted hoist limits for the two isolation gates
3) Made repairs and modifications to the crowder, trap door area and lift hopper
4) Replaced upstream fish passage sluice hose from overhead tank
5) Cleaned attraction water intake grating
6) Replaced attraction water outlet grating on floor of diffusion chamber

Fishway Closures

There was only one unexpected closure at the Brunswick fishway during the 2022 fish passage season. The fishway was dewatered due to high flows and debris on October 14 to October 18. The river flows at the Brunswick fishway, which are often too high to open the fishway prior to the first week of May, had subsided prior to April 29 and were not a concern. The season was defined by lower river flows during the summer and early fall. Water temperatures were within the typical ranges of water temperatures observed during the fishway season.

1) Fishway opened on April 29, 2022.

2) The fishway was shut down on August 1 through the morning of August 15 for routine seasonal maintenance.
3) The fishway was shut down on October 14 due to high river flow and large amounts of debris. The fishway was started back up on October 19.
4) The fishway was closed for the season on November 15.

During the seasonal shutdown, BWPH employees serviced the following items:

1) Cleaned fish attraction grating
2) Replaced upstream fish passage sluice hose from overhead tank
3) Removed debris from parking area
4) Installed employee parking signs for maintenance and stocking operations

High water in the spring and the fall can cause significant damage to the infrastructure and prevent operation of the fishway at Brunswick. During the early spring and late fall can be particularly damaging due to high debris loads. During these same time periods, documented fish passage is very low and may not justify keeping Androscoggin River fishway facilities open during this period.

FISH PASSAGE

The fishway officially opened for its 40th consecutive season April 29, 2022. Personnel from the MDMR began staffing the fishway on May 1, 2022 with BWPH assistance and BWPH personnel staffed the fishway from August 1 until the fishway closed for the season on November 15.

River Herring

There were 139,326 river herring captured at the fishway during the 2022 season. Of that, 11,366 were trucked by MDMR staff to three ponds within the watershed and 15,160 were trucked outside of the watershed. The remaining 112,800 fish were passed upstream into the riverine reaches between the three hydropower stations on the lower Androscoggin River as documented by counts conducted at the Worumbo Project.

During the past several years, the timely arrival and adequate number of Androscoggin River adults captured at the Brunswick fishway for transport and release was greater than the amount of upstream spawning and nursery habitat available at the stocking rate of six fish per surface acre of historical habitat. The adult release target for the Androscoggin watershed is 27,358 river herring into 1,886 ha of upstream habitat available for restoration as seen in Table 1 provided by MDMR.

Table 1. Herring Run Size and Habitat Above Brunswick

Year	Habitat* (hectares)	Run Size
2000	1,318	9,551
2001	1,846	18,196
2002	1,846	104,520
2003	1,846	53,732
2004	1,846	113,686

2005	1,886	25,896
2006	1,886	34,239
2007	1,886	60,662
2008	1,886	92,359
2009	1,886	44,725
2010	1,886	39,689
2011	1,886	54,886
2012	1,886	170,191
2013	1,886	69,104
2014	1,886	55,678
2015	1,886	71,887
2016	1,886	114,874
2017	1,886	49,923
2018	1,886	179,040
2019	1,886	81,025
2020	1,886	67
2021	1,886	54,906
2022	1,886	139,326

*Habitat area does not include the Brunswick headpond

The typical downstream river herring migration occurs during the period of mid-July through October. MDMR and BWPH staff observed no significant downstream river herring migration throughout the year.

American Shad

Two-hundred and twenty-eight American shad were captured at the fishway in 2022 compared to 550 passed in 2021 and 23 passed in 2020(Table 2). There were no shad trucked upstream by MDMR during the 2022 season.

Table 2. American shad passed upstream at the Brunswick fishway in 2022

Date	Number Passed*	Water Temperature (c)	River Flow (cfs)
5/18/2022	1	16.9	8,850
5/23/2022	1	17.1	7,820
5/24/2022	4	16.2	6,410
5/25/2022	3	16.9	6,390
5/26/2022	1	16.9	5,000
5/27/2022	3	16.7	4,320
5/28/2022	1	17.8	3,740
5/30/2022	7	18.6	3,950
5/31/2022	2	19.0	4,560
6/1/2022	1	18.0	3,030
6/2/2022	10	18.0	2,950

6/3/2022	17	18.3	3,160
6/4/2022	9	18.0	3,060
6/5/2022	1	17.6	2,950
6/6/2022	2	18.1	2,960
6/7/2022	4	19.0	2,970
6/8/2022	18	19.5	3,080
6/9/2022	14	19.5	3,410
6/10/2022	2	18.4	4,130
6/11/2022	9	18.7	4,520
6/12/2022	9	19.4	4,020
6/13/2022	8	19.6	3,170
6/14/2022	12	20.0	2,870
6/15/2022	6	20.2	2,780
6/16/2022	19	20.3	2,130
6/17/2022	13	20.2	2,143
6/18/2022	8	20.1	2,370
6/19/2022	10	19.5	2,150
6/20/2022	5	18.5	2,570
6/23/2022	3	20.0	2,170
6/24/2022	2	20.1	2,150
6/25/2022	8	20.8	2,140
6/26/2022	2	22.1	2,170
6/28/2022	4	22.9	2,030
7/3/2022	1	23.3	1,870
7/12/2022	1	23.1	1,940
7/14/2022	3	24.3	2,770
7/18/2022	2	24.4	1,700
7/19/2022	1	24.3	2,020
7/20/2022	1	25.1	2,900
Total Number	228		

*Counts provided by MDMR

Table 3. American Shad Passage at Brunswick Fishway 2009-2022

Year	Shad Passed
2009	31
2010	22
2011	0
2012	0

2013	16
2014	0
2015	53
2016	1,096
2017	1
2018	32
2019	63
2020	23
2021	550
2022	228

Atlantic Salmon

Atlantic salmon are listed as a federal endangered species throughout the Northeast and specifically the Androscoggin River. However, there is not an active Atlantic salmon restoration program in place for the Androscoggin River other than providing upstream passage for wild and hatchery origin Atlantic salmon at the first three dams on the river. The Biological Opinion and Interim Species Protection Plan for the Brunswick Project was incorporated into the Project license on August 16, 2022.

Through July of the 2022 passage season, MDMR fishway staff observed seventeen Atlantic salmon at the Brunswick fishway (Table 4). No Atlantic salmon were observed by BWPH staff at the Brunswick fishway after August 1, 2022.

Table 4. Atlantic salmon captured ascending the Androscoggin River at the Brunswick fishway, May 1 through November 15, 2022

Date	Total Length (mm)*	Clips/Marks	Water Temp. (C)
31-May	730	None	19.0
31-May	752	None	19.2
31-May	771	None	19.3
2-Jun	790	None	18.1
2-Jun	770	None	18.1
5-Jun	760	None	18.4
8-Jun	550	None	19.4
14-Jun	565	None	20.6
17-Jun	585	None	20.2
21-Jun	533	None	17.9
22-Jun	575	None	20.0
23-Jun	570	None	20.0
23-Jun	540	None	20.2
23-Jun	570	None	21.2
2-Jul	559	None	23.3

8-Jul	790	None	23.1
12-Jul	762	None	24.1
Total	17		

*Biological data provided by MDMR

Table 5. Number of Atlantic salmon captured at the Brunswick fishway 2000-2022

Year	Total
2000	4
2001	5
2002	2
2003	3
2004	12
2005	10
2006	6
2007	21
2008	18
2009	24
2010	9
2011	44
2012	0
2013	1
2014	4
2015	2
2016	7
2017	0
2018	1
2019	1
2020	5
2021	5
2022	17
Total	**201**

Non-Target Fish Species

During the 2022 passage season, there were a total of eight different non-target species passed into the headpond. White suckers were the most common with 1,302 passed followed by sea lamprey at 370 passed. No white catfish or carp were captured in the fishway during the 2022 season.

Table 6. Non-Target Species Passed in 2022

Species	Total*
American Eel (Anguilla rostrata)	7
Landlocked Salmon (Salmo salar)	1
Rainbow Trout (Salmo gairdneri)	1
Sea Lamprey (Petromyzon marinus)	370
Smallmouth Bass (Micropterus dolomieu)	163
Striped Bass (Morone saxatilis)	1
Sunfish (Lepomis spp)	3
White Sucker (Catostomus commersoni)	1,302
Grand total	**1,848**

*Totals provided by MDMR

EFFECTIVENESS STUDIES

Adult Atlantic Salmon - Upstream Passage

At this time, there are not enough returning adult Atlantic salmon to conduct upstream effectiveness studies. A new Species Protection Plan was filed for the Project on December 31, 2019 and NMFS filed their Biological Opinion (BiOp) with the FERC on December 28, 2021. FERC issued its Order Amending License to Modify and Approve Final Species Protection Plan for Atlantic Salmon, Atlantic Sturgeon, and Shortnose Sturgeon on August 16, 2022.

Upstream passage studies, as outlined in the 2019 ISPP and 2021 BiOp, will be conducted when there are 40 adult salmon returning to the Androscoggin River and observed at the Brunswick Project in two consecutive years.

Adult Atlantic Salmon - Downstream Passage

At this time, there are not enough returning adult Atlantic salmon to conduct downstream passage effectiveness studies. The new December 2019 SPP and December 2021 BiOP, incorporated into the license by order dated August 16, 2022, collectively state that downstream adult passage studies will be conducted when there are 40 adult salmon returning to the Androscoggin River and observed at the Brunswick Project in two consecutive years.

Atlantic Salmon Smolts -

Downstream Passage

As outlined in the 2019 SPP and 2021 BiOP, BWPH provides nighttime spill flows at the Brunswick Project for downstream smolt migration based on a set of unit operational guidelines driven by total river flow at the Project (Table 7). This prioritization was implemented throughout the month of May, 2022.

Table 7. Unit Prioritization for Atlantic Salmon Smolt Passage

Total River Discharge (cfs)	Unit Operations
<7,615	Unit 1 - online day; offline night
	Unit 2/3 - both online day; one offline night
7,615 - 18,275	Unit 1 - online day; offline night
	Unit 2/3 - both online day; both online night
>18,275	Unit 1 - online day and night
	Unit 2/3 - online day and night

River Herring - Upstream and Downstream Effectiveness Studies

No studies have been conducted at this time.

American Shad - Upstream and Downstream Effectiveness Studies

No studies have been conducted at this time.

2023 PLAN

The Brunswick fishway will continue with normal operation in 2023, running from May 1st to November 15th as river conditions allow. MDMR will operate the fishway from May 1st to July 31st and BWPH will be available for supplemental coverage and assistance during this time. From August 1st to November 15th, BWPH staff will operate the fishway. An annual shut-down for maintenance will be undertaken sometime in early August. Unit prioritization will be implemented from May 1 to May 31, following consultation with NMFS on March 3, 2023.

Consistent with the terms and conditions of the 2021 BiOp, BWPH will continue to undertake the following additional actions in 2023:

- Install, operate, and maintain a PIT tag receiver near the entrance of the fishway to monitor movements of salmon and sturgeon in the project area annually throughout the term of the amended license. Provide all PIT tag data to NMFS annually by December 31. *Will be installed before 2023 season.*
- Coordinate with the MDMR to insert a PIT tag into all ESA-listed Atlantic salmon that are trapped and handled at the Brunswick fishway. *Approval from NMFS to not start tagging in 2023.*
- Inspect the upstream and downstream fish passage facilities at the Brunswick Project daily when they are open. Submit summary reports to NMFS weekly during the fish passage season.
- Notify NMFS of any changes in operation including maintenance activities and debris management at the project during the term of the amended license.
- Review and update Fishway Operations and Maintenance Plan to ensure it is consistent with the terms and conditions of the BiOP, as well as with the State of Maine's most recent version of their Atlantic Salmon Trap Operating and Fish-Handling Protocols (except where it may conflict with

the terms and conditions included with this Incidental Take Statement). *Completed and distributed on May 19, 2022.*

- In the event of a serious injury or mortality of any ESA listed species, allow NMFS access to investigate the source of the mortality and work in cooperation with NMFS to correct the source of serious injury/mortality.
- Submit annual reports at the end of each calendar year summarizing the results of proposed action and any takes of listed sturgeon or Atlantic salmon to NMFS by December 31. *An extension of time to file the incidental take report to March 31 of each year, approved by NMFS, was submitted to the FERC on December 9, 2022. The annual SPP report is required to be filed by March 31 annually in accordance with the BiOP.*
- Contact NMFS within 24 hours of any interactions with Atlantic salmon, shortnose sturgeon, or Atlantic sturgeon, including non-lethal and lethal takes (Matt Buhyoff: by email (Matt.Buhyoff@noaa.gov) or phone (207) 370-2797 and to: incidental.take@noaa.gov. By December 31 of each year, an annual report summarizing this information must be provided to NMFS to document the take level from all sources and all life stages. *Take report was filed on January 6, 2023. As discussed above, an extension of time to file the annual incidental take report was filed with the FERC on December 9, 2022.*
- In the event of any lethal takes, any dead specimens or body parts must be photographed, measured, and preserved (refrigerate or freeze) until disposal procedures are discussed with NMFS.
- Take immediate action, regardless of whether the fishway is being observed in–person or remotely, to pass Atlantic salmon when they are observed in the fishway, regardless of the co-occurrence of an invasive species. If an invasive species is observed with an Atlantic salmon in the fishway, BWPH should attempt to pass the salmon upstream while preventing the passage of the invasive species.
- Be onsite if the v-gate near the viewing window of the Brunswick fishway is being operated to ensure that salmon are not injured or killed by the closing of the gate. This gate must not be controlled remotely.
- Position cameras to ensure that there are no blind spots where Atlantic salmon could hold without being observed when operating remotely. *A camera was installed in 2021 and an elevated floor panel was installed in the area of the viewing window in 2022.*
- Remove any debris that could affect the ability of fish to pass either the downstream or upstream fish passages immediately upon inspection.
- Replace entrance gate actuator and upstream fishway handrail within one day of tailrace flows subsiding to safe levels after high water event during the fish passage season.
- Develop, in consultation with NMFS, an appropriate schedule for regularly surveying the pool downstream of the Brunswick dam for both stranded salmon and shortnose and Atlantic sturgeon. *Schedule finalized in consultation with NMFS on March 3, 2023.*
- Update the sturgeon handling plan. *Plan was updated and received NMFS concurrence on March 8, 2023.*

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Appendix A.

Brunswick fishway air and water temperatures, headpond levels and river flows for the 2022 passage season – provided by MDMR

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April 2022

Day	Air Temp (°C)	Water Temp (°C)	Headpond Level	River Flow (cfs)
4/1				
4/2				
4/3				
4/4				
4/5				
4/6				
4/7				
4/8				
4/9				
4/10				
4/11				
4/12				
4/13				
4/14				
4/15				
4/16				
4/17				
4/18				
4/19				
4/20				
4/21				
4/22				
4/23				
4/24				
4/25				
4/26				
4/27				
4/28				
4/29		8.3	41.2	11,300
4/30				
Mean		**8.3**	**41.2**	**11,300**
MIN.		**8.3**	**41.2**	**11,300**
MAX.		**8.3**	**41.2**	**11,300**

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May 2022

Day	Air Temp (°C)	Water Temp (°C)	Headpond Level	River Flow (cfs)
5/1	10.5	9.1	40.0	8,920
5/2	9.0	9.3	40.4	8,190
5/3	10.0	9.4	40.6	8,060
5/4	9.5	9.6	40.1	7,980
5/5	9.5	9.5	40.5	8,950
5/6	10.5	11.0	40.6	9,500
5/7	9.5	11.3	39.5	8,990
5/8	11.0	11.7	40.2	8,170
5/9	10.5	11.9	39.7	7,160
5/10	12.0	12.2	40.0	6,850
5/11	10.5	12.3	40.5	6,500
5/12	12.0	13.4	40.5	5,490
5/13	15.0	14.6	40.5	6,000
5/14	15.5	14.9	40.0	5,930
5/15	15.5	15.9	39.6	5,460
5/16	13.4	15.8	40.0	5,530
5/17	15.5	17.0	39.3	5,630
5/18	12.0	16.9	40.1	8,850
5/19	13.0	17.3	39.5	7,330
5/20	11.0	16.7	40.0	6,320
5/21	16.0	16.7	39.5	6,700
5/22	18.3	17.5	39.5	6,650
5/23	15.5	17.1	39.8	7,820
5/24	13.0	16.2	40.0	6,410
5/25	13.5	16.9	39.8	6,390
5/26	14.0	16.9	39.6	5,000
5/27	16.0	16.7	39.5	4,320
5/28	17.0	17.8	39.5	3,740
5/29	17.0	18.2	40.1	4,080
5/30	17.0	18.6	39.5	3,950
5/31	15.5	19.0	39.6	4,560
Mean	**13.2**	**14.6**	**39.9**	**6,627**
MIN.	**9.0**	**9.1**	**39.3**	**3,740**
MAX.	**18.3**	**19.0**	**40.6**	**9,500**

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June 2022

Day	Air Temp (°C)	Water Temp (°C)	Headpond Level	River Flow (cfs)
6/1	13.0	18.0	39.7	3,030
6/2	13.5	18.0	39.8	2,950
6/3	13.0	18.3	39.6	3,160
6/4	13.0	18.0	39.8	3,060
6/5	14.0	17.6	39.9	2,950
6/6	16.0	18.1	39.8	2,960
6/7	16.0	19.0	39.6	2,970
6/8	16.0	19.5	39.6	3,080
6/9	16.0	19.5	39.6	3,410
6/10	16.0	18.4	39.5	4,130
6/11	17.0	18.7	39.5	4,520
6/12	18.0	19.4	39.1	4,020
6/13	18.0	19.6	39.7	3,170
6/14	18.0	20.0	39.5	2,870
6/15	19.0	20.2	39.3	2,780
6/16	19.0	20.3	39.1	2,130
6/17	18.0	20.2	38.9	2,143
6/18	15.5	20.1	39.0	2,370
6/19	13.8	19.5	38.9	2,150
6/20	18.0	18.5	22.5	2,570
6/21	16.0	17.9	39.5	2,840
6/22	16.0	19.4	39.3	2,670
6/23	16.0	20.0	39.0	2,170
6/24	18.0	20.1	39.5	2,150
6/25	20.0	20.8	38.5	2,140
6/26	23.0	22.1	38.8	2,170
6/27	21.5	22.4	38.8	2,250
6/28	21.0	22.9	39.2	2,030
6/29	21.0	22.3	38.8	1,930
6/30	20.0	21.9	39.0	1,900
Mean	**17.1**	**19.7**	**38.8**	**2,756**
MIN.	**13.0**	**17.6**	**22.5**	**1,900**
MAX.	**23.0**	**22.9**	**39.9**	**4,520**

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July 2022

Day	Air Temp (°C)	Water Temp (°C)	Headpond Level	River Flow (cfs)
7/1	20.5	22.1	39.0	2,020
7/2	21.0	22.5	38.5	1,870
7/3	24.5	23.3	39.0	1,870
7/4				1,900
7/5	21.0	23.0	39.2	1,920
7/6	21.0	22.6	38.9	1,930
7/7	21.0	22.3	38.8	1,930
7/8	21.0	22.3	38.5	1,930
7/9	20.0	22.7	38.5	1,940
7/10	21.0	23.3	39.0	1,940
7/11	21.0	23.5	38.9	1,890
7/12	21.0	23.1	39.0	1,940
7/13	22.0	23.4	39.1	1,980
7/14	23.0	24.3	39.0	2,770
7/15	23.0	24.3	39.0	1,600
7/16	21.0	24.2	38.8	1,480
7/17	23.0	24.0	38.8	1,480
7/18	23.0	24.4	38.8	1,700
7/19	22.5	24.3	38.9	2,020
7/20	23.0	25.1	39.0	2,900
7/21	24.0	25.2	39.4	3,370
7/22	24.5	25.5	39.5	3,180
7/23	30.0	25.8	39.0	2,810
7/24	24.0	26.1	38.9	2,500
7/25	25.0	26.2	38.7	2,140
7/26	21.0	25.5	38.7	2,070
7/27	22.0	25.2	39.0	1,960
7/28	22.0	25.1	39.1	2,250
7/29	23.0	25.4	39.0	2,240
7/30	27.0	26.0	39.0	2,060
7/31	22.0	25.4	39.0	2,020
Mean	**22.6**	**24.2**	**38.9**	**2,116**
MIN.	**20.0**	**22.1**	**38.5**	**1,480**
MAX.	**30.0**	**26.2**	**39.5**	**3,370**

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August 2021

Day	Air Temp (°C)	Water Temp (°C)	Headpond Level	River Flow (cfs)
8/1	22.0	25.3	38.8	1,830
8/2	Fishway closed for regular maintenance.			1,700
8/3				1,690
8/4				1,640
8/5				1,820
8/6				2,000
8/7				2,150
8/8				1,960
8/9				2,020
8/10				1,920
8/11				1,940
8/12				1,930
8/13				1,900
8/14				1,720
8/15				1,770
8/16	19.0	24.2	39.2	1,750
8/17	20.0	24.2	38.9	1,760
8/18	18.0	23.1	39.1	1,790
8/19	18.5	22.9	39.2	1,990
8/20	19.0	22.5	39.0	1,910
8/21	21.0	22.8	39.0	1,910
8/22	21.0	23.7	39.0	2,250
8/23	20.0	24.1	38.9	2,700
8/24	20.0	23.7	39.0	3,640
8/25	19.5	23.4	39.5	2,680
8/26	18.5	23.7	39.3	2,710
8/27	18.5	23.5	39.3	2,570
8/28	20.0	23.0	39.0	2,530
8/29	22.0	24.4	39.0	2,850
8/30	21.5	23.6	39.4	3,020
8/31	20.2	24.1	39.5	3,060
Mean	**19.9**	**23.7**	**39.1**	**2,165**
MIN.	**18.0**	**22.5**	**38.8**	**1,640**
MAX.	**22.0**	**25.3**	**39.5**	**3,640**

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September 2022

Day	Air Temp (°C)	Water Temp (°C)	Headpond Level	River Flow (cfs)
9/1	19.5	23.8	39.2	2,240
9/2	16.0	22.5	39.3	2,010
9/3	14.5	21.9	39.2	1,910
9/4	17.5	21.4	39.1	1,940
9/5	17.0	22.0	39.0	2,040
9/6	15.0	21.7	39.1	2,070
9/7	14.5	21.2	39.2	2,150
9/8	14.0	20.3	39.0	2,090
9/9	16.5	20.5	39.5	2,000
9/10	17.0	21.2	39.0	1,960
9/11	18.5	21.8	39.0	1,960
9/12	20.0	22.2	39.0	2,000
9/13	19.0	22.4	39.1	2,050
9/14	19.0	22.1	38.8	2,080
9/15	15.5	21.4	38.8	1,980
9/16	15.0	20.1	39.4	2,010
9/17	12.0	19.4	39.2	2,010
9/18	15.0	18.7	39.2	2,020
9/19	13.0	18.8	39.4	1,910
9/20	12.0	18.7	39.1	2,240
9/21	12.5	18.1	39.5	3,980
9/22	15.0	17.8	41.7	5,180
9/23	11.5	17.4	40.0	4,970
9/24	11.5	15.8	40.5	4,870
9/25	9.5	15.5	39.6	4,810
9/26	17.0	16.5	41.3	4,980
9/27	13.5	16.4	39.5	4,820
9/28	13.5	15.5	39.5	3,590
9/29	12.0	15.0	40.2	3,550
9/30	10.0	14.7	40.0	3,390
Mean	**14.9**	**19.5**	**39.5**	**2,827**
MIN.	**9.5**	**14.7**	**38.8**	**1,910**
MAX.	**20.0**	**23.8**	**41.7**	**5,180**

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October 2022

Day	Air Temp (°C)	Water Temp (°C)	Headpond Level	River Flow (cfs)
10/1	9.5	14.7	39.9	2,190
10/2	9.5	14.3	39.0	2,220
10/3	8.0	13.8	39.5	2,960
10/4	7.0	13.6	39.9	3,140
10/5	10.0	13.7	40.0	3,260
10/6	12.0	14.2	40.0	3,200
10/7	12.0	14.5	39.0	2,070
10/8	10.0	14.8	39.6	2,040
10/9	8.5	13.9	39.2	2,030
10/10	6.0	13.8	39.4	2,810
10/11	5.0	12.5	40.2	3,140
10/12	7.5	12.0	40.0	3,170
10/13	15.0	12.8	40.0	3,090
10/14	15.5	13.7	39.5	4,130
10/15				30,900
10/16				20,900
10/17				11,900
10/18				11,200
10/19	10.5	13.0	40.8	10,600
10/20	10.0	12.2	40.3	10,100
10/21	8.0	11.6	40.0	7,820
10/22	9.5	11.3	40.5	7,740
10/23	8.0	11.5	40.7	7,170
10/24	11.0	11.5	40.5	6,970
10/25	12.5	11.5	40.0	7,060
10/26	14.5	11.8	40.5	7,080
10/27	14.0	11.7	40.7	7,070
10/28	6.5	11.1	40.0	5,840
10/29	4.0	10.7	40.5	5,770
10/30	5.8	10.4	40.0	5,580
10/31	7.0	10.4	39.0	5,490
Mean	**9.5**	**12.6**	**40.0**	**6,730**
MIN.	**4.0**	**10.4**	**39.0**	**2,030**
MAX.	**15.5**	**14.8**	**40.8**	**30,900**

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November 2022

Day	Air Temp (°C)	Water Temp (°C)	Headpond Level (feet above sea level)	River Flow (cfs)
11/1	9.5	10.9	39.9	5,450
11/2	10.0	11.1	39.4	4,410
11/3	5.5	10.6	39.8	5,300
11/4	8.5	10.4	40.0	5,050
11/5	10.0	10.6	40.3	3,440
11/6	11.5	11.0	40.9	3,440
11/7	13.5	11.7	40.3	3,400
11/8	9.0	11.0	40.3	4,680
11/9	4.5	9.1	39.5	5,180
11/10	7.5	9.1	39.3	5,170
11/11	6.5	9.5	39.5	3,480
11/12	13.5	10.3	40.5	4,150
11/13	10.5	11.4	39.4	7,030
11/14	3.0	9.3	41.2	10,500
11/15	1.0	8.5	41.4	9,450
11/16		**Closed for the Season**		9,450
11/17				9,450
11/18				9,450
11/19				9,450
11/20				9,450
11/21				9,450
11/22				9,450
11/23				9,450
11/24				9,450
11/25				9,450
11/26				9,450
11/27				9,450
11/28				9,450
11/29				9,450
11/30				9,450
Mean	**8.3**	**10.3**	**40.1**	**7,396**
MIN.	**1.0**	**8.5**	**39.3**	**3,400**
MAX.	**13.5**	**11.7**	**41.4**	**10,500**

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Appendix B.

Brunswick Fishway Specifications

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Brunswick Fishway Specifications

Type:	Vertical Slot
Description:	Reinforced concrete w/precast baffles
Overall Length:	570' +/-
Floor Elevations:	Elevation 34.0 at fishway exit Elevation -5.0 at fishway entrance
Floor Slope:	1 on 10
Pool Size:	8'-6"W x 10'-0"L with 11" wide slot
Drop per Pool:	12"
Design Populations:	85,000 shad per year 1,000,000 alewives per year
Fishway Operating Range:	Maximum headwater elevation 43.0 Maximum tailwater elevation 7.5 Q = 30,000 CFS Normal headwater elevation 39.4 Normal tailwater elevation 2.5 Q = 4,400 CFS Minimum headwater elevation 37.4 Minimum tailwater elevation -1.0 Q = 0 CFS
Design Flow:	30 CFS
Supplementary Attraction Flow:	70 CFS (gravity)
Total Attraction Flow:	100 CFS
Fishway Entrance Jet Velocity:	4.0 FPS to 6.0 FPS
Tailrace Velocity:	5.0 FPS maximum

Appurtenances:

Gates:	1 - 7' x 10' motorized & instrumented sluice gate at fishway exit. This gate to be closed when pond level reaches elevation 43.0+ 1 - 4' x 10' motorized & instrumented sluice gate at entrance to downstream

Migrant passage on north side of powerhouse

Gates:	2 - 27" diameter motorized & instrument sluice gates at intake of supplementary attraction flow system 2 - pneumatic trap gates at fish trap Stop logs at fishway entrance & exit

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	Trash rack: 1 10' x 12' at fishway exit with 5 3/4" clear bar spacing
Fish Crowder	1" x 4" grating on motorized trolley at fish trap
Fish Hopper	500-gallon capacity with electric hoist at fish trap

Related Work:

Existing Overflow Spillway	Addition of flashboards (120 L.F.) to elevation 42.0 to prevent discharge into tailrace at river flow of 20,000 CFS

Fish Barrier Wall

Reinforced concrete semi-gravity type with top at elevation 21.0 to prevent discharge into tailrace at river flows up to 20,000 CFS. Elevation 21.0 to prevent discharge into tailrace at river flows up to 20,000 CFS

Overall Length	170' +/-
Maximum Height	30' +/-
Appurtenances	Sluice gate for dewatering intermediate pool