White River Hydroelectric Project
FERC Project No. 2444

Application for a Subsequent License for a Minor Water Power Project
Less than 1.5 Megawatts

Prepared for

Northern States Power Company
a Wisconsin Corporation

Prepared by

Mead & Hunt

meadhunt.com

Volume 1 of 4
Initial Statement and
Exhibits A and E

July 2023

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Initial Statement and Exhibits A and E

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Before the
Federal Energy Regulatory Commission
Application for a Subsequent License
For a Minor Water Power Project
Less than 1.5 Megawatts

Initial Statement as required under 18 CFR §4.61

1. Northern States Power Company, a Wisconsin Corporation (NSPW) *applies to the Federal Energy Regulatory Commission (FERC) for a subsequent license for the White River Water Power Project, as described hereinafter* (FERC Project No. 2444).

2. *The location of the project is:*

State or territory:	Wisconsin
County:	Ashland and Bayfield
Township or nearby town:	Town of White River, Ashland County and Town of Kelly, Bayfield County
Stream:	White River
Other:	Located in northwest Ashland County and east central Bayfield County, Wisconsin, approximately 13 miles upstream of the river's confluence with the Bad River. The Project is located 5 miles south of the City of Ashland, and roughly 120 miles northeast of the City of Eau Claire, Wisconsin.

A Project location map is included in Appendix A-1.

3. *The exact name, address, and telephone number of the applicant is:*

Northern States Power Company, a Wisconsin Corporation
1414 W Hamilton Avenue, PO Box 8
Eau Claire, Wisconsin 54702-0008
715-737-1428

4. *The exact name, address, and telephone number of each person authorized to act as agent for the applicant in this application are:*

Donald Hartinger
Plant Director, Renewable Operations-Hydro
NSPW
414 Nicollet Mall, 2
Minneapolis, MN 55401
651-261-7668

Matthew Miller
Environmental Analyst
NSPW
1414 W Hamilton Avenue, PO Box 8
Eau Claire, Wisconsin 54702-0008
715-737-1353

5. *Applicant is a* domestic corporation *and* is not *claiming preference under Section 7(a) of the Federal Power Act.*

6. *The statutory or regulatory requirements of the state(s) in which the project would be located and that affect the project as proposed, with respect to bed and banks and to the appropriation, diversion, and use of water for power purposes, and with respect to the right to engage in the business of developing, transmitting, and distributing power and in any other business necessary to accomplish the purposes of the license under the Federal Power Act, and*

a. The Applicant must be in accordance with the following state requirements:

In accordance with Section 401 of the Federal Water Pollution Control Act, 33 U.S.C. §1341, the applicant must obtain water quality certification, or a waiver thereof, from the State of Wisconsin. In Wisconsin, the Certification Program is administered by the Wisconsin Department of Natural Resources (WDNR).

The Applicant is a corporation duly organized and existing under the laws of the State of Wisconsin and is duly authorized by its Articles of Incorporation to engage in the business of generating, transmitting, and distributing power.

Chapter 31 Wisconsin Statutes Regulation of Dams and Bridges Affecting Navigable Waters.

The Applicant must comply with the provisions of the Coastal Zone Management Act (CZMA) of 1972.

b. *The steps the applicant has taken or plans to take to comply with each of the laws cited above are outlined below:*

The Applicant will apply to the WDNR for a Section 401 water quality certificate pursuant to Section 401 of the Clean Water Act for continued operation of the Project.

NSPW has complied with all state laws necessary for its corporate existence, for engaging in the business of a wholesale power generation, and for ownership, operation, and maintenance of the White River Hydroelectric Project.

Electric utilities are governed by various statutes and regulated by the Public Service Commission of Wisconsin.

The Wisconsin Coastal Resources Management Program (WCMP) is responsible for implementing the State of Wisconsin's coastal zone management program. The State of Wisconsin Coastal Zone Management Program is limited to only the 15 counties that have frontage on Lake Superior and Lake Michigan. Ashland and Bayfield counties are located within Wisconsin's Lake Superior coastal zone. The Licensee requested a formal written determination of consistency with the WCMP on April 25, 2023. No response has been received from WCMP as of the date of this filing.

Northern States Power Company owns or has all the rights necessary for the operation of the hydroelectric project.

7. *Brief Project Description*

The Project operates as a run-of-river facility, for the purpose of generating hydroelectric power, where the discharge measured immediately downstream of the Project tailrace approximates the sum of inflows into the Project reservoir. Under the current license, the reservoir is operated between elevations 710.4 and 711.6 feet National Geodetic Vertical Datum 1929 (NGVD). A minimum flow of 16 cubic feet per second (cfs) or inflow, whichever is less, is released into the approximately 1/4 mile-long bypass reach at all times to protect aquatic resources.

The Project has an average head of 49 feet. It consists of a 46-foot-high dam and 775-foot long earthen and concrete dam that includes a left earth embankment, an intake structure, a gated spillway section and a right earth embankment. Water is conveyed from the intake structure to the powerhouse through a 1,346-foot-long conveyance system consisting of a 7-foot diameter conduit, a 16-foot diameter surge tank, and two 5.5-foot diameter penstocks. The powerhouse contains 2 generating units and a short underground transmission line from the powerhouse to a non-project substation. The minimum hydraulic capacity of the Project is 50 cfs (Unit #2) and the maximum hydraulic capacity of the powerhouse is 350 cfs. The energy from the project is routed locally to NSPW's rural distribution system or into the interconnected transmission system. In both instances, NSPW is the entity receiving the power generation.

a. The Project has an installed generating capacity of 1.2 MW.
b. The Project is an existing dam.

8. *Lands of the United States affected (Shown in Exhibit G)*

The Project does not occupy any lands of the United States.

9. *Construction of the Project*

No construction is proposed.

The information provided below complies with Section 4.32 of 18 CFR.

1. *For a preliminary permit or a license, identify every person, citizen, association of citizens, domestic corporation, municipality, or state that has or intends to obtain and will maintain any proprietary right necessary to construct, operate, or maintain the project*.

   NSPW is the sole entity that intends to maintain any proprietary right necessary to construct, operate, or maintain the Project.

2. *For a license, identify (providing names and mailing addresses):*

   Every county in which any part of the project and any federal facilities that would be used by the project would be located:

   Heather Schutte, Clerk
   Ashland County
   201 Main St. W, Room 202
   Ashland, WI 54806

   Lynn Divine
   Bayfield County
   117 E 5th Street
   Washburn, WI 54891

   No federal facilities are used by the Project.

   Every city, town, or similar local political subdivision in which any part of the project, and any Federal facilities that is used by the project is located:

   Mr. Matthew Lehto, Chairperson
   Town of White River
   65273 Charles Johnson Road
   Ashland, WI 54806

   Mr. Matthew Erickson, Chairperson
   Town of Kelly
   29745 Polich Road
   Mason, WI 54856

   No federal facilities are used by the Project.

   Every city, town, Indian Tribe, or similar local political subdivision that has a population of 5,000 or more people and is located within 15 miles of the project dam:

   The following cities and towns each have a population of 5,000 or more people (2020 U.S. Census data), and are located within 15 miles of the Project powerhouse:

   Brant Kucera, City Administrator
   City of Ashland
   601 Main St. W
   Ashland, WI 54806

   Every irrigation district, drainage district, or similar special purpose political subdivision which any part of the project is located, and any federal facility used by the project is located:

   Northwest Regional Planning Commission
   1400 S. River Street
   Spooner, WI 54801-8692

   No federal facilities are used by the Project.

Every other political subdivision in the general area of the project that there is reason to believe would be likely to be interested in or affected by the notification:

There is no other political subdivision in the general area of the Project that there is reason to believe would likely be interested in, or affected by, this notification.

All Indian tribes that may be affected by the project:

Mr. Lawrence Plucinski, THPO
Bad River Band of Lake Superior Tribe of Chippewa Indians
PO Box 39
Odanah, WI 54862

Ms. Whitney Gravelle, Chairman
Bay Mills Indian Community of Michigan
12140 W. Lakeshore Drive
Brimley, MI 49715-9319

Ms. Jill Hoppe, THPO
Fond du Lac Band of Lake Superior Chippewa
1720 Big Lake Road
Cloquet, MN 55720

Mr. Benjamin Rhodd, THPO
Forest County Potawatomi Community of Wisconsin
5320 Wensaut Lane
PO Box 340
Crandon, WI 54520

Mr. Michael Blackwolf, THPO
Fort Belknap Indian Community
656 Agency Main Street
Harlem, MT 59526-9455

Ms. Mary Ann Gagnon, THPO
Grand Portage Band of Chippewa Indians
PO Box 428
Grand Portage, MN 55605

Mr. William Quackenbush, THPO
Ho-Chunk Nation
Executive Offices
PO Box 667
Black River Falls, WI 54615

Mr. Warren Swartz, President
Keweenaw Bay Indian Community
16430 Beartown Road
Baraga, MI 44908-9210

Mr. Brian Bisonette, THPO
Lac Courte Oreilles Band of Lake Superior Chippewa Indians of Wisconsin
13394 West Trepania Road, Bldg No. 1
Hayward, WI 54843

Ms. Melinda Young, THPO
Lac du Flambeau Band of Lake Superior Chippewa Indians of Wisconsin
PO Box 67
Lac du Flambeau, WI 54538

Ms. Alina Shively, THPO
Lac Vieux Desert Band of Lake Superior Chippewa Indians
PO Box 249, E23857 Poplar Circle
Watersmeet, MI 49969

Mr. James Williams, Chairman
Lac Vieux Desert Band of Lake Superior Chippewa Indians of Michigan
E23968 Pow Wow Trail
Watersmeet, MI 49969

Ms. Amy Burnette, THPO
Leech Lake Band of Minnesota
Chippewa Tribe
190 Sailstar Drive NE
Cass Lake, MN 56633

Mr. Farron Jackson, Sr., Chairman
Leech Lake Band of Chippewa Indians
6530 U.S. Hwy 2 NW
Cass Lake, MN 56633

Ms. Regina Gasco-Bentley, Chairperson
Little Traverse Bay Band of Odawa Indians
7500 Odawa Circle
Harbor Springs, MI 49740

Mr. David Grignon, THPO
Menominee Indian Tribe of WI
W3426 Cty VV
PO Box 910
Keshena, WI 54135-0910

Ms. Diane Hunter, THPO
Miami Tribe of Oklahoma
PO Box 1326
Miami, OK 74355

Ms. Natalie Weyaus, THPO
Mille Lacs Band of Ojibwe
43408 Oodena Drive
Onamia, MN 56359

Ms. Catherine Chavers, President
Minnesota Chippewa Tribe
PO Box 428
Cass Lake, MN 56633

Mr. Nicholas Metoxen, THPO
Oneida Nation of Wisconsin
PO Box 365
Oneida, WI 54155-0365

Mr. Marvin Defoe, THPO
Red Cliff Band of Lake Superior
Chippewa Indians of Wisconsin
88385 Pike Road HWY 13
Bayfield, WI 54814

Mr. Michael LaRonge, THPO
Sokaogon Chippewa Community Mole Lake Band
3051 Sand Lake Road
Crandon, WI 54520

Mr. Lewis Taylor, President
St. Croix Chippewa Indians of WI
24663 Angeline Ave.
Webster, WI 54893

Ms. Sherry White, THPO
Stockbridge Munsee Community of Wisconsin
PO Box 70
Bowler, WI 54416

Ms. Jamie Arsenault, THPO
White Earth Band of the Minnesota Chippewa Tribe
PO Box 418
White Earth, MN 56591

As to any facts alleged in the application or other materials filed, be subscribed and verified under oath in the form set forth in paragraph (2)(3)(ii) of Section 9.32 by the person filing, an officer thereof, or other person having knowledge of the matters set forth.

This application is executed in the:

State of Wisconsin

County of Eau Claire

By Donald Hartinger

Being duly sworn, deposes and says the contents of this application are true to the best of his knowledge. The undersigned applicant this 17th day of July, 2023.

Donald Hartinger
Plant Director, Renewable Operations-Hydro
Northern States Power Company, a Wisconsin corporation

Subscribed and sworn before me, a Notary Public, of the State of Wisconsin this 17th day of July, 2023.

C. Van Gorden-Duex
Notary Public

SEAL
C. VAN GORDEN-DUEX
NOTARY PUBLIC, STATE OF WISCONSIN

White River Hydroelectric Project
FERC No. 2444

Exhibit A
Description of Project

Final License Application

Prepared for

Northern States Power Company
a Wisconsin Corporation

Prepared by

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meadhunt.com

July 2023

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TABLES

APPENDICES

LIST OF ABBREVIATIONS

A	Amperes
AC	Alternating Current
cfs	cubic feet per second
FERC	Federal Energy Regulatory Commission
FLA	Final License Application
kV	Kilovolt
kW	Kilowatt
NGVD	National Geodetic Vertical Datum
NSPW	Northern States Power Company, a Wisconsin corporation
O&M	Operation and management
Project	White River Hydroelectric Project
PURPA	Public Utility Regulatory Policies Act
USGS	United States Geological Survey
WDNR	Wisconsin Department of Natural Resources

1. Project Description

The White River Hydroelectric Project (Project) is located on the White River, approximately 5 miles south of the City of Ashland, in Ashland County and Bayfield counties, Wisconsin. **Appendix A-1** of this application includes a map showing the general location of the Project. **Appendix A-2** presents an aerial photograph showing the Project facilities.

The Project works consist of (1) a 46-foot high and 775-foot long earthen and concrete dam that includes a left earthen embankment, an intake structure, a gated spillway section and a right earthen embankment; (2) a reservoir with a maximum surface area of 39.9 acres and a maximum gross storage capacity of approximately 297 acre-feet[1] at an elevation of 711.6 feet National Geodetic Vertical Datum 1929 (NGVD)[2]; (3) a 1,346-foot long conveyance system from the intake to the powerhouse consisting of a 7-foot diameter conduit, a 16-foot diameter surge tank, and two 5.5-foot diameter penstocks; (4) a concrete powerhouse that houses two generating units with a total authorized installed capacity of 1,200 kilowatts (kW); (5) a 2.4 kilovolt (kV), 220-foot long underground transmission line from the powerhouse to the non-project substation containing the 1,000 kVA, 69/2.4 kV 3-phase step-up transformer; and (6) appurtenant facilities.

A description of each part of the facility is provided in the following paragraphs.[3] The Project boundary is provided in Exhibit G in Volume 2 of this application.

2. Description of Dam Structures

The dam is 775 feet long[4] and 46 feet high. From left to right looking downstream, the main structures of the dam consist of a left earth embankment dam section, an intake structure, a gated spillway section, and a right earth embankment dam section. The downstream portion of the abutment walls on either ends of the intake structure and gated spillway section are curved to the right approximately 40 feet.[5] The abutments are parallel to the river flows at their downstream ends. The State Highway 112 (non-project structure) runs along the top of the dam structures.

2.1 Intake Structure

The intake structure consists of a mass concrete structure between the left abutment and bridge pier. The structure is 20 feet wide[6], 110 feet long[7] at its base, 36.5-feet-high.[8] The elevation of the top of the intake structure is 718.13 feet.[9] The intake base extends upstream approximately 20 feet[10] from the upstream side of the bridge. The intake structure directs flow into the 7-foot diameter concrete conduit that extends downstream to the powerhouse. There is no gate to control flow. A trash rack is located on the upstream

[1] Calculated by interpretation of the updated bathymetric map included as Figure 10 of the Aquatic and Terrestrial Invasive Species Study Report.
[2] NGVD is assumed to be the same datum as mean sea level.
[3] Unless otherwise cited, all facility description attributes are from the Supporting Technical Information Document filed with the FERC in December 2008 (NSPW, 2008).
[4] Spillway and Intake length 75 feet, left earthen embankment 400 feet, and right earthen embankment 300 feet.
[5] Measured from Exhibit F-1
[6] Measured from Exhibit F-2 cross section.
[7] Measured from Exhibit F-2 cross section.
[8] Height measured from Exhibit F-2 cross section.
[9] Unless noted otherwise, all elevations provided are given in National Geodetic Vertical Datum, NGVD. Top elevation noted in previous Exhibit F-2.
[10] Measured from Exhibit F-2 cross section.

end of the intake structure. The trash rack has a vertical length of 27 feet[11] by 12.5-feet-wide with 1.6875 inch clear spacing.[12]

The trashrack is raked manually and the material cleaned from the trashrack (except for large woody debris) is collected, garbage removed, and flushed downstream. When a sizable amount of large woody debris has been stock piled on the shoreline near the intake deck, it is loaded into a truck and disposed of in the landfill. Raking occurs at least weekly during the spring season, after storms during the summer season, and at least weekly during the fall season. Raking is not normally required during the winter season.

Downstream of the trash rack, but upstream of where the intake structure tapers to the concrete conduit, a 12-inch steel pipe penetrates the concrete wall of the intake and extends downstream penetrating the left abutment wall in order to pass the required minimum flow of 16 cfs. The invert of the intake for the pipe is at an elevation of approximately 684.8 feet NGVD and the flow can be controlled with a flapper valve. During each visit to the facility, the minimum flow release is confirmed by the operator by visual observation.

2.2 Gated Spillway

The gated spillway section is 55-feet-long, approximately 60-feet wide at the base, and 35-feet-high. It is a mass concrete structure with a downstream concrete apron. The spillway is comprised of 2 gate bays each 25-feet wide separated by a concrete pier. The elevation of the gate sill is 685.17 feet. Concrete piers are located on both ends of each of the gated spillways and support the steel radial-type gate, the steel walkway, and gate opening equipment. The radial-type gates are 25-feet-wide and have a top of gate elevation of 711.6 feet. The left gate is comprised of two sections stacked on top of each other. The top section is 6-feet-tall and can be operated independently from the lower section. The gates are lifted by hydraulic cylinders connected to the hoist chains. The power unit for the hydraulic cylinders is located above the intake structure.

2.3 Earth Embankment

2.3.1 Left Embankment

The left earthen dam is 400 feet long, 86 feet wide[13] at its base, and has a maximum height of 37-feet above bedrock. It extends north from the intake structure. It has a minimum crest elevation 717.62 feet. Rip-rap has been placed on the upstream face to protect against wave action.

2.3.2 Right Embankment

The right earthen dam is 300 feet long, 112 feet wide[14] at its base, and has a maximum height of 37-feet above bedrock. It extends south from the gated spillway. It has a minimum crest elevation of 717.62. Rip-rap has been placed on the upstream face to protect against wave action.

[11] Height measured along the incline.
[12] The top of the trash racks is angled downstream 22 degrees from vertical, with a bar thickness of 0.3125 inches. The rack is supported by the dam structure on the top, in the middle by two 1.25 foot-high I-beam supports, and at the base by a 0.25 foot-high notch in the foundation. There are no other vertical frame supports. The spacing of the bars is held in place by seven horizontal, 2-inch high spacers between the bars. However, only four of the horizontal rows of spacers restrict flow beyond the restrictions provided by the other supports. The effective vertical height of the trash rack is 23.25 feet minus 3.25 feet or 20 feet. The effective width is 12.5 feet minus 2 feet or 10.5 feet. This results in an effective opening of approximately 210 square feet.
[13] Width varies.
[14] Width varies.

3. Description of Reservoir

The reservoir encompasses approximately 39.9 acres with a storage capacity of approximately 297 acre-feet at the maximum reservoir operating elevation of 711.6 feet.

4. Description of Conveyance Systems

Conveyance systems at the Project consist of a reinforced concrete conduit, a steel surge tank, and two steel penstocks.

4.1 Conduit

The conduit is a reinforced concrete pipe with an inside diameter of 7 feet. It extends approximately 1,346 feet downstream from the intake structure to the surge tank. The conduit is covered by approximately 3 feet of soil.

4.2 Surge Tank

The steel surge tank is situated between the conduit and the steel penstocks which connect to the powerhouse. It is a steel-walled tank that is 16 feet in diameter and extends 60 feet above the flange on the conveyance pipeline. The steel surge tank is supported by a reinforced concrete base.

4.3 Penstock

The two steel penstocks, which are bifurcated immediately downstream of the surge tank, extend 30 feet downstream above ground from the surge tank to the powerhouse. Each pipe is 66 inches in diameter. Each penstock has a gate valve located in the powerhouse.

5. Description of Powerhouse

The single-story powerhouse structure is comprised of reinforced concrete and brick masonry with a wooden roof covered with steel. The powerhouse is 69 feet long by 39 feet wide and is 25 feet high from the ground surface to the peak of the roof and 45 feet high from the bottom of the tailrace to the peak of the roof. The combined maximum hydraulic discharge of the powerhouse is 350 cfs. The minimum discharge of the powerhouse is 50 cfs (Unit #2 minimum discharge). The average head of the Project is 49 feet.

5.1 Turbines

The powerhouse contains one Kiser Hydro double Francis-type runner (15 blades), horizontal-type turbine unit (Unit #1) and one S. Morgan Smith double Francis-type runner (16 blades), horizontal-type turbine unit (Unit #2). The rated horsepower of Unit #1 is 940 and the calculated horsepower of Unit #2 is 667.[15]

The rated hydraulic discharge of Unit #1 is 200 cfs and the rated hydraulic discharge of Unit #2 is 150 cfs.

[15] Both units were originally installed in 1954. The turbine for unit #1 was replaced in 2017.

5.2 Generators

The Project features one General Electric 2,300-Volt, 700 kW generator unit (Unit #1) and one Westinghouse 2,300-Volt, 500 kW generator unit. Each unit is operated on a 2,400 Volt system at 450 revolutions per minute. Unit #1 was installed in 2017 and Unit #2 was installed in 1954. The combined plant capacity is 1,200 kW.

6. Tailrace

Water is released from the powerhouse directly to the White River. Normal tail water elevation at the powerhouse is 662.1 feet.

7. Transmission Equipment

The power generated by the project is transferred to a non-project substation through underground 2.4 kV cables. The 3-phase underground cables are approximately 220 feet long and include a main set and a spare set, each composed of three 4/0 conductors. The cables are connected to a 1,000 kVA, 69/2.4 kV step-up transformer within the non-project substation that serves as the point of interconnect with the Licensee's non-project distribution system and the 69 kV grid.

The energy from the Project is routed locally to the Licensee's rural distribution system or into the interconnected transmission system. In both situations, NSPW is the entity receiving the power generation.

8. Appurtenant Equipment

Appurtenant equipment includes, but is not limited to, bearing lubrication systems, generator ventilation systems, switchboards, additional gate raising equipment, switchgear, protective devices, and metering devices.

9. Project Operation

Under the proposed operation, NSPW will continue to operate the Project as a run-of-river facility for the purpose of generating hydroelectric power where the discharge measured immediately downstream of the Project approximates inflows into the Project reservoir. NSPW will continue to operate the reservoir between reservoir elevations 710.4 and 711.6 feet NGVD.[16]

NSPW also will continue to release a minimum flow of 16 cfs, or inflow, whichever is less, into the approximately ¼ mile-long bypass reach at all times to protect aquatic resources. The hydroelectric generating and spillway tainter gate equipment are set up for automatic operation based on the headwater elevation.

Just prior to spring runoff, the Applicant may need to deviate from the maximum reservoir elevation (by no more than an increase of 0.5 feet) to remove ice from the downstream side of the dam for dam safety purposes. The duration of the deviation shall be no longer than necessary (normally less than a few days)

[16] In the Pre-Application Document, NSPW proposed to operate under the subsequent license with a maximum reservoir elevation of 712.6 feet NGVD. NSPW has adjusted its operation and no longer believes a maximum elevation up to 712.6 feet NGVD is necessary.

to remove the ice and will be conducted as a planned deviation under the requirements outlined in Section 5.8 of Exhibit E.[17]

An operator is assigned to oversee the daily operation and routine maintenance of the Project. The operator visits the project site daily on weekdays and conducts a visual inspection once a week. The Project is set up for automatic operations, but the gates can also be operated locally when needed. Whenever a malfunction occurs, an alarm is sent to the operator and the owner's off-site control center.

For emergency operation of the facility, the operator is available 24 hours a day and can also be supported by two operators from the licensee's nearby hydroelectric projects as well as personnel from NSPW's Hydro Maintenance Department in Chippewa Falls, Wisconsin.

10. Safe Management, Operation, and Maintenance

NSPW has a robust Owners Dam Safety Program that incorporates all inspection, monitoring, and reporting requirements for a dam with this hazard classification. It also ensures that adequate resources are allocated for fulfillment of FERC dam safety requirements. The current Owners Dam Safety Program was revised and submitted to FERC on January 12, 2022.

NSPW developed a public safety plan in consultation with the FERC. The plan is reviewed on an annual basis to determine if changes are necessary. The plan was last updated in 2015.

11. Average Annual Generation

Average annual generation for the Project averaged approximately 4,927 Megawatt-hours (MWh) for the five-year period ending in 2022.

12. River Flow Characteristics

The river basin drainage area upstream of the Project powerhouse is approximately 301 square miles[18] as calculated at the United States Geological Survey (USGS) Gaging Station No. 04027500, located in the tailrace of the Project. The gage was used to develop flow duration curves for the White River. Based on the data for the period of May 1948 to December 2021, the average annual calendar year flow at the Project was 279 cfs; the maximum annual calendar year flow at the Project was 457 cfs in 2018; and the minimum annual calendar year flow was 156 cfs in 1948 (US Geological Survey, n.d.). Streamflow duration data show the percentage of time a given flow is equaled or exceeded. Monthly flow duration curves and the annual exceedance table are based on data collected for the period of record from May 1948 to December 2021 and are included in **Appendix A-3**.

NSPW is not proposing any material changes in Project operations.[19]

[17] Due to the short duration of the ice removal events, and their timing during high inflow periods (which matches the natural hydrologic cycle), the proposed planned deviations for ice removal purposes are not expected to have an adverse impact upon geology and soil resources, water resources, fish and aquatic resources, terrestrial resources, threatened and endangered resources recreation resources, aesthetic resources, cultural resources, socioeconomic resources, tribal resources, land use, or environmental justice. Therefore, the planned deviations for ice removal are not considered a material change to operations.
[18] The 2008 STID states a drainage area of 279 square miles. Since there is no source given for the 279 square mile figure, the 301-square mile figure provided by USGS is believed to be a more-accurate value and has been incorporated in this document.
[19] Due to the short duration of the planned deviations for ice removal events, and their timing during high inflow periods (which matches the natural hydrologic cycle) they are not considered a material change to operations.

13. Purpose of the Project

The purpose of the Project is to generate renewable hydroelectric energy. NSPW is a public utility that produces, purchases, transmits, and distributes power to retail customers.

14. Estimated Project Cost

The Project is an existing, FERC licensed facility. As of December 31, 2022, the net book value or net investment was calculated at ($169,768) and the gross book value was calculated at $2,232,503. These figures include the land and land rights, structures and improvements, waterway improvements, generating equipment, accessories, and miscellaneous equipment.

15. Estimated Costs of Proposed Environmental Measures

Based upon the environmental review of the Project NSPW has proposed several mitigation and enhancement measures. The measures proposed and their estimated costs are provided in **Table A-1**.

Table A-1 Estimated Costs of Proposed Environmental Measures

Proposed Measure	**Capital Cost**	**O & M Cost**
Conduct shoreline erosion surveys every 10 years.	$0	N/A[20]
Develop Rapid Response Invasive Species Monitoring Plan and conduct biennial surveys.	$35,000	$35,000 every other year
Woody Debris Passage	$0	$10,000
Develop a Compliance Monitoring Plan including deviation reporting and agency consultation requirements.	$30,000	$50,000
Develop Historic Properties Management Plan in consultation with SHPO, Bad River Tribe, and other interested Native American Nations to follow requirements outlined in the Programmatic Agreement.	$20,000	$3,000 per year and $25,000 every 10 years
Review and update or replace Part 8 Sign at Boat Landing and Canoe Portage Take-Out site.	$2.000	N/A[21]
Review and update or replace Part 8 sign at Canoe Portage Trail and Put-in site.	$2,000	N/A[22]
Conduct routine maintenance of NSPW's FERC-approved recreation sites.	$0	N/A[23]
Implement the cave Bat BITP/A for any routine vegetation maintenance at NSPW's FERC-Approved recreation sites	$0	$1,000
Implement the Wood Turtle BITP/A for routine maintenance work at NSPW's FERC-approved recreation sites, as long as the turtle remains a state threatened or endangered species.	$0	$1,000
Total Costs	**$89,000**	**N/A[24]**

[20] Cost for the shoreline erosion survey is listed with the cost for the HPMP survey every 10 years.
[21] O&M cost figures for 2022 already include the costs of routine recreation site maintenance (including replacement of signs).
[22] O&M cost figures for 2022 already include the costs of routine recreation site maintenance (including replacement of signs).
[23] O&M cost figures for 2022 already include the costs of routine recreation site maintenance (including replacement of signs).
[24] A total for the O&M Costs is not listed here because not all the costs are incurred annually.

16. License Application Development Costs

The cost for NSPW to relicense under the Traditional Licensing Process through the filing of the FLA is $387,000.

17. Estimated Value of On-Peak and Off-Peak Power

The Project operates in a run-of-river mode of operation; therefore, this section is not applicable.

18. Average Annual Increase or Decrease in Project Generation and Value of Power Due to Changes in Project Operations

NSPW is not proposing any material changes to the operation of the Project that would result in a decrease in Project generation or value of power produced by the Project.[25]

19. Remaining Undepreciated Net Investment, or Book Value, of the Project

The undepreciated net investment of the Project as of December 31, 2022 was $2,232,503 (book cost) and $2,402,272 (accumulated depreciation).

20. Annual Operation and Management Costs

The annual O&M expenses for the Project including administrative costs, insurance, taxes, depreciation, and general operations and maintenance costs are estimated to be $207,982 per year. A breakdown of the expenses is provided in **Tables A-2** and **A-3**.

Table A-2 Annual Operation and Management Costs

Item	Cost
General O & M Expenses (5-year average)	$207,982
Insurance	N/A[26]
2022 Property Taxes	$15,314
2022 Depreciation	$551,124
Average Annual O & M Cost	**$774,420**

[25] Due to the short duration of the planned deviations for ice removal events, and their timing during high inflow periods (which matches the natural hydrologic cycle) they are not considered a material change to operations. Since planned deviations for ice removal will typically occur during periods of high inflow when flows exceed the capacity of the generating units, they are not expected to result in a loss of generation.
[26] NSPW pays a lump sum for insurance costs per operating company (i.e., NSPW, NSPM), therefore there are no insurance costs specific to the White River Project.

Table A-3 Cost Breakdown of General O&M Expense Category[27] (2018 to 2022)

Cost	2018	2019	2020	2021	2022	2018-2022 Mean
Employee Expenses	$11,766	$11,794	$7,636	$14,401	$30,732	$15,266
Labor	$165,630	$144,741	$118,673	$143,027	$209,742	$156,363
Materials & Commodities	$23,762	$25,769	$9,158	$12,776	$27,016	$19,696
IT Costs	$36					
Miscellaneous	$29,849	$6,974	$1,626	$3,113	$8,980	$10,108
Outside Services	$11,538	$7,985	$3,046	$10,075	$67	$6,542
Total General O&M Costs	**$242,581**	**$197,262**	**$140,139**	**$183,393**	**$276,536**	**$207,982**

21. One-Line Diagram of Electrical Circuits

The One-line Diagram of Electrical Circuits is shown in **Appendix A-4**.

22. Lands of the United States

There are no federal lands located within the Project boundary.

23. Public Utilities Regulatory Policy Act

The Licensee reserves any future rights it may have under the Public Utility Regulatory Policies Act (PURPA) as it pertains to the Project.

24. Supporting Design Report

The supporting design report is considered Critical Energy Infrastructure Information and has been filed accordingly as a separate document with this application.

25. Applicant's Electricity Consumption Efficiency Improvement Programs

The Applicant is committed to energy conservation by using demand side management (DSM) measures as a means to meet customer energy needs. Cost-effective DSM resources, in the form of capacity and energy savings, are in essence "purchased" from the customer through incentives, subsidies, rate structures, or other means needed to meet system DSM goals and commitments. NSPW offers programs for the residential, commercial, and agricultural sectors. Specific options in these programs include, but are not limited to:

[27] Includes administrative costs.

Residential Programs

- Residential Rate Plans
    - Time of Day Service
    - Optional Off-Peak Service
    - Savers Switch Credit
- Residential Rewards {Focus on Energy (FOE)[28]}
    - Energy Saving Tips
    - Home rebates
        - Home Performance
        - Simple Energy Efficiency
        - New Homes
- Renewable Choices
    - Renewable Connect
    - Solar Connect Community
    - Net metering

Business Programs

- Equipment Rebates
- Energy Audits
- Renewable Programs
    - Renewable Connect
    - Solar
    - Working with Third Party Providers
- Energy Efficient Buildings
    - Multi-Family Building Efficiency (FOE)
    - Custom Efficiency
    - Efficient Facilities (FOE)
    - Energy Benchmarking
- Rate Programs
    - Electric Rate Savings
    - Savers Switch for Business

Farm Programs

- Farm Rewiring
- Agriculture and Farm Rebates

The Applicant's conservation programs have been approved by the Public Service Commission of Wisconsin.

[28] Funded through the Focus on Energy® program. Focus on Energy® is Wisconsin's energy efficiency and renewable resource program. It is funded by Wisconsin's investor-owned utilities and participating municipal and electric cooperative utilities, including NSPW's parent company, Xcel Energy.

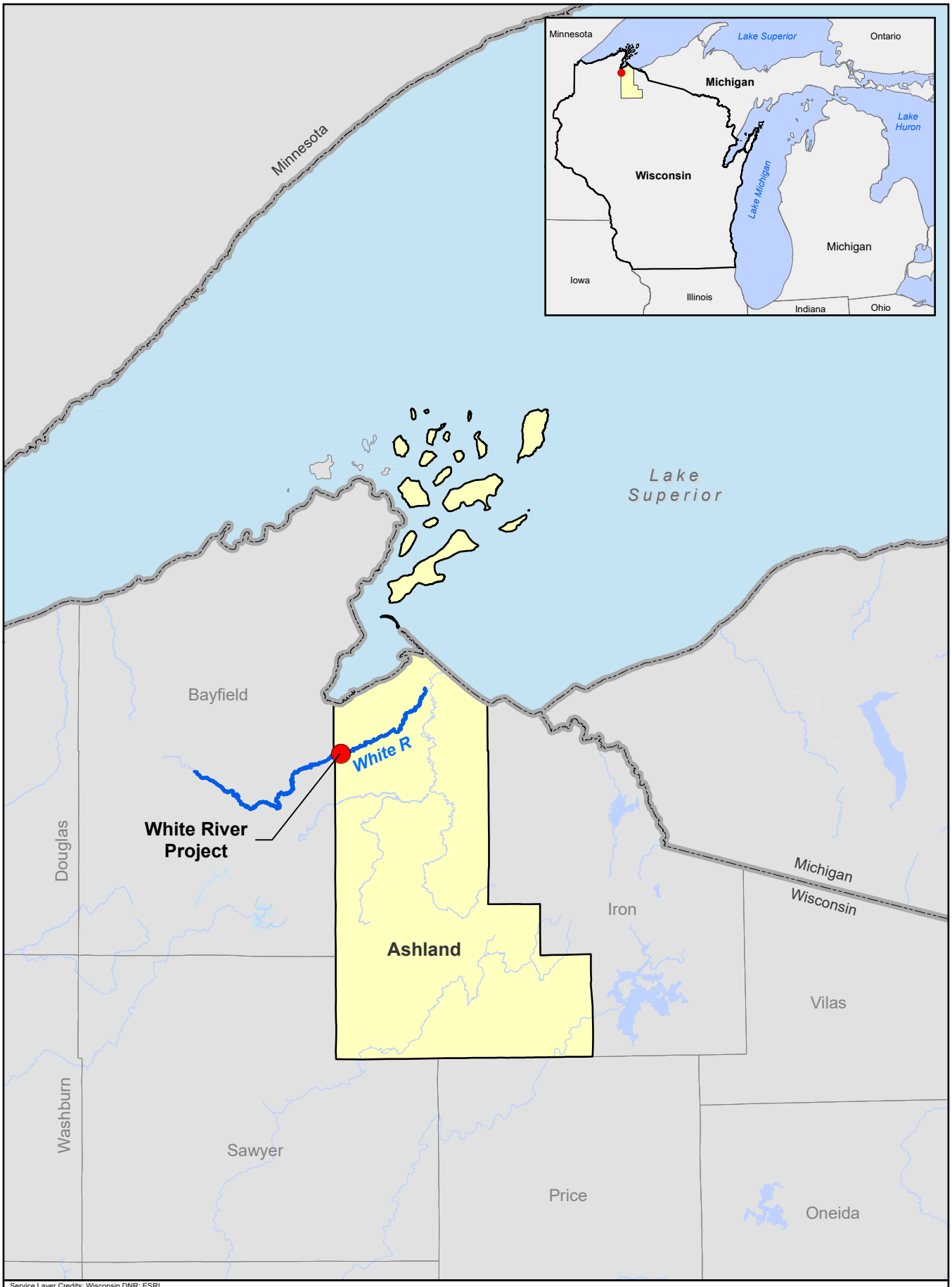
26. Works Cited

NSPW. (1991). *Exhibit A of the License Application for the White River Hydroelectric Project, FERC No. 2444.* 1991.

NSPW. (2008). *White River Hydroelectric Project, FERC No. 2444, Supporting Technical Information Document.* December, 2008.

US Geological Survey. (n.d.). *USGS 04027500 White River near Ashland, WI, Water System Information System Web Interface*. Retrieved November 1, 2022, from https://waterdata.usgs.gov/monitoring-location/04027500/#parameterCode=00065&period=P7D

APPENDIX A-1 Project Location



Service Layer Credits: Wisconsin DNR; ESRI

Xcel Energy®

Mead & Hunt

Dam Location
State Boundary
County Boundary
White River
Water Body
River/Creek

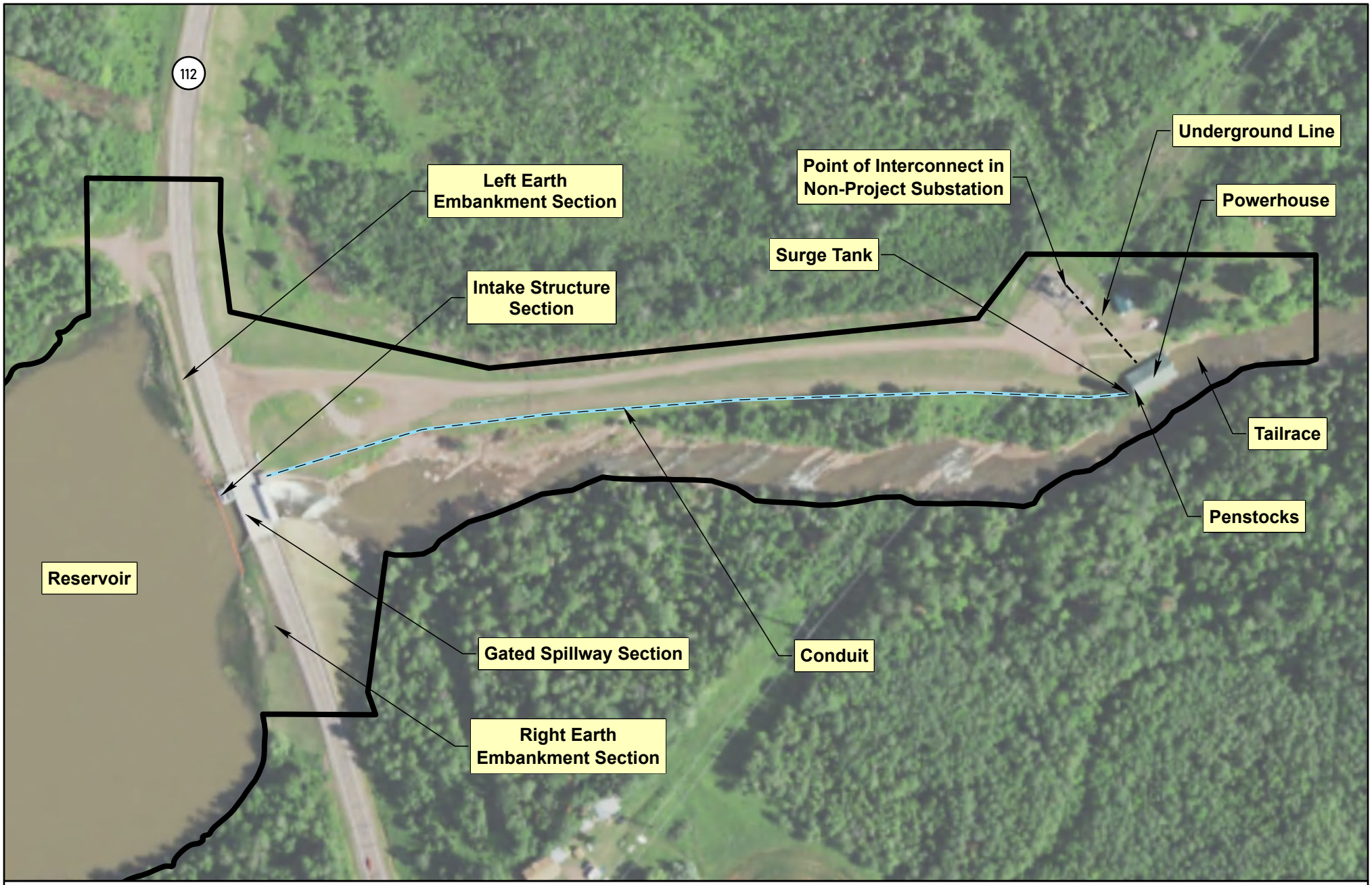
N

0 100 200
Miles

White River Project Location
Town of White River
Ashland County, Wisconsin
FERC No. 2444

X:\24001001\192923.01\TECH\White River\Project Maps\DLA\ArcMAP\WhiteRiver_StateLocation.mxd

APPENDIX A-2 Project Facilities



Xcel Energy®

Mead & Hunt

Proposed Project Boundary

Conduit

Underground Line

Note: the impounded Proposed Project Boundary is established at elevation 711.6 feet NGVD.

N

0 150 300

Feet

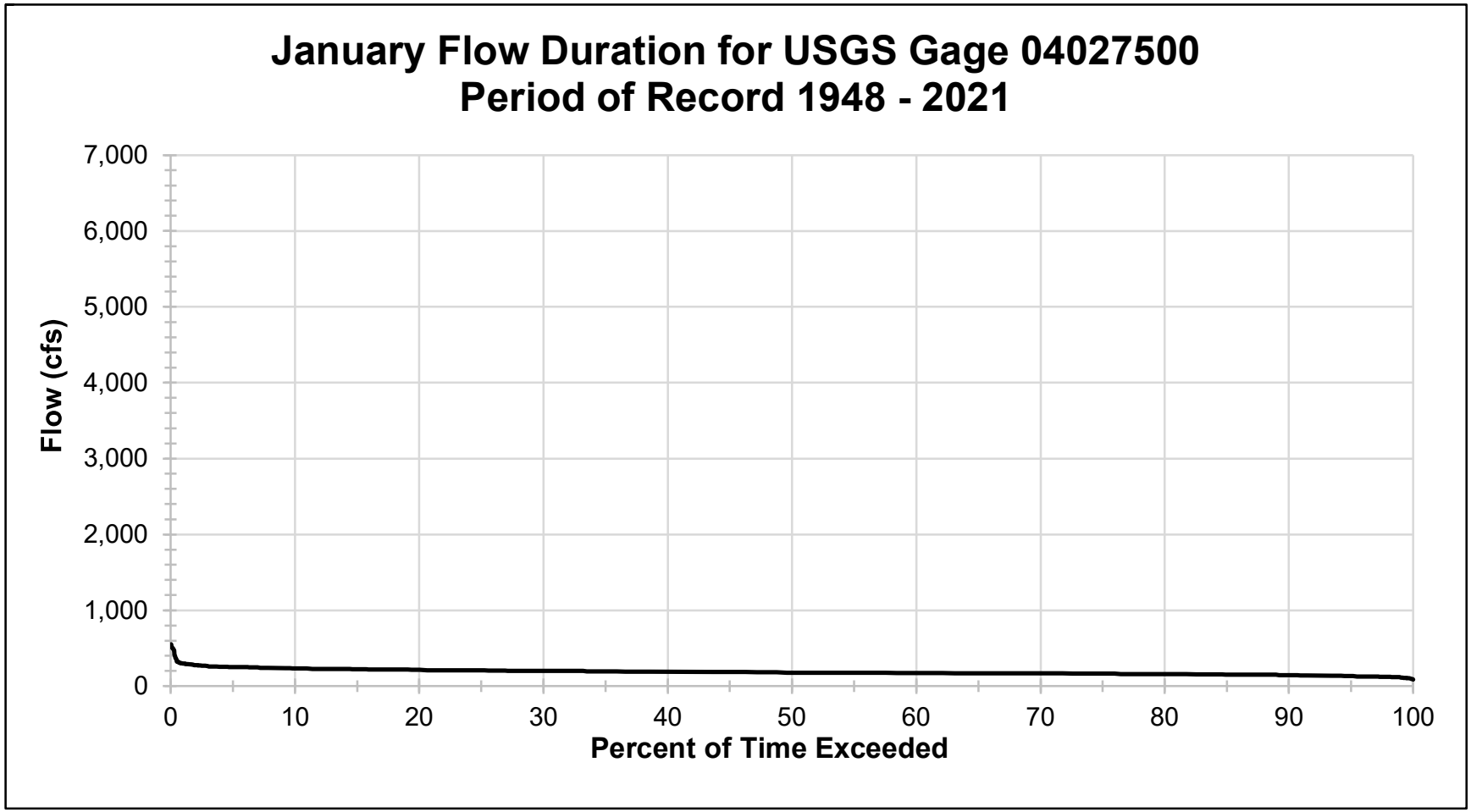
White River Hydroelectric Project
Project Facilities

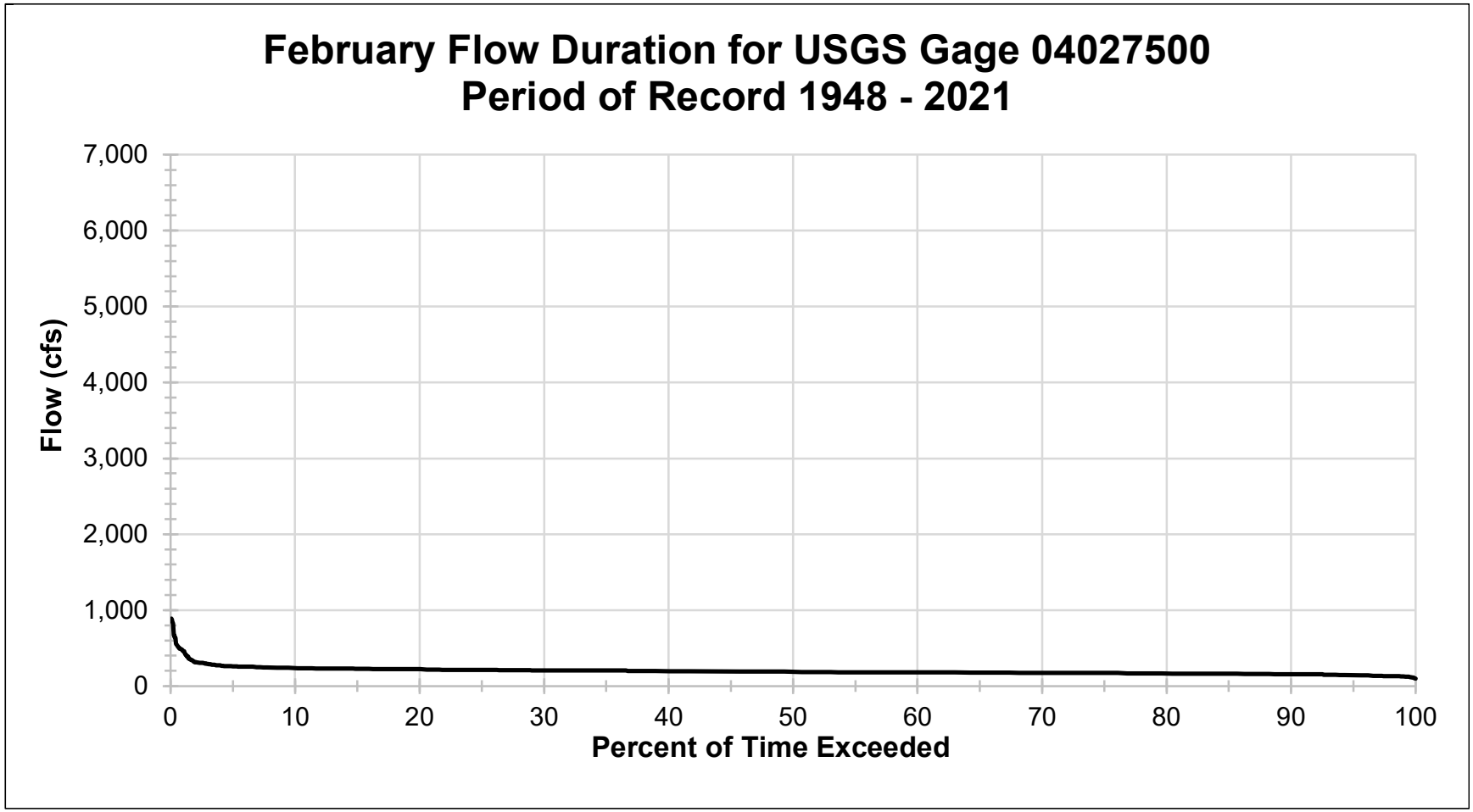
FERC No. 2444

Source Layer: WI 2022 NAIP (natural color, 0.6-meter resolution)

X:\240010019292 3.01\TECH\White River\Project Maps\DLA\PRO\WhiteRiver_DLA\WhiteRiver_DLA.aprx

APPENDIX A-3 Flow Duration Curves


January Flow Duration for USGS Gage 04027500
Period of Record 1948 - 2021
Flow (cfs)
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
0
10
20
30
40
50
60
70
80
90
100
Percent of Time Exceeded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Period of Record 1948 - 2021
Flow (cfs)
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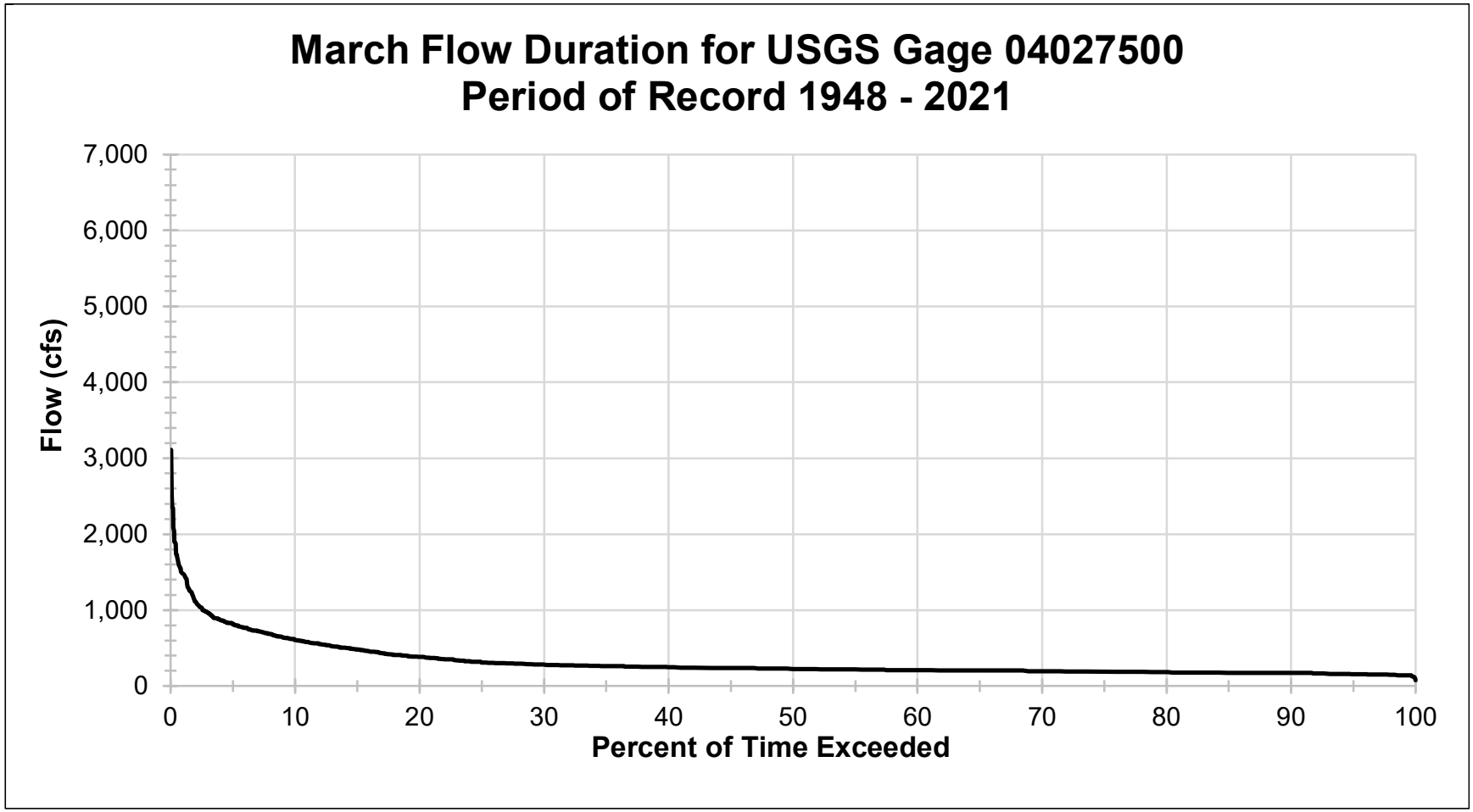
6,000
5,000
4,000
3,000
2,000
1,000
0
0
10
20
30
40
50
60
70
80
90
100
Percent of Time Exceeded


March Flow Duration for USGS Gage 04027500
Period of Record 1948 - 2021
Flow (cfs)
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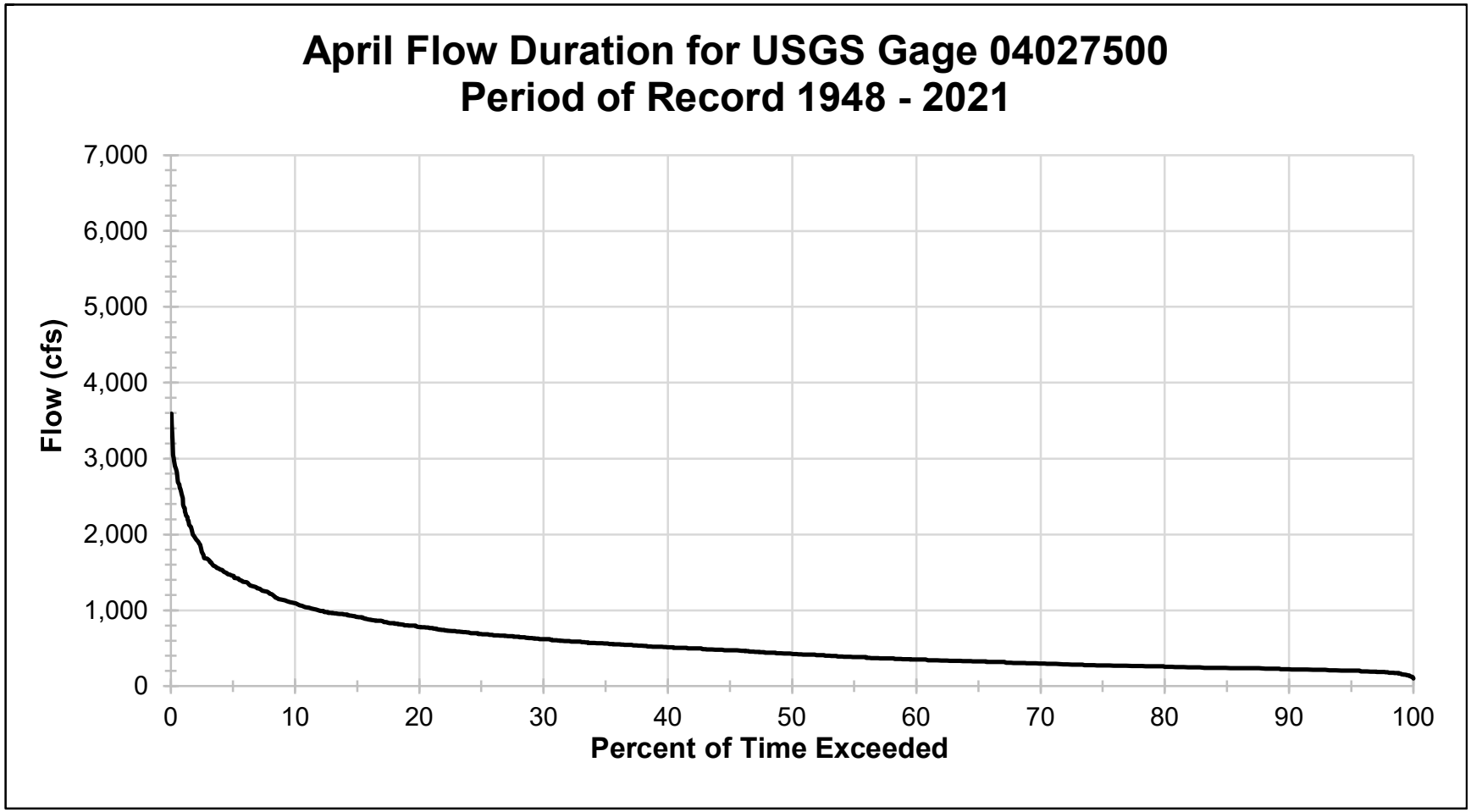
6,000
5,000
4,000
3,000
2,000
1,000
0
0
10
20
30
40
50
60
70
80
90
100
Percent of Time Exceeded


April Flow Duration for USGS Gage 04027500
Period of Record 1948 - 2021
Flow (cfs)
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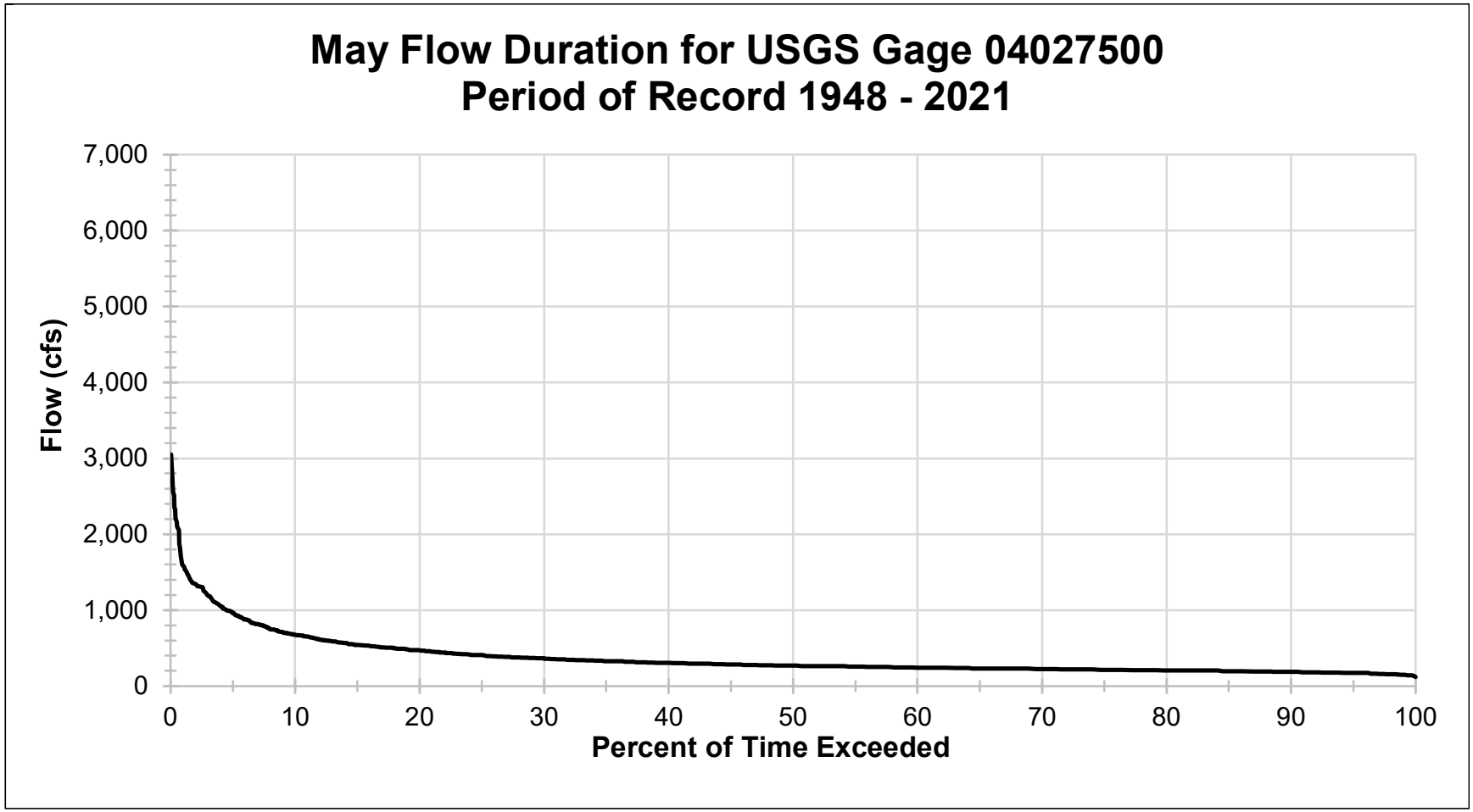
6,000
5,000
4,000
3,000
2,000
1,000
0
0
10
20
30
40
50
60
70
80
90
100
Percent of Time Exceeded


May Flow Duration for USGS Gage 04027500
Period of Record 1948 - 2021
Flow (cfs)
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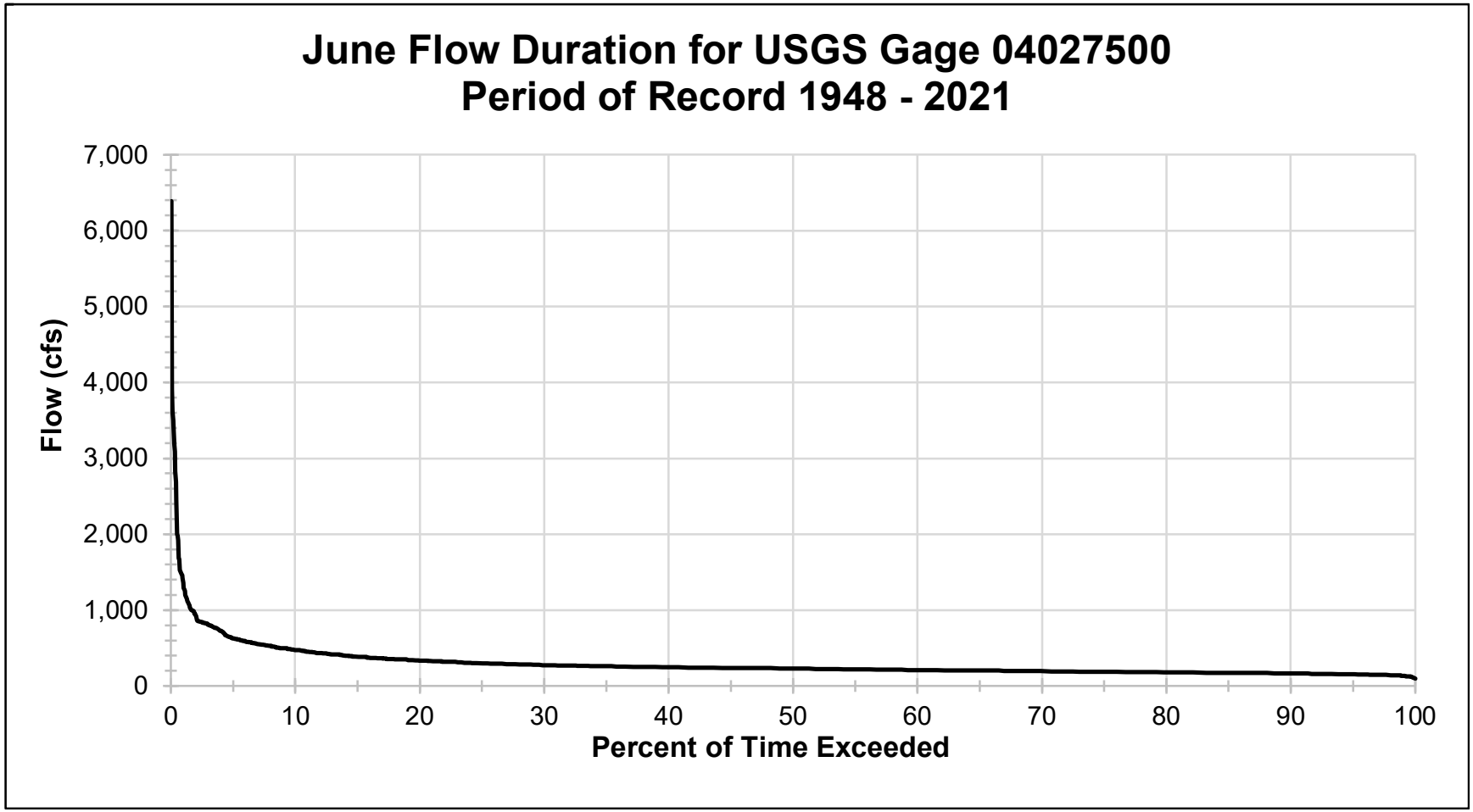
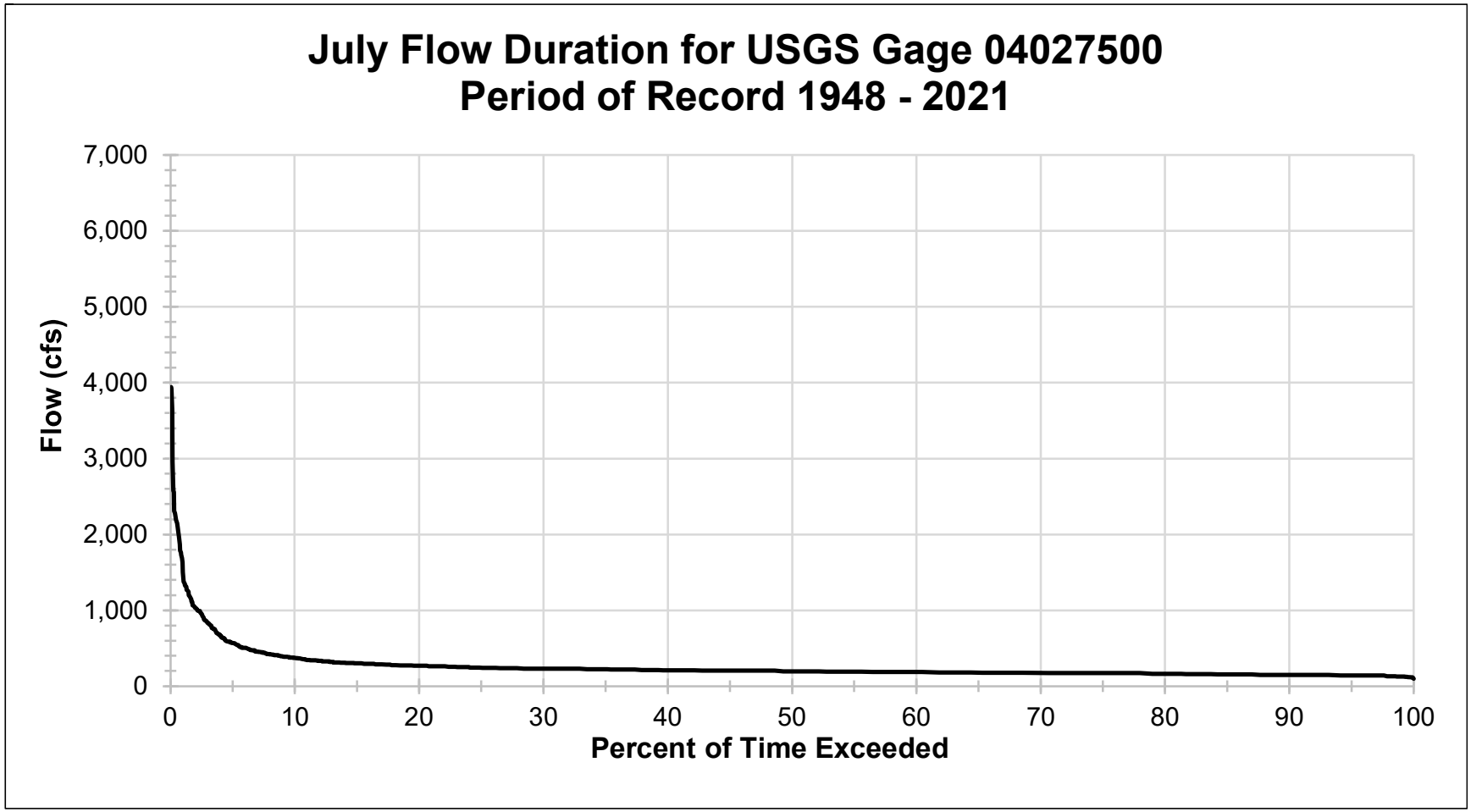
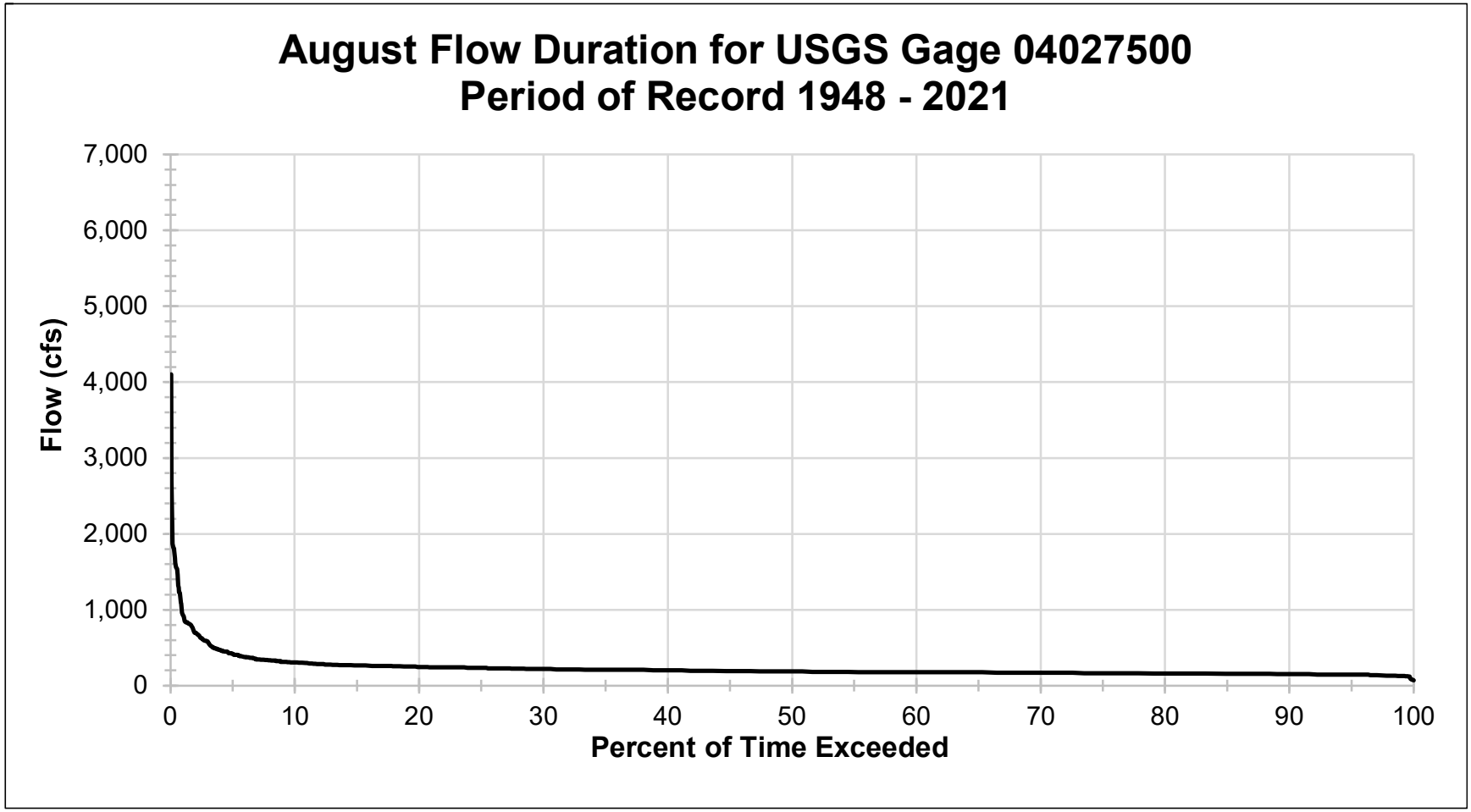
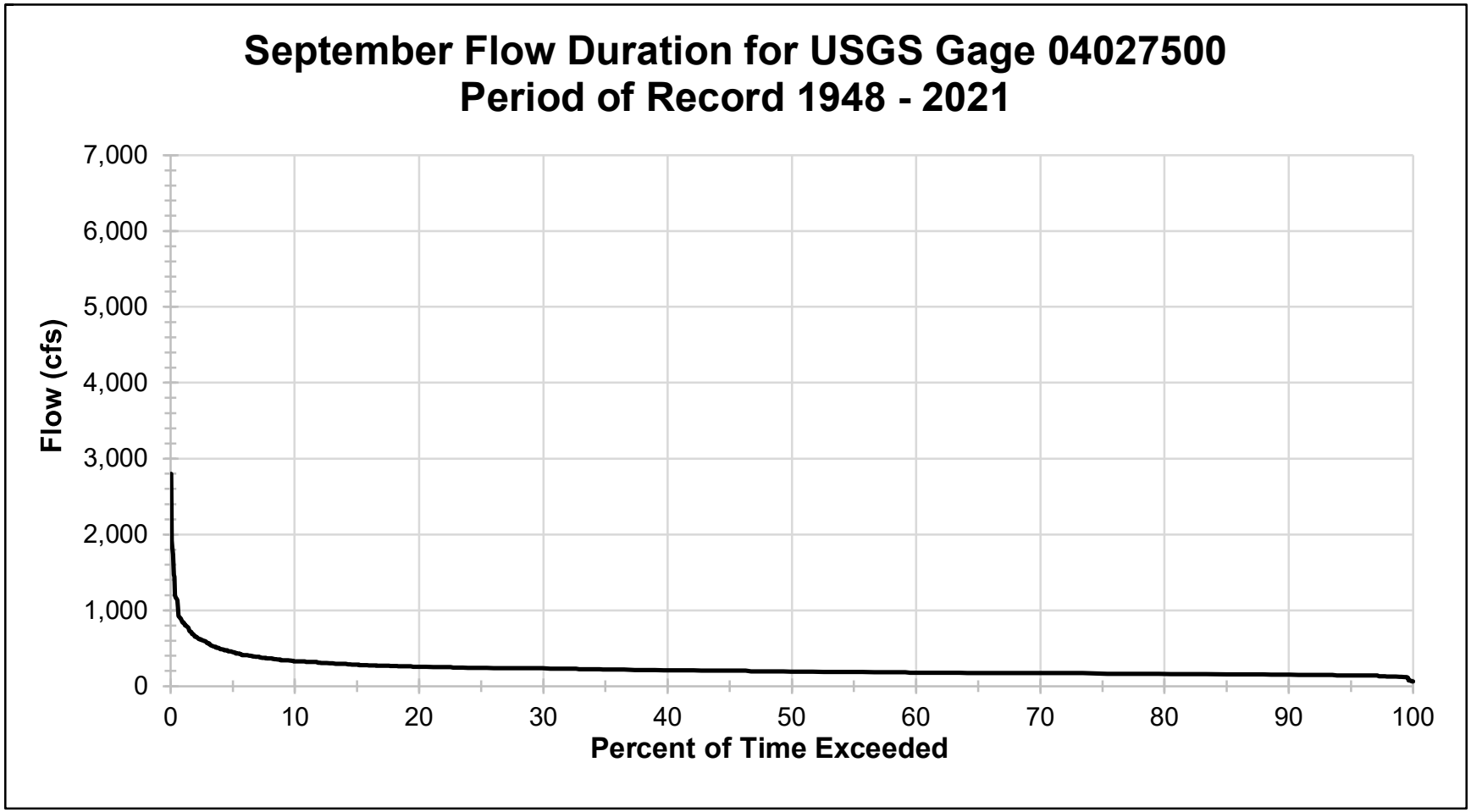
6,000
5,000
4,000
3,000
2,000
1,000
0
0
10
20
30
40
50
60
70
80
90
100
Percent of Time Exceeded


June Flow Duration for USGS Gage 04027500
Period of Record 1948 - 2021
Flow (cfs)
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
0
10
20
30
40
50
60
70
80
90
100
Percent of Time Exceeded


July Flow Duration for USGS Gage 04027500
Period of Record 1948 - 2021
Flow (cfs)
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
0
10
20
30
40
50
60
70
80
90
100
Percent of Time Exceeded


August Flow Duration for USGS Gage 04027500
Period of Record 1948 - 2021
Flow (cfs)
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
0
10
20
30
40
50
60
70
80
90
100
Percent of Time Exceeded


September Flow Duration for USGS Gage 04027500
Period of Record 1948 - 2021
Flow (cfs)
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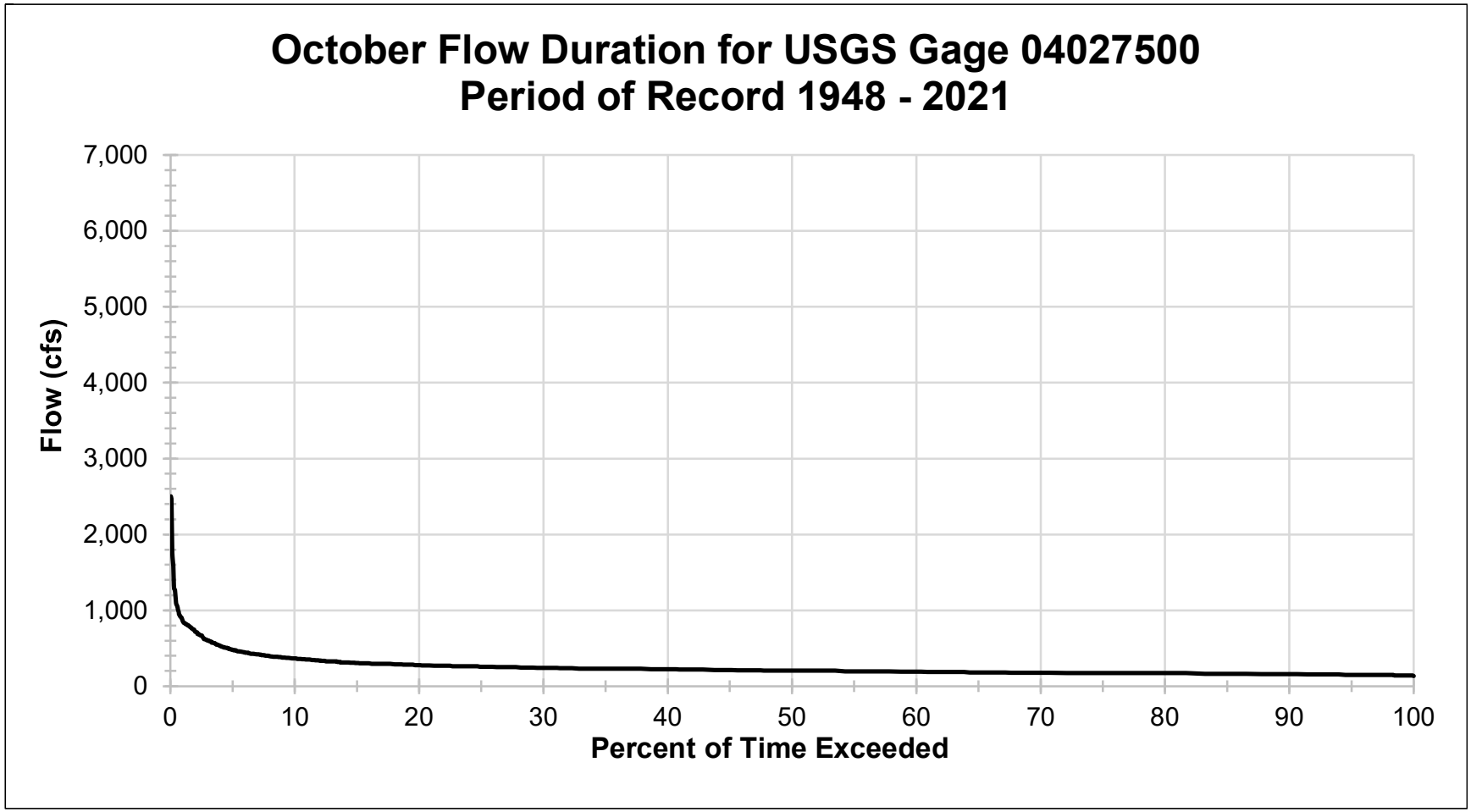
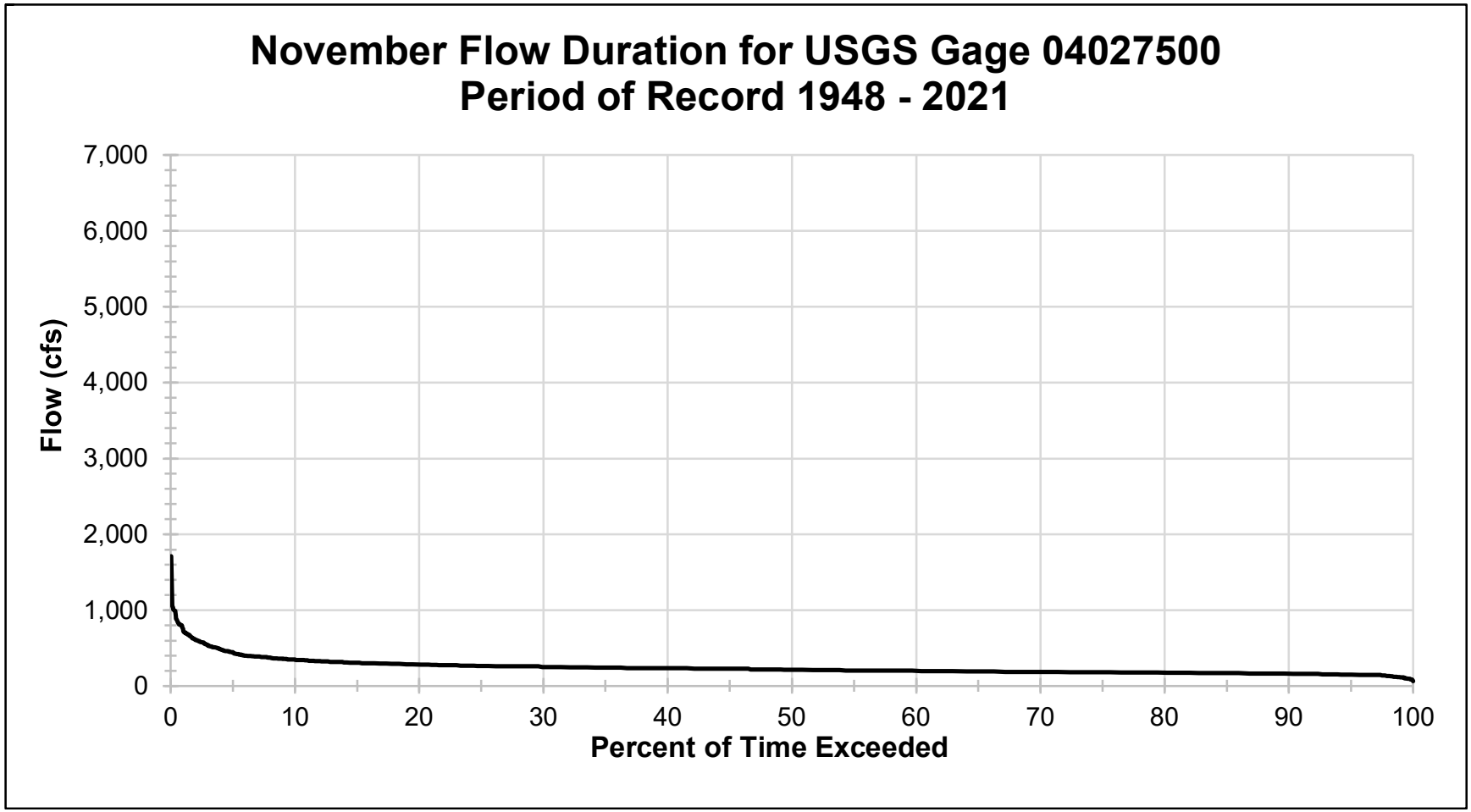
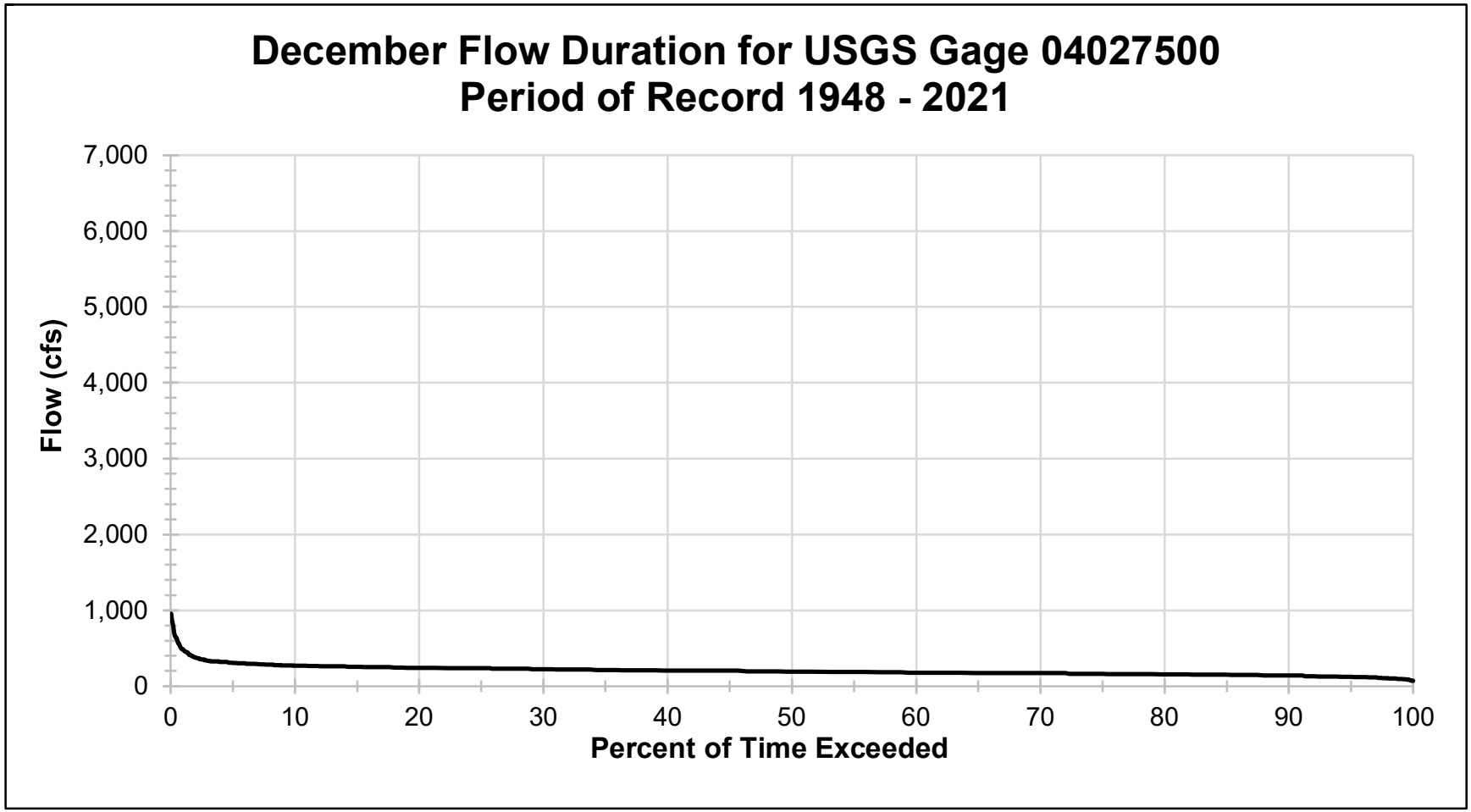
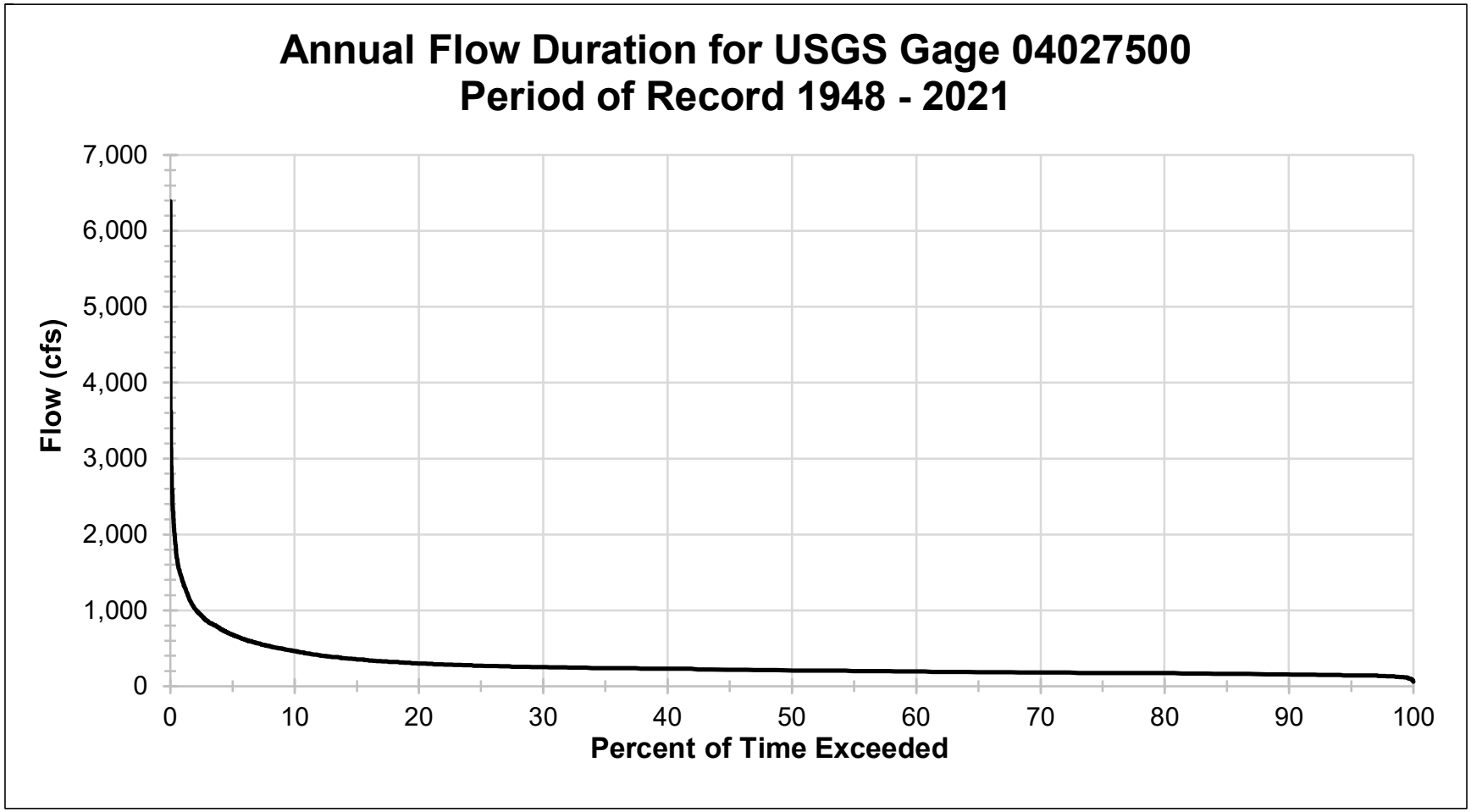
6,000
5,000
4,000
3,000
2,000
1,000
0
0
10
20
30
40
50
60
70
80
90
100
Percent of Time Exceeded


October Flow Duration for USGS Gage 04027500
Period of Record 1948 - 2021
Flow (cfs)
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
0
10
20
30
40
50
60
70
80
90
100
Percent of Time Exceeded


November Flow Duration for USGS Gage 04027500
Period of Record 1948 - 2021
Flow (cfs)
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
0
10
20
30
40
50
60
70
80
90
100
Percent of Time Exceeded


December Flow Duration for USGS Gage 04027500
Period of Record 1948 - 2021
Flow (cfs)
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
0
10
20
30
40
50
60
70
80
90
100
Percent of Time Exceeded


Annual Flow Duration for USGS Gage 04027500
Period of Record 1948 - 2021
Flow (cfs)
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
0
10
20
30
40
50
60
70
80
90
100
Percent of Time Exceeded

Flow Duration for USGS Gage 04027500 (Period of Record 1948 - 2021)

Percent of Time	January	February	March	April	May	June	July	August	September	October	November	December	Annual
95	132	140	157	203	173	154	142	144	142	152	150	122	145
90	146	150	170	222	187	164	149	152	150	160	162	138	156
85	152	160	175	240	198	173	156	157	157	164	169	149	163
80	160	162	182	257	207	180	164	161	162	169	176	157	170
75	164	169	190	274	216	187	170	164	167	173	182	163	175
70	170	170	197	298	224	194	176	169	170	177	187	170	180
65	170	175	202	325	234	202	181	173	175	183	192	175	187
60	175	180	210	350	244	211	186	176	180	191	199	180	194
55	180	180	218	384	256	220	191	181	186	198	206	187	200
50	180	185	225	427	268	228	198	186	193	204	215	193	210
45	188	190	235	472	284	238	204	193	202	214	225	200	219
40	190	194	248	513	305	247	212	202	212	224	234	207	229
35	195	200	261	562	330	260	223	210	221	231	243	214	239
30	200	202	281	619	363	276	232	218	231	243	253	224	252
25	209	210	312	688	405	299	245	233	242	257	265	234	271
20	214	218	383	781	468	335	269	248	256	278	286	243	301
15	225	225	481	913	543	386	303	266	282	307	305	255	355
10	235	236	608	1,100	675	475	373	307	330	365	345	270	463

APPENDIX A-4 One-Line Diagram of Electrical Circuits

SUBSTATION

NONPROJECT FACILITIES

WHITE RIVER HYDRO PLANT

HYDROELECTRIC PROJECT FACILITIES

12.5KV TO RURAL ASHLAND

WHR21
3-1 PH
AR

12.5KV TO RURAL MASON

WHR22
3-1 PH
AR

12.5KV TO RURAL SANBORN

WHR23
3-1 PH
AR

WHR20

3-100A
2165 KVA

A
C B
3

TR 2
2500
3
12.5-69

TR 1
1000
2.4
69

4R35
4R36
4R154
4R155

69KV TO GINGLES (GNG)

69KV TO FARMERS INN (FIN)

SPARE

STA AUX
120/240V

2.4KV
#1 TRANS.
LINE PT.
PANEL 1

2.4KV MAIN
BUS PT
PANEL 7

H09
PANEL 1B

W04
PANEL 6B

W03
PANEL 7B

2.4 KV MAIN BUS

GEN #1 & #2
EXCITER POWER
TRANSFORMER
FUSED DISC

2.4KV
120V

GEN #1 & #2
EXCITER POWER
TRANSFORMER

W01
PANEL 1B

PT
NOT
USED

FLYBALL PT
PANEL 3

METERING PT
PANEL 2B

H 700
#1 GEN

W02
PANEL 4B

FLYBALL PT
PANEL 5

METERING PT
PANEL 4B

H 500
#2 GEN

THIS PE SEAL IS ONLY APPLICABLE TO THE CURRENT CONSTRUCTION REVISION.

REVISIONS				
REV	XMIT DATE	DWN	CHK	APPR
1	6-15-17	KKP	SRS	
2	9-23-19	WJK	BSS	DMH

FOR DRAWING REFERENCE AND REVISION INFORMATION SEE PHYSICAL INDEX SHEET.

ISSUED BY ENGINEERING DEPT FOR: RECORD

WHITE RIVER SUBSTATION

WHR

OPERATIONS ONE-LINE DIAGRAM

69KV-12.5KV

Xcel Energy®

NE-162044

SCALE: NONE

REV: 2

REV	DATE	WBS 4	REVISION DESCRIPTION
2A	08/20/2019	D.0005055.016.001.201	WHR - UPDATE OPERATIONS ONE-LINE FOR RECORD

8/20/2019 10:33:56 AM

White River Hydroelectric Project
FERC Project No. 2444

Exhibit E
Environmental Report

Final License Application

Prepared for

Northern States Power Company
A Wisconsin Corporation

Eau Claire, WI

Prepared by

Mead & Hunt

meadhunt.com

July 2023

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

APPENDICES[1]

[1] All Appendices for Exhibit E are in Volume 3 of 4, Appendices.

LIST OF ABBREVIATIONS AND TERMS

§ ..... Section
°F ..... degrees Fahrenheit
°C ..... degrees Celsius
µS/cm ..... micro-Siemens per centimeter
ADA ..... Americans with Disabilities Act
Applicant ..... Northern States Power Company, a Wisconsin Corporation
APE ..... Area of Potential Effect
ATIS ..... Aquatic and Terrestrial Invasive Species
Bad River Tribe ..... Bad River Band of Lake Superior Tribe of Chippewa Indians
Barrier free ..... ADA accessible
BITP/A ..... Broad Incidental Take Permit and Broad Incidental Take Authorization
CFR ..... Code of Federal Regulations
cfs ..... cubic feet per second
cm ..... centimeter
CNNF ..... Chequamegon-Nicolet National Forest
Commission ..... Federal Energy Regulatory Commission
CPUE ..... catch per unit effort
CWA ..... Clean Water Act
CZMA ..... Coastal Zone Management Act
Dam ..... White River Dam
DC ..... Direct Current
DLA ..... Draft License Application
DO ..... Dissolved oxygen
E.coli ..... Escherichia coli
Eagle Act ..... Bald and Golden Eagle Protection Act
EFH ..... Essential Fish Habitat
EJ ..... Environmental Justice
ESA ..... Endangered Species Act
FERC ..... Federal Energy Regulatory Commission
FLA ..... Final License Application
fps ..... feet per second
GPS ..... global positioning system.
IPaC ..... Information for Planning and Consultation
JAM ..... Joint Agency Meeting
kV ..... Kilovolt
kVA ..... Kilovolt ampere
kW ..... Kilowatts
Licensee ..... Northern States Power Company, a Wisconsin Corporation
m ..... meter
MDC ..... maximum dept of colonization
mg/L ..... milligrams per liter
MIBI ..... Macroinvertebrate Index of Biological Integrity
µg/L ..... micrograms per liter
mL ..... milliliter
MIBI ..... Macroinvertebrate Index of Biological Integrity
MOE-corrected ..... Margin of error-corrected

MPN ..... Most Probable Number
n.d. ..... no date
NGVD ..... National Geodetic Vertical Datum 1929
NHI ..... Natural Heritage Inventory
NLEB ..... northern long-eared bat
NOI ..... Notice of Intent
NPS ..... National Park Service
NOAA ..... National Oceanic and Atmospheric Administration
NR 40 ..... Chapter NR 40 of the Wisconsin Administrative Code
NR 102 ..... Chapter NR 102 of the Wisconsin Administrative Code
NRCS ..... Natural Resource Conservation Service
NRHP ..... National Register of Historic Places
NSPW ..... Northern States Power Company, a Wisconsin corporation
NTU ..... Nephelometric Turbidity Units
OHWM ..... ordinary high-water mark
Ojibwe ..... Chippewa
PAD ..... Pre-Application Document
Project ..... White River Hydroelectric Project
Register ..... National Register of Historic Places
RUSLE2 ..... Revised Universal Soil Loss Equation Version 2
SCORP ..... Statewide Outdoor Comprehensive Recreation Plan
SHPO ..... State Historic Preservation Officer
TCP ..... Traditional Cultural Property
TLP ..... Traditional Licensing Process
TSS ..... total suspended solids
USC ..... United States Code
USDA ..... United States Department of Agriculture
USFWS ..... United States Fish and Wildlife Service
USGS ..... United States Geologic Survey
WCMP ..... Wisconsin Coastal Management Program
WDNR ..... Wisconsin Department of Natural Resources
White River Project ..... White River Hydroelectric Project
WHPD ..... Wisconsin Historic Preservation Database
WisCALM ..... Wisconsin Consolidated Assessment and Listing Methodology
WQC ..... Water Quality Certification

1. Introduction

Northern States Power Company – Wisconsin (Applicant, Licensee, or NSPW), is applying to the Federal Energy Regulatory Commission (FERC or Commission) for a subsequent license to operate the White River Hydroelectric Project (FERC Project No. 2444) (White River Project or Project).

The purpose of this Exhibit E is to provide a description of the environmental setting in the vicinity of the Project. This Exhibit E was prepared to conform to the Commission's regulations under 18 Code of Federal Regulations (CFR) § 4.38 and § 4.61, as required under the Traditional Licensing Process (TLP). NSPW's request to use the TLP was approved by the FERC via letter dated September 16. 2020.

2. White River Proposed Action and Alternatives

In accordance with the National Environmental Policy Act (NEPA) review process, the environmental analysis must consider, at a minimum, the three alternatives described in the sections below: (1) the no-action alternative, (2) NSPW's proposed action, and (3) alternatives to the proposed action. Detailed Project descriptions are provided in Exhibit A of this Final License Application (FLA).

2.1 White River Project No Action Alternative

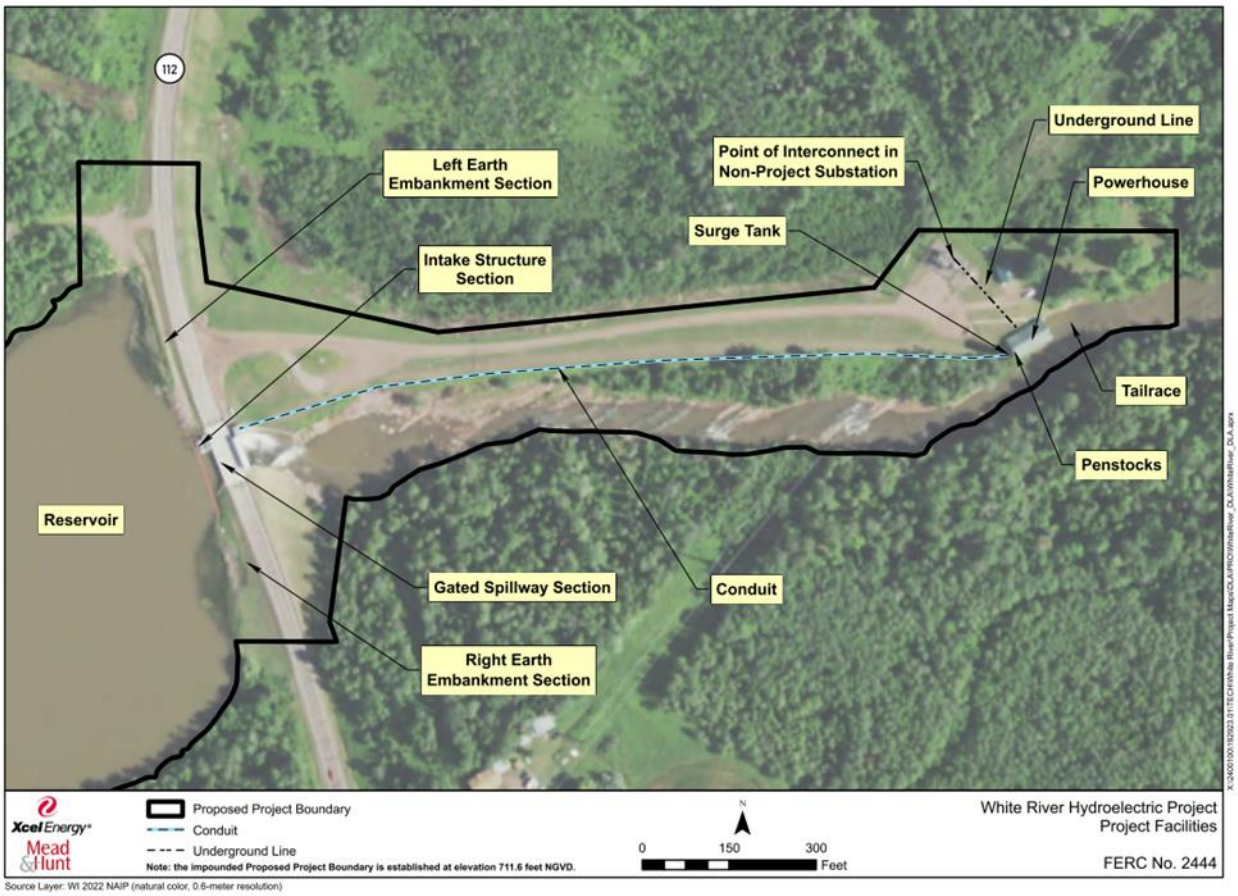
Under the no-action alternative (denial of the application), the White River Project would continue to operate under the existing license and no new environmental protection, mitigation, or enhancement measures would be implemented. This alternative is also defined as the current operation relative to the other alternatives.

2.1.1 Project Facilities

The Project works consist of (1) a 46-foot high and 775-foot-long earthen and concrete dam that includes a left earth embankment, an intake structure, a gated spillway section and a right earth embankment; (2) a reservoir with a maximum surface area of 45.1 acres[2] and a maximum gross storage capacity of approximately 315.7 acre-feet at an elevation of 712.13 feet National Geodetic Vertical Datum 1929 (NGVD); (3) a 1,346-foot long conveyance system from the intake to the powerhouse consisting of a 7-foot diameter conduit, a 16-foot diameter surge tank, and two 5.5-foot diameter penstocks; (4) a concrete powerhouse that houses two generating units with a total authorized installed capacity of 1,200 kilowatts (kW); (5) a 2.4 kilovolt (kV), 220-foot long underground transmission line from the powerhouse to the non-project substation containing a 1,000 kilovolt-Amperes (kVA), 69/2.4 kV 3-phase step-up transformer; and (6) appurtenant facilities. Project facilities are shown in Figure 2.1-1. A more thorough description of the Project's facilities is included in Exhibit A of this Final License Application (FLA).

[2] Reservoir acreage derived by digitizing existing Exhibit G map and calculating the reservoir area using GIS. Water Storage capacity was calculated by multiplying the GIS-derived reservoir surface area by the average reservoir depth of 7 feet.

Figure 2.1-1 White River Project Facilities



2.1.2 White River Project Dam Safety

Dam safety has been considered during the development of the proposed and alternative actions described in this application to ensure the Project continues to meet the Commission's dam safety guidelines. There are no proposed modifications to the dam structures that could impact their integrity as part of this application.

The purpose of the Project is to generate hydroelectric power. The Project is operated as a run-of-river facility where discharge measured immediately downstream of the Project tailrace approximates the sum of inflows into the Project reservoir. In order to minimize reservoir fluctuations, NSPW operates the reservoir between elevations 710.4 and 711.6 feet National Geodetic Vertical Datum 1929 (NGVD). A minimum flow of 16 cubic feet per second (cfs), or inflow, whichever is less, is released into the approximately 1/4 mile-long bypass reach at all times to protect aquatic resources.

2.1.3 Geologic and Soil Resources

NSPW currently implements best management practices (BMPs) for erosion control during ground disturbing activities associated with in-kind maintenance activities at the Project. BMPs include temporary measures such as silt fencing, installation of straw wattles, seeding, and mulching. Permanent BMPs include establishment of vegetation and shoreline stabilization with rock riprap.

2.1.4 Aquatic Resources

NSPW currently operates the Project in the following manner for the projection and enhancement of aquatic resources.

- The Project is operated as a run-of-river facility where discharge measured immediately downstream of the Project tailrace approximates the sum of inflows into the Project reservoir.
- Reservoir fluctuations are minimized by operating the reservoir between elevations 710.4 and 711.6 feet National Geodetic Vertical Datum 1929 (NGVD).
- A minimum flow of 16 cubic feet per second (cfs) or inflow, whichever is less, is released into the approximately 1/4 mile-long bypass reach at all times to protect aquatic resources.

2.1.5 Terrestrial Resources

NSPW does not currently implement any specific measures for terrestrial resources.

2.1.6 Threatened and Endangered Species

NSPW currently implements the USFWS northern long-eared bat (NLEB) guidance. The Wisconsin's Broad Incidental Take Permit/Authorization (BITP/A) for Cave Bats will be followed for all tree removal activities greater than 3 inches in diameter.

2.1.7 Recreation and Land Use

NSPW currently maintains three recreation sites at the Project. These sites include the Boat Landing and Canoe Portage Take-out, Canoe Portage Trail and Put-in, and Tailrace Fishing Area.

2.1.8 Cultural Resources

To ensure the operation of the Project does not have an adverse impact on cultural resources, NSPW inspects the shoreline every 10 years for areas of erosion where artifacts may be exposed.

2.2 White River Project as Proposed

The proposed FERC Project boundary is depicted in the Exhibit G Drawings of this application. No federal lands are located within the Project boundary.

2.2.1 White River Project Proposed Project Facilities

NSPW is not proposing any changes to the existing Project facilities.

2.2.2 White River Project Proposed Project Operation

Under the proposed alternative, the Project would operate according to the operating conditions and environmental protection, mitigation, and enhancement measures described in the following sections. This alternative is defined as the proposed operation relative to the other alternatives.

2.2.2.1 Proposed Operations

Under the Proposed Operation Alternative, NSPW will:

- Continue to operate the Project as a run-of-river facility, for the purpose of generating hydroelectric power, where the discharge measured immediately downstream of the Project tailrace approximates the sum of inflows into the Project reservoir.

- In order to minimize reservoir fluctuations, NSPW will continue to operate the reservoir between elevations 710.4 and 711.6 feet NGVD.
- Continue to release a minimum flow of 16 cfs or inflow, whichever is less, into the bypass reach at all times to protect aquatic resources.
- Just prior to spring runoff, and for emergency purposes, NSPW may deviate from the maximum reservoir elevation by not more than 0.5 feet to remove ice from the spillway for dam safety purposes. The duration of the deviation shall be no longer than necessary, typically less than a few days, and will be conducted as a planned deviation under the requirements outlined in Section 5.8.

2.2.2.2 Proposed Environmental Measures

In addition to the operating parameters proposed in Section 2.2.2.1 above, the following environmental measures are being proposed by NSPW to mitigate for potential adverse impacts that could result from the Project's proposed operation:

- Conduct shoreline erosion surveys every 10 years.
- Develop an Aquatic and Terrestrial Invasive Species Plan and conduct biennial invasive species surveys.
- Pass woody debris collected at the dam and intake downstream into the bypass reach to enhance aquatic habitat.
- Develop an Operations Management Plan including deviation reporting and agency consultation requirements.
- Develop a HPMP in consultation with the Wisconsin SHPO, the Bad River Tribe, and other interested Native American Nations. The HPMP will follow the requirements outlined in the Programmatic Agreement and include a requirement for shoreline surveys every 10 years.

NSPW is also proposing the following environmental measures regarding the ongoing maintenance of recreation resources:[3]

- Review and update or replace the Part 8 sign at the Boat Landing and Canoe Portage Take-out site.
- Review and update or replace the Part 8 sign at the Canoe Portage Trail and Put-In site.
- Conduct routine maintenance of NSPW's FERC-approved recreation sites, including signage, over the term of the subsequent license.
- Implement the Cave Bat BITP/A for any routine vegetation maintenance activities at NSPW's FERC-approved recreation sites.
- Implement the Wood Turtle BITP/A for maintenance work at NSPW's FERC-approved recreation sites, as long as the turtle remains a state-listed species.

2.2.2.2.1 Proposed Environmental Measures for Yet to be Fully Defined In-Kind Maintenance Work that may Occur During the Term of the Subsequent License

In addition to the operational parameters proposed in Section 2.2.2.1 and Section 2.2.2.2, the following environmental measures are being proposed to avoid any potential adverse impacts during any yet to be fully defined in-kind maintenance activities that could occur during the subsequent license:

- Implement the Cave Bat BITP/A.

[3] Ongoing maintenance of recreation resources is not considered ground-disturbing activity under the Programmatic Agreement. Therefore, there are no restrictions regarding cultural resources during ongoing maintenance or recreation resources.

- Implement the Wood Turtle BITP/A, as long as wood turtles remain a state threatened or endangered species.
- Review the Wisconsin Natural Heritage Inventory (NHI) to determine the location of bald eagle nests and provide a 660-foot buffer between any vegetation management or construction activities and identified nests during the nesting season.

These activities are further described in Section 12.0.

2.2.3 White River Proposed Project Boundary

The proposed Project boundary is included in Exhibit G of this application and encompasses all lands and water necessary for Project purposes consistent with FERC regulations and governing precedent. There are no federal lands within the current or proposed boundary.

2.3 White River Project Alternatives to the Proposed Project

As part of their NEPA analysis, the Commission will consider reasonable alternatives for operational or facility modifications, as well as protection, mitigation, and enhancement measures identified by the Commission, resource agencies, Native American Nations, non-governmental organizations, and the public.

3. Pre-Filing Consultation Process

The FERC issued NSPW a subsequent license for the White River Project on August 29, 1995, with an effective date of August 1, 1995. The current license expires on July 31, 2025. On July 29, 2020, NSPW filed with the Commission a Notice of Intent (NOI) to relicense the Project, a Pre-Application Document (PAD) containing information for the Project, and a request to use the TLP. After due consideration and the opportunity for public comment, the FERC granted the NSPW's request to use the TLP on September 16, 2020 (FERC, 2020). Each stage of the consultation process is further discussed in the following sections.

3.1 First-Stage Consultation

NSPW distributed the NOI, PAD, and TLP request to the various stakeholders concurrent with the July 29, 2020 FERC filing. NSPW also published a public notice of said documents on July 29, 2020, in the Ashland Daily Press, a bi-weekly newspaper of general circulation in Ashland County where the Project is located. Hard copies of the NOI, PAD, and TLP request are available for viewing at the Vaughn Public Library in Ashland, Wisconsin. Comments regarding the request to use the TLP were due to the FERC within 30 days of the PAD filing, i.e., on or before August 28, 2020. The FERC approved NSPW's request via their September 16, 2020 letter.

In accordance with the schedule set by the FERC, NSPW held a virtual Joint Agency Meeting (JAM) on October 29, 2020, due to the COVID-19 Centers for Disease Control and corporate guidelines restricting public gatherings and discretionary travel at the time. The FERC was notified of the meeting on October 7, 2020, and a public notice of the JAM was published in the Ashland Daily Press on October 16, 2020. A total of 18 individuals attended the JAM including representatives from the resource agencies, members of the public, NSPW and their relicensing consultant. A site visit to the Project was held on June 17, 2021. The FERC was notified of the site visit via NSPW's May 27, 2021, letter and a public notice regarding the visit was published on June 1, 2021, in the Ashland Daily Press.

Comments and study requests were received from the following entities after the JAM: The Bad River Band of Lake Superior Tribe of Chippewa Indians (Bad River Tribe), National Park Service (NPS), Wisconsin State Historic Preservation Office (SHPO), and Wisconsin Department of Natural Resources (WDNR). Comments and study requests are discussed within each respective resource section and are summarized in *Volume 4, Documentation of Consultation.*

3.2 Second-Stage Consultation

3.2.1 Study Plans

Based upon the study requests submitted during the first stage of consultation, NSPW developed plans to perform the following:

- Aquatic and Terrestrial Invasive Species (ATIS) Study
- Fisheries Study and Riverine Aquatic Habitat Assessment
- Mussel Study
- Recreation Use Study
- Water Quality Study
- Wood Turtle Nesting Habitat Study

On August 2, 2021, NSPW provided a draft study summary for comment to those agencies/entities who requested studies. The WDNR was the only agency/entity that provided comments. Their comments were provided on August 18, 2021. A final study summary, including copies of the final study plans that addressed stakeholder comments, was submitted to FERC on April 21, 2022. Stakeholder comments regarding the draft study plans, and NSPW's responses, are included in the final study plans and in *Volume 4 Documentation of Consultation*.

3.2.1.1 Aquatic and Terrestrial Invasive Species Study Plan

The ATIS Study Plan was distributed to the Bad River Tribe and WDNR for comment on January 13, 2022. The Bad River Tribe did not provide comments. The WDNR responded with comments on January 26 and February 1, 2022, which were subsequently incorporated into the final study plan.

3.2.1.2 Fisheries Study and Riverine Aquatic Habitat Assessment Study Plan

The Fisheries Study and Riverine Aquatic Habitat Assessment Study Plan was submitted to the WDNR on February 3, 2022 for comment. The WDNR did not respond with comments.

3.2.1.3 Mussel Study

The Mussel Study Plan was submitted to the WDNR on February 2, 2022 for comment. The WDNR responded on February 16, 2022 indicating it did not have comments.

3.2.1.4 Phase I Archaeological Survey of Project Shorelines

NSPW conducted a Phase I Archaeological Survey of the Project shoreline. Since the procedures for conducting the survey are set forth in the existing Programmatic Agreement, no formal study plan was necessary for consultation. The survey report was sent to the SHPO for comment as discussed further in Section 7.2.

3.2.1.5 Recreation Use Study

The Recreation Study Plan was submitted to the WDNR on January 7, 2022 for comment. The WDNR did not respond with comments. A subsequent telephone conversation with Cheryl Laatsch (WDNR) confirmed that no comments would be provided.

3.2.1.6 Water Quality Study Plan

The Water Quality Study Plan was submitted to the WDNR on February 3, 2022 for comment. The WDNR did not respond with comments.

3.2.1.7 Wood Turtle Nesting Habitat Study

The Wood Turtle Nesting Habitat Study Plan was submitted to the WDNR on February 3, 2022 for comment. The WDNR did not provide comments.

3.2.2 Study Reports

The studies were performed in 2022 in accordance with the final study plans. Draft study reports were provided to the Bad River Tribe and WDNR for comment on December 6, 2022. No comments on any of the study reports were received. The study reports and corresponding consultation can be found in *Volume 4, Documentation of Consultation.*

Results from each of the studies conducted in 2022 were presented in the Draft License Application (DLA). No specific comments regarding the study results were received.

3.2.3 Draft License Application

The DLA was submitted for review and comment to the consulting parties included in the distribution list attached to the corresponding cover letter submitted to FERC on March 6, 2023. Written comments regarding the DLA were received from the Bad River Tribe on June 2, 2023. No other stakeholder comments were received. The comments received on the DLA, and NSPW's responses, are included in *Volume 4, Documentation of Consultation* of the FLA.

3.2.4 Third-Stage Consultation

The FLA addresses the comments received on the DLA. A letter with a website link to the electronic version of the FLA has been sent via certified mail, concurrent with the filing of the FLA, to the consulting parties included in the aforementioned distribution list. All landowners with property located inside or immediately adjacent to the proposed Project boundary have been included on the distribution list as included in *Volume 4, Documentation of Consultation* of the FLA. The FLA has also been posted on the relicensing website at: http://hydrorelicensing.com/whiteriver/. An electronic version of the FLA's public documents is also available for public inspection at the Ashland Public Library in Ashland, Wisconsin.

3.3 Consistency with Statutory and Regulatory Requirements

3.3.1 Section 401 of the Clean Water Act

Under Section 401 of the Clean Water Act (CWA) (33 United States Code (USC) § 1341), any federal license or permit to conduct any activity that may result in discharge into navigable waters requires a certification from the state in which the discharge originates that it will comply with the applicable provisions of the CWA, unless the certification is waived. Therefore, a Section 401 Water Quality Certification (WQC) or waiver is required prior to the FERC's issuance of a new license for the Project. The WDNR is the state agency designated to carry out the certification requirements prescribed in Section 401 of the CWA. Pursuant to 18 CFR § 5.23(b), NSPW will request a Section 401 WQC from the WDNR.

3.3.2 Endangered Species Act

Section 7 of the Endangered Species Act (ESA) requires federal agencies to ensure any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of any federally listed endangered or threatened species, or result in the destruction or adverse modification of the critical habitat of any federally listed species.

NSPW was granted designation as the FERC non-federal representative for ESA consultation on September 16, 2020. The NSPW consulted with the US Fish and Wildlife Service (USFWS) and concluded that four federally listed species and one species proposed for listing may occur in the vicinity of the Project. Those species include the Canada lynx (*Lynx canadensis),* gray wolf (*Canis lupus),* northern long-eared bat (NLEB) (*Myotis septentrionalis*)[4], piping plover (*Charadrius melodus),* and

[4] Effective January 30, 2023, the NLEB was reclassified as endangered.

monarch butterfly[5] (*Danaus plexippus)* (US Fish and Wildlife Service, 2022a). NSPW's analysis of Project's impacts on threatened and endangered species is presented in Section 6.3.2.

3.3.3 Magnuson-Stevens Fishery Conservation and Management Act

The Magnuson-Stevens Fishery Conservation and Management Act (Public Law 94-265) requires federal agencies to consult with the National Oceanic and Atmospheric Administration (NOAA) Fisheries on all actions that may adversely affect Essential Fish Habitat (EFH). EFH is only applicable to federally managed commercial fish species which live at least one component of their lifecycle in marine waters. All fish in the White River are freshwater species; therefore, there is no designated EFH within the Project vicinity.

3.3.4 National Historic Preservation Act

Section 106 of the National Historic Preservation Act (Public Law 89-665) requires every federal agency to consider how each of its undertakings could affect historic properties. Historic properties are any prehistoric or historic districts, sites, building structures, Traditional Cultural Property (TCP), and objects significant in American history architecture, engineering, and culture which are eligible for inclusion in the National Register of Historic Places (NRHP or Register). The White River Dam (Dam) and hydroelectric plant were evaluated for inclusion in the NRHP during the last relicensing effort in 1991 and both were determined ineligible (NSPW, 1991).

3.3.5 Coastal Zone Management Act

Under Section 307 (c)(3)(a) of the Coastal Zone Management Act (CZMA), the FERC cannot issue a license for a project within or affecting a state's coastal zone unless the state CZMA agency concurs with the license applicant's certification of consistency with the state's CZMA program, or the agency's concurrence is conclusively presumed by its failure to act within 180 days of its receipt of the applicant's certification.

The Wisconsin Coastal Management Program (WCMP) is responsible for implementing Wisconsin's coastal management program, which includes 15 counties with frontage on Lake Superior or Lake Michigan. The Project is located within the designated coastal zone for Wisconsin; therefore, the Project is subject to coastal zone management review and a consistency certification is needed for the Commission's relicensing of the Project. NSPW requested a formal written determination of consistency with the WCMP via e-mail dated February 23, 2023. No response from the WCMP has been received as of the filing of the FLA.

Correspondence with the WCMP is included in *Volume 4, Documentation of Consultation* of this application.

3.3.6 Wild and Scenic Rivers Act

Section 7(a) of the Wild and Scenic Rivers Act (Public Law 90-542) requires federal agencies to make a determination as to whether the operation of a project under a new license would unreasonably diminish the scenic, recreational, and fish and wildlife values present in the designated area. The White River is not designated as a Wild and Scenic River by NPS (National Wild and Scenic Rivers System, n.d.).

[5] The Monarch is proposed for listing as an endangered species.

The Wilderness Act (Public Law 88-577) was enacted to establish a National Wilderness Preservation System. There are no nationally designated wilderness areas within the Project vicinity.

3.3.7 Bald and Golden Eagle Protection Act

The Bald and Golden Eagle Protection Act (16 USC § 668-668c) (Eagle Act) was enacted to protect eagles from human-induced alterations and human interactions. The act prohibits the take; possession; sale; purchase; barter; offer to sell, purchase, or barter; transport; export; or import of any bald or golden eagle whether alive or dead, including any eagle, part, nest, or egg. A take is defined as pursuing, shooting, shooting at, poisoning, wounding, killing, capturing, collecting, molesting, or disturbing eagles (US Fish and Wildlife Service, n.d.a).

There are no recorded occurrences of bald eagle (*Haliaeetus leucocephalus*) nests within two miles of the Project boundary. Therefore, no adverse impacts to the species are anticipated from the continued operation of the Project.

4. General Location and Project Locale

4.1 Location

Of the four regulated dams on the White River listed below in **Table 4.1-1**, the White River Project is the only FERC-regulated project on the main stem of White River. The other three dams do not generate power and are regulated by the State of Wisconsin. These three dams are located along the Long Lake Branch of the White River and they include, in order from upstream to downstream, Lake Owen Dam, Drummond Mill Pond Dam, and Drummond Lake Dam. Only the White River Dam is owned and operated by NSPW. A figure depicting the locations of the dams is located in **Appendix E-1**.

Table 4.1-1 Dams Located on the White River

Dam Name	Location	River	FERC or State Regulated	FERC No.	Authorized Capacity
White River	Town of White River Ashland County	White River	FERC	P-2444	1,200 kW
Drummond Lake	Town of Drummond Bayfield County	Long Lake Branch of the White River	State	N/A	N/A
Drummond Mill Pond	Town of Drummond Bayfield County	Long Lake Branch of the White River	State	N/A	N/A
Lake Owen	Town of Drummond Bayfield County	Long Lake Branch of the White River	State	N/A	N/A

The White River Project is located on the White River in Ashland and Bayfield counties, Wisconsin approximately 13 miles upstream of the White River's confluence with the Bad River. The White River Dam impounds the White River, creating a 39.9-acre reservoir known as the White River Flowage. Municipalities within the current and proposed Project boundary include the Town of White River in Ashland County and the Town of Kelly in Bayfield County.

From left to right looking downstream, the main dam structures consist of a left earthen embankment, intake structure, gated spillway section, and right earthen embankment. The facilities and property within the Project boundary are located within the Town of White River in Ashland County and the Town of Kelly in Bayfield County. The Project and surrounding area are shown on an orthophotograph included in **Appendix E-2**. The proposed Project boundary is further described in Section 9.3 and **Exhibit G** of this application.

4.2 Climate

The Project is located within the Continental Climate Region, which is characterized by hot summers and cold winters, with some variation due to lake effects caused by Lake Superior (University of Wisconsin-Madison, 2003).

Based on data from 1981-2010, the average monthly minimum temperature ranges from 1 degree Fahrenheit (°F) in January to 55°F in July. The average monthly maximum temperature ranges from 22°F in January to 80°F in July. The overall monthly average temperature ranges from 11.5°F in January to 67.5°F in July (U.S. Climate Data, n.d.).

The regional climate is moderately moist with an average annual rainfall of approximately 30.77 inches, with approximately 60% of yearly precipitation occurring during the growing season of May through September (U.S. Climate Data, n.d.). The area has an average annual winter snowfall of 107 inches. January experiences the greatest snowfall with an average of 25.8 inches (Sperling's Best Places, n.d.).

4.3 Topography, Geology, and Soils

4.3.1 Topography

The Project is located in a region of nearly flat but deeply dissected lake plain of glacial origin (NSPW, 2008). Topography surrounding the Project varies up to 180 feet in elevation; the highest land surface elevation of about 850 feet descends to the White River surface elevation of about 670 feet downstream of the powerhouse (US Geological Survey, n.d.). Topography of the Project and the surrounding area is shown in **Appendix E-3**. The White River water surface elevation profile drops about 224.8 feet in the 17.5-mile stretch between the State Highway 63 bridge crossing to downstream of the powerhouse. This equates to an elevation drop of approximately 12.8 feet per mile.[6]

4.3.2 Geology

The Superior Coastal Plain Ecological Landscape is characterized by till-covered hills of the Bayfield peninsula and level plains that gently slope towards Lake Superior on both sides of the peninsula. The plains are dissected by many deeply incised streams and large rivers that flow towards Lake Superior (WI Department of Natural Resources, 2015). The Project is located within one of the deeply incised, large rivers on the plain sloping towards Lake Superior.

Up to 300 feet of red lake clay deposits overlie sandstone, shale, and conglomerate bedrock of Precambrian age, which can reach a thickness up to 25,000 feet (NSPW, 2008). The White River has eroded through about 50 feet of red clay overburden and exposed sedimentary bedrock consisting of sandstone and shale at the Project site. The dam and powerhouse are founded on bedrock. Bedrock downstream of the spillway consists of very hard sandstone. Visible bedrock along the lower portions of the right bank downstream from the dam is a layered sandstone overlying clayey sandstone (shale) bedrock (NSPW, 2008).

4.3.3 Soils

There are nine soil types found throughout the Project vicinity, which are grouped into nine major soil associations with distinctive soil patterns, relief, and drainage factors (USDA-Natural Resources Conservation Service, n.d.). A custom soils report and map for the general Project vicinity is included in **Appendix E-4**.

Odanah silt loam, Sanborg-Badriver complex, and Moquah fine sandy loam soils are the most prevalent soil series found in the Project vicinity, with the most commonly identified soil classifications being Odanah silt loam soils with 25-60% slopes (280F), Sanborg-Badriver complex soils with 0-6% slopes (580B), and Moquah fine sandy loam-frequently flooded soils with 0-3% slopes (6A), in respective order of abundance. Soil characteristics are shown in **Table 4.3.3-1**.

[6] Elevation 886.9 ft. NGVD at Hwy 63 crossing to elevation 662.1 ft. NGVD downstream of the powerhouse.

Table 4.3.3-1 Prevalent Soil Characteristics in the White River Project Vicinity

Soil Series	Drainage Classification	Formation	Water Transmittal Capacity	Runoff Class
Odanah	Well-drained	Till plain, shoulder, backslope	Moderately low to moderately high	Very high
Sanborg-Badriver complex	Moderately well-drained to somewhat poorly drained	Till plain, summit, footslope	Moderately low to Moderately high	High
Moquah	Moderately well-drained	Floodplains	Moderately high to high	Negligible

4.3.4 Erosion

The United States Department of Agriculture (USDA)-Natural Resource Conservation Service (NRCS) uses a computer software model called the Revised Universal Soil Loss Equation Version 2 (RUSLE 2) to estimate soil loss from erosion caused by rainfall on cropland. Several factors are viewed in RUSLE 2 to estimate soil erosion based on the soil type's inherent erodibility. Those factors include hydrologic group, T factor, Kf factor, and soil texture.

The hydrologic group for each soil type is based upon runoff potential for saturated and bare soils and range from Group A to Group D, with Group A having the lowest runoff potential and Group D having the highest. The T factor is an estimate of the maximum average rate of soil erosion in tons per acre that can occur without affecting crop productivity over a sustained period. T factor values range from 1 to 5 tons per acre, with higher values being less subject to damage from erosion. The T factor also relates to the ability of the soil to revegetate once it is disturbed. The Kf factor gives an indication of how susceptible a soil type is to sheet and rill erosion. Kf factor values range from 0.02 to 0.69, with 0.69 having the highest susceptibility to erosion (Natural Resources Conservation Service, 2001). NRCS also provides representative values of the amounts of sand, silt, and clay to describe the representative soil texture in each soil type (USDA Natural Resources Conservation Service, 2001).

A summary of the RUSLE 2 related attributes for the four most prevalent soil series in the Project vicinity are shown in **Table 4.3.4-1**.

Table 4.3.4-1 RUSLE2 Related Attributes for the Three Most Prevalent Soil Series in the White River Project Vicinity

Soil name		Percent of Project Vicinity	Hydrologic Group	Kf Factor	T Factor	Soil Texture Representative Values		
						% Sand	% Silt	% Clay
	Odanah silt loam							
25 to 60% slopes		34.1	C/D	0.37	5	29.0	51.0	20.0
	Sandborg-Badriver Complex							
0 to 6 % slopes		19.7%	C/D	0.17- 0.55	5	30.0	55.0	15.0
	Moquah fine sandy loam							
0 to 3% slopes, frequently flooded		12.3%	C	0.15	5	71.0%	17.0%	12.0%

4.3.5 Impoundment Shoreline Conditions

NSPW owns approximately 25% of the reservoir shoreline with the remainder under private ownership. With the exception of the White River Dam, appurtenant facilities, and recreation sites, the reservoir shoreline is undeveloped and has a natural, vegetative buffer.

In 2022, NSPW conducted an archaeological/shoreline erosion survey of the White River Flowage as part of the federal relicensing effort. The survey was conducted by boat, or on foot where the use of a boat was not feasible and included an inspection of the entire shoreline for actively eroding sites. The survey indicated the reservoir shoreline is, for the most part, buffered by emergent vegetation of cattails and marsh grasses. Near the west end of the reservoir, woody shrubs and large private landholdings dominate the shoreline. Downstream of the dam, the shoreline includes exposed bedrock or is heavily wooded. The archaeologist recommended the reservoir shoreline be monitored again in ten years. No actively eroding sites were identified. The Archaeological Shoreline Survey Report is included in **Appendix E-5**.

4.4 Vegetative Cover

The shoreline upstream and downstream of the White River Dam is primarily forested and entirely undeveloped except for the dam, generation facilities, and recreation facilities. Forested areas consist of mixed forest, coniferous forest, deciduous forest, and wooded/shrub wetlands.

The proposed Project boundary includes approximately 41.8 acres of wetland (Mead & Hunt, Inc., 2023a). These wetlands support various sedges, grasses, and water tolerant trees and shrubs including white cedar, white pine, black ash, yellow birch, willow, and alder (WI Department of Natural Resources, 2015).

The vegetation along the reservoir shoreline was evaluated in conjunction with the ATIS Study. Observations were conducted from a boat while moving slowly along the shoreline, or on foot where the use of a boat was not feasible. To provide an overall characterization of the terrestrial plant composition, the shoreline was divided into sections based on the plant community type. The overall community type within a 10-meter riparian zone visible from the open water was recorded for each section. A full description of the botanical species identified during the surveys is included in Section 6.1.8. The White River ATIS Report is included in **Appendix E-6**.

4.5 Land Development

Based on the United States Geological Survey (USGS) National Land Cover Database, major land uses within the Project vicinity include mixed forest, coniferous forest, wooded/shrub wetlands, emergent wetlands, and grassland. A map depicting the major land uses in the Project vicinity is included in **Appendix E-7**.

Major land uses in Ashland County consist of approximately 94% woodlands or open space (including agriculture), 2.5% residential, 1.6% infrastructure, 1.2% parks and recreation, and less than 1% commercial (Ashland County, 2016).

Major land uses in Bayfield County consist of approximately 73% forest, 14% agriculture, 6% residential, 5% other, 1,5% commercial, and 0.5% industrial (Bayfield County, 2010).

4.6 Population Size and Density

The only city located near the Project is the City of Ashland, which serves as the county seat of Ashland County and is the largest city within the county. Data from the 2020 census indicated the population of the City of Ashland was 7,908, which was a decrease of 3.7% from the 2010 census figure of 8,216. This results in a population density of 591.7 persons per square mile (US Census Bureau, n.d.a).

The estimated 2020 population of the Town of White River (Ashland County) was 1,065, a 13.5% increase from the 2010 figure of 923. This results in an average population density of 24.1 persons per square mile (City Population, n.d.a).

The estimated 2020 population of the Town of Kelly (Bayfield County) was 431, a 7% decrease from the 2010 figure of 463. This results in an average population density of 11.7 persons per square mile (City Population, n.d.b).

The 2020 population of Ashland County was 16,027, a decrease of 0.8% from the 2010 figure of 16,157. This results in an average population density of 15.3 persons per square mile. From 2016-2020 there were an estimated 6,483 households with an average of 2.3 persons per household (US Census Bureau, n.d.b).

The 2020 population of Bayfield County was 16,220, an 8.0% increase from the 2010 figure of 15,014. This results in an average population density of 11.0 persons per square mile. From 2017-2021 there were an estimated 7,358 households with an average of 2.16 person per household (US Census Bureau, n.d.c).

The population changes from 1980 to 2020 for the City of Ashland, Town of White River, Town of Kelly, Ashland County, and Bayfield County are depicted in **Table 4.6-1**.

Table 4.6-1 Historical Population (1980 to 2020)

Municipality	1980	1990	2000	2010	2020	% Change between 1980 and 2020
City of Ashland	8,496	8,744	8,602	8,216*	7,908*	↓ 6.9%
Town of White River	NA	771	894	923	1,065	↑ 38.1%
Town of Kelly	NA	377	377	463	431	↑ 14.3%
Ashland County	16,704	16,307	16,866	16,157*	16,027*	↓ 4.1%
Bayfield County	13,822	14,008	15,013	15,830	16,220*	↑ 17.3%

*US Census

Source: (City Population, n.d.a), (City Population, n.d.b) (City of Ashland, 2017) (Bayfield County, 2010) (Ashland County, 2016)

The 2025 through 2040 population projections for the City of Ashland, Town of White River, Town of Kelly, Ashland County, and Bayfield County are presented in **Table 4.6-2**. Between 2025 and 2040, the projected populations will decrease by 9.4% in the City of Ashland, 4.6% in the Town of White River, 15.5% in the Town of Kelly, 5.7% in Ashland County, and 15.4% in Bayfield County.

Table 4.6-2 Population Projections

Municipality	2025	2030	2035	2040
City of Ashland	8,065	7,980	7,835	7,460
Town of White River[7]	1,077	1,072	1,060	1,016
Town of Kelley[8]	401	395	380	364
Ashland County	16,200	16,140	15,965	15,315
Bayfield County	15,100	14,860	14,330	13,725

Source: (Ashland County, 2016) (Bayfield County, 2010) (City of Ashland, 2017)

4.7 Labor Force and Employment

The largest employment sectors for the City of Ashland, in order of prevalence, include educational services, healthcare, and social assistance; manufacturing; retail trade; and construction, as shown in **Table 4.7-1**.

The largest employment sectors for Ashland County, in order of prevalence, include educational services, healthcare, and social assistance; manufacturing; retail trade; and construction, as shown in **Table 4.7-2**.

The largest employment sectors for Bayfield County, in order of prevalence, include educational services, healthcare, and social assistance; arts, entertainment, recreation, accommodation, and food services; manufacturing; and construction, as shown in **Table 4.7-3**.

Table 4.7-1 Employment Status, City of Ashland

Industry	Jobs	
	Number (est.)	Percentage
Civilian employed population 16 years and over	3,879	-
Agriculture, forestry, fishing, hunting, and mining	108	2.8%
Construction	**372**	**9.6%**
Manufacturing	**612**	**15.8%**
Wholesale trade	80	2.1%
Retail trade	**529**	**13.6%**
Transportation, warehousing, and utilities	92	2.4%
Information	27	0.7%
Finance and insurance, real estate, rental, and leasing	82	2.1%
Professional, scientific, and management; administrative; and waste management services	283	7.3%
Educational services, health care, and social assistance	**965**	**24.9%**
Arts, entertainment, recreation, accommodation, and food services	312	8.0%
Other services, except public administration	185	4.8%
Public administration	232	6.0%

Source: (US Census Bureau, n.d.d)

[7] Population projections for the Town of White River were calculated using the same rate of change as the Ashland County projections.
[8] Population projections for the Town of Kelly were calculated using the same rate of change as the Bayfield County projections.

Table 4.7-2 Employment Status, Ashland County

Industry	Jobs	
	Number (est.)	Percentage
Civilian employed population 16 years and over	7,281	-
Agriculture, forestry, fishing, hunting, and mining	216	3%
Construction	**707**	**9.7%**
Manufacturing	**1,156**	**15.9%**
Wholesale trade	105	1.4%
Retail trade	**834**	**11.5%**
Transportation, warehousing, and utilities	278	3.8%
Information	62	0.9%
Finance and insurance, real estate, rental, and leasing	219	3.0%
Professional, scientific, and management; administrative; and waste management services	433	5.9%
Educational services, health care, and social assistance	**1,779**	**24.4%**
Arts, entertainment, recreation, accommodation, and food services	686	9.4%
Other services, except public administration	368	5.1%
Public administration	438	6.0%

Source: (US Census Bureau, n.d.d)

Table 4.7-3 Employment Status, Bayfield County

Industry	Jobs	
	Number (est.)	Percentage
Civilian employed population 16 years and over	7,050	-
Agriculture, forestry, fishing, hunting, and mining	275	3.9%
Construction	**589**	**8.4%**
Manufacturing	**766**	**10.9%**
Wholesale trade	103	1.5%
Retail trade	559	7.9%
Transportation, warehousing, and utilities	440	6.2%
Information	52	0.7%
Finance and insurance, real estate, rental, and leasing	245	3.5%
Professional, scientific, and management; administrative; and waste management services	459	6.5%
Educational services, health care, and social assistance	**1,634**	**23.2%**
Arts, entertainment, recreation, accommodation, and food services	**1,038**	**14.7%**
Other services, except public administration	368	5.2%
Public administration	522	7.4%

Source: (US Census Bureau, n.d.d)

4.8 Environmental Justice

Environmental Justice (EJ) communities are communities composed of a substantial proportion of people of minority heritage or a substantial proportion of people living below the poverty level. The following sections provide information on the EJ communities located within the geographic scope of the current and proposed Project boundaries for the Project.

4.8.1 Race, Ethnicity, and Low-Income Data

Race, ethnicity, and low-income data from the 2020 US Census Bureau's 2016 to 2020 five-year estimates are summarized in **Table 4.8.1-1**. The data covers the State of Wisconsin, Ashland County, Bayfield County, census block group, and census tracts located within the geographic scope of the White River Project.

Table 4.8.1-1 White River Project Environmental Justice Community Information (2016-2020)

WHITE RIVER PROJECT (2016-2020)	RACE AND ETHNICITY DATA										LOW INCOME DATA
Geography	Total Population (count)	White Alone Not Hispanic (count)	African American (count)	Native American/ Alaska Native (count)	Asian (count)	Native Hawaiian & Other Pacific Islander (count)	Some Other Race (count)	Two or More Races (count)	Hispanic or Latino (count)	Total Minority	Households Below Poverty Level
State of Wisconsin	5,806,975	4,681,072	360,526	43,830	162,010	2,174	14,407	134,689	408,267	19.4%	10.7%
Ashland County, Wisconsin	15,524	12,778	119	1,425	87	87	0	564	464	17.7%	16.3%
Census Tract 9505, Block Group 1	1,237	1,133	0	28	0	0	0	42	34	8.4%	9.3%
Bayfield County, Wisconsin	15,088	12,728	46	1,481	77	0	16	409	331	15.6%	11.4%
Census Tract 9604.02, Block Group 1	1,422	1,294	4	46	2	0	5	58	13	9.0%	6.0%
Census Tract 9604.02, Block Group 3	913	868	0	32	2	0	0	0	11	4.9%	7.2%

Source: (US Census Bureau, n.d.e) (US Census Bureau, n.d.f)

4.8.2 Environmental Justice Communities

Three census block groups and tracts are located within the geographic scope of the Project and include Census Tract 9505, Block Group 1 (Ashland County), Census Tract 9604.02, Block Group 1 (Bayfield County), and Census Tract 9604.02, Block Group 3 (Bayfield County). NSPW evaluated each of the three to determine if EJ communities are present. Three different evaluation methods were used to make this determination and they include the 50% analysis method, meaningful greater analysis method, and low-income threshold method.

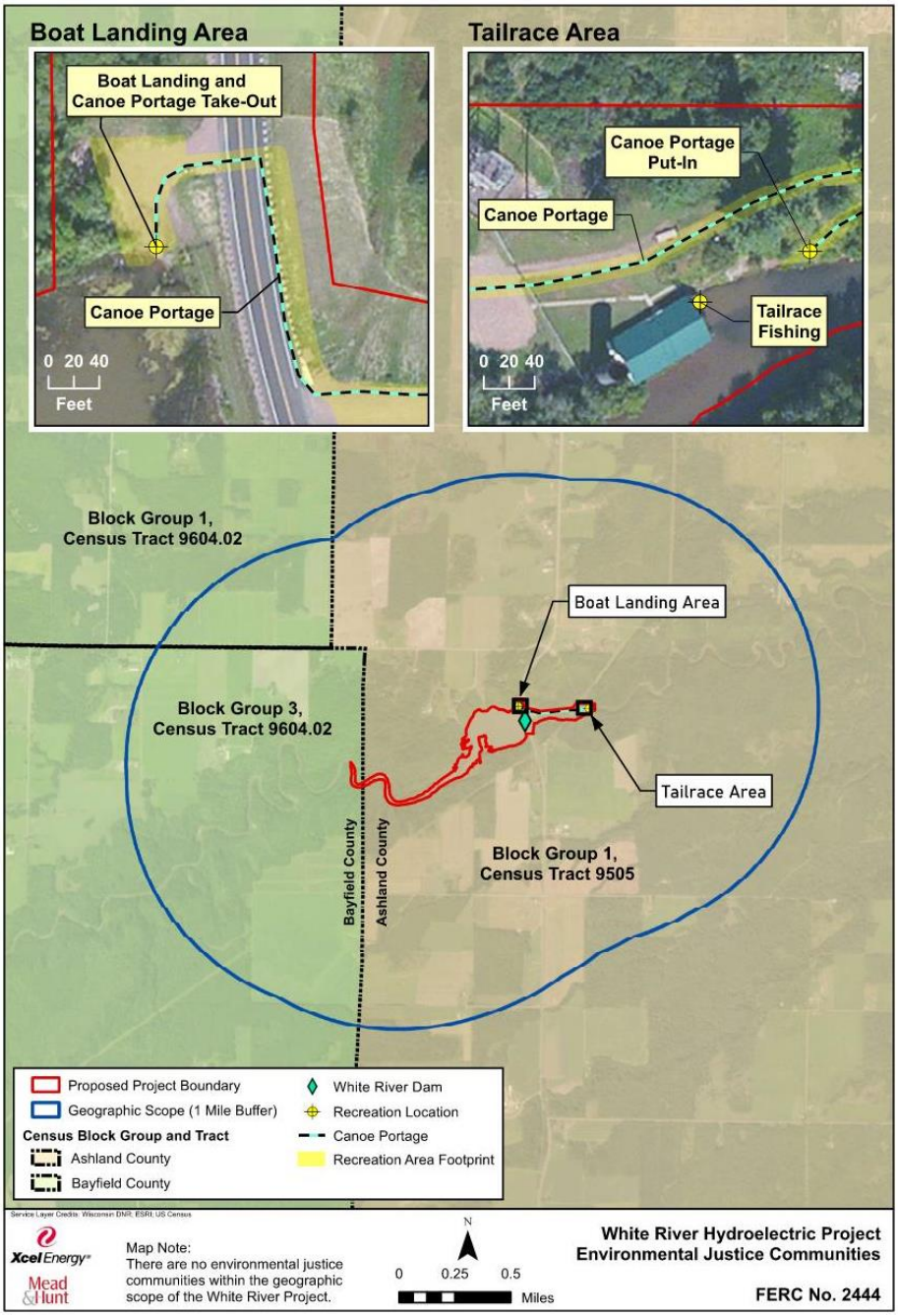
To qualify as an EJ community under the 50% analysis method, the total percentage of the minority population must exceed 50%. To qualify as an EJ community under the meaningful greater analysis method, the block group minority population must exceed 19.5% for block groups in Ashland County and 17.2% for block groups in Bayfield County.[9] To qualify as an EJ community under the low-income threshold method, the

[9] Meaningful Greater Analysis:
Ashland County minority population 17.7% X 1.1 = 19.5%; Bayfield County minority population 15.6% X 1.1 = 17.2%

percentage of the population below the poverty line must equal or exceed Ashland County's poverty level of 16.3% for block groups in Ashland County and equal or exceed Bayfield County's poverty level of 11.4% for block groups in Bayfield County. The three evaluation methods did not identify any EJ communities within the geographic scope of the Project.

Figure 4.8.2-1 shows the White River Project boundary and corresponding Project-related structures and facilities within the geographic scope of the Project. A search was conducted for sensitive receptor locations including daycare centers, schools, nursing homes, hospitals, fire stations, and police stations. No sensitive receptor locations are located within the geographic scope of the Project.

Figure 4.8.2-1 Environmental Justice Analysis within White River Project Geographic Scope



4.8.3 Project-Related Impacts to Environmental Justice Communities

Since no EJ communities were identified in the geographic scope of the Project, no adverse impacts to EJ communities will occur from continued operation of the Project.

4.8.4 Public Outreach

NSPW conducted numerous public outreach activities as outlined in Section 3. In order to determine if additional outreach was needed for non-English speaking communities, NSPW reviewed the 2020 American Community Survey Table S1601 Language Spoken At Home data. The data for Ashland County indicates 96.5% of the county's population speak only English and 3.5% speak a language other than English, including Spanish (1.2%), other Indo-European languages (1.1%), Asian and Pacific Island languages (0.3%), and other languages (0.9%). Table S1601 also indicates 99.8% of the population of all citizens 18 years old and over speak English only or speak English very well (US Census Bureau, n.d.g).

The data for Bayfield County indicates 96.8% of the county's population speak only English and 3.2% speak a language other than English, including Spanish (0.9%), other Indo-European languages (0.7%), Asian and Pacific Island languages (0.2%), and other languages (1.4%). Table S1601 also indicates 99.8% of the population of all citizens 18 years old and over speak English only or speak English very well (US Census Bureau, n.d.g).

Language does not appear to be a major barrier within the geographic scope of the Project based on the data for Ashland and Bayfield counties. Additionally, the continued operation of the Project is not anticipated to adversely impact any EJ or non-English speaking communities. Therefore, no mitigation measures for EJ communities or non-English speaking communities have been proposed in this FLA. NSPW does not plan any future EJ community-specific or non-English speaking community-specific outreach measures.

4.9 Tribal Resources

There are 11 federally recognized tribes in Wisconsin and they include: the Forest County Potawatomi, Ho-Chunk Nation, Menominee Indian Tribe of Wisconsin, Oneida Nation of Wisconsin, Stockbridge-Munsee Band of Mohican Indians, and six Ojibwe (Chippewa) tribes. The Ojibwe tribes include the Bad River Band of Lake Superior Chippewa, Lac Courte Oreilles Band of Lake Superior Chippewa, Lac du Flambeau Band of Lake Superior Chippewa, Red Cliff Band of Lake Superior Chippewa, St. Croix Band of Chippewa Indians of Wisconsin, and Sokaogon Chippewa (Mole Lake) Community (Wisconsin Department of Public Instruction, n.d.). There are no Tribal lands within the Project boundary.

NSPW is not proposing any material changes to the Project's to run-of-river operations, reservoir elevation operating range or minimum flow.[10] Since there are no material operational changes proposed, continued operation of the Project is not expected to adversely impact Tribal resources in the area.

[10] The planned deviations for ice removal purposes are not expected to cause adverse effects to EJ communities due to their short duration and timing during high flow periods, which matches the natural hydrologic cycle. Therefore, the planned deviations are not considered a material change regarding impacts to any EJ communities.

The Commission initiated Tribal consultation via letter on July 18, 2019, and again by telephone and email on August 30, 2019. The Commission reached out to the Bad River Band of Lake Superior Chippewa, Bay Mills Indian Community of Michigan, Fond du Lac Band of Lake Superior Chippewa, Forest County Potawatomi Community of Wisconsin, Fort Belknap Indian Community, Ho-Chunk Nation, Keweenaw Bay Indian Community, Lac Courte Oreilles Band of Lake Superior Chippewa Indians, Lac du Flambeau Band of Lake Superior Chippewa Indians, Lac Vieux Desert Band of Lake Superior Chippewa Indians of Michigan, Leech Lake Band of Chippewa Indians, Little Traverse Bay Band of Odawa Indians, Menominee Indian Tribe of Wisconsin, Miami Tribe of Oklahoma, Mille Lacs Band of Ojibwe, Minnesota Chippewa Tribe, Oneida Nation of Wisconsin, Red Cliff Band of Lake Superior Chippewa Indians, Sokaogon Chippewa Community/Mole Lake Band, St. Croix Chippewa Indians of Wisconsin, Stockbridge-Munsee Community-Band of Mohican Indians, Stockbridge-Munsee Community of Wisconsin, and the White Earth Band of the Minnesota Chippewa.

4.9.1 Forest County Potawatomi

Potawatomi oral tradition speaks of three brothers, the Ojibwe (kept the faith), Odawa (handled trade), and Bodewadmi (kept the fires lit). Today, the three brothers are known as Ojibwe, Ottawa, and Potawatomi. Within a century of their migration back to the Great Lakes region, the three brothers had evolved into separate, but closely aligned nations. The Potawatomi still refer to themselves as the "keepers of the Fire" and arrived in Wisconsin in the mid-17th century from Canada and the western United States. In the early 1800s, the government took away Potawatomi land rights. In 1913, the Forest County Potawatomi bought back approximately 12,000 acres located in northern Wisconsin (Loew, 2001).

4.9.2 Ho-Chunk Nation

The Ho-Chunk people, who were driven from Wisconsin to the west, have gradually returned to reclaim their ancestral lands. No treaty lands have been reserved, so present Ho-Chunk lands are tribal lands that have been re-purchased. Today, 4,700 members of the Wisconsin Ho-Chunk hold title to 2,000 acres of land in Wisconsin (Loew, 2001).

4.9.3 Menominee Indian Tribe of Wisconsin

The Menominee people are believed to have occupied Wisconsin for more than 5,000 years. As Europeans arrived, the Menominee lost most of their lands, but maintained a significant presence in the state. Menominee County was created from part of Shawano County in 1959 in anticipation of the Menominee Indian Reservation termination in 1961. Reservation status was restored in 1973. Today, most land within Menominee County is designated as tribal trust lands by the U.S. Bureau of Indian Affairs; non-tribal regulations do not apply. The Menominee Tribe also holds a small amount of land within the Town of Red Springs, Shawano County (Loew, 2001).

4.9.4 Oneida Nation of Wisconsin

The Oneida people were part of the New York Iroquois League prior to the Revolutionary War. In 1822, the Oneida purchased land in a territory that would later become the State of Wisconsin. Much of these lands were taken away by the 1900s, but 1,270 acres were repurchased in 1937 (Loew, 2001).

4.9.5 Stockbridge-Munsee Band of Mohican Indians

The Stockbridge-Munsee are a blend of Mohican Tribes from Massachusetts and Delaware who moved west, settling near Lake Winnebago. In 1856, they obtained their present treaty lands from neighboring Menominee Native Americans. Tribal fee lands are owned by the Stockbridge-Munsee and remain subject to non-tribal regulations. As such, lands held in fee title are subject to County zoning and subdivision regulation. The Stockbridge-Munsee population was estimated at 1,527 in 2000, which represents a 163% increase from 1990 (Loew, 2001).

4.9.6 Ojibwe (Chippewa) Tribes

The Ojibwe (Chippewa) people originally from the Great Lakes had moved east near the Atlantic Ocean. Over 1,000 years ago, the Tribe returned to the Great Lakes Region, settling amidst fertile wild rice beds. Their final resting stop was Madeline Island in Wisconsin. The Ojibwe had a close relationship with the French, but the effort to convert the Ojibwe people to Christianity divided their belief systems into various bands of Ojibwe who established themselves in other locations.

As the pursuit of furs for trade progressed inland, conflicts with other Tribes, including the Dakotas, culminated with a Treaty assembled by the U.S. Government in 1825. The Treaty forced the Ojibwe to cede their territory to the U.S. under negotiations in 1837 and 1842. The Project is located within the territory ceded in 1842 (Loew, 2001).

Certain areas within the ceded territory have cultural significance; however, these areas are not publicly documented or recorded. If these areas are expected to be impacted by Project operation, this information will need to be disclosed through consultation with the individual Tribal representatives who consider the lands contained within the Project home territories.

4.10 Floodplains and Streamflow

The White River is subject to periodic flooding. These floodplain areas are defined in terms of a floodway and a flood fringe. The floodway is the river channel and adjacent areas where water continues to flow downstream and moves under flood conditions. The flood fringe is the portion of the floodplain outside the floodway where water will collect and not readily move during a flood. A flood occurs when water flows outside river channel banks and activates the floodplain. A floodplain typically includes an area of land covered by water during a 100-year flood event, which is a flood defined as having a 1% chance of occurring in any given year. The WDNR floodplain mapping for the area is included in **Appendix E-8**. The floodplain within the Project boundary is entirely undeveloped with the exception of the Project's facilities including the dam, electric generation facilities, and recreation facilities.

Streamflow information from January 1948 to December 2021 from the USGS gage No. 04027500 (White River Near Ashland, WI) was used to develop flow duration curves. The gage is located in the tailrace area immediately downstream of the powerhouse at Latitude 46.497222N, Longitude 90.9041667W and has a drainage area of 301 square miles. Based on the data, the average calendar year flow at the Project is 279 cfs, the minimum annual calendar year flow was 156 cfs in 1948, and the maximum annual calendar year flow was 457 in 2018 (Mead & Hunt, Inc., 2022).

The water discharge records for the Project are presented in **Exhibit A**. Flow statistics for the Project are summarized in **Table 4.10-1**.

Table 4.10-1 White River Dam Flow Statistics

Flow Statistic	Value (cfs)	Date(s)
Annual Mean	279	2012-2019
Highest Annual Mean	457	2018
Lowest Annual Mean	156	1948
Highest Daily Mean	6,390	June 17, 2018
Lowest Daily Mean	61	September 8, 1979
10% Exceedance	463	-
50% Exceedance	210	-
90% Exceedance	156	-
100-Year Flood Flow	7,900[11]	-

[11] The 100-year flood flow value is from the Supporting Design Report.

5. Report on Water Use and Quality

5.1 Uses of Project Waters

5.1.1 Existing Uses of Project Waters

Beginning in the late 1800's, the White River Dam provided mechanical power for a sawmill. The Project was reconstructed in 1907 to generate electricity. The Project in its present form was completed in 1927, providing water for hydroelectric power production, recreation, and fish and wildlife habitat. The primary uses of the White River today remain the same (NSPW, 1991).

The White River Project powerhouse operates with a rated head of 49.5 feet and has an estimated maximum hydraulic capacity of 350 cfs (Unit #1-200 cfs, Unit #2-150 cfs). The powerhouse contains two generators, one General Electric 2,300-Volt, 700kW generator unit (Unit 1) and one Westinghouse 2,300-Volt, 500 kW generator unit (Unit 2). Each unit operates at 450 revolutions per minute. Both units were originally installed in 1954. The turbine on Unit 1 was replaced in 2017. The combined plant capacity is 1,200 kW.

The White River Flowage encompasses approximately 39.9 acres with a gross storage capacity of 297 acre-feet at the maximum reservoir surface elevation of 711.6 feet NGVD (Mead & Hunt, Inc., 2023b). The purpose of the Project is to generate hydroelectric power. The Project is operated as a run-of-river facility where discharge measured immediately downstream of the Project tailrace approximates the sum of inflows into the Project reservoir. In order to minimize reservoir fluctuations, NSPW maintains the reservoir elevation between 710.4 and 711.6 feet NGVD. A minimum flow of 16 cfs or inflow, whichever is less, is released at all times into the bypass reach immediately below the dam to protect aquatic resources.

5.1.2 Proposed Uses of Project Waters

Under the proposed operation, NSPW will continue to operate the Project as a run-of-river facility, for the purpose of generating hydroelectric power, where the discharge measured immediately downstream of the Project approximates inflows into the Project reservoir. In order to minimize reservoir fluctuations, NSPW will continue to operate the reservoir between reservoir elevations 710.4 and 711.6 feet NGVD.[12]

NSPW will also continue to release a minimum flow of 16 cfs or inflow, whichever is less, into the bypass reach at all times to protect aquatic resources.

Just prior to spring runoff, and for emergency purposes, NSPW may deviate from the maximum reservoir elevation, by no more than 0.5 feet, to remove ice from the spillway for dam safety purposes. The duration of the deviation shall be no longer than necessary, typically less than a few days, to remove the ice and will be conducted as a planned deviation under the requirements outlined in Section 5.8.

[12] In the Pre-Application Document, NSPW proposed to operate under the subsequent license with a maximum reservoir elevation of 712.6 feet NGVD. NSPW has adjusted its operation and no longer believes a maximum elevation up to 712.6 feet NGVD is necessary.

Since NSPW is not proposing any material changes to the operation of the Project, no changes to available water quantity are anticipated for downstream uses.[13]

5.2 Existing Water Quality

The State of Wisconsin established water quality standards under Chapter NR 102 of the Wisconsin Administrative Code (NR 102) to protect, maintain, and enhance surface waters for a variety of designated uses. The standards set limits for each designated use described below for which water quality cannot be artificially lowered unless a variance has been provided. NR 102 standards are consistent with CWA § 303 (d). A copy of NR 102 is included in **Appendix E-9**.

The stretch of the White River flowing through the Project boundary, including the reservoir, is a cold-water fish community with designated uses for fish and aquatic life, general recreation, public health and welfare, and fish consumption.

5.2.1 Fish and Aquatic Life Standards

Fish and aquatic life standards in Wisconsin are as follows:

- pH shall be between 6.0 and 9.0, with no change greater than 0.5 units outside the estimated natural seasonal maximum and minimum.
- Surface water dissolved oxygen (DO) shall never be lowered below 5 milligrams per liter (mg/L)
- Water bodies classified as trout waters by the WDNR or as Great Lakes or cold-water communities may not be altered from natural background DO levels to such an extent that trout populations are adversely affected. Additionally, all of the following conditions shall be met:
    - DO in classified trout streams shall not be artificially lowered to less than 6.0 mg/L at any time, nor shall the DO be lowered to less than 7.0 mg/L during the spawning season.[14]
    - DO in the Great Lakes tributaries used by stocked salmonids for spawning runs shall not be lowered below natural background during the period of habitation.

5.2.2 Wisconsin Temperature Standards

The White River upstream and downstream of the Project reservoir is classified as a Class II trout stream and is subject to the cold-water temperature standard. The Project reservoir is classified as an impounded flowing water due to its size of less than 50 acres and a short water residence time of less than 14 days. Therefore, the Project reservoir is subject to the same cold-water temperature standards as the White River upstream and downstream of the Project. Details of the maximum acute water temperatures allowed within the vicinity of the Project are shown in **Table 5.2.2-1**.

[13] Due to the short duration of the ice removal events, and their timing during high inflow periods (which matches the natural hydrologic cycle), the proposed planned deviations for ice removal purposes are not expected to have an adverse impact upon water resources. Therefore, the planned deviations are not considered a material change to operations.

[14] The fish spawning period is September 15 through May 15 for all trout streams in Wisconsin.

Table 5.2.2-1 Wisconsin Cold-Water Maximum Acute Water Temperature Standards

Month	Cold-Water Maximum Acute Temperatures	
	ºF	ºC
January	68	20.0
February	68	20.0
March	69	20.56
April	70	21.11
May	72	22.22
June	72	22.22
July	73	22.78
August	73	22.78
September	72	22.22
October	70	21.11
November	69	20.56
December	69	20.56

Source: NR102, see **Appendix E-9**

5.2.3 Wisconsin Recreational Use Standards

NR 102.04(6) indicates a recreation use classification requires the geometric mean of bacterial counts of *E. coli (Escherichia coli*) shall not exceed a most probable number of 200 counts per 100 milliliters (mL), based on five or more water samples per month. Under the WDNR Beach Advisory Program, a beach advisory is issued when the bacterial counts reach an action value of 235 per 100 mL and a beach closure is issued at 1,000 per 100 mL.

5.2.4 Wisconsin Public Health Standards

NR 102.14 establishes taste and odor standards for public health and welfare, which are outlined by specific substance and will not be summarized here.

5.2.5 Fish Consumption Standards

NR 105.07 establishes wildlife use standards, which are outlined based upon specific substance concentrations and will not be summarized here.

5.2.6 Reservoir Total Phosphorus Water Quality Standards

Under NR 102.06 definitions, a waterbody is considered a reservoir if there is a dam that raises water depth more than two times the conditions prior to dam construction, and that has a mean water residence time of 14 days or more under summer mean flow conditions. Under this definition, the White River is considered an impounded flowing water and is subject to the stream total phosphorus criterion. The White River, from the White River Dam downstream to the river's confluence with the Bad River, is subject to a phosphorus criterion of 100 µg/L. The White River upstream of the White River Dam is subject to a phosphorus criterion of 75 µg/L.

5.3 Historic Water Quality Data

The White River is not currently listed as an impaired water under § 303(d) of the Clean Water Act (WI Department of Natural Resources, n.d.a).

5.3.1 NSPW Historic Water Quality Data

Water quality monitoring for pH, DO, water temperature, and total phosphorous was conducted by NSPW in 1989 and 1990 in conjunction with the previous relicensing effort. The monitoring included monthly sampling at three sites from May through October of 1989 as well as a late winter sampling in March of 1990. Sampling Site 1 was located upstream of the reservoir. Sampling Site 2 was located within the reservoir approximately 300 feet upstream of the dam at three various depths. Sampling Site 3 was located in the tailrace downstream of the powerhouse (NSPW, 1991). The historic NSPW water quality monitoring data is summarized below in **Table 5.3.1-1** and the following sections.

Table 5.3.1-1 Historic NSPW Water Quality Monitoring Data

Monitoring Site	Date	pH	DO (mg/L)	Temp (°F)	Total Phosphorous (mg/L)
SITE 1 Upstream of reservoir	05/16/1989	8.5	10.6	61.2	0.02
	06/14/1989	8.7	12.2	52.3	0.06
	07/19/1989	**9.2**	10.0	65.3	0.03
	08/15/1989	**11.8**	9.8	62.6	0.03
	09/19/1989	8.5	9.1	59.4	0.03
	10/23/1989	8.2	11.5	44.6	0.01
	03/01/1990	6.7	11.2	32.7	**0.23**
SITE 2A Upstream of dam (1 ft deep)	05/16/1989	8.3	9.2	66.2	0.02
	06/14/1989	8.4	10.6	57.2	0.05
	07/19/1989	8.5	8.2	70.7	0.02
	08/15/1989	8.5	7.4	69.8	0.03
	09/19/1989	8.4	8.6	62.6	0.02
	10/23/1989	8.3	11.4	44.6	0.01
	03/01/1990	8.4	9.4	32.7	0.14
SITE 2B Upstream of dam (6-15 ft deep)	05/16/1989	N/A	N/A	N/A	N/A
	06/14/1989	8.5	10.0	57.2	0.05
	07/19/1989	8.2	7.6	66.2	0.03
	08/15/1989	8.3	7.8	66.2	0.08
	09/19/1989	8.3	8.3	62.6	0.03
	10/23/1989	8.2	12.1	41.0	0.01
	03/01/1990	N/A	N/A	N/A	N/A
SITE 2C Upstream of dam (20 ft+ deep)	05/16/1989*	7.9	8.0	60.8	0.03
	06/14/1989	8.5	9.2	55.4	0.05
	07/19/1989	8.5	7.0	66.2	0.06
	08/15/1989	8.3	6.1	63.5	0.02
	09/19/1989	8.0	6.9	59.0	0.05
	10/23/1989	N/A	N/A	N/A	N/A
	03/01/1990*	8.2	11.0	33.4	**0.30**
	05/16/1989	7.8	10.4	67.1	0.02

Monitoring Site	Date	pH	DO (mg/L)	Temp (°F)	Total Phosphorous (mg/L)
SITE 3 Powerhouse tailrace	06/14/1989	8.5	9.2	53.6	0.05
	07/19/1989	8.4	8.7	66.2	0.04
	08/15/1989	8.5	8.5	66.2	0.04
	09/19/1989	8.2	8.7	62.2	0.04
	10/23/1989	8.0	13.0	41.7	0.01
	03/01/1990	8.0	10.4	32.9	0.08

*Sample site labeled as 2B-but sampled in 20+ feet of water (no mid depth sample taken on this date).
N/A indicates no data was collected at the monitoring site on that monitoring date.
Source: NSPW, 1991

5.3.1.1 pH

Monitoring data showed the surface water pH decreased from upstream to downstream. Only two pH readings at Sampling Site 1 exceeded the water quality standard of 9.0. A reading of 9.2 occurred on July 19, 1989 and a reading of 11.8 occurred on August 15, 1989. This exceedance was interpreted as an instrumentation error. All other sampling events met the NR 102 water quality standard for pH.

5.3.1.2 DO

DO levels remained above the standard of 7 mg/L for cold-water streams during the spawning season and above 6.0 mg/L during the remainder of the year. DO levels downstream of the Project remained high in the tailrace (>8.5 mg/L) during all monitoring events, indicating there were no adverse impacts downstream of the Project (NSPW, 1991). All sampling events met the NR 102 water quality standard for DO.

5.3.1.3 Water Temperature

Water temperature increased slightly when passing through the Project (measuring the difference between Site 1 and Site 3). The largest water temperature difference of 5.9 ºF occurred during May, while temperatures from June through August increased an average of 1.5 ºF (NSPW, 1991). All sampling events met the NR 102 water quality standard for water temperatures.

5.3.1.4 Total Phosphorus

The sampling event on March 1, 1990 showed high total phosphorus levels. Phosphorus readings at Sampling Site 1 and Sampling Site 2C were identified as of 0.23 mg/L and 0.3 mg/L, respectively. The high total phosphorus concentrations were interpreted to have been caused by the release of nutrients from the decomposition of organic material and aquatic plants (NSPW, 1991).

5.3.2 WDNR Historic Water Quality Data

A search of the WDNR Surface Water Data Viewer identified water quality data for two stations within the White River Project, one in the reservoir just upstream of State Hwy 112 and one in the Project tailrace. In 2003, total phosphorus was monitored. In 2007, pH, DO, temperature, and total phosphorus were monitored. The WDNR historic water quality monitoring data is summarized below in **Table 5.3.2-1** and the following sections.

Table 5.3.2-1 Historic WDNR White River Water Quality Monitoring Data

Monitoring Site	Date	pH	DO (mg/L)	Temp (°F)	Total Phosphorus (mg/L)
0231127 Project Tailrace	09/26/2007	8.0	9.8	60.3	0.035
	08/30/2007	7.7	8.7	65.1	0.039
	06/27/2007	7.9	8.8	**75.6**	0.042
	04/24/2007	7.6	10.9	52.9	0.044
	03/27/2007	6.9	12.7	28.5	**0.143**
	10/15/2003	-	-	-	0.028
	09/17/2003	-	-	-	0.036
	08/20/2003	-	-	-	0.050
	07/16/2003	-	-	-	0.046
010020884 White River Flowage Hwy 112	07/31/2007	-	8.0	**75.6**	0.041
	05/29/2007	7.2	9.0	59.2	0.040

Source: (WI Department of Natural Resources, n.d.a)* Exceeds state standards

5.3.2.1 pH

All historic pH sampling events met the NR 102 water quality standard for pH.

5.3.2.2 DO

All historic DO sampling events met the NR 102 water quality standard for DO.

5.3.2.3 Water Temperature

As previously noted, all waters within the Project are subject to the cold-water temperature standards. One reading in the Project tailrace (75.6 ºF) exceeded the June temperature standard of 72 ºF and one reading in the Project reservoir (75.6 ºF) exceeded the July temperature standard of 73 ºF.[15] All other sampling events met the NR 102 water quality standard for water temperatures.

5.3.2.4 Total Phosphorous

One total phosphorous reading exceeded the NR 102 water quality standard of 0.1 mg/L. Similar to the NSPW historic water quality monitoring sampling event (March 1, 1990), the reading of 0.143 on March 27, 2007 in the Project tailrace is interpreted to have been caused by the release of nutrients from the decomposition of organic material and aquatic plants. All other sampling events met the NR 102 water quality standard for total phosphorus.

[15] In the PAD, the reservoir was listed as being subject to the warm-small temperature standard. WDNR indicated in their comments on the PAD all waters within the Project are subject to the cold-water temperature standard. Therefore, the PAD incorrectly noted all reservoir readings met temperature standards.

5.4 Current Water Quality

NSPW conducted water quality monitoring at the Project on May 18, June 14, July 13, August 17, September 13, and October 11, 2022 to characterize current water quality conditions and determine compliance with Wisconsin NR 102. Study results are described in the following sections and the Water Quality Study report is included in **Appendix E-10**.

Surface water quality monitoring was conducted at three locations within the Project boundary using the WDNR river monitoring protocols. Monitoring Site 1 (46.49392N, 90.92295W) was located approximately 4,800 feet upstream of the dam in a riverine area. Monitoring Site 2 (46.49762N, 90.91066W) was located approximately 300 feet upstream of the White River Dam in the deep hole of the reservoir. Monitoring Site 3 (46.49837N, 90.90302W) was located approximately 165 feet downstream of the powerhouse at the existing WDNR Monitoring Station No. 023127. The monitoring locations are shown in **Figure 5.4-1**. The parameters that were monitored, number of grab samples, sampling measurement (conducted in a lab or in the field), and sampling frequency are detailed in **Table 5.4-1**.

Data was collected and analyzed using the standard operating procedures of the WDNR Wisconsin Consolidated Assessment and Listing Methodology (WisCALM Guidance). The WDNR Nutrient Grab Sample Protocols were used to monitor ammonia, dissolved phosphorus, nitrate (plus nitrite), sulfate, total mercury, total nitrogen, total phosphorus, and total suspended solids. The procedures listed in the Wisconsin Citizen Lake Monitoring training Manual (Chemistry Procedures) were used to monitor bacteria (*E. coli*), chlorophyll A, and chloride (Great Lakes Environmental Center, Inc., 2022a).

Discrete multi-parameter water quality measurements of specific conductance, DO, pH, and temperature were collected at each monitoring location during each field visit using a calibrated YSS ProDSS multi-parameter meter (Great Lakes Environmental Center, Inc., 2022a).

Continuous monitoring (hourly) was conducted for specific conductance, DO, pH, and temperature at Monitoring Site 1 and Monitoring Site 3. Specific conductance, DO, and pH were measured using calibrated YSI EXO3 Multi-parameter sondes. Temperatures were monitored using Onset HOBO Tidbit Temperature Data Loggers (Great Lakes Environmental Center, Inc., 2022a).

Field measurements and water (grab) samples collected for lab analysis were completed as outlined in the study plan. The WDNR did not recommend hydrographic profiles for the deep hole upstream of the White River Dam be developed in their study request as the water residence time within the reservoir is one day making it unlikely the reservoir would become stratified.

Figure 5.4-1 Water Quality Monitoring Locations

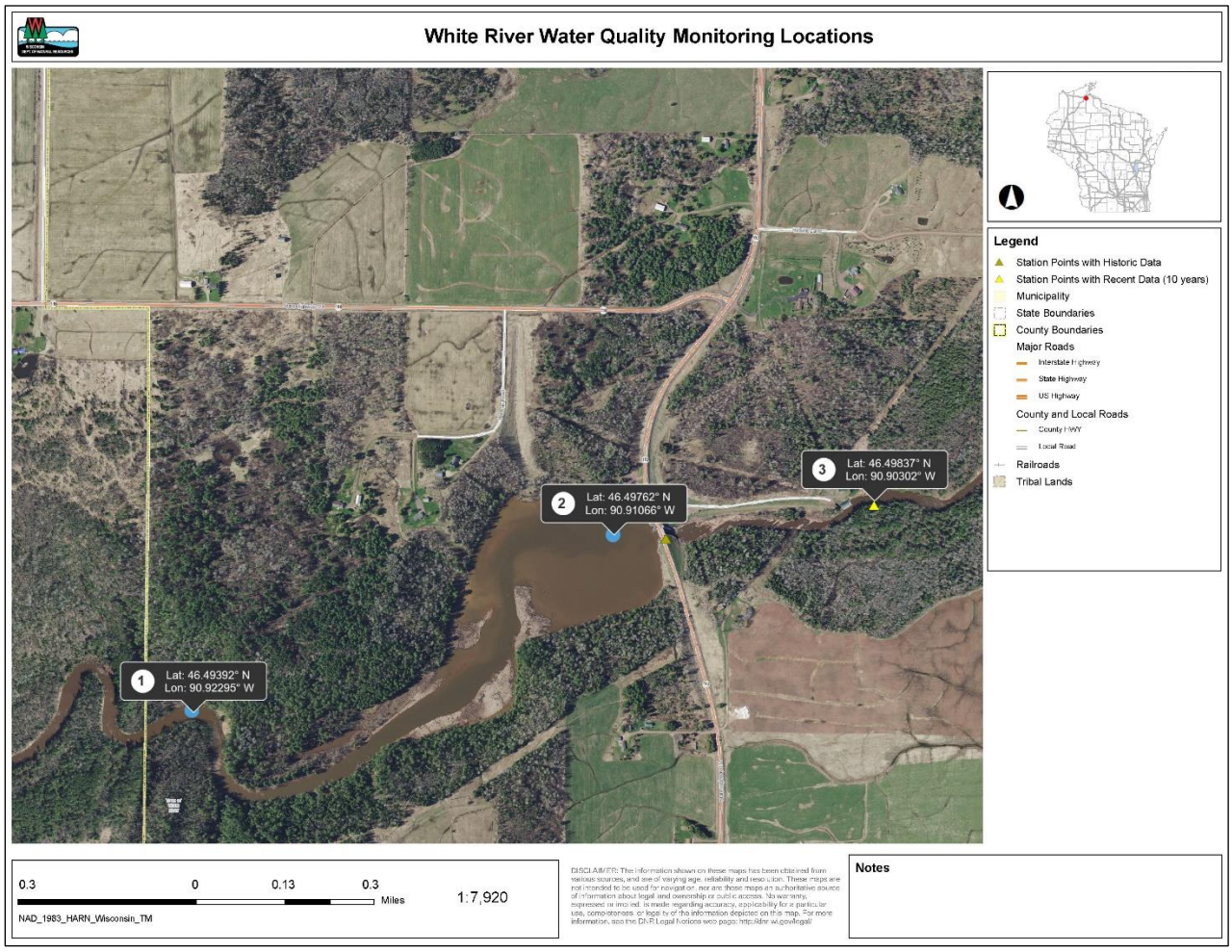


Table 5.4-1 White River Water Quality Monitoring Parameters and Frequency

Monitored Parameter	Number of Samples	Sampling Measurement	Sampling Frequency					
			May	June	July	Aug	Sept	Oct
Ammonia	6	Lab	X	X	X	X	X	X
Bacteria	6	Lab	X	X	X	X	X	X
Chloride	6	Lab	X	X	X	X	X	X
Chlorophyll-a	3	Lab			X	X	X	
Conductivity	Continuous July-Sept	Field			X	X	X	
DO	Continuous July-Sept	Field			X	X	X	
Dissolved Phosphorus	6	Lab	X	X	X	X	X	X
Nitrate (plus nitrite)	6	Lab	X	X	X	X	X	X
pH	Continuous July-Sept	Field			X	X	X	
Sulfate	6	Lab	X	X	X	X	X	X

Monitored Parameter	Number of Samples	Sampling Measurement	Sampling Frequency					
			May	June	July	Aug	Sept	Oct
Total Mercury	6	Lab	X	X	X	X	X	X
Temperature[16]	Continuous May-Oct	Field	X	X	X	X	X	X
Total Nitrogen	6	Lab	X	X	X	X	X	X
Total Phosphorus	6	Lab	X	X	X	X	X	X
Total Suspended Solids	6	Lab	X	X	X	X	X	X

Source: (Great Lakes Environmental Center, Inc., 2022a)

5.4.1 Water Monitoring Results for Lab Analyzed Water Quality Parameters

Lab-analyzed water quality parameters are summarized below and in **Table 5.4.1-1**.

5.4.1.1 Monitoring Results for Ammonia

Ammonia concentrations at the Project ranged between <13.0 and 267.0 µg/L(<.0130 and 0.267 mg/L). The concentration of ammonia at all three sampling locations increased over the season, with the highest concentration detected during the September and October monitoring events. However, the concentrations are far below the toxicity thresholds for freshwater aquatic organisms.

5.4.1.2 Monitoring Results for Bacteria (*E. coli*)

Using the IDEXX methodology, *E. coli* concentration is given as a Most Probable Number (MPN) which is equivalent to colony counts per 100 mL. *E coli* colony counts ranged between 3.1 and 162.4 MPN. All *E. coli* readings met the Wisconsin standards.

5.4.1.3 Monitoring Results for Chloride

The concentration of total chloride for the study ranged between 2.4 and 6.7 mg/L, which is typical of waterbodies in this region of Wisconsin.

5.4.1.4 Monitoring Results for Chlorophyll a

The concentration of Chlorophyll a ranged between 1.10 and 3.49 µg/L, which is considered very low and typical of waterbodies in this region of Wisconsin.

5.4.1.5 Monitoring Results for Total and Dissolved Phosphorus

The total phosphorus criterion for the White River, from the White River Dam to the river's confluence with the Bad River, is 100 µg/L. The total phosphorus criterion for the White River upstream of the White River Dam is 75 µg/L. Total phosphorus results ranged from 5.9µg/L to 19.5 µg/L, well below the state standard in both river reaches. The dissolved phosphorus results ranged from <1.5 µg/L to 8.3µ g/L. While there is no specific state standard for dissolved phosphorus, the concentration was far lower than that required to support algal growth.

[16] The WDNR recommended year-round continuous temperature monitoring. However, it is extremely unlikely temperature standards will be exceeded between the months of November and April, any data collected during this timeframe would provide no value to the FERC when developing license conditions. Therefore, NSPW restricted continuous temperature monitoring to the same timeframe as other monitoring commitments (i.e., May-October).

5.4.1.6 Monitoring Results for Nitrate/Nitrite and Total Nitrogen

The natural level of nitrate in surface water is typically low (less than 1.0 mg/L nitrate/nitrite). Nitrate/nitrite concentrations at the Project ranged from <0.0034 to 0.0126 mg/L and total nitrogen ranged from 0.30 to 0.56 mg/L. Therefore, nitrate/nitrite and total nitrogen levels are not a concern at the Project.

5.4.1.7 Monitoring Results for Sulfate

The concentrations of sulfate ranged from <0.71 to 4.7 mg/L, which is considered very low.

5.4.1.8 Monitoring Results for Total Mercury

None of the total mercury samples analyzed were above the detection limit.

5.4.1.9 Monitoring Results for Total Suspended Solids

Total suspended solids (TSS) are waterborne particles that exceed 2 microns in size. High TSS levels reduce water clarity. TSS at the Project ranged from 3.7 to 19.9 mg/L, which is considered very low.

5.4.2 Water Monitoring Results for Field Tested Water Quality Parameters

Results for the monitoring parameters that were field measured via use of a YSI ProDSS Multi-parameter meter are summarized below and in **Table 5.4.1-2**.

5.4.2.1 Monthly Specific Conductance Measurements

The monthly specific conductance readings ranged from 154 to 199 micro-Siemens per centimeter (µS/cm). See Section 5.4.3 for continuous monitoring results. While there is no state standard regarding specific conductance, the parameter is used as a general measure of water quality. Conductivity is generally relatively constant within a waterbody. Therefore, significant changes in conductivity may be an indicator of a source of pollution. The values collected during the study provide baseline information for future comparison.

5.4.2.2 Monthly DO Measurements

All of the monthly DO readings met the state standards, ranging from 8.63 to 11.71 mg/L. See Section 5.4.3 for continuous monitoring results.

5.4.2.3 Monthly pH Measurements

All of the monthly field analyzed surface water pH measurements were within the required range of 6.0 to 9.0. See Section 5.4.3 for continuous monitoring results.

5.4.2.4 Monthly Discrete Temperature Measurements

Discrete temperature readings ranged from 9.6 to 20.2 degrees Celsius (°C) (49.3 to 68.4°F) at Monitoring Site 1 (upstream); 9.2 to 21.6°C (48.6 to 70.9°F) at Monitoring Site 2 (deep hole); and 9.0° C to 19.8°C (48.2 F to 67.6°F) at Monitoring Site 3 (downstream). Most discrete temperature measurements were above the ambient temperature criteria for cold waters. Additional discussion of temperatures, including the continuous temperature monitoring results, are included Section 5.4.3.

Table 5.4.1-1 Summary of Lab Analyzed Water Quality Parameters for the White River Project

Parameter	White River Monitoring Site 1 (Upstream)						White River Monitoring Site 2 (Deep Hole)						White River Monitoring Site 3 (Downstream)					
	May	June	July	Aug	Sept	Oct	May	June	July	Aug	Sept	Oct	May	June	July	Aug	Sept	Oct
Ammonia (µg/L)	<30.3	<30.3	<30.0	<13.0	267.0	178.0	51.4	<30.3	<30.0	<13.0	148.0	129.0	30.5	<30.3	42.9	14.2	61.0	65.0
***E. coli* (MPN)**	56.3	36.9	62.0	49.6	137.6	23.1	20.9	13.4	25.6	3.1	162.4	24.6	23.8	30.9	53.8	40.8	155.3	21.6
Chloride (mg/L)	3.8	5.3	2.7	2.4	6.7	3.0	4.1	2.8	2.8	2.6	2.7	2.9	5.4	2.9	2.9	2.7	3.1	3.1
Chlorophyll-*a* (µg/L)	NC*	NC	1.40	1.10	2.29	NC	NC	NC	2.01	3.02	2.65	NC	NC	NC	2.18	2.39	3.49	NC
Dissolved Phosphorus (µg/L)	5.0	5.3	2.5	3.6	3.8	5.2	8.3	<1.5	<1.5	3.9	3.4	2.4	6.1	2.2	2.9	2.9	2.8	5.4
Nitrate (plus nitrite) (µg/L)	8.9	10.8	10.2	<3.4	3.6	<3.4	12.3	9.2	<3.4	<3.4	9.7	5.2	12.6	6.9	3.4	7.0	10.4	8.2
Sulfate (mg/L)	<0.71	3.9	3.5	4.0	4.6	4.4	<0.71	3.9	3.5	4.0	4.7	4.3	<0.71	4.0	3.5	4.0	4.7	4.2
Total Mercury (µg/L)	<0.16	<0.066	<0.066	<0.066	<0.066	<0.066	<0.16	<0.066	<0.066	<0.066	<0.066	<0.066	<0.16	<0.066	<0.066	<0.066	<0.066	<0.066
Total Nitrogen (mg/L)	0.46	0.39	0.34	0.34	0.34	0.33	0.52	0.49	0.33	0.33	0.30	0.34	0.56	0.45	0.53	0.48	0.50	0.50
Total Phosphorus (µg/L)	6.9	5.9	9.1	11.5	16.0	7.4	10.3	6.8	10.0	11.0	19.5	12.9	10.4	9.6	10.7	14.0	15.4	10.2
Total Suspended Solids (mg/L)	13.0	14.3	14.6	11.4	9.7	3.7	10.1	7.1	9.1	4.6	13.4	4.8	15.3	12.4	12.1	10.9	19.9	9.4

*NC = not collected per study plan

Table 5.4.1-2 Summary of Field Analyzed Water Quality Parameters for the White River Project

Parameter	White River Monitoring Site 1 (Upstream)						White River Monitoring Site 2 (Deep Hole)						White River Monitoring Site 3 (Downstream)					
	May	June	July	Aug	Sept	Oct	May	June	July	Aug	Sept	Oct	May	Jun	July	Aug	Sept	Oct
Sp. Conductance (µS/cm)	160	NC*	186	198	191	196	154	NC	192	199	191	198	159	NC	190	199	191	197
DO (mg/L)	10.09	NC	9.78	8.75	9.97	11.71	9.44	NC	8.63	9.48	9.2	11.17	9.44	NC	8.8	9.39	10.19	11.13
pH (su)	7.78	NC	8.31	8.21	7.91	8.15	7.92	NC	8.1	8.25	7.74	7.91	7.84	NC	7.92	8.09	7.97	7.91
Temp. (°C)	13.0	16.8	20.2	18.8	12.8	9.6	16.0	19.0	21.6	20.7	14.1	9.2	14.2	17.1	19.8	18.8	13.7	9.0

*NC = not collected per study plan

5.4.3 Continuous Monitoring Results

The results of continuous monitoring for temperature, DO, specific conductance, and pH are shown in **Tables 5.4.3-1** and **5.4.3-2**.

Table 5.4.3-1 Continuous Monitoring Results at White River Monitoring Site 1 (May 18 to Sept 3, 2022)

Monitoring Site 1 (Upstream)	Hobo Tidbit Temperature		Temperature		DO	Specific Conductance	pH
	(°C)	(°F)	(°C)	(°F)	(mg/L)	(µS/cm)	
Min	10.28	50.50	16.71	62.08	7.20	169.3	7.85
Max	26.92	80.46	26.16	79.09	10.47	208.8	8.73
Mean	19.11	66.40	20.53	69.95	8.80	191.8	8.27
Median	19.40	66.92	20.32	68.58	8.68	190.4	8.24

Source: (Great Lakes Environmental Center, Inc., 2022a)

Table 5.4.3-2 Continuous Monitoring Results at White River Monitoring Site 3 (May 18 to Oct 11, 2022)

Monitoring Site 3 (Downstream)	Hobo Tidbit Temperature		Temperature		DO	Specific Conductance	pH
	(°C)	(°F)	(°C)	(°F)	(mg/L)	(µS/cm)	
Min	7.97	46.35	9.82	49.68	7.00	173.8	7.83
Max	25.34	77.61	25.41	77.74	10.98	208.4	8.36
Mean	18.16	64.69	18.64	65.55	9.11	196.1	8.08
Median	19.16	66.49	19.53	67.15	9.06	198.7	8.10

Source: (Great Lakes Environmental Center, Inc., 2022a)

5.4.3.1 Temperature Continuous Monitoring Results

Hobo Tidbit Temperature readings ranged from 50.50 to 80.46°F at Monitoring Site 1 with an average of 66.40°F and from 46.35 to 77.61°F at Monitoring Site 3 with an average 64.69°F.

In accordance with Section 6.2 of the 2022 WisCALM, NSPW completed a review of the collected water temperature data and calculated the percentage of days in June, July, and August when the measured values exceeded the acute temperature criteria for a cold river and stream.[17] The monitoring period in May was not analyzed further because the acute value for May is 72°F and there were no measured maximum daily water temperature values (upstream or downstream) exceeding that value.

June Results

The acute value listed in WisCALM for June is 72°F. Six daily maximum water temperature measurements, or 20% of the margin of error-corrected (MOE-corrected) measurements, exceeded 72°F. However, the same number of daily maximum exceedances were measured at both the upstream and downstream monitoring sites. The highest June daily maximum water temperature recorded at the upstream site was 79.15°F on June 21, 2022. For comparison, the highest daily temperature recorded at the downstream site was 76.08°F on the same date. The highest June daily maximum water temperature recorded at the downstream site was 76.27°F on June 22, 2022. For comparison, the highest daily maximum temperature reading recorded at the upstream site was 76.66°F on the same date.

[17] https://dnr.wisconsin.gov/topic/SurfaceWater/WisCALM.html

July Results

The acute value listed in WisCALM for July is 73°F. Seven daily maximum water temperatures, or 22% of the MOE-corrected measurements, exceeded 73°F at the upstream site. However, only four daily maximum water temperatures, or 12.9% of the MOE-corrected, exceeded 73°F downstream. The highest July daily maximum water temperatures recorded at both sites occurred on July 19, 2022. The highest maximum daily temperature at the upstream site was 77.49°F and the highest daily maximum temperature at the downstream site was 76.31°F.

August Results

The acute value listed in WisCALM for August is 73°F. One daily maximum water temperature, or 3.2% of the MOE-corrected measurements, exceeded 73°F at the upstream site. However, zero daily maximum water temperature measurements (MOE-corrected) exceeded 73°F at the downstream site. The highest August daily maximum water temperature recorded at the upstream site was 73.75°F on August 5, 2022. For means of comparison, the highest daily maximum temperature at the downstream site was 71.16°F on the same date. The highest daily maximum water temperature recorded at the downstream site was 72.47°F on August 6, 2022. For comparison, the daily maximum temperature at the upstream site was 72.80°F on the same date.

According to the application of methods outlined in WisCALM, Project operations do not contribute to increased water temperatures at the White River Project.

5.4.3.2 DO Continuous Monitoring Results

DO at Monitoring Site 1 ranged from 7.20 to 10.47 mg/L with an average of 8.80 mg/L. DO at Monitoring Site 3 ranged from 7.00 to 10.98 mg/L with an average of 9.11 mg/L. All DO readings met state standards.

5.4.3.3 Specific Conductance Continuous Monitoring Results

Specific conductance at Monitoring Site 1 ranged from 169.3 to 208.8 µS/cm with an average of 191.9 µS/cm. Specific conductance at Monitoring Site 3 ranged from 173.8 to 208.4 µS/cm with an average of 196.1 µS/cm.

5.4.3.4 pH Continuous Monitoring Results

The pH at Monitoring Site 1 ranged from 7.85 to 8.73 with an average of 8.27. The pH at Monitoring Site 3 ranged from 7.83 to 8.36 with an average of 8.08. All pH readings met state standards.

5.5 Turbidity and Total Suspended Solids Monitoring

NSPW conducted an 8-foot drawdown of the reservoir in 2022 to replace deteriorated seals on the spillway gates. A drawdown plan was developed in consultation with the WDNR and the Bad River Tribe to address environmental concerns. The drawdown plan included the following environmental mitigation measures:

- Target drawdown elevation 703.4 feet NGVD (8-foot drawdown).
- Drawdown rate was limited to no more than 5 inches per day, not to exceed 1 inch every four hours.
- Turbidity monitoring was required to be conducted at four sites, one upstream of the reservoir and three downstream of the dam.
- Total suspended solids samples were required to be collected weekly during the drawdown at two sites.

- Environmental inspections for every one foot of drawdown (every other day), beginning at elevation 709.9 feet NGVD until the target elevation was reached (NSPW, 2022).

A description of the turbidity and TSS monitoring methods, along with the corresponding results from the 2022 drawdown, are included in the following sections. The Drawdown Monitoring Report is included in **Appendix E-11**.

5.5.1 Turbidity Monitoring

The approved drawdown plan required turbidity monitoring at four sites. Site 1 was located at Maple Ridge Road, approximately 14.8 river miles upstream of the White River Dam. Site 2 was located immediately below the Dam in the bypass reach. Site 3 was located downstream of the powerhouse. Site 4 was located approximately 6 river miles downstream of the Project at State Highway 13. Baseline monitoring of all four sites was completed between June 22 and July 14, 2022 to provide background turbidity data. Data collected as a result of this baseline monitoring is shown in **Table 5.5.1-1**.

Table 5.5.1-1 Baseline Turbidity Monitoring Results for the 2022 Drawdown

Date	Baseline Turbidity (NTU)			
	Site 1	Site 2	Site 3	Site 4
June 22, 2022	18.4	18.8	18.2	21.4
June 23, 2022 (a)	16.8	20.5	18.2	24.2
June 23, 2022 (b)	15.3	18.5	17.8	19.0
June 24, 2022	19.5	17.2	14.7	25.1
June 29, 2022	11.7	13.9	13.8	16.3
June 30, 2022(a)	13.7	13.27	13.25	21.2
June 30, 2022 (b)	12.0	14.3	11.9	16.0
July 1, 2022	16.8	12.6	12.6	24.6
July 13, 2022	12.0	15.8	16.2	19.7
July 14, 2022	15.7	15.0	15.5	25.2
Min	11.7	12.6	11.9	16.0
Max	19.5	20.5	18.2	25.2
Average	15.19	15.99	15.22	21.27
Upstream Average Turbidity (Site 1)	15.19	**Downstream** Average Turbidity (Sites 2,3,4 combined)		17.5

Source: (NSPW, 2022)

The baseline turbidity results show a relationship between Site 1 (upstream), Site 2 (downstream), and Site 3 (downstream). However, Site 4 (downstream) showed higher turbidity readings of approximately 5 to 6 Nephelometric Turbidity Units (NTU) higher than the other sites, which indicates additional factors downstream of the White River Project influence turbidity at Site 4 (six miles downstream of the Project). It should be noted the baseline monitoring did not capture any rain events to demonstrate what impacts runoff events have on turbidity levels in non-drawdown situations.

Turbidity monitoring during the drawdown phase included collecting grab samples once per day from Site 1 and Site 4, four times per day for Site 2 and Site 3, and for any storm event resulting in more than one-

half inch of rain in 24 hours during the target elevation maintenance phase. The drawdown plan directed NSPW to review its drawdown operations to determine if any mitigating measures would be warranted should turbidity levels reach the threshold level. The threshold level was defined as when downstream grab sample results exceeded the corresponding upstream result (Site 1) and greater than twice the baseline range at two or more of the downstream sites (Sites 2,3, and 4). Once the threshold levels were met, the frequency of monitoring at Site 1 was increased to four times per day (NSPW, 2022).

Turbidity monitoring results during the drawdown are shown in **Table 5.5.1-2**. Threshold exceedances occurred several times during the drawdown and are indicated in bold font in the table. The first exceedance occurred on September 9, 2022, following a rain event. Exceedances also occurred from September 12 through 16, 2022. There were no operational actions that could have been implemented to limit the increase in turbidity levels since the increase in flows was not sufficient to trigger any significant changes in gate operations (NSPW, 2022).

Table 5.5.1-2 Turbidity Monitoring Results during Drawdown

Date	Time	Flow at USGS Gage 0427500 (cfs)	Reservoir Elevation (Feet NGVD)	Site 1 (NTU)	Site 2 (NTU)	Site 3 (NTU)	Site 4 (NTU)
8/31/2022	0600	187	711.40		21.1	16.7	
8/31/2022	1000	187	711.32	16.34	20.8	17.24	24.7
8/31/2022	1400	179	711.22		21.3	18.51	
8/31/2022	1800	179	711.14		20.6	18.8	
9/1/2022	0600	179	710.89		21.5	18.25	
9/1/2022	1000	179	710.72	16.64	21.1	19.34	24.0
9/1/2022	1400	177	710.72		20.6	19.05	
9/1/2022	1800	177	710.64		19.4	19.0	
9/2/2022	0600	174	710.39		22.4	18.14	
9/2/2022	1000	177	710.31	17.01	19.2	19.12	25.0
9/2/2022	1400	172	710.22		22.9	15.2	
9/2/2022	1800	177	710.14		22.6	16.65	
9/3/2022	0600	169	709.89		23.4	19.7	
9/3/2022	1000	174	709.81	18.19	25.2	20.5	26.6
9/3/2022	1400	169	709.72		25.7	22.5	
9/3/2022	1800	172	709.65		24.9	20.4	
9/4/2022	0600	169	709.39		26.9	23.1	
9/4/2022	1000	172	709.31	16.00	25.0	21.6	26.3
9/4/2022	1400	169	709.22		23.4	20.7	
9/4/2022	1800	172	709.15		25.0	20.4	
9/5/2022	0600	172	708.90		26.3	21.3	
9/5/2022	1000	172	708.81	15.23	24.2	21.0	24.2
9/5/2022	1400	172	708.73		23.1	20.0	
9/5/2022	1800	179	708.65		23.9	21.1	
9/6/2022	0600	172	708.40		24.5	20.3	
9/6/2022	1000	172	708.31	14.04	24.9	21.3	22.3
9/6/2022	1400	172	708.22		22.8	19.2	

Date	Time	Flow at USGS Gage 0427500 (cfs)	Reservoir Elevation (Feet NGVD)	Site 1 (NTU)	Site 2 (NTU)	Site 3 (NTU)	Site 4 (NTU)
9/6/2022	1800	182	708.15		24.2	22.3	
9/7/2022	0600	174	707.90		26.2	22.0	
9/7/2022	1000	174	707.82	15.70	25.2	20.2	21.5
9/7/2022	1400	179	707.73		23.2	20.9	
9/7/2022	1800	179	707.65		26.5	21.9	
9/8/2022	600	174	707.40		29.7	22.2	
9/8/2022	1000	179	707.32		27.4	23.6	
9/8/2022	1400	177	707.23	14.8	29.7	20.9	18.6
9/8/2022	1800	169	707.15		26.6	21.2	
9/9/2022	0600	184	706.90		31.6	24.4	
9/9/2022	1000	203	706.82	25.17	47.0	26.4	44.7
9/9/2022	**1400**	**203**	**706.73**	**24.10**	**77.2**	**51.7**	
9/9/2022	**1800**	**195**	**706.65**	**23.80**	**80.7**	**57.3**	
9/10/2022	0600	211	706.40	33.80	52.9	48.6	62.6
9/10/2022	1000	219	706.32	26.20	46.0	41.8	
9/10/2022	1400	227	706.24		47.3	40.9	
9/10/2022	1800	232	706.15		49.1	45.8	
9/11/2022	0600	238	705.90		51.0	48.7	
9/11/2022	1000	235	705.82	25.30	51.3	46.3	39.3
9/11/2022	1400	235	705.73		60.1	44.9	
9/11/2022	1800	232	705.65		58.2	49.4	
9/12/2022	0600	224	705.41		53.3	47.9	
9/12/2022	**1000**	**216**	**705.32**	**19.60**	**51.9**	**44.0**	**50.1**
9/12/2022	**1400**	**211**	**705.23**	**14.37**	**46.7**	**42.3**	
9/12/2022	**1800**	**203**	**705.15**	**14.63**	**51.3**	**42.6**	
9/13/2022	0600	205	704.90	20.00	47.6	39.7	
9/13/2022	**1000**	**197**	**704.82**	**18.90**	**45.3**	**39.2**	**38.1**
9/13/2022	**1400**	**192**	**704.73**	**15.20**	**40.3**	**38.0**	
9/13/2022	**1800**	**189**	**704.65**	**14.98**	**44.6**	**38.9**	
9/14/2022	**0600**	**189**	**704.40**	**18.93**	**50.3**	**42.2**	
9/14/2022	**1000**	**189**	**704.32**	**16.63**	**47.1**	**40.3**	**37.2**
9/14/2022	**1400**	**189**	**704.23**	**14.26**	**47.5**	**36.6**	
9/14/2022	**1800**	**192**	**704.15**	**15.28**	**53.0**	**39.6**	
9/15/2022	**0600**	**187**	**703.90**	**24.0**	**50.8**	**36.9**	**51.4**
9/15/2022	**1000**	**184**	**703.82**	**19.2**	**49.7**	**42.4**	
9/15/2022	**1400**	**187**	**703.73**	**16.09**	**51.3**	**42.1**	
9/15/2022	**1800**	**189**	**703.65**	**14.9**	**50.2**	**46.4**	
9/16/2022	**0600**	**187**	**703.40**	**18.58**	**69.0**	**47.9**	
9/16/2022	**1000**	**192**	**703.40**	**18.52**	**66.9**	**48.4**	**56.7**

Source: (NSPW, 2022)

5.5.2 Total Suspended Solids

NSPW collected weekly grab samples to measure total suspended solids at monitoring Site 1 and Site 4 during the active drawdown period. TSS results appeared to be within a normal range for a medium sized river in the region. The results of TSS monitoring are summarized in **Table 5.5.2-1**.

Table 5.5.2-1 Total Suspended Solids Observed During the Active Drawdown Period

Date	Site 1 Maple Ridge Road (mg/L)	Site 4 Highway 13 (mg/L)
9/1/2022	12.0	15.6
9/6/2022	9.8	14.4
9/14/2022	16.2	30.3

Source: (NSPW, 2022)

5.6 Future Water Quality Monitoring

As described in Section 5.4, inflows to the White River Flowage do not meet NR 102 cold-water temperature standards, nor do the flows discharged from the Project. The increased temperatures are not due to Project operations as the Project operates in a run-of-river mode and features a small reservoir with a short retention time. Additionally, slightly cooler water temperatures were recorded in the downstream monitoring locations compared to the upstream site.[18]

The WDNR conducted a macroinvertebrate sampling below the White River Project in 2015 which identified a good Macroinvertebrate Index of Biological Integrity (MIBI) as discussed in Section 6.1.4.[19] No additional macroinvertebrate monitoring has been conducted since that time.

NSPW is not proposing any new facilities or any material changes to the operation of the Project.[20] As such, the continued operation of the Project is not expected to adversely impact water quality in the area. Therefore, no future monitoring is proposed.

5.7 Project Operation (Minimum Flow and Reservoir Fluctuation)

Under the proposed operation, NSPW will continue to operate the Project as a run-of-river facility, for the purpose of generating hydroelectric power, where the discharge measured immediately downstream of the Project tailrace approximates the sum of inflows into the Project reservoir. In order to minimize reservoir fluctuations, NSPW will continue to operate the reservoir between elevations 710.4 and 711.6 feet NGVD and release a minimum flow of 16 cfs or inflow, whichever is less, into the bypass reach at all times to protect aquatic resources.

[18] Regardless of the monitoring results, for the purpose of this analysis, the environmental baseline is the existing Project operation, not a pre-dam condition.
[19] The MIBI is one biological measurement that can be used to measure water quality. A good MIBI indicates that water quality is considered good and can sustain macroinvertebrate populations.
[20] Due to the short duration of the ice removal events, and their timing during high inflow periods (which matches the natural hydrologic cycle), the proposed planned deviations for ice removal purposes are not expected to have an adverse impact upon water resources. Therefore, the planned deviations are not considered a material change to operations.

Just prior to spring runoff, and for emergency purposes, NSPW may deviate from the maximum reservoir elevation by no more than of 0.5 feet to remove ice from the spillway for dam safety purposes. The duration of the deviation shall be no longer than necessary (normally less than a few days) to remove the ice and will be conducted as a planned deviation under the requirements outlined in Section 5.8.

5.8 Operational Deviations

In an effort to protect water quality, NSPW will notify the FERC, USFWS, and WDNR of planned deviations with a duration up to three weeks. This advanced notification will allow NSPW to implement any agency-recommended measures in an effort to minimize adverse environmental impacts during planned deviations.

An after-the-fact notification process for unplanned deviations will allow the FERC, USFWS, and WDNR to respond to any stakeholder questions about the deviations in an informed manner.[21] The process will also allow the NSPW to track the deviations. Should a deviation result in unanticipated adverse environmental impacts as identified by the responding operator(s), NSPW will address the cause of the deviation so as to limit future deviations of a similar nature.

NSPW recommends the following deviation requirements be incorporated into any issued license:

Planned Deviations
Project operation may be temporarily modified for short periods, of up to 3 weeks, after mutual agreement among USFWS, and WDNR (collectively, resource agencies), the Bad River Tribe, and the Licensee. Upon concurrence from the resource agencies, the Licensee must file a report with the Secretary of the Commission as soon as possible, but no later than 14 calendar days after the onset of the planned deviation. Each report must include: (1) reasons for the deviation and how project operations were modified, (2) duration and magnitude of the deviation, (3) any observed or reported environmental effects and how the observations were made, and (4) documentation of consultation with the resource agencies. For planned deviations exceeding 3 weeks, the Licensee shall file for Commission approval an application for a temporary amendment of license.

Unplanned Deviations
Operations may be temporarily modified if required by operating emergencies beyond the control of the Licensee (i.e., unplanned deviations). For any unplanned deviation that lasts longer than 3 hours ***or*** *results in visible adverse environmental effects such as a fish kill, turbidity plume, bank erosion, or downstream flooding, the Licensee shall file a report with the Secretary of the Commission as soon as possible, but no later than 14 days after each such incident. The report must include: (1) cause of the deviation, (2) duration and magnitude of the deviation, (3) any pertinent operational and/or monitoring data, (4) a timeline of the incident and the Licensee's response, (5) any comments or correspondence received from the resource agencies, Bad River Tribe, or confirmation that no comments were received from the resource agencies, (6) documentation of any observed or reported environmental effects, and (7) a description of measures implemented to prevent similar deviations in the future.*

For unplanned deviations lasting 3 hours or less that do not result in visible adverse environmental effects, the Licensee must file an annual report, by March 1, describing each incident that occurred

[21] Unplanned deviations may include, but are not limited to, operating gates to sluice debris collecting on the dam that has the potential to impact gate operations that could prevent proper gate operations.

during the prior calendar year. The report must include: (1) cause of the deviation, (2) duration and magnitude of the deviation, (3) any pertinent operational and/or monitoring data, (4) a timeline of the incident and the Licensee's response to each deviation, (5) any comments or correspondence received from the resource agencies, Bad River Tribe, or confirmation that no comments were received from the resource agencies, and (6) a description of measures implemented to prevent similar deviations in the future.

NSPW will develop an operations monitoring plan, in consultation with the WDNR, and the Bad River Tribe to document how it will comply with the operational requirements of the license, including reservoir elevation and minimum flow requirements. The plan will also include the following:

- locations of headwater monitoring gages,
- frequency of monitoring,
- procedures for maintaining and calibrating monitoring equipment,
- standard operating procedures to be implemented outside of normal operating conditions, such as scheduled or emergency facility shutdowns or maintenance activities,
- schedule for installing and operating the monitoring equipment, and
- procedures to remove ice from the spillway as a planned deviation.

The cost to develop the operations monitoring plan is estimated at $30,000, with an additional estimated annual cost of $10,000 for deviation reporting.

5.9 Water Quality Impacts During Project Operation

Water quality monitoring programs conducted in the Project area are described in Section 5.2.

No ground disturbing activities are proposed as part of this application that could impact water quality due to erosion or siltation. NSPW has not identified any proposed operational changes that would adversely impact minimum flows, run-or-river operations, or reservoir elevation requirements.[22] Therefore, the proposed operation of the Project is not expected to adversely impact water quality.

5.10 Water Quality Certification

NSPW will request a water quality certification from WDNR, pursuant to Section 401 of the Clean Water Act, no later than 60 days following the Commission's issuance of the Notice of Application Ready for Environmental Assessment.

[22] The planned deviations for ice removal purposes are not expected to cause adverse effects to water quality due to their short duration and timing during high flow periods, which matches the natural hydrologic cycle. Therefore, the planned deviations are not considered a material change regarding impacts to water quality.

6. Report on Fishery, Terrestrial, and Endangered Resources

The Project works consist of dam that includes a left earth embankment, an intake structure, a gated spillway section and a right earth embankment; a reservoir with a surface area of 39.9 acres at the maximum elevation of 711.6 feet NGVD, a conveyance system from the intake to the powerhouse consisting of a conduit, a surge tank, and two penstocks; a concrete powerhouse that houses two generating units, an underground transmission line, and appurtenant facilities. A bathymetric map developed as part of the 2022 ATIS study is included in **Appendix E-12**.

Under the proposed operation, NSPW will continue to operate the Project as a run-of-river facility, for the purpose of generating hydroelectric power, where discharge measured immediately downstream of the Project tailrace approximates the sum of inflows into the Project reservoir. In order to minimize reservoir fluctuations, NSPW will continue to operate the reservoir between elevations 710.4 and 711.6 feet NGVD. NSPW also will continue to release a minimum flow of 16 cfs or inflow, whichever is less, at all times to protect aquatic resources.

Just prior to spring runoff, and for emergency purposes, NSPW may deviate from the maximum reservoir elevation by not more than 0.5 feet to remove ice from the spillway for dam safety purposes. The duration of the deviation shall be no longer than necessary, typically less than a few days, to remove the ice and will be conducted as a planned deviation under the requirements outlined in Section 5.8.

NSPW is not proposing any material changes to White River Project facilities or operations.[23]

6.1 Existing Resources

6.1.1 Aquatic Habitat Resources

As part of the ATIS study, NSPW conducted a point-intercept aquatic vegetation survey of White River Flowage. To account for both early and late season species, two surveys were completed, one in late June and one in mid-July. WDNR provided a point intercept plan with 212 sampling grid points distributed evenly throughout the flowage. Per WDNR guidelines, grid points to be sampled included those located in water depths of less than 15 feet or to the maximum depth of colonization (MDC) if less than 15 feet (WI Department of Natural Resources, 2010).

The vegetation survey was conducted from a boat using a global positioning system (GPS) with submeter accuracy to navigate to the grid point locations. Points were sampled using a double-sided rake mounted on a pole. The rake was lowered until it rested gently on the river bottom, twisted twice, and then raised straight up out of the water. The density for each rake sample was recorded based on rake fullness. Plants not collected on the rake sample, but visible within six feet of the sample point, were recorded as visual sightings.

[23] The planned deviations for ice removal purposes are not expected to cause adverse fishery, terrestrial, or endangered resources due to their short duration and timing outside during high flow periods, which matches the natural hydrologic cycle. Therefore, the planned deviations are not considered a material change regarding impacts to fishery, terrestrial, or endangered resources.

A meander survey of the near shore littoral zone (areas less than 5 feet in water depth) was also conducted for aquatic invasive species. A summary of aquatic and terrestrial invasive species identified during the ATIS survey is provided in Section 6.1.5 and Section 6.1.9, respectively.

Additional information on bed substrates and water depths was collected during the June survey at points with water depths less than 15 feet. Substrate was categorized using nine substrate types: clay, silt, sand, gravel, cobble, boulder, bedrock, wood, or organic. During rake sampling, the presence or absence of woody debris on the lake bottom was also noted. Locations with coarse woody habitat greater than four inches in diameter and five feet in length that were observed in the water at or below the ordinary high-water mark (OHWM) were mapped. Maps depicting the substrate types and coarse woody habitat are shown in Figures 11 and 12, respectively. The ATIS Study Report is included in **Appendix E-6**.

During the June survey a total of 163 of the 212 grid points were sampled. The remaining grid points were not sampled for the following reasons:

- Grid point was terrestrial (3)
- Grid point was in an area where water depth was greater than 15 feet (15)
- Grid point was unnavigable (27)
- Grid point was too shallow (4)

Of the 163 sample points, 49 were shallower than the MDC (4 feet) of which 19 had vegetation. A total of 15 species were identified during the survey. Two of the identified species, common arrowhead (*Sagettaria latifolia)* and sago pondweed (*Stuckenia pecitinata*), were observed visually but not present on the rake. The predominant species from the June survey, in order of prevalence, included coontail (*Ceratophullum demersum*), leafy pondweed (*Potamogeton foliosus*), common waterweed (*Elodea canadensis*), and grass leaved arrowhead (*Sagittaria graminea*). The average rake fullness during the study was 1.3.

During the July survey, 74 of the 212 grid points were sampled. The remaining grid points were not sampled for the following reasons:

- Grid point was terrestrial (4)
- Grid point was in an area where water depth was greater than the MDC (101)
- Grid point was unnavigable (29)
- Grid point was too shallow (4)

Of the 74 points sampled, 46 were shallower than the MDC of which 22 had vegetation. Seventeen species were identified during the survey, one of which was observed visually (narrow leaf cattail - *Typha angustifolia*). The predominant species identified during the July survey, in order of prevalence, included leafy pondweed, grass-leaved arrowhead, common waterweed, and coontail. The average rake fullness during the July survey was 1.8.

Occurrences of wild rice (*Zizania sp*.) were identified along the northern shoreline of the reservoir during both surveys. Wild rice locations are shown in Figure 4 of the ATIS Study report.

Table 6.1.1-1 lists all submerged aquatic plant species identified during the early season and late season ATIS Surveys. **Table 6.1.1-2** provides an overall summary of the ATIS survey. The ATIS Study Report, including all maps and datasheets, is included in **Appendix E-6**.

Table 6.1.1-1 Species of Aquatic Vegetation Observed During White River Project ATIS Surveys

Common Name	Scientific Name
Clasping-leaf pondweed	*Potamogeton richardsonii*
Common arrowhead	*Sagittaria latifolia*
Common bur-reed	*Sparganium eurycarpum*
Common waterweed	*Elodea canadensis*
Coontail	*Ceratophyllum demersum*
Flatstem pondweed	*Potamogeton zosteriformis*
Floating-leaf pondweed	*Potamogeton natans*
Grass-leaved arrowhead	*Sagittaria graminea*
Leafy pondweed	*Potamogeton foliosus*
Muskgrass	*Chara sp.*
Narrowleaf cattail	*Typha angustifolia*
Ribbonleaf pondweed	*Potamogeton epihydrus*
Sago pondweed	*Stuckenia pectinata*
Small duckweed	*Lemna minor*
Vasey's pondweed	*Potamogeton vaseyi*
Water star grass	*Heteranthera dubia*
White-stem pondweed	*Potamogeton praelongus*
White water lily	*Nymphaea odorata*
Wild rice	*Zizania sp.*

Source: (GAI Consultants, Inc., 2022a)

Table 6.1.1-2 Overall White River Project Point-Intercept Vegetation Survey Summary

Statistic	June 2022	July 2022
Littoral Frequency of Occurrence	38.8	47.8
Maximum Plant Depth	4.0	3.8
Species Richness	13	17
Floristic Quality Index	19.7	24.7

Source: (GAI Consultants, Inc., 2022a)

6.1.2 Fish

6.1.2.1 Summary of Historic Fish Sampling Efforts

The WDNR indicated in its comments on the PAD that the Fish Mapper Database, which was used to develop fisheries information for the PAD, has been discontinued and removed from the WDNR website and therefore should not be used for relicensing purposes. The WDNR requested that fisheries information provided in response to the PAD questionnaire be used instead. NSPW noted that all data provided by the WDNR was included in Appendix 6-1 of the PAD and is already included in the public

record. While there was a significant amount of data, much of what was related to the White River Project was outdated, reaching back to before the last relicensing and in some cases back to the 1960s.

NSPW has amended the Historic Fish Monitoring information to include the following:

- fisheries monitoring data collected in the immediate Project vicinity.
- fish sampling efforts completed during the last relicensing effort in 1989 and 1990.
- the most recent reservoir sampling conducted in 2015.
- trend monitoring information upstream of the Project spanning between 2006 and 2019.

WDNR White River Project Relicensing Fish Study-1989-1990

The WDNR conducted a fish study in 1989 and 1990 that was funded by NSPW. Areas surveyed included three stations. Station 1 included the White River Flowage and an area extending ¼ mile upstream of the flowage. Station 2 included the bypass reach between the dam and the powerhouse. Station 3 included the tailrace area from the powerhouse and extending downstream ¼ mile. The full results of the study are included in **Appendix E-13**.

Electrofishing was conducted by the WDNR on September 25, 1989 at Station 1 and used a pulsed, direct current (DC) boom shocker deployed from a boat. The shoreline electrofishing involved 1.5 hours of generator-on time and was conducted at night with two dip netters collecting fish. In addition to electrofishing, fyke nets were fished in the flowage from April 13-16, 1990. A total of 17 net lifts were made over the course of the four days. Sampling in Station 1 produced 14 species of fish which are shown in **Table 6.1.2.1-1**. The fish community was dominated by white sucker *(Catostomus commersonii)*, black bullhead *(Ameiurus melas)*, common shiner *(Notropis cornutus)*, and northern pike *(Esox lucius)*. White sucker was the overwhelmingly predominant species collected during electrofishing with a catch rate of 202.7 fish/hour, while northern pike and black bullhead co-dominated the spring fyke net catch with catch rates of 16.0 and 15.6 fish/net/day, respectively (**Table 6.1.2.1-2**) (NSPW, 1991).

Station 2 was sampled on August 14 and September 15, 1989 and on April 17, 1990. A DC stream shocker was used. The plunge pool below the dam required the use of a boat to hold the stream shocker due to its depth (one person dip netting). The remained of the downstream reach was sampled by wading (two people dip netting). Station 2 had the greatest diversity of fish among the stations sampled, producing 21 species of fish which are shown in **Table 6.2.2.1-1**. The most abundant species were common shiner, longnose dace *(Rhinicthys cartaractae)*, and white sucker. The stream segment offers good habitat for the small minnows and juveniles of other species that comprise the river's forage base. It is also frequented by transient gamefish including Lake Superior migrants, but it is unknown whether the area is used for spawning (NSPW, 1991). The White River Dam is the first impassible barrier on the river and prevents Lake Superior migrants and invasive species such as sea lamprey (*Petromyzon marinus*) from moving further upstream into the river basin.

Station 3 was sampled using a DC stream shocker on August 15, 1989 and April 17, 1990. The fish community at Station 3 was represented by most of the species that were encountered in the upstream bypass reach, although there were some differences in the two fish assemblages (**Table 6.1.2.1-1**). The same species that were dominant in Station 2 (common shiner, longnose dace, and white sucker) were dominant at Station 3, but they were supplemented by a fourth species, the shorthead redhorse

(*Moxostoma macrolepidotum).* In addition, blacknose dace *(Rhinicthys atratulus)*, trout-perch *(Percopsis omiscomaycus)* and logperch *(Percina caprodes)* were common in Station 3, while they were only present in Station 2. Five species were collected in Station 2 that were not found in Station 3 including rainbow trout *(Oncorhynchus mykiss)*, fathead minnow *(Pimephales promelas)*, largemouth bass *(Micropterus salmoides)*, yellow perch *(Perca flavescens),* and Johnny darter *(Etheostoma nigrum)*. Smallmouth bass *(Micropterus dolomieu)*, rock bass *(Ambloplites rupestris)*, and walleye *(Sander vitreum)* were only collected in Station 3 (NSPW, 1991).

Table 6.1.2.1-1 Fish Species Sampled in 1989-1990 and Relative Abundance in the White River Flowage, Bypass Reach, and Tailrace

Common Name	Scientific Name	Flowage Station 1	Bypass Reach Station 2	Tailrace Station 3
Black bullhead	*Ameiurus melas*	Abundant	Present	Present
Black crappie	*Pomoxis nigromaculatus*	Present		
Blacknose dace	*Rhinicthys atratulus*		Present	Common
Bluegill	*Lepomis macrochirus*	Present		
Bluntnose minnow	*Pimephales notatus*	Present	Present	Present
Brown trout	*Salmo trutta*	Present	Present	Present
Burbot	*Lota lota*		Present	Present
Common shiner	*Notropis cornutus*	Abundant	Abundant	Abundant
Creek chub	*Semotilus atromaculatus*	Present	Common	Present
Fathead minnow	*Pimephales promelas*		Common	
Hornyhead chub	*Nocomis biguttatus*		Common	Present
Johnny darter	*Etheostoma nigrum*		Present	
Largemouth bass	*Micropterus salmoides*	Present	Present	
Logperch	*Percina caprodes*		Present	Common
Longnose dace	*Rhinicthys cartaractae*		Abundant	Abundant
Northern pike	*Esox lucius*	Abundant	Present	Present
Pumpkinseed	*Lepomis gibbosus*	Present	Present	Present
Rainbow trout	*Oncorhynchus mykiss*		Present	
Rock bass	*Ambloplites rupestris*			Present
Sand shiner	*Notropis stramineus*		Present	Present
Shorthead redhorse	*Moxostoma macrolepidotum*	Common	Common	Abundant
Smallmouth bass	*Micropterus dolomieu*			Present
Trout-perch	*Percopsis omiscomaycus*		Present	Common
Walleye	*Sander vitreus*			Present
Warmouth	*Lepomis gulosus*	Present		
White sucker	*Catostomus commersonii*	Abundant	Abundant	Abundant
Yellow perch	*Perca flavescens*	Present	Present	

Source: (NSPW, 1991)

Table 6.1.2.1-2 Results of Fall 1989 Electrofishing and Spring 1990 Fyke Netting in the White River Flowage by WDNR

Common Name	September 25, 1989 Electrofishing Results*		April 13-16 1990 Fyke Netting Results	
	Number	Catch/Hour	Number	Catch/Net/Day
Black bullhead	11	7.3	272	16.0
Black crappie	1	0.7	4	0.235
Bluegill	9	6.0	6	0.352
Brown trout	7	4.7	-	-
Largemouth bass	9	6.0	1	0.058
Northern pike	9	6.0	266	15.6
Pumpkinseed	5	3.3	3	0.176
Shorthead redhorse	4	5.3	95	5.6
Warmouth	1	0.7	-	-
White sucker	152	202.7	61	3.6
Yellow perch	2	1.3	-	-

*Other species captured included creek chub, common shiner, and bluntnose minnow.
Source: (NSPW, 1991)

2015 WDNR White River Flowage Surveys

The WDNR conducted fyke netting surveys in the White River Flowage from April 8-10, 2015. **Table 6.1.2.1-3** includes the numbers of each species captured during the surveys. The fish were captured with 15 net nights of effort (5 nets over three nights) (WI Department of Natural Resources, 2020). The 2015 WDNR fyke netting survey forms are included in **Appendix E-14**.

Table 6.1.2.1-3 2015 WDNR White River Flowage Fisheries Survey Data

Common Name	Scientific Name	Number	Percentage[24]
Black crappie	*Pomoxis nigromaculatus*	5	1.8%
Bluegill	*Lepomis macrochirus*	23	8.4%
Brown bullhead	*Ameiurus nebulosus*	13	4.8%
Brook trout	*Salvelinus fontinalis*	1	0.4%
Brown trout	*Salmo trutta*	1	0.4%
Northern Pike	*Esox lucius*	21	7.7%
Pumpkinseed	*Lepomis gibbosus*	6	2.2%
Shorthead Redhorse	*Moxostoma macrolepidotum*	123	45.6%
White Sucker	*Catostomus commersonii*	80	29.6%

Source: (WI Department of Natural Resources, 2020)

WDNR Trend Monitoring 2006 to 2019

The WDNR provided long-term trend monitoring data in their response to NSPW's PAD questionnaire. The trend monitoring includes fisheries data collected from 2006 to 2019 on a 5.8-mile reach of the White River

[24] Percentage does not add to 100% due to rounding.

from Sutherland Bridge to a primitive campsite within the Bibon Swamp. This river reach is located approximately 30 river miles/12 linear miles upstream of the White River Project. Information provided by the WDNR is included in **Appendix E-15** and is summarized below (WI Department of Natural Resources, 2020).

Of the 4,323 fish identified between 2006 and 2019, the five most predominant species collected included:

- Brown trout at 4,031 or 93.2% (most abundant fish)
- White sucker at 255 or 5.9%
- Brook trout at 31 or 0.7%
- Northern pike at 3 or 0.07%
- Tiger trout (*Salmo trutta* x *Salvelinus fontinalis*) at 2 or 0.05%
- Creek chub at 1 or 0.02%

Fish Stocking

A review of the WDNR Fish Stocking Database identified only one occurrence of fish stocking within the White River Flowage. A total of 2,000 yearling brown trout were stocked in the reservoir in 1977 (WI Department of Natural Resources, n.d.b).

6.1.2.1 Current Fisheries Information – 2022 Fisheries Study

Despite the recent fisheries information for the White River Flowage, there was no current fisheries data downstream of the White River Dam. Therefore, NSPW conducted a fisheries study to quantify fish population relative abundance and document the composition of the general fish community in two river reaches below the dam. The first reach (bypass reach) was located between the White River Dam and Project powerhouse. The second reach (tailrace) began at the powerhouse and extended downstream for approximately ¼ mile. The study also evaluated the riverine habitat of the two reaches. In order to compare the fish community between the bypass reach and tailrace, fisheries data was recorded separately for each reach. Similarly, in order to compare the habitat between the two reaches, half of the habitat assessment transects were established in each reach.

Electrofishing Results

Stream electrofishing surveys were conducted seasonally in the spring (late May), summer (late July), and fall (late September) of 2022. One electrofishing pass was conducted during each season. Each electrofishing pass was distributed across the stream channel and throughout various habitats as conditions dictated. Electrofishing was conducted via a towed barge with a pulsed DC-current set up controlled by a Smith-Root Generator Powered Pulser running to a hand-held netted anode and powered by a 12 V alternating current generator. Time fished was recorded in seconds to allow for catch per unit effort (CPUE) calculations (Great Lakes Environmental Center, Inc., 2022b).

Collected fish were held in a live-well until the end of each sampling pass, when they were counted and identified to species. After processing, fish were released in an area where the risk of recapture was minimized. Larger fish were measured to the nearest millimeter and weighed to the nearest gram. For smaller fish, a length range was obtained (smallest and largest value of each species) and the fish were batch weighed in order to register a valid weight on the scale.

Ideally, fish sampling was to be conducted under low flows to provide easier access and fish collection. While spring flows were high during the May sampling, the summer and fall sampling were conducted during low flow conditions. Streamflow conditions during the surveys are shown below in **Table 6.1.2.2-1**.

Table 6.1.2.2-1 Streamflow during Fish and Habitat Sampling Events Below the White River Dam

Sampling Date	Bypass Reach Flow (cfs)	Powerhouse Flow (cfs)	Total Flow (cfs)
May 26, 2022	130	270	400
May 27, 2022	145	270	415
July 25, 2022	40	150	190
September 27, 2022	20*	190	210
September 28, 2022	20*	185	205

*Minimum flow from dam (16cfs) plus estimated leakage flow (4cfs) from gate 2

A total of 2,389 individual fish, representing 26 species and nine families, were collected during the sampling events. CPUE was calculated for each species collected by dividing the number of individuals collected by the number of seconds of button time on the electrofishing unit. Common shiner was the most abundant species collected and represented over 40% of all fish captured during the study. The next most abundant species included shorthead redhorse (15%), longnose dace (11%), trout-perch (9%), hornyhead chub *(Nocomis biguttatus)* (5%), and smallmouth bass (5%). The remaining species each represented less than 5% of the total fish captured. Complete results of the fisheries and riverine habitat assessment study are included in **Appendix E-16**. **Table 6.1.2.2-2** shows the total number of individuals collected, relative abundance, and CPUE for each species.

Table 6.1.2.2-2 Species Collected Below the White River Dam During the 2022 Fisheries Study

Common Name	Scientific Name	Total Collected	Relative Abundance†	CPUE (#/sec.)
Black bullhead	*Ameiurus melas*	1	0.04%	7.54831E-05
Blacknose shiner	*Notropis heterolepis*	9	0.38%	0.000679348
Bluntnose minnow	*Pimephales notatus*	44	1.84%	0.003321256
Brown trout	*Salmo trutta*	28	1.17%	0.002113527
Central stoneroller	*Campostoma anomalum*	1	0.04%	7.54831E-05
Chestnut lamprey	*Ichthyomyzon castaneus*	1	0.04%	7.54831E-05
Common shiner	*Luxilus cornutus*	964	40.35%	0.072765700
Creek chub	*Semotilus atromaculatus*	76	3.18%	0.005736715
Fathead minnow	*Pimephales promelas*	10	0.42%	0.000754831
Golden redhorse	*Moxostoma erythrurum*	1	0.04%	7.54831E-05
Hornyhead chub	*Nocomis biguttatus*	127	5.32%	0.009586353
Johnny darter	*Etheostoma nigrum*	42	1.76%	0.003170290
Largemouth bass	*Micropterus salmoides*	4	0.17%	0.000301932
Logperch	*Percina caprodes*	27	1.13%	0.002038043
Longnose dace	*Rhinichthys cataractae*	256	10.72%	0.019323671
Northern pike	*Esox lucius*	3	0.13%	0.000226449

Pumpkinseed	*Lepomis gibbosus*	5	0.21%	0.000377415
Rainbow trout	*Oncorhynchus mykiss*	1	0.04%	7.54831E-05
Rock bass	*Ambloplites rupestris*	14	0.59%	0.001056763
Ruffe	*Gymnocephalus cernuus*	1	0.04%	7.54831E-05
Shorthead redhorse	*Moxostoma macrolepidotum*	351	14.69%	0.026494565
Smallmouth bass	*Micropterus dolomieu*	118	4.94%	0.008907005
Trout-perch	*Percopsis omiscomaycus*	208	8.71%	0.015700483
Walleye	*Sander vitreus*	4	0.17%	0.000301932
White sucker	*Catostomus commersonii*	85	3.56%	0.006416063
Yellow perch	*Perca flavescens*	8	0.33%	0.000603865
TOTAL NUMBER OF SPECIES		**26**		
TOTAL NUMBER OF INDIVIDUALS		**2,389**		

[†] Percent Total Fish Collected

Habitat Assessment Results

A habitat assessment was conducted following WDNR Guidelines for Evaluating Habitat of Wadable Streams, with the objective of evaluating the habitat quality in the White River downstream of the dam. A total of 14 transects (seven in each river reach) were established, each separated by 45 meters (m).

The study area contained a mix of riffle, run, and pool habitat dominated by hard substrate. The bypass reach (Reach 1) was primarily bedrock while the tailrace (Reach 2) was a mix of bedrock boulder, cobble, and gravel. Shallow water and areas of soft substrates were rare in both reaches. Cover for adult gamefish, which includes boulders, aquatic macrophytes, overhanging vegetation, undercut banks, woody debris, ledges, etc., in at least 20 cm of water, was somewhat sparse through the entire study area. A comparison of the physical parameters of each reach are presented in **Table 6.1.2.2-3**.

Table 6.1.2.2-3 Physical Parameters of the Habitat Study Area

Study Area	Entire Study Area (Transects 1-14)	Bypass Reach (Transects 1-7)	Tailrace Area (Transects 8-14)
Wetted Width Range (m)	7 - 32	7 - 27	17 - 32
Average Wetted Width (m)	20.9	17.6	24.3
Thalweg Depth Range (cm)	43 - 120	43 - 75	65 - 120
Average Thalweg Depth (cm)	77.4	60.6	94.1
Amount of Fish Cover Range (m)	0-3	0.5-1	0-3
Average Amount of Fish Cover (m)	1.3	0.7	1.8
Amount of Fish Cover Range (%)	0 - 13.6	2.2 - 12.9	0 - 13.6
Average Amount of Fish Cover (%)	6.7	5.2	8.2
Percent Rocky Substrate Range (%)	78.8 - 100	100	78.8 - 100
Average Percent Rocky Substrate (%)	96.2	100	92.3

Using the habitat data collected and the fish habitat rating system developed by the WDNR, an average fish habitat score was calculated for each study reach. The score, which ranges from zero to 100, is divided into the following categories:

- Excellent ≥80
- Good 60-80
- Fair 20-60
- Poor <20

The habitat data was entered into the WDNR fish habitat scoring worksheet for streams greater than 10 meters wide to develop habitat ratings. The ratings are included below in **Table 6.1.2.2-4**. The study area as a whole (including both reaches) scored in the "good" range with an overall score of 69. Deductions from the top score of 100 were due primarily to moderate depths, relatively low amounts of fish cover, and a lack of bends or other stream complexes which add to the overall diversity of the stream structures. When evaluating the data from the bypass and tailrace reach separately, both still scored in the "good" range; however, the bypass reach scored on the low end of the range (61) while the tailrace area scored on the upper end (77). The differences between the two reaches were found to be thalweg depths and fish cover. Thalweg depths are generally shallower in the bypass reach and hence the lower score. Fish cover was slightly more prevalent in the tailrace area, thereby resulting in a higher score for that reach.

Table 6.1.2.2-4 Fish Habitat Rating Scores for Entire Study Area, Bypass Reach, and Tailrace Area

Rating Item	Entire Study Area Rating Score	Bypass Reach Rating Score	Tailrace Area Rating Score
Bank Stability	Excellent (12)	Excellent (12)	Excellent (12)
Maximum Thalweg Depth	Good (16)	Fair (8)	Good (16)
Riffle: Riffle or Bend: Bend Ratio	Good (8)	Good (8)	Good (8)
Rocky Substrate	Excellent (25)	Excellent (25)	Excellent (25)
Cover For Fish	Fair (8)	Fair (8)	Good (16)
TOTAL SCORE	**69**	**61**	**77**

Since the Project is a run-of-river facility, the habitat ratings for the tailrace area are indicative of the natural river conditions. The bypass reach received a rating of 8 (Fair) for maximum thalweg depth compared to a rating of 16 (good) for thalweg depth in the tailrace area. The bypass reach also received a rating of 8 (fair) for fish cover compared to a rating of 16 (good) in the tailrace area. For the remaining three categories (bank stability, riffle or bend ratio, and rocky substrate), both reaches received the same ratings.

The bypass reach received a total score of 61 (good) for aquatic habitat compared to an overall score of 77 (good) for the tailrace. Both reaches, although differing in thalweg depth, are rated good for aquatic habitat. Increasing the minimum flow requirement to provide for greater depth and aquatic habitat was considered during the previous licensing proceeding; however, there was no information available indicating a higher minimum flow release would provide additional benefit to the current minimum flow of 16 cfs (Federal Energy Regulatory Commission, 1997). The same statement holds true as evidenced by the results of the 2022 study where the bypass reach provides good aquatic habitat under the current 16 cfs minimum flow requirement.

Under the current license, there is no requirement to pass woody debris downstream. This restricts the amount of woody debris available for fish habitat in the bypass reach. Additional fish cover would be provided if the subsequent license required woody debris be sluiced downstream. A woody debris management plan, whereby NSPW would be required to pass woody vegetation collected at the dam into the bypass reach, could improve fish cover. Therefore, to enhance the aquatic habitat of the bypass

reach and areas further downstream, NSPW proposes to pass woody debris collected at the dam[25] and intake into the bypass reach. Further detail is provided in Section 6.4.1.

6.1.2.2 Fish Entrainment and Mortality Information

A search of available literature during the development of the PAD did not identify any historic entrainment or mortality information regarding the White River Project. No entrainment studies were requested by the resource agencies during either the current or previous relicensing processes.

The White River Project contains a 20-foot-high by 14.25-foot-wide main trashrack with 1.25-inch clear spacing (NSPW, 1991). The approach velocities at the trash racks are calculated to be approximately 1.6 feet per second (fps) with a vertical open length of 18.5 feet and an open width of 12.0 feet. The maximum hydraulic capacity of the powerhouse is 350 cfs. The combination of low intake velocities and existing narrow trashrack spacing precludes the passage of larger fish while allowing primarily young-of-year fish to pass. Young-of-year fishes are more susceptible to entrainment but are less prone to mortality due to their small size. Natural mortality in the first year for most resident fish species is very high; therefore, an additional small increment in mortality due to turbine passage at the early life state should not significantly affect the overall fishery.

6.1.3 Freshwater Mussels

6.1.3.1 Historic Mussel Information

In response to the PAD questionnaire, the WDNR provided information confirming giant floaters (*Pyganodon grandis*) have been identified within the reservoir by WDNR staff (WI Department of Natural Resources, 2020). The WDNR also provided information regarding mussel species present in the West Branch of the White River. This tributary is located approximately 24 miles upstream of the Project and is likely not representative of mussels found within the White River Project.

6.1.3.2 Current Mussel Information – 2022 Mussel Study

In order to provide additional information regarding the mussel community in the Project vicinity, mussel surveys were conducted within two riverine reaches in 2022. The objectives of the surveys were to provide baseline data on mussel species occurrence, diversity, and abundance within the Project boundary.

The mussel surveys were performed according to the 2015 *WDNR Guidelines for Sampling Freshwater Mussels in Wadable Streams* and other standard protocols. Two river reaches were sampled. Reach 1 (upstream reach) began approximately 1,200 m upstream of the White River Dam and extended an additional 1,000 m upstream within a riverine area upstream of the flowage proper. Reach 2 (downstream reach) began 35 m downstream of the powerhouse and extended approximately 1,000 m downstream.

Within each reach, a series of transects extending bank to bank were established every 100 m creating a series of 10 possible transects for each reach. Transects were numbered sequentially from downstream to upstream and a random number function was used to select five transects to survey within each reach.

Searches along each transect were conducted in 10-m segments and extended 0.5 m on each side of the transect. A rapid visual search for signs of freshwater mussels was performed within each segment. The

[25] During major flood events, there is large tangle of debris above the gates that must be removed with clam bucket. Passing these large accumulations after flood events is not possible and this will need to be reflected in the upcoming plan.

rapid visual search entailed an initial search of 0.2 min/m^2 along each 10-m segment to determine if mussels were present. If mussels were present in a particular segment, a semi-quantitative search was triggered and the time was extended for one min/m^2. During the semi-quantitative search, divers were to visually search, probe the substrate, and turn over rocks to detect small, burrowed mussels (Enviroscience, 2022).

General stream conditions and morphology were recorded within the study area. Water depth and river bottom substrate composition using the Wentworth Scale were record for each 10-transect segment. In addition, a general description of mussel habitat characteristics within the Project was recorded.

The mussel survey was conducted on June 21, 2022. River flow at the time was 242 cfs as recorded at USGS gage 04027500 below the Project powerhouse. Maximum visibility was approximately 0.5 m and water temperatures ranged from 67°F downstream of the dam to 71°F upstream of the dam (Enviroscience, 2022).

Reach 1 encompassed a stretch of river upstream of the main impoundment with slow water velocities. Transects 1, 2, 3, 7, and 10 were randomly selected for sampling. The substrate in most transect segments was primarily sand and silt. Some gravel was also present along Transects 7 and 10, as were exposed patches of bedrock/hardpan. Water depths ranged from 0.3 to 1.5 m. No evidence of mussels, living or dead, was observed in Reach 1 (Enviroscience, 2022).

Reach 2 consisted primarily of riffle and run habitat with a few deeper pools with moderate to swift water velocities. Transects 2, 5, 6, 9, and 10 were randomly selected for sampling. The substrate varied somewhat among the transects but was generally coarse throughout the entire reach. Cobble and gravel were the primary substrate constituents in the three downstream transects (Transects 2, 5, and 6) with small amounts of sand present in most segments. Boulder became more prevalent in Transect 9 and fine material was absent. Substrate in Transect 10, nearest to the powerhouse, was almost exclusively bedrock with a small amount of cobble. Water depths ranged from 0.3 to 1.1 m. No evidence of mussels, live or dead, was observed in Reach 2 (Enviroscience, 2022).

The mussel study concluded that the study reaches do not appear to provide quality mussel habitat. Reach 1, upstream of the dam, was characterized by fine substrate and slow current velocity. Reach 2, downstream of the dam, was characterized by coarse substrate and swift current. Neither habitat type is particularly suitable for mussels. Many species are not tolerant of the impounded conditions upstream of the dam, while the coarse substrate and swift current downstream of the dam likely prevent mussels from burrowing and maintaining position in the substrate (Enviroscience, 2022). The Mussel Study Report is included in **Appendix E-17**.

6.1.3.3 Current Mussel Information – 2022 White River Flowage Drawdown Environmental Surveys

As previously discussed in Section 5.5, NSPW conducted an eight-foot reservoir drawdown in the fall of 2022 to replace the seals on the spillway gates. The approved drawdown plan required NSPW to conduct environmental surveys during the drawdown period. The environmental surveys entailed searching the exposed reservoir bed for fish and mussel species and returning any species found to deeper water. The surveys began on September 3, 2022 and were conducted every other day until the target reservoir elevation was reached on September 16, 2022. The surveys identified 204 live papershell mussels, which were likely cylindrical papershell (*Anondontoides ferussacianus*); 3 northern brook lamprey (*Ichthyomyzon*

fossor), of which 1 was live and 2 were dead; one central mudminnow (*Umbra limi*); and one black bullhead (*Ameiurus melas*). All live mussels and fish species were relocated to a permanently inundated areas of the reservoir. Additional details from the environmental inspections are included in the White River Drawdown Report in **Appendix E-11**.

6.1.4 Macroinvertebrate Community

In 2015, the WDNR conducted macroinvertebrate sampling at monitoring station 023127, *White River Downstream Hwy 112 near Ashland, WI*. This station is located a short distance downstream of the Project's powerhouse. The study results are included in **Appendix E-18**.

The WDNR uses biological indices, including the Macroinvertebrate Index of Biological Integrity (MIBI), to determine the Aquatic Life portion of the FAL-Fish and Aquatic Life designated use. According to the 2022 WisCALM guidelines, condition category thresholds for non-wadable river MIBI scores are as follows (WI Department of Natural Resources, 2021):

- >75 Excellent
- 50-75 Good
- 25-49 Fair
- <25 Poor

The MIBI value at monitoring station 023127 was listed at 70, indicating the site falls within the upper end of the "good" condition category. No other macroinvertebrate sampling information within the Project vicinity has been identified.

6.1.5 Aquatic Invasive Species

Chapter NR 40 of the Wisconsin Administrative Code (NR 40) makes it illegal to possess, transport, transfer, or introduce certain invasive species into the state without a permit (WI Department of Natural Resources, n.d.c). NR 40 requirements are often used as a guide at hydroelectric projects to determine which species should be considered invasive. NR 40.03 classifies invasive species into two categories: prohibited and restricted. Prohibited species are defined as invasive species not currently found in Wisconsin, but if introduced are likely to survive, spread, and potentially cause negative environmental and economic impacts. Restricted species are invasive species already established in Wisconsin and have caused or are believed to cause negative environmental and economic impacts. NR 40 further categorizes invasive species by group, which include plants, algae and cyanobacteria, aquatic invertebrates (except crayfish), fish and crayfish, terrestrial and aquatic vertebrates (except fish), terrestrial invertebrates and plant disease-causing microorganisms, and fungus.

6.1.5.1 Historic Aquatic Invasive Species

A review of the WDNR Lakes and Aquatic Invasive Species Mapping Tool identified one invasive species listed in NR 40 in the vicinity of the Project, reed canary grass (*Phalaris arundinacea)* (WI Department of Natural Resources, n.d.d). Currently only the ribbon grass cultivar is proposed to be listed as a restricted species under the rule (WI Department of Natural Resources, n.d.e). The remaining cultivars of reed canary grass are not currently, or proposed to be, classified as restricted or prohibited species. The ribbon grass cultivar has not been identified at the Project.

The Ashland County Land and Water Conservation Department conducted aquatic invasive species monitoring on the White River Project reservoir in 2019. Narrowleaf cattail, a restricted species under NR40, was identified within the reservoir during the surveys (WI Department of Natural Resources, n.d.a).

6.1.5.2 Current Aquatic Invasive Species Information

NSPW conducted an ATIS Study at the Project in 2022. The study area encompassed the aquatic portions of the Project reservoir, bypass reach and tailwater area and the upland areas owned by the NSPW located within the current and proposed project boundaries. Aquatic invasive species monitoring was conducted concurrently with the submerged aquatic vegetation survey (Section 6.1.1). Each sampling point was inspected for the presence of invasive species as included in NR 40.

A single invasive species, narrowleaf cattail, was identified on the rake during the June point-intercept survey. One additional aquatic invasive species, aquatic forget-me-not (*Myosotis scorpiodes*), was observed growing along the shoreline in one location and was hand pulled during the June survey. No aquatic invasive species were identified on the rake during the July point-intercept survey. However, narrow-leaf cattail was observed on the reservoir and several new locations of aquatic forget-me-not were also observed. All of the aquatic forget-me-not plants observed were hand pulled and disposed of properly (GAI Consultants, Inc., 2022a).

In addition to aquatic vegetation sampling, two water samples were collected during the July survey using WDNR protocol to sample for the presence of zebra mussels (*Dreissena polymorpha*). Likewise, two water samples were collected to sample for the presence of spiny and fishhook water fleas (*Bythotrephes longimanus* and *Cercopagis pengoi,* respectively*).* The samples were delivered to the Wisconsin State Lab of Hygiene in Madison on August 11, 2022 for analysis. All water samples tested negative for the presence of zebra mussel veligers and water fleas (GAI Consultants, Inc., 2022a).

Sediment samples were collected at the boat launch on the White River Flowage using WDNR protocol. The samples were examined for the presence of invasive macroinvertebrates, including Asian clam (*Corbicula fluminea*), faucet snail (*Bithynia tentaculate*), New Zealand mud snail (*Potamopyrgus antipodarum*), Malaysian trumpet snail (*Melanoides tuberculata*), rusty crayfish (*Orconectes rusticus*), and others. The area around the sampling site was also visually examined for live snails, crayfish, or shells. The sediment sampling did not identify the presence of any invasive macroinvertebrates (GAI Consultants, Inc., 2022a). The complete ATIS Study Report is included in **Appendix E-6** and includes maps depicting the locations of aquatic invasive species.

6.1.6 Terrestrial Habitat

The terrestrial habitat along both the upstream and the downstream Project shoreline was characterized in 2022 during the ATIS study. The shoreline was divided into four different classifications based on the natural communities and land use present. The majority of the shoreline is heavily forested and dominated by tree species typical for the ecological landscape. A more thorough listing of botanical species found in terrestrial areas is included in Section 6.1.8.

6.1.7 Wildlife

Wildlife found in the vicinity of the Project includes various mammals, reptiles, amphibians, and birds typical of the ecological provinces in which the Project is located.

6.1.7.1 Mammal Species

Mammal species likely to be found in the vicinity of the Project are listed in **Table 6.1.7.1-1**. The list is based on the mammal species list for the Whittlesey Creek National Wildlife Refuge, which is located a few miles northwest of the Project (US Fish and Wildlife Service, 2006).

Table 6.1.7.1-1 Mammal Species in Vicinity of the Project

Common Name	Scientific Name
Arctic shrew	*Sorex arcticus*
American beaver	*Castor canadensis*
Badger	*Taxidea taxus*
Big brown bat	*Eptesicus fuscus*
Black bear	*Ursus americanus*
Bobcat*	*Lynx rufus*
Canada Lynx*	*Lynx canadensis*
Coyote	*Canis latrans*
Eastern chipmunk	*Tamias striatus*
Eastern cottontail	*Sylvilagus floridanus*
Eastern gray squirrel	*Sciurus carolinensis*
Eastern pipistrelle	*Pipistrellus subflavus*
Fisher	*Martes pennanti*
Gray fox	*Urcyon cineoargenteus*
Gray wolf	*Canis lupis*
Hoary bat	*Lasiurus cenereus*
House mouse	*Mus musculus*
Masked shrew	*Sorex cinereus*
Least chipmunk	*Eutamias minimus*
Least weasel	*Mustela nivalis*
Little brown bat	*Myotis lucifugus*
Long-tailed weasel	*Mustela frenata*
Marten*	*Martes americana*
Meadow jumping mouse	*Zapus hudsonius*
Meadow vole	*Microtus pennsylvanicus*
Muskrat	*Ondontra zibethicus*
Mink	*Mustela vison*
Moose*	*Alces alces*
North American deer mouse	*Peromyscys maniculatus*
Northern flying squirrel	*Glaucomys sabrinus*
Northern long-eared bat	*Myotis septentrionalis*
Northern short-tailed shrew	*Blarina bevicauda*
Norway rat	*Rattus norvegicus*
Plains pocket gopher	*Geomys bursarius*
Porcupine	*Erethizon dorsatum*
Pygmy shrew	*Sorex hoyi*
Raccoon	*Procyon lotor*

Common Name	Scientific Name
Red bat	*Lasiurus borealis*
Red fox	*Vulpes vulpes*
Red squirrel	*Tamiasciurus hudsonicus*
River otter	*Lutra canadensis*
Silver-haired bat	*Lasionycteris noctivagans*
Short-tailed weasel	*Mustela erminea*
Snowshoe hare	*Lepus americanus*
Southern bog lemming	*Synaptoms cooperi*
Southern flying squirrel	*Glaucomys volans*
Southern red-backed vole	*Clethrionomys gapperi*
Star-nosed mole	*Condylura cristata*
Striped skunk	*Mephitis*
Thirteen-lined ground squirrel	*Spermophilus tridecemlineatus*
Virginia opossum	*Didelphis virginiana*
Water shrew	*Sorex palustris*
White-footed deer mouse	*Permyscus leucpus*
White-tailed deer	*Odocoileus virginianus*
Woodland jumping mouse	*Napaeozapus insignis*
Woodchuck	*Marmota monax*

* Although identified in Whittlesey Creek NWR mammal list, these species are not known to occur in the Project vicinity.

6.1.7.2 Herptile Species

Reptiles and amphibians likely to be found in the Project vicinity are listed below. Species information is based on Whittlesey Creek National Wildlife Refuge data (US Fish and Wildlife Service, 2006).

Table 6.1.7.2-1 Herptile Species in Vicinity of the Project

Common Name	Scientific Name
American bullfrog	*Rana catesbeiana*
American toad	*Bufo americanus*
Blue spotted salamander	*Ambystoma laterale*
Central newt	*Notophthalmus viridescens*
Chorus frog	*Pseudacris triseriata*
Common snapping turtle	*Chelydra sepentina*
Common gartersnake	*Thamnophis sirtalis*
Eastern gray treefrog	*Hyla versicolor*
Eastern hog-nosed snake	*Heteron platirhinos*
Eastern red-backed salamander	*Plethodon cinereus*
Four-toed salamander	*Hemidactlylium scutatum*
Fox snake	*Elaphe vulpine*
Green frog	*Rana clamitans*
Leopard frog	*Rana pipiens*
Mink frog	*Rana septentrionalis*
Mudpuppy	*Necturus maculosus*
Northern prairie skink	*Eumeces septentrionalis*

Common Name	Scientific Name
Northern red bellied snake	*Diadophis occipitomaculata*
Northern spring peeper	*Pesudacris crucifer*
Northern water snake	*Nerodia sepidon*
Painted turtle	*Chrysemys picta*
Ring-necked snake	*Diadophis punctatus*
Smooth green snake	*Opheodrys vernalis*
Spotted salamander	*Ambystoma maculatum*
Wood frog	*Rana sylvatica*
Wood turtle	*Glyptemys insculpta*

6.1.7.3 Avian Species

Avian species historically observed in the Project vicinity can be found on the Cornell E-Bird White River Flowage Checklist. These species are included in **Table 6.1.7.3-1** (Cornell E Bird, n.d.).

Table 6.1.7.3-1 Avian Species in the Vicinity of the Project

Common Name	Scientific Name
Alder flycatcher	*Empidonax alnorum*
American crow	*Corvus brachyrhynchos*
American Goldfinch	*Carduelis tristis*
American kestrel	*Falco sparverius*
American redstart	*Setophaga ruticilla*
American robin	*Turdus migratorius*
American woodcock	*Scolopax minor*
Baird's sandpiper	Calidris bairdii
Bald eagle	*Haliaeetus leucocephalus*
Barn swallow	*Hirundo rustica*
Barred owl	*Strix varia*
Belted kingfisher	*Megaceryle alcyon*
Black-capped chickadee	*Poecile atricapilla*
Blue Jay	*Cyanocitta cristata*
Blue-winged teal	*Anas discors*
Broad-winged hawk	*Buteo platypterus*
Buff-breasted sandpiper	*Tryngites subruficollis*
Bufflehead	*Bucephala albeola*
Canada goose	*Branta canadensis*
Canada warbler	*Cardellina canadensis*
Cedar waxwing	*Bombycilla cedrorum*
Chestnut-sided warbler	*Setophaga pensylvanica*
Cliff swallow	*Petrochelidon pyrrhonota*
Common merganser	*Mergus merganser*
Common raven	*Corvus corax*
Common yellowthroat	*Geothlypis trichas*
Dark-eyed junco	*Junco hyemalis*

Common Name	Scientific Name
Downy woodpecker	*Picoides pubescens*
Eastern bluebird	*Sialia sialis*
Eastern kingbird	*Tyrannus tyrannus*
Eastern meadowlark	*Sturnella magna*
Eastern wood-pewee	*Contopus virens*
European starling	*Sturnus vulgaris*
Great blue heron	*Ardea herodias*
Great crested flycatcher	*Myiarchus crinitus*
Greater yellowlegs	*Tringa melanoleuca*
Hairy woodpecker	*Picoides villosus*
Hooded merganser	*Lophodytes cucullatus*
Killdeer	*Charadrius vociferus*
Least sandpiper	*Calidris minutilla*
Lesser yellowlegs	*Tringa flavipes*
Lincoln's sparrow	*Molospiza lincolnii*
Mallard	*Anas platyrhynchos*
Merlin	*Falco columbarius*
Mourning dove	*Zenaida macroura*
Mourning warbler	*Oporonis philadelphia*
Nashville warbler	*Leiothlypis ruficapilla*
Northern flicker	*Colaptes auratus*
Northern rough-winged swallow	*Stelgidopteryx serripennis*
Ovenbird	*Seiurus aurocapillus*
Pectoral sandpiper	*Calidris melanotos*
Pied-billed grebe	*Podilymbus podiceps*
Pileated woodpecker	*Dryocopus pileatus*
Pine siskin	*Carduelis pinus*
Pine warbler	*Dendroica pinus*
Red crossbill	*Loxia curvirostra*
Red -breasted grosbeak	*Pheucticus ludovicianus*
Red-breasted nuthatch	*Sitta canadensis*
Red-eyed vireo	*Vireo olivaceus*
Red-tailed hawk	*Buteo jamaicensis*
Red-winged blackbird	*Agelaius phoeniceus*
Ring-billed gull	*Larus delawarensis*
Ruby-crowned kinglet	*Corthylio calendula*
Ruffed grouse	*Bonasa umbellus*
Semipalmated plover	*Charadrius semipalmatus*
Semipalmated sandpiper	*Calidris pusilla*
Short-billed dowitcher	*Limnodromus griseus*
Solitary sandpiper	*Tring solitaria*
Song sparrow	*Melospiza melodia*
Spotted sandpiper	*Actitis macularia*

Common Name	Scientific Name
Stilt sandpiper	*Calidris himantopus*
Tree swallow	*Tachycineta bicolor*
Trumpeter swan	*Cygnus buccinator*
Turkey vulture	*Cathartes aura*
Veery	*Catharus fuscescens*
White-breasted nuthatch	*Sitta carolinensis*
White-throated sparrow	*Zonotrichia albicollis*
Wild turkey	*Meleagris gallopavo*
Wood Duck	*Aix sponsa*
Yellow-rumped warbler	*Setophaga coronata*

Source: (Cornell E Bird, n.d.)

6.1.8 Botanical Resources

Ecological landscapes are classified by a combination of physical factors including climate, geology, topography, soils, water, and vegetation. Wisconsin defines 16 ecological landscapes within the state (WI Department of Natural Resources, 2015).

The Project is located within the Superior Coastal Plain Ecological Landscape. East of the Bayfield Peninsula, the landscape consists of level plains gently sloping towards Lake Superior. They are dissected by many deeply incised streams and several large rivers that flow from south to north towards the lake. Aspen dominated boreal forests are abundant on the clay plains. In some areas, white spruce, balsam fir and eastern white pine are now common understory species or are colonizing abandoned pastures and fields. Older stands of boreal conifers still occur in a few places (WI Department of Natural Resources, 2015). A map showing the ecological landscapes of Wisconsin is included in **Appendix E-19**.

The habitat along the Project shoreline was characterized during the 2022 ATIS Study. The predominant community type was Northern Mesic Forest with 100% of the shoreline falling into that classification. The typical botanical species found along the shoreline areas in the Project vicinity are shown in **Table 6.1.8-1**, **Table 6.1.8-2**, and **Table 6.1.8-3**. These tables include species identified during the ATIS study, those found within the Northern Mesic Forest type, and species identified during the last licensing process.

Table 6.1.8-1 Typical Tree Species in Project Vicinity

Common Name	Scientific Name
American basswood	*Tilia americana*
Balsam fir*	*Abies balsamea*
Black ash	*Fraxinus nigra*
Eastern hemlock*	*Tsuga canadensis*
Eastern white cedar*	*Thuja occidentalis*
Eastern white pine*	*Pinus strobus*
Paper birch*	*Betula papyrifera*
Quaking aspen	*Populus tremuloides*
Sugar maple*	*Acer saccharum*

Common Name	Scientific Name
Red maple	*Acer rubrum*
White spruce*	*Picea glauca*

*Observed during ATIS Study
Source: (GAI Consultants, Inc., 2022a) (NSPW, 1991)

Table 6.1.8-2 Typical Shrub Species in Project Vicinity

Common Name	Scientific Name
Alder species	*Alnus spp.*
Alternate-leaved dogwood	*Cornus alternifolia*
American hazelnut	*Corylus americana*
Beaked hazelnut	*Corylus cornuta*
Common buckthorn*	*Rhamnus cathartica*
Eurasian honeysuckle*	*Lonicera spp*
Gray dogwood	*Cornus racemosa*
Leatherwood	*Dirca palustris*
Red osier dogwood	*Cornus sericea*
Willow species	*Salix spp.*
Winterberry	*Ilex verticillata*

* Observed during ATIS Study
Source: (GAI Consultants, Inc., 2022a) (NSPW, 1991)

Table 6.1.8-3 Typical Herbaceous Species in Project Vicinity

Common Name	Scientific Name
Aquatic forget-me-not*	*Myosotis scorpioides*
Blackberry	*Rubus allegheniensis*
Black-eyed Susan	*Rudbeckia hirta*
Black raspberry	*Rubus occidentalis*
Blue vervain	*Verbena hastata*
Canada thistle*	*Cirsium arvense*
Crown vetch*	*Coronilla varia*
Dogbane	*Apocynum cannabinum*
Ferns*	*Pteridophyta spp.*
Jewelweed	*Impatiens capensis*
Joe-pye weed	*Eupatorium maculatum*
Narrowleaf cattail*	*Typha angustifolia*
Poison ivy	*Rhus radicans*
Red raspberry	*Rubus idaeus*
Reed canary grass	*Phalaris arundinacea*
Sedges	*Carex spp.*
Solomon’s seal	*Polygonatum biflorum*
Spotted knapweed*	*Centaurea stoebe*

Stinging nettle	*Urtica dioica*
Tansy*	*Tanacetum vulgare*
Wild parsnip*	*Pastinaca sativa*
Yarrow	*Achillea millefolium*

*Observed during ATIS Study

Source: (GAI Consultants, Inc., 2022a) (NSPW, 1991)

6.1.9 Terrestrial Invasive Species

As part of the relicensing process, stakeholders recommended studies to document observed invasive species in the vicinity of the Project. Information regarding terrestrial invasive species was documented concurrent with the ATIS Surveys.

6.1.9.1 Upland Shoreline Survey

Upland shoreline areas were surveyed from a boat, or on foot where use of a boat was not possible, while moving slowly along the shoreline. During the survey, an overall characterization of the terrestrial plant community was made. Invasive terrestrial plants listed in NR40 were noted and their location was recorded via a handheld GPS unit. The shoreline survey identified two invasive species, narrow-leaf cattail, and aquatic forget-me-not. Narrowleaf cattail was identified along 42.29% (0.96 miles) of the surveyed shoreline. Aquatic forget-me-not was identified along 0.26% (0.006 miles) of surveyed shoreline (GAI Consultants, Inc., 2022a).

6.1.9.2 Upland Meander Survey

A meander survey was completed along the upland shoreline areas owned by NSPW including those lands with Project facilities and recreation sites. The survey was divided into the following four regions:

- Northwest (NW): included lands located between the flowage and Highway 112 and north of the dam, including the boat launch area.
- Northeast (NE): included lands located east of Highway 112 and north of White River, including the powerhouse and associated buildings, access roads, and canoe portage put-in.
- Southwest (SW): included lands located between the flowage and Highway 112 and south of the dam.
- Southeast (SE): included lands located east of Highway 112 and south of the White River.

A total of eight terrestrial invasive species were identified during the upland meander survey (GAI Consultants, Inc., 2022a). Species identified during the survey are shown in **Table 6.1.9.2-1**. A description of each terrestrial invasive species' frequency of occurrence and maps showing their locations are included in the ATIS Study Report found in **Appendix E-6**.

Table 6.1.9.2-1 Terrestrial Invasive Species Identified During the ATIS Survey

Common Name	Scientific Name	Location	Status
Canada thistle	*Cirsium arvense*	NW, NE, SW, SE	Restricted
Common buckthorn	*Rhamnus cathartica*	NE	Restricted
Crown vetch	*Coronilla varia*	NW, NE, SW, SE	Restricted
Eurasian honeysuckle	*Lonicera spp.*	NE	Restricted

Common Name	Scientific Name	Location	Status
Narrow-leaf cattail	*Typha angustifolia*	NE, SW	Restricted
Spotted knapweed	*Centaurea stoebe*	NE, SW, SE	Restricted
Tansy	*Tanacetum vulgare*	NW, NE	Restricted
Wild parsnip	*Pastinaca sativa*	NE, SW	Restricted

Source: (GAI Consultants, Inc., 2022a)

6.1.10 Threatened and Endangered Resources

6.1.10.1 Federally Listed Species

The USFWS Information for Planning and Consultation (IPaC) website was accessed on July 20, 2022 to update the official list of federally threatened or endangered species for the Project. The list identified the potential presence of two federally endangered species, two federally threatened species, and one candidate species likely to occur within the vicinity of the Project. The species and their federal status are shown in **Table 6.1.10.1-1** and described in the following paragraphs (US Fish and Wildlife Service, 2022a). The White River Project IPaC Resource List is included in **Appendix E-20**.

Table 6.1.10.1-1 Species Identified in IPaC Resource List for the White River Project

Common Name	Scientific Name	Group	Status
Canada lynx	*Lynx canadensis*	Mammal	Threatened
Gray wolf	*Canis lupus*	Mammal	Endangered
Northern long-eared bat	*Myotis septentrionalis*	Mammal	Threatened
Bald Eagle	*Haliaeetus leucocephalus*	Bird	Protected
Piping Plover	*Charadrius melodus*	Bird	Endangered
Monarch Butterfly	*Danaus plexippus*	Insect	Candidate/endangered

Source: (US Fish and Wildlife Service, 2022a)

Canada Lynx

The Canada lynx is a federally endangered mammal species associated with moist, cool, boreal spruce-fir forests with rolling terrain. They are dependent upon snowshoe hare populations and need persistent deep powdery snow, which limits competition from other predators (US Fish and Wildlife Service, 2021a). There is no designated critical habitat for the species within Wisconsin. A breeding population has never been discovered and it is believed that most occurrences are drifters coming through Michigan or Minnesota. Wisconsin removed the lynx from the state's endangered species list due to the lack of a breeding population in the state. The species is now listed as protected by the state (UW Stevens Point, n.d.). While unlikely, it is possible that lynx may pass through the Project vicinity. Therefore, the proposed operation of the Project is not expected to impact the species.

Gray Wolf

The gray wolf was removed from the Wisconsin state endangered species list in 2004. In 2007, the USFWS delisted the Western Great Lakes wolf population (including WI, MI, and MN). The delisting rule was challenged in federal court and vacated in 2008, resulting in the gray wolf being relisted as federally endangered in Wisconsin and Michigan. In 2009, the USFWS again delisted the Western Great Lakes wolf population. Due to the failure to hold public hearings on the delisting, the rule was vacated via a

federal court order in 2009 and relisted as endangered in Wisconsin and Michigan. Wolves retained this status until 2011 when the USFWS issued a new delisting rule. The rule was vacated by a federal court and wolves reverted back to federally endangered status in 2014. In 2020, the gray wolf was again delisted by a USFWS delisting rule. On February 10, 2022, the order was again vacated by a federal court restoring the endangered status for wolves in Wisconsin and Michigan, which remains in effect (WI Department of Natural Resources, 2022b).

The gray wolf is a federally endangered mammal that lives in family groups or packs. The wolf is a habitat generalist. There were an estimated 292 wolf packs in Wisconsin during the winter of 2020-2021 with an average territory size of 63.4 square miles (WI Department of Natural Resources, 2022b). Wolves prefer areas which consist mainly of forestland and other wildland areas. They are common in northern Wisconsin and Upper Peninsula of Michigan and although they were not identified in Wisconsin's Natural Heritage Inventory (NHI) review for the Project vicinity, they may occasionally pass through the Project. Therefore, the proposed operation of the Project is not expected to impact the species.

Northern Long-Eared Bat

The northern long-eared bat is a Wisconsin threatened mammal. The species was reclassified from federally threatened to federally endangered on November 30, 2022 (US Fish and Wildlife Service, 2022b). The NLEB roosts during the summer months underneath loose bark or in cavities or crevices of both live and dead trees. Non-reproducing females and males may also roost in cool places such as caves or mines. The NLEB feeds in the forest interior and hibernates in caves and mines during the months of October through April. Ashland and Bayfield Counties are within the NLEB range. The location of hibernacula and maternity roost trees are tracked in Wisconsin's NHI. However, there are no known hibernacula or roost trees in the vicinity of the Project (WI Department of Natural Resources, 2022a). Project operations that involve tree removal activities may impact unknown maternity roosts. NSPW has proposed mitigation measures in Section 6.4.2 to address these types of potential impacts.

Bald Eagle

The bald eagle lives near rivers, lakes, and marshes. In winter, birds congregate near open water in tall trees to spot prey and roost at night for sheltering. The bird mates for life and chooses the tops of large trees to build nests, which they typically use and enlarge each year. They may have one or more alternate nests within their breeding territory. Bald eagles typically return to breeding grounds within 100 miles of where they were raised. Project activities that involve disturbance within 660 feet of a nest during the nesting season may cause impacts to the species (US Fish and Wildlife Service, 2021b).

As of August 9, 2007, the bald eagle population had recovered to the extent that it no longer required the protection of the federal Endangered Species Act; however, is it still protected by the Migratory Bird Treaty Act, the Bald and Golden Eagle Protection Act, and the Lacey Act (US Fish and Wildlife Service, 2021b), 2021b). The bald eagle is no longer listed as a threatened, endangered, or special concern species in Wisconsin. The IPaC Official Species List identified the potential presence of bald eagles in the Project vicinity. However, the NHI review did not identify any eagle nests within a two-mile buffer of the Project boundary (WI Department of Natural Resources, 2022a). NSPW has not proposed any specific activities in this application that involve vegetation management or construction activities within

660 feet of any active eagle nests.[26] Therefore, the proposed operation of the Project is not expected to impact the species.

Piping Plover

The piping plover is a State of Wisconsin and federally endangered bird species. The bird prefers to nest and forage along the shores of Lake Superior and Lake Michigan which feature sparse or non-vegetated sand-pebble beaches with less than 5% vegetative cover. Nests are simple depressions in the sand and are generally placed in level areas between the water's edge and the first dune. The recommended avoidance period is May 15 to July 30.

While there is suitable habitat for the species along the shoreline of Lake Superior, approximately 5 miles north of the Project, there is no suitable habitat present within the Project vicinity. The species was not identified as being present in the Project vicinity in the NHI review. Since there is no suitable habitat for the Piping Plover in the Project vicinity, the proposed operation of the Project is not expected to impact the species.

Monarch Butterfly

On December 15, 2020, the USFWS announced the listing of the monarch butterfly as endangered or threatened under the ESA was warranted; however, it was precluded by higher priority listing actions. The decision was the result of an extensive status review of the species that compiled and assessed the monarch's current and future status. The monarch butterfly is now a candidate species under the ESA. As a candidate species, its status will be reviewed annually until a listing decision is made (US Fish and Wildlife Service, n.d.c).

The monarch butterfly is one of the most recognized North American butterflies with its 3.5- to 4-inch-long striking orange and black wings. Wisconsin monarchs are migratory, journeying to central Mexico for the winter each year. Adults feed on nectar collected from flowers (WI Department of Natural Resources, n.d.h).

Habitat for the monarch butterfly is located within the Project vicinity. The proposed operation is not expected to result in the direct take of the monarch butterfly during any life stage. Nor is the proposed operation of the Project expected to result in any loss of habitat. Therefore, the proposed operation is not expected to have an adverse impact upon the species.

6.1.10.2 State Listed Species

A review of the Wisconsin NHI conducted on June 9, 2022 by the WDNR indicated two state threatened species are likely to occur in the vicinity of the Project (WI Department of Natural Resources, 2022a). The species are shown in **Table 6.1.10.2-1**. The NHI Endangered Resources Review is included in **Appendix E-21** as a privileged document.

[26] Since routine maintenance of existing recreation sites has been occurring over the term of the existing license and will continue under the subsequent license, any new eagle nests established within a 660-foot buffer of the recreation sites is unlikely to be adversely affected, because the eagles would be establishing the new nest despite the presence of the recreation sites and its routine maintenance activities.

Table 6.1.10.2-1 State Threatened and Endangered Species Likely to Occur in the White River Project Vicinity

Common Name	Scientific Name	Group	State Status
Upland sandpiper	*Bartramia longicauda*	Bird	Threatened
Wood turtle	*Glyptemys insculpta*	Reptile	Threatened

Source: (WI Department of Natural Resources, 2022a)

Upland Sandpiper

The upland sandpiper (*Bartramia longicauda*) is a state threatened bird that prefers grasslands with low to moderate forb cover, moderate grass cover, moderate litter cover and little bare ground. Dominant breeding habitats in Wisconsin include lightly grazed pastures, old fields, idle upland grasslands, barrens, and hayfields for nesting. Heavily grazed pastures, hayfields, fallow fields, and row crops are used for foraging. The avoidance period for the species is April 30 to July 25 (WI Department of Natural Resources, n.d.f).

While the current and former agricultural lands in the Project vicinity provide habitat for the species, these areas are on uplands outside of both the White River valley and outside of the Project boundary. These areas are unaffected by Project operations, even during flood conditions. Therefore, the proposed operation of the Project is not expected to impact the species.

Wood Turtle

The wood turtle (*Glyptemys insculpta*) is a state threated reptile species that prefers rivers and streams with adjacent riparian wetlands and upland, deciduous forests. The species often forages in open wet meadows or shrub-carr habitats dominated by speckled alder. They overwinter in streams and rivers in deep holes or undercut banks where there is enough water flow to prevent freezing. The species typically remains within 300 m of rivers and streams. Wood turtles nest in open or semi-open canopy areas containing gravel or sandy soils, typically within 200 feet of the water (WI Department of Natural Resources, n.d.g). The species is known to occur within the Project boundary.

In order to provide additional information regarding areas of suitable wood turtle nesting habitat within the Project boundary, a Wood Turtle Nesting Habitat Study was completed in 2022. A visual encounter survey for presence/absence of basking and nesting wood turtles on Project shorelines was conducted by approximating WDNR survey guidelines. The presence/absence of suitable wood turtle nesting habitat was mapped in the month of June on sunny days when the temperature was between 50°F and 80°F. On June 16, 2022, the visual encounter survey was completed on the uplands and shorelines downstream of the dam. Areas upstream of the dam were surveyed on June 29, 2022.

Property owned by NSPW within 200 feet of the water was surveyed on foot. Within this area, two surveyors walked abreast at approximately 10-15 m apart along the shoreline, adjusting the distance to accommodate for topography and vegetation. Shoreline areas not owned by NSPW were sampled using a boat, moving slowly along the shoreline with the aid of binoculars to provide a good view into the upland understory.

A total of 1.41 acres of wood turtle nesting habitat was mapped within 200 feet of the shoreline. The majority of the nesting habitat is comprised of the gravel access roads to the powerhouse and dam, a small portion of the road shoulder along Highway 112, and the gravel boat launch area. A small area of

naturally occurring nesting habitat was mapped upstream of the dam, but this area has steep slopes which may discourage wood turtles from nesting.

High quality nesting habitat (naturally occurring habitat not associated with roadways) was not readily available within the Project boundary. Most of the shoreline upstream of the dam was heavily vegetated down to the shore and consisted of either steep-sloped forested land or wetland marsh dominated by cattails, burr reed, or reed canary grass. In a few areas, the banks sloughed to the extent that trees have fallen into the river. These areas provide the only naturally occurring habitat with open canopy and sandy substrates; however, they may not be suitable for nesting due to steep slopes (GAI Consultants, Inc., 2022b).

Downstream of the dam, the shoreline is dominated by bedrock and steep slopes. The nesting habitat observed on the north shoreline was comprised of gravel roads and areas where foot traffic and mowing exposed the substrate (GAI Consultants, Inc., 2022a).

No basking wood turtles were observed during the study. Those basking turtles identified during the study were all painted turtles. Two turtle nests were observed at the boat launch. They appeared to be painted turtle nests based on their size. A dead painted turtle was also found at the site (GAI Consultants, Inc., 2022b). The complete study report and map showing the location of wood turtle habitat within the Project are located in **Appendix E-22**.

NSPW has not proposed any specific activities in this application that involve ground disturbing activities within areas of suitable nesting habitat, extensive ground disturbing activities which could cause erosion or sedimentation adjacent to the river, or work on the reservoir bed.[27] However, day-to-day operational activities such as regular maintenance activities at the Project's recreation sites, could cause an impact on a wood turtle if it is nesting at the site (see Section 6.3.2.3).

6.2 Agency/Stakeholder Recommended Mitigation Measures

Fishery, terrestrial, and endangered resources mitigation measures recommended by resource agencies and stakeholders are described in the following sections.

6.2.1 Recommended Aquatic Mitigation Measures

The WDNR requested that NSPW develop a Drawdown Plan in their comments on the PAD. The Bad River Tribe requested studies in their comments on the PAD; however, they did not recommend aquatic mitigation measures at that time.

In their June 2, 2023 letter providing comments on the DLA, the Bad River Tribe requested that several additional studies be conducted, including studies regarding aquatic invasive species. They also requested that treatment of aquatic invasive species be incorporated into the management of the reservoir with a goal of suppressing aquatic invasive plants. In addition to study requests, the Bad River Tribe requested that the license include provisions to include the Bad River Tribe in any notifications regarding planned or unplanned deviations. Section 5.8 of this Exhibit E has been revised to include the

[27] Maintenance of existing recreation sites is not considered ground-disturbing activity.

Bad River Tribe as a consulting party to be notified of planned or unplanned deviations. The Bad River Tribe's comments and NSPW's responses are included in *Volume 4, Documentation of Consultation*.

6.2.2 Recommended Terrestrial Mitigation Measures

Although the WDNR and Bad River Tribe both requested studies, neither recommended terrestrial mitigation measures in their comments on the PAD. The Bad River Tribe did not request any specific terrestrial mitigation measures in their June 2, 2023 letter providing comments on the DLA. No other stakeholders provided comments on the DLA.

6.3 Anticipated Project Impacts

6.3.1 Aquatic Impacts

6.3.1.1 Aquatic Invasive Species

Maintenance of recreational facilities and Project works can pose a risk to the transfer of aquatic invasive species. Mitigation and enhancement measures for these potential impacts are further discussed under Section 6.4.

6.3.1.2 Work on Reservoir Bed

Work on the reservoir or riverbed below the OHWM can have an adverse impact upon rare and sensitive resources. NSPW has not proposed any specific activities in this application which would result in disturbance to the reservoir bed. Therefore, no mitigation measures have been proposed.

6.3.1.3 Erosion and Siltation

Although NSPW has not proposed any specific activities in this application that could cause erosion and siltation at the Project, there is a potential for erosion or sedimentation to develop along the shoreline over the term of the subsequent license that could have an adverse impact on aquatic resources. NSPW has proposed mitigation measures in Section 6.4 to address these potential effects.

6.3.1.4 Reservoir Drawdowns

The timing, drawdown rate, and other factors of a reservoir drawdown can have adverse impacts upon aquatic resources. Regular drawdowns are not required to operate the Project and no drawdowns are currently planned at this time. Reservoir drawdowns are discussed further under Section 6.4.

6.3.2 Terrestrial Impacts

6.3.2.1 Recreational Site Improvements

New construction and major maintenance projects [28] at recreational facilities involving significant ground disturbance have the potential to cause adverse terrestrial effects. NSPW has not proposed any new construction or major maintenance activities that would involve ground disturbance that could the potential to adversely affect terrestrial resources as part of this FLA. A discussion of ongoing recreational site maintenance is included in Section 8.5.

[28] Major maintenance activities are not routinely completed, and typically involve ground disturbance. Major maintenance activities may include items such as replacement of an existing boat ramp, establishment of new parking areas, dredging of the existing boat landing, etc. Ongoing maintenance of recreation sites as described in Section 8.5 are not considered major maintenance of recreational facilities.

6.3.2.2 NLEB Roosting Sites

Roosting sites of the federally threatened NLEB can occur in any tree. Most of the lands within the Project boundary are forested. Although the NHIS review did not identify any federally protected trees that are known maternity roosts, or any areas where known hibernacula occur within the Project, impacts to trees within the Project boundary could impact the species. NSPW has not proposed any specific activities as part of the FLA that could have an adverse impact upon the NLEB. However, ongoing recreational maintenance activities, such as removal of a hazard tree at a recreation site, could impact the NLEB if occupying said hazard tree. Therefore, NSPW has proposed mitigation measures in Section 6.4 to address these types of potential effects.

6.3.2.3 Wood Turtle Nesting Sites

Nesting sites for the wood turtle may occur in sand or gravel areas within 200 feet of the White River. Although NSPW has not proposed any specific activities in this application that could have an adverse effect upon the species, day-to-day operational activities such as ongoing recreational maintenance activities, could cause an impact on a wood turtle if it is nesting at a particular site. Therefore, NSPW has proposed mitigation measures in Section 6.4 to address these potential effects.

6.3.2.4 Terrestrial Invasive Species

Maintenance of recreational facilities and Project works within the Project boundary can pose a risk to the transfer of invasive species. NSPW has proposed mitigation measures in Section 6.4 to address these potential effects.

6.3.2.5 Erosion and Siltation Impacts

Although NSPW has not proposed any specific activities in this application that could cause erosion and siltation at the Project, there is a potential for erosion or sedimentation to occur on the shoreline over the term of the subsequent license. NSPW has proposed mitigation measures in Section 6.4 to address these potential effects.

6.4 Applicant Proposed Mitigation and Enhancements

The continued operation of the Project is not expected to adversely impact the resources (environmental, recreational, cultural, etc.) described herein with the implementation of the proposed mitigation measures discussed in this section. Indeed, NSPW's proposed low-cost enhancement measures have the potential to improve the quality of the environment in the Project vicinity over the term of the subsequent license.

6.4.1 Proposed Aquatic Mitigation

6.4.1.1 Aquatic Invasive Species

NSPW proposes to develop a rapid response invasive species monitoring plan to monitor for the introduction of new "rapid response" invasive species and limit the dispersal of established species. Within one year of license issuance, NSPW proposes to develop the plan in consultation with the WDNR and Bad River Tribe prior to filing the plan with the Commission for approval. The plan will incorporate rapid response measures for both aquatic and terrestrial invasive species and recommend biennial surveys.

6.4.1.2 Woody Debris Passage

NSPW proposes to pass woody debris collected at the dam and intake downstream into the bypass reach to enhance aquatic habitat in the bypass reach and areas further downstream.[29]

6.4.1.3 Erosion and Siltation

NSPW proposes to conduct erosion surveys of the Project's shoreline, including the tailwater area, every 10 years during the term of the license. The surveys will ensure that no shoreline erosion develops during the upcoming term of the subsequent license. More specifically, the surveys will include an erosion inspection of all shorelines within the Project boundary, a review of the status of previously identified erosion sites, and development of a report to be submitted to FERC, the Bad River Tribe, and the WDNR. The report will provide a recommendation on whether mitigation of any erosion site located on NSPW-owned lands is warranted.

6.4.1.4 Reservoir Drawdowns

There are no reservoir drawdowns proposed or planned as part of this Application. Routine drawdowns are not necessary to operate the Project. Should a drawdown of greater than three weeks be necessary during the term of the new license, NSPW will consult with the appropriate resource agencies and submit a request to the Commission for a temporary license amendment.[30]

If a non-emergency drawdown of less than three weeks in duration is necessary during the term of the subsequent license, NSPW proposes to conduct the drawdown as a planned deviation.[31]

6.4.2 Proposed Terrestrial Mitigation

6.4.2.1 NLEB Bat Roosting Sites

The State of Wisconsin administers the Broad Incidental Take Permit and Broad Incidental Take Authorization for Wisconsin Cave Bats (Cave Bat BITP/A), last updated in November 2022, which are included herein as **Appendix E-23**. NSPW proposes to follow these requirements and the current USFWS NLEB guidance to provide protection to any NLEB within the Project vicinity during routine recreation site maintenance. With the implementation of these measures, the proposed operation of the Project is not likely to jeopardize the continued existence and recovery of the species.

6.4.2.2 Wood Turtle Nesting Sites

The WDNR administers the Incidental Take Permit/Authorization for Common Activities for the Wood Turtle (Wood Turtle BITP/A) dated April 2016. Although NSPW has not identified any specific activities in this application that could have an adverse effect upon the species, it is understood that day-to-day operational activities, such as ongoing recreational maintenance at a recreation site, have the potential to affect a wood turtle if it were nesting at said site. As a result, as long as wood turtles remain a state threatened or endangered species, NSPW is proposing to follow the terms of the Wood Turtle BITP/A. Under the Wood Turtle BITP/A, Project activities are not likely to jeopardize the continued existence and

[29] Passing large accumulations after flood events is not possible.
[30] Please note that NSPW will consult with the resource agencies and the Bad River Tribe during development of the plans for the temporary license amendment.
[31] Please note as outlined in **Section 5.8**, planned deviations only occur in consultation with the resource agencies and the Bad River Tribe.

recovery of the state population of the protected turtle or the whole plant community of which they are part. The Wood Turtle BITP/A is included in **Appendix E-24**.

6.4.2.3 Terrestrial Invasive Species

Although NSPW has not identified any specific activities in this application that could have an adverse effect regarding invasive species, it is understood that day-to-day operational activities, such as ongoing recreational maintenance or recreational use at a recreation site, have the potential to result in the spread of invasive species. Therefore, NSPW is proposing to develop a rapid response invasive species monitoring plan to monitor for the introduction of new rapid response invasive species and limit the dispersal of established species. Within one year of license issuance, NSPW proposes to develop the aforementioned plan in consultation with the WDNR and Bad River Tribe before filing the plan with the FERC for approval. Terrestrial surveys will be conducted in conjunction with the aquatic surveys identified in Section 6.4.1.

6.4.2.4 Erosion and Siltation

Although NSPW has not proposed any specific activities in this application that could cause erosion and siltation at the Project, there is a potential for erosion or sedimentation to occur over the term of the subsequent license. Therefore, NSPW is proposing to conduct erosion surveys of the Project's shoreline, including the tailwater area, every 10 years during the term of the license. The surveys will ensure no shoreline erosion develops during the upcoming term of the subsequent license. More specifically, the surveys will include an erosion inspection of all shorelines within the Project boundary, a review of the status of previously identified erosion sites, and development of a report to be submitted to FERC, the Bad River Tribe, the USFWS and the WDNR. The report will provide a recommendation on whether mitigation of any erosion site located on NSPW-owned lands is warranted.

7. Report on Historical and Archeological Resources

7.1 General History of the White River Project Area and Waterway

Prior to European contact, the area of the current State of Wisconsin that contains the watershed of the White River was settled primarily by people identifying themselves as Ojibwe while on their migration westward from their homes on the eastern seaboard (Loew, 2001). Their migration eastward is believed to have begun as early as early as 1500 years before the present time (Loew, 2001). Their subsistence relied upon spearing fish and processing maple syrup in the springtime, fishing, hunting, and gathering nuts and berries in the summertime, and in later years harvesting their small, planted gardens of corn, beans, squash, and potatoes (Loew, 2001). One major nutritional, cultural, and spiritual staple was wild rice, which they believe was the reason they were led to settle in this area by their Creator. Wild rice was harvested in the fall each year and in the winter, hunting and trapping provided for many of their winter needs of food along with their year-round needs for pelts (Loew, 2001).

Post European contact, the Ojibwe affection for French voyageurs drawn to this area in the search of furs was such that they were assimilated into their communities (Loew, 2001). During westward expansion of European descendants, a high interest in agriculture and the use of timber as a resource drove the harvesting and removal of trees by business interests. As such, the original White River Dam was built prior to 1884 to power a sawmill (NSPW, 2008).

Once most, if not all, trees were harvested or removed from the area, the dam was reconstructed in 1907 to generate electricity.[32] The present structure was erected in 1927 when the prior dam was destroyed a year earlier. The dam was refurbished in 1976 with a reinforced concrete conduit replacing the older wooden conduit, as well as stabilizing the right downstream retaining wall with the construction of a new retaining wall behind it (NSPW, 2008).

7.2 Efforts to Identify Significant Properties (National Register Status)

The following sections detail NSPW's completed efforts to identify historic and archaeological properties within the Project's Area of Potential Effects (APE) in accordance with Section 106 of the National Historic Preservation Act of 1966 and 36 CFR 800 - Protection of Historic Properties. In the State of Wisconsin, the specific monitoring requirements are outlined in the December 30, 1993, *Programmatic Agreement among the FERC, Advisory Council on Historic Preservation, the State of Wisconsin - State Historic Preservation Officer, and the State of Michigan SHPO, for Managing Historic Properties That May Be Affected By New and Amended Licenses Issuing for the Continued Operation of Existing Hydroelectric Projects in the State of Wisconsin and Adjacent Portions of the State of Michigan* (Programmatic Agreement) was executed.

The Programmatic Agreement defines the APE as:

- Lands enclosed by the Project boundary as delineated in the existing license.
- Attached or associated buildings and structures extending beyond the Project boundary, which contribute to the NRHP eligibility of the hydroelectric generating facility.
- Lands or properties outside the Project boundary where the Project may cause changes in the character or use of historic properties, if any historic properties exist.

[32] The WHPD database states 1906.

7.2.1 Project Historic Properties

To identify historic properties within the APE, NSPW conducted a Project Architectural/Historical record review in the Wisconsin Historic Preservation Database (WHPD). The WHPD identified three structures within the APE, which include the White River Dam, White River powerhouse and surge tank, and White River bridge.

Site number 26205 (White River Dam) and site number 26206 (White River powerhouse and surge tank) were evaluated for potentially having local significance under NRHP criterion A and C under the significance areas of Industry and Engineering. Based on criterion A, the sites were determined not of special significance. Based on criterion C, the modernization of the facilities since they were originally installed has altered the level of their integrity such that it is too low to justify inclusion in the NRHP based on the importance of its connection with the theme of engineering. Additionally, on July 27, 1990, it was determined none of the facilities are of sufficient importance or rarity that their survival in an altered state would warrant inclusion in the NRHP (NSPW, 1991) (WI Historical Society- SHPO, 2020). Site number 26204 (White River State Highway 112 Bridge) was rebuilt in 1985 and was determined not eligible for the NRHP on July 27, 1990. The results of the historic properties review are summarized in **Table 7.2.1-1**.

Table 7.2.1-1 Surveyed Properties within the APE

SITE Number	Property Name	NRHP Status
26204	White River State Highway 112 Bridge	Not eligible
26205	White River Dam	Not eligible
26206	White River Powerhouse and Surge Tank	Not eligible

7.2.2 Archaeological Properties

Section 106 of the National Historic Preservation Act and 36 CFR Part 800 requires Phase 1 Archaeological Surveys be completed to determine whether any archaeological sites are eligible for the NRHP, and if they are eligible, will they be affected by continued operation of the Project. Further discussion on the archaeological surveys is outlined in the Programmatic Agreement, which specifies that the Project shoreline areas within the APE will be surveyed to identify archaeological sites currently subject to erosion.

A review of the WHPD for previously surveyed areas and archaeological sites within the White River Project boundary identified two prior surveys, one conducted in 1989 by Harris and the other by Van Dyke in 2013. The surveys did not reveal any previously unidentified archaeological sites. Per the requirements of the Programmatic Agreement, the shoreline survey was repeated in 2022. During the 2022 survey, no artifacts or cultural features were noted and the archaeologist recommended the shoreline survey be completed again in 10 years (TRC, Inc., 2022). The survey report is included in **Appendix E-5**.

7.2.3 Wisconsin Historic Society Review of Historical/Archaeological Reports

NSPW submitted the 2022 Phase 1 Archaeological Survey Report for White River to the Wisconsin SHPO on January 20, 2023. The report included the recommendation that the shoreline monitoring be conducted again in 10 years. To date, no response from the SHPO has been received.

7.3 Proposed Mitigation Measures

7.3.1 Programmatic Agreement

The Programmatic Agreement assigns a Licensee the responsibility to "ensure that historic properties are considered in the continued operation and maintenance of hydroelectric facilities during the term of their licenses." To further this purpose, a Licensee is required to develop a Historic Resource Management Plan within one year of any license issuance.[33]

7.3.2 Historic Properties Management Plan

In accordance with Stipulation II of the Programmatic Agreement, NSPW will develop a Historic Properties Management Plan for the White River Project within one year of license issuance in consultation with the Wisconsin SHPO, the Bad River Tribe, and any other interested Native American Nations.

[33] Historic Resources Management Plan is also known as a Historic Properties Management Plan.

8. Report on Recreational Resources

8.1 Existing Recreational Resources

The White River Dam is located within the Town of White River in Ashland County and the White River Flowage is located in both the Town of White River in Ashland County and Town of Kelly in Bayfield County. The White River Canoe Portage Take-out and Boat Landing, Canoe Portage Put-in, and Tailrace Fishing Area are the only recreation sites identified as FERC approved recreation facilities according to the Form 80 report filed in 2015 (NSPW, 2015). Recreation sites located on NSPW-owned property are listed below in **Table 8.1-1,** shown in **Appendix E-25,** and depicted on the Project boundary drawings provided in Exhibit G of this application. Other recreation sites in the Project vicinity are listed in **Table 8.1-2** and illustrated in **Appendix E-26**.

Table 8.1-1 Recreation Sites Within the White River Project Boundary

Recreation Site	Owner	Operate/ Maintain	Amenities
Boat Landing and Canoe Portage Take-out	NSPW	NSPW	• Single lane concrete-plank boat ramp and canoe portage take-out • Parking • Bank fishing • Signage
Canoe Portage Trail and Put-in	NSPW	NSPW	• Canoe portage trail • Canoe portage put-in • Bank fishing • Parking • Signage
Tailrace Fishing Area	NSPW	NSPW	• Fishing platform • Signage

Table 8.1-2 Recreation Sites in the Vicinity of the White River Project Boundary

Recreation Site	Project Boundary Location	Owner	Operate/ Maintain	Amenities
White River Fishery Area	Adjacent and outside	WDNR	WDNR	• Bank fishing • Hiking • Hunting • Trapping • Canoeing/kayaking

8.2 Existing Recreation Plans

The area in the vicinity of the Project offers an abundance of outdoor recreational opportunities. The Town of White River, Bayfield County, and the State of Wisconsin have recognized the contribution of recreation to the quality of life for its citizens. Recognizing the need to plan for orderly growth, each unit of government has developed outdoor recreation plans which are described in the following sections.

8.2.1 Town of White River Comprehensive Plan

The *Town of White River Comprehensive Plan: 2006 to 2025, Policy Document* was approved on November 28, 2006.[34] The plan describes the goals, objectives, and policies to implement the Town's vision. From a recreation standpoint, the Town identified a need to increase the number of public recreational facilities and trails within its boundary and expressed support for the maintenance of recreational boat landings (Town of White River, 2006). The plan was previously included in Appendix 4.8.2.3-1 of the PAD.

8.2.2 Bayfield County Comprehensive Outdoor Recreation Plan

Recreation within Bayfield County is addressed in the *Bayfield County Comprehensive Outdoor Recreation Plan, 2020-2024.* The plan identifies county-owned recreational facilities and lists planned improvements over the term of the plan. The plan also identifies recreational facilities and planned improvements managed by other municipalities within the county. There are no county or town-owned recreation facilities within the Town of Kelly or the Project vicinity (Bayfield County, 2020). The plan is included in **Appendix E-27**.

8.2.3 Wisconsin Statewide Comprehensive Outdoor Recreation Plan

Wisconsin regularly publishes a Statewide Comprehensive Outdoor Recreation Plan (SCORP) as required by the Federal Land and Water Conservation Fund Act of 1965. The SCORP is used to help allocate federal funds among local communities and focuses on preserving and improving recreation opportunities in Wisconsin while targeting relationships such as public health and wellness, urban access to outdoor recreation, and public and private partnerships. The SCORP recognizes one of the top-priority needs is to provide more recreation places near urban centers to support a variety of nature-based recreation (WI Department of Natural Resources, 2019). The Wisconsin SCORP was previously included in Appendix 4.8.2.1-1 of the PAD.

8.3 Estimated Use of Existing and Potential Recreation Resources.

8.3.1 Recreation Survey Methods and Results

As part of the relicensing consultation process, stakeholders requested recreational use information be collected at recreation areas in the Project vicinity to document recreation utilization and recreation needs within the Project boundary.

The recreation study consisted of the following:

- Recreation site inventory
- Recreation facility condition assessment
- Recreation use surveys
- Recreation questionnaire

During the recreation study, only those facilities within the current Project boundary were evaluated. Other entities recreation needs are identified in their respective recreation plans as described above in Section 8.2.

[34] Recreation within Ashland County is discussed in the Ashland County Comprehensive Plan Volumes 1, 2, and 3 (https://ashland.extension.wisc.edu/community-development/comprehensive-plan/). There are no recreation sites within the Project vicinity; therefore, the Ashland County Comprehensive Plan is not discussed in this application.

8.3.2 Recreation Site Inventory

The recreation site inventory was completed during the summer of 2021 to collect data on the following:

- recreation amenities and capacities
- primary type(s) of recreation provided at the site
- existing sanitation facilities
- type of vehicle access and parking
- type of Americans with Disabilities Act (ADA) accessible (barrier-free) facilities (if available)
- location of the site
- photographs of amenities

The amenities at the White River Project are listed below in **Table 8.3.2-1**, in general order from upstream to downstream. A more detailed description of each recreation site and its amenities is provided in the following paragraphs. Recreation Inventory and Condition Assessment Forms, and photographs of the amenities taken during the inventory, are included in **Appendix E-28** and **Appendix E-29**, respectively.

Table 8.3.2-1 White River Project Recreation Site Inventory

Recreation Site	Parking Sites	Boat Launch/ Carry-in Access	Picnic Facilities	Bank Fishing	Part 8 Sign	Other Signage
Boat Landing and Canoe Portage Take-out	4 (vehicle-trailer)	Boat Launch/ Take-out (1-lane)	No	Yes	Yes	Directional (2) Part 8 (1) Regulations (1)
Canoe Portage Trail and Put-in	10 (vehicle)	Canoe Portage Put-in (1)	No	Yes	Yes	Directional (3) Part 8 (1)* Regulatory (6)
Tailrace Fishing Area	10 (vehicle)	No	No	Yes	Yes	Directional/Part 8 (1)* Regulatory (4)

* Parking Area & Part 8 sign for Canoe Portage Trail/Put-in and Tailrace Fishing Area are shared

8.3.2.1 Boat Landing and Canoe Portage Take-out

The White River Boat Landing and Canoe Portage Take-out are owned and maintained by NSPW. The site has a single lane boat launch with a concrete plank ramp as shown in **Figure 8.3.2.1-1**. The boat landing also functions as the canoe portage take-out. The four signs at the site include a directional sign at the road, directional “Take Out” sign directing boaters to the boat landing, Part 8 sign, and regulatory sign.

Figure 8.3.2.1-1 Boat Landing/Canoe Portage Take-out

8.3.2.2 Canoe Portage Trail and Put-in

The Canoe Portage Trail and Put-in site is owned and maintained by NSPW. The site shares a Part 8 sign (**Figure 8.3.2.2-1**) and gravel parking area with the Tailrace Fishing Area. The parking area can accommodate a minimum of 10 vehicles. There are three directional signs and six regulatory signs at the site. The canoe portage path is partially located on the gravel access road leading to the powerhouse and partially located on a mowed grass path. The path provides bank fishing access to the bypass reach and to the tailrace area downstream of the dam.

Figure 8.3.2.2-1 Canoe Portage Trail/Put-in and Tailrace Fishing Area Part 8 Sign

Figure 8.3.2.2-2 Canoe Portage Trail

8.3.2.3 Tailrace Fishing Area

As noted previously, the Tailrace Fishing Area shares a Part 8 sign and parking area with the Canoe Portage Trail and Put-in site. There are four regulatory/safety signs located at the site.

Figure 8.3.2.3-1 Tailrace Fishing Area

8.3.3 Recreation Facility Condition Assessment

An assessment of recreation facilities was completed to determine if their amenities were in good condition or required maintenance, repair, or replacement. Recommended site improvements are listed in **Table 8.3.3-1**. Complete results for the recreation site condition assessments are found in **Appendix E-29**.

Table 8.3.3-1 Recommended Recreation Facility Improvements from Study Report

Recreation Site	Recommended Improvements
Boat Landing and Canoe Portage Take-out	• Maintenance of boat ramp recommended (removal of driftwood) • Recommend updating Part 8 sign to meet current standards
Canoe Portage Trail and Put-in	• Recommend updating Part 8 sign to meet current standards*
Tailrace Fishing Area	• Recommend updating Part 8 sign to meet current standards*

*One Part 8 sign is shared for the Canoe Portage Trail/Put-in and the Tailrace Fishing Area Sites

8.3.4 Recreation Use Surveys

Surveys were conducted on 14 randomly selected weekdays, weekends, and holiday weekend days from April through August 2022 to quantify recreational use during the primary recreation season (April through September). The recreational use survey schedule is shown below in **Table 8.3.4-1** and a summary of the recreation observations is provided in the following sections.

Table 8.3.4-1 Recreation Use Survey Dates

Survey Date (2022)	Type of Day
April 16	Weekend
April 17	Weekend
May 7	Weekend
May 8	Weekend
May 30	Holiday Weekend
June 4	Weekend
June 12	Weekend
June 26	Weekend
July 3	Holiday Weekend
July 15	Weekday
July 17	Weekend
August 3	Weekday
August 14	Weekend
August 20	Weekend

8.3.4.1 Boat Landing/Canoe Portage Take-out

The White River boat landing received 15 recreation users over the 14 days surveyed. The number of individuals recreating at the site ranged from a maximum of nine users (May 7) to a minimum of zero users on 10 of the 14 survey days. The recreation activities observed were bank fishing and boat fishing.

8.3.4.2 Canoe Portage Trail & Put-in

The Canoe Portage Trail and Put-in experienced 14 recreation users over the 14 days surveyed. The number of individuals recreating at the site ranged from a maximum of four users (May 30 and August 3) to a minimum of zero users on eight of the 14 survey days. The recreation activities observed were shoreline fishing and other.[35]

8.3.4.3 Tailrace Fishing Area

The Tailrace Fishing Area experienced 22 recreation users over the 14 days surveyed. The number of individuals recreating at the site ranged from a maximum of six users (May 7) to a minimum of zero users on six of the 14 survey days. The recreation activities observed were bank fishing and boat fishing.

8.3.5 Overall Recreation Use Summary

Each recreation site was evaluated for its current capacity or use and maximum capacity. The evaluation included several assumptions. First, the number of parking sites was assumed to be the limiting factor for the Boat Landing and Canoe Portage Take-out site and Canoe Portage Trail and Put-in site. Second, it was assumed the average vehicle at the site represented an average of 1.5 people. Therefore, total capacity of these two sites is 1.5 times the number of parking sites. Third, for the Tailrace Fishing Area, the limiting factor for capacity was determined to be the number of anglers that could fish in the tailrace area at one time. It was assumed a maximum of nine anglers could fish at one time. The results from the analysis are discussed in the following sections. Completed recreation survey forms and spreadsheets summarizing the results are included in **Appendix E-30**.

Recreation use recorded during the survey period is shown in **Table 8.3.5-1**. During the recreation user survey, the Tailrace Fishing Area received the most use with 22 observed users, followed by the Boat Landing and Canoe Portage Take-out with 15 observed users, and the Canoe Portage Trail and Put-in with 14 observed users. Based on the analysis, the Boat Landing and Canoe Portage Take-out had the highest annual average utilization rate at 17.9%, followed by the Tailrace Fishing Area at 17.5%, and the Canoe Portage Trail and Put-in at 2.9%. The Boat Landing and Canoe Portage Take-out was the only site that exceeded capacity and that occurred on a single survey date (150% on May 7).

Table 8.3.5-1 White River Project Primary Season Recreation Use Survey Summary

Recreation Site	Total Observed Users	Percent Capacity Observed	
		Average (All Dates)	Maximum Daily
Tailrace Fishing Area	22	17.5%	40.0%
Boat Landing and Canoe Portage Take-out	15	17.9%	150.0%
Canoe Portage Trail and Put-in	14	2.9%	26.7%

[35] Other activities included spillway viewing.

8.3.6 Estimate of Current and Future Recreation

Based upon the results from the recreation use study, a total of 51 users were observed over 14 primary recreation season observations for an average of 3.6 users per day. Assuming each observation accounted for an entire recreation day, the recreation season total use as surveyed from April through September (183 days at 3.6 users per day) was 658.8 days. Assuming recreation use is 25% during the winter recreation season (October to March), the Project experienced 164.7 winter recreation days. This provides an estimated annual total of 823.5 recreation days at the Project in 2022.

Between 2025 and 2040, Ashland County is projected to experience a population decrease of 5.7% while Bayfield County is projected to have a population decrease of 15.4% (Section 4.6). Typically, it can be assumed the population growth rate will have a corresponding impact on recreation use. NSPW used a conservative approach in its recreation analysis and assumed the recreation demand would remain unchanged from 2025-2040 despite the projected population decreases. Therefore, the capacity of the recreation facilities within the Project is expected to be adequate for the foreseeable future.

8.3.7 Recreation Questionnaires

A recreation questionnaire was sent to the municipalities and other entities responsible for recreation in the Project vicinity to determine future recreation needs. Those entities included Ashland County, City of Ashland, Town of White River, and WDNR. The WDNR was the only entity to respond; however, they did not complete the survey, but rather, provided the following comment, "*We have nothing to add at this time. The formal WDNR managed properties are just outside of the FERC Project boundary. The areas above the dam are heavily used, as is a well-established fishery recreation area*." The questionnaires and corresponding responses are included in **Appendix E-31**.

8.4 Stakeholder Comments and Recommended Recreational Development

Development recommendations brought forward by stakeholders throughout Stage 1 and Stage 2 consultation are contained in *Volume 4, Documentation of Consultation*. No stakeholders provided input regarding recreational development in their comments on the DLA.

8.5 New or Ongoing Recreational Measures Proposed

New measures or facilities listed in the sections below will be completed within one year of license issuance.

8.5.1 Boat Landing and Canoe Portage Take-Out

- Review and update or replace the existing Part 8 sign to meet current standards.
- Conduct routine maintenance of boat launch throughout the term of the new license.

8.5.2 Canoe Portage Trail and Put-In

- Review and update or replace the existing Part 8 sign to meet current standards.
- Conduct routine maintenance of canoe portage trail and put-in throughout the term of the new license.

8.5.3 Tailrace Fishing Area

- Conduct routine maintenance of tailrace fishing area throughout the term of the new license. The estimated costs for proposed improvements are described in 2023 dollars in Section 10.3 of this exhibit.

9. Report on Land Management and Aesthetics

9.1 Existing Development and Use of Project

Land-use regulation and zoning in Wisconsin occur at the county government level, excluding incorporated villages and cities within the county. The provisions of certain county zoning ordinances may not take effect for a particular rural civil town area within the county until the county ordinance is adopted by the respective civil town governments. Regulations regarding navigable waters of the state occur at the state and federal level under the authority of the WDNR and the US Army Corps of Engineers.

In the vicinity of the White River Project, land use and zoning are regulated by Ashland and Bayfield Counties and the Towns of White River and Kelly. Both counties maintain zoning and floodplain ordinances that limit development along the shoreline and within the floodplain.

The Town of White River developed a comprehensive plan in 2006. The plan classifies the lands within the vicinity of the White River Project for low-density residential uses with a net density of two dwelling units per 20 acres. The town has set a minimum lot size of five acres to ensure there is sufficient land for an onsite wastewater treatment system. The plan also provides protections for wetland and floodplain areas (Town of White River, 2006).

9.2 Measures Proposed to Ensure Modifications Blend with Surrounding Environment

The White River Project and its associated hydroelectric facilities have been operating in the current location since 1927. From its original construction to the present, the Project has become part of the local environment. The proposed operation of the Project under the new license will not violate any federal or state policies or regulations. There are no known conflicts between the respective local governmental planning and/or zoning ordinances and the Project's development or operation. Existing Project aesthetics and facilities are shown below in **Figure 9.2-1**, **Figure 9.2-2**, **Figure 9.2-3**, and **Figure 9.2-4**. The proposed operation of the Project is not expected to affect aesthetic resources.

Figure 9.2-1 View Upstream of the White River Dam (looking west)

Figure 9.2-2 View downstream of the White River Dam (looking east)

Figure 9.2-3 View of Powerhouse and Surge Tank (looking south)

Figure 9.2-4 View of Powerhouse (looking southeast)

9.3 Project Boundary

The current FERC license established the White River Project boundary (depicted in the existing Exhibit G) up to elevation 712.13 NGVD and included all lands in the Project vicinity owned by NSPW.[36] Project facilities and lands owned by NSPW include the dam, conduit, surge tank, penstocks, powerhouse, recreation sites, and adjacent undeveloped forested lands. NSPW conducted a review of the current Project boundary which was likely developed using USGS topographic maps that displayed 10- or 20-foot contours.

In order to develop a more accurate depiction of the Project, NSPW remapped the Project boundary using LiDAR elevation data with an accuracy of +/- 0.13 feet. An analysis of the LiDAR data revealed that the upper limit of the current Project boundary did not extend far enough upstream to encompass all areas inundated by the impounding effects of the White River Dam at the maximum reservoir elevation of 711.6 feet NGVD. The analysis further revealed that the current Project boundary included lands adjacent to the reservoir that are not inundated at the maximum reservoir elevation.[37]

9.3.1 Lands

The proposed Project boundary was updated to include the area upstream of the White River Dam to elevation 711.6 feet NGVD, excluding those lands not impounded at that elevation, other than lands containing Project facilities or recreation sites (i.e., dam and boat landing/canoe portage take-out). Downstream of the dam, only lands with Project facilities or recreation sites were included in the Project boundary. This resulted in an overall reduction of 72.4 acres from the current Project boundary.

The current Project boundary encompasses approximately 125.1 acres, which includes 76.9 acres of upland and 48.2 acres of submerged or inundated land. The inundated areas are further divided into 45.1 acres of reservoir area upstream of the dam, 2.9 acres within the bypass reach, and 0.2 acres within the tailrace downstream of the powerhouse (Mead & Hunt, Inc., 2023b).

The proposed Project boundary encompasses approximately 52.7 acres, 10.1 acres of which is upland and 42.6 acres of which is inundated. The inundated area is further divided into 39.9 acres of reservoir, 2.4 acres within the bypass reach, and 0.3 acres within the tailrace area downstream of the powerhouse (Mead & Hunt, Inc., 2023b). All landowners within or adjacent to the proposed Project boundary have been included in the FLA's distribution list.

Maps depicting NSPW's upland and inundated ownership within the current and proposed Project boundaries are included in **Appendix E-32**.

9.3.2 Threatened and Endangered Species

The proposed Project boundary contains all areas of wood turtle nesting habitat mapped during the Wood Turtle Nesting Habitat Study, other than one small site on the upper end of the reservoir. The study report indicated that this site was unlikely to be used by wood turtles for nesting due to the steep terrain.

[36] The existing Exhibit G used an elevation of 712.13 to delineate the Project reservoir.
[37] Since the maximum reservoir elevation under the current license is 711.6 and NSPW is proposing to keep the existing maximum reservoir elevation under the new license, this elevation was used to help determine the proposed Project boundary.

Additionally, the site is privately owned, not inundated at the reservoir's maximum elevation, and is not under the control of NSPW. Therefore, this area was not included in the proposed Project boundary.

9.3.3 Cultural Resources

The Project's facilities have been evaluated for inclusion in the NRHP and determined ineligible. No known archaeological or cultural sites are located within lands that would be excluded under the proposed Project boundary. Therefore, these lands are not necessary to protect cultural resources.

9.3.4 Botanical Resources

WDNR maintains a detailed land cover dataset called WISCLAND 2.0 that describes the land cover types across the state (WI Department of Natural Resources, n.d.xx). In order to compare the cover types between the current and proposed Project boundaries, this data was used to generate detailed land cover maps for the lands within each boundary. These maps are included in **Appendix E-33**. The detailed cover types identified within the existing and proposed Project boundaries are shown in **Table 9.3.4-1**.

The acreages of all cover types, except one (red pine), are less under the proposed Project boundary versus the current Project boundary. However, forested lands that are not inundated by the Project reservoir showed the largest decrease. Aspen forest, fir-spruce, and Aspen forested wetlands are impacted the most with decreases of 25.6, 17.1, and 8.0 acres, respectively. All of these cover types are common in the Project vicinity; therefore, the reduced acreage of these cover types is not expected to result in adverse impacts to the wildlife species that depend upon them.

Table 9.3.4-1 WISCLAND 2.0 Land Cover Types Within Existing and Proposed Project Boundaries

Detailed Land Cover Description	Land Cover Current Boundary (acres)	Land Cover Proposed Boundary (acres)
Developed, High Intensity	3.1	3.0
Developed, Low Intensity	6.4	4.8
Hay	0.4	0
Pasture	0.7	0
Cool season Grass	4.2	0.4
Fir/Spruce	26.4	9.4
Red Pine	0.2	0.2
White Pine	2.4	0.2
Aspen Forest	26.0	0.4
Open Water	37.3	32.7
Cattails	2.4	0
Other Coniferous Forested Wetland	7.1	1.5
Aspen Forested Wetland	8.2	0.2

Source: (WI Department of Natural Resources, n.d.xx)

9.3.5 Project Boundary Change Summary

The proposed Project boundary includes lands owned by NSPW that encompass Project facilities and recreational sites. The proposed Project boundary also includes all land and water resources necessary for the safe and effective operation of the Project and all lands required for other Project purposes, including but not limited to, aesthetics, flowage, public recreation, shoreline control, and protection of environmental resources, archaeological and historical resources, wetlands, and threatened and/or endangered species.

9.4 Wetlands or Floodplains within or Adjacent to the Project Boundary

9.4.1 Description of Existing Wetlands

Wetlands are transition habitats between land and water and have unique hydrologic, soil, and vegetative parameters that allow them to be differentiated (delineated) from other habitat types. Wetlands function to improve water quality, wildlife habitat, nutrient cycling and storage, and aesthetics or recreation. Large wetlands absent from human influence are generally higher quality wetlands. In riverine systems, wetlands provide flood water storage and filtration for water contaminants and sediment. They also provide an environmental corridor for enhanced recreation and aesthetics. The USFWS National Wetland Inventory data layers were used to determine the types of wetlands located within the Project boundaries (current and proposed).

Wetland types and their corresponding acreages within the current and proposed Project boundaries are shown in **Table 9.4.1-1**.

Table 9.4.1-1 Wetlands within Current and Proposed Project Boundaries

Wetland Type	Project Boundary	
	Current	Proposed
Lacustrine	37.6 acres	31.6 acres
Riverine	5.9 acres	7.5 acres
Freshwater Forested/Shrub	12.9 acres	2.7 acres
Freshwater Emergent	1.5 acres	0.0 acres
TOTAL	**57.9 acres**	**41.8 acres**

Source: (Mead & Hunt, Inc., 2023a)

Wetlands identified included the following types: lacustrine, riverine, freshwater forested/shrub, and freshwater emergent. A comparison between the current and proposed Project boundaries shows an increase in riverine wetlands and a decrease in all other wetland types. All wetlands excluded from the proposed Project boundary are located on lands that are not inundated by the dam at the maximum reservoir elevation of 711.6 feet NGVD and are not impacted by Project operations. Despite wetland areas being excluded from the proposed Project boundary, they will remain protected under existing state and federal regulations. Maps illustrating wetlands within each boundary are included in **Appendix E-34**.

Since there are no material changes being proposed to Project operations in this application, the proposed operation of the Project is not expected to impact wetlands.[38]

9.5 Shoreline Erosion

There are no proposed activities in this application involving ground disturbance[39] that would cause erosion or sedimentation. NSPW has proposed to periodically monitor the Project shoreline for erosion (Section 7.3.2) throughout the term of the new license. These inspections will also document any newly identified areas of shoreline erosion.

9.6 Buffer Zone

As stated previously herein, the White River Dam and its associated hydroelectric facilities have been operating in their present location since 1927. The Project has become part of the environment. The Project's reservoir shoreline is undeveloped and heavily wooded with the exception NSPW's generation and recreational facilities.

9.7 Applicant's Policy Toward Development of Shoreline Facilities

In the State of Wisconsin, the WDNR is charged under various Wisconsin Statutes with the licensing, permitting, and supervision of all structures in lakes or streams that extend beyond the ordinary high-water mark. NSPW plans to monitor shoreline use during routine field activities according to the appropriate statutes as administered by the WDNR and their administrative regulations for any piers, docks, boat landings, extended bulkheads, or other structures owned by others that extend into Project waters. NSPW is not opposed to these developments as permitted by the WDNR and will develop a consistent policy regarding these structures if the demand requires. NSPW does not plan to permit any private docks originating on lands under NSPW's fee ownership.

9.8 Maps or Drawings of Proposed Measures

Volume 2, Exhibits F and G includes drawings and maps depicting the primary structures and location of the White River Project. NSPW is not proposing any new measures concerning Project works, right-of-way, access roads, or any other topographic alterations as part of this FLA.

[38] Planned deviations for ice removal are expected to have no effect on wetlands due to their short duration and timing outside of the growing season.
[39] Grading of existing gravel parking areas, trail maintenance involving lawn mowing or trimming of brush, and removal of hazard trees at recreation sites are not considered ground disturbing activities.

10. White River Project Developmental Analysis

This section analyzes the cost of continued operation and maintenance of the Project under the No Action and Proposed Operation Alternatives. Costs are associated with the operation and maintenance of the Project's facilities, as well as the cost of providing proposed environmental mitigation measures.

10.1 Power and Economic Benefits of the Project

The current operation provided an average of 4,927 MWh of energy per year for the five-year period between 2018 and 2022.

10.1.1 Current Annual Value of Developmental Resources

Based on an average energy value of $36.87 per MWh, the average annual gross revenue from 2018-2022 was $181,658.49. As noted in Exhibit A, issuance of a subsequent license to include the proposed Project operation, including the implementation of the environmental mitigation and enhancement measures proposed in this application, is not expected to result in any adverse impacts to generation.

10.1.2 Current Annual Cost of Project Operations, Maintenance, Repairs, and Administration

The estimated cost of Project operations is $774,420 per year. This includes the costs of operation and maintenance expenses, FERC fees, depreciation, and administrative and general expenses as identified in Section 20 of Exhibit A.

10.2 Comparison of Alternatives

10.2.1 No Action Alternative

Under the No Action alternative, NSPW would continue to operate the Project under the existing license including:

- Operating the Project as a run-of-river facility for the purpose of generating hydroelectric power where the discharge measured immediately downstream of the Project tailrace approximates the sum of inflows into the Project reservoir.
- Minimizing reservoir fluctuations by maintaining the reservoir between elevations 710.4 and 711.6 feet NGVD.
- Releasing a minimum flow of 16 cfs or inflow, whichever is less, at all times to protect aquatic resources.
- Continuing to conduct shoreline surveys every 10 years.
- Continuing to maintain existing FERC-approved recreation sites.

Under the No Action alternative, no new environmental mitigation or enhancement measures would be implemented.

10.2.2 Proposed Operation Alternative

Under the Proposed Operation alternative, NSPW will:

- Continue to operate the Project as a run-of-river facility for the purpose of generating hydroelectric power where the discharge measured immediately downstream of the Project tailrace approximates the sum of inflows into the Project reservoir.
- Minimize reservoir fluctuations, by continuing to operate the reservoir between elevations 710.4 and 711.6 feet NGVD.
- Continue to release a minimum flow of 16 cfs or inflow, whichever is less, at all times to protect aquatic resources.
- Just prior to spring runoff, and for emergency purposes, NSPW may deviate from the maximum reservoir elevation, by not more than 0.5 feet to remove ice from the spillway for dam safety purposes. The duration of the deviation shall be no longer than necessary, typically less than a few days to remove the ice and will be conducted as a planned deviation under the requirements outlined in Section 5.8.

Under the Proposed Operation alternative, NSPW would also implement the following environmental measures:

- Conduct shoreline erosion surveys every 10 years.
- Develop an Aquatic and Terrestrial Invasive Species Plan and conduct biennial invasive species surveys.
- Pass woody debris collected at the dam and intake downstream into the bypass reach to enhance aquatic habitat.
- Develop an Operations Management Plan including deviation reporting and agency consultation requirements.
- Develop a HPMP in consultation with the Wisconsin SHPO, the Bad River Tribe, and other interested Native American Nations. The HPMP will follow the requirements outlined in the Programmatic Agreement.

NSPW is also proposing the following environmental measures regarding recreation resources:

- Review and update or replace Part 8 sign at the Boat Landing and Canoe Portage Take-Out site.
- Review and update or replace Part 8 sign at the Canoe Portage Trail and Put-In site.
- Conduct routine maintenance, including signage, of the recreation sites during the term of the subsequent license.
- Implement the Cave Bat BITP/A for any routine vegetation maintenance activities at NSPW's FERC-approved recreation sites.
- Implement the Wood Turtle BITP/A for routine maintenance activities at NSPW's FERC-approved recreation sites as long as the turtle remains a state-threatened or endangered species.

The following environmental measures are being proposed to avoid any potential adverse impacts during any yet to be fully defined in-kind maintenance activities that could occur during the subsequent license (see Section 12.0 for a list of the types of activities):

- Implement the Cave Bat BITP/A.
- Implement the Wood Turtle BITP/A as long as wood turtles remain state threatened or endangered.
- Review the Wisconsin NHI to determine the location of bald eagle nests and provide a 660-foot buffer between any vegetation management or construction activities as identified.

10.3 Cost of Environmental Measures

The cost of environmental measures is provided in Section 12 of Exhibit A and summarized in **Table 10.3-1**.

Table 10.3-1 Estimated Capital and Additional O & M Costs for Proposed Environmental Measures

Proposed Measure	**Capital Cost**	**O & M Cost**
Conduct shoreline erosion surveys every 10 years.	$0	N/A[40]
Develop Rapid Response Invasive Species Monitoring Plan and conduct biennial surveys.	$35,000	$35,000 every other year
Woody Debris Passage	$0	$10,000
Develop a Compliance Monitoring Plan including deviation reporting and agency consultation requirements.	$30,000	$50,000
Develop Historic Properties Management Plan in consultation with SHPO, Bad River Tribe, and other interested Native American Nations to follow requirements outlined in the Programmatic Agreement.	$20,000	$3,000 per year and $25,000 every 10 years
Review and update or replace Part 8 Sign at Boat Landing and Canoe Portage Take-Out site.	$2.000	N/A[41]
Review and update or replace Part 8 sign at Canoe Portage Trail and Put-in site.	$2,000	N/A[42]
Conduct routine maintenance of NSPW's FERC-approved recreation sites.	$0	N/A[43]
Implement the cave Bat BITP/A for any routine vegetation maintenance at NSPW's FERC-Approved recreation sites	$0	$1000
Implement the Wood Turtle BITP/A for routine maintenance work at NSPW's FERC-approved recreation sites, as long as the turtle remains a state threatened or endangered species.	$0	$1000
Total Costs	**$89,000**	**N/A[44]**

[40] Cost for the shoreline erosion survey is listed with the cost for the HPMP survey every 10 years.
[41] O&M cost figures for 2022 already include the costs of routine recreation site maintenance (including replacement of signs).
[42] O&M cost figures for 2022 already include the costs of routine recreation site maintenance (including replacement of signs).
[43] O&M cost figures for 2022 already include the costs of routine recreation site maintenance (including replacement of signs).
[44] The total O&M costs are not listed here because not all of the costs are incurred annually.

11. Comprehensive Plans per 18 CFR Part 16.8 [F][6]

Section 10(a)(2) of the Federal Power Act requires the FERC to consider the extent to which a proposed project is consistent with existing federal and state comprehensive plans, as defined in Section 2.19 under Part 2 of Chapter 1, Title 18, Code of Federal Regulations.

The following sections discuss the current list of FERC-approved comprehensive plans that may be applicable to the relicensing of the Project. This application was prepared in consultation with various resource agencies, including those who prepared the comprehensive plans outlined in this section.

Volume 4, Documentation of Consultation, details all consultation between the applicant and stakeholders. The license application outlines and incorporates various recommendations made by the stakeholders during consultation.

In general, NSPW is not proposing any material changes to the current operation of the Project.[45] If the environmental reviews conducted by the resource agencies identified any operational characteristics that required mitigation, appropriate mitigation has been proposed herein. Thus, the continued operation of the Project, in conjunction with the proposed mitigation measures, is not expected to adversely impact the resources in the area.

11.1 National Park Service Plans

11.1.1 The Nationwide Rivers Inventory (1993)

The Nationwide Rivers Inventory is a listing of more than 3,200 free-flowing river segments in the U.S. that are believed to possess one or more “outstandingly remarkable” values. The White River, from its headwaters in Bayfield County to the White River Flowage at State Highway 112 in Ashland County, is considered to possess outstandingly remarkable recreational and scenic values (National Park Service, n.d.). The Project has been in place since 1927 and the recreational and scenic values exist under the current run-of river operations. Since no operational changes are proposed, continued operation of the Project is not expected to affect the recreational or scenic values of the White River.

11.2 US Fish and Wildlife Service Plans

11.2.1 North American Waterfowl Management Plan (2012)

This plan is general in nature regarding outlining specific plan policies, goals, and recommendations and does not establish goals or recommendations specific to the Project area. However, this plan does stress the importance of resource conservation, management, and enhancement (US Fish and Wildlife Service, n.d.d). This license application has been developed to analyze impacts based upon resource conservation, management, and enhancement. There are no conflicts between this comprehensive plan and continued operation of the Project.

11.2.2 Upper Mississippi River & Great Lakes Region Joint Venture Implementation Plan (1998)

The Joint Venture is a partnership of resource agencies, Tribes, corporations, individuals, and organizations that have accepted the responsibility of implementing conservation plans within this geographic region. The

[45] The planned deviations for ice removal purposes are not expected to cause adverse fishery, terrestrial, or endangered resources due to their short duration and timing outside during high flow periods, which matches the natural hydrologic cycle. Therefore, the planned deviations are not considered a material change.

Joint Venture conducts activities to support bird conservation goals and are the standard for effective, science-based delivery of bird conservation through partnerships (US Fish and Wildlife Service, 1993). There are no conflicts between this comprehensive plan and continued operation of the Project.

11.2.3 Fisheries USA: The Recreational Fisheries Policy of the U.S. Fish & Wildlife Service (1989)

This policy defines the USFWS's role in the management of the country's recreational fishery resources and is intended to ensure high-quality recreational fisheries through federal cooperation and partnership (US Fish and Wildlife Service, 1986). There are no conflicts between this comprehensive plan and continued operation of the Project.

11.3 State of Wisconsin Plans

11.3.1 Lake Superior WDNR Basin Area Wide Water Quality Management Plan (1979)

This plan provides a snapshot of the current condition of land and water resources in the basin and creates a means for increased interagency cooperation and public involvement through identification and prioritization of issues and objectives (WDNR, 1979). There are no conflicts between this comprehensive plan and continued operation of the Project.

11.3.2 Statewide Comprehensive Outdoor Recreation Plan for 2019-2023 (2019)

The SCORP is discussed in Section 8.2.3.

11.3.3 Wisconsin's Water Quality Report to Congress (2020)

This report details the findings of water quality assessments in the state and describes specific state programs that control, manage, and prevent water quality degradation (WDNR, 2020b). This report indicates the White River meets water quality standards.

11.3.4 WDNR Biodiversity as a Management Issue (1995)

This document presents a strategy for the conservation of biological diversity and presents general strategic recommendations and possible actions for specific biological community types (WDNR, 1995a). There are no conflicts between this comprehensive plan and continued operation of the Project.

11.3.5 WDNR Forestry Best Management Practices for Water Quality (1995)

This document provides cost-effective methods to protect water quality in lakes, streams, and wetlands before, during, and after forest management activities. While no forest management practices are proposed as part of this DLA, any tree removal activities during the term of the license will follow the Forestry Best Management Practices for Water Quality (WDNR, 1995b).

11.3.6 WDNR White River Property Group (Bayfield and Ashland Counties) Master Plan (2013)

This plan determines how the White River Wildlife and Fishery Areas are managed. The White River Wildlife and Fishery Areas are primarily managed to provide opportunities for hunting, trapping, and fishing. The areas are also open for traditional outdoor recreational uses including hiking, skiing, snowshoeing, nature study, berry picking, and other low impact recreational uses as long as they do not detract from the primary purpose of the properties (WI Department of Natural Resources, 2013). There are no conflicts between this comprehensive plan and continued operation of the Project.

12. Maintenance Work - Yet To Be Fully Defined

In this FLA, NSPW provided analyses of the potential effects of the proposed operation of the Project regarding reasonably foreseeable future actions required under each subsequent license for the operation and maintenance of the Project. However, in the future, certain activities may become necessary for the day-to-day operations of the Project for which the schedule and full scope of environmental effects cannot be fully defined at this time. Some of these activities will require separate approval from the Commission prior to implementation. However, many activities can be considered in-kind replacements which would not require prior authorization from the resource agencies or Commission.

Examples of such yet to be fully defined maintenance work that may occur during the term of each Project's license include, but are not limited to, the following:

- Replacement of gate seals, gate repairs, concrete repairs, etc. that do not require a drawdown.
- Replacement of boat launch hard surfaces (in-kind).
- Grading of existing roads and parking areas.
- Replacement of existing signs or placement of new signs.
- Mowing and vegetation management at recreation sites and other Project facilities.
- Removal of hazardous trees from recreation sites or Project facilities.
- Replacement of turbine runners that do not result in a significant increase in authorized capacity or increase in water use.
- Any other maintenance of existing facilities that occurs above or below the ordinary high-water mark that does not result in a required change to the approved license exhibits or plans, provided all local, state, and federal permits are obtained prior to construction.

Impacts from yet to be fully defined in-kind maintenance work can generally be separated into categories based on areas of impact where specific mitigation measures can be implemented to avoid adverse impacts to the resources. The three general areas of potential impact are as follows:

- Structure or facility impacts such as concrete replacement, equipment replacement, or equipment resurfacing.
- Terrestrial impacts.
- Aquatic impacts.

The Commission is aware of the need for yet to be fully defined in-kind maintenance work to occur over the course of the new license. Therefore, it has previously established guidelines that allow such activities to occur, under the license in Article 3 of the L-Form Articles, without prior Commission approval. The license for the Project falls into L-Form Category 9 of which Article 3 states the following (emphasis added):

> *The project area and project works shall be in substantial conformity with the approved exhibits referred to in Article 2 herein or as changed in accordance with the provisions of said article. Except when emergency shall require for the protection of navigation, life, health, or property, there shall not be made without prior approval of the Commission any substantial alteration or addition not in conformity with the approved plans to any dam or other project works under the license or any substantial use of project lands and waters not authorized herein; and any emergency alteration, addition, or use so made shall thereafter be subject to such modification and change as the Commission may direct.* ***Minor changes in project works, or in uses of***

> ***project lands and waters, or divergence from such approved exhibits may be made if such changes will not result in a decrease in efficiency, in a material increase in cost, in an adverse environmental impact, or in impairment of the general scheme of development****; but any of such minor changes made without the prior approval of the Commission, which in its judgment have produced or will produce any of such results, shall be subject to such alteration as the Commission may direct.*

NSPW proposes that the conditions described in Section 12.1 be included in the license for yet to be fully defined in-kind maintenance activities that may occur during the term of the subsequent license. NSPW proposes to complete yet to be fully defined, in-kind maintenance activities under L-Form Article 3 as minor changes in project works, or in uses of Project lands or waters, without prior Commission approval because the activity will not and cannot be considered to "result in an adverse environmental impact or an impairment of the general scheme of development within the judgment of the Commission."

The conditions described in Section 12.1 shall be implemented by NSPW, as applicable, in the planning and/or execution of any yet to be fully defined in-kind maintenance activities that will occur during the term of the subsequent license. If the activity is unable to meet the requirements, there may be adverse environmental impacts, and the activity cannot proceed without prior Commission approval and cannot be considered a minor change as defined in the L-Form Article 3.

12.1 Conditions for Implementation of Minor Changes in Project Works or Uses Without Prior Commission Approval

The following requirements and/or conditions shall be implemented by NSPW, as applicable, in the planning and/or execution of any yet to be fully defined future in-kind maintenance activities that will occur during the term of the subsequent license. If the activity is unable to follow the requirements/conditions, there could be adverse environmental impacts, and the activity cannot proceed without prior Commission approval as a minor change as defined in the L-Form Article 3.

12.1.1 Structures or Facilities

Yet to be fully defined in-kind future maintenance activities could produce adverse impacts to the structures or facilities which would be contrary to the conditions and intent of the requirements of the subsequent license. Adverse impacts can be avoided if the following conditions/requirements are followed:

- No changes shall be made to the structure without following the requirements outlined in the upcoming Programmatic Agreement or Historic Properties Management Plan (Section 7.3).[46]
- No changes will be made to the structure or the facilities such that they no longer substantially conform to the approved Exhibits in the subsequent license; and
- No changes will be made to the structure or the facilities such that they no longer comply with the requirements of compliance plans developed as a result of the subsequent license.

[46] Project facilities are not eligible for the NRHP; therefore, no structure-related historic protection measures need to be implemented at this Project.

12.2 Terrestrial Areas

Yet to be fully defined future in-kind maintenance activities could produce adverse impacts to the terrestrial areas within the Project boundary which would be contrary to the conditions and intent of the requirements of the subsequent license. Adverse impacts can be avoided if the following conditions/requirements are followed:

- No ground-disturbing activities shall occur without following the requirements outlined in the Programmatic Agreement or Historic Properties Management Plan (Section 7.3);
- Prior to undertaking the activity, NSPW will obtain all applicable local, state, and federal permits and comply with all permit conditions during construction;
- For ground-disturbing activities, appropriate erosion, and sediment control best management practices from the current Wisconsin Construction Site Erosion Control Field Guide (NASECA Wisconsin, 2019) will be implemented (**Appendix E-35**);
- Prior to undertaking the activity, NSPW will review the Wisconsin NHI database to determine the location of bald eagle nests and provide a 660-foot buffer between any vegetation management or construction activities and identified nests during the nesting season;
- Prior to the undertaking activity, NSPW will complete a search of the IPaC database and review the current Wisconsin NHI Endangered Resources review for the Project and follow any required conditions to avoid adverse impacts to any listed species;
- For activities involving the removal of trees greater than 3 inches in diameter, the current USFWS NLEB guidance and Wisconsin's BITP/A for Cave Bats (**Appendix E-23**) will be followed for said tree removal activities.
- NSPW proposes to follow the terms of the current Wood Turtle BITP/A (**Appendix E-24**) as long as the wood turtle remains a state-listed threatened or endangered species; and
- NSPW will follow the current terrestrial invasive species BMPs identified in the Invasive Species Monitoring and Control Plan, to be developed under the subsequent license, for ground disturbing or vegetation maintenance activities that have the potential to spread existing or introduce new terrestrial invasive species.

12.3 Aquatic Areas

Yet to be fully defined future in-kind maintenance activities may produce adverse impacts to the aquatic resources within the vicinity of the Project which would be contrary to the conditions and intent of the requirements of the subsequent license. Adverse impacts can be avoided if the following conditions/requirements are followed:

- Prior to undertaking the activity, NSPW will obtain all necessary applicable local, state, and federal permits and comply with all permit conditions with during construction;
- For any deviation from license prescribed reservoir elevation or minimum flow requirements not exceeding three weeks,[47] NSPW will implement the planned deviation reporting process as outlined in Section 5.8.
- Prior to undertaking the activity, NSPW will review the Wisconsin NHI to determine the location of bald eagle nests and provide a 660-foot buffer between any vegetation management or construction activities and identified nests during the nesting season;

[47] Any planned change exceeding three weeks requires independent Commission approval prior to implementation.

- Prior to undertaking the activity, NSPW will complete a search of the IPaC database and follow any required measures included in the current Wisconsin NHI Endangered Resources review for the Project;
- For equipment used for in-water work, the current WDNR Manual Code # 9183.1 Boat, Gear, and Equipment Decontamination and Disinfection Protocol (WI Department of Natural Resources, 2016) or equivalent, will be followed (**Appendix E-36**); and
- NSPW proposes to follow the terms of the current Wood Turtle BITP/A (**Appendix E-24)** as long as the wood turtle remains a state-listed threatened or endangered species.

13. Requested License Term

NSPW respectfully requests the Commission issue a standard 40-year license for the White River Project.

14. Documentation of Consultation

Volume 4, Documentation of Consultation, details all phases of consultation between NSPW and the resource agencies, Tribes, and public during the development of this application. By reference here, *Volume 4, Documentation of Consultation,* becomes part of Exhibit E of this application.

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