

**ENVIRONMENTAL ASSESSMENT
FOR
HYDROPOWER LICENSE**

Black Brook Hydroelectric Project
FERC Project No. 2894-013
Wisconsin

Federal Energy Regulatory Commission
Office of Energy Projects
Division of Hydropower Licensing
888 First Street, NE
Washington, D.C. 20426

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TABLE OF CONTENTS

TABLE OF CONTENTS	ii
LIST OF FIGURES	iv
LIST OF TABLES.....	v
ACRONYMS AND ABBREVIATIONS.....	vi
1.0 INTRODUCTION	1
1.1 APPLICATION	1
1.2 PURPOSE OF ACTION AND NEED FOR POWER	1
1.2.1 Purpose of Action.....	1
1.2.2 Need for Power.....	2
1.3 STATUTORY AND REGULATORY REQUIREMENTS.....	3
1.3.1 Federal Power Act.....	3
1.3.1.1 Section 18 Fishway Prescriptions	3
1.3.1.2 Section 10(j) Recommendations.....	4
1.3.2 Clean Water Act	4
1.3.3 Endangered Species Act.....	4
1.3.4 Coastal Zone Management Act	5
1.3.5 National Historic Preservation Act	5
1.4 PUBLIC REVIEW AND COMMENT	6
1.4.1 Scoping.....	6
1.4.2 Interventions.....	6
1.4.3 Comments on the Application.....	6
2.0 PROPOSED ACTION AND ALTERNATIVES.....	6
2.1 NO ACTION ALTERNATIVE.....	6
2.1.1 Existing Project Facilities.....	6
2.1.2 Project Safety	7
2.1.3 Project Operation.....	8
2.2 APPLICANT’S PROPOSAL	8
2.2.1 Proposed Project Facilities	8
2.2.2 Proposed Operation and Environmental Measures	8
2.3 STAFF ALTERNATIVE.....	9
2.4 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED ANALYSIS	9
2.4.1 Retiring the Project.....	9
3.0 ENVIRONMENTAL ANALYSIS.....	10
3.1 GENERAL DESCRIPTION OF THE RIVER BASIN.....	11
3.2 SCOPE OF CUMULATIVE EFFECTS ANALYSIS.....	11
3.3 PROPOSED ACTION AND ACTION ALTERNATIVES	12
3.3.1 Aquatic Resources	12
3.3.1.1 Affected Environment.....	12
3.3.1.2 Environmental Effects	17
3.3.2 Terrestrial Resources.....	25

3.3.2.1	Affected Environment	25
3.3.2.2	Environmental Effects	26
3.3.3	Threatened and Endangered Species.....	28
3.3.3.1	Affected Environment	28
3.3.4	Recreation and Land Use	30
3.3.4.1	Affected Environment	30
3.3.4.2	Environmental Effects	32
3.3.5	Cultural Resources	32
3.3.5.1	Affected Environment	32
3.3.5.2	Environmental Effects	34
4.0	DEVELOPMENTAL ANALYSIS	36
4.1	POWER AND ECONOMIC BENEFITS OF THE PROJECT	36
4.2	COMPARISON OF ALTERNATIVES	38
4.2.1	No-Action Alternative.....	38
4.2.2	Flambeau Hydro’s Proposal	39
4.2.3	Staff Alternative	39
4.3	COST OF ENVIRONMENTAL MEASURES	39
5.0	CONCLUSION AND RECOMMENDATIONS.....	41
5.1	COMPREHENSIVE DEVELOPMENT AND RECOMMENDED ALTERNATIVE	41
5.1.1	Measures Proposed by Flambeau Hydro.....	41
5.1.2	Additional Measures Recommended by Staff.....	42
5.1.3	Measures Not Recommended.....	44
5.1.4	Conclusion.....	44
5.2	UNAVOIDABLE ADVERSE IMPACTS	44
5.3	CONSISTENCY WITH COMPREHENSIVE PLANS	44
6.0	FINDING OF NO SIGNIFICANT IMPACT	46
7.0	LITERATURE CITED.....	47
8.0	LIST OF PREPARERS	51

LIST OF FIGURES

Figure 1 Location of the Black Brook Hydroelectric Project (Source: Flambeau Hydro, 2019).	2
Figure 2 Mean (\pm Standard Deviation) lengths of fish collected in the project reservoir (Source: Flambeau Hydro, 2018).....	16

LIST OF TABLES

Table 1. Monthly estimated flows (cfs) at the the project based on prorated monthly flow data from USGS gage (05368000) located along the Hay River from 1950 to 2019 (Source: Staff).....	13
Table 2. Overall fish catches by gear type in the project reservoir (Source: Flambeau Hydro, 2018).....	15
Table 3. Intake approach velocities at the Black Brook Project according to turbine capacity under minimum and maximum flow conditions (Source: staff).	22
Table 4. Percent entrainment composition by family at 11 Wisconsin hydropower projects. (Source: EA, 2008; compiled data from EPRI, 1997).	24
Table 5 Parameters for economic analysis of the Black Brook Project.	37
Table 6 Summary of the annual cost of alternative power and annual project cost for the three alternatives for the Black Brook Project.....	38
Table 7 Cost of environmental mitigation and enhancement measures considered in assessing the effects of operating the Black Brook Project.	39

ACRONYMS AND ABBREVIATIONS

APE	area of potential effect
Black Brook certification	Black Brook Hydroelectric Project water quality certification
C.F.R.	Code of Federal Regulations
cfs	cubic feet per second
Commission	Federal Energy Regulatory Commission
CWA	Clean Water Act
CZMA	Coastal Zone Management Act
DO	dissolved oxygen
EA	environmental assessment
EFH	essential fish habitat
ESA	Endangered Species Act
°F	degree Fahrenheit
FERC	Federal Energy Regulatory Commission
FERC Form 80	Licensed Hydropower Development Recreation Report
Flambeau Hydro	Flambeau Hydro, LLC
FPA	Federal Power Act
fps	feet per second
FWS	U.S. Fish and Wildlife Service
Interior	U.S. Department of the Interior
IPaC	U.S. Fish and Wildlife Service Information for Planning and Consultation
kV	kilovolt
kW	kilowatt
mg/L	milligrams per liter
MW	megawatts
MWh	megawatt-hours
National Register	National Register of Historic Places
NAVD 1988	North American Vertical Datum 1988
NEPA	National Environmental Policy Act
NERC	North American Electric Reliability Corporation
NHPA	National Historic Preservation Act
Northwestern	Northwestern Wisconsin Electric
TSS	total suspended solids
USGS	U.S. Geological Survey
2017 wildlife survey	Wildlife Habitat Survey
Wisconsin DNR	Wisconsin Department of Natural Resources
Wisconsin DOA	Wisconsin Department of Administration
Wisconsin SHPO	Wisconsin State Historic Preservation Office

ENVIRONMENTAL ASSESSMENT

Federal Energy Regulatory Commission Office of Energy Projects Division of Hydropower Licensing Washington, DC

Black Brook Hydroelectric Project FERC Project No. 2894-013 – Wisconsin

1.0 INTRODUCTION

1.1 APPLICATION

On December 31, 2018, Flambeau Hydro, LLC (Flambeau Hydro) filed an application with the Federal Regulatory Commission (Commission or FERC) for a subsequent license to continue to operate and maintain the Black Brook Hydroelectric Project No. 2894-013 (Black Brook Project or project).¹ The 650-kilowatt (kW) project is located on the Apple River, in Polk County, Wisconsin (Figure 1). The project does not occupy federal land.

1.2 PURPOSE OF ACTION AND NEED FOR POWER

1.2.1 Purpose of Action

The purpose of the Black Brook Project is to continue to provide a source of hydroelectric power. Therefore, under the provisions of the Federal Power Act (FPA), the Commission must decide whether to issue a subsequent license to Flambeau Hydro for the Black Brook Project, and what conditions should be placed on any license issued. In deciding whether to issue a license for a hydroelectric project, the Commission must determine that the project will be best adapted to a comprehensive plan for improving or developing a waterway. In addition to the power and developmental purposes for which licenses are issued (such as flood control, irrigation, and water supply), the Commission must give equal consideration to the purposes of: (1) energy conservation; (2) the protection of, mitigation of damage to, and enhancement of fish and wildlife resources; (3) the protection of recreational opportunities; and (4) the preservation of other aspects of environmental quality.

¹ The original license for the project was issued on January 22, 1980, for a term of 30 years, with an effective date of January 1, 1980, and an expiration date of December 31, 2020. *See Northwestern Wisconsin Electric Company, 10 FERC ¶ 62,049.*

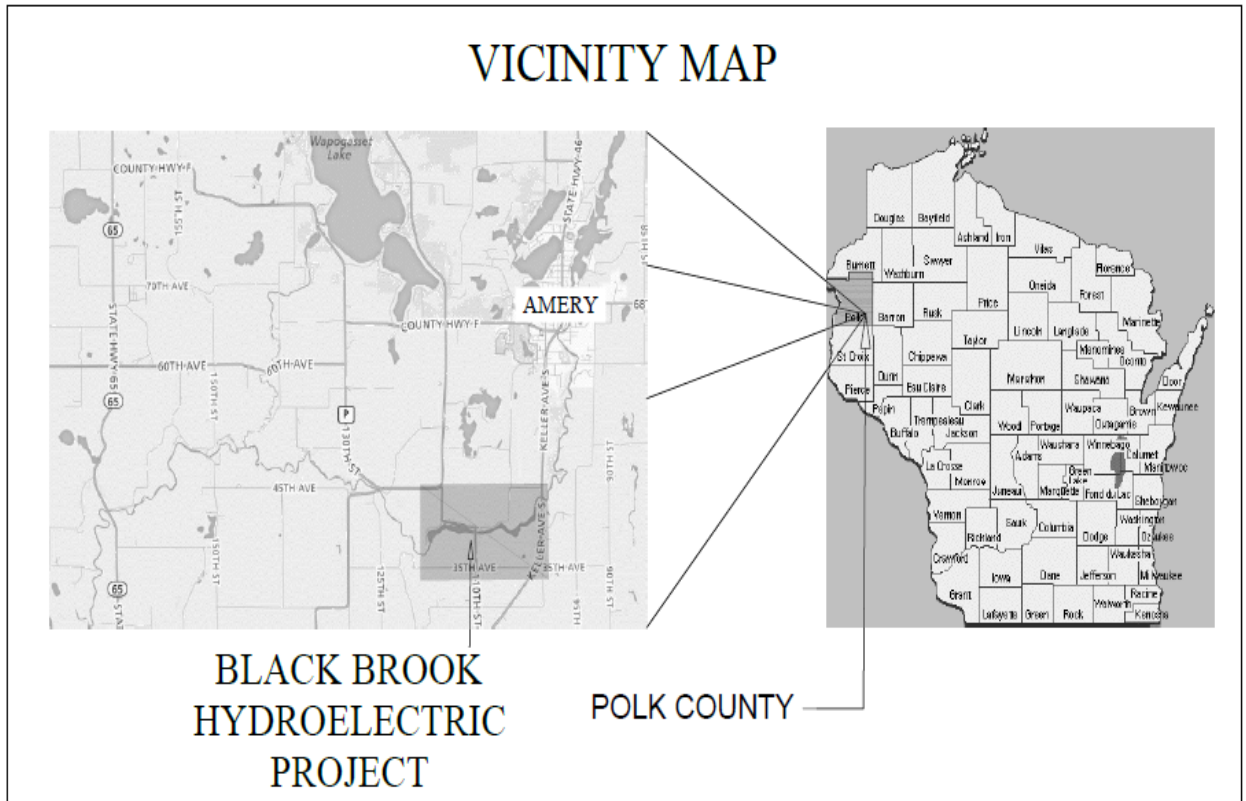


Figure 1. Location of the Black Brook Project (Source: Flambeau Hydro, 2019).

Issuing a subsequent license for the Black Brook Project would allow Flambeau Hydro to continue to generate electricity at the project for the term of the license.

This environmental assessment (EA) analyzes the effects associated with continued operation of the project and alternatives to it, and makes recommendations to the Commission on whether to issue a license, and under what terms and conditions to issue a license.

In this EA, we assess the environmental and economic effects of continuing to operate the project: (1) as proposed by Flambeau Hydro; and (2) as proposed by Flambeau Hydro with staff-recommended measures. We also consider the effects of the no-action alternative. The primary issue associated with relicensing the project is protecting aquatic resources.

1.2.2 Need for Power

The Black Brook Project has an installed capacity of 650 kW and an average annual energy production of about 7,336 megawatt-hours (MWh). The project sells

power to Northwestern Wisconsin Electric (Northwestern) to supplement Northwestern’s generating system.

To assess the need for power, we looked at the needs in the operating region in which the project is located. The Black Brook Project is located within the Midcontinent Independent System Operator assessment area of the Midwest Reliability Organization (MRO), a regional organization of the North American Electric Reliability Corporation (NERC). NERC annually forecasts electrical supply and demand nationally and regionally for a 10-year period. According to NERC’s 2019 Long-Term Reliability Assessment, the 10-year annual peak demand for this region is projected to increase by 0.2 percent. The anticipated reserve margin² is forecasted to range from 22.49 percent in 2020 to 14.27 percent in 2029. The MISO assessment area is projected to have resources in excess of the regional requirement through 2029. (NERC, 2019).

Given that annual peak demand is projected to increase in the MISO region, we conclude that power from the project would continue to help meet the regional need for power by providing a portion of that power that would otherwise have to come from alternative power sources. In addition, the project provides power that can displace non-renewable sources. Displacing the operation of non-renewable facilities may avoid some power plant emissions, thus creating an environmental benefit.

1.3 STATUTORY AND REGULATORY REQUIREMENTS

A subsequent license for the project would be subject to numerous requirements under the FPA and other applicable statutes. The major regulatory and statutory requirements are described below.

1.3.1 Federal Power Act

1.3.1.1 Section 18 Fishway Prescriptions

Section 18 of the FPA, 16 U.S.C. § 811, states that the Commission is to require construction, operation, and maintenance by a licensee of such fishways as may be prescribed by the Secretaries of the U.S. Department of Commerce or the U.S. Department of the Interior (Interior). No fishway prescriptions or requests for reservation of authority to prescribe fishways were filed under section 18 of the FPA.

² The “anticipated reserve margin” considers the amount of anticipated generation resources relative to net electricity demand. For example, an anticipated reserve margin of 15 percent means that 15 percent of a region’s electric generating capacity would be available as a buffer to supply the summer’s peak hourly load.

1.3.1.2 Section 10(j) Recommendations

Under section 10(j) of the FPA, each hydroelectric license issued by the Commission must include conditions based on recommendations provided by federal and state fish and wildlife agencies for the protection, mitigation, or enhancement of fish and wildlife resources affected by the project. The Commission is required to include these conditions unless it determines that they are inconsistent with the purposes and requirements of the FPA or other applicable law. Before rejecting or modifying an agency recommendation, the Commission is required to attempt to resolve any such inconsistency with the agency, giving due weight to the recommendations, expertise, and statutory responsibilities of such agency. No recommendations were filed pursuant to section 10(j) of the FPA.

1.3.2 Clean Water Act

Under section 401(a)(1) of the Clean Water Act (CWA), 33 U.S.C. § 1341(a)(1), a license applicant must obtain either a water quality certification (certification) from the appropriate state pollution control agency verifying that any discharge from the project would comply with applicable provisions of the CWA, or a waiver of such certification. A waiver occurs if the state agency does not act on a request for certification within a reasonable period of time, not to exceed one year after receipt of such request.

On September 30, 2019, Flambeau Hydro applied to the Wisconsin Department of Natural Resources (Wisconsin DNR) for certification for the Black Brook Project. Wisconsin DNR received the request for certification on November 1, 2019. Wisconsin DNR has not yet acted on the application.

1.3.3 Endangered Species Act

Section 7 of the Endangered Species Act (ESA), requires federal agencies to ensure that their actions are not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of the critical habitat of such species. In March 2020, we accessed the U.S. Fish and Wildlife Service's (FWS) Information for Planning and Consultation (IPaC) database to determine whether any federally listed species could occur in the project vicinity. According to the IPaC database, the federally threatened northern long-eared bat (*Myotis septentrionalis*) and the federally endangered gray wolf (*Canis lupus*) could occur in the project vicinity.³ No critical habitat has been designated for the bat.

³ See Interior's official list of threatened and endangered species, accessed by staff using the IPaC database (<https://ecos.fws.gov/ipac/>) on March 22, 2020 and filed on March 22, 2020.

Our analyses of project effects on the northern long-eared bat and gray wolf are presented in section 3.3.3.2, *Threatened and Endangered Species, Environmental Effects*. We conclude that licensing the project would have no effect on the gray wolf and is not likely to have an adverse effect on the northern long-eared bat.

1.3.4 Coastal Zone Management Act

The Coastal Zone Management Act of 1972 (CZMA), as amended, requires review of the project’s consistency with a state’s Coastal Management Program for projects within or affecting the coastal zone. Under section 307(c)(3)(A) of the CZMA, 16 U.S.C. §1456(c)(3)(A), the Commission cannot issue a license for a project within or affecting a state’s coastal zone unless the state’s 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.

On December 6, 2018, Flambeau Hydro emailed the Wisconsin Department of Administration (Wisconsin DOA) for compliance with the CZMA. Wisconsin DOA responded on December 6, 2018,⁴ and stated the project is not within Wisconsin’s Great Lakes counties, and as such, would not require a federal consistency review by the Wisconsin Coastal Management Program. Therefore, CZMA consistency certification is not required.

1.3.5 National Historic Preservation Act

Section 106 of the National Historic Preservation Act (NHPA), 54 U.S.C. § 306108, requires that a federal agency “take into account” how its undertakings could affect historic properties. Historic properties are districts, sites, buildings, structures, traditional cultural properties, and objects significant in American History, architecture, engineering, and culture that are eligible for inclusion in the National Register of Historic Places (National Register or historic properties).

By letter dated September 18, 2018, the Wisconsin State Historic Preservation Office (Wisconsin SHPO) stated that no known historic properties are located within the project’s area of potential effect (APE). Based on the information provided and comments from the Wisconsin SHPO, we conclude that relicensing the project would not affect any historic properties.

⁴ Appendix E-16.1 of the license application contains the email correspondence dated December 6, 2018 from the Wisconsin DOA.

1.4 PUBLIC REVIEW AND COMMENT

The Commission's regulations (18 C.F.R. § 16.8) require applicants to consult with appropriate resource agencies, tribes, and other entities before filing an application for a license. This consultation is the first step in complying with the Fish and Wildlife Coordination Act (16 U.S.C. § 661 *et seq.*), ESA, NHPA, and other federal statutes. Pre-filing consultation must be completed and documented according to the Commission's regulations.

1.4.1 Scoping

Before preparing this EA, staff conducted scoping to determine what issues and alternatives should be addressed. A scoping document was distributed to interested agencies and others on August 14, 2019. The document was noticed in the *Federal Register* on August 20, 2019. The Wisconsin SHPO provided written comments pertaining to the scoping document on September 9, 2019.

1.4.2 Interventions

On September 30, 2019, the Commission issued a notice accepting the application and setting November 29, 2019, as the deadline for filing motions to intervene and protests. Wisconsin DNR filed a motion to intervene on October 4, 2019.

1.4.3 Comments on the Application

On September 30, 2019, the Commission issued a notice setting November 29, 2019, as the deadline for filing comments, recommendations, terms and conditions, and prescriptions. Comments were filed by Wisconsin DNR and Interior on November 27, 2019.

2.0 PROPOSED ACTION AND ALTERNATIVES

2.1 NO ACTION ALTERNATIVE

Under the no-action alternative, the project would continue to operate under the terms and conditions of the current license, and no new environmental protection, mitigation, or enhancement measures would be implemented. We use this alternative as the baseline condition for comparison with other alternatives.

2.1.1 Existing Project Facilities

The Black Brook Project includes a 131-foot-long by 32-foot-high concrete gravity dam with three 12-foot-high by 12-foot-wide radial gates and a 32.5-foot-wide by 23.6-foot-high overflow section with an additional 6-inch flashboard; a 315-foot-long by

8.3-foot-high left embankment with a 12-foot-wide crest. The right embankment is a 75-foot-long by 38.5-foot-wide by 31.2-foot-tall structure from the core wall to normal tailwater elevation. The embankment is located to the right of and abuts the powerhouse.

Located directly upstream and integral to the powerhouse is a forebay structure that consists of a 10-foot-long by 38-inch-wide by 15-foot-high reinforced concrete intake structure with two 7-foot-wide by 12-foot-tall steel dewatering gates and two 16-foot-wide by 15-foot-tall, 65-degree inclined trash racks with a 1.5-inch clear-bar spacing and a gantry system used to operate the stop gates. Each rack bar is ¼ inch thick.

The powerhouse is a cement block superstructure with a concrete substructure containing two vertical Francis turbines and is located to the right of the overflow spillway section of the dam and to the left of the right embankment. The exterior of the powerhouse is 34.66-foot by 25.33-foot. The generating units have a total installed capacity of 0.650 megawatts (MW). The project also includes a 30-foot by 10-foot tailrace that is integral with the powerhouse.

The project has a normal pool elevation of 1045.47 feet North American Vertical Datum 1988 (NAVD 1988),⁵ with a surface area of about 98 acres and no usable storage capacity.

Power is conveyed from the powerhouse to Northwestern's electric transmission system via a 20-foot-long, 2400-volt underground transmission line that is connected to a 6-foot by 5.5-foot, 13.2-kilovolt (kV) pad-mount transformer substation facility and a 1.25-mile-long three-phase 13.2-kV underground transmission line. The transmission line crosses the Apple River downstream of the project overhead for approximately 270 feet and then travels back underground to the transmission interconnection point. Additionally, an informal tailwater walk-in fishing area is located immediately downstream of the powerhouse.

2.1.2 Project Safety

The Black Brook Project has been operating for more than 32 years under its existing license. During this time, Commission staff has conducted operational inspections focusing on the continued safety of the structures, identification of unauthorized modifications, efficiency and safety of operations, compliance with the terms of the license, and proper maintenance.

As part of the licensing process, Commission staff will evaluate the continued adequacy of the project's facilities under a subsequent license. Special articles will be

⁵ Minimum and maximum elevations converted to North American Vertical Datum of 1988. *See* 156 FERC ¶ 62,198 (2016).

included in any license issued, as appropriate. Commission staff would continue to inspect the project during the term of any subsequent license to assure continued adherence to Commission-approved plans and specifications, special license articles relating to construction (if any), operation and maintenance, and accepted engineering practices and procedures.

2.1.3 Project Operation

The Black Brook Project is operated as a run-of-river facility, with a maximum reservoir elevation of 1045.47 feet NAVD 1988 and a minimum of 1044.34 feet NAVD 1988.

The project is manually operated. Operation personnel live within 20 minutes of the site and monitor the project daily, and are on call 24 hours a day, every day of the year to respond to problems at the project. A minimum flow of 60 cubic feet per second (cfs), or inflow if less, is discharged into the tailrace year round from the project to the Apple River. Whenever flows increase or decrease, operators increase or decrease flows through the turbines up to the turbines' capacities to maintain targeted water elevations. Once these capacities are reached, operators open or close spillway gates as flows determine the need to do so.

The operator checks the plant twice per day and maintains Plant Operation Logs. At least once per month, Flambeau Hydro staff visits the site to perform preventative maintenance duties and inspection of the grounds. Debris at the plant forebay is removed by manual raking.

2.2 APPLICANT'S PROPOSAL

2.2.1 Proposed Project Facilities

Flambeau Hydro proposes no new facility construction/modification, changes to current operation, or revisions to the project boundary.

2.2.2 Proposed Operation and Environmental Measures

Flambeau Hydro proposes to:

- Continue to operate the project in a run-of-river mode, such that outflow approximates inflow at all times to protect aquatic resources.
- Release a continuous minimum flow of 60 cfs, or inflow if less, from the project into the tailrace.

- Continue to maintain the tailwater walk-in fishing area downstream of the powerhouse.
- Develop and implement an Historic Properties Management Plan (HPMP) to protect historic properties eligible for the National Register.

2.3 STAFF ALTERNATIVE

Under the staff alternative, the project would be operated as proposed by Flambeau Hydro, with the exception of developing and implementing an HPMP, and with the following additional measures:

- An operation compliance monitoring plan for maintaining and monitoring run-of-river operation and the 60 cfs minimum flow release.
- A debris management plan.
- Avoid cutting trees between June 1 and July 31 to protect roosting northern long-eared bats.

2.4 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED ANALYSIS

Retiring the project was considered as an alternative to the project, but has been eliminated from further analysis because it is not reasonable in the circumstances of this case. We discuss our justification for eliminating the alternative below.

2.4.1 Retiring the Project

As the Commission has previously held, decommissioning is not a reasonable alternative to relicensing a project in most cases, when appropriate protection, mitigation and enhancement measures are available.⁶ The Commission does not speculate about possible decommissioning measures at the time of relicensing, but rather waits until an applicant actually proposes to decommission a project, or there are serious resource concerns that cannot be addressed with appropriate license measures, making

⁶ See, e.g., *Eagle Crest Energy Co.*, 153 FERC ¶ 61,058, at P 67 (2015); *Public Utility District No. 1 of Pend Oreille County*, 112 FERC ¶ 61,055, at P 82 (2005); *Midwest Hydro, Inc.*, 111 FERC ¶ 61,327, at PP 35-38 (2005).

decommissioning a reasonable alternative to relicensing.⁷ This is consistent with the National Environmental Policy Act (NEPA) and the Commission's obligation under section 10(a) of the FPA to issue licenses that balance developmental and environmental interests.

Project retirement would require denying the relicense application and surrender or termination of the existing license with appropriate conditions.

No participant has suggested that project retirement would be appropriate in this case, and we have no basis for recommending it. The power and ancillary services provided by the Black Brook Project are important resources that would be lost if the project was retired, and there would be significant costs involved with retiring the project and or removing any project facilities. Thus, we do not consider project retirement a reasonable alternative to relicensing the project with appropriate protection, mitigation, and enhancement measures.

3.0 ENVIRONMENTAL ANALYSIS

This section includes: (1) a general description of the project vicinity, (2) an explanation of the scope of our cumulative effects analysis, and (3) our analysis of the proposed action and other recommended environmental measures. Sections are organized by resource area (aquatic, recreation, etc.). Historic and current conditions are described under each resource area. The existing conditions are the baseline against which the environmental effects of the proposed action and alternatives are compared, including an assessment of the effects of proposed mitigation, protection, and enhancement measures, and any potential cumulative effects of the proposed action and alternatives. Staff conclusions and recommended measures are discussed in section 5.1, *Comprehensive Development and Recommended Alternative*.⁸

⁷ See generally *Project Decommissioning at Relicensing; Policy Statement*, FERC Stats. & Regs., Regulations Preambles (1991-1996), ¶ 31,011 (1994); see also *City of Tacoma, Washington*, 110 FERC ¶ 61,140 (2005) (finding that unless and until the Commission has a specific decommissioning proposal, any further environmental analysis of the effects of project decommissioning would be both premature and speculative).

⁸ Unless otherwise indicated, our information is taken from the application for license filed by Flambeau Hydro on December 31, 2018, and Flambeau Hydro's February 5, 2020, January 15, 2020, September 20, 2019, July 27, 2019, May 28, 2019, and March 23, 2020 responses to staff's requests for additional information.

3.1 GENERAL DESCRIPTION OF THE RIVER BASIN

The Lower Apple River watershed lies in south central Polk County and extends into the Northern St. Croix County. The area contains the drainage to the Apple River downstream of the Apple River Flowage Dam in Amery, WI. The Polk County portion of this watershed contains 33 lakes. The watershed is 129,385 acres in size and consists of 152 miles of streams and rivers, 4,392 acres of lakes and 9,095 acres of wetlands. The watershed is dominated by agriculture (31 percent) and grassland (31 percent), and is ranked high for nonpoint source issues affecting streams and groundwater.

Polk County has a diverse landscape ranging from broad, nearly level glacial outwash and lacustrine plains to rough, broken glacial moraines and areas of pitted outwash. The county generally has a young drainage pattern and many closed depressions and pothole lakes. The lakes range widely in size and depth. Among the larger are Balsam Lake, Deer Lake, Cedar Lake, and Lake Wapogasset. Lakes and streams total more than 23,000 acres, or slightly less than four percent of the county.

The Black Brook Project is located at approximately river mile 36 on the Apple River.⁹ Land use in the near Town of Black Brook is predominantly agricultural with some forested areas. Land uses close to the Black Brook Project include water, forest, agricultural, and single-family residential housing.

Climate in the river basin varies by season, with cold winters and warm summers. On average, monthly summer temperatures are approximately 70 Fahrenheit (°F) and monthly winter temperatures are approximately 20°F.¹⁰ Precipitation occurs year-round and is markedly greater in summer months.

3.2 SCOPE OF CUMULATIVE EFFECTS ANALYSIS

According to the Council on Environmental Quality's regulations that implement NEPA, 40 C.F.R. § 1508.7, a cumulative effect is the impact on the environment that results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (federal or non-federal)

⁹ See Wisconsin Department of Natural Resources: Water Condition Viewer (https://dnrmaps.wi.gov/H5/?Viewer=Water_Condition_Viewer&runWorkflow=search¶m=AULN,ASSESSMENT_UNIT_SEQ_NO,1466514). Accessed on March 20, 2020.

¹⁰ See City Data: Black Brook, Wisconsin (<https://www.city-data.com/city/Black-Brook-Wisconsin.html>). Accessed on March 20, 2020.

or person undertakes such other actions. Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time, including hydropower and other land and water development activities.

Based on our review of the license application and agency comments, we have not identified any resources that could be cumulatively affected by continued operation of the Black Brook Project.

3.3 PROPOSED ACTION AND ACTION ALTERNATIVES

In this section, we discuss the project-specific effects of the project alternatives on environmental resources. For each resource, we first describe the affected environment, which is the existing condition and baseline against which we measure project effects. We then discuss and analyze the site-specific environmental issues.

Only the resources that would be affected, or about which comments have been received, are addressed in detail in this EA. Based on this, we have determined that aquatic resources, terrestrial resources, threatened and endangered species, recreation, and cultural resources may be affected by the proposed action and alternatives. We have not identified any substantive issues related to geology and soils, aesthetic resources, or socioeconomics associated with the proposed action; therefore, these resources are not assessed in the EA. We present our recommendations in section 5.1, *Comprehensive Development and Recommended Alternative*.

3.3.1 Aquatic Resources

3.3.1.1 Affected Environment

The project impoundment has a surface area of about 98 acres with an average depth of seven feet and a maximum depth of about 23 feet. The total water volume of the Black Brook impoundment is about 732 acre-feet with a residence time of approximately two days (1.97 days). As described in section 2.1.4, *Existing Project Operation*, the Black Brook Project is operated as a run-of-river facility maintaining a maximum water elevation of 1045.47 feet NAVD 1988 and a minimum of 1044.34 feet NAVD 1988. A minimum flow of 60 cfs (or inflow to the project, whichever is less) is discharged from the project year-round to the Apple River.

The Apple River has a drainage area at the project of approximately 202 square miles. Flow data for the Apple River near the project is not available. Therefore, discharge data from the U.S. Geological Survey (USGS) gage (05368000) located along the Hay River was used to estimate flows at the project. The Hay River site was selected as a viable alternative due to its proximity to the project (located about 30 miles east of project) and has a basin with similar characteristics (e.g., topography, precipitation). The Hay River gage site has a drainage area of 418 square miles and a 69-year period of flow

record (1950-2019). To estimate monthly flows at the project (Table 1), flows from the Hay River were prorated based on the ratio of the drainage area at the project (202 square miles) to the drainage area at the gage site (418 square miles) (conversion factor $202/418 = 0.48$).

Table 1. Monthly estimated flows (cfs) at the project based on prorated monthly flow data from USGS gage (05368000) located along the Hay River from 1950 to 2019 (Source: Staff).

Month	Mean	Median	Minimum	Maximum
January	101	100	47	199
February	112	102	41	317
March	231	210	75	493
April	306	273	80	993
May	187	169	74	450
June	174	146	74	492
July	135	127	65	322
August	132	119	61	274
September	142	123	68	368
October	134	127	67	308
November	131	119	67	348
December	114	108	59	300

Besides hydropower production, the only other water uses in the project area are for recreation. There are no public water supply uses or withdrawals for agriculture or industrial purposes in the Apple River near the project .

Water Quality

State water quality standards for the Apple River in the project area, including the impoundment, specify a minimum dissolved oxygen (DO) level of 5.0 milligrams per liter (mg/L), a pH in the range of 6 to 9, and monthly sub-lethal maximum water temperatures ranging from 49 °F in December and January, to 79 °F in July and August.

Flambeau Hydro conducted a water quality study at the project from May to October 2017. Monthly sampling was done for various water quality parameters at three locations: (1) Upstream Site, near the Highway 46 Bridge (about 2.1 river miles upstream of project); (2) Downstream Site, located about 75 feet downstream of the project; and (3) flowage site, located about 400 feet upstream of the project dam at the deepest spot of the reservoir. In June, July, and August, twelve comprehensive reservoir monitoring parameters were sampled at these locations each month: chlorophyll *a*, color, conductivity, ammonia, nitrate, nitrite, total Kjeldahl nitrogen (TKN), pH, total phosphorus, ortho-phosphorus, total dissolved phosphorus, and total suspended solids (TSS). In May, October, and September grab samples were taken to measure total phosphorus, total dissolved phosphorus, ortho-phosphorus, and pH. Surface DO and temperature were also measured in the monthly samplings. DO, temperature, and pH were also measured during August and the first half of September at the Downstream and Upstream Sites. Additionally, DO and temperature profiles were taken at the three different sites and the flowage site within the impoundment, in June, July, and August (plus September for the flowage site).

For the twelve comprehensive reservoir monitoring parameters, conductivity increased at the sites throughout the summer as water temperatures increased, which is typical. Color values were less than regional and statewide datasets. Parameters that indicate pollution, including chlorophyll *a*, ammonia, nitrate, nitrite, TKN, total phosphorus, organic phosphorus, total dissolved phosphorus, and TSS, were all below levels that would indicate degradation. Water temperatures, DO, and pH were within the ranges or at levels established by the state standards. August and September DO levels and water temperatures showed that the project had no detectable influence on these parameters downstream of the project.

The DO and temperature profiles for the three impoundment monitoring sites (not including the flowage site) showed that water was well mixed from top to bottom, with relatively steady temperatures and DO concentrations throughout the water column. DO concentrations met or exceeded levels established by the state standards, and temperatures were all below the state maximum at the three sites. The flowage site, which is also the deepest site of the impoundment, showed seasonal stratification, with DO concentrations decreasing to near 0 mg/L, along with decreasing water temperatures, at the bottom of the impoundment in late June and mid-July.

In 2019, Wisconsin DNR assessed water quality information in the project impoundment and concluded that the general condition of the water for the designated use categories for fish and aquatic life use, and fish consumption, were both “good” (Wisconsin DNR, 2020). Waters assigned the condition category of “good” are considered to be attaining applicable water quality standards and supporting their assessed designated uses.

Fishery Resources

Reservoir fishery survey

Flambeau Hydro conducted a fishery study to determine the composition of littoral panfish and pelagic fish communities in the reservoir between May 23 and September 26, 2017. During the study, sixteen passive gear deployments (fyke nets and gill nets) and four shoreline electrofishing surveys were completed. A total of 365 fish were captured in fyke nets (N = 258), gill nets (N = 66), and shoreline electrofishing (N = 41; Table 2). Panfish species (i.e., Bluegill, Pumpkinseed, Rock Bass, Crappie, and Yellow Perch) were about 85 percent of the overall catch with Bluegill being the most abundant species collected, accounting for around 61 percent of all fish captured (Table 2).

Table 2. Overall fish catches by gear type in the project reservoir (Source: Flambeau Hydro, 2018).

Species	Gear				Species Count	Proportion of Total Catch
	Shoreline Electrofishing	Fyke net	Daytime Fyke net	Gill net		
Black Bullhead		3			3	0.8 %
Black Crappie	4	6		2	12	3.3 %
Bluegill	1	199	4	18	222	60.8 %
Common Shiner		2			2	0.5%
Golden Shiner				2	2	0.55 %
Largemouth Bass	2			1	3	0.82 %
Northern Pike	10	1		4	15	4.11 %
Pumpkinseed		26		3	29	7.95 %
Rock Bass	6	10		13	29	7.90 %
Smallmouth Bass	9			6	15	4.10 %
Walleye				2	2	0.55 %
White Crappie		1			1	0.27 %
White Sucker	3	2		2	7	1.92 %
Yellow Bullhead	1	3			4	1.10 %
Yellow Perch	5	1		13	19	5.20 %
Total Count	41	254	4	66	365	

Length frequency data indicate that common sport fish are represented by various life stages in the project vicinity, including bluegill (mean = 3.6 in; range = 1.2 to 7.4 in), black crappie (mean = 8.6 in; range = 7.1 to 10.0 in), largemouth bass (mean = 6.9 in; range = 5.9 to 8.5 in), northern pike (mean = 16.6 in; range = 1.8 to 26.4 in), pumpkinseed sunfish (mean = 4.7 in; range = 2.1 to 7.3 in), rock bass (mean = 5.3 in; range = 2.4 to 9.9 in), smallmouth bass (mean = 11.9 in; range = 2.0 to 19.5 in), walleye (mean = 20.6 in; range = 19.5 to 21.7 in), white crappie (mean = 2.2 in; range = n/a), and

yellow perch (mean = 8.2 in; range = 5.8 to 9.4 in). Mean lengths (\pm Standard Deviation) for all fish (i.e., sportfish and non-game species) captured during the 2017 reservoir fish survey are presented in Figure 2.

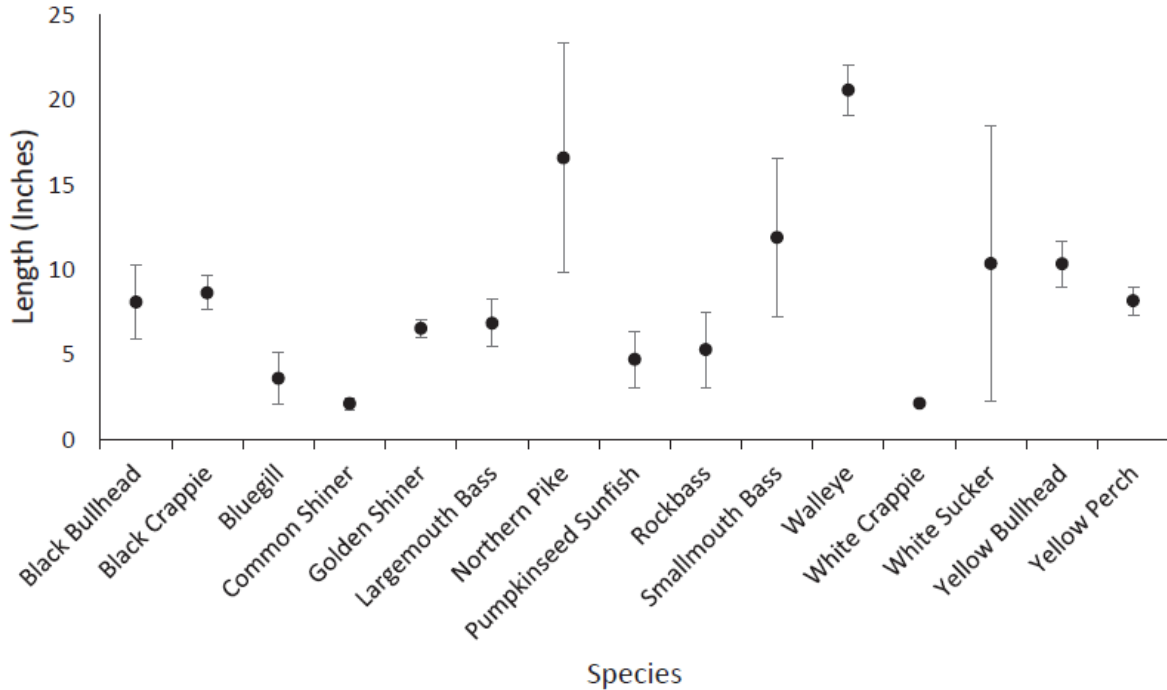


Figure 2. Mean (\pm Standard Deviation) lengths of fish collected in the project reservoir (Source: Flambeau Hydro, 2018).

Downstream larval fish survey

Flambeau Hydro performed field surveys of the larval fish community in the Apple River immediately downstream of the spillway below the powerhouse. Twelve overnight driftnet sets were completed between May 5 and June 10, 2017 yielding 514 larval fish. Percids (i.e., perches) dominated the catch during May sampling while Centrarchids (i.e., sunfishes) and Cyprinids (i.e., minnows) dominated catches in early June. Many specimens (N = 385) were severely degraded (i.e. substantial physical damage to the body, fins, etc.) and could not be clearly identified. For the entire study period, for those that could be identified (N = 129), Percids were the most abundant (47 percent), followed by Centrarchids (41 percent), Cyprinids (10 percent), and Catostomids (2 percent).

Downstream aquatic habitat survey

Flambeau Hydro performed field surveys in July and September 2017 of water depths and velocities, substrate characteristics, and channel morphology in a 0.25-mile section of the Apple River immediately downstream of the project. The results of the

surveys showed that the Apple River averages about 75 feet in width throughout the downstream study area, yielding an overall wetted surface area of approximately 2.5 acres. Run habitat was the dominant macrohabitat type in this river reach interspersed with short sections of riffles with a single deep pool immediately downstream of the dam spillway. Coarse sediments such as cobble and gravel made up the vast majority of benthic substrates in the downstream study area with very little fine sediment (i.e. silt and sand) found between the channel margins. Although a large proportion of the riparian zone on both banks of the downstream study area consisted of large diameter (i.e. > 6 inches) trees, there was very little woody debris present in the river channel. Aquatic macrophyte growth covered approximately 12 percent of the overall surface area in the downstream study area with wild celery (*Vallisneria americana*) and duckweed (*Lemna* spp., and *Spirolela polyrhiza*) being the dominant species within the main channel.

Mussels

Flambeau Hydro conducted qualitative timed searches in the project reservoir and in the downstream study area (a 0.25-mile section of the Apple River immediately downstream of the project) in an effort to create a species list of mussels for the project area. A total of five mussel species were observed in the project area. Three species were collected both upstream and downstream: creeper (*Strophitus undulatus*), fat mucket (*Lampsilis siliquoidea*), and giant floater (*Pyganadon grandis*). Cylindrical papershell (*Anodontoidea ferussacianus*) was only observed in the upstream area, and plain pocketbook (*Lampsilis cardium*) was only observed in the downstream area. The most frequently encountered species during both surveys was the giant floater.

3.3.1.2 Environmental Effects

Mode of Operation

Flambeau Hydro does not propose to change the way the project is operated. Currently, the project operates in a run-of-river mode maintaining a maximum water elevation of 1045.47 feet NAVD 1988 and a minimum of 1044.34 feet NAVD 1988, thereby limiting impoundment fluctuations to about 1.13 feet or less throughout the year.

Our Analysis

Continuing to operate the project in a run-of-river mode would result in no change in the amount, schedule, or duration of flow released to the Apple River downstream of the project. This measure would continue to provide stable reservoir water levels, which protects fish that spawn in near-shore areas, such as largemouth bass and bluegill. By continuing to operate the project in a run-of-river mode, habitat in the impoundment and habitat in the Apple River downstream of the project would remain unchanged from current conditions for aquatic organisms, including fish and macroinvertebrates.

Therefore, there would be no expected change to the abundance, suitability, or distribution of aquatic species in the project area.

Minimum Flow Release

Flambeau Hydro proposes to continue to release a minimum flow of 60 cfs (or inflow to the project, whichever is less) downstream of the project at all times to protect aquatic resources in Apple River downstream of the project. If the project is operating, the 60 cfs is provided to the river channel through the turbines, otherwise it is passed through one of the radial gates.

Our Analysis

The existing 60-cfs minimum flow requirement was developed in consultation with resource agencies and approved on May 30, 1986,¹¹ and requires Flambeau Hydro to operate the project with a minimum flow of 60 cfs, or inflow to the reservoir, whichever is less, at all times. A 60-cfs minimum flow slightly exceeds the prorated 7Q10 flow for the Apple River at the project location, which is 48 cfs. The 7Q10 is often used to estimate a minimum streamflow value to protect water quality and other aquatic resources. Because the project operates run-of-river with no bypassed reach, the benefits of the minimum flow of 60-cfs, or inflow if less, would be limited to those atypical instances when there would otherwise be no flow releases downstream, such as while the project is not generating contemporaneously with the refilling of the reservoir after an emergency drawdown. Therefore, the overall benefits of the proposed minimum flow release would be minor.

Drawdown Management

Flambeau Hydro is not proposing to drawdown the project impoundment seasonally or for any maintenance related activities. Wisconsin DNR states that it plans to “require” a “drawdown management plan,” and a “fish stranding management plan” to be approved by Wisconsin DNR within one year of the issuance of a project license. Wisconsin DNR provides no details about the plans, including whether or not the plans would be conditions of the certification.

Our Analysis

Rapid drawdowns in reservoir levels can lead to fish stranding and desiccate fish spawning habitat, as well as any eggs, or larval fish that may be present within the substrates. Rapid drawdowns can also cause rapid increases in downstream flows, which

¹¹*Northwestern Wisconsin Electric Company*. 35 FERC ¶ 62,397 (1986).

have the potential to flush aquatic organisms from their downstream habitats. Subsequent refill of the reservoir after a drawdown could also limit downstream flows, as inflow to the project would need to be stored for refill purposes.

Flambeau Hydro states that no scheduled drawdowns are needed for maintenance activities because personnel are able to dewater specific areas of the project (e.g., forebay, individual radial gate sections, individual turbines/intakes), while maintaining the current reservoir elevations. Additionally, there is no evidence in the record that indicates fish stranding is an issue in the impoundment or tailrace of the project. Emergency situations that may require the project reservoir to be drawn down are discussed below.

Compliance Monitoring

Flambeau Hydro indicates that reservoir elevations are maintained by manually checking a staff gage that is located on the forebay. The 60-cfs minimum flow, or inflow if less, requirement is maintained through the project turbines. In the event that the project trips offline, an operator is notified via an alarm and one of the radial gates is manually opened to allow flows to pass downstream.

Wisconsin DNR states that it plans to “require” an “operations management plan,” to be approved by Wisconsin DNR within one year of the issuance of a project license. Wisconsin DNR provides no details about the plan, including whether or not the plan would be a condition of the certification. However, Wisconsin DNR requests that any plans developed as part of any license include Wisconsin DNR as part of development and approval of the plans.

Our Analysis

Although compliance measures do not directly affect environmental resources, they do allow the Commission to verify that a licensee is complying with the environmental requirements of a license.

An operation compliance monitoring plan would help Flambeau Hydro document its compliance with the operational provisions of any subsequent license and provide a mechanism for reporting deviations. An operation compliance monitoring plan would also help the Commission verify that the project is operating in a run-of-river mode and releasing the required minimum flow downstream of the project, thereby facilitating administration of the license and assisting with the protection of resources that are sensitive to impoundment fluctuations, low flows, and deviations from normal operating conditions, including any unscheduled impoundment drawdowns.

The plan could be developed in consultation with Wisconsin DNR and include provisions for: (1) monitoring run-of-river operation, minimum flows, and impoundment elevation levels to document compliance with the operational conditions of any subsequent license; (2) standard operating procedures to be implemented (a) outside of normal operating conditions, including during scheduled facility shutdowns, and (b) during emergency conditions such as unscheduled facility shutdowns and maintenance, including any unscheduled impoundment drawdowns and subsequent refills, in order to minimize project effects on environmental resources; (3) reporting deviations to the Commission; and (4) maintaining a log of project operations for inspection.

Water Quality

Besides operating in a run-of-river mode and releasing a minimum downstream flow of 60 cfs, or inflow if less, Flambeau Hydro is not proposing any additional measures to protect or enhance water quality at the project, nor is it proposing to monitor water quality. Wisconsin DNR states that it plans to “require” a “water quality” management plan to be approved by Wisconsin DNR within one year of the issuance of a project license. Wisconsin DNR provides no details about the plan, including whether or not the plan would be a condition of the certification.

Our Analysis

There are no proposed or recommended environmental measures that would adversely affect water quality in the impoundment or downstream of the project, relative to the existing environmental conditions. Water quality in the impoundment currently meets or exceeds minimum levels stipulated in the current state standards for DO (5.0 mg/L) and remains below maximum temperature levels (79 degrees Fahrenheit during July/August), with the exception of low DO in the hypolimnion¹² during the summer at the deepest portion of the impoundment. The low DO levels in the hypolimnion of the flowage sampling site (i.e., deepest portion of impoundment) are most likely attributed to a combination of depth and outside nutrient deposits/decomposing organic material that are not attributed to project operation. Additionally, this pattern of decreased DO levels below the hypolimnion during the summer is a common phenomenon for deeper (> 20 feet) eutrophic impoundments in Wisconsin (Shaw et al., 2004; Manteufel and Robertson, 2014).

Considering that the other sampling sites in the impoundment met or exceeded levels stipulated in the state standards for minimum DO throughout the water column, and that these deeper deoxygenated portions only make up 3 to 4 percent of the entire

¹² Hypolimnion refers to a cool dense lower layer of water in a thermally stratified body of water.

impoundment, this would have a limited effect on aquatic communities in the reservoir. Furthermore, even when the impoundment is experiencing stratification, downstream DO levels are at levels consistent with or exceeding those stipulated by the state standards for minimum DO. Moreover, the water quality in the impoundment is currently sufficient to support fish and aquatic life, negating the need for a water quality management plan.

Fish Entrainment and Impingement

The operation of the project has the potential to result in some fish impingement on the project trashracks and fish entrainment through the project turbines. Flambeau Hydro does not propose any additional measures to minimize fish mortality related to entrainment and impingement. Wisconsin DNR states that it plans to “require” a “fish management, protection and enhancement” plan to be approved by Wisconsin DNR within one year of the issuance of a project license. Wisconsin DNR does not specify whether or not the plan would be a condition of the certification. However, Wisconsin DNR indicates that it will work with Flambeau Hydro to determine the degree and depth of a fishery management plan to address a possible turbine mortality concern that was indicated in the license application.

Our Analysis

Water intake structures at hydropower projects can injure or kill fish that are either impinged on intake screens/trash racks or entrained through turbines. The level of fish entrainment and impingement at the project is dependent upon many factors; including swim speeds, size, and the seasonality of entrainment and impingement patterns of fish present at project sites (EPRI, 1992). Although turbine passage mortality rate estimates can be relatively variable, some trends have been recognized. For example, certain species typically dominate entrainment collections, and the dominant fishes entrained usually represent those species that are highly abundant (FERC, 1995) and are usually fish species that are very fecund,¹³ with high reproductive rates (EPRI, 1992). In general, most fish entrained at hydroelectric projects tend to be smaller fish less than 4 to 6 inches long and are often juvenile fish or species, such as minnows that never exceed a length of 3 or 4 inches (FERC, 1995; EPRI, 1997).

The velocity of water upstream of a hydroelectric water intake is an important component in determining the level of potential fish entrainment and impingement. Most

¹³ Fecundity is the egg laying capacity of a fish.

resident fish species are at risk of impingement or entrainment if their burst swim speed¹⁴ is less than the approach velocity¹⁵ at a trashrack or other intake screening device (Peake, 2004; Boys et al, 2013). To better understand the potential for existing project operations to cause impingement and entrainment, Commission staff calculated approach velocities for each of the turbines according to their respective hydraulic capacities. The estimated approach velocities for the intakes range from 0.2 to 0.6 feet per second (fps) for turbine unit one, and 0.4 to 1.0 fps for turbine unit two (Table 3).¹⁶ Research has shown that most fish have a burst swim speed of about 8 to 12 body lengths per second (Bell, 1986; Videler and Wardle, 1991; Aadland, 2010). For example, a two-inch long fish would have a burst speed of around 1.3 to 2.0 fps. Therefore, most fish species greater than 2-inches in length exposed to the maximum 1.0 foot/sec velocity at the project (i.e., intake for turbine unit two) are likely to escape impingement and entrainment.

Table 3. Intake approach velocities at the Black Brook Project according to turbine capacity under minimum and maximum flow conditions (Source: staff).

Turbine unit 1			Turbine unit 2		
Range of flows (cfs)		Intake approach velocity (fps)	Range of flows (cfs)		Intake approach velocity (fps)
Min	50	0.2	Min	87	0.4
Max	144	0.6	Max	248	1.0

¹⁴ Burst swim speeds are the highest speeds attainable by fish and can be maintained for brief periods, usually lasting a few seconds (Hammer, 1995), but no more than 20 seconds (Beamish, 1978).

¹⁵ The approach velocity is the velocity of water as it approaches the trashrack and is defined as the average water velocity measured a few inches in front of an intake screening device (e.g., trashrack) (EPRI, 2000).

¹⁶ Approach velocities were calculated by dividing the range of flows (cfs) during project operation for each turbine (*see* Table 3) by the surface area of each trashrack (240 square feet).

As discussed in section 3.3.1.1, *Affected Environment*, Flambeau Hydro performed field surveys of the larval fish community in the Apple River immediately downstream of the spillway below the powerhouse. Out of the total number of fish samples (N = 514), many specimens (N = 385) were severely degraded (i.e. substantial physical damage to the body, fins, etc.) and could not be clearly identified. Flambeau Hydro suggests that these degraded individuals may be evidence of entrainment through the project turbines.

Without sampling above the project intakes, the source of the degraded individuals is speculative. The individuals may have originated below the project, died from being entrained, or may have already been dead prior to being entrained. Turbine-passage mortality among fish early life stages can be very difficult to estimate directly (EPRI, 1992), and the majority of larvae of most riverine fishes die before they reach the juvenile stage (Kopf et al., 2014), thereby making it difficult to discern larval entrainment losses and natural losses. However, those early life stages that are spawned upstream tend to drift downstream and may be entrained in the turbine intake flow and weakly swimming early larvae are the most susceptible stages of resident fish species (Cada, 1991). Fish in these life stages range in length from about 0.04 in to 1.2 in (Cada, 1991), and would mostly be susceptible to the intake velocities at the project. But, beyond this size, juvenile fish are less susceptible to entrainment and impingement because they are stronger swimmers, and many reside near the bottom rather than in the open waters (Cada, 1991).

To help determine which fish species may be vulnerable to entrainment at the project, we looked at the results of 11 fish entrainment studies conducted at hydropower projects in Wisconsin from the EPRI (1997) database (Table 4). These results show that sunfish are most likely to be entrained, followed by perches, and then catfish and minnows. When considering the results of the fish survey of the reservoir, where the catch was dominated by sunfish (85 percent of total catch), but with few catfish (2 percent of total catch), the species most likely to be entrained at the project would mostly consist of sunfishes, followed by perches and minnows.

Table 4. Percent entrainment composition by family at 11 Wisconsin hydropower projects. (Source: EA Engineering, 2008; compiled data from EPRI, 1997).

Site Name	State	River	Sunfishes	Perches	Catfishes	Minnows	Herrings	Suckers	Temperate Bass	Drum	Freshwater	Other Families
Brule	WI	Brule	13.1	60.0	0.7	21.5	0.0	2.3	0.0	0.0		2.4
Thornapple	WI	Flambeau	44.0	15.5	6.7	22.0	0.0	4.5	0.0	0.0		7.3
Crowley	WI	N.F.	11.2	74.3	6.6	3.4	0.0	2.4	0.0	0.0		2.1
		Flambeau										
Caldron Falls	WI	Peshtigo	41.7	48.1	0.6	4.9	0.0	2.8	0.0	0.0		1.9
Potato Rapids	WI	Peshtigo	41.0	10.1	0.3	16.0	0.0	30.3	0.0	0.0		2.4
Sandstone Rapids	WI	Peshtigo	51.3	9.1	2.1	3.4	0.0	31.1	0.0	0.0		3.0
Centralia	WI	Wisconsin	7.6	0.6	80.9	10.3	0.0	0.3	0.0	0.0		0.3
Wisconsin River	WI	Wisconsin	31.6	1.6	50.7	11.1	0.0	0.6	0.0	0.0		4.4
Shawano	WI	Wolf	58.1	5.1	6.5	18.4	0.0	8.0	0.0	0.0		3.9
Grand Rapids	MI/WI	Menominee	10.9	38.3	6.6	20.5	0.0	6.2	0.0	0.0		17.4
White Rapids	MI/WI	Menominee	38.9	19.8	6.2	29.9	0.0	4.4	0.0	0.0		0.7
Average percent entrainment composition:			31.8	25.7	15.3	14.7	0.0	8.4	0.0	0.0		4.2

[†]Top Family at Each Site in Bold Underline.
Source: EPRI 1997a.

Overall, our analysis shows that sunfish, perches, and minnows that are less than 2-inches in length with burst speeds less than 1.0 fps would be most susceptible to entrainment through project facilities. However, the fish species most likely to become entrained at the project, such as sunfishes (e.g., bluegill, crappie and bass) have rapid growth rates and reproductive characteristics (e.g., excavating spawning sites, guarding eggs and fry, frequent spawning intervals, high fecundity) that increase their dispersal abilities by increasing their reproductive potential (Bert, 2007). Further, losses of both juvenile and adult fish through the project facility may be offset by increased survival and growth of the remaining fish within the project impoundment due to reduced competition for limited resources (Ricker, 1975; EPRI, 1992; Therrien and Bourgeois, 2000).

Although impingement and turbine entrainment at the project likely causes some loss of resident fish, there is no evidence that existing levels of fish impingement, entrainment, and related mortality, are adversely affecting fish communities in the project area. Therefore, continued operation of the project in the same mode of operation it has used in the past, would likely have little to no adverse effect on the overall fish community in the project reservoir.

Debris Management

Flambeau Hydro states that it currently removes debris from the project forebay by manual raking. Flambeau Hydro does not specifically propose to continue this practice as a condition of any subsequent license, nor does it propose other measures for removing debris. No agencies have recommended additional measures related to debris management at the project, although Wisconsin DNR states that it plans to “require” a “woody debris management plan” to be approved by Wisconsin DNR within one year of the issuance of a project license. Wisconsin DNR provides no details about the plan, including whether or not the plan would be a condition of the certification.

Our Analysis

Debris that accumulates on the trashrack reduces the effectiveness of the trashrack at protecting fish from entrainment or impingement. If the trashrack is covered with debris, fish may become entangled in the debris rather than sliding off the trashrack as intended. In addition, the approach velocity at the trashrack increases with debris loading, which could result in a greater amount of fish entrainment or impingement.

Downstream of the project, organic debris sustains lower order trophic organisms, such as benthic macroinvertebrates, which in turn influences the productivity of higher order organisms, such as fish. Organic debris also provides habitat for macroinvertebrates and fish. In contrast, inorganic debris such as trash cannot be used as a food source and provides little-to-no benefit to aquatic resources.

To ensure that the trashrack protects fish from entrainment as intended and that desirable organic material is reintroduced to the river downstream of the dam, a debris management plan could be used to identify procedures for: (1) removing and sorting debris that collects on project structures; (2) passing organic debris (i.e., leaves and wood) downstream of the project; and (3) removing and disposing of trash.

3.3.2 Terrestrial Resources

3.3.2.1 Affected Environment

The Black Brook Project is located in the North Central Hardwood Forests ecoregion which is transitional between the predominantly forested Northern Lakes and Forests to the north and the agricultural ecoregions to the south (Wisconsin DNR, 2020). Land cover in this ecoregion consists of a mosaic forests, wetlands and lakes, cropland agriculture, and pasture.

Wetlands

According to FWS's National Wetlands Inventory system (FWS, 2020b), riverine is the predominant system in the project area followed by lacustrine and palustrine systems, the latter of which is dominated by freshwater emergent wetlands. The emergent wetlands occur on both the eastern and western portions of the project area. Wetland vegetation found in the project area include flat-stem pondweed, large and small duck weed, wild celery, white water lily, and hard-stem bulrush.

Wild rice was observed during the Invasive Species Survey, in northern eastern portion of the flowage site. The survey indicated that wild rice was most prolific in the shallow, fast moving part of the flowage.

Wildlife

Wetland, riparian, and upland habitat around the project area support a variety of wildlife species. Mammals common to the area include white-tailed deer, black bear, coyotes, red and gray fox, river otters, beavers, and porcupines. Various nesting bird species are known to occur in the area including mallards, blue-winged teal, wood ducks, hooded and American mergansers, American widgeon, green-winged teal, common loon, and the coot. Migratory waterfowl in the area include scaup, ring-necks, goldeneyes, buffleheads, redheads and ruddy ducks.

A variety of wildlife were observed during surveys conducted by Flambeau Hydro, including the eastern American toad, green treefrog, spiny softshell, eastern foxsnake, American beaver and unidentified bats. During the 2017 Wildlife Habitat Survey conducted by Flambeau Hydro (2017 wildlife survey), 98 species of breeding birds were identified including five species which are designated special concern in Wisconsin: (1) bobolink; (2) dickcissel; (3) goldenwinged warbler; (4) least flycatcher; and (5) vesper sparrow.

During the 2017 wildlife survey, the bald eagle was observed in the vicinity of the project; however, a nesting location within the project boundary was not identified.

3.3.2.2 Environmental Effects

Wetlands and Wild Rice

Flambeau Hydro proposes to continue to operate the project in a run-of-river mode. Fluctuations in the reservoir are limited to 1.13 feet below the maximum elevation of 1045.47 feet NAVD 1988. There were no recommendations from agencies or stakeholders regarding wetlands or wild rice at the project.

Our Analysis

Operating the project in a run-of-river mode would continue to maintain stable impoundment levels that would protect wetlands within the project boundary.

The 2017 wetland and invasive plant surveys in project area identified five native plants and one invasive plant. Overall it was determined that the wetland vegetation at the project is indicative of a diverse aquatic plant community according the Simpson Diversity Index (Simpson, 1949). Flambeau Hydro is not proposing any changes in operation, maintenance, or any new construction that would affect wetlands or wild rice in the project boundary. As such, continued operation would not adversely affect wetlands or wild rice in the project relative to the existing environmental conditions.

Wildlife

Flambeau Hydro proposes to continue to operate the project in a run-of-river mode. There were no recommendations from agencies or stakeholders regarding wildlife at the project.

Our Analysis

Continuing to operate in run-of-river mode would provide habitat stability and maintain foraging opportunities for aquatic and semi-aquatic wildlife, including waterfowl and some mammals. In addition, continuing in a run-of-river operation would maintain the overall function of riparian habitat and provide a benefit to wildlife.

Invasive Plants

Flambeau Hydro does not propose any measures to monitor or control invasive plants at the project. Wisconsin DNR states that it plans to “require” an “aquatic and terrestrial invasive species” plan to be approved by Wisconsin DNR within one year of the issuance of a project license. Wisconsin DNR provides no specific details about the plan, including whether or not the plan would be a condition of the certification.

Our Analysis

Non-native invasive plant species are able to out-compete and displace native species, thereby reducing biodiversity and altering compositions of existing native plant and animal communities. Once established, invasive plant species can be difficult to remove from an area. However, mechanical and chemical methods can be used to restrict the abundance of existing populations, allowing for greater vegetation diversity.

No significant ground-disturbing activities that would facilitate the spread of terrestrial invasive plant species within the project boundary, such as road construction or

land clearing, have been proposed. Further, no changes to project operation or water levels within the project boundary have been proposed that would disturb additional areas in the project vicinity or otherwise promote the expansion of the invasive species. As the invasive species do not appear to be affecting project operation or other environmental resources, there is no indication that a plan or other invasive species management measures are needed to protect fish and wildlife resources.

3.3.3 Threatened and Endangered Species

3.3.3.1 Affected Environment

The IPaC database lists the federally threatened northern long-eared bat (*Myotis septentrionalis*) and federally endangered gray wolf (*Canis lupus*) as potentially occurring in the project vicinity (FWS, 2020a). No critical habitat designated for these species occurs on project-affected lands.

Northern Long-Eared Bat

The northern long-eared bat is a medium-sized nocturnal bat ranging from 3 to 3.7 inches in length and possessing shades of brown fur. The northern long-eared bat's historical range includes 37 states, encompassing most of the central and eastern United States. Northern long-eared bats forage almost exclusively in the understory of forested areas, feeding on moths, flies and other insects using echolocation. The northern long-eared bat uses various habitat and may even roost in man-made structures, as well as mature hardwoods. Both dead and live trees greater than 3 inches in diameter at breast height¹⁷ provide a necessary reproductive component for the bat. The northern long-eared bat primarily uses the crawl spaces between dead and exfoliating bark for roosting in the summer months. Parturition¹⁸ occurs in mid-May through July, with pups becoming able to fly within 3-5 weeks after birth. The decline in northern long-eared bat populations has been attributed to the emergence of white-nose syndrome; there has been a 99-percent reduction of northern long-eared bats in recent years as a result of white-nose syndrome in the Northeast United States. White-nose syndrome is expected to spread throughout the rest of United States in the foreseeable future. There were no northern long-eared bats observed during the 2017 wildlife survey.

¹⁷ Diameter at breast height refers to the tree diameter as measured about 4 to 4.5 feet above the ground.

¹⁸ Parturition is the process of giving birth. It occurs at the end of the gestation period, or pregnancy.

Gray Wolf

The gray wolf is known to occur in Polk County, Wisconsin. The gray wolf was initially listed as endangered under the ESA in May 1974, and was delisted in December 2011. In the western Great Lakes area, including Michigan, Minnesota, and Wisconsin, the gray wolf was relisted under the ESA, effective December 19, 2014. Gray wolves have a large home range and are adept at using a variety of habitat types with a sufficient prey base, primarily deer. Gray wolves once ranged throughout most of the continental United States; however, by the early 20th century, government-sponsored predator control programs and declines in prey brought gray wolves to near extinction.

Wisconsin DNR actively monitors gray wolf populations in the state and reported that in 2018-2019 there were 243 gray wolf pack sightings.¹⁹ This indicated a 1% increase in gray wolf observations from the 2017-2018 surveys. There were no gray wolves observed during the 2017 wildlife survey.

3.3.3.2 Environmental Effects

Northern Long-Eared Bat

Flambeau Hydro owns 2.79 acres of forested lands within the project boundary. Flambeau Hydro does not propose any measures for the protection of the northern long-eared bat. There were no agency or stakeholder recommendations for the northern long-eared bat.

Our Analysis

Deciduous, mature forest that may provide roosting habitat to the northern long-eared bat exists within the project boundary. The surveys conducted by Flambeau Hydro identified in a large proportion of the riparian zone on both banks of the reservoir consisting of large diameter (i.e., > 6 inches) trees which could provide foraging opportunities and possible roosting habitat for the northern long-eared bat.

Although there is no known documentation of northern long-eared bats or maternity roosts occurring at the project, the project-owned forested lands that occur along riparian areas could provide foraging and roosting habitat for the northern long-eared bat. Avoiding tree removal starting on June 1 and ending on July 31 would reduce the likelihood of disturbance to roosting bats and their pups, should they be present.

¹⁹ See Wisconsin DNR: 2018-19 Wolf Count Brief (<https://dnr.wi.gov/topic/Wildlifehabitat/wolf/documents/2018-19wolfcountbrief.pdf>), accessed on January 20, 2020.

Therefore, restricting tree removal activities during June and July would ensure that continued project operation and maintenance would not likely to adversely affect the northern long-eared bat, but any incidental take that may result is not prohibited per the final FWS 4(d) rule.²⁰

Gray Wolf

Flambeau Hydro does not propose any measures for the protection of the gray wolf, and no agency recommendations were received regarding the gray wolf.

Our Analysis

Although gray wolf have been reported to occur in the project vicinity, no gray wolves have been observed at the project, including during a 2017 wildlife survey. Various wildlife including white-tailed deer and other small mammals are common to the area and were observed during Flambeau Hydro's wildlife survey, indicating that prey is available in the project vicinity for gray wolf. However, there is no indication that project operation and maintenance are affecting the gray wolf or its habitat. Also, Flambeau Hydro does not propose any ground disturbing activities or changes to project operation as part of relicensing that would affect the gray wolf, or its habitat and food availability. Because there are no gray wolf at the project and because the project would not affect gray wolf habitat or prey, we conclude that relicensing the Black Brook Project would have no effect on the gray wolf.

3.3.4 Recreation and Land Use

3.3.4.1 Affected Environment

Regional Recreation

Located in the Lower Apple River watershed in Northwest Wisconsin, recreation opportunities in the region surrounding the project include boating, fishing, canoeing, and

²⁰ As part of the 4(d) rule, FWS proposes that take incidental to certain activities conducted in accordance with the following habitat conservation measures, as applicable, would not be prohibited: (1) occurs more than 0.25 mile from a known, occupied hibernacula; (2) avoids cutting or destroying known, occupied maternity roost trees during the pup season (June 1 – July 31); and (3) avoids cutting or destroying any tree within a 150-foot radius of a known, occupied maternity tree during the pup season (June 1 to July 31). The 4(d) rule provides flexibility to landowners, land managers, government agencies, and others as they conduct activities in areas that could be northern long-eared bat habitat.

swimming. In Polk County alone, there are numerous recreation opportunities and facilities, including several parks, trails, a campground, and a wildlife preserve. Downstream of the project, boaters can also find class II (possibly up to class III) whitewater boating²¹ flows on the Apple River at Pike Hole Rapids.

Existing Recreation Facilities at the Project

The Black Brook Project offers limited recreational opportunities within the project boundary, due to its size. However, there are several recreation opportunities provided in the immediate vicinity of the dam. Polk County owns and manages the Black Brook Flowage Access, located immediately upstream of the dam, which provides a paved boat launch with parking for approximately 6-10 vehicles with trailers. Polk County also owns and manages the Black Brook County Park, located adjacent to the project. The park provides a number of recreation facilities, including a picnic area, playground, boat lands, vault toilets, and parking for approximately 10 vehicles. Additionally, there is a canoe portage and boater take-out area located within the park. The boater put-in area is located further downstream of the powerhouse and signs are located at each end of the canoe portage path in order to allow boaters to traverse around the dam. The only recreation site within the project boundary is an informal tailwater walk-in fishing area located immediately downstream of the powerhouse that provides tailwater shoreline fishing for approximately 10 anglers. Flambeau Hydro owns and maintains this site.

Project Recreation Use

To comply with reporting conditions required by its license, Flambeau Hydro has filed a Licensed Hydropower Development Recreation Report (FERC Form 80) with the Commission every six years. The FERC Form 80 required licenses to collect and report data on recreation use at the project. Based on the last FERC Form 80 filed, annual recreation use was estimated at 3,944 daytime recreation user days and 986 nighttime recreation user days. Further, both the tailwater walk-in fishing area and canoe portage were utilized well below capacity, 40 percent and 15 percent capacity, respectively.

Land Use

In the vicinity of the project, the majority of land use is agricultural. The town of Black Brook itself consists mostly of agricultural use with some forested areas. Although

²¹ American Whitewater. 2020. Pike Hole Rapids. Available at: (<https://www.americanwhitewater.org/content/River/detail/id/4102/>). Accessed on March 17, 2020.

there is some residential use near the Black Brook Project, land within the project boundary is considered either industrial or agricultural.

3.3.4.2 Environmental Effects

To manage recreation at the project, Flambeau Hydro proposes to continue to operate and maintain the existing tailwater fishing area within the project boundary. Wisconsin DNR states that it plans to “require” a recreation management plan to be approved by Wisconsin DNR within one year of the issuance of a project license. Wisconsin DNR provides no specific details about the plan, including whether or not the plan would be a condition of the certification.

Our Analysis

Continuing to operate and maintain the existing informal tailwater walk-in fishing area at the project would ensure the facility is operated and maintained over the term of any subsequent license.

Although Wisconsin DNR states that it plans to require a recreation management plan within one year of any issuance of a project license, it is unclear what would be included in the plan. While developing a plan to manage project recreation facilities and monitor recreation use at the project could help to ensure that facilities meet recreation demand over the term of any subsequent license, there is minimal recreation use at the project. Further, there is only one informal recreation site within the project boundary. Therefore, a recreation plan would have little value for this project.

3.3.5 Cultural Resources

3.3.5.1 Affected Environment

Section 106 of the NHPA requires that the Commission take into account the effects of its actions on historic properties and afford the Advisory Council on Historic Preservation a reasonable opportunity to comment on the undertaking.²² Historic properties are those that are listed or eligible for listing on the National Register. The regulations implementing section 106 of the NHPA also require that the Commission seek concurrence with the SHPO on any finding involving effects or no effects on historic properties, and consult with interested Indian tribes or Native Hawaiian

²² An undertaking means “a project, activity, or program funded in whole or in part under the direct or indirect jurisdiction of a Federal agency, including those carried out by or on behalf of a Federal agency; those carried out with Federal financial assistance; and those requiring a Federal permit, license, or approval.” 36 C.F.R. § 800.16 (2019). Here, the undertaking is the potential issuance of a subsequent license for the Black Brook Project.

organizations that attach religious or cultural significance to historic properties that may be affected by an undertaking. In this document, we also use the term “cultural resources” for properties that have not been determined eligible for listing on the National Register. Cultural resources represent things, structures, places, or archaeological sites that can be either prehistoric or historic in origin. In most cases, cultural resources less than 50 years old are not considered historic.

Area of Potential Effect

The Advisory Council on Historic Preservation defines an APE as the geographic area or areas in which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist (36 C.F.R. § 800.16(d)). In this case, the APE for the project is the area within the project boundary.

Regional History

The earliest evidence of Native American occupation in Wisconsin dates to the Paleo-Indian period (10,000-8500 B.C.). Occupation continued through the Archaic (8,500-1,000 B.C.), Woodland (1000 B.C.-1100 A.D.), and Mississippian periods (A.D. 900-1600).²³ Over a period of thousands of years, the native populations of Wisconsin transitioned from hunters of megafauna; such as, bison, woolly mammoth, and mastodon to creating ceramic pottery, domesticating plants, bow and arrow use, and building large earthen mounds. In many more years, the peoples of Wisconsin started participating in a vast trade network spanning the Mississippi Valley. When the first Europeans arrived in the 1600s, they would have found a wide variety of peoples, each with their own, beliefs and customs, language, trying to coexist in the area of Wisconsin.²⁴ Upon European contact, the project area was likely home to the Ojibwe Tribe.²⁵

Researchers believe that the first Europeans arrived in Wisconsin in the 1620’s. European contact with the existing tribes of North America caused disease, conflict, and displacement. Between 1640 and 1680, the Iroquois invaded the tribal nations in Ontario

²³ See Milwaukee Public Museum: Archaeological History (<http://www.mpm.edu/content/wirp/ICW-22>). Accessed on March 24, 2020.

²⁴ See Wisconsin Historical Society: Ancient Land and First Peoples (<https://www.wisconsinhistory.org/Records/Article/CS3584>). Accessed on March 19, 2020.

²⁵ See Wisconsin First Nations: Map (<https://wisconsinfirstnations.org/map/>). Accessed on March 19, 2020.

and Michigan, pushing the Potawatomi, Maschouten, Ottawa, Kickapoo, Meskwaki, Sauk, and other groups into the region ^{26, 27}.

Primarily driven by the growing logging industry and potential homesteading in St. Croix County, people from European descent established their first permanent settlement in 1837. The surrounding area had abundant pine forests for lumbering and waterpower potential at the St. Croix River. The State of Wisconsin legislature split up St. Croix County into Pierce, St. Croix, and Polk Counties in 1853. Black Brook Dam was originally constructed in 1917 on the Apple River in the Town of Black Brook, Polk County^{28, 29}.

3.3.5.2 Environmental Effects

Flambeau Hydro proposes to develop an HPMP, in accordance with the Wisconsin Programmatic Agreement.³⁰ In a letter dated September 18, 2018, and filed with the license application, the Wisconsin SHPO stated that no known historic properties would be affected by the project.

²⁶ See Wisconsin Historical Society: Arrival of the First Europeans (https://www.wisconsinhistory.org/turningpoints/tp-006/?action=more_essay). Accessed on March 19, 2020.

²⁷ See Wisconsin Historical Society: Colonialism Transforms Indian Life (https://www.wisconsinhistory.org/turningpoints/tp-008/?action=more_essay). Accessed on March 19, 2020.

²⁸ See Polk County, Wisconsin: Polk County Early History (https://www.co.polk.wi.us/index.asp?SEC=F9B4E8ED-0309-429E-8AB0-B73B6428743A&DE=5B1F8A09-5C36-4558-BF9D-E2B3C4FC8A7C&Type=B_BASIC). Accessed on March 19, 2020.

²⁹ See University of Wisconsin: Brief History of Polk County, Wisconsin (<https://www.uwrf.edu/AreaResearchCenter/PolkHistory.cfm>). Accessed on March 19, 2020.

³⁰ See *Programmatic Agreement among the Federal Energy Regulatory Commission; the Advisory Council on Historic Preservation; the State of Wisconsin, State Historic Preservation Officer; and the State of Michigan, State Historic Preservation Officer, 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* (December 1993).

Our Analysis

An HPMP contains measures to avoid, lessen, or mitigate for any adverse effects to historic properties during the term of any license, if issued. An HPMP is needed only when there would be an adverse effect to known historic properties. There are not any known historic properties within the APE for the Black Brook Project; therefore, an HPMP would serve no purpose for the project.

However, there is always a possibility that unknown archaeological resources may be discovered as a result of the projects operation or project-related activities. To ensure the proper treatment of any archaeological resource that may be discovered, a provision should be included in any license, if issued, to notify the Wisconsin SHPO of any such unanticipated discovery and follow the Wisconsin SHPO's guidance regarding an evaluation of the discovery. If the resource would be eligible for the National Register and adversely affected, the provision should also contain measures that would avoid, lessen, or mitigate for any adverse effects.

4.0 DEVELOPMENTAL ANALYSIS

In this section, we look at the project's use of the Apple River for hydropower purposes to see what effects various environmental measures would have on the project's costs and power generation. Under the Commission's approach to evaluating the economics of hydropower projects, as articulated in *Mead Corp.*,³¹ the Commission compares the current project cost to an estimate of the cost of obtaining the same amount of energy and capacity using a likely alternative source of power for the region (cost of alternative power). In keeping with Commission policy as described in *Mead Corp.*, our economic analysis is based on current electric power cost conditions and does not consider future escalation of fuel prices in valuing the hydropower project's power benefits.

For each of the licensing alternatives, our analysis includes an estimate of: (1) the cost of individual measures considered in the EA for the protection, mitigation, and enhancement of environmental resources affected by the project; (2) the cost of alternative power; (3) the total project cost (*i.e.*, operation, maintenance, and environmental measures); and (4) the difference between the cost of alternative power and total project cost. If the difference between the cost of alternative power and total project cost is positive, the project helps to produce power for less than the cost of alternative power. If the difference between the cost of alternative power and total project cost is negative, then the project helps to produce power for more than the cost of alternative power. This estimate helps to support an informed decision concerning what is in the public interest with respect to a proposed license. However, project economics is only one of many public interest factors the Commission considers in determining whether, and under what conditions, to issue a license.

4.1 POWER AND ECONOMIC BENEFITS OF THE PROJECT

Table 5 summarizes the assumptions and economic information we use in our analysis for the project. This information was provided by Flambeau Hydro in its license application or estimated by staff. We find that the values provided by Flambeau Hydro are reasonable for the purposes of our analysis. Cost items common to all alternatives include: taxes, net investment (the total investment in power plant facilities remaining to be depreciated), relicensing costs, and normal operation and maintenance cost.

³¹ See *Mead Corporation, Publishing Paper Division*, 72 FERC ¶ 61,027 (1995). In most cases, electricity from hydropower would displace some form of fossil-fueled generation, in which fuel cost is the largest component of the cost of electricity production.

Table 5. Parameters for economic analysis of the Black Brook Project.

Economic Parameters	Values (2019 dollars)^a	Sources
Proposed capacity	0.650 MW	Flambeau Hydro
Dependable capacity	100 kW	Flambeau Hydro
Proposed average annual generation	7,336 MWh	Flambeau Hydro
Net investment	\$197,818	Flambeau Hydro
Annual operation and maintenance cost	\$18,776 ^b	Flambeau Hydro
Cost to prepare license application	\$250,000	Flambeau Hydro
Period of economic analysis	30 years	Staff
Term of financing	20 years	Staff
Cost of capital (Long-term interest rate)	8 percent	Staff
Short-term interest rate (during construction)	8 percent ^c	Staff
Federal tax rate	34 percent	Staff
Local tax rate	3.05 percent	Staff
Insurance rate	0.25 percent	Staff
Energy rate	\$18.08/MWh ^d	Staff
Capacity rate	\$159.7/kilowatt-year ^d	Staff

^a Values provided by staff and Flambeau Hydro in 2019 dollars.

^b Based on average annual cost for 3-year period (2017 – 2019) less the average insurance cost of \$2,583 for the same period.

^c Assumed by staff to be the same as the interest rate.

^d Source: Energy Information Administration using rates obtained from Annual Energy Outlook 2019 at <http://www.eia.gov/outlooks/aeo/index.cfm>.

4.2 COMPARISON OF ALTERNATIVES

Table 6 summarizes the installed capacity, annual generation, annual cost of alternative power, annual project cost, and difference between the cost of alternative power and project cost for each of the alternatives considered in this EA: no-action, Flambeau Hydro’s proposal, and the staff alternative.

Table 6. Summary of the annual cost of alternative power and annual project cost for the three alternatives for the Black Brook Project.

	No Action	Flambeau Hydro’s Proposal	Staff Alternative
Installed capacity (MW)	0.650	0.650	0.650
Annual generation (MWh)	7,336	7,336	7,336
Annual cost of alternative power (\$ and \$/MWh)	\$132,634.88 18.08	\$132,634.88 18.08	\$132,634.88 18.08
Annual project cost (\$ and \$/MWh)	\$97,862.24 13.34	\$98,449.12 13.42	\$98,962.64 13.49
Difference between the cost of alternative power and project cost (\$ and \$/MWh)	\$34,772.64 4.74	\$34,185.76 4.66	\$33,672.24 4.59

(Source: Staff)

4.2.1 No-Action Alternative

Under the no-action alternative, the project would continue to operate as it does now. The project would have an installed capacity of 0.650 MW and generate an average of 7,336 MWh of electricity annually. The average annual cost of alternative power would be \$132,634.88, or about \$18.08/MWh. The average annual cost of producing this power, including depreciation, operation and maintenance costs, and taxes would be \$97,862.24, or about \$13.34/MWh. Overall, the project would produce power at a cost that is \$34,772.64, or \$4.74/MWh, less than the cost of alternative power.

4.2.2 Flambeau Hydro’s Proposal

Table 7 lists all environmental measures, and the estimated cost of each, considered for the Black Brook Project. Under Flambeau Hydro’s proposal, the Black Brook Project would have an installed capacity of 0.650 MW and generate an average of 7,336 MWh of electricity annually. The average annual cost of alternative power would be \$132,634.88, or about \$18.08/MWh. The average annual cost of producing this power, including depreciation, operation and maintenance costs, and taxes would be \$98,449.12, or about \$13.42/MWh. Overall, the project would produce power at a cost that is \$34,185.76, or \$4.66/MWh, less than the cost of alternative power.

4.2.3 Staff Alternative

The staff alternative is based on Flambeau Hydro’s proposal with staff modifications, deletions, and additional measures, as shown in Table 6. The staff alternative would have an installed capacity of 0.650 MW and an average annual generation of 7,336 MWh. The cost of alternative power would be \$132,634.88, or about \$18.08/MWh. The average annual cost of producing this power, including depreciation, operation and maintenance costs, and taxes would be \$98,962.64, or about \$13.49/MWh. Overall, the project would produce power at a cost that is \$33,672.24, or \$4.59, less than the cost of alternative power.

4.3 COST OF ENVIRONMENTAL MEASURES

Table 7 gives the cost of each of the environmental enhancement measures considered in our analysis. We convert all costs to equal annual (levelized) values over a 30-year period of analysis to give a uniform basis for comparing the benefits of a measure to its cost.

Table 7. Cost of environmental mitigation and enhancement measures considered in assessing the effects of operating the Black Brook Project.

Enhancement/Mitigation Measures	Entity	Capital cost	Annual cost^a	Levelized annual cost^b
General				
Continue to operate the project in a run-of-river mode with a minimum downstream flow of 60 cfs, or inflow if less.	Flambeau Hydro, Staff	\$0	\$0	\$0

Enhancement/Mitigation Measures	Entity	Capital cost	Annual cost^a	Levelized annual cost^b
Aquatic Resources				
Develop an operation compliance monitoring plan.	Staff ^c	\$7,500	\$0	\$585
Develop a debris management plan.	Staff ^c	\$1,000	\$100	\$144
Terrestrial Resources				
To protect the federally threatened northern long-eared bat, avoid tree removal from June 1 through July 31	Staff ^d	\$0	\$0	\$0
Recreation Resources				
Continue to maintain the project tailwater walk-in fishing area.	Flambeau Hydro, Staff	\$0	\$500	\$330
Cultural Resources				
Develop and implement an HPMP to protect historic properties that are eligible for or listed on the National Register.	Flambeau Hydro ^c	\$3,000	\$500	\$564

(Source: Staff)

^a Annual costs typically include operational and maintenance costs and any other costs that occur on a yearly basis.

^b All capital and annual costs are converted to equal annual costs over a 30-year period to give a uniform basis for comparing all costs.

^c Staff estimated the cost of this measure.

^d Staff assumes that there will be no capital costs associated with this measure as it will not require a cost to implement the measure.

5.0 CONCLUSION AND RECOMMENDATIONS

5.1 COMPREHENSIVE DEVELOPMENT AND RECOMMENDED ALTERNATIVE

Sections 4(e) and 10(a)(1) of the FPA require the Commission to give equal consideration to the power development purposes and to the purposes of energy conservation; the protection, mitigation of damage to, and enhancement of fish and wildlife; the protection of recreational opportunities; and the preservation of other aspects of environmental quality. Any license issued shall be such as in the Commission's judgment would be best adapted to a comprehensive plan for improving or developing a waterway or waterways for all beneficial public uses. This section contains the basis for, and a summary of, our recommendations for relicensing the project. We weigh the costs and benefits of our recommended alternative against other proposed measures.

Based on our independent review of agency and public comments filed on the project and our review of the environmental and economic effects of the proposed project and project alternatives, we selected the staff alternative as the preferred alternative. We recommend this alternative because: (1) issuing a subsequent license for the project would allow Flambeau Hydro to continue operating its project as a dependable source of electrical energy; (2) the 0.650 MW of electric capacity comes from a renewable resource that does not contribute to atmospheric pollution; (3) the public benefits of the staff alternative would exceed those of the no-action alternative; and (4) the staff-recommended measures would protect aquatic resources.

In the following section, we make recommendations as to which environmental measures proposed by Flambeau Hydro or recommended by agencies or other entities should be included in any subsequent license issued for the project. In addition to Flambeau Hydro's proposed environmental measures listed below, we recommend additional environmental measures to be included in any license issued for the project.

5.1.1 Measures Proposed by Flambeau Hydro

Based on our environmental analysis of Flambeau Hydro's proposal in section 3, *Environmental Analysis*, and the costs presented in section 4, *Developmental Analysis*, we conclude that the following environmental measures proposed by Flambeau Hydro would protect and enhance environmental resources and would be worth the cost. Therefore, we recommend including these measures in any license issued for the project.

- Continue to operate the project in a run-of-river mode, such that outflow approximates inflow at all times to protect aquatic resources.
- Release a continuous minimum flow of 60 cfs, or inflow if less, from the project into the tailrace.

- Continue to maintain the tailwater walk-in fishing area downstream of the powerhouse.

5.1.2 Additional Measures Recommended by Staff

In addition to Flambeau Hydro’s proposed measure noted above, we recommend including the following additional measures in any license that may be issued for the Black Brook Project.

- An operation compliance monitoring plan for maintaining and monitoring run-of-river operation and the 60-cfs, or inflow if less, minimum flow release.
- A debris management plan.
- Avoid cutting trees between June 1 and July 31 to protect roosting northern long-eared bats.

Below, we discuss the rationale for the additional staff-recommended modifications and measures.³²

Operation Compliance Monitoring

Flambeau Hydro is proposing to continue operating the project in a run-of-river mode, maintaining a maximum water elevation of 1045.47 feet NAVD 1988 and a minimum of 1044.34 feet NAVD 1988, thereby limiting impoundment fluctuations to 1.13 feet or less, and continue to release a minimum flow of 60 cfs (or inflow to the project, whichever is less) downstream of the project at all times.

³² Wisconsin DNR filed general comments on resource issues without providing an explanation of how the project is affecting the resources or providing specific measures that could be implemented to reduce potential project effects (*e.g.*, a list of plans that could be filed by Wisconsin DNR as part of the certification). Without specific measures to evaluate, there is no information to analyze and no information to determine whether measures would or would not provide benefits to environmental resources occurring at the project. Therefore, there is no justification for recommending any measures associated with these issues, and we do not include a detailed discussion of Wisconsin DNR’s comments below. Our environmental analysis of the resource issues is provided in section 3.3 (*Proposed Action and Action Alternatives*) and notes Wisconsin DNR’s general comments on resource issues where appropriate.

An operation compliance monitoring plan would help Flambeau Hydro document its compliance with the operational provisions of any subsequent license and provide a mechanism for reporting operational data and deviations. The plan would also help facilitate administration of the license and ensure the protection of resources that are sensitive to impoundment fluctuations and deviations from normal operating conditions. We recommend that Flambeau Hydro develop an operation compliance monitoring plan, in consultation with Wisconsin DNR, that includes: (1) monitoring run-of-river operation, minimum flows, and impoundment elevation levels to document compliance with the operational conditions of any subsequent license; (2) standard operating procedures to be implemented (a) outside of normal operating conditions, including during scheduled facility shutdowns, and (b) during emergency conditions such as unscheduled facility shutdowns and maintenance, including any unscheduled impoundment drawdowns and subsequent refills, in order to minimize project effects on environmental resources; (3) reporting deviations to the Commission; and (4) maintaining a log of project operations for inspection. The benefits of developing and implementing this plan would be worth the estimated annual levelized cost of \$585.

Debris Management

Flambeau Hydro states that it currently removes debris from the project forebay by manual raking. Flambeau Hydro has not proposed specific debris management procedures and the agencies have not recommended or required any specific procedures. Debris that accumulates on the trashrack reduces the effectiveness of the trashrack at protecting fish from entrainment or impingement. A debris management plan would ensure that the trashrack operates effectively for reducing fish impingement and that beneficial organic debris is passed downstream of the project dam to improve aquatic habitat. Therefore, we recommend the development and implementation of a debris management plan that includes procedures for: (1) removing and sorting debris that collects on project structures; (2) passing organic debris (i.e., leaves and wood) downstream of the project; and (3) removing and disposing of trash. We conclude that the benefits of a debris management plan would be worth the estimated annual levelized cost of \$144.

Northern Long-Eared Bat Protection

As discussed in section 3.3.3, *Threatened and Endangered Species*, various trees provide valuable habitat for northern long-eared bat during their roosting reproductive phase, which takes place in the summer months, and tree removal during these months may disturb northern long-eared bat. Implementing a seasonal clearing restriction for trees greater than 3 inches in width at breast height, between June 1 and July 31, would avoid the time period when the northern long-eared bat may be occupying nearby roosting trees, at no additional cost to Flambeau Hydro.

5.1.3 Measures Not Recommended

One of the measures proposed by Flambeau Hydro would not contribute to the best comprehensive use of Apple River water resources, do not exhibit sufficient nexus to the project environmental effects, or would not result in benefits to non-power resources that would be worth their cost. The following discussion includes the basis for staff's conclusion not to recommend such measure.

Cultural Resources

The development of an HPMP is only needed to mitigate for adverse effects to historic properties within a project's APE. If there are no historic properties or no adverse effects to historic properties, then an HPMP is not needed. As discussed in section 3.3.5, *Cultural Resources*, there are no known historic properties within the APE; therefore, we do not recommend the development and implementation of an HPMP.

However, there is always a possibility that unknown archaeological resources may be discovered in the future as a result of the project's operation or project-related activities. To ensure the proper treatment of any archaeological resource that may be discovered, a provision should be included in any license issued to notify the Wisconsin SHPO of any such unanticipated discovery, follow the Wisconsin SHPO's guidance regarding an evaluation of the discovery, and, if the resource would be eligible for the National Register and adversely affected, implement ways to avoid, lessen, or mitigate for any adverse effects.

5.1.4 Conclusion

Based on our review of the agency and public comments filed for the project and our independent analysis pursuant to sections 4(e), 10(a)(1), and 10(a)(2) of the FPA, we conclude that licensing the Black Brook Project, as proposed by the staff alternative, would be best adapted to a plan for improving the Apple River Basin.

5.2 UNAVOIDABLE ADVERSE IMPACTS

Although fish kills have not been documented at the project and fish entrainment has not been studied or raised as an issue at the project, some fish likely pass through and would continue to pass through the project's turbine and could be injured or killed.

5.3 CONSISTENCY WITH COMPREHENSIVE PLANS

Section 10(a)(2)(A) of the FPA, 16 U.S.C. § 803(a)(2)(A), requires the Commission to consider the extent to which a project is consistent with federal or state comprehensive plans for improving, developing, or conserving a waterway or waterways

affected by the project. We reviewed the following 13 comprehensive plans that are applicable to the Black Brook Project. No inconsistencies were found.

National Park Service. 1976. St. Croix National Scenic Riverway final master plan. Department of the Interior, Omaha, Nebraska. August 10, 1976.

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6.0 FINDING OF NO SIGNIFICANT IMPACT

If the Black Brook Project is issued a subsequent license as proposed, with the exception of developing an HPMP, and with the additional staff-recommended measures, the project would continue to operate as it does today, while providing enhancements to aquatic resources in the project area.

Based on our independent analysis, we find that the issuance of a license for the Black Brook Project, with additional staff-recommended environmental measures, would not constitute a major federal action significantly affecting the quality of the human environment.

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