ENVIRONMENTAL ASSESSMENT
FOR
HYDROPOWER LICENSE

French Paper Hydroelectric Project

FERC Project No. 10624-026

Michigan

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

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ACRONYMS AND ABBREVIATIONS

Advisory Council	Advisory Council on Historic Preservation
APE	area of potential effect
certification	water quality certification
CFR	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
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
°F	Fahrenheit
FERC	Federal Energy Regulatory Commission
FPA	Federal Power Act
fps	feet per second
French Hydro	French Hydro LLC
French Paper Project	French Paper Hydroelectric Project
FWS	U. S. Fish and Wildlife Service
HPMP	Historic Properties Management Plan
Indiana DNR	Indiana Department of Natural Resources
Interior	United States Department of the Interior
IPaC	Information for Planning and Conservation
kV	kilovolt
kW	kilowatt
Michigan DEQ	Michigan Department of Environmental Quality
Michigan EGLE	Michigan Department of Environment, Great Lakes and Energy
Michigan DNR	Michigan Department of Natural Resources
Michigan SHPO	Michigan Historic Preservation Officer
mg/L	milligrams per liter
msl	mean sea level
MW	megawatt
MWh	megawatt-hour
National Register	National Register of Historic Places
NERC	North American Electric Reliability Council
NGVD	National Geodetic Vertical Datum of 1929
NHPA	National Historic Preservation Act
NRCS	Natural Resources Conservation Service
PA	programmatic agreement
PCB	polychlorinated biphenyls

PJM	PJM Interconnection LLC
project	French Paper Hydroelectric Project
RM	river mile
SCORP	Statewide Comprehensive Outdoor Recreation Plan
SD1	Scoping Document 1
SD2	Scoping Document 2
S.U.	standard units
U.S.C.	United States Code
USGS	United States Geological Survey

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FRENCH PAPER HYDROELECTRIC PROJECT
Project No. 10624-026 - Michigan

1.0 INTRODUCTION

1.1 APPLICATION

On February 27, 2019, French Paper Company filed an application with the Federal Energy Regulatory Commission (Commission or FERC) for a license to continue to operate and maintain the French Paper Hydroelectric Project No. 10624 (French Paper Project, or project).[1] The 1.3-megawatt (MW) project is located on the St. Joseph River in the City of Niles, Berrien County, Michigan (figure 1). The project does not occupy federal land.

On July 9, 2019, French Paper Company filed a Certificate of Amendment to the Articles of Incorporation with the State of Michigan, changing its name to French Hydro Company. On July 30, 2019, French Hydro Company: (1) filed an application for the transfer of the current license for the French Paper Project to French Hydro LLC; and, (2) filed a request for the substitution of French Hydro LLC as the applicant in the pending application for subsequent license. On December 6, 2019, the Commission issued an order approving the transfer of the license from the French Hydro Company to French Hydro LLC (French Hydro).[2] As such, the current applicant is French Hydro.

[1] The original license for the French Paper Project was issued on February 28, 1991, with an effective date of March 1, 1971, for a term of 50 years, and expires on February 28, 2021. Pursuant to Commission policy, the license was backdated to 1971, because the project should have been licensed as far back as 1938 when the Commission determined that the reach of the St. Joseph River where the project is located is a navigable waterway. *French Paper Co.*, 54 FERC ¶ 62,134 (1991). The project was constructed between about 1915 and 1921.

[2] *French Paper Co./French Hydro, LLC*, 169 FERC ¶ 62,140 (2019).

Figure 1. French Paper Project location map (Source: French Paper Company, 2019a).

1.2 PURPOSE OF ACTION AND NEED FOR POWER

1.2.1 Purpose of Action

The purpose of the French Paper Project is 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 French Hydro for the 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 the waterway. In addition to the power and developmental purposes for which licenses are issued (such as flood control, irrigation, or 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.

Issuing a subsequent license for the French Paper Project would allow French Hydro to continue to generate electricity at the project for the term of the subsequent license, making electric power from a renewable resource available to provide electricity to the adjacent paper mill.

This environmental assessment (EA) assesses the effects associated with continued operation of the project and alternatives to it, and makes recommendations to the Commission on whether to issue a subsequent license, and if so, recommends the terms and conditions to become part of any subsequent license issued.

In this EA, we assess the environmental and economic effects of the following alternatives: (1) operating and maintaining the project as proposed by French Hydro; (2) operating and maintaining the project as proposed by French Hydro, with additional staff recommended measures (staff alternative); and (3) the staff alternative with mandatory conditions. We also consider the effects of the no-action alternative. Under the no-action alternative, the project would continue to operate as it does under the current license, and no new environmental protection, mitigation, or enhancement measures would be implemented. The primary issues associated with relicensing the project are: (1) shoreline and streambank erosion; (2) water quality; (3) fish passage; and (4) cultural resources.

1.2.2 Need for Power

The French Paper Project provides hydroelectric generation to operate the adjacent paper mill. Excess power is sold to Indiana Michigan Power Company. The project has an installed capacity of 1.3 MW and generates approximatively 8,442.8 megawatt-hours (MWh) per year.

The North American Electric Reliability Corporation (NERC) annually forecasts electricity supply and demand nationally and regionally for a 10-year period. The French

Paper Project is in the PJM Interconnection LLC (PJM) assessment area of the NERC. NERC's 2019 Long-Term Reliability Assessment (NERC, 2019) designates summer as the peak season for load forecasting in the PJM assessment area. The net internal demand is forecast to increase 3.9 percent between 2020 and 2029, or 0.4 percent per year. The anticipated reserve margin[3] is forecasted to decrease from 39.43 percent in 2020 to 31.48 percent in 2029, a decrease of 20.2 percent. The PJM assessment area is forecast to meet PJM's reference margin level[4] for the anticipated reserve margin through the year 2029.

We conclude that power from the French Paper Project would help meet a need for power in the PJM assessment area in both the short and long-term. The project provides low-cost power that displaces generation from 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

Any 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 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 have been filed under section 18 of the FPA.

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

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[3] Reserve margin is (capacity minus demand)/demand, where "capacity" is the expected maximum available supply and "demand" is expected peak demand.

[4] The reference margin level is the reserve margin target based on the assessment area's load, generation capacity, and transmission characteristics. The reference margin level is 15.90 percent in 2020, 15.80 percent in 2021 and 15.70 percent from 2022 through 2029.

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 have been 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 United States Code (U.S.C.) § 1341(a)(1), a license applicant must obtain either water quality certification (certification) from the appropriate state pollution control agency verifying that any discharge from a project would comply with applicable provisions of the CWA, or a waiver of certification by the appropriate state agency. 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 April 24, 2017, French Hydro applied to the Michigan Department of Environmental Quality (Michigan DEQ) for certification for the project.[5] Michigan DEQ received the request for certification on April 25, 2017, and issued a certification on April 23, 2018.[6] The conditions of the certification are described under section 2.2.4, *Modifications to Applicant's Proposal – Mandatory Conditions*.

1.3.3 Endangered Species Act

Section 7 of the Endangered Species Act (ESA), requires federal agencies to ensure their actions are not likely to jeopardize the continued existence of endangered or threatened species, or result in the destruction or adverse modification of the critical habitat of such species. Review of the U. S. Fish and Wildlife Service's (FWS) Information for Planning and Conservation (IPaC) system in March 2020 indicated that nine federally listed species have the potential to occur in Berrien County, including the piping plover, *rufa* red knot, Mitchell's satyr, Pitcher's thistle, Indiana bat, northern long-eared bat, whooping crane, eastern massasauga, and small whorled pogonia.

Our analysis of project effects on threatened and endangered species is presented in section 3.3.3, *Threatened and Endangered Species*. We conclude that relicensing the project would have no effect on the piping plover, *rufa* red knot, Mitchell's satyr, Pitcher's thistle, Indiana bat, northern long-eared bat, whooping crane, eastern massasauga, and small whorled pogonia.

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[5] In April 2019, Michigan DEQ was restructured as the Michigan Department of Environment, Great Lakes and Energy (Michigan EGLE).

[6] The certification was filed on April 26, 2018.

1.3.4 Coastal Zone Management Act

Under section 307(c)(3)(A) of the Coastal Zone Management Act (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 February 14, 2019, French Hydro submitted a consistency certification to Michigan DEQ for compliance with the CZMA.[7] In a letter dated March 15, 2019,[8] Michigan DEQ states that the project is located outside the State of Michigan's coastal management boundary and no adverse effects to coastal resources are anticipated as a result of continued project operation. Therefore, Michigan DEQ concludes that the project is consistent with Michigan's Coastal Management Program.

1.3.5 National Historic Preservation Act

Section 106 of the National Historic Preservation Act (NHPA), 54 U.S.C. § 306108 (2018), 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).

On April 26, 2016, Commission staff designated French Hydro as its non-federal representative for the purposes of conducting section 106 consultation. Pursuant to section 106 of the NHPA, and as the Commission's designated non-federal representative, French Hydro consulted with the Michigan State Historic Preservation Officer (Michigan SHPO), Dr. Michael Nassaney of Western Michigan University, the Forest County Potawatomi Community of Wisconsin, the Miami Tribe of Oklahoma, the Nottawaseppi Huron Band of Potawatomi, the Citizen Potawatomi Nation of Oklahoma, and the Pokagon Band of Potawatomi Indians of Michigan and Indiana to identify historic properties, determine the National Register-eligibility of the projects, and assess potential adverse effects on historic properties within the project's area of potential effects (APE).

These consultations and other investigations concluded that within the project's APE, one architectural resource, the French Paper Company Complex (French Paper

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[7] *See* Kevin Siedlecki's (Lawson-Fisher Associates) email to Chris Antieau (Michigan DEQ), filed as Appendix E-1 to French Paper Company's February 27, 2019, license application.

[8] *See* Appendix E-1 of French Paper Company's June 25, 2019, filing.

Company Historic District) is eligible for listing in the National Register under Criterion A. Also, within the APE, one historic site is listed on the National Register, one archaeological site is eligible for the National Register, and one archaeological site is potentially eligible for listing on the National Register. In a letter filed on February 6, 2020, the Michigan SHPO concurred with the findings of no adverse effect on the archeological resources, but did not comment on the eligibility of the French Paper Company Historic District. The Michigan SHPO stated that a final concurrence would be provided after the issuance of the EA.

Operation and maintenance of the project could adversely affect the French Paper Company Historic District and its individual components within the project's APE. To meet the requirements of section 106 of the NHPA, Commission staff intends to execute a Programmatic Agreement (PA) with the Michigan SHPO. The PA would contain principals and procedures for the protection of historic properties from the effects of the operation and maintenance of the project. The terms of the PA would ensure that French Hydro addresses and treats all historic properties adversely affected within the project's APE through implementation of an Historic Properties Management Plan (HPMP).

1.4 PUBLIC REVIEW AND COMMENT

The Commission's regulations (18 C.F.R. §§ 5.1 to 5.16) 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, the ESA, the NHPA, and other federal statutes. Pre-filing consultation must be completed and documented according to the Commission's regulations.

Relicensing of the project was formally initiated on February 26, 2016, when French Hydro filed with the Commission a Pre-Application Document and a Notice of Intent to license the project using the Integrated Licensing Process. The Commission issued a Notice of Commencement of Proceeding on April 26, 2016.

1.4.1 Scoping

Before preparing this EA, we conducted scoping to determine what issues and alternatives should be addressed. A scoping document (SD1) was issued on April 26, 2016, and noticed in the *Federal Register* on May 3, 2016. Scoping meetings were held in Niles, Michigan on May 11 and 12, 2016. A court reporter recorded all comments and statements made at the scoping meetings, and these are part of the Commission's public record for the project. An environmental site review was held on May 11, 2016.

In addition to comments provided at the scoping meetings, the following entities provided written comments on SD1:

Commenting Entity	Date Filed
U.S. Environmental Protection Agency (EPA)	May 17, 2016
Michigan DEQ	June 6, 2016
Michigan Department of Natural Resources (Michigan DNR)	June 23, 2016

A revised scoping document (SD2) was issued on July 29, 2016. EPA filed a letter on August 22, 2016, stating it had no comments on SD2.

1.4.2 Interventions

On November 5, 2019, the Commission issued a notice accepting the application and setting January 4, 2020, as the deadline for filing protests and motions to intervene. No entities filed motions to intervene.

1.4.3 Comments on the Application

On November 5, 2019, the Commission issued a notice setting January 4, 2020, as the deadline for filing comments, recommendations, terms and conditions, and prescriptions. Interior field a letter on January 2, 2020, stating it had no comments on the application.

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 to establish baseline environmental conditions for comparison with other alternatives.

2.1.1 Current Project Facilities

The French Paper Project is on the St. Joseph River in the City of Niles, in Berrien County, Michigan, 44.5 miles upstream of the mouth of the St. Joseph River at Lake Michigan, in the City of St. Joseph, Michigan. The French Paper Project is adjacent to a paper mill[9] and provides electricity for mill operations. The project also is connected to Indiana Michigan Power Company's transmission system. Excess power from the French Paper Project is sold to Indiana Michigan Power Company. However, when the project's generating units are offline or otherwise cannot meet the demand of the paper mill, Indiana Michigan Power Company supplies power to the paper mill. Annually, about 60 percent of the paper mill's power needs are provided by the project. The interconnection also synchronizes the project's generating units to Indiana Michigan Power Company's electrical network.

The French Paper Project reservoir is created by a 321-foot-long, 13-foot-high concrete dam that is topped with 2.3-foot-high flashboards. The top of the flashboards is at 653.75 feet mean sea level (msl), which produces a reservoir with a surface area of 112 acres and a gross storage capacity of 864 acre-feet.

Flow from the reservoir enters the project through a 100-foot-wide, 600-foot-long intake channel leading to the powerhouse. A 185-foot-wide, 3-foot-high floating debris boom is located at the entrance to the intake channel. At the downstream end of the intake channel is a 115-foot-wide, 55-foot-long, 56-foot-high powerhouse with an operating head of 14 feet. Two separate intakes convey flow into the powerhouse from the intake channel.

At the entrance to the north intake is a 22-foot-wide, 14.8-foot-high trashrack with a 3-inch clear spacing (i.e., trashrack 2). Trashrack 2 is oriented 15 degrees from the vertical. Flow into the north intake, leading to units 3 and 4, is controlled by a vertical slide gate, which is left in the open position. Each turbine has wicket gates to control the flow. Unit 3 is a vertical shaft propeller turbine[10] coupled to a 400-kilowatt (kW) generator and unit 4 is a vertical shaft Francis turbine coupled to a 200-kW generator.

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[9] The paper mill buildings and facilities are not part of the project.

[10] The horsepower ratings for the turbines are unknown.

At the entrance to the south intake is a 27.9-foot-wide, 14.2-foot-high trashrack with a 3-inch clear spacing (i.e., trashrack 1). Trashrack 1 is oriented 14 degrees from the vertical. Flow into the south intake, leading to units 1 and 2, is controlled by a vertical slide gate, which is left in the open position. Each turbine has wicket gates to control the flow. Unit 1 is a vertical shaft propeller turbine coupled to a 300-kW generator and unit 2 is a vertical shaft propeller turbine coupled to a 400-kW generator.

The project generators connect to two 480-volt indoor generator leads that provide electricity to the adjacent paper mill. The project generators are also connected to a 480-volt to 34.5-kilovolt (kV) transformer adjacent to the powerhouse. The project's 440-foot-long, 3-phase, 3-wire, 34.5-kV overhead transmission line connects the transformer to Indiana Michigan Power Company's overhead transmission line. The point of interconnection is a power pole equipped with an electric meter, which is located on French Hydro's property.

The powerhouse discharges through the tailrace into the St. Joseph River approximately 250 feet downstream of the project dam creating a short-bypassed reach. The project includes a 6-foot-wide, 220-foot-long reinforced-concrete fish ladder consisting of 15 steps to provide upstream fish passage past the project and an adjacent fish counting room. Attraction flows to the fish ladder are provided via two, 30-inch-diameter ductile iron pipes that convey water from the intake channel to a diffusion chamber located on each side of the fish ladder's downstream entrance.

A 340-foot-long, 16-foot-wide road provides access to the project facilities described above, as shown in figure 2.

There are no recreation facilities associated with the project.

2.1.2 Current Project Boundary

The current project boundary for the French Paper Project, which encloses an area of 112.36 acres, includes the facilities described above, except for the project's access road. The project boundary includes 0.83 acre of land, and all lands within the project boundary are owned by French Hydro. The project boundary around the reservoir generally follows the 653.75-foot msl elevation contour line, and expands to include lands around the project dam, intake channel, intake structures, powerhouse, fish ladder, tailrace and bypassed reach. The waters within the project boundary are owned by the State of Michigan and have an area of 111.53 acres.

The access road noted above provides access to project facilities including the powerhouse.

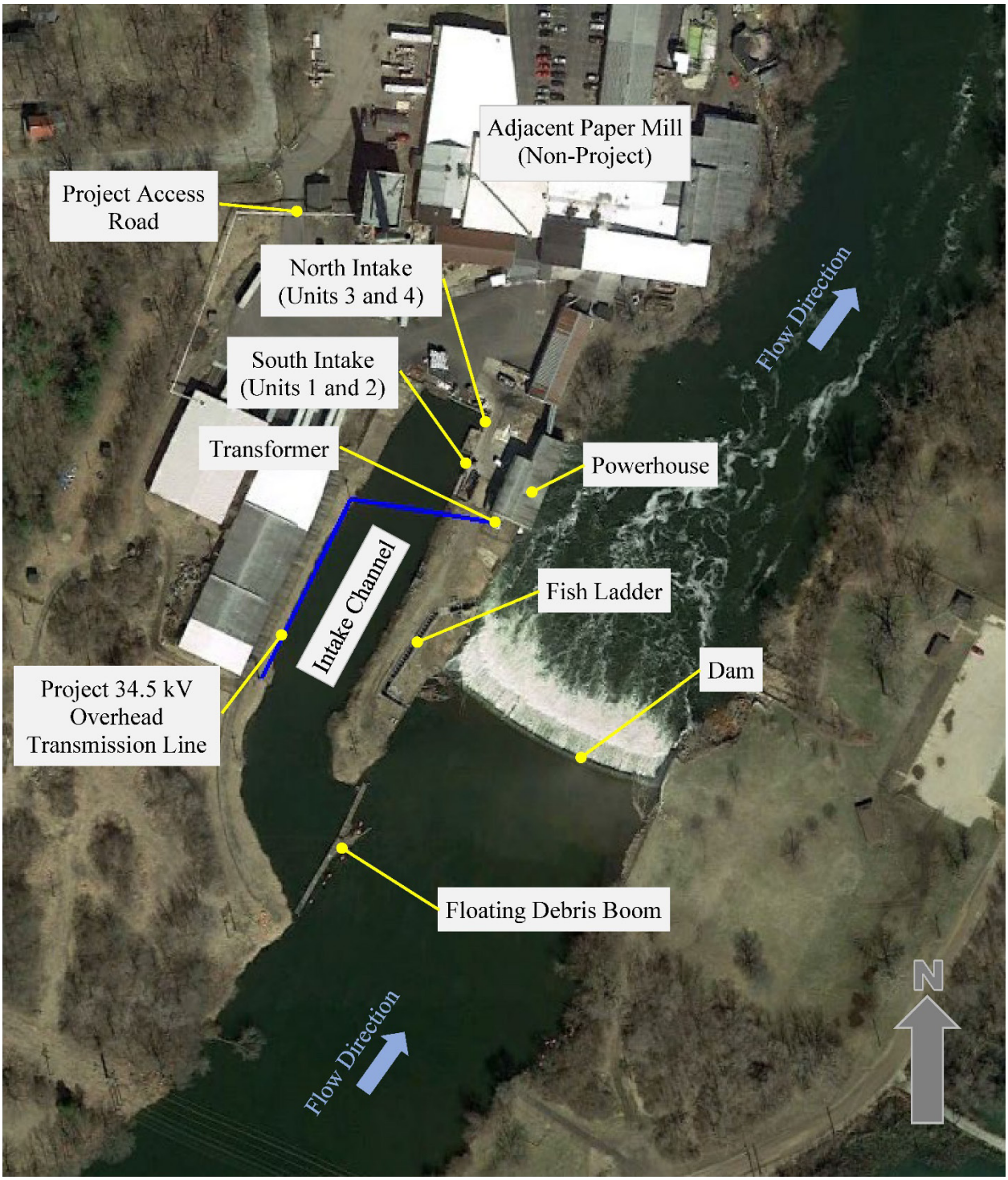

Figure 2. French Paper Project facilities (Source: Google Earth, 2019a; as modified by staff).

2.1.3 Project Safety

The French Paper Project has been operating for more than 29 years under the current 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 relicensing process, the Commission staff would evaluate the continued adequacy of the project's facilities under a subsequent license. Special articles would be included in any license issued, as appropriate. Commission staff would continue to inspect the project during the term of the 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.

2.1.4 Current Project Operation

The French Paper Project is operated in a run-of-river mode, with outflow equal to inflow. During normal operation, flow is passed through the project's turbines to maintain the reservoir surface elevation at normal pool, which is 653.75 feet msl and corresponds to the top of the flashboards. When the reservoir surface elevation is at normal pool, the hydraulic capacity of the four turbines is 1,370 cubic feet per second (cfs) and the flow rate through the fish ladder is 192 cfs, which yields a project flow rate of 1,562 cfs. Flows in the St. Joseph River in excess of 1,562 cfs flow uncontrolled over the project's spillway. The wicket gates on each of the turbines operate independently, but all gates are typically maintained at a 100 percent opening when flows in the St. Joseph River are greater than 1,562 cfs, which is about 89 percent of the time. The wicket gates are used to take a turbine unit offline for maintenance and repairs.

The water surface elevation in the reservoir is monitored using a water-level sensor, and these readings are manually recorded daily, typically between 7:00 a.m. and 9:00 a.m. The project is equipped with an alarm that provides a warning that the water surface in the reservoir has dropped to a low level that might damage the turbines' water-lubricated bearings. Low-flow conditions occur when flows in the St. Joseph River are less than the hydraulic capacity of the project, 1,562 cfs, which is about 11 percent of the time. During low-flow conditions, individual turbine units can be taken offline to match the hydraulic capacity of the powerhouse to the flow rates in the St. Joseph River. Typically, not more than two units need to be taken offline at any given time to maintain the run-of-river operation.

Water surface elevations are monitored by French Hydro staff. However, during high-flow events, the Maintenance Manager and Plant Operations Manager have the primary responsibility for monitoring activities, both in person and remotely using the U.S. Geological Survey (USGS) website. High-flow operation include the following:

- When flow rate in the St. Joseph River as measured at USGS gage no. 04101500 is greater than 8,500 cfs downstream, French Hydro remotely monitors the USGS website and Water Alert subscription service;
- When the water surface elevation reservoir reaches 656.50 feet msl, French Hydro's flood response mode is activated and the USGS gage and forecast are monitored for prediction of rising water levels in the St. Joseph River;
- When the water surface elevation reservoir reaches 656.83 feet msl, the generators are taken offline and the turbines' wicket gates are closed;
- When the water surface elevation reservoir reaches 659.00 feet msl, if not already open, the fish attraction flow gates are opened;
- When flow rates at the USGS gage are greater than 25,200 cfs (corresponding to 500-year flood), 24-hour on-site monitoring of river embankment erosion is implemented.

The maximum dam capacity (excluding freeboard) is estimated to be 31,000 cfs, which is greater than the 100-year flood discharge of 22,500 cfs.

During cold weather, project operation is modified when icing could occur. During winter months, slush ice[11] may form in the St. Joseph River. Although the floating debris boom prevents most of the slush ice from entering the intake channel, careful attention is paid to the condition of the trashracks. Slush ice can block the water intakes as crystals accumulate and build up on the trash rack. If a hard freeze occurs and the intake channel freezes over, careful attention is paid when cleaning the trashracks to avoid dislodging any ice that could slip through the trashracks. If icing conditions impede flow through the trashracks, damage to the turbines' water-lubricated bearings could occur. If flow to a unit must be turned off, the wicket gate is closed slowly to avoid a hard stop and wave propagation upstream.

French Hydro discontinues project generation annually for a 72-hour period beginning at 6:00 a.m. on the second Friday of May to allow for the safe downstream passage of Chinook salmon and steelhead smolts stocked upstream of the project. The 72-hour annual shutdown is scheduled to coincide with the annual spring release date of Chinook salmon and steelhead smolts from the upstream Richard Clay Bodine State Fish Hatchery, located approximately 21 miles upstream of the project.

As noted above, when the reservoir surface elevation is at normal pool, the flow rate through the fish ladder is 192 cfs. All flow to the fish ladder is provided via a combination of flow from: (1) the upstream entrance to the fish ladder; and (2) two, 30-inch-diameter ductile iron pipes that convey water (i.e., auxiliary flows) from the intake channel to a diffusion chamber on each side of the fish ladder's downstream entrance. The auxiliary flows serve to attract fish to the downstream entrance of the fish ladder.

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[11] Slush ice, also referred to as frazil ice, is a collection of loose, randomly oriented, ice crystals.

Flow into the fish ladder is not controlled during normal operation but could be stopped to dewater the fish ladder using a slide gate at the upstream exit of the fish ladder and a gate at the inlet to auxiliary flow pipes. Michigan DNR maintains control of the gate that operates the auxiliary flows and can operate it remotely; however, this gate is typically left in the open condition to provide auxiliary flows on a year-round basis.

2.1.5 Current Environmental Measures

Article 401 of the current license requires that French Hydro operate the project in a run-of-river mode, such that outflow from the project approximates inflow, for the protection of aquatic resources within the St. Joseph River. Article 401 of the current license also requires that French Hydro maintain a continuous flow of 120 cfs for the operation of the project's fish ladder, which provides upstream fish passage past the French Paper Project Dam for migratory fish species present in the St. Joseph River.

Article 404 of the current license previously required French Hydro to cease project operation for up to ten, 12-hour periods during each calendar year to provide protection for downstream-migrating potamodromous fishes in the St. Joseph River. This requirement was modified by the Commission in an Order Modifying and Approving Fish Entrainment Study Recommendations.[12] Currently, French Hydro is required to shut the project down for a single, 72-hour period to allow for the safe downstream passage of stocked Chinook salmon and steelhead smolts released upstream of the project. This shutdown begins annually at 6 a.m. on the second Friday of May.

French Hydro currently provides funding for the USGS gage no. 04101501 located approximately 0.9 mile downstream of the project. USGS gage no. 04101501 works in tandem with USGS gage no. 04101500 (located just upstream of USGS gage no. 04101501) to measure streamflow in the St. Joseph River.[13]

2.2 APPLICANTS' PROPOSAL

2.2.1 Proposed Project Facilities

French Hydro does not propose to change current project facilities, add any new project facilities, or revise the project boundary.

2.2.2 Proposed Project Operation

French Hydro is proposing no changes to how the project currently operates.

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[12] *See French Paper Co.*, 82 FERC ¶ 62,090 (1998).

[13] In addition to streamflow, USGS gage no. 04101500 also measures water temperature, specific conductivity, dissolved oxygen (DO), pH, and turbidity.

2.2.3 Proposed Environmental Measures

French Hydro proposes the following environmental measures:

2.2.3.1 Geological and Soil Resources

- Develop a plan that contains provisions to periodically inspect (every 5 years) the shoreline of the project reservoir and the streambanks of the St. Joseph River immediately downstream of the project to identify and remediate new areas of erosion caused by project operation.

2.2.3.2 Aquatic Resources

- Install a staff gage in the project reservoir and an accompanying sign showing the water levels required by any subsequent license issued for the project to provide public awareness of reservoir elevations.
- Install a level transducer and data logger to continuously record water surface elevations in the project reservoir on an hourly basis to document compliance with run-of-river operation.
- Continue to provide the current level of funding for USGS gage no. 04101501, located approximately one mile downstream of the project, to document compliance with continued run-of-river operation.[14]
- Develop a streamflow monitoring plan to monitor the flow of the St. Joseph River downstream of the project on an hourly basis to document compliance with continued run-of-river operation.
- Following a three-year test period, submit a report to Michigan EGLE that documents French Hydro's ability to comply with the operational requirements contained in Michigan EGLE's certification and includes a corrective action plan and implementation schedule if the operational requirements are not met.
- Develop a water quality monitoring plan that contains provisions to: (1) monitor water temperature and DO levels upstream and downstream of the project on an hourly basis from June 1 through September 3 of the first year after any subsequent license is issued for the project; and (2) conduct water temperature and DO profile monitoring in the project reservoir every two weeks from June 1 through September 30 of the first year after any subsequent license is issued for the project.

[14] French Hydro currently provides $4,650 on an annual basis to fund USGS gage no. 04101501, which works in tandem with USGS gage no. 04101500 (located just upstream of USGS gage no. 04101501) to measure streamflow in the St. Joseph River.

- Conduct contaminant testing on sediment collected from within the project reservoir.[15] French Hydro proposes to conduct this sampling beginning in year ten after the issuance of any subsequent license for the project and continuing every 10 years thereafter for the duration of the subsequent license.
- Sample fish collected from within the project reservoir for mercury and polychlorinated biphenyls (PCB). French Hydro proposes to conduct this sampling beginning the first year after any subsequent license is issued for the project and continuing every ten years thereafter for the duration of the subsequent license.
- Develop a natural debris management plan to establish procedures for the continued removal and downstream passage of natural debris that accumulates on the project's floating debris boom and trashracks to benefit aquatic resources in the St. Joseph River.

2.2.4 Modifications to Applicant's Proposal--Mandatory Conditions

The following mandatory conditions have been provided and are summarized below.

2.2.4.1 Water Quality Certification Conditions

Michigan EGLE's water quality certification includes 26 conditions (*see* Appendix B). Conditions 2.4 and 6 through 12 are administrative or legal in nature, and are not analyzed in this EA.

- Condition 1.1 would require that French Hydro maintain a water surface elevation of 653.75 feet National Geodetic Vertical Datum of 1929 (NGVD) (i.e., top of the flashboards) in the project reservoir and limit reservoir fluctuations to within 0.25 foot below the top of the flashboards, except during events beyond the French Hydro's control.[16]
- Condition 1.2 would require that French Hydro operate the project in a run-of-river mode at all times, except for the 72-hour project shutdown to facilitate downstream fish passage.

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[15] French Hydro proposes to analyze sediment for the contaminant parameters specified in Michigan EGLE's certification condition 3.2.

[16] We note that the certification utilizes NGVD as the datum to describe required reservoir elevations. However, French Hydro utilizes msl as the datum to describe current and proposed water surface elevations in the license application. Therefore, we assume Michigan EGLE inadvertently utilized NGVD and, as such, we hereafter describe the requirements of certification condition 1.1 using msl.

- Condition 1.3 would require that French Hydro: (1) install a calibrated staff gage in the project reservoir and an accompanying sign showing the water levels required by certification condition 1.1; (2) record reservoir levels on an hourly basis; and (3) provide an annual summary report on reservoir levels to Michigan EGLE.
- Condition 1.4 would require that French Hydro maintain a minimum flow of 120 cfs in the bypassed natural river channel immediately downstream of the French Paper Project dam.[17]
- Condition 1.5 would require that French Hydro continue to provide the current annual level of funding for USGS stream gage no. 04101500.
- Condition 1.6 would require that French Hydro develop a plan to monitor the flow of the St. Joseph River downstream of the project on an hourly basis.
- Condition 1.7 would require French Hydro to: (1) conduct a three-year study to determine its ability to comply with the requirements of certification conditions 1.1, 1.2, and 1.4 and submit a report to Michigan EGLE detailing the results of the study at the conclusion of the study; and (2) develop and implement a corrective action plan and schedule to meet the requirements of certification conditions 1.1, 1.2, and 1.4, if Michigan EGLE determines French Hydro is unable to comply with the above requirements based on the results of the three-year study.
- Condition 1.8 would require French Hydro to consult with Michigan EGLE and Michigan DNR during adverse environmental conditions (e.g., low flows) when the requirements in certification conditions 1.1, 1.2, and 1.3 cannot be met.
- Condition 2.1 would require that project operation must not warm the St. Joseph River to temperatures in degrees Fahrenheit (°F) higher than the following monthly maximum temperatures. Condition 2.1 does not apply when the natural water temperature of the St. Joseph River upstream of the French Paper Project reservoir exceeds the below monthly maximum water temperature values. In such cases, water temperature in the St. Joseph River downstream of the project dam shall not exceed the water temperature as measured upstream of the dam.

Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
50°F	50°F	55°F	65°F	75°F	85°F	85°F	85°F	85°F	70°F	60°F	50°F

[17] In an email filed into the project record on May 20, 2020, Michigan EGLE clarified that the intent of condition 1.4 is for French Hydro to maintain a minimum flow of 120 cfs to the fish ladder.

- Condition 2.2 would require that project operation shall not cause DO levels in the St. Joseph River downstream of the project to be less than 5.0 milligrams per liter (mg/L) at any time.
- Condition 2.3 would require that the compliance point for the temperature and DO limits required by the certification be in the St. Joseph River, within 500 feet downstream of the powerhouse, unless upon demonstration by French Hydro, a different point is appropriate and approved by Michigan EGLE.
- Condition 3.1 would require that French Hydro: (1) monitor water temperature and DO on an hourly basis in the St. Joseph River at the compliance point downstream of the project and at a representative location upstream of the project from June 1 through September 30; and (2) conduct water temperature and DO profile monitoring in the project reservoir every two weeks from June 1 through September 30.
- Condition 3.2 would require that 10 years after the issuance of any subsequent license for the project and every 10 years thereafter, French Hydro must conduct contaminant testing on sediment collected from within the project reservoir.[18]
- Condition 3.3 would require that after the issuance of any subsequent license for the project and every 10 years thereafter, French Hydro must monitor the edible portion of fish collected from the project reservoir for mercury and PCBs.
- Condition 3.4 would require that French Hydro submit a plan for Michigan EGLE approval that provides details on the water quality and fish tissue monitoring required by certification conditions 3.1 through 3.3.
- Condition 4.1 would require that French Hydro develop and submit for Michigan EGLE approval, a plan to periodically inspect project shorelines to identify and mitigate areas of project-related erosion.
- Condition 5.1 would require that French Hydro develop and submit for Michigan EGLE approval, a plan to pass natural debris collected on the project's trashracks and booms over the dam.

[18] Certification condition 3.2 specifies that sediments must be analyzed for the following parameters: oil and grease; total cadmium; total copper; total mercury; total selenium; total zinc; total silver; total arsenic; total chromium; total lead; total nickel; total phosphorus; and total PCBs.

2.3 STAFF ALTERNATIVE

The staff alternative includes French Hydro's proposed measures described above in section 2.2.3, *Proposed Environmental Measures*, except for the following:[19] (1) the program to identify and remediate any new erosion caused by project operation (certification condition 4.1); (2) continuing to fund USGS gage no. 04101501 (certification condition 1.5); (3) the streamflow monitoring plan (certification condition 1.6); (4) the three-year test period and report on the project's ability to comply with the operational requirements contained in Michigan EGLE's certification (certification condition 1.7); (5) water quality monitoring in the project vicinity (certification conditions 2.3 and 3.1); (6) conducting contaminant testing (certification conditions 3.2 and 3.3); and (7) the comprehensive plan pertaining to the proposed water quality monitoring and fish and sediment testing (certification condition 3.4).

The staff alternative includes the following modifications and additions to French Hydro's proposed measures:

- An operation compliance monitoring plan that includes provisions for monitoring and reporting compliance with the operating requirements of the license (e.g., run-of-river mode and minimizing water-level fluctuations in the project reservoir), and reporting deviations from operating requirements, instead of a streamflow monitoring plan.
- Modification of the project boundary to include the access road from the intersection of French Street to the project facilities.
- An HPMP, implemented by a PA, within one year of license issuance to protect historic properties that are eligible for or listed on the National Register that may be adversely affected by project operation and maintenance.

2.4 STAFF ALTERNATIVE WITH MANDATORY CONDITIONS

We recognize that the Commission is required to include all conditions required by the certification in any subsequent license issued for the project. Therefore, the staff alternative with mandatory conditions includes all the measures in the staff alternative with the addition of the nine certification conditions not included in the staff alternative, as discussed above in section 2.3, *Staff Alternative*.

[19] Michigan EGLE's water quality certification conditions that are consistent with the proposed measures are noted in parenthesis.

2.5 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.

2.5.1 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.[20] 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 decommissioning a reasonable alternative to relicensing.[21] This is consistent with NEPA and the Commission's obligation under section 10(a) of the FPA to issue licenses that balance developmental and environmental interests.

Project retirement could be accomplished with or without dam removal.[22] Either alternative would involve denial of the license application and surrender or termination of the current license with appropriate conditions.

French Hydro does not propose decommissioning, nor does the record to date demonstrate there are serious resource concerns that cannot be mitigated if the project is relicensed; as such, there is no reason, at this time, to include decommissioning as a reasonable alternative to be evaluated and studied as part of staff's NEPA analysis.

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[20] *See, e.g.*, *Eagle Crest Energy Co.*, 153 FERC ¶ 61,058, at P 67 (2015); *Pub. Util. Dist. No. 1 of Pend Oreille Cty.*, 112 FERC ¶ 61,055, at P 82 (2005); *Midwest Hydro, Inc.*, 111 FERC ¶ 61,327, at PP 35-38 (2005).

[21] *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).

[22] In the unlikely event that the Commission denies relicensing of a project or a licensee decides to surrender an existing project, the Commission must approve a surrender "upon such conditions with respect to the disposition of such works as may be determined by the Commission." 18 C.F.R. § 6.2 (2019). This can include simply shutting down power operation, removing all or parts of the project (including the dam), or restoring the site to its pre-project condition.

3.0 ENVIRONMENTAL ANALYSIS

In this section, we present: (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 recommended environmental measures. Sections are organized by resource area (aquatics, recreation, *etc*.). Historic and current conditions are described first under each resource area. The existing condition is the baseline against which the environmental effects of the proposed action and alternatives are compared, including an assessment of the effects of proposed protection, mitigation, 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*, of this EA.[23]

3.1 GENERAL DESCRIPTION OF THE PROJECT AREA

The French Paper Project is located on the St. Joseph River and has a drainage area of approximately 3,666 square miles. The St. Joseph River Basin occupies about 3,000 square miles of the southwest corner of Michigan, about 1,685 square miles of northern Indiana, and is the third largest watershed draining into Lake Michigan. The basin includes about 1,640 miles of significant tributaries, and over 400 lakes used for recreational activities. A map of the river basin is shown in figure 3.

The land use within the St. Joseph River Basin is primarily agricultural (animal and crop production) with some forested, developed, and wetland areas. Beech-maple and oak-hickory forests primarily makeup the banks and land along the St. Joseph River within the project area. Project facilities occupy the northwestern bank of the project boundary. North of the project is an urban community, Niles, Michigan. Riverfront Park, an adjacent recreation area, is located along the eastern bank of the St. Joseph River and extends approximately 4,000 feet downstream of the project. Residential subdivisions are located along the banks upstream and downstream of the project. South Bend, Mishawaka, and Elkhart, Indiana make up approximately 65 percent of the basin's population. The St. Joseph River basin is largely dependent on agriculture (consisting of small dairy and fruit farms) and manufacturing (consisting of fishing tackle and band instrument production). Smaller cities along the St. Joseph River manufacture paper, furniture, and canned fruits and vegetables.

[23] Unless otherwise indicated, the sources of our information are the final license application filed by French Hydro on February 27, 2019 (French Paper Company, 2019a) and the responses to requests for additional information filed on June 25, 2019 (French Paper Company, 2019b), October 15, 2019 (French Paper Company, 2019c), and May 5, 2020 (French Hydro, 2020).

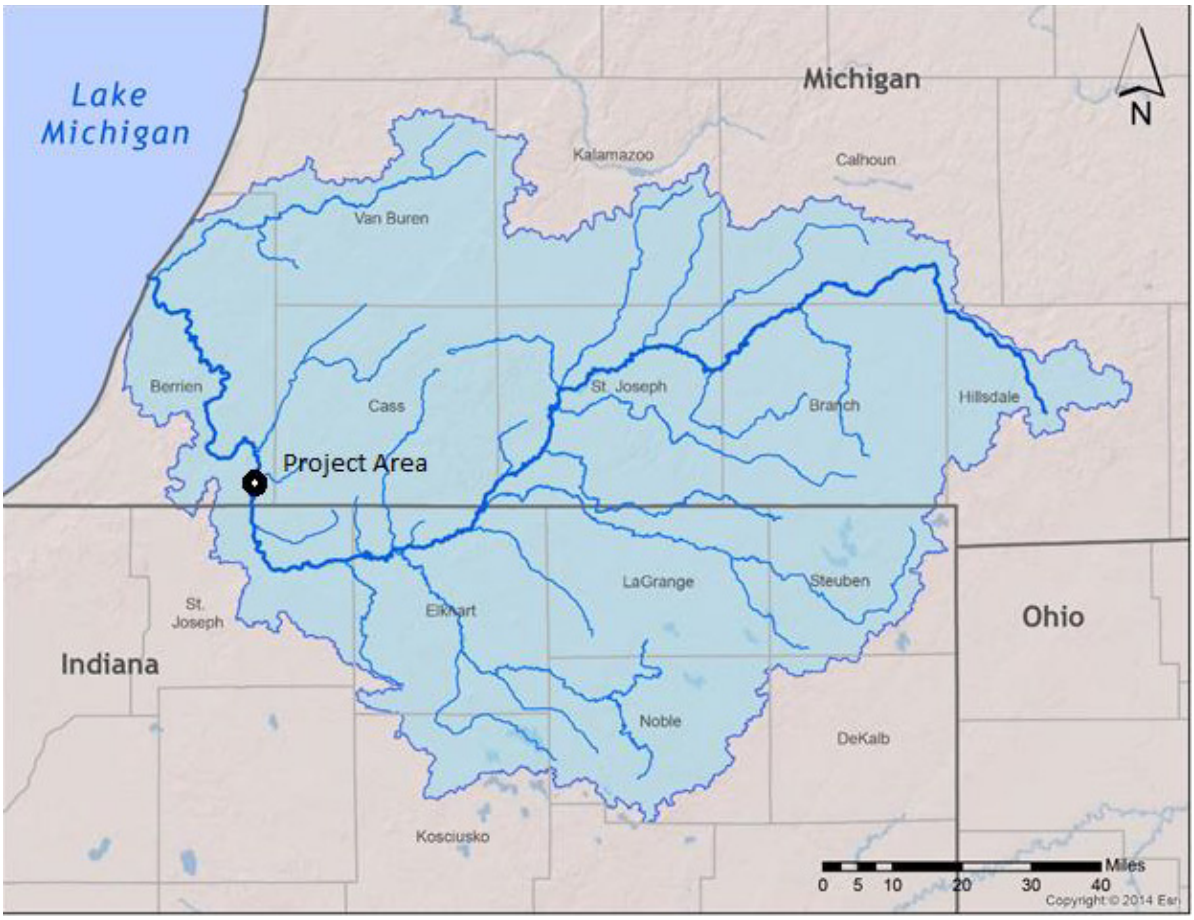

Figure 3. St. Joseph River Basin (Source: French Paper Company, 2019a).

3.2 SCOPE OF CUMULATIVE EFFECTS ANALYSIS

According to the Council on Environmental Quality's regulations for implementing NEPA, 40 Code of Federal Regulations (CFR) § 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) or person undertakes such actions. Cumulative effects can result from individually minor but collectively significant actions taking place over time, including hydropower and other land and water development activities.

Based on our review of the license application and agency and public comments, we have identified migratory fish as a resource that could potentially be cumulatively affected by the continued operation and maintenance of the project. We discuss these cumulative effects at the end of section 3.3.2, *Aquatic Resources*.

3.2.1 Geographic Scope

The geographic scope of analysis for cumulatively affected resources is defined by the physical limits or boundaries of the proposed action's effect on the resources. We have identified the geographic scope for migratory fish to include the St. Joseph River Basin from the Twin Branch Hydroelectric Project (FERC Project No. 2579) located approximately 21 miles upstream of the project on the St. Joseph River to the mouth of the St. Joseph River at Lake Michigan. We chose this geographic scope because the collective operation and maintenance of dams within this reach of the St. Joseph River, in combination with other developmental and non-developmental uses of the St. Joseph River Basin, has the potential to cumulatively affect migratory fishery resources in the basin.

3.2.2 Temporal Scope

The temporal scope of our cumulative effects analysis in the EA will include a discussion of past, present, and reasonably foreseeable future actions and their effects on each resource that could be cumulatively affected. Based on the potential term of subsequent licenses, the temporal scope will look 40 years into the future, concentrating on the effect on the resources from reasonably foreseeable future actions. The historical discussion will, by necessity, be limited to the amount of available information for each resource. The quality and quantity of information, however, diminishes as we analyze resources further away in time from the present.

3.3 PROPOSED ACTION AND ACTION ALTERNATIVES

In this section, we discuss the effects of the proposed action and 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 effects. We then discuss and analyze the site-specific environmental effects and any cumulative effects.

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 geological and soils, aquatic, terrestrial, threatened and endangered species, recreation and land use, and cultural resources may be affected by the proposed action and action alternatives. We have not identified any substantive issues related to aesthetic resources or socioeconomics associated with the proposed action; therefore, these resources are not assessed in this EA. We present our recommendations in section 5.1, *Comprehensive Development and Recommended Alternative*.

3.3.1 Geological and Soil Resources

3.3.1.1 Affected Environment

The French Paper Project is in the southern lower peninsula hills and plains region in Berrien County, Michigan. The general characteristics of this region include a heterogeneous mix of glacial hilly and rolling landscapes associated with the Saginaw, Lake Michigan, and Huron-Erie lobes of the Laurentide ice sheet. The glacial melt from the Laurentide ice sheet produced long, curvilinear lowlands of low relief that is covered with sandy outwash and gravel. In addition, glacial melt erosion has left terraces and deep channels. The regional topography ranges from smooth in areas associated with ground moraine[24] and glacial outwash deposits to more irregular in areas associated with end moraines, low hills and gently sloping uplands marked by knolls, hummocks, and closed depressions. This results in more than 400 small lakes with surface areas ranging in size from 0.13 to 6 square miles. These lakes and associated springs maintain the flow of the St. Joseph River, allowing it not to be subjected to extremely low flows.

Geologic structure underlying the project area consists of surficial glacial outwash sands and gravels, lake clays, and boulder till with an average thickness of 100 to 200 feet. Underlying this material is Ellsworth and Antrim Shales of the Devonian and Mississippian Age. No known mineral resources are present in the area.

There have been 42 different soil types identified in Berrien County and there is a wide mix of soil types in the project area. These soils surrounding the project area were developed and deposited during the Wisconsin Glaciation or more recent activity. These deposits generally consist of either sandy or silt loams with grades less than 10 percent.

Both banks of the St. Joseph River in the project area are generally flat, vegetated, floodplains with grades less than 6 percent, which transition into wooded banks with grades ranging from 18 to 35 percent. The siltier soils within the floodplains generally have a higher erosion susceptibility than the sandy soils found on the streambanks adjacent the floodplains.

3.3.1.2 Environmental Effects

Fluctuations in river levels during the operation of hydropower projects can affect bank stability in reservoirs and downstream reaches by exposing areas to periodic inundation and dewatering. Soil and sediment eroded from streambanks and shorelines can adversely affect loss of riparian and terrestrial habitat. Sediment in the water reduces water clarity, transports nutrients and other pollutants downstream, and degrades habitats and spawning areas of benthic and aquatic organisms.

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[24] A moraine is a glacially formed accumulation of unconsolidated glacial sediment, typically as ridges at its sides or end.

French Hydro proposes to continue to operate the project in a run-of-river mode where outflow from the project approximates inflow, except during the proposed 72-hour project shutdown to facilitate the safe and timely downstream passage of stocked Chinook salmon and steelhead smolts. French Hydro also proposes to continue to maintain a target normal water surface elevation of 653.75 feet msl (i.e., top of the flashboards) in the project reservoir and a minimum reservoir elevation of 653.5 feet msl (i.e., 0.25 foot below the top of the flashboards), except during events beyond French Hydro's control, to reduce bank erosion of the St. Joseph River in the project boundary.

French Hydro also proposes, within one year of license issuance, to develop a plan to periodically inspect the shoreline of the project reservoir and the streambanks of the St. Joseph River immediately downstream of the project to identify any new erosion caused by the French Paper Project. The plan would be submitted to Michigan EGLE for its approval prior to implementation of the plan. French Hydro's proposal establishes frequency of monitoring, the locations to be monitored, the methodology that would be used to monitor the streambank and reservoir shoreline stability, the types of information that would be collected to document erosion sites, and report format. French Hydro proposes to remediate project-caused instability.

French Hydro's proposals to continue operating the project in a run-of-river mode, maintaining a target normal water surface elevation of 653.75 feet msl in the project reservoir and a minimum reservoir elevation of 653.5 feet msl (i.e., 0.25 foot below the top of the flashboards), and periodically inspecting the shoreline of the project reservoir and the streambanks of the St. Joseph River immediately downstream of the project to identify and remediate new areas of erosion caused by project operation are consistent with the requirements of Michigan EGLE's certification conditions 1.1, 1.2 and 4.1.

Our Analysis

The current concrete spillway structure was constructed in 1914 to replace the former rock-filled timber crib overflow structure that had been damaged during that year's spring flooding. Flashboards were likely added after the dam was constructed but flashboards were present at their current height when the current license was issued on February 28, 1991. The current license requires that French Hydro operate the project in a run-of-the-river mode, acting at all times to minimize fluctuations of the reservoir surface elevation. Therefore, the project has operated with minimal fluctuation of the reservoir surface elevation. Except for natural fluctuations related to river flow, the present water surface elevation in the project reservoir has remained at a consistent level for at least 30 years.

To determine the severity and extent of erosion, French Hydro conducted a visual survey of the banks of the St. Joseph River in the project boundary. The surveyed area included the banks of the French Paper Project reservoir extending about 1.9 miles upstream of the dam and the area extending 400 feet downstream of the dam (including the project tailrace). All erosion sites were inventoried according to the Natural

Resources Conservation Service's (NRCS) Technical Guide for Streambank Erosion Prediction (NRCS, 2015), mapped and photographed.

At the time of the survey, the flow in the St. Joseph River was 1,854 cfs as reported at USGS gage no. 04101500, which is about 0.9 miles downstream of the dam. A flow of 1,854 cfs has an exceedance for August of about 60 percent and an annual exceedance of about 80 percent. The low flow in the river occurring during the survey exposed the banks below the normal water level. Ten areas of erosion were observed in the project boundary, which were all located in the project reservoir. No erosion was identified downstream of the French Paper Dam. The locations of erosion sites 1 through 10 are shown in figure 4. Based on the NRCS streambank erosion categories, erosion sites 1 through 9, were characterized as moderate, with site 10 characterized as severe. A moderate category has a lateral recession rate 0.06 to 0.2 feet per year and a bank that is predominantly bare, with some rills and vegetative overhang. A moderate category also has some exposed tree roots, but no slumps or slips. A severe category has a lateral recession rate 0.3 to 0.5 feet per year and a bank that is bare, with rills and severe vegetative overhang. A moderate category also has many exposed tree roots, some fallen trees, and slumps or slips. French Hydro stated that the none of the observed areas of erosion are related to project operation because the project is operated in a run-of-river mode, with outflow equal to inflow. French Hydro concluded that the suspected cause of the erosion was natural river fluctuation.

Project operation diverts about 1,562 cfs from the St. Joseph River; 1,370 cfs for the generation of electricity and 192 cfs for the operation of the fish ladder. The diversion of flow for project operation causes less flow to be spilled over the project spillway. To assess the effect of project operation on the water surface elevation in the project reservoir, an approximate relationship between flow rate and water surface elevation was developed. The relationship, referred to as a rating curve, was developed using the weir equation[25] for the spillway with the flashboards in place. Flow data were obtained from USGS gage no. 04101500. The USGS flow data represents the total flow in the river, which includes project flow and flow over the spillway. This total flow represents the "natural" flow over the spillway that would occur without the diversion of water for project purposes. Flow over the spillway with water being diverted for project purposes is the project-affected flow, or "project" flow. Water surface elevations were developed using the spillway rating curve for both the "natural" and "project" flow.

[25] The weir equation is $Q = CLH^{1.5}$, where Q is flow in cfs, C is an empirical discharge coefficient, L is the length of the spillway and H is the depth of flow over the spillway. The discharge coefficient was determined from Exhibit F, sheet F-8; which provided a water surface elevation of 654.80 feet msl (with flashboards) and a flow of 1,200 cfs.

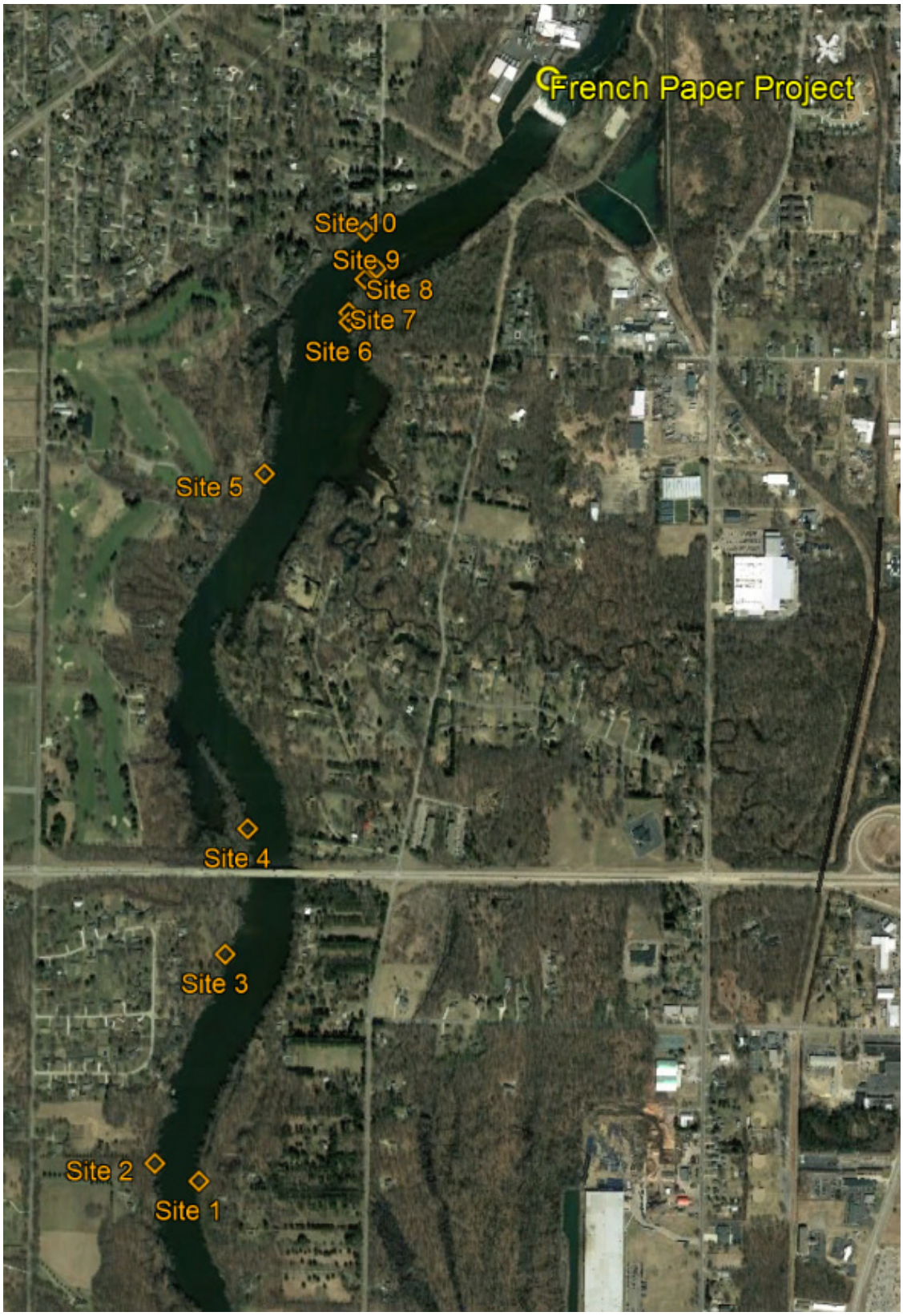

Figure 4. Locations of identified areas of erosion in the project boundary (Source: Google Earth, 2019b; as modified by staff).

The differences in water surface elevation resulting from natural flows and project-affected flows were evaluated for a runoff event. A portion of a runoff event from April 27, 2019 through May 6, 2019, was evaluated using 15-minute data. The water surface elevations for the natural flow and project-affected flow are shown in figure 5. At the peak of the runoff event, the water surface elevation for the project-affected flow is 0.41 feet less than for the natural flow. At the beginning of the runoff event, the water surface elevation for the project-affected flow is 0.59 feet less than for the natural flow. At the end of the runoff event, the water surface elevation for the project-affected flow is 0.47 feet less than for the natural flow. The difference between the project-affected flow and natural flow for this runoff event is more pronounced at the lower flows.

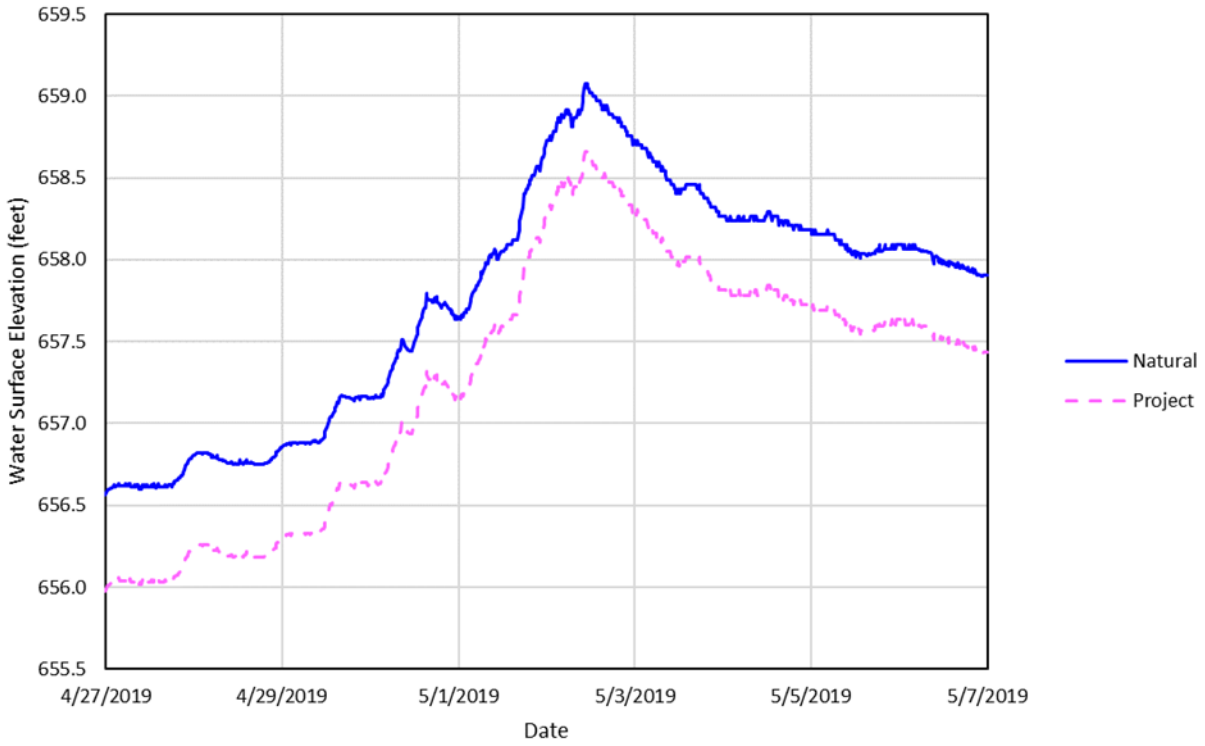

Figure 5. Water surface elevation hydrograph for natural flow and project-affected flow (Source: Staff).

The project-affected flow and natural flow were evaluated using average daily data for the period of record at USGS gage no. 04101500, which ecompasses the period from October 1, 1930 through July 24, 2019. A water surface elevation duration curve was created for the natural flow and the project-affected flow, and are shown in figure 6. Figure 6 shows that the difference between the project-affected flow and natural flow is more pronounced at the lower flows. The water surface elevations for the natural flow and project-affected flow for the 90, 80, 50, and 20 percent exceedances are presented in table 1. As shown in figure 6 and table 1, the effect of diverting flow for project operation is a lower water surface as compared to having all the flow passing over the spillway. The project has sufficient hydraulic capacity to maintain a water surface in the project reservoir at, or below, the top of the flashboards when the flow rates in the St. Joseph River are less than 1,562 cfs, which occurs about 11 percent of the time. However, flow rates in the St. Joseph River greater than the hydraulic capacity of the project, 1,562 cfs, flow uncontrolled over the project's 321-foot-long spillway, which occurs about 89 percent of the time. When flows in the St. Joseph River are greater than 1,562 cfs and the project is operating at its maximum hydraulic capacity, as it typically operates, the project has no ability to affect the water level in the project reservoir.

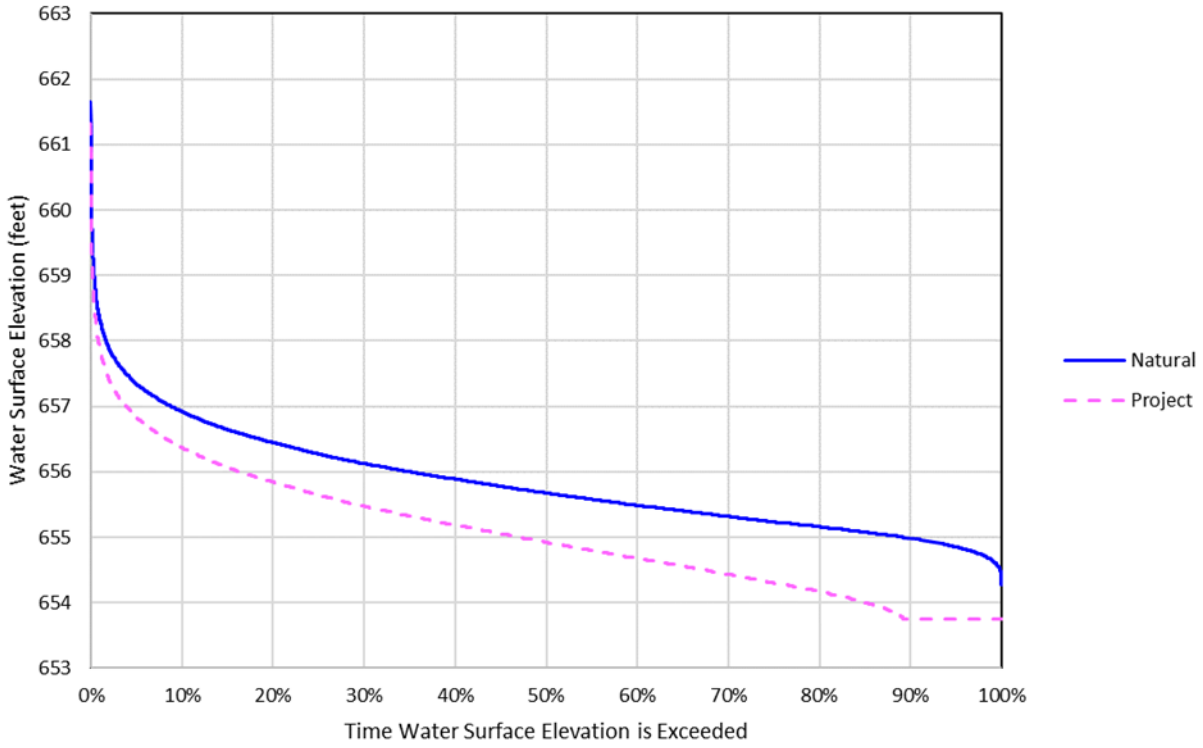

Figure 6. Water surface elevation exceedance curves for natural flow and project-affected flow (Source: Staff).

Compared to a natural flow condition, project operation reduces the water surface elevation in the project reservoir, which decreases banks exposure to inundation and dewatering during runoff events. High-water events can inundate and saturate the

reservoir shoreline and streambanks that, when the water level decreases, exerts outward pressure on soil particles, potentially causing the bank to collapse (NRCS, 2009). Therefore, by lowering the water surface in the reservoir, project operation has the potential to negligibly lower the shoreline and streambank erosion potential when compared to flow over the spillway without project diversion.

Table 1. Water surface elevations for the natural flow and project-affected flow for the 90, 80, 50 and 20 percent exceedances (Source: Staff).

	Water Surface Elevation (feet msl)		
Exceedance	Natural Flow	Project-Affected Flow	Difference
90%	654.98	653.75	1.23
80%	655.16	654.17	0.99
50%	655.68	654.92	0.75
20%	656.45	655.85	0.60

We conclude that operating the project in a run-of-river mode would continue to minimize the erosion potential of the project reservoir shoreline and the streambanks immediately downstream of the dam by reducing the exposure of these areas to periodic inundation and dewatering. Under the proposed run-of-river operation, the erosion potential of the reservoir shoreline and streambanks within the project boundary would not be altered and erosion of these areas would continue to occur at the historical rate.

Based on a visual survey conducted by French Hydro, we also conclude that erosion occurring along the project reservoir shoreline and the streambanks immediately downstream of the dam is attributed to natural river fluctuation, which is not related to project operation. Therefore, because erosion occurring in these areas not attributed to project operation, there would be no project-related justification for periodically inspecting the shoreline of the project reservoir and the streambanks immediately downstream of the dam to identify and remediate any new erosion, as proposed by French Hydro.

3.3.2 Aquatic Resources

3.3.2.1 Affected Environment

Water Quantity and Use

The mainstem of the St. Joseph River is 210 miles long and has an additional 1,641 miles of significant tributaries. The project is located at river mile (RM) 44.5 on the St. Joseph River and has a drainage area of 3,666 square miles. At an elevation of 653.75 feet msl, the project reservoir has a surface area of about 112 acres with an estimated gross storage capacity of 864 acre-feet. The project reservoir is long and narrow, or riverine in shape with depths typically ranging between 10 and 15 feet.

Table 2 shows the monthly flow statistics for the St. Joseph River at the project. The flow data presented in table 2 were prorated based on data obtained from USGS gage no. 04101500 (St. Joseph River, Niles, Michigan). USGS gage no. 04101500 is located approximately one mile downstream of the project and has a period of record from 1930 to the present.[26] Mean monthly flows at the project are generally highest from February through May, and lowest in August and September. The flood of record at the project occurred on February 22, 2018, with a flow of 24,800 cfs, as measured at USGS gage no. 04101500.

Table 2. Mean monthly flow data (in cfs) for the St. Joseph River at the project estimated from prorated data obtained from USGS Gage no. 04101500 (Source: French Paper Company, 2019b).

Month	Mean Flow (cfs)	Minimum Flow (cfs)	Maximum Flow (cfs)
January	3,769	700	18,000
February	4,119	971	19,300
March	5,341	963	19,800
April	5,427	920	19,400
May	4,487	750	17,100
June	3,583	596	16,000
July	2,607	466	10,900
August	2,163	420	11,600
September	2,111	550	12,400
October	2,369	708	11,300
November	2,767	663	8,690
December	3,287	700	16,400

There are approximately 190 dams in the St. Joseph watershed that are registered with Michigan EGLE and Indiana Department of Natural Resources (Indiana DNR). Of these, 17 are located on the mainstem of the St. Joseph River and eight of these dams have hydropower facilities. Table 3 provides summary statistics for each of the hydropower projects located at mainstem dams on the St. Joseph River. The French Paper Project is the third hydropower project upstream of Lake Michigan on the St. Joseph River and is located between the Buchanan Hydroelectric Project (FERC No. 2551) located approximately 9.3 miles downstream of the project and the South Bend

[26] USGS gage no. 04101501, located just downstream USGS gage no. 04101500, is a stage-only gage that works in tandem with USGS gage no. 04101500 to accurately measure streamflow in the St. Joseph River by measuring river slope. USGS gage no. 04101500 continuously monitors streamflow and several water quality parameters, including water temperature, DO, specific conductivity, pH, and turbidity.

Hydroelectric Project (FERC No. 7569) located approximately 13.7 miles upstream of the project.

Table 3. Hydropower dams on the mainstem St. Joseph River. (Source: FERC, 2002, as modified by staff)

Project Name	FERC No.	License/Exemption Issuance Date	River Mile	Installed capacity (kW)	Drainage area (square miles)	Storage capacity (acre-feet)
Berrien Springs	A	NA	24.6	7,200	4,081	6,400
Buchanan	2551	Dec. 31, 1996	35.2	4,105	4,037	1,775
French Paper	10624	Feb. 28, 1991	44.5	1,300	3.666	864
South Bend	7569	April 18, 1984 (exemption)	58.2	1,830	3,572	800
Elkhart	2651	January 11, 2001	62.2	3,440	3,551	3,300
Twin Branch	2579	December 23, 1996	65.7	4,800	3,530	9,700
Mottville	401	April 17, 2003	96.4	1,750	1,860	1,727
Constantine[b]	10661	November 20, 1993	103	1,200	1,543	5,750
Three Rivers	11797	September 24, 2003	112.4	900	1,350	8,600
Sturgis	2964	November 28, 2003	120	2,720	950	6,550
Union Lake (Riley Dam)	A	NA	150	418	534	5,760

a Non-jurisdictional project.
b The Constantine Project is currently undergoing the relicensing process.

Minimum flows associated with the operation of the project's fish ladder are discussed below in the *Fishery Resources* section.

There are no known permitted water withdrawals from the project reservoir for purposes other than hydropower and the operation of the project's fish ladder. The only other water uses in the project area are for recreational activities, including fishing and boating.

Water Quality

The State of Michigan's Part 4 Rules, Water Quality Standards (of Part 3, Water Resources Protection, of Act 451 of 1994), specify water quality standards which must be met in all waters of the state (Michigan EGLE, 2020). Michigan's Part 4 Water Quality Standards require that all designated uses of the receiving water be protected. Designated uses are defined in Michigan Administrative Code Section R 323.1100 and all surface waters in Michigan are designated and protected for all the following uses: agriculture; navigation; industrial water supply; warmwater fishery; other indigenous aquatic life and wildlife; fish consumption; and partial body contact recreation. Additional designated uses (i.e., trout stream, public water supply, etc.) may be applied to specific waters;

however, the St. Joseph River has no such additional designations. State water quality standards for water temperature, DO, and pH in the St. Joseph River are as follows:

- *Dissolved oxygen*
  - A minimum of 5 mg/L of DO shall be maintained.
- *Water temperature*
  - Rivers, streams, and reservoirs naturally capable of supporting warmwater fish shall not receive a heat load which would warm the receiving water at the edge of the mixing zone more than 5 ºF above the existing natural water temperature.
  - Rivers, streams, and reservoirs naturally capable of supporting warmwater fish shall not receive a heat load which would warm the receiving water at the edge of the mixing zone to temperatures greater than the following monthly maximum temperatures:

Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
50°F	50°F	55°F	65°F	75°F	85°F	85°F	85°F	85°F	70°F	60°F	50°F

- *pH*
  - The pH shall be maintained within the range of 6.5 to 9.0 standard units (S.U.) in all surface waters of the state, except for those waters where the background pH lies outside the range of 6.5 to 9.0 S.U.

Water Quality Monitoring

In support of the relicensing process, French Hydro conducted a water quality study in the project vicinity from July through August 2017 to supplement existing water quality data from the 1980s and 1990s with more recent data. French Hydro collected hourly DO and water temperature data from within the top third of the water column at the following locations: (1) approximately 1.25 mile upstream of the project dam (Site A); and (2) approximately 500 feet downstream of the dam on the western side of the St. Joseph River (Site B). Streamflow at the project was slightly above average in July 2017 (30 percent exceedance), while streamflow in August 2017 was slightly below average (60 percent exceedance).

Mean monthly water temperature data collected during this study is presented in table 4, along with water temperature data obtained from the downstream USGS gage no. 04101500. Water temperatures ranged from 69.5 to 78.3 ºF at Site A and from 70.2 to 78

ºF at Site B.[27] DO levels ranged from 5.8 to 7.7 at Site A to 7.5 to 8.9 at Site B. The overall daily minimum DO levels from Sites A and B are presented in table 5. All water temperature and DO data collected by French Hydro in 2017 met state water quality standards.

Table 4. Mean water temperature data from French Hydro's 2017 water quality study and USGS Gage no. 04101500. (Source: French Paper Company, 2018)

Location	Mean Water Temperature (ºF) July 2017	Mean Water Temperature (ºF) August 2017
Site A – Upstream of French Paper Project Dam	76.5	73.6
Site B – Downstream of French Paper Project Dam	75.9	73.7
Site C – USGS Gage No. 04101500 (located 1 mile downstream of French Paper Dam)	75.8	73.6

Table 5. Daily minimum DO data from French Hydro's 2017 water quality study. (Source: French Paper Company, 2018)

Location	Minimum Daily DO (mg/L) July 2017	Minimum Daily DO (mg/L) August 2017
Site A – Upstream of French Paper Project Dam	6.1	5.8
Site B – Downstream of French Paper Project Dam	7.6	7.5

Since 1980, Michigan EGLE (formerly Michigan DEQ) has monitored bioaccumulative contaminants in fish tissue samples to help support the development of the Michigan Department of Community Health's *Michigan Eat Safe Fish Guide* (Michigan Department of Health and Human Services, 2018). The purpose of this guide is to issue general and specific consumption advisories for sportfish caught in Michigan waters. Consumption advisories in the project area exist for the following species and contaminants: carp (PCBs); largemouth bass (PCBs and mercury); and smallmouth bass (PCBs and mercury) (Michigan Department of Health and Human Services, 2018).

[27] On the day the high water temperature of 78.3ºF was recorded at Site A, no data was available for Site B due to an instrument power failure which occurred from July 17 through 26, 2017.

Fishery Resources

The St. Joseph River is characterized as a warmwater stream and the basin supports a diverse fishery with over 100 different species. Many tributaries to the St. Joseph River are fed by groundwater and provide important coldwater habitat that supports a variety of coldwater species. As such, the river's fishery consists of numerous residential and introduced potamodromous species with thermal preferences ranging from coldwater to warmwater conditions.[28]

Given the large size of the St. Joseph River watershed, Wesley and Duffy (1999) separated the river into five different sections or valley segments that share common channel and landscape features and, therefore, represent distinctive and homogenous ecosystems. The project is located in segment 4, which is considered a lower section of the St. Joseph River. A number of fish surveys have been conducted by Michigan DNR and Indiana DNR, and also by private entities in support of the FERC licensing process for projects located throughout the St. Joseph River over the past 30 years. Wesley and Duffy (1999) reported that the lower section of the St. Joseph River primarily contains redhorse, spotfin shiners, smallmouth bass, and bluegill, and the reservoirs within this reach, including the project reservoir, primarily support populations of white and black crappie, pumpkinseed, bluegill, walleye, and flathead catfish. Based on a site-specific fish entrainment and mortality study conducted at the project in 1993 and 1994, as further discussed below, golden redhorse, bluegill, channel catfish, shorthead redhorse, and spottail shiners were the most abundant species collected in the immediate project vicinity (STS, 1994).

Each of the five sections of the St. Joseph River are managed differently by the respective resource agencies in Michigan and Indiana. Fish management in the St. Joseph River is most aggressive in the lower segments of the river (Wesley and Duffy, 1999). Several of the coldwater tributaries to the lower St. Joseph River are managed for trout and several of these tributaries have self-supporting populations of brown trout. The Dowagiac River is the largest tributary within this segment of the St. Joseph River and it is designated as a coldwater stream.[29] The Dowagiac River and its tributaries provide important coldwater habitat for potadromous salmonids; however, the Pucker Street Dam (located 3 miles upstream of the confluence with the St. Joseph River) serves

[28] In this EA, we use the term "potadromous" rather than "anadromous" when referring to fish species in the project area (e.g., Chinook salmon and steelhead) that migrate exclusively with freshwater (i.e., the St. Joseph River Basin and Lake Michigan) to complete their respective lifecycles. Potamodromous species move and complete their life cycle entirely within freshwater, moving and migrating various distances throughout their life cycle for feeding or reproductive purposes.

[29] The Dowagiac River's confluence with the St. Joseph River is approximately 2.3 miles downstream of the French Paper Project Dam.

as a complete upstream barrier to migratory fish species (Wesley and Duffy, 1999). Natural reproduction of Coho salmon, Chinook salmon, and steelhead have also been documented within the lower tributaries to the St. Joseph River (STS, 1994; Wesley and Duffy, 1999). Annual creel surveys conducted by Michigan DNR from 1992 through 2004 indicated that 59 percent of the fishing effort was targeted toward salmonids, followed by walleye (16 percent), and other species (25 percent) (Gunderman, 2017).[30]

In the early 1980s, the States of Michigan and Indiana, in consultation with the FWS, cooperatively developed and funded the St. Joseph River Interstate Cooperative Salmonid Management Plan with a goal of developing and managing a potamodromous fishery in the St. Joseph River.[31] To achieve this goal, the following three objectives were identified in the plan: (1) construct a series of fish ladders at existing dams on the lower St. Joseph River to allow the migration of salmon and steelhead from Lake Michigan into the lower reaches of the St. Joseph River and its coldwater tributaries; (2) construct a new fish hatchery in Indiana to provide fish stocks for enhancing the potamodromous fishery; and (3) improve fishing access and amenities to support the anticipated increase in recreational use.

In 1992, five fish ladders were constructed at the lowermost dams on the St. Joseph River to facilitate fish migration in the mainstem river and its tributaries. Fish ladders were constructed at Berrien Springs Dam (RM 24.6),[32] Buchanan Dam (35.2), French Paper Project Dam (RM 44.5), South Bend Dam (RM 58.2), and Elkhart Dam (RM 62.2), allowing fish to migrate upriver from Lake Michigan to the Twin Branch Dam (RM 65.7). The fish ladder installed at the project is a "vertical slot" fish ladder.[33] The French Hydro Project's fish ladder contains 15 steps and its entrance is located approximately 95 feet downstream of the spillway crest. The exit to the fish ladder is located approximately 75 upstream of the spillway crest. As described in section 2.1.4, *Current Project Operation*, the current license requires that French Hydro maintain a

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[30] Michigan DNR initiated a walleye fry and fingerling stocking program in 1980 in the lower St. Joseph River to augment the existing walleye population and enhance fishing opportunities. Between 1980 and 2004, approximately 25 million walleye were stocked in the lower St. Joseph River (Gunderman, 2017).

[31] A copy of the plan is appended to French Hydro's June 25, 2019 filing.

[32] The Berrien Springs fish ladder has a pool-weir configuration, which incorporates a sea lamprey barrier to prevent the upstream migration of this species into the St. Joseph River.

[33] A "vertical slot" fishway is a pool-type fish ladder. This type of fish ladder is characterized by a rectangular channel with a sloping floor and a series of regularly spaced baffles separating the pools. "Vertical slot" fish ladders are also installed at Buchanan, South Bend, and Elkhart Dams.

continuous 120-cfs minimum flow for the operation of the fish ladder at the project. This minimum flow is achieved by maintaining the normal water surface elevation of the reservoir (i.e., 653.75 feet msl), which supplies approximately 192 cfs to the fish ladder via a combination of flow from the upstream entrance to the fish ladder and two, 30-inch-diameter ductile iron pipes. These pipes have an invert elevation of 646.50 feet msl and convey water (i.e., auxiliary flows) from the intake channel to a diffusion chamber located on each side of the fish ladder's downstream entrance.[34] These auxiliary flows are provided on a year-round basis and serve as a velocity jet to attract fish migrating upstream into the downstream entrance to the fish ladder. The fish ladder is equipped with a viewing window to allow resource agency personnel to assess the effectiveness of the ladder at passing various fish species, monitor trends in abundance of major game fish species, determine the timing of spawning migrations, and elucidate daily movement patterns for salmonids (Gunderman, 2017).[35]

Historically, fish counts at the project were made using time-lapse video recordings. Although all fish passage monitoring was discontinued at the project in 2009, fish passage continues to be monitored at the downstream Berrien Springs fish ladder and upstream South Bend fish ladder.[36] The most recent fish passage data available from the fish ladder at the French Paper Project Dam is shown in table 6. More recent fish ladder data from the St. Joseph River, collected at the upstream South Bend fish ladder, is shown in table 7.

Historic fish count data from the Berrien Springs and French Paper Project fish ladders indicate spring-run steelhead migrations peak during late-March through early-April, while fall-run steelhead migrations peak during early to mid-September. Chinook salmon migration peaks from late-September through mid-October, while migrating Coho salmon are most abundant from mid- to late-September. Other migratory species such as brown trout, walleye, smallmouth bass, suckers, channel catfish, and carp have also been observed using the fish ladders on the St. Joseph River (FERC, 1996; Wesley and Duffy, 1999). However, Gunderman (2017) estimates 99 percent of the fish moving through the Berrien Springs and French Paper Project fish ladders are salmonids.

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[34] Michigan DNR maintains control of the gate that operates the auxiliary flows and can operate it remotely; however, this gate is typically left in the open condition.

[35] Fish viewing windows are also installed at the Berrien Springs and South Bend fish ladders, located downstream and upstream of the project, respectively.

[36] *See* Brian Gunderman's (Michigan DNR – Fisheries Division) February 29, 2016 email to Sue Ellen Doudrick, included as Appendix A-2 to French Hydro's October 15, 2019 filing.

Table 6. Fish count data from the Berrien Springs, French Paper Project, and South Bend fish ladders (1992 through 2010). (Source: French Paper Company, 2019b)

	Berrien Springs Fish Ladder (RM 24.6)			**French Paper Project Fish Ladder (RM 44.5)**			**South Bend Fish Ladder (RM 58.2)**		
	Chinook Salmon	**Coho Salmon**	**Steelhead**	**Chinook Salmon**	**Coho Salmon**	**Steelhead**	**Chinook Salmon**	**Coho Salmon**	**Steelhead**
Year									
1992	2,049	149	2,371	1,771	193	1,540	1,995	146	1,254
1993	7,491	447	20,604	3,523	137	7,995	3,025	146	7,087
1994	5,101	2,346	15,628	2,070	287	7,744	1,460	119	6,401
1995	4,740	5	18,283	2,243	0	7,980	1,216	35	5,736
1996	6,176	576	24,232	3,298	145	13,402	1,572	4	11,139
1997	2,821	42,453	18,774	1,000	8,897	10,866	911	6,413	10,293
1998	4,623	19,303	19,355	1,770	1,692	11,433	2,122	361	8,528
1999	9,514	5,672	27,695	5,074	1,991	20,738	4,981	874	16,816
2000	7,526	14,754	23,106	3,557	2,620	13,642	3,698	1,348	15,769
2001	6,654	8,821	18,880	3,495	1,810	13,382	4,557	295	14,771
2002	3,882	7,627	7,648	1,112	1,645	4,382	1,234	173	5,636
2003	2,477		18,007	1,799		10,067	1,666		12,406
2004	4,305		20,365	854		7,642	985		14,229
2005	6,163		14,448	2,652		7,728	1,391		9,246
2006	3,946		18,100	2,272		9,393	1,683		11,931
2007	3,975		8,500	n/a		n/a	439		10,225
2008	4,025		12,436	n/a		n/a	207		9,897
2009	3,274		15,764	0		7,309	251		6,778
2010	2,545		8,891	n/a		n/a	394		3,120
Total	**91,287**	**102,153**	**313,087**	**36,490**	**19,417**	**155,243**	**33,787**	**9,914**	**181,262**

Table 7. Fish count data from the South Bend Dam fish ladder at St. Joseph River Mile 58.2 (2008 through 2018). (Source: French Paper Company, 2019b)

Year	Chinook Salmon	Coho Salmon	Steelhead	Brown Trout
2008	207	210	9,896	22
2009	251	705	6,678	15
2010	397	264	3,120	12
2011	828	1,446	9,646	21
2012	269	195	5,769	10
2013	444	469	10,869	8
2014	182	1,081	14,149	2
2015	32	1,441	7,434	19
2016	162	1,423	10,814	16
2017	170	6,147	16,295	5
2018	86	5,745	13,540	5
Total	**3,028**	**19.136**	**108,210**	**135**

In accordance with the objectives of the St. Joseph River Interstate Cooperative Salmonid Management Plan, the Richard Clay Bodine State Fish Hatchery was completed in 1983 and stocking of steelhead and chinook salmon from this facility into the St. Joseph River began the following year.[37] From 1986 through 1999, nearly 6 million chinook salmon, 2.5 million steelhead, and 1 million coho were stocked into the lower St. Joseph River. Currently, annual releases of approximately 165,000 chinook salmon smolts and 225,000 summer steelhead smolts are made from the Richard Clay Bodine State Fish Hatchery each spring. As further discussed in section, 2.1.4, *Current Project Operation*, French Hydro currently conducts an annual project shutdown to reduce turbine-induced injury and morality for downstream migrating chinook salmon and steelhead smolts. This annual shutdown begins at 6 am on the second Friday of May, in coordination with the upstream release of Chinook salmon and coho salmon smolts from the Richard Clay Bodine State Fish Hatchery, and continues for 72 hours. During this shutdown, downstream migrating smolts pass over the project's spillway and/or through the fish ladder.[38]

[37] The hatchery is located in Mishawaka, Indiana at the base of the Twin Branch Dam (RM 65.7).

[38] In a letter dated January 6, 2004, Michigan DNR concurred with the annual 72-hour project shutdown beginning at 6 am on the second Friday of May. *See* Chris Freiburger's letter (Michigan DNR – Fisheries Division) to Ted Krichowski (French Paper Company), included as Appendix A-2 to French Hydro's October 15, 2019 filing.

3.3.2.2 Environmental Effects

Run-of-River Operation and Reservoir Levels

Flow fluctuations during the operation of hydropower projects can affect shoreline littoral and riverine habitat in reservoirs and downstream reaches by exposing areas to periodic dewatering, making them unsuitable for aquatic biota.

French Hydro proposes to continue to operate the project in a run-of-river mode where outflow from the project approximates inflow, except during the proposed 72-hour project shutdown to facilitate the safe and timely downstream passage of stocked Chinook salmon and steelhead smolts, as discussed below in the *Downstream Fish Passage* section. French Hydro also proposes to continue to maintain a target normal water surface elevation of 653.75 feet msl (i.e., top of the flashboards) in the project reservoir and a minimum reservoir elevation of 653.5 feet msl (i.e., 0.25 foot below the top of the flashboards), except during events beyond French Hydro's control, to protect aquatic resources and reduce shoreline erosion in the project reservoir.

French Hydro's proposals to continue operating the project in a run-of-river mode, and maintaining a target normal water surface elevation of 653.75 feet msl in the project reservoir and a minimum reservoir elevation of 653.5 feet msl (i.e., 0.25 foot below the top of the flashboards) are consistent with the requirements of Michigan EGLE's certification conditions 1.1 and 1.2.

Our Analysis

Continuing to operate the project in run-of-river mode would minimize fluctuations in the project reservoir and in the St. Joseph River downstream of the project. Maintaining relatively stable reservoir levels (i.e., within 0.25 foot of the top of the 2.3-foot-high flashboards) would protect shoreline habitat, including fish and other aquatic organisms (e.g., macroinvertebrates) that rely on near-shore habitat in the project reservoir for spawning, foraging, and cover. Minimizing flow fluctuations downstream of the project would also protect aquatic habitat and minimize potential fish stranding. Minimizing flow fluctuations downstream of the project would also help to maintain aquatic habitat connectivity, which would ensure stable passage routes for migratory fish in the St. Joseph River are maintained downstream of the powerhouse.

Allowing exceptions to normal operating requirements to account for anomalous environmental conditions (e.g., drought conditions), emergency situations, or equipment failures outside of the control of the licensee is a typical provision in Commission licenses. Such exceptions also typically include provisions for notifying the Commission and the relevant resource agencies when such events occur.

Operation Compliance Monitoring

As discussed below, French Hydro proposes several measures to address operation compliance monitoring at the project. Because several of these proposed measures are consistent with conditions contained in Michigan EGLE's certification for the project, where appropriate, we have noted (in parenthesis) the corresponding condition contained in the certification.

French Hydro proposes to install a level transducer and data logger to continuously record water surface elevations in the project reservoir on an hourly basis. To also document compliance with continued run-of-river operation, French Hydro proposes to develop a streamflow monitoring plan to monitor the flow of the St. Joseph River downstream of the project on an hourly basis (certification condition 1.6). French Hydro proposes to use USGS gage no. 04101500 as the point of compliance for monitoring streamflow downstream of the project (certification condition 1.6). French Hydro also proposes to continue funding USGS gage no. 04101501 at the current funding level to ensure the data necessary to document streamflow downstream of the dam is available (certification condition 1.5).[39] French Hydro further proposes to install a staff gage in the project reservoir and an accompanying sign showing the water levels required by any subsequent license issued for the project to provide public awareness of reservoir elevations (certification condition 1.3). French Hydro proposes to utilize a professional land surveyor to obtain confirmation of the elevation and datum associated with the staff gage.

Lastly, following a three-year test period beginning after the proposed streamflow monitoring plan is implemented, French Hydro proposes to submit a report to Michigan EGLE that documents the project's ability to comply with the operational requirements contained in Michigan EGLE's certification for the project, including certification conditions 1.1, 1.2, and 1.4 (certification condition 1.7). French Hydro states that the report to Michigan EGLE would contain a corrective action plan, developed in consultation with Michigan EGLE and Michigan DNR, and an implementation schedule, if the results of the three-year test indicate the aforementioned operational requirements are not being met (certification condition 1.7).

Our Analysis

Under current project operation, French Hydro ensures compliance with run-of-river operation and required water levels in the project reservoir by manually recording reservoir elevations using a water level sensor. These readings are typically made once a

[39] We note that Michigan EGLE's certification condition 1.5 would require that French Hydro continue to provide the current level of funding for USGS gage no. 04101500. French Hydro currently provides $4,650 on an annual basis to fund USGS gage no. 04101501, which works in tandem with USGS gage no. 04101500 (located just upstream of USGS gage no. 04101501) to measure streamflow in the St. Joseph River.

day between 7 and 9 a.m. French Hydro also ensures compliance with the required 120-cfs minimum flow for the operation of the fish ladder through the daily water surface elevation recordings in the project reservoir. French Hydro states that maintaining a normal reservoir surface elevation of 653.75 feet msl provides a flow of approximately 192 cfs to the fish ladder, thereby ensuring compliance with the current license requirements.

French Hydro's proposal to install a level transducer and data logger to continuously record water surface elevations in the project reservoir on an hourly basis would ensure an automated system is in place to continuously monitor and record water surface elevations. This would allow French Hydro to accurately document compliance with the operational requirements contained in any subsequent license issued for the project, including run-of-river operation and maintaining flow requirements to the fish ladder. As compared to current conditions, the proposed equipment would allow French Hydro to more quickly identify and respond to non-compliance events. However, French Hydro does not currently have formalized protocols or reporting requirements in place to verify compliance with and report on deviations from operating requirements. Although compliance measures do not directly affect environmental resources, they do allow the Commission to ensure that a licensee complies with the environmental requirements of a license. Formalizing French Hydro's proposed monitoring protocols in an operation compliance monitoring plan would help French Hydro document its compliance with the operational provisions of any subsequent license issued 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, maintaining flow requirements to the fish ladder, and meeting requirements for minimal water level fluctuations in the project reservoir. This plan would facilitate Commission administration of the license and assist with the protection of aquatic resources that are sensitive to reservoir fluctuations and deviations from normal operating conditions.

Installing a visible staff gage in the project reservoir and an accompanying sign showing the water levels required by any subsequent license issued for the project would serve as an informational tool to convey any required water surface elevations to the general public. A staff gage would also provide a numerical benchmark for the water surface elevation of the project reservoir, thereby enabling French Hydro to calibrate the proposed level transducer, as necessary. Lastly, French Hydro's proposal to utilize a professional land surveyor to obtain confirmation of the elevation and datum associated with the staff gage would provide a level of assurance that all elevation markings shown on the staff gage are accurate.

USGS gage no. 04101500 operates in collaboration with USGS gage no. 04101501 to provide real-time measurements of stream discharge in the St. Joseph River at a location approximately 1 mile downstream of the project. However, streamflow data obtained from USGS gage no. 04101500 would not ensure the project continues to maintain compliance with run-of-river operation, minimum flow releases for the operation of the fish ladder, or reservoir elevations in the project reservoir. As

discussed above, French Hydro proposes to use a level transducer and data logger to continuously record water surface elevations in the project reservoir to document compliance with the operational requirements contained in any subsequent license issued for the project. As such, data obtained from USGS gage no. 04101500 would not provide any additional useful information for documenting compliance with the operational requirements contained in any subsequent license issued for the project. For these reasons, French Hydro's proposal to develop a streamflow monitoring plan, which is consistent with the requirements of Michigan EGLE's certification condition 1.6, would also be unnecessary.

With regard to French Hydro's proposed three-year test period, which is consistent with the requirements of Michigan EGLE's certification condition 1.7, the Commission would require compliance reporting for any requirements included in any subsequent license issued for the project. A three-year test to document French Hydro's ability to comply with run-of-river operations would not provide any additional assurance of project operational compliance and is, therefore, unnecessary.

Water Quality

Operating a dam on a riverine system can affect water temperature, by increasing the residence time of water in a reservoir and exposing more water at the surface to the heat of the sun. High temperatures are often associated with lower DO levels and shifts in water chemistry that can be harmful to fish and other aquatic organisms.

French Hydro proposes to develop a water quality monitoring plan that contains provisions to monitor water temperature and DO levels upstream and downstream of the project on an hourly basis from June 1 through September 3 for the first year after any subsequent license is issued for the project.[40] As part of the proposed water quality monitoring plan, French Hydro also proposes to conduct water temperature and DO profile monitoring in the project reservoir every two weeks from June 1 through September 30 of the first year after any subsequent license is issued for the project. French Hydro proposes to conduct the profile monitoring in the deepest part of the project reservoir and obtain water temperature and DO measurements at 0.5-meter increments or less. French Hydro also proposes to measure water clarity using a secchi disc at the same time and depths as the profile monitoring. The above proposals for water quality monitoring in the project vicinity are consistent with the requirements of Michigan EGLE's certification condition 3.1. Michigan EGLE certification condition 3.1 would also require that: (1) the compliance point for water temperature and DO

[40] At the conclusion of the first year of water quality monitoring, French Hydro anticipates obtaining Michigan EGLE approval to discontinue water quality monitoring in the project vicinity. At that time, French Hydro states DO and water temperature data obtained from USGS Gage no. 04101500 could be utilized to verify the project's continued compliance with state water quality standards.

monitoring be located at a representative location upstream and downstream of the project that is approved by Michigan EGLE; and (2) French Hydro request Michigan EGLE approval of any change to the frequency of the DO and water temperature monitoring required by the certification.

Michigan EGLE certification condition 2.1 would also require that French Hydro operate the project in such a manner as to adhere to state water quality standards for water temperature in the St. Joseph River. Specifically, certification condition 2.1 would require that project operation not cause the waters of the St. Joseph River (downstream of the project) to exceed the following monthly maximum temperatures:

Jan.	**Feb.**	**March**	**April**	**May**	**June**	**July**	**Aug.**	**Sept.**	**Oct.**	**Nov.**	**Dec.**
50°F	50°F	55°F	65°F	75°F	85°F	85°F	85°F	85°F	70°F	60°F	50°F

Michigan EGLE states, however, that deviations from the above state water quality standards would be acceptable when the natural water temperature of the St. Joseph River, as measured upstream of the project reservoir, exceeds these specified monthly average temperature values. In these instances, Michigan EGLE's certification condition 2.1 would require that water temperature in the St. Joseph River, as measured downstream of the project, not exceed the water temperature as measured upstream of the project.

Lastly, Michigan EGLE certification condition 2.2 would also require that French Hydro operate the project in such a manner as to adhere to state water quality standards for DO levels in the St. Joseph River. Michigan EGLE certification condition 2.2 would specifically require a DO level of no less than 5.0 mg/L be maintained at all times in the St. Joseph River, as measured downstream of the project.

Our Analysis

During French Hydro's 2017 water quality monitoring study, water temperature and DO levels were continuously measured within the project reservoir and immediately downstream of the project. All water temperature and DO data collected at both sites were at or above the current state water quality standards for these parameters. Although water temperature was relatively consistent between the upstream and downstream monitoring sites (table 4), the study results indicate that DO levels downstream of the project were slightly higher than those observed within the project reservoir. As shown in table 5, during the months of July and August 2017, mean DO levels were approximately 1.5 and 1.7 mg/L higher, respectively, at the downstream monitoring site. These data suggest that spill flow over the French Paper Project Dam helps to aerate the water, thereby resulting in increased DO levels immediately downstream of the project.

French Hydro is not proposing any changes to current project operation and, as discussed above, the results of the 2017 water quality monitoring study show that current project operation has no effect on water temperature and a beneficial effect on

downstream DO levels in the St. Joseph River. Therefore, under the proposed action, we expect that water quality in the project vicinity would likely be similar to current conditions, and water temperature and DO levels would be consistent with those values specified by Michigan's state water quality standards. For these reasons, there would be no project-related benefit to developing a plan to conduct post-license water temperature and DO monitoring at the project.

Contaminant Sampling

French Hydro proposes to implement Michigan EGLE certification conditions 3.2, 3.3, and 3.4 as part of the proposed action.

Michigan EGLE certification condition 3.2 would require that French Hydro, beginning the first year after any subsequent license is issued for the project and every ten years thereafter, conduct contaminant testing on sediments collected from within the project reservoir. Certification condition 3.2 specifies that French Hydro sample for the following parameters: oil and grease; total cadmium; total copper; total mercury; total selenium; total zinc; total silver; total arsenic; total chromium; total lead; total nickel; total phosphorus; and total PCBs.[41]

Michigan EGLE certification condition 3.3 would require that French Hydro, beginning the first year after any subsequent license is issued for the project and every 10 years thereafter, analyze fish tissue samples collected from within the project reservoir for specified contaminants. Specifically, certification condition 3.3 would require that the edible portion of each fish sample be analyzed for total mercury and PCBs. This condition would require that samples consist of ten legal size resident predator fish of one species and ten bottom feeder fish of one species that are representative of sizes normally consumed by anglers.[42]

Michigan EGLE certification condition 3.4 would require that: (1) the sediment and fish tissue sampling required by conditions 3.1 and 3.2 be formalized in a plan that would be submitted (within six months of any subsequent license issued) to Michigan EGLE for approval; (2) the plan include quality assurance/quality control protocols; (3) French Hydro utilize analytical sampling methods approved by the U.S. Environmental Protection Agency (EPA) (pursuant to Title 40 of the CFR, Part 136) or Michigan EGLE; and (4) annual reports detailing all water quality monitoring required by

[41] PCBs are a class of chemical compounds introduced in the late 1940's for uses in electrical equipment, hydraulic systems, flame retardants, immersion oils, paints, carbonless copy paper, and a host of other applications.

[42] Michigan EGLE certification condition 3.3 specifies that other fish tissue data of adequate quality less than five years old from the project impoundment may be substituted upon approval of Michigan EGLE.

the certification (including sediment and fish tissue sampling results) and quality assurance data be provided to Michigan EGLE.

Our Analysis

The French Paper Project Dam was been in place for over 100 years and it is likely that significant quantities of sediment have accumulated within the project reservoir. Water quality in the St. Joseph River Basin has improved in recent years, but it is still affected by a variety of point- and non-point sources of pollution. Point-source water pollution in the basin is attributed to effluent from municipalities (e.g., wastewater treatment plants, water treatment facilities, storm sewers, and combined sewer overflows) and industrial discharges (e.g., contact and non-contact cooling waters, process wastewater, sanitary wastewater, groundwater remediation sites; and miscellaneous discharges from trailer parks, campgrounds, and highway rest areas) (Wesley and Duffy, 1999). Non-point source water pollution in the basin is attributed to: sediment, nutrients, bacteria, organic chemicals, and inorganic chemicals from agricultural fields; livestock feedlots; construction sites; parking lots; urban streets; septic seepage; and open dumps (Wesley and Duffy, 1999). Overall, the historic and existing sources of contaminants within the basin are well-documented (Wesley and Duffy, 1999; DeGraves, 2005; Baldwin et al., 2016).

According to the EPA, the St. Joseph River is a significant contributor of toxic substances such as mercury and PCBs to Lake Michigan (DeGraves, 2005). Within the project reservoir specifically, fish tissue sampling efforts conducted by Michigan EGLE in the late 1990s and early 2000s documented the presence of several contaminants in fish tissue, including: mercury; PCBs (Aroclors and Congeners); chlordane; and DDT.[43] These data have helped to inform the existing fish consumption advisories in the project area for carp (PCBs), largemouth bass (PCBs and mercury), and smallmouth bass (PCBs and mercury) (Michigan Department of Health and Human Services, 2018).

In some cases, large fluctuations in water levels or construction-related activities can mobilize and resuspend contaminated sediment. However, French Hydro does not propose any changes to the project's current run-of-river mode of operation. Continuing to operate the project in this manner would minimize reservoir fluctuations and maintain relatively stable reservoir elevations, which would minimize the potential for shoreline erosion and the resuspension and mobilization of contaminated sediment. Further, French Hydro does not propose any new construction or modifications to current project facilities.

Periodically testing sediment and fish tissue samples collected from within the project area for the contaminate parameters specified in Michigan EGLE's certification would assist state agencies in monitoring bioaccumulative contaminant levels in sediment

[43] *See* Appendix E-5 of French Hydro's license application filed on February 27, 2019 for fish contaminant monitoring results in the project vicinity.

and sportfish in the project area over time. Presumably, this data could then be used by the Michigan Department of Community Health to support the development of new or revised fish consumption advisories in the project area. However, because the sources of bioaccumulative contaminates entering the St. Joseph River Basin are not project related, and the proposed action would not contribute pollutants to the St. Joseph River or disturb potentially contaminated sediments, we do not expect any changes to bioaccumulative contaminant levels in sportfish as a result of continued project operation. For these reasons, there would be no project-related benefit to monitoring the level of contaminants in sediment and fish samples collected from within the project vicinity.

Upstream Fish Passage

To enable the upstream migration of potadromous fish past the project, French Hydro proposes to maintain a continuous 120-cfs minimum flow for the operation of the fish ladder.[44] French Hydro proposes that the 120-cfs minimum flow necessary to operate the fish ladder would take priority over project generation during periods of low flow. The requirements of Michigan EGLE certification condition 1.4 are consistent with this proposal.

Our Analysis

The St. Joseph River, from its confluence to the Twin Branch Dam at RM 65.7, is designated as a migratory route for potadromous salmonids and is protected for that use (Wesley and Duffy, 1999). French Paper Project Dam is the third-most upstream dam on the mainstem St. Joseph River and is one of five dams within this reach that has an operating fish ladder to facilitate the upstream migration of potadromous fish from Lake Michigan (table 3). Fish ladder construction at these five dams was completed in the early 1990s as part of a cooperative interstate potadromous fish passage program undertaken by the States of Michigan and Indiana, in consultation with FWS, to establish a recreational fishery for trout and salmon (i.e., the St. Joseph River Interstate Cooperative Salmonid Management Plan). As part of this plan, the Richard Clay Bodine State Fish Hatchery was constructed in Mishawaka, Indiana at the base of Twin Branch Dam to raise salmonid species for subsequent release in the St. Joseph River. Stocking salmonids to the St. Joseph River to enhance the fishery is considered a critical element in the success of this plan.

Based on the available fish count data (1992 through 2006, and 2009 for steelhead and Chinook salmon; 1992 through 2002 for coho salmon), an average of 9,703, 2,281, and 1,765 steelhead, Chinook salmon, and coho salmon, respectively, passed upstream of the project via the project's fish ladder on an annual basis (table 6). However, the results of these annual fish counts are highly variable from year to year. Although more recent fish count data (i.e., post-2010 for steelhead and Chinook salmon; and post-2002 for coho salmon) is not available for the project's fish ladder, more recent fish count data is

[44] The minimum hydraulic capacity of the project's fish ladder is 120 cfs.

available at the upstream South Bend fish ladder (from 2008 through 2018), as shown in table 7. This fish count data from the Sound Bend fish ladder helps to quantify the numbers of Chinook salmon, coho salmon, steelhead, and brown trout that were able to successfully migrate from Lake Michigan into the uppermost reaches of the St. Joseph River's potadromous zone during this period and helps to fill the recent fish count data gaps at the project. This data suggests that at a minimum, from 2008 through 2018, a total of 3,028 Chinook salmon, 19,136 coho salmon, 108,210 steelhead, and 135 brown trout successfully navigated the lowermost 60 miles of the St. Joseph River through the use of the five existing fish ladders, including the one located at French Paper Project Dam.[45]

Overall, fish count data obtained from Berrien Springs, the French Paper Project, and South Bend Dams show that the construction and operation of the fish ladders on the St. Joseph River have been successful in reestablishing connectivity within the lowermost reaches of the river. In turn, this has enabled a number of potadromous fish species to successfully ascend the lower St. Joseph River and its tributaries over the past 30 years and has created a unique and popular sport fishery. Available information also suggests that the continued operation of the project's fish ladder would provide few benefits to non-migratory fish species in the St. Joseph River, as Dexter and Ledet (1995) concluded that steelhead, chinook salmon, coho salmon, brown trout, and lake trout consist of over 94 percent of the species known to use the existing ladders on the St. Joseph River. Wesley and Duffy (1999) also noted that although some warmwater species have been observed to use the fish ladders (e.g., walleye, smallmouth bass, channel catfish, etc.), the existing fish ladder designs on the St. Joseph River are generally not sufficient to pass warmwater fish species.

French Hydro proposes to continue to maintain a normal reservoir surface elevation of 653.75 feet msl, which provides an attraction flow of approximately 192 cfs to the downstream entrance to the project's fish ladder via a combination of flows from the upstream entrance to the fish ladder and the two, 30-inch-diameter ductile iron pipes that convey water from the intake channel to a diffusion chamber located on each side of the fish ladder's downstream entrance. French Hydro also proposes that the minimum flows necessary to operate the fish ladder would take priority over generation during periods of low flow. These proposed operational measures would ensure that the project's fish ladder continues to receive the minimum flow necessary (i.e., 120 cfs) for its continued, year-round operation. This would continue to ensure potadromous fish species are able to successfully pass upstream of the project during their respective migration periods to gain access to upstream spawning habitats. Continuing to operate the project's fish ladder would also continue to support the existing sport fishery for

[45] The project is located approximately 13.7 miles downstream of the South Bend Dam.

potadromous species on the lower St. Joseph River, thus facilitating the goals and objectives of the St. Joseph River Interstate Cooperative Salmonid Management Plan.

Downstream Fish Passage

Fish entrainment at the project could occur when fish are unable to escape water flowing into the project intakes. This could result in injury or mortality to entrained fish that pass through the turbines when operating. In addition to entrainment effects, fish can become impinged on the bars of a trashrack if they are not able to overcome the water velocities immediately upstream of the trashrack (i.e., approach velocity).

French Hydro proposes to continue to annually shut down the project for a 72-hour period beginning at 6 am on the second Friday of May, in accordance with its current agreement with Michigan DNR, to allow for the continued safe downstream passage of stocked Chinook salmon and steelhead smolts at the project.[46] The requirements of Michigan EGLE certification condition 1.2 are consistent with this proposal.

Our Analysis

Potential for Entrainment of Stocked Chinook Salmon and Steelhead

As required by the current license, a fish entrainment and mortality study was conducted at the project between April 1993 and March 1994.[47] The objectives of this study were to: (1) determine the timing of Chinook salmon and steelhead smolt emigration past the project; (2) estimate the number of Chinook salmon and steelhead smolts entrained at the project; (3) estimate the number, size range, and seasonal variation of native fish entrainment at the project; (4) estimate rates of instantaneous and delayed fish mortality due to project entrainment; and (5) develop a relationship between fish length and mortality rate. During this study, four conventional tailrace nets equipped with detachable live boxes were affixed to the downstream end of the project's powerhouse to capture fish entrained through each of the project's four turbines.

On May 12, 1993, a total of 83,770 Chinook salmon smolts (3 to 4 inches in length) were released at the upstream Richard Clay Bodine State Fish Hatchery. Stocked Chinook salmon smolts were captured at the project on May 12, the day of the upstream smolt release, and the catch peaked at the project the following day (May 13) with

[46] In a letter dated January 6, 2004, Michigan DNR states that it concurs with the annual 72-hour project shutdown beginning at 6 am on the second Friday of May. *See* Chris Freiburger's letter (Michigan DNR – Fisheries Division) to Ted Krichowski (French Paper Company), included as Appendix A-2 to French Paper Company's October 15, 2019 filing.

[47] The fish entrainment and mortality testing report was filed on May 31, 1994.

88 percent of the total catch.[48] The results of the study showed that emigration of stocked Chinook salmon smolts followed a pattern of rapid increase within 12 hours of release and a gradual decline in numbers to a low rate of emigration within 96 hours of release (figure 7). On April 12 through 15, 1993, a total of 130,274 steelhead smolts (6 to 7 inches in length) were released at the Richard Clay Bodine State Fish Hatchery. Stocked steelhead smolts were first captured at the project on April 20 and were continually captured through every 48 hour sampling period conducted through May 1993 (figure 8). Overall, the study estimated that a total of 2,956 stocked steelhead and 10,348 stocked Chinook salmon smolts were entrained at the project in 1993. Of the total number of stocked steelhead and Chinook salmon smolts, this equates to a 2.3 and 12.3 percent entrainment rate, respectively, indicating the majority of stocked smolts likely pass downstream of the project via the spillway. The study further concluded that based on observed turbine injuries to entrained steelhead and Chinook salmon smolts: (1) the entrainment mortality rate for steelhead smolts was 4.3 percent for a total of 127 individual fish;[49] and (2) the entrainment mortality rate for Chinook salmon smolts was 1.7 percent for a total of 176 individual fish. Applying the above entrainment and turbine mortality estimates to the current number of Chinook salmon (165,000) and steelhead (225,000) smolts stocked in the St. Joseph River suggests that without any mitigative measures in place at the project: (1) approximately 5,175 stocked steelhead smolts would be entrained and 223 of these would suffer from turbine-related injury/mortality; and (2) approximately 20,295 stocked Chinook salmon smolts would be entrained at the project and 345 of these would suffer from turbine-related injury/mortality.

Currently, the 72-hour annual shutdown is scheduled to coincide with the annual spring release date of Chinook salmon and steelhead smolts from the upstream Richard Clay Bodine State Fish Hatchery. Based on the results of the 1993/1994 fish entrainment

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[48] A total of seven Chinook salmon smolts were collected at the project on April 30 and May 10, 1993, prior to the smolt release from the Richard Clay Bodine State Fish Hatchery, providing evidence of natural Chinook salmon reproduction in the St. Joseph River watershed upstream of the French Paper Project Dam.

[49] When calculating total steelhead smolt entrainment morality at the project, the study took a "worse-case scenario" approach by utilizing the steelhead smolt entrainment estimates for the unit with the highest observed rates of entrainment (i.e., 739 smolts through Unit 4) and applying this entrainment rate to each of the remaining three turbines for a total of 2,956 fish entrained. The highest rate of entrainment injury to steelhead smolts observed at the project's turbines (i.e., 4.3 percent at Unit 2) was then applied to the total estimated number of entrained steelhead smolts. The study then applied this worse-case scenario approach when estimating total steelhead smolt mortality at the project by assuming all injured smolts suffered mortality. The study used this methodology to also estimate rates of entrainment, injury, and mortality for Chinook salmon smolts.

and mortality study, the vast majority of hatchery-raised Chinook salmon smolts migrate downstream of the project within 72 hours of their upstream release (figure 7). The results of the fish entrainment and mortality study also demonstrate that once stocked in the St. Joseph River, steelhead smolts exhibit a more prolonged out-migration period, as compared to stocked Chinook salmon smolts (figure 8). As shown in figure 8, few hatchery-raised steelhead smolts were captured at the project within two weeks of their release, as the majority of smolts arrived at the project approximately two to four weeks after their release. These results suggest that steelhead smolt outmigration in the St. Joseph River is episodic and most likely triggered by a number of unknown environmental cues in the watershed (e.g., local precipitation patterns, water temperature, etc.).

French Hydro is not proposing any changes to current project operation. Therefore, turbine survival estimates for stocked Chinook salmon and steelhead smolts at the project under the proposed action would be similar to current conditions. Continuing to implement the 72-hour shutdown to coincide with the scheduled upstream release of Chinook salmon smolts, as proposed by French Hydro, and as required by Michigan EGLE certification condition 1.2, would ensure out-migrating, hatchery-raised Chinook salmon smolts continue to be protected from turbine entrainment-related injury and mortality. This proposal would effectively allow all stocked Chinook salmon smolts to continue to pass downstream of the project via the spillway and/or the project's fish ladder in a safe, timely, and efficient manner. We note, however, that scheduling a 72-hour shutdown to coincide with the upstream release of Chinook salmon smolts would be relatively inefficient at reducing overall project-related entrainment of hatchery-raised steelhead smolts, regardless of the steelhead smolt release date, and would result in little benefit to this species. The study results shown in figure 8 suggest an extended project shutdown period of several weeks would be necessary to effectively protect the majority of out-migrating hatchery-raised steelhead smolts. However, an extended project shutdown of this magnitude would necessitate a substantial reduction in annual generation. Furthermore, the results of the fish entrainment and mortality study indicate that the turbine passage survival of steelhead smolts at the project is high at approximately 96 percent.

The outmigration of Chinook salmon and steelhead smolts from natural reproduction in the basin would be expected to incur levels of turbine-related mortality similar to those observed during the fish entrainment and mortality study, as detailed above. However, because no data exists on the timing and magnitude of naturally spawned Chinook salmon and steelhead smolt outmigration, quantifying project effects and the potential benefits associated with the proposed 72-hour project shutdown on naturally spawned smolt populations, is not possible.

Potential for Entrainment of Native Fishes

Fish can pass downstream of the French Paper Project Dam via the spillway or through the fish ladder or powerhouse. Entrainment would occur when fish are unable to

overcome the approach velocities at the trashracks and pass through the turbines during project operation, or if they volitionally seek downstream passage through the trashracks. The project is configured such that two separate intakes convey water to the powerhouse. Turbine units 1 and 2 share an intake (i.e., south intake) and trashrack system and turbine units 3 and 4 share a separate intake (i.e., north intake) and trashrack system (figure 2). Both of the project's trashracks have 3-inch clear spacing. The project's 3-inch clear spacing between the trashrack bars would allow all but the largest fish to pass through the trashracks, which limits the potential for fish to become impinged on the trashracks.

French Hydro provided estimated approach velocities for each of the project's intakes based on the current dimensions of each trashrack structure.[50] However, French Hydro's calculations assumed that the entire height of both trashracks would be submerged under current and proposed project operation. Staff recalculated French Hydro's approach velocity calculations for each intake utilizing a reservoir elevation of 653.75 feet msl, which is consistent with the target reservoir elevation under current and proposed project operation.[51] Staff estimates maximum approach velocities of 2.7 and 3.0 feet per second (fps) at the north and south intakes, respectively, based on maximum hydraulic capacities of 737 cfs for the south trashrack and 633 cfs for the north trashrack. Staff's estimated approach velocities were approximately 18 and 24 percent greater than French Hydro's estimated approach velocities for the north and south trashracks, respectively.

The ability of various fish species to avoid impingement and entrainment is based largely on swimming ability (which is strongly influenced by fish size, form, and behavior) and the physical characteristics of the project (such as trashrack clear spacing, approach velocity, and intake location). Burst speeds are the fastest speeds a fish can attain. Burst speeds can only be sustained for a few seconds and are typically used to escape predation and/or for feeding purposes.

Table 8 shows the known burst speeds for several fish species that are representative of the resident fish community in the project reservoir. The burst speeds shown in table 8 suggest that most resident fish species and lifestages present in the project reservoir can swim faster than the maximum approach velocities at the project, and could avoid being swept into the trashracks. Based on the information in table 8, the exception to this would be juvenile Centrarchids (e.g., sunfishes), which may not have

[50] *See* French Paper Company's June 25, 2019 response to the Commission's March 27, 2019, additional information request (French Paper Company, 2019b).

[51] French Hydro's calculations assumed trashrack heights of 14.2 and 14.8 feet for the north and south intakes, respectively. These calculations assumed the entire height of each trashrack would be submerged and were based on a top elevation of 656.3 feet msl for the north intake and a top elevation of 656.9 feet msl for the south intake.

burst speeds that are capable of escaping the project's maximum approach velocities (2.7 to 3.0 fps) and avoiding entrainment.

Table 8. Swim speeds of representative fish species commonly found in the St. Joseph River (Source: Staff).

Fish Species	Surrogate Species	Known Burst Speed (fps)	Total length (inches total length unless noted)	Reference
Bluegill		1.8 2.4 4.3	2 3 to 6 6	Appalachian Power Company, 2009
Largemouth bass		3.2 4.3	2 to 4 5.9 to 10.6	Appalachian Power Company, 2009
Smallmouth bass		3.5 to 5.6	9.4 to 15	Peake and Farrell, 2004
Channel catfish		3.9	9	Venn Beecham et al., 2007
Walleye		5.3 to 8.5	7.1 – 26 (FL)[a]	Peake et al., 2000
Rockbass	Bluegill (see above)			
Black crappie	White crappie	3	0.36 to 1.04	HDR (2013)
Redhorse (golden and shorthead)	Notchlip redhorse	4 to 9	4 to 16	HDR (2014)

a FL is the acronym for the fork length of a fish, which is the length of a fish from the tip of the snout to the middle, forked portion of the tail fin.

To evaluate the effects of project operation on downstream fish passage, as part of a 1993/1994 fish entrainment and mortality study conducted at the project (STS, 1994), the number, size range, and seasonal variation of native fish entrainment at the project was estimated.[52] Redhorse (golden and shorthead), bluegill, and channel catfish accounted for the highest rates of entrainment at the project at approximately 25, 13, and 10 percent of all fish entrained, respectively. Game fish with the highest rates of entrainment were smallmouth bass and walleye, each at 3 percent. Seasonally, entrainment peaked in April and May (41 percent of the total annual entrainment), while

[52] Entrainment sampling commenced at the French Paper Project on April 15, 1993, and sampling of the tailrace nets was conducted during two 48-hour periods per week through May 21, 1993, and then again for one 72-hour period each month in June, July, August, September, October, and December 1993, and in March 1994.

the lowest entrainment rates were in the late-fall and winter months. Overall, the study estimated that approximately 51,490 native fish become entrained at the project on an annual basis. The study also estimated that approximately 75 percent of these fish were less than 12.6 inches in length (51,490 fish), while the remaining 25 percent of fish (12,873) were greater than 12.6 inches in length. Using worse-case scenario estimates for turbine injury, the study also estimated that approximately 1 (386 fish) and 11 (1,416 fish) percent of all entrained fish in the less than and greater than 12.6-inch classes, respectively, would suffer injury. The study results also indicated only nine species of fish were observed to have turbine injuries, which was predominately limited to a few non-game species, including redhorse species (golden and shorthead), channel catfish, and yellow bullhead.

Because French Hydro is not proposing any changes to current project operation, current levels of fish entrainment and turbine mortality at the project for native fishes would remain similar to current conditions. Based on the project's trashrack bar spacing and approach velocities, and the results of the 1993/1994 fish entrainment and mortality study, the effects of fish impingement and entrainment on native fish populations at the project would be minor. We expect that most fish in the project reservoir are too small to become impinged on the project's trashracks and the few fish large enough for impingement have burst speeds that would enable them to easily avoid impingement. Further, based on the results of the 1993/1994 entrainment and mortality study, a maximum entrainment mortality rate of 3.5 percent is expected.[53] However, the relatively high fecundity[54] of most warmwater fish species in the reservoir that would become entrained and are susceptible to entrainment-related mortality (e.g., channel catfish, bluegill, redhorse *sp*.) should sufficiently offset the low level of mortality associated with continued project operation. In summary, there is no evidence or allegation of significant fish entrainment or impingement issues at the project. Therefore, continued operation of the project is not likely to cause any measurable changes to fish populations in the St. Joseph River.

[53] A maximum entrainment mortality rate of 3.5 percent assumes all fish injured during the fish entrainment and mortality study would experience 100 percent mortality.

[54] Fecundity is the total number of eggs spawned by a female fish in a given year.

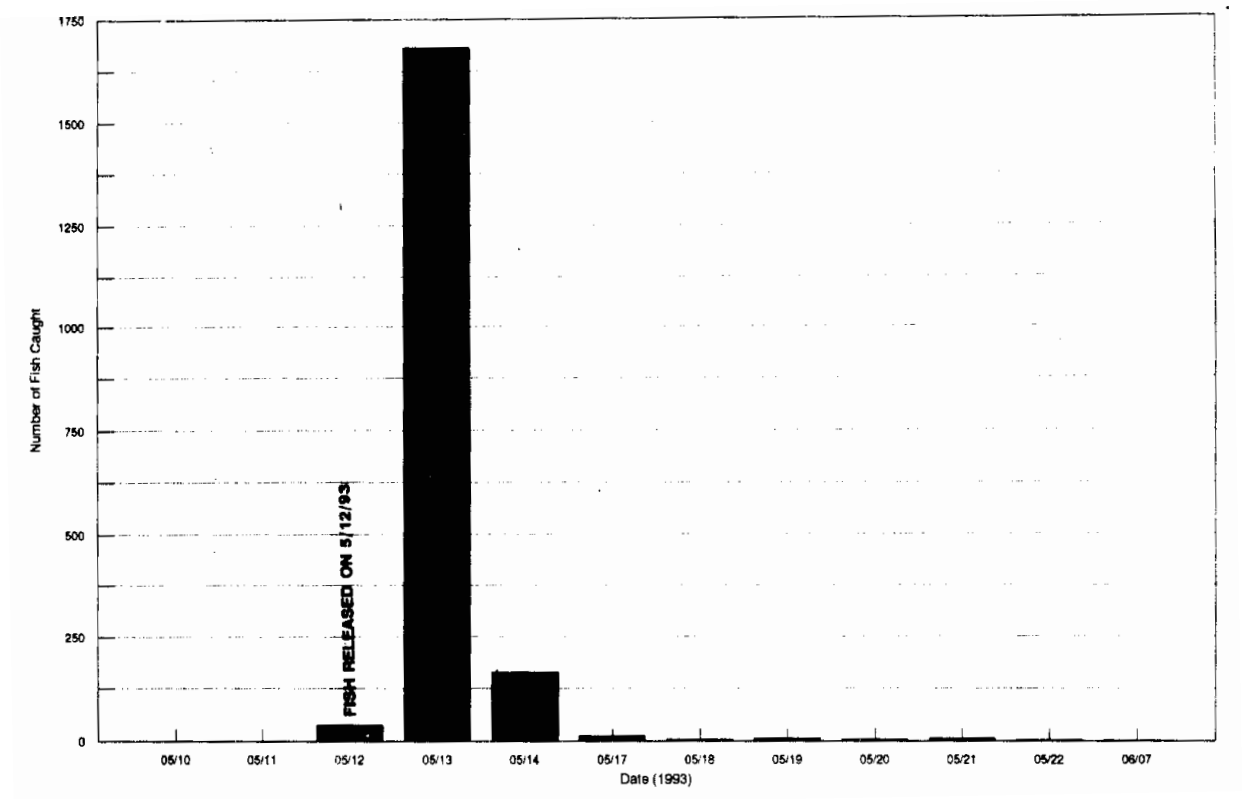

Figure 7. Chinook salmon catch distribution at the French Paper Project based on 1993 Fish Entrainment and Mortality Testing Study (Source: STS, 1994).

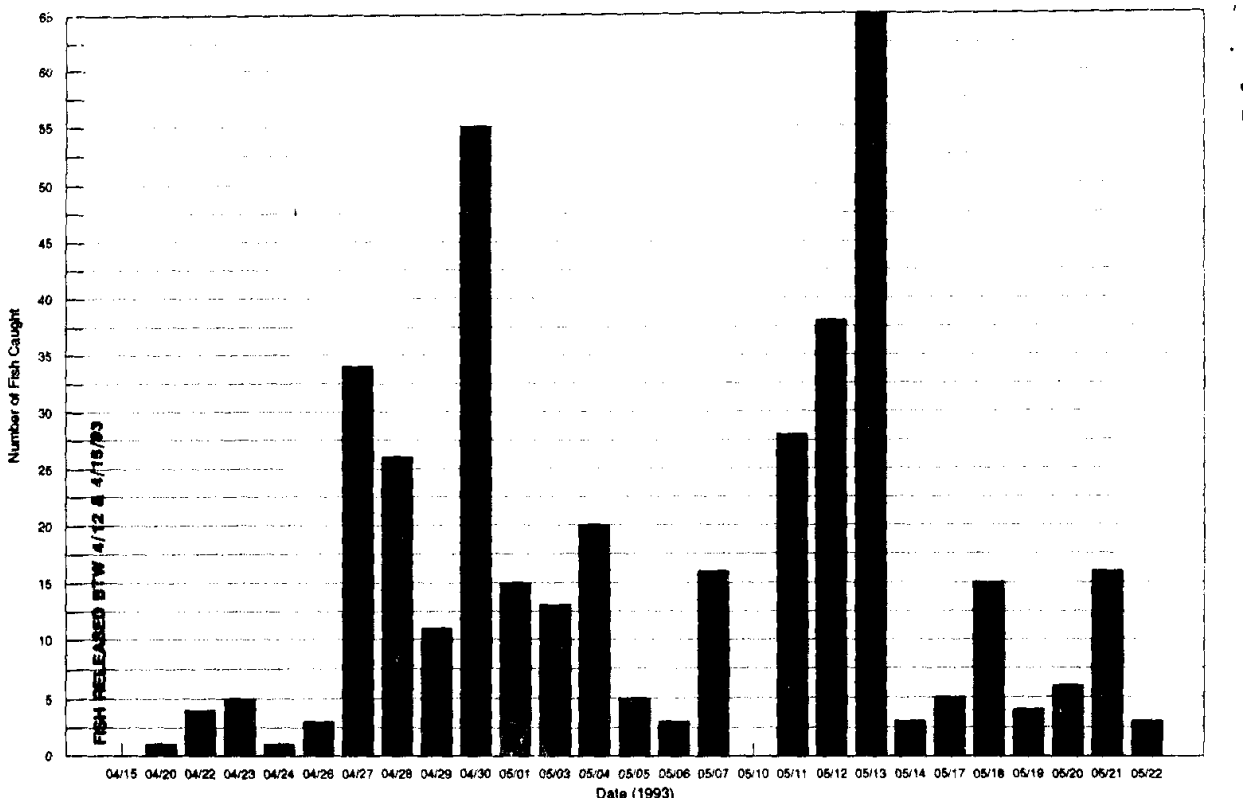

Figure 8. Steelhead catch distribution at the French Paper Project based on 1993 Fish Entrainment and Mortality Testing Study (Source: STS, 1994).

Debris Management

French Hydro proposes to develop a debris management plan to establish procedures for the continued removal and downstream passage of organic debris (e.g., logs, stumps, etc.) that accumulates on the project's floating debris boom and trashracks. French Hydro proposes to remove and properly dispose of all other debris that collects at the project. French Hydro also proposes to include appropriate safety provisions and an implementation schedule in the plan. French Hydro's proposal is consistent with the requirements of Michigan EGLE certification condition 5.1.

Our Analysis

Currently, French Hydro utilizes manual raking to remove debris that collects at the project's trashracks based on periodic visual inspections. Collected debris is then sorted. Inorganic material such as plastic and other forms of trash are properly disposed of, while organic materials such as leaves and wood are passed downstream of the dam. French Hydro removes larger debris that collects at the project spillway when flows are low enough to not put crews in danger. French Hydro states a subcontractor is hired occasionally when debris maintenance at the project is beyond its capabilities.

Debris that continues to collect on the project's floating debris boom, trashracks, and spillway would need to be removed and disposed of in order to provide continued

safe and efficient project operation. Debris that accumulates on the project's trashracks could reduce the effectiveness of the trashracks at protecting fish. For example, if the trashracks are covered with debris, fish may become entangled in the debris or the through-screen velocities at the trashracks could increase.[55] Debris loads in a river can vary seasonally (e.g., leaf drop) and with weather events (e.g., rain and thawing events that can transport debris to a river and increase flow causing suspension and transport of settled debris on the riverbed). Consequently, the frequency of debris clearing would be best determined in consultation with the resource agencies most familiar with the nature of debris loads in the St. Joseph River, with final approval from the Commission. Additional debris that accumulates on the project's floating debris boom or on the spillway would also need to be removed in order to maintain efficient project operation.

Proper disposal of debris that is removed from project facilities is important because 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. Therefore, while removal of river-borne trash from the stream is beneficial for project operation, it is more appropriate to return organic debris to the river by passing it downstream of the dam. Continuing to pass large woody debris downstream of the project would provide habitat structures downstream of the dam and enhance the carrying capacity of the St. Joseph River for macroinvertebrates and fish by providing cover and velocity shelters.

Developing a debris management plan would formalize French Hydro's current debris removal methods, and help to ensure proper project operation and the protection of aquatic resources in the St. Joseph River (e.g., by maintaining current through-screen velocities at the project). An effective debris management plan would identify the frequency and methods for managing organic debris and trash at the project, and include provisions for: (1) removing and sorting debris that collects on project structures; (2) passing organic debris downstream of the project; and (3) removing and disposing of trash.

3.3.2.3 Cumulative Effects on Migratory Fish

Dam construction in the St. Joseph River Basin began on smaller tributaries in the early to mid-19th century to provide power for saw and grain mills. The French Paper Project Dam was the first dam constructed on the mainstem St. Joseph River in 1863 and

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[55] Through-screen velocity represents the velocity of water as it passes between the bars of a trash rack. The through-screen velocity would be experienced only when a fish is right at the face of the trash rack or passing through the trash rack bars. Through-screen velocity is not likely to be as important a factor in whether a fish becomes impinged or entrained as approach velocity, but may relate to how difficult it is for a fish to remove itself from the trash rack once it is impinged (EPRI, 2000).

was subsequently rebuilt in 1871. Mill dam construction in the basin continued through 1900. After 1900, dams were primarily constructed for hydropower, recreation, and waterfront development purposes (Wesley and Duffy, 1999). Wesley and Duffy (1999) estimated there are over 190 dams in the St. Joseph River basin, including 17 on the mainstem St. Joseph River.

Dam construction in the St. Joseph River Basin eliminated or modified important lotic habitats used by a variety of aquatic organisms such as fish, mussels, and insects. This created fragmented populations and eliminated genetic interchange between these populations. Dam construction also created barriers that progressively impeded the movement and migration of migratory fish from accessing historic habitat used to fulfill essential life cycle functions such as reproduction and juvenile development. In addition to the construction of dams, the collective effects of numerous other anthropogenic activities in the basin, including land-use practices, water quality and aquatic habitat degradation, and sedimentation further contributed to the past and present effects on migratory fish in the St. Joseph River.

As further discussed above, a cooperative potamodromous fish passage project began on the St. Joseph River in the late 1970s to establish and maintain a recreational fishery for trout and salmon in the St. Joseph River. As part of this project, five fish ladders were constructed on the lowermost mainstem dams on the St. Joseph River to enable potadromous species from Lake Michigan (e.g., Chinook salmon, steelhead, coho salmon, brown trout, etc.) to access approximately 60 river miles of the lower mainstem St. Joseph River. As part of this project, Chinook salmon and steelhead smolts have been annually stocked into the St. Joseph River downstream of Twin Branch Dam since 1984 to enhance the fishery. Fish count data from the Berrien Springs, French Paper Project, and South Bend fish ladders and creel surveys have shown the project to be successful and the collective operation of the fish ladders have had a beneficial effect on migratory fish, especially salmonid species. French Hydro's proposal to maintain a 120-cfs minimum flow for the operation of the project's fish ladder would ensure the fish ladder at French Paper Project Dam continues to receive the minimum flow necessary for its continued, year-round operation. This would continue to ensure potadromous fish species are able to successfully pass upstream of the project during their respective migration periods to gain access to upstream spawning habitats. However, the presence of Twin Branch Dam approximately 21 miles upstream of the project would continue to serve as a complete barrier to the further upstream migration of potadromous fish species in the St. Joseph River watershed.

The 29 hydroelectric dams (11 of these are currently retired) (DeGraves, 2005) in the St. Joseph River basin have also cumulatively contributed to varying degrees of delay, injury, and mortality for resident and migratory fish species passing downstream of these dams. As further discussed in section 3.3.2.2, *Environmental Effects - Downstream Fish Passage*, some entrainment of migratory species would continue to occur under the proposed action. With regard to stocked Chinook salmon and steelhead, the results of a fish entrainment and mortality study conducted at the project in support of the previous

relicensing of the project indicated turbine-related injury for Chinook salmon and steelhead was 1.7 and 4.3 percent, respectively. French Hydro's proposal to continue implementing an annual 72-hour project shutdown in May would reduce these estimated entrainment-related injury rates for Chinook salmon smolts stocked upstream of the project, and to a lesser extent, for steelhead smolts, as well. Overall, however, only a small proportion of the migratory fish entrained at the project are expected to suffer turbine-induced mortality and the loss of these fish are not expected to significantly affect the health of migratory fish populations.

Future improvements to water quality, aquatic habitat restoration projects, and reestablishing the connectivity throughout the St. Joseph River Basin via dam removal or the installation of additional fish ladders in the upper St. Joseph River Basin would have a beneficial effect on migratory fish. The City of Niles, Michigan is currently proposing to remove the Pucker Street Dam, which was constructed in 1928 and is located on the Dowagiac River in Niles Township, Berrien County, Michigan. As detailed in FWS's Pucker Street Dam Removal and Dowagiac River Restoration EA (FWS, 2019a), the removal of this dam would allow migratory fish species such as steelhead, Chinook salmon, coho salmon, shorthead redhorse, and walleye to access 159 miles of the mainstem Dowagiac River and its tributaries that are currently blocked by the presence of the dam. Removing Pucker Street Dam is also expected to provide numerous other benefits to migratory fish, including long-term benefits to water quality and the restoration of approximately 6,300 feet of aquatic habitat.

Relicensing the project would not involve any new construction or changes to current project operation. Continuing to implement French Hydro's proposed aquatic resource measures to facilitate the upstream and downstream passage of potadromous fish species at the project would have a beneficial effect on migratory fish and help to minimize the cumulative effects of the project on migratory fish. Lastly, these proposed measures would be consistent with the goals of the "St. Joseph River Anadromous Fisheries Program" by helping to maintain a potamodromous sport fishery in the lower St. Joseph River. For these reasons, relicensing the project would not add to the cumulative effects on migratory fish that have occurred or that may occur in the future within the geographic scope of analysis.

3.3.3 Terrestrial Resources

3.3.3.1 Affected Environment

The project is located within the Southern Michigan / Northern Indiana drift plains ecoregion. The ecoregion is characterized by many lakes and marshes as well as an assortment of landforms, nutrient rich soils, and land uses. Broad till plains with thick and complex deposits of drift, paleobeach ridges, relict dunes, morainal hills and meltwater channels are common features in the region. Historically, oak-hickory forests, northern swamp forests and beech forests were typical; agriculture, woodlots, quarries and urban-industrial areas are now dominant (EPA, 2013).

The area surrounding the project is a mix of woodland, agricultural, residential, and industrial lands. Land immediately surrounding the project facilities include the paper mill, paved access roads, and maintained lawn. The St. Joseph River corridor upstream of the project is a mix undisturbed riparian bottomland and residential properties. The vegetated banks of the reservoir range from residential lawn to mature woodlands and scrub thicket cover. Upland woodlands in the area contain a mixture of both early and mature successional species characteristic of the ecoregion, including basswood, sycamore, silver maple, willow, and oak. Bottomland areas along the St. Joseph River are poorly drained and dominated by willow, cottonwood, sycamore, and hawthorn. Herbaceous growth in palustrine wetlands within the project boundary include smartweed, purple loosestrife, sedge, bulrush, and cattail.

Invasive Plants

Aquatic plant surveys conducted by French Hydro in 2017 identified five invasive plant species within the project boundary, including flowering rush, Carolina fanwort, purple loosestrife, Eurasian water milfoil, and curly-leaf pondweed (State of Michigan, 2020). A total of 68 beds containing one or more invasive aquatic plant species were mapped. Purple loosestrife was identified in 41 beds, Eurasian watermilfoil in 18 beds, curly-leaf pondweed in 14 beds, Carolina fanwort in 7 beds, and flowering rush in 2 beds. Aquatic invasive plants in the project area are not actively managed by French Hydro.

Wetlands

Wetlands provide a variety of ecological functions, including groundwater recharge, flood-flow alteration, fish and wildlife habitat, toxicant sequestration, and shoreline stabilization. Riparian wetland habitats within the project boundary are primarily located adjacent to the St. Joseph River mainstem, and an unnamed tributary approximately 2,500 feet upstream of the dam. Within the project boundary, approximately 20.2 acres of freshwater forested and shrub wetlands and 10.9 acres of freshwater emergent wetlands occur upstream and adjacent to the St. Joseph River (NWI, 2020).

Wildlife and Species of Concern

Wildlife within the project area is characteristic of the Northern Lower Peninsula and Southern Lower Peninsula of Michigan. Although riverine wetland composes most of the land cover within the project boundary, a relatively large amount of undisturbed riparian habitat, designated parkland, and farmland exists within and adjacent to the project area. This habitat supports a variety of mammals, including muskrats, white-tailed deer, raccoons, and red foxes. Upland gamebirds identified in the project area include ring-necked pheasant and quail. Bottomland waterbirds including mallard, wood duck, canvasback, common goldeneye, and great blue heron have been documented in riparian habitats within the project area.

There are no recent records of Michigan state-listed threatened or endangered species occupying project lands.

3.3.3.2 Environmental Effects

Wetlands

As stated in section 2.1.4, *Current Project Operation*, the project is operated in a run-of-river mode to minimize fluctuations of the project reservoir. French Hydro maintains the water surface elevation of the project reservoir at a normal pool elevation of 653.75 feet msl (i.e., top of the flashboards) and a minimum reservoir elevation of 653.5 feet msl (i.e., 0.25 foot below the top of the flashboards). French Hydro does not propose any changes to project operation and does not propose any new construction that would affect wetlands within project boundaries.

Our Analysis

The majority of wetlands in the vicinity of the project are located upstream of the project. French Hydro does not propose any drawdowns of the project reservoir and existing water surface elevations within the project reservoir would not be affected by continued run-of-river operation of the project. There would be no modification of the hydrologic regimen that sustains wetlands adjacent to the St. Joseph River. As such, continued project operation would not affect wetlands in the vicinity of the project.

Invasive Species

French Hydro does not propose any measures to monitor or control invasive plant species. No agency has filed recommendations to address invasive plant species in the project vicinity.

Our Analysis

Invasive plants can out-compete and displace native species, which can reduce biodiversity and alternative plant and animal community composition. Land clearing or fluctuating water levels can disturb soils and promote the colonization of new areas by invasive plants. Established invasive plant species can be difficult to remove; however, mechanical and chemical methods can be used to restrict the expansion of invasive plant populations and allow for greater diversity of native vegetation.

No construction or other ground-disturbing activities that would facilitate the spread of terrestrial invasive plant species within the project boundary have been proposed. Additionally, no changes to current project operation that would affect existing water levels within the project reservoir have been proposed. There is also no documentation that invasive plants in the project boundary are having significant adverse effects to other resources, including recreation, or fish and wildlife. Consequently, there is no indication that invasive plant monitoring or management is needed at this time.

3.3.3 Threatened and Endangered Species

3.3.3.1 Affected Environment

FWS's IPaC database lists nine federally listed threatened or endangered species are known to potentially occur in Berrien County: (1) the Indiana bat; (2) northern long-eared bat; (3) piping plover (4) red knot; (5) whooping crane; (6) eastern massasauga; (7) Mitchell's satyr butterfly; (8) Pitcher's thistle; and (9) small whorled pogonia (FWS, 2020a). No designated critical habitat for any federally listed threatened or endangered species occurs within the project boundary.

Indiana Bat

The Indiana bat *(Myotis sodalis)* is federally listed as endangered. The Indiana bat is a migratory species found throughout much of the midwestern United States, hibernating colonially in caves, mines, and other underground areas (hibernacula) through the winter. About half of all Indiana bats hibernate in caves in southern Indiana (FWS, 2006). Foraging primarily occurs at forest edges and within closed to semi-open canopy woodlands. Prey species include flying insects found along rivers, lakes and in uplands. The non-hibernation season includes spring emergence and migration, summer reproduction in maternity roosts, and fall migration, swarming, and mating. Female Indiana bats and their young primarily use dead or dying hardwood deciduous trees with exfoliating bark or cavities as summer habitat. Tree species favored by females and their young include shagbark hickory, green ash, American elm, and red oak. Roosting trees with exfoliating bark provide cover for Indiana bats within crawl spaces between the bark and the trunk (FWS, 2007).

Bat pups are born in June or early July and can fly after 3 to 5 weeks. Maternity roosts can be described as "primary" or "alternate" based on the number of bats consistently occupying an individual tree (FWS, 2006). Primary roosts can support more than 30 bats and commonly serve as a maternity colony in the summer months. Alternate roosts provide the bats safe resting areas and protection from inclement weather (Miller, 2002). The loss of a primary tree is a natural phenomenon that the species is adapted to address through the use of alternate sites. However, if a roost tree does not have alternates available, or if those alternates are also lost, effects to reproductive success may occur. Threats to Indiana bats include human disturbance in hibernacula, such as gates or other structures that exclude people from caves and mines, and summer habitat loss and degradation (FWS, 2007).

Northern Long-Eared Bat

The northern long-eared bat *(Myotis septentrionalis)* is federally listed as threatened. The northern long-eared bat is nocturnal, ranges from 3 to 3.7 inches in length, and possesses shades of brown fur. The northern long-eared bat's historical range includes 37 states, encompassing most of the forested central and eastern United States. Northern long-eared bats forage almost exclusively in the understory of mature-growth

forests, feeding on moths, flies and other insects using echolocation. Both dead and live trees greater than 3 inches in diameter provide a necessary habitat for reproduction. The northern long-eared bat primarily uses the crawl spaces between dead and exfoliating bark for roosting in the summer months. Northern long-eared bats will return to the same roosts seasonally and in subsequent years, if not disturbed. Pups are born mid-May through July and are able to fly 3 to 5 weeks after birth. Winter hibernation typically occurs in caves or similar habitats, and serves as a nexus for fall-swarming[56] and spring-staging[57] (FWS, 2014).

The rapid decline in northern long-eared bat populations has been attributed to the emergence of white-nose syndrome, accounting for a 99-percent reduction of northern long-eared bat populations in the last decade. Northern long-eared bats commonly share summer roosts and hibernacula, and will frequently move between hibernacula in the winter (Caceres and Barclay, 2000). Bat roosting behavior facilitates the transfer of the pathogenic fungus among individuals. Consequently, white-nose syndrome is expected to continue to spread throughout the rest of United States in the foreseeable future (FWS, 2015).[58]

As of 2016, a single hibernaculum used by northern long-eared bats has been identified in Buchanan township, within Berrien County (FWS, 2016b).

Piping Plover

The piping plover *(Charadrius melodus)* is federally listed as endangered. The piping plover is a small, stocky shorebird, possessing sand-colored plumage and orange legs. Adults are approximately 7 inches long, with a 15-inch wingspan. During the breeding season, adults have a black forehead, a black breast band, and an orange bill. Piping plovers use broad, sandy beaches with low vegetative cover as nesting habitat. Piping plovers are migratory and arrive at shoreline breeding sites at the Great Lakes in April and early May. Egg-laying often begins the second or third week in May, with female piping plovers laying three to five eggs. The incubation period lasts about a

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[56] Fall-swarming occurs in the weeks prior to winter hibernation. The purpose of swarming behavior includes the introduction of juveniles to potential hibernacula, copulation, and gathering at stop-over sites on migratory pathways between summer and winter habitats.

[57] Spring-staging occurs between winter hibernation and migration to summer habitat. During this time, bats begin to gradually emerge from hibernation to feed, but will return to the same or alternative hibernacula to resume bouts of inactivity.

[58] White-nose syndrome is an emerging disease that has led to the death of more than 5.7 million bats in North America. The fungal infection agitates hibernating bats, causing them to rouse prematurely from their hibernation and to burn essential fat reserves. Mortality results from bats evacuating their roosts during the winter when no food is available, and consequently starving or dying from exposure (FWS, 2015).

month. Young chicks are precocial and leave the nest almost immediately, though many adult males will stay with the chicks until they fledge, about 28 days later. Departure from breeding sites by both adults and young is typically complete by early August. Although the specific diet and foraging habits of piping plovers is largely unknown, based on available information, piping plovers likely consume littoral-dwelling invertebrates, including crustaceans, mollusks, and marine worms. The decline in piping plover populations has been attributed to habitat loss and degradation, nest disturbance, and predation; coastal beaches traditionally used by piping plovers for nesting have been lost to commercial, residential, and recreational developments (FWS, 2018).

Red Knot

The *rufa* red knot *(Calidris canutus rufa)* is federally listed as threatened. The red knot is a small shorebird, about 9 inches long with a 20-inch wingspan. Plumage alternates between a mottled gray during the winter months to a cinnamon brown color during the summer breeding season. Though the majority of the red knot population uses the Atlantic flyway during its migration northward,[59] some migrants are known to forage along shoreline tributaries to the Mississippi River and the Great Lakes. Each year the *rufa* subspecies population migrates from its winter habitat in Terra del Fuego, the Caribbean, and from the southern reaches of the United States to the northern reaches of the Canadian arctic, making its migration route one of the longest in the western hemisphere. Prior to its migration, the red knot incurs dramatic physiological changes, which include an enlargement of its flight muscles and a decrease in the size of its stomach and gizzard. Forage for the species commonly consists of clams, mussels, snails and other macroinvertebrates. The red knot is unusual in that it possesses the capacity to consume shellfish whole while feeding at its summer and winter habitats. During its 9,300-mile-long migration, its diet is comprised of more readily digestible foods such as insects and horseshoe crab eggs, with the horseshoe crab eggs becoming an essential component for providing staple nourishment during its long migration. The rapid decline of the red knot has been associated with loss of habitat from increased coastal development, and more recently, a loss of its important food source caused by increased commercial overharvesting of horseshoe crabs in Delaware Bay (FWS, 2005).

Whooping Crane

The whooping crane *(Grus americana)* is federally listed as endangered. The crane is endemic to North America, with a historic distribution that ranged from the Rocky Mountains to the East Coast; it extended as far north as Canada, and as far south as Mexico. Whooping cranes are one of the largest birds in North America, with an average height of 5 feet when standing erect, and a 7-foot wingspan. Habitat

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[59] About 80 percent of the North American red knot population migrates through the Delaware Bay each year (New Jersey Department of Environmental Protection, 2009).

requirements for whooping cranes include nesting in marshy areas amongst bulrushes, cattails, and sedges, as well as in sloughs and along lake margins. Whooping cranes often feed and roost in wetlands as well as in upland grain fields, where they consume insects, minnows, mollusks, crustaceans, frogs, rodents, small birds and berries (FWS, 2006a). Only one non-experimental population of 504 cranes exists in the wild: the Aransas-Wood Buffalo National Park population. This whooping crane population migrates annually from the Wood Buffalo National Park in northern Canada to the Aransas National Wildlife Refuge on the Texas coast (FWS, 2020c). Historic population declines resulted from habitat destruction, shooting, and displacement activities by humans (FWS, 2006a).

An experimental reintroduction of migratory whooping cranes to the eastern United States began in 2000. As of December 2019, this nonessential experimental population was estimated at 86 whooping cranes (WCEP, 2019), annually migrating from Necedah Nation Wildlife Refuge in central Wisconsin to the coastal Chassahowitzka National Wildlife Refuge, approximately 50 miles north of Tampa, Florida (FWS, 2020d). The nonessential experimental population of whooping cranes generally uses an established migration path approximately 100 miles west of the project, well outside of the project boundary.

Eastern Massasauga

The Eastern massasauga *(Sistrurus catenatus)* is federally listed as threatened. The Eastern massasauga is a gray or light brown small rattlesnake, about 2 feet in length, and possesses light-edged chocolate brown blotches on its back and sides. Eastern massasaugas live in wet prairies, marshes and low areas along rivers and lakes, and their diet includes prey species that make use of wetlands, including small rodents, amphibians and other snakes. The home range for the Eastern massasauga includes the upper Midwest and northeast United States, extending from central New York to eastern Iowa. Massasaugas are dependent on wetlands as habitat; consequently, the decline in Eastern massasauga populations has been attributed to habitat degradation and destruction resulting from the extensive draining of wetlands for agriculture purposes and urban expansion (FWS, 2016a).

Mitchell's Satyr

The Mitchell's satyr butterfly *(Neonympha mitchellii mitchelli)* is federally listed as endangered. The butterfly has a 1.75-inch wingspan and is generally brown in color. A distinctive series of orange-ringed, black eyespots are located on the lower surface of both pairs of wings. Habitat for the butterfly is restricted to fens, nutrient-poor wetlands sustained by carbonate-rich ground water. Caterpillars feed on sedges, while adults may never eat or drink. Historically, the Mitchell's satyr was found in New Jersey, Ohio, Michigan, Indiana, and possibly Maryland (FWS, 2019b). Currently the butterfly can only be found in 10 locations in Michigan and 1 location in Indiana; however, habitat conditions and population sizes have declined to such a degree that only six populations

in Michigan and Indiana are considered viable (Michigan DNR, 2016). The decline in Mitchell's satyr populations is attributed to the destruction and degradation of fen habitat resulting from drained wetlands, intrusion of exotic and invasive plants, pesticide contamination, and butterfly collectors (FWS, 2019b).

Pitcher's Thistle

The Pitcher's thistle *(Cirsium pitcheri)* is federally listed as threatened. The plant is gray-green in appearance, up to 3 feet in height with a 6-foot tap root, and covered in dense, silvery hairs. These hairs are an adaptation to sandy-soil habitats and help the plant retain water. The Pitcher's thistle blooms once during its lifetime, after a 5 to 8-year non-flowering period. The flower is pink in appearance and pollinated by insects. The thistle commonly colonizes shoreline habitat along the Great Lakes, including open beaches and grassland dunes with low plant cover. The decline in Pitcher's thistle populations is attributed to habitat loss and fragmentation associated with shoreline development and recreation (FWS, 2019c).

Small Whorled Pogonia

The small whorled pogonia *(Isotria medeoloides)* is federally listed as threatened. The plant has a single grayish-green vertical stem, about 10 inches in length when flowering, and about 14 inches when bearing fruit. The plant is named for the whorl-like appearance of five to six leaves near the top of the stem and below the flower. Habitat for the pogonia includes older hardwood stands of beech, birch, maple, oak, and hickory with an open understory. The pogonia is commonly found in acidic soils, among thick layers of dead leaves, and near small streams. The small whorled pogonia is widely distributed, but rare within its range; the pogonia's current range is in 18 eastern states, and Ontario, Canada. It has been extirpated in Missouri, Vermont, and Maryland. Forest conversion, improper forestry practices, and collection for commercial or private use are the primary contributing factors to the plant's decline (FWS, 2016c).

3.3.3.2 Environmental Effects

French Hydro does not propose any change to current project operation and does not propose any construction. No agency has filed recommendations addressing federally listed threatened or endangered species for the project.

Our Analysis

The Indiana bat and northern long-eared bat similarly use mature-growth hardwood trees with sloughing bark as summer habitat. Woodland habitat exists in abundance within the riparian corridor upstream of French Paper Dam. However, most of these woodlands occur outside the project boundary. French Hydro does not maintain this land (i.e., mowing or clearing vegetation), and project operation does not affect this habitat. Therefore, we conclude continued operation and maintenance of the project would have no effect on the Indiana and northern long-eared bat.

The piping plover, *rufa* red knot, and pitcher's thistle favor sandy coastal shoreline habitat that does not exist within the project boundary. Because this habitat is not present within the project boundary and it is unlikely these species would make use of project land, we conclude that continued operation and maintenance of the project would have no effect on the piping plover, *rufa* red knot, and pitcher's thistle.

As mentioned above, the only non-experimental population of the whooping crane uses a well-documented corridor between northern Canada and the Texas coast, approximately 700 miles west of the project. Due to the absence of suitable habitat within the project boundary and the remote likelihood of a whooping crane making use of habitat in the project vicinity, we conclude continued operation and maintenance of the project would have no effect on the whooping crane.

As stated in section 3.3.3, *Terrestrial Resources,* approximately 20.2 acres of freshwater forested and shrub wetlands, and 10.9 acres of freshwater emergent wetlands occur within the project boundary. Riparian wetland habitats, like those found within the project boundary, are favored by the eastern massasauga for foraging and reproduction. Persistent fluctuations to water levels can adversely affect the hydrology that sustains wetland habitats adjacent to the St. Joseph River. However, the project is operated in a run-of-river mode, and wetlands within the project boundary are sustained by the current hydrological regimen. French Hydro does not propose any changes to current project operation that would affect wetlands within the project boundary that may be used by the eastern massasauga as habitat. French Hydro also does not currently perform or propose regular maintenance of these lands. Therefore, we conclude continued operation of the project would have no effect on the eastern massasauga.

The Mitchell's satyr butterfly is restricted to fen wetland habitat sustained by carbonate-rich groundwater. Wetland habitats with this feature are not found within the project boundary. Therefore, we conclude continued operation and maintenance of the project would have no effect on the Mitchell's satyr.

The small whorled pogonia is typically found within the understory of mature hardwood stands of trees. As stated above, abundant woodland habitat exists within the riparian corridor upstream of French Paper Dam. However, most of this woodland habitat occurs outside the project boundary. French Hydro does not maintain this land (i.e., mowing or clearing vegetation), and project operation does not affect this habitat. Therefore, we conclude continued operation and maintenance of the project would have no effect on the small whorled pogonia.

3.3.4 Recreation and Land Use

3.3.4.1 Affected Environment

Regional Recreation

Located in the St. Joseph River watershed in Southwest Michigan, recreation opportunities in the region surrounding the project include walking, hiking, biking, fishing boating, kayaking and other recreational sports activities. Within Berrien County alone, there are numerous recreation opportunities and facilities including several parks, hiking trails, a beach, and a nature center.

Local Recreation

The French Paper Project does not provide recreation facilities. However, there are several recreation features within the vicinity of, and adjacent to, the project, as shown in figure 9. Island Park, which is located north and upstream of the project on the St. Joseph River, is owned and operated by the City of Niles. Island Park features playground equipment, a picnic shelter, and shoreline fishing access. North and east of the project is Riverfront Park, which is also owned and operated by the City of Niles. Riverfront Park is a 25.2-acre park that includes Allouez Park and St. Joseph Park. The park includes upstream and downstream boating ramps, which also serve as a canoe/boat put in and take out, a canoe portage, a fishing pier, tailwater fishing area, a parking lot for trailered vehicles, and bathroom facilities. The park also has a skate park, amphitheater, walking trails, and picnic facilities. French Field and Community Park, located to the west and east of the project, respectively, provide baseball/softball/soccer, and golfing opportunities.

Recreation Use

A 2017 Recreation and Land Use Study inventoried recreation within the vicinity of the project, including Riverfront Park, and the associated St. Joseph and Allouez Parks. Over 80 percent of the amenities were found to be in good to excellent condition and less than 20 percent were found to be in fair to poor condition. In addition, most recreation amenities were observed to be utilized well below capacity, including the tailwater fishing area, play structures and picnic areas, which were utilized at 10 percent, 10 percent, and 5 percent of capacity, respectively. The canoe portages were also observed to be utilized well below capacity, with less than 5 percent capacity.

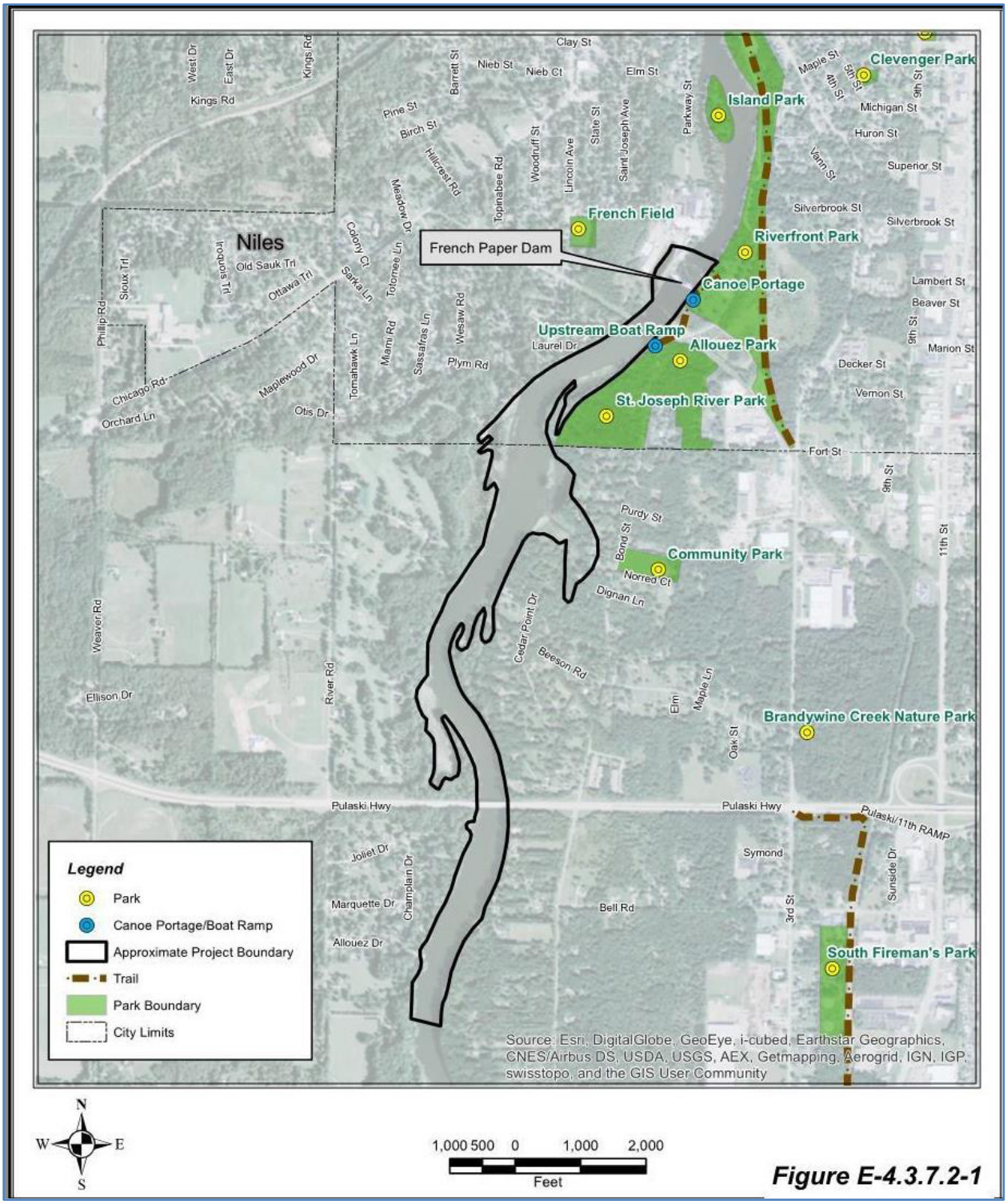

Figure 9. Local Recreation Facilities (Source: French Paper Company, 2019a).

Land Use

The project encompasses approximately 111.53 acres of open water (St. Joseph River) and 0.83 acre of land. The majority of land within the project boundary is

developed, consisting of non-public lands primarily associated with the project powerhouse, dam intake structures, and other project structures. The French Paper Project occupies the northwestern bank of the project site. All project land is owned by French Hydro.

3.3.4.2 Environmental Effects

French Hydro does not propose any measures for recreation resources, and no agency has filed recommendations addressing recreation resources at the project.

Our Analysis

While there are no recreation facilities within the project boundary, continuing to operate the project in a run-of-river mode would ensure that recreation such as boating and fishing opportunities provided by the nearby facilities would remain accessible during the term of any subsequent license. Based on the 2017 Recreation and Land Use Study, the use of the facilities is currently underutilized; therefore, the numerous existing recreation sites within the vicinity of the project are anticipated to meet future recreation use.

Project Boundary

As discussed in section 2.1.2, *Current Project Boundary*, the road to access the project is not within the project boundary. Commission regulations require that all lands necessary for the operation and maintenance of the project be included in the project boundary.[60] The road connecting French Street to the project is the only road used to access the project facilities, including the powerhouse. Because the access road serves a project purpose by providing access to project facilities used for operation and maintenance, it should be considered part of the project and located within the project boundary.

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 (Advisory Council) a reasonable opportunity to comment on the

[60] *See* 18 C.F.R. § 4.41(h)(2) (2019).

undertaking.[61] Historic properties are those that are listed or eligible for listing in the National Register. The regulations implementing section 106 of the NHPA also require that the Commission seek concurrence with the state historic preservation office on any finding involving effects or no effects on historic properties, and consult with interested Indian tribes or Native Hawaiian 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 in 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)). The APE for the project includes the project boundary and all areas within or directly adjacent to the St. Joseph River that may be affected by the project.

Cultural and Historical Background

Regional History

The precontact occupation of Michigan is generally divided into three broad periods: Paleo-Indian, Archaic and Woodland, defined primarily by changes in subsistence strategies, cultural developments, and technology. The Paleo-Indian period encompasses the cultural remains of the earliest recorded occupations of the region, after approximately 12,000 B.P. Paleo-Indians were nomadic, seasonally following large herds of migrating game. Later in the period, hunting activity shifted from large-scale expeditions to smaller but more regular hunting within a more localized territory. The beginning of the Archaic period is marked by the retreat of the Great Lakes and decreasing populations of mega-fauna. In response, the broad seasonal migration patterns of the previous period shifted toward more localized seasonal settlement and subsistence patterns. By the end of this period, interaction among settlements and trade across regions of North America indicates larger and more permanent occupations. During the Woodland period, the innovation of ceramic technology and the emergence of

[61] 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(y) (2019). Here, the undertaking is the potential issuance of a subsequent license for the French Paper Project.

agriculture were accompanied by a shift toward sedentary, agrarian communities with increased cultural complexity and traditions.

The first permanent European settlement in Michigan was established in 1668 by Father Jacques Marquette, a Jesuit missionary and explorer. Early settlers, fur traders and priests came to the area to hunt, fish and trade with the Native Americans in the region. In the early seventeenth century, historic documentation and archaeological evidence indicates the Potawatomi, Fox, Sauk, Kickapoo, and the Mascoutah inhabited southern Michigan; however, by the middle of the century these populations abandoned the area and moved westward into Wisconsin. Some groups, such as the Potawatomi, returned to Michigan in the eighteenth century, around which time the Ottawa territory expanded south, along the east coast of Lake Michigan and into the Grand River valley and Chippewa moved into the Saginaw River valley.

Local History

In the late seventeenth and eighteenth centuries, southwestern Michigan and the St. Joseph River Valley was occupied primarily by the Potawatomi and Miami tribes and by European and Euromerican trade and military sites. Fort St. Joseph, near present day Niles, was first occupied as a French trading post in 1687, and later served as an outpost for English and American forces until its abandonment in the early nineteenth century. The fort was also controlled by the Potawatomi during Pontiac's war in 1762. The first permanent settlers did not arrive in the project vicinity, around the City of Niles, until the early nineteenth century.

The first dam in the city of Niles was constructed across the St. Joseph River in 1871 by the Niles Manufacturing Company. Following the dam's construction, the company offered land and water-power free to anyone who would erect a mill or manufactory. Perhaps in response to Niles Manufacturing Company's offer, the Michigan Wood Pulp Company, later known as the French Paper Company, was constructed on the west side of the dam in 1871. The Michigan Wood Pulp Company produced paperboard from local silver poplars, which was used by the baking industry. Around 1905 the Michigan Wood Pulp Company reorganized as the French Paper Company. The present dam and associated flumes were completed in ca. 1915, following the destruction of the previous 1883 dam by a flood, and the powerhouse was built in 1921.

Archaeological and Historic Resources

Cultural Resources Investigations

In 2017, French Hydro conducted a cultural resources study to identify any archaeological or historic resources that could be affected by the project. The study included an above ground architectural survey and a Phase I archaeological survey.

The above ground architectural survey identified one previously unevaluated historic site, the French Paper Company Historic District, which is eligible for listing on the National Register under Criteria A as a significant paper-making industrial facility.

The 2017 archaeological survey resulted in the identification of three previously recorded archaeological sites within the project's APE. Of the previously recorded sites, site 20BE23, the Fort St. Joseph mission and trading post, is listed on the National Register and site 20BE10, a Potawatomi camp or village, was previously determined to be eligible for listing on the National Register. A twentieth-century mill site, site 20BE357, was also identified, but has not been formally evaluated and is therefore potentially eligible for listing on the National Register.

In 2018, French Hydro conducted a second Phase I archaeological survey of three previously recorded Potawatomi sites (20BE2, 20BE7, and 20BE21). The survey relocated a portion of site 20BE2, but no archaeological evidence of the site was found within 50 meters of the shoreline and it was therefore determined to be outside of the APE. Sites 20BE7 and 20BE21 could not be relocated.

Architectural Resources

The French Paper Company Historic District, which is eligible for listing on the National Register, is a papermill complex located on the western bank of the Saint Joseph River and includes: (1) the project dam;[62] (2) the project powerhouse; (3) the office; (4) modern tank and ancillary structures; (5) the pulp storage building; (6) the water treatment plant; (7) Mill No. 2;[63] (7) Dock 9; (8) two warehouses; (9) a heating plant; (10) an ancillary structure; (11) the box shop; (12) a storage building; (13) the finishing building; and (14) an accident recordation sign. Only the project dam and powerhouse are part of the French Paper Project.

The French Paper Company Historic District retains a high level of historic integrity, including integrity of location and historic setting as well as integrity of design. The complex has the same layout of buildings and structures that was in place for much of the twentieth century, and many of the buildings retain their historic form and scale. The French Paper Company has used the site since ca. 1872 and continues to use the site to manufacture paper products today.

Archaeological Resources

Site 20BE23, which is listed on the National Register, is the Fort St. Joseph mission and trading post. A portion of site 20BE23 has been inundated since the

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[62] The dam includes a fish ladder and mill race.

[63] The components of Mill No. 2 include: (1) the Machine Shop; (2) the Roller Room; (3) the Starch Room (mill buildings); (4) the Bleaching Room ruins; (5) a wood-framed structure; (6) the Paper Warehouse; and (7) the Machine Room.

construction of the dam, which raised the water table upstream by approximately 20 to 12 feet. The remainder of the site is covered by 2 to 6 feet of sediment deposited by the river or from a twentieth-century landfill located upstream and covering site 20BE357. Although sedimentation is occurring at the site, no evidence of erosion was observed.

Site 20BE10, which was previously determined eligible for listing on the National Register, is a Late Woodland period village or camp site affiliated with the Mississippian culture. The site overlaps slightly with 20BE23 and is located on a peninsula that extends into the river. Although sedimentation is occurring at the site, no wave action or evidence of erosion was observed.

Site 20BE357, which is potentially eligible for listing on the National Register, is a late nineteenth to early twentieth century industrial complex that consisted of a mill race and several manufactories belonging to the Niles Paper Mill Company. In the 1940s, prior to its present-day conversion to a public park, the site was used as a landfill. Although much of the site is beneath park landscaping and landfill, several features were located during the survey, including the remnants of the mill race and several stone walls associated with structures from the Niles Paper Mill Company. Although the site is heavily disturbed, these cut-stone features remain in sound condition.

Consultation

In a letter dated January 21, 2020,[64] the Michigan SHPO concurred with the results of the Phase I archaeological studies conducted in 2017 and 2018, which concluded that no archaeological properties would be adversely affected by the relicensing of the project. The Michigan SHPO did not comment on the results of the architectural study, including the National Register eligibility determination or effects of the project on the French Paper Company Historic District.[65]

3.3.5.2 Environmental Effects

French Hydro proposes to continue to operate the project as run-of-river and does not propose any new construction, ground disturbing activities or changes to project operation and maintenance. French Hydro does not propose any cultural resources measures.

Our Analysis

Architectural Resources

Continued operation of the French Paper Project would ensure that the project, as part of the French Paper Company Historic District, would be used as it was originally

[64] The letter was filed on February 6, 2020.

[65] The Michigan SHPO states that it will reserve its final statement of concurrence until after staff issues its determination of effects in the EA.

designed and built, which would be considered a beneficial effect. However, operating and maintaining the project throughout the term of any license could result in unanticipated adverse effects to the French Paper Company Historic District, including repairs and modifications that, while necessary for the continued safe and efficient operation, are not in keeping with the project's historic character. Therefore, because of the potential for adverse effects on the French Paper Company Historic District, staff intends to execute a PA with the Michigan SHPO, that would stipulate that French Hydro file an HPMP for Commission approval one year after issuance of any license for the project. An HPMP would contain measures that ensures that any adverse effects on the French Paper Company Historic District arising from project operation, maintenance, or project-related activities would be mitigated, lessened, or avoided.

Archaeological Resources

French Hydro observed significant accretion and sedimentation at sites 20BE10 and site 20BE23, but no evidence of erosion. Because the accretion and sedimentation processes afford added protection to the sites by providing a protective barrier between archaeological artifacts and the outside environment, including the riverine environment and exposure to looting, and because the project is operated under a run-of-release system, which resembles a natural riverine hydraulic system, the project would not adversely affect sites 20BE10 or 20BE23. Similarly, because no erosion was observed at site 20BE357, and no changes in operation and maintenance are proposed, relicensing the project would not adversely affect site 20BE357.

Although sites 20BE10, 20BE23 and 20BE357 would not be adversely affected by relicensing the project, project operation and maintenance could affect unknown archaeological resources or result in the unanticipated discovery of archaeological materials during the term of the license. In the event of an unanticipated archaeological discovery, the HPMP for the French Paper Company Historic District would include measures to respond to the discovery of previously unidentified archaeological resources during project operation and maintenance.

4.0 DEVELOPMENTAL ANALYSIS

In this section, we look at the project's use of the St. Joseph River for hydropower purposes to see what effect 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.*,[66] 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 for construction, 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 produces power for less than the cost of alternative power. If the difference between the cost of alternative power and total project cost is negative, the project produces 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 9 summarizes the assumptions and economic information we use in our analysis. This information was provided by French Hydro in its license application and subsequent submittals and is reasonable to use for the purposes of our analysis. Cost items common to all alternatives include: taxes and insurance costs; net investment (the total investment in power plant facilities remaining to be depreciated); estimated future capital investment required to maintain and extend the life of plant equipment and facilities; relicensing costs; normal operation and maintenance cost; and Commission fees. All dollars in table 9 are for year 2019.

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[66] *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 9. Parameters for the economic analysis of the French Paper Project (Source: French Hydro and Staff).

Parameter	Value	Source
Period of analysis	30 years	Staff
Term of financing	20 years	Staff
Federal tax rate	21 percent	Staff
Local tax rate	3.05 percent	Staff
Net investment	$1,836,553	French Hydro
Relicensing cost	$200,000	French Hydro
Annual operation & maintenance	$51,391	French Hydro
Commission fees[1]	$0	Staff
Installed capacity	1.30 MW	French Hydro
Dependable capacity	1.17 MW	French Hydro
Annual generation	8,442.8 MWh	French Hydro
Insurance rate	0.25 percent	Staff
Alternative energy value[2]	$18.08/MWh	Staff
Capacity value[2]	$159.7/kW-year	Staff
Interest rate	8.00 percent	Staff
Discount rate	8.00 percent	Staff

1 Commission fees are based on statements of annual charges received from the Commission for federal lands and administrative charges based on authorized installed capacity greater than 1.5 MW.

2 Source: Energy Information Administration using rates obtained from Annual Energy Outlook 2020 at http://www.eia.gov/outlooks/aeo/index.cfm.

4.2 COMPARISON OF ALTERNATIVES

Table 10 summarizes the installed capacity, annual generation, cost of alternative power, estimated total project cost, and difference between the cost of alternative power and total project cost for each of the alternatives considered in this EA: no-action, the applicant's proposal, the staff alternative, and the staff alternative with mandatory conditions.

Table 10. Summary of the annual cost of alternative power and annual project cost for four alternatives for the French Paper Project (Source: Staff).

	No-Action	French Hydro's Proposal	Staff Alternative	Staff Alternative with Mandatory Conditions
Installed capacity (MW)	1.30	1.30	1.30	1.30
Annual generation (MWh)	8,442.8	8,442.8	8,442.8	8,442.8
Annual cost of alternative power ($/MWh)	$339,485 40.21	$339,485 40.21	$339,485 40.21	$339,485 40.21
Annual project cost ($/MWh)	$304,954 36.12	$318,716 37.75	$313,397 37.12	318,462 37.72
Difference between the cost of alternative power and project cost ($/MWh)	$34,531 4.09	$20,769 2.46	$26,088 3.09	$21,023 2.49

4.2.1 No-Action Alternative

Under the no-action alternative, the project would have an installed capacity of 1.30 MW, and generate an average of 8,442.8 MWh of electricity annually. The average annual cost of alternative power would be $339,485, or about $40.21/MWh. The average annual project cost would be $304,954 or about $36.12/MWh. Overall, the project would produce power at a cost of about $4.09/MWh, which is $34,531 less than the cost of alternative power.

4.2.2 French Hydro's Proposal

Under French Hydro's proposal, which includes new environmental measures, the project would continue to operate in its current mode with an installed capacity of 1.30 MW, and generate an average of 8,442.8 MWh of electricity annually. The average annual cost of alternative power would be $339,485 or $40.21/MWh. The average annual project cost would be $318,716 or $37.75/MWh. Overall, the project would produce power at a cost which is $20,769, or $2.46/MWh, less than the cost of alternative power.

4.2.3 Staff Alternative

Table 11 shows the staff-recommended additions, deletions, and modifications to French Hydro's proposed environmental protection, mitigation and enhancement measures and the estimated capital, annual and levelized annual cost of each.

Based on an authorized installed capacity of 1.30 MW and an average annual generation of 8,442.8 MWh, the cost of alternative power would be $339,485 or

$40.21/MWh. The average annual project cost would be $313,397 or $37.12/MWh. Overall, the project would produce power at a cost which is $26,088, or $3.09/MWh, less than the cost of alternative power

4.2.4 Staff Alternative with Mandatory Conditions

This alternative includes the same measures as the staff alternative and adds six mandatory conditions as shown in table 11. Under this alternative, the project would have an installed capacity of 1.30 MW, and generate an average of 8,442.8 MWh of electricity annually. The average annual cost of alternative power would be $339,485, or about $40.21/MWh. The average annual project cost would be $318,462 or about $37.72/MWh. Overall, the project would produce power at a cost of about $2.49/MWh, which is $21,023 less than the cost of alternative power.

4.3 COST OF ENVIRONMENTAL MEASURES

Table 11 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 11. Cost of environmental mitigation and enhancement measures considered in assessing the environmental effects of the French Paper Hydroelectric Project (Source: Staff).

Enhancement / Mitigation Measure	Entity	Capital Cost	Annual Cost	Levelized Annual Cost	Notes
Geological and Soil Resources					
1. Develop and implement a plan to periodically identify (every 5 years) and remediate new sources of project-related erosion within the project boundary.	French Hydro, Michigan EGLE	$500	$5,000 every 5 years	$960	i
Aquatic Resources					
2. Continue to operate the project in a run-of-river mode.	French Hydro, Michigan EGLE, Staff	$0	$0	$0	
3. Continue to maintain a target normal water surface elevation of 653.75 feet msl (i.e., top of the flashboards) in the project reservoir and a minimum reservoir elevation of 653.5 feet msl (i.e., 0.25 foot below the top of the flashboards), except during events beyond French Hydro's control.	French Hydro, Michigan EGLE, Staff	$0	$0	$0	
4. Install, maintain, and operate a level transducer and data logger in the project reservoir to record water surface elevations in the project reservoir on an hourly basis. File an annual summary report of all water surface elevation data.	French Hydro, Michigan EGLE, Staff	$5,000	$3,500	$3,240	

Enhancement / Mitigation Measure	Entity	Capital Cost	Annual Cost	Levelized Annual Cost	Notes
5. Install a calibrated staff gage in the French Paper Project reservoir at a location clearly visible to the public with a sign that shows the required reservoir operating levels.	French Hydro, Michigan EGLE, Staff	$0	$0	$0	a
6. Hire a professional land surveyor to confirm project reservoir elevations and the datum associated with the operating requirements of any subsequent license issued for the project.	French Hydro, Staff	$2,500	$0	$240	
7. Continue to maintain a continuous minimum flow of 120 cfs for the operation of the fish ladder.	French Hydro, Michigan EGLE, Staff	$0	$55,710	$44,010	b, g
8. Continue to annually shut down the project for a 72-hour period to allow for the safe downstream passage of Chinook salmon and steelhead smolts.	French Hydro, Michigan EGLE, Staff	$0	$11,600	$9,160	g
9. Continue to partially fund the operation and maintenance of USGS gage no. 04101501.	French Hydro, Michigan EGLE	$0	$4,670	$3,690	c
10. Develop a streamflow monitoring plan to monitor the flow of the St. Joseph River downstream of the project on an hourly basis.	French Hydro, Michigan EGLE	$3,000	$0	$280	
11. Develop a compliance monitoring plan that includes provisions for monitoring and reporting compliance with the operating requirements of any subsequent license issued (e.g., run-of-river	Staff	$3,000	$0	$280	

Enhancement / Mitigation Measure	Entity	Capital Cost	Annual Cost	Levelized Annual Cost	Notes
mode and minimizing water-level fluctuations in the project reservoir), and reporting deviations from operating requirements.					
12. Conduct a three-year test to determine the project's ability to comply with the operating conditions required by Michigan EGLE's water quality certification for the project. Within 90 days after the end of the three-year test period, submit a report to Michigan EGLE that documents French Hydro's ability to comply with the operational requirements required by Michigan EGLE's water quality certification for the project and includes a corrective action plan and implementation schedule if the operational requirements are not met.	French Hydro, Michigan EGLE	$0	$3,500 for the first three years	$630	d
13. Develop and implement a water quality monitoring plan that contains provisions to: (1) continuously monitor water temperature and DO levels upstream and downstream of the project from June 1st through September 30th; (2) conduct water temperature and DO profile monitoring in the project reservoir every two weeks from June 1st through September 30th; and (3) provide annual reports to Michigan EGLE.	French Hydro, Michigan EGLE	$8,500	$30,000 for first year	$2,750	e, f

Enhancement / Mitigation Measure	Entity	Capital Cost	Annual Cost	Levelized Annual Cost	Notes
14. Beginning in year 10 after license issuance and continuing every 10 years thereafter, analyze the sediment samples taken from the project reservoir for the contaminant parameters specified in Michigan EGLE's water quality certification.	French Hydro, Michigan EGLE	$0	$10,000 every 10 years	$550	
15. Beginning the first year after license issuance and continuing every 10 years thereafter, analyze the edible portion of fish collected from the French Paper Project reservoir for total mercury and PCBs.	French Hydro, Michigan EGLE	$0	$20,000 every 10 years	$1,090	
16. Develop a natural debris management plan to establish procedures for the continued removal and downstream passage of natural debris that accumulates on the project's floating debris boom and trashracks to benefit aquatic resources in the St. Joseph River.	French Hydro, Michigan EGLE, Staff	$500	$5,000	$4,000	
Cultural Resources					
17. Develop an HPMP to protect historic properties.	Staff	$5,000	$250	$670	h

a The capital and annual costs associated with the installation and maintenance of a staff gage at the project are included in measure no. 4.

b Under current conditions and the proposed action, maintaining a target normal water surface elevation of 653.75 feet msl supplies 192 cfs to the fish ladder. Accordingly, the annual cost associated with measure no. 7 is the cost of lost generation associated with 192 cfs being continuously provided to the fish ladder, not 120 cfs.

c French Hydro currently provides $4,650 on an annual basis to fund USGS gage no. 04101501, which works in tandem with USGS gage no. 04101500 (located just upstream of USGS gage no. 04101501) to measure streamflow in the St. Joseph River.

d Because it is currently unknown whether "corrective actions" would be necessary in the future (i.e., the need for a corrective action plan is contingent upon the result of the three-year study), staff is unable to determine an annual cost for this measure beyond year three of any subsequent license is issued for the project.

e The $8,500 capital cost includes $5,000 for the purchase of the water quality monitoring equipment and $3,500 for the development of the plan. The plan itself would not only describe the procedures associated with conducting French Hydro's proposed water quality monitoring, but also the proposed contaminant monitoring described in measure nos. 14 and 15, as would be required by Michigan EGLE certification condition 3.4.

f At the conclusion of the first year of water quality monitoring, French Hydro states that it anticipates obtaining Michigan EGLE approval to discontinue its proposed water quality monitoring in the project vicinity. Post-license water quality monitoring would likely support staff's conclusions in section 3.3.2.2, *Aquatic Resources*, *Environmental Effects* of the EA that continued project operation would have no effect on water temperature and a beneficial effect on DO levels downstream of the dam. As such, it is unlikely Michigan EGLE would require French Hydro to continue water quality monitoring after the first year of study. Therefore, our cost analysis assumes the $30,000 annual cost to implement this study would be incurred for only one year.

g The cost of this measure is a result of lost generation.

h The cost was estimated by staff.

i The initial monitoring would occur upon approval of the plan and would occur every 5 years hence.

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 COMPREHENSIVE DEVELOPMENT AND RECOMMENDED ALTERNATIVE

Sections 4(e) and 10(a) 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 will 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 French Hydro to continue to operate the project as a dependable and inexpensive source of electrical energy; (2) the 1.3 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 proposed and recommended measures would protect and enhance fish and wildlife resources, and protect cultural resources at the project.

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

5.1.1 Measures Proposed by French Hydro

Based on our environmental analysis of French 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 French 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.

- Operate the project in a run-of-river mode, such that outflow from the project approximates inflow at all times to protect aquatic resources in the St. Joseph River (except during the proposed 72-hour project shutdown).

- Continue to maintain a target normal water surface elevation of 653.75 feet msl (i.e., top of the flashboards) in the project reservoir and a minimum reservoir elevation of 653.5 feet msl (i.e., 0.25 foot below the top of the flashboards), except during events beyond French Hydro's control, to protect aquatic resources and reduce shoreline erosion in the project reservoir.
- Install a staff gage in the project reservoir and an accompanying sign showing the water levels required by any subsequent license issued for the project to provide public awareness of reservoir elevations.
- Install a level transducer and data logger to continuously record water surface elevations in the project reservoir on an hourly basis to document compliance with run-of-river operation.
- Continue to maintain a continuous 120-cfs minimum flow for the operation of the fish ladder.
- Continue to annually shut down the project for a 72-hour period beginning at 6 am on the second Friday of May to allow for the safe downstream passage of stocked Chinook salmon and steelhead smolts released upstream of the project.
- Develop a natural debris management plan to establish procedures for the continued removal and downstream passage of natural debris that accumulates on the project's floating debris boom and trashracks to benefit aquatic resources in the St. Joseph River.

5.1.2 Additional Measures Recommended by Staff

In addition to French Hydro's proposed measure noted above, we recommend including the following additional measures in any license that may be issued for the French Paper Project.

- An operation compliance monitoring plan that includes provisions for monitoring and reporting compliance with the operating requirements of the license (e.g., run-of-river mode and minimizing water-level fluctuations in the project reservoir), and reporting deviations from operating requirements, instead of a streamflow monitoring plan.
- Modification of the project boundary to include the access road from the intersection of French Street to the project facilities.
- An HPMP, implemented by a PA, within one year of license issuance to protect historic properties that are eligible for or listed on the National Register that may be adversely affected by project operation and maintenance.

Below, we discuss the basis for the staff-recommended modifications and measures.

Operational Compliance Monitoring Plan

As discussed in section 3.3.2.2, *Aquatic Resources, Environmental Effects,* French Hydro proposes to install a level transducer and data logger to continuously record water surface elevations in the project reservoir on an hourly basis to document compliance with run-of-river operation. Developing a formal project operation compliance monitoring plan would provide a mechanism for reporting operational data and deviations from license requirements, facilitate administration of any subsequent license issued for the project, and ensure the protection of aquatic resources that are sensitive to water level fluctuations. Additionally, developing such a plan would ensure that continuous minimum flows required for the operation of the project's fish ladder are met and monitored effectively via the hourly water surface elevation recordings in the project reservoir.

For the reasons discussed above, we recommend that French Hydro develop an operation compliance monitoring plan that includes a description of the equipment that would be used, a protocol for maintaining and calibrating equipment, and provisions for: (1) monitoring reservoir elevation levels to document compliance with the operational conditions of any subsequent license, including run-of-river operation and minimum flows required for the operation of the project's fish ladder; (2) standard operating procedures to be implemented (a) outside of normal operating conditions, including during scheduled facility shutdowns, reservoir drawdowns, and reservoir refilling, and (b) during emergency conditions such as unscheduled facility shutdowns and maintenance, in order to minimize project effects on aquatic resources; (3) reporting deviations to the Commission; and (4) maintaining a log of project operations for inspection.

We estimate that the annual levelized cost of developing an operation compliance monitoring plan would be approximately $300 and conclude that the benefits of the plan outweigh the cost.

Project Boundary

The access road located at the intersection of French Street is not included in the current project boundary. As discussed in section 3.3.4, *Recreation and Land Use,* the road connecting French Street to the project is required to access project facilities, including the powerhouse. Therefore, because the road is required to access facilities necessary for the operation and maintenance of the project, we recommend the access road be included in the project boundary.

Measures to Protect Historic Resources

As discussed in section 3.3.5, *Cultural Resources*, continued operation and maintenance of the project could have adverse effects on the National Register-eligible French Paper Company Historic District if there are no protective measures in place. Also, during the term of any license, if issued, unknown archaeological resources may be

discovered during project operation or other project-related activities that require ground disturbance within the APE. We recommend that French Paper develop and implement an HPMP in consultation with the Michigan SHPO, Dr. Michael Nassaney of Western Michigan University, the Forest County Potawatomi Community of Wisconsin, the Miami Tribe of Oklahoma, the Nottawaseppi Huron Band of Potawatomi, the Citizen Potawatomi Nation of Oklahoma, and the Pokagon Band of Potawatomi Indians of Michigan and Indiana tribes to avoid, lessen, or mitigate for any adverse effects on the French Paper Company Historic District or any unknown archaeological resources that may be discovered. We estimate that the annual levelized cost of developing an HPMP would be $670 and conclude that the benefits of an HPMP outweigh the cost. Commission staff intend to execute a PA with the Michigan SHPO. The PA would describe the measures required in the HPMP.

5.1.3 Measures Not Recommended

Some of the measures proposed by French Hydro and recommended by other interested parties would not contribute to the best comprehensive use of water resources within the St. Joseph River, 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 measures.

Reservoir Shoreline and Streambank Erosion Monitoring Plan

French Hydro proposes to inspect, every five years, the shoreline of the project reservoir and the streambanks immediately downstream of the dam to identify any new erosion caused by the project and remediate erosion caused by project operation. As discussed in section 3.3.1.2, *Geological and Soil Resources, Environmental Effects*, we conclude that erosion occurring along the banks of the project reservoir is attributed to natural river fluctuation, not project operation. Under the proposed run-of-river operation, the erosion potential of the reservoir shoreline and streambanks within the project boundary would not be altered by project operation. Therefore, there is no justification for a license requirement to periodically inspect the shoreline of the project reservoir and the streambanks immediately downstream of the dam for erosion. Nevertheless, because certification condition 4.1 is mandatory, it would be included as a requirement in any subsequent license issued for the project.

Compliance Monitoring

French Hydro proposes to monitor project operation for a three-year test period to determine its ability to comply with the certification's operational requirements, including: (1) continuing to operate the project in a run-of-river mode (certification condition 1.2); (2) maintaining a target normal water surface elevation of 653.75 feet msl (i.e., top of the flashboards) in the project reservoir and limiting water surface fluctuations to 0.25 foot below the top of the flashboards, except during events beyond

French Hydro's control; and (3) maintaining a continuous minimum flow of 120 cfs for the continued operation of the fish ladder (certification condition 1.4). French Hydro's proposal for a three-year compliance test is consistent with the requirements contained in Michigan EGLE's certification condition 1.7. Staff recommends that French Hydro develop an operation compliance monitoring plan to document its compliance with the operational provisions of any subsequent license, and provide a mechanism for reporting deviations. There is no reason to conclude that French Hydro would be incapable of implementing these requirements. Therefore, staff has no justification for recommending a license condition requiring a three-year testing program to assess French Hydro's ability to comply with the operational requirements contained in Michigan EGLE's certification. Nevertheless, because certification condition 1.7 is mandatory, it would be included as a requirement in any subsequent license issued for the project.

Streamgage Funding

French Hydro proposes to develop a streamflow monitoring plan to continuously monitor the flow of the St. Joseph River downstream of the project to document compliance with continued run-of-river operation. French Hydro proposes to use data collected from USGS gage no. 04101501 to inform its proposed streamflow monitoring plan. French Hydro also proposes to continue to provide the current level of funding for USGS gage no. 04101501. French Hydro's proposals are consistent with the requirements contained in Michigan EGLE's certification conditions 1.5 and 1.6.[67]

In addition to the above proposals, French Hydro also proposes to install a level transducer and data logger to continuously record water surface elevations in the project reservoir on an hourly basis. Installing and operating this equipment at the project would ensure an automated system is in place to continuously monitor and record water surface elevations within the project reservoir. This equipment would allow French Hydro to accurately document compliance with the operational requirements contained in any subsequent license issued for the project, including run-of-river operation, maintain flow requirements to the fish ladder, and meet requirements for minimal water level fluctuations in the project reservoir. Continuing to provide funding for USGS streamflow gage no. 04101501 would only provide information on streamflows in the St. Joseph River at a point approximately one mile downstream of the project. This information would not provide any additional useful information for documenting compliance with the operational requirements contained in any subsequent license issued for the project. Furthermore, as discussed above, staff's recommended operation compliance monitoring

[67] Michigan EGLE certification condition 1.5 would require French Hydro to continue funding USGS gage no. 04101500, located approximately one mile downstream of French Paper Project Dam. As explained in section 3.3.2.1, *Aquatic Resources*, *Affected Environment,* USGS gage no. 04101501 is located just downstream of USGS gage no. 04101500 and works in tandem with USGS gage no. 04101500 to accurately measure streamflow in the St. Joseph River.

plan would enable the Commission to sufficiently track and enforce the operating requirements contained in any subsequent license issued for the project, which would ensure the protection of aquatic resources that are sensitive to water level fluctuations. For these reasons, there is no justification for recommending that French Hydro continue funding USGS gage no. 04101501 or develop a streamflow monitoring plan. Nevertheless, because certification conditions 1.5 and 1.6 are mandatory, they would be included as requirements in any subsequent license issued for the project.

Water Quality Monitoring

Michigan EGLE certification conditions 2.1 and 2.2 would require that French Hydro operate the project in such a manner as to adhere to state water quality standards for water temperature and DO levels in the St. Joseph River.[68] Consistent with Michigan EGLE certification condition 3.1, French Hydro proposes to continuously monitor water temperature and DO levels at locations upstream and downstream of the project, including within the project reservoir (i.e., via profile monitoring), from June 1 through September 31, beginning the first year after license issuance. Michigan EGLE certification condition 3.3 would also require that the water quality monitoring plan be submitted to Michigan EGLE for approval, prior to implementation.

As discussed in section 3.3.2.2, *Aquatic Resources, Environmental Effects,* water temperature and DO data collected by French Hydro in the project vicinity indicate that these parameters are consistent with values specified by Michigan state water quality standards. Therefore, overall, there are no project-related water temperature or DO issues under current project operation. Because French Hydro does not propose any construction activities or changes to current project operation, we do not expect any changes to water quality under the proposed action for the duration of any subsequent license issued. Consequently, there is no justification for recommending a license requirement for French Hydro to develop a plan to conduct post-license water quality monitoring. Nevertheless, because certification conditions 2.3, 3.1, and 3.3 are mandatory, they would be included as requirements in any subsequent license issued for the project.

Contaminant Sampling

Michigan EGLE certification condition 3.2 would require that French Hydro conduct (at 10 year intervals) contaminant testing on sediments collected from within the

[68] Michigan EGLE certification condition 2.3 would require that the compliance point for the water temperature and DO limits required by the certification be in the St. Joseph River, within 500 feet downstream of the powerhouse, unless another location is otherwise approved by Michigan EGLE.

project reservoir.[69] Michigan EGLE certification condition 3.3 would require that French Hydro also conduct (at 10 year intervals) contaminant monitoring (i.e., total mercury and PCBs) of the edible portion of fish samples collected from the project reservoir. As discussed in section 3.3.2.2, *Aquatic Resources, Environmental Effects,* the historic and existing point- and non-point sources of pollution within the basin are numerous and have been well documented. As such, elevated levels of bioaccumulative contaminants in fish tissue have been reported throughout the St. Joseph River Basin and currently portions of the St. Joseph River in the project vicinity are under fish consumption advisories for mercury, PCBs, chlordane, and DDT.

French Hydro does not propose any changes to current project operation or any new construction that would contribute pollutants to the St. Joseph River or disturb potentially contaminated sediment in the project vicinity. Therefore, we do not expect any changes in the levels of bioaccumulative contaminants in sportfish as a result of continued project operation. Although the data generated from this monitoring would assist state agencies in monitoring bioaccumulative contaminant levels in sportfish and likely support the development of new or modified fish consumption advisories in the project area, such assistance is not a project-related purpose. Consequently, there is no justification for recommending license requirements for French Hydro to periodically monitor sediment or fish tissue for the contaminants noted above. Nevertheless, because certification conditions 3.2 and 3.3 are mandatory, these conditions would be included as requirements of any subsequent license issued for the project.

5.2 UNAVOIDABLE ADVERSE EFFECTS

Despite French Hydro's proposal to continue with the annual 72-hour project shutdown, some project-related entrainment mortality is likely unavoidable for hatchery-raised Chinook and coho salmon stocked upstream of the project. For resident native fish species, most adult fish could avoid involuntary entrainment, but entrainment of some adult fish at the project could still occur. We expect that most of the fish entrained at the project would be limited to smaller fish (less than 6 inches in length) with expected high survival rates during turbine passage. Overall, the long-term effect of fish entrainment at the project is not likely to cause any measurable changes to fish populations in the St. Joseph River.

[69] Certification condition 3.2 specifies that French Hydro sample for the following parameters: oil and grease; total cadmium; total copper; total mercury; total selenium; total zinc; total silver; total arsenic; total chromium; total lead; total nickel; total phosphorus; and total PCBs.

6.0 FINDING OF NO SIGNIFICANT IMPACT

If the French Paper Project is issued a subsequent license as proposed with the additional staff-recommended measures, the project would continue to operate as it does today, while providing protective measures for aquatic and cultural resources in the project area.

Based on our independent analysis, the issuance of a subsequent license for the French Paper 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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APPENDIX A: LICENSE CONDITIONS RECOMMENDED BY STAFF

In this section, we present draft license articles for staff-recommended measures:

Draft Article 2XX. *Administrative Annual Charges*. The licensee must pay the United States annual charges, effective the first day of the month in which this license is issued, and as determined in accordance with provisions of the Commission's regulations in effect from time to time, for the purposes of reimbursing the United States for the cost of administration of Part I of the Federal Power Act. The authorized installed capacity for that purpose is 1,300 kilowatts (kW). Under the regulations currently in effect, projects with authorized installed capacity of less than or equal to 1,500 kW will not be assessed an annual charge.

Draft Article 2XX. *Exhibit A*. Within 90 days of the effective date of this license, the licensee must file for Commission approval, a revised Exhibit A that includes the following:

(1) a description of the primary transmission line from the step-up transformer to the regional grid, including length, voltage and whether the transmission line is above ground or underground;

(2) a description of the transmission line providing power to the paper mill from the generators to the powerhouse panels, including length and voltage;

(3) a description of the actual flow rate diverted to the fish ladder during normal operation; and

(4) a detailed single-line electrical diagram that shows the voltage on both sides of the step-up transformer and the primary transmission line identified.

The single-line diagram must be identified as **Critical Energy Infrastructure Information (CEII) material under 18 C.F.R. §388.113**. The revised Exhibit A must comply with section 4.61(c) of the Commission's regulations.

Draft Article 2XX. *Exhibit F Drawings*. Within 45 days of the effective date of this license, the licensee must file for Commission approval, revised Exhibit F drawings that include the following:

(1) sheet F-1, the 34.5-kilovolt overhead transmission line from the project transformer to the point of interconnection with Indiana Michigan Power Company's overhead transmission line;

(2) sheets F-2 and F-3, the top elevation of trashracks 1 and 2 factoring the inclination angle;

(3) sheet F-3, a corrected plan view of turbines 3 and 4 that shows the trashrack width consistent with the trashrack schematic detail;

(4) sheet F-3, a corrected section view of turbines 3 and 4 that shows the trashrack height consistent with the trashrack schematic detail; and

(5) sheet F-7, a corrected graphic scale.

The Exhibit F drawings must comply with sections 4.39 and 4.41(g) of the Commission's regulations.

Draft Article 2XX. *Exhibit G Drawings*. Within 90 days of the effective date of this license, the licensee must file for Commission approval, revised Exhibit G drawings that include the following:

(1) the 34.5-kilovolt overhead transmission line from the project transformer to the point of interconnection with Indiana Michigan Power Company's overhead transmission line;

(2) the project boundary enclosing all principal project works necessary for operation and maintenance of the project, including the access road extending from the intersection of French Street to the project;

(3) sheets G-1 and G-2, "Impacted Land Parcels" table, the acreage within the project boundary that includes the addition of the access road; and

(4) sheet G-2, a corrected horizontal scale in the title block.

The Exhibit G drawings must comply with sections 4.39 and 4.41(h) of the Commission's regulations.

Draft Article 3XX. *Project Modification Resulting from Environmental Requirements*. If environmental requirements under this license require modification that may affect the project works or operations, the licensee must consult with the Commission's Division of Dam Safety and Inspections (D2SI)–Chicago Regional Engineer. Consultation must allow sufficient review time for the Commission to ensure that the proposed work does not adversely affect the project works, dam safety, or project operation.

Draft Article 4XX. *Notification and Filing of Amendments.*

(a) Requirement to File Plans for Commission Approval

The Michigan Department of Environment, Great Lakes and Energy (Michigan EGLE) certification (Appendix B) requires the licensee to prepare plans in consultation with Michigan EGLE and implement specific measures without prior Commission approval. The following plan must also be submitted to the Commission for approval by the deadline specified below.

Michigan EGLE Certification Condition No.	Plan Name	Commission Due Date
5.1	Natural Organic Debris Maintenance Plan	Within 12 months of the effective date of the license

(b) Requirement to Notify the Commission of Planned and Unplanned Deviations from License Requirements

Michigan EGLE's certification (Appendix B) condition no. 1.8 allows the licensee to temporarily modify project operations under certain conditions. The Commission must be notified prior to implementing such modifications, if possible, or in the event of an emergency, as soon as possible, but no later than 14 days after each such incident.

Michigan EGLE Certification Condition No.	License Requirement
1.8	Project operation during adverse conditions

(c) Requirement to File Amendment Applications

Certain conditions of Michigan EGLE's certification (Appendix B) contemplate unspecified long-term changes to project operation or facilities for the purposes of complying with the certification or mitigating environmental impacts. For example, certification condition 2.4 contemplates long-term changes to project facilities or operations for the purposes of complying with state water quality standards and minimizing impacts on adjacent waters. Such changes may not be implemented without prior Commission authorization granted after the filing of an application to amend the license.

Draft Article 4XX. *Deviations from Project Operation Requirements*. The project operation requirements of conditions 1.1, 1.2, and 1.4 in Appendix B may be temporarily modified as described below.

Planned Deviations

The project operation requirements of conditions 1.1, 1.2, and 1.4 in Appendix B may be temporarily modified for short periods, of up to 3 weeks, after mutual agreement among the licensee; the Michigan Department of Environment, Great Lakes and Energy; and the U.S. Fish and Wildlife Service. After concurrence from the agencies, the licensee must file a report with the Secretary of the Commission as soon as possible, but no later than 14 calendar days after the onset of the planned deviation. Each report must include: (1) the reasons for the deviation and how project operation was modified; (2) the duration and magnitude of the deviation; (3) any observed or reported environmental effects; and (4) documentation of consultation with the resource agencies. For planned deviations

exceeding 3 weeks, the licensee must file an application for a temporary amendment of the operational requirements of this license and receive Commission approval prior to implementation.

Unplanned Deviations

The project operation requirements of conditions 1.1, 1.2, and 1.4 in Appendix B may be temporarily modified if required by operating emergencies beyond the control of the licensee (*i.e.*, unplanned deviations). For any unplanned deviation that lasts longer than 3 hours or results in visible environmental effects such as a fish kill, turbidity plume, bank erosion, or downstream flooding, the licensee must file a report as soon as possible, but no later than 14 days after each such incident. The report must include: (1) the cause of the deviation; (2) the duration and magnitude of the deviation; (3) any pertinent operational and/or monitoring data; (4) a timeline of the incident and the licensee's response; (5) any comments or correspondence received from the resource agencies, or confirmation that no comments were received from the resource agencies, (6) documentation of any observed or reported environmental effects; and (7) a description of measures implemented to prevent similar deviations in the future.

For unplanned deviations lasting 3 hours or less that do not result in visible environment effects, the licensee must file an annual report, by March 1, describing each incident that occurred during the prior January 1 through December 31 time period. The report must include for each 3 hour or less deviation: (1) the cause of the deviation; (2) the duration and magnitude of the deviation; (3) any pertinent operational and/or monitoring data; (4) a timeline of the incident and the licensee's response; (5) any comments or correspondence received from the resource agencies, or confirmation that no comments were received from the resource agencies; and (6) a description of measures implemented to prevent similar deviations in the future.

Draft Article 4XX. *Operation Compliance Monitoring Plan*. Within six months of the effective date of the license, the licensee must file with the Commission, for approval, a plan that describes how the licensee will monitor and report compliance with the operational requirements of this license.

The plan must include, but not necessarily be limited to, the following provisions:

(1) a detailed description of how the licensee will monitor and document compliance with the operational requirements of the license, including: (a) operating the project in a run-of-river mode, as required by Michigan Department of Environment, Great Lakes and Energy's (Michigan EGLE) condition 1.2 (Appendix B), and maintaining a target normal water surface elevation of 653.75 feet mean sea level (msl) (i.e., top of the flashboards) in the project reservoir and a minimum reservoir elevation of 653.5 feet msl (i.e., 0.25 foot below the top of the flashboards), as required by condition 1.1 (Appendix B); (b) maintaining a continuous minimum flow of 120 cubic feet per second for the project's fish ladder, as required by condition 1.4 (Appendix B); and (c) shutting down the project for a 72-hour period beginning at 6 am on the second Friday

of May to allow for the safe downstream passage of Chinook salmon and steelhead smolts released upstream of the project, as required by condition 1.2 (Appendix B).

(2) in addition to the staff gage required by condition 1.3 (Appendix B), a provision to install, operate, and maintain a level transducer and data logger in the project reservoir immediately upstream of the project's dam to continuously record water surface elevations in the project reservoir on an hourly basis;

(3) a description of the level transducer and data logger, staff gage, and any other gages or measuring devices, or techniques that will be used to monitor compliance;

(4) a description of the specific locations of all gages or other measuring devices;

(5) a description of the procedures for maintaining and calibrating monitoring equipment;

(6) a provision to maintain a daily log of project operation;

(7) standard operating procedures to be implemented outside of normal operating conditions, including during: (a) scheduled facility shutdowns and maintenance; and (b) emergency conditions such as unscheduled facility shutdowns and maintenance;

(8) the protocols or methods to be used for reporting the monitoring data to the Commission; and

(9) an implementation schedule.

The plan must be developed after consultation with Michigan EGLE and U.S. Fish and Wildlife Service. The licensee must include with the plan documentation of consultation, copies of comments and recommendations on the completed plan after it has been prepared and provided to the agencies, and specific descriptions of how the agencies' comments are accommodated by the plan. The licensee must allow a minimum of 30 days for the agencies to comment and to make recommendations before filing the plan with the Commission. If the licensee does not adopt a recommendation, the filing must include the licensee's reasons, based on project-specific information.

The Commission reserves the right to require changes to the plan. Implementation of the plan must not begin until the licensee is notified by the Commission that the plan is approved. Upon Commission approval, the licensee must implement the plan, including any changes required by the Commission.

Draft Article 4XX. *Programmatic Agreement and Historic Properties Management Plan*. The licensee must implement the "Programmatic Agreement Between the Federal Energy Regulatory Commission and the Michigan State Historic Preservation Officer for Managing Historic Properties that May be Affected by Issuance of a License to French Hydro LLC for the Continued Operation of the French Paper Hydroelectric Project in Berrien County, Michigan (FERC No. 10624-026)," executed on (*date*), and including but not limited to the Historic Properties Management Plan (HPMP) for the project. Pursuant to the requirements of this Programmatic Agreement, the

licensee must file, for Commission approval, a HPMP within one year of issuance of this order. When filing the HPMP for Commission approval, the licensee must include any documentation of consultation with the Michigan State Historic Preservation Office (Michigan SHPO), Tribes, and stakeholders during the development of the HPMP.

The Commission reserves the authority to require changes to the HPMP at any time during the term of the license. If the Programmatic Agreement is terminated prior to Commission approval of the HPMP, the licensee must obtain approval from the Commission and the Michigan SHPO before engaging in any ground-disturbing activities or taking any other action that may affect any historic properties within the project's area of potential effects.

Draft Article 4XX. *Use and Occupancy*. (a) In accordance with the provisions of this article, the licensee must have the authority to grant permission for certain types of use and occupancy of project lands and waters and to convey certain interests in project lands and waters for certain types of use and occupancy, without prior Commission approval. The licensee may exercise the authority only if the proposed use and occupancy is consistent with the purposes of protecting and enhancing the scenic, recreational, and other environmental values of the project. For those purposes, the licensee must also have continuing responsibility to supervise and control the use and occupancies for which it grants permission, and to monitor the use of, and ensure compliance with the covenants of the instrument of conveyance for, any interests that it has conveyed, under this article. If a permitted use and occupancy violates any condition of this article or any other condition imposed by the licensee for protection and enhancement of the project's scenic, recreational, or other environmental values, or if a covenant of a conveyance made under the authority of this article is violated, the licensee must take any lawful action necessary to correct the violation. For a permitted use or occupancy, that action includes, if necessary, canceling the permission to use and occupy the project lands and waters and requiring the removal of any non-complying structures and facilities.

(b) The type of use and occupancy of project lands and waters for which the licensee may grant permission without prior Commission approval are: (1) landscape plantings; (2) non-commercial piers, landings, boat docks, or similar structures and facilities that can accommodate no more than 10 water craft at a time and where said facility is intended to serve single-family type dwellings; (3) embankments, bulkheads, retaining walls, or similar structures for erosion control to protect the existing shoreline; and (4) food plots and other wildlife enhancement. To the extent feasible and desirable to protect and enhance the project's scenic, recreational, and other environmental values, the licensee must require multiple use and occupancy of facilities for access to project lands or waters. The licensee must also ensure, to the satisfaction of the Commission's authorized representative, that the use and occupancies for which it grants permission are maintained in good repair and comply with applicable state and local health and safety requirements. Before granting permission for construction of bulkheads or retaining walls, the licensee must: (1) inspect the site of the proposed construction, (2) consider

whether the planting of vegetation or the use of riprap would be adequate to control erosion at the site, and (3) determine that the proposed construction is needed and would not change the basic contour of the impoundment shoreline. To implement this paragraph (b), the licensee may, among other things, establish a program for issuing permits for the specified types of use and occupancy of project lands and waters, which may be subject to the payment of a reasonable fee to cover the licensee's costs of administering the permit program. The Commission reserves the right to require the licensee to file a description of its standards, guidelines, and procedures for implementing this paragraph (b) and to require modification of those standards, guidelines, or procedures. project lands for: (1) replacement, expansion, realignment, or maintenance of bridges or roads where all necessary state and federal approvals have been obtained; (2) storm drains and water mains; (3) sewers that do not discharge into project waters; (4) minor access roads; (5) telephone, gas, and electric utility distribution lines; (6) non-project overhead electric transmission lines that do not require erection of support structures within the project boundary; (7) submarine, overhead, or underground major telephone distribution cables or major electric distribution lines (69-kV or less); and (8) water intake or pumping facilities that do not extract more than one million gallons per day from a project impoundment. No later than January 31 of each year, the licensee must file three copies of a report briefly describing for each conveyance made under this paragraph (c) during the prior calendar year, the type of interest conveyed, the location of the lands subject to the conveyance, and the nature of the use for which the interest was conveyed.

(d) The licensee may convey fee title to, easements or rights-of-way across, or leases of project lands for: (1) construction of new bridges or roads for which all necessary state and federal approvals have been obtained; (2) sewer or effluent lines that discharge into project waters, for which all necessary federal and state water quality certification or permits have been obtained; (3) other pipelines that cross project lands or waters but do not discharge into project waters; (4) non-project overhead electric transmission lines that require erection of support structures within the project boundary, for which all necessary federal and state approvals have been obtained; (5) private or public marinas that can accommodate no more than 10 water craft at a time and are located at least one-half mile (measured over project waters) from any other private or public marina; (6) recreational development consistent with an approved report on recreational resources of an Exhibit E; and (7) other uses, if: (i) the amount of land conveyed for a particular use is five acres or less; (ii) all of the land conveyed is located at least 75 feet, measured horizontally, from project waters at normal surface elevation; and (iii) no more than 50 total acres of project lands for each project development are conveyed under this clause (d)(7) in any calendar year. At least 60 days before conveying any interest in project lands under this paragraph (d), the licensee must file a letter with the Commission, stating its intent to convey the interest and briefly describing the type of interest and location of the lands to be conveyed (a marked Exhibit G map may be used), the nature of the proposed use, the identity of any federal or state agency

official consulted, and any federal or state approvals required for the proposed use. Unless the Commission's authorized representative, within 45 days from the filing date, requires the licensee to file an application for prior approval, the licensee may convey the intended interest at the end of that period.

(e) The following additional conditions apply to any intended conveyance under paragraph (c) or (d) of this article:

(1) Before conveying the interest, the licensee must consult with federal and state fish and wildlife or recreation agencies, as appropriate, and the State Historic Preservation Officer.

(2) Before conveying the interest, the licensee must determine that the proposed use of the lands to be conveyed is not inconsistent with any approved report on recreational resources of an Exhibit E; or, if the project does not have an approved report on recreational resources, that the lands to be conveyed do not have recreational value.

(3) The instrument of conveyance must include the following covenants running with the land: (i) the use of the lands conveyed must not endanger health, create a nuisance, or otherwise be incompatible with overall project recreational use; (ii) the grantee must take all reasonable precautions to ensure that the construction, operation, and maintenance of structures or facilities on the conveyed lands will occur in a manner that will protect the scenic, recreational, and environmental values of the project; and (iii) the grantee must not unduly restrict public access to project waters.

(4) The Commission reserves the right to require the licensee to take reasonable remedial action to correct any violation of the terms and conditions of this article, for the protection and enhancement of the project's scenic, recreational, and other environmental values.

(f) The conveyance of an interest in project lands under this article does not in itself change the project boundaries. The project boundaries may be changed to exclude land conveyed under this article only upon approval of revised Exhibit G drawings (project boundary maps) reflecting exclusion of that land. Lands conveyed under this article will be excluded from the project only upon a determination that the lands are not necessary for project purposes, such as operation and maintenance, flowage, recreation, public access, protection of environmental resources, and shoreline control, including shoreline aesthetic values. Absent extraordinary circumstances, proposals to exclude lands conveyed under this article from the project must be consolidated for consideration when revised Exhibit G drawings would be filed for approval for other purposes.

(g) The authority granted to the licensee under this article must not apply to any part of the public lands and reservations of the United States included within the project boundary.

APPENDIX B: WATER QUALITY CONDITIONS ISSUED BY MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY ON APRIL 23, 2018 FOR THE FRENCH PAPER HYDROELECTRIC PROJECT NO. 10624[70]

1.0 Operational Requirements:

1.1 French Hydro shall maintain the level of the French Paper Project impoundment at minimum elevation of 653.75 feet National Geodetic Vertical Datum (NGVD)[71] and any fluctuation shall not exceed - (minus) 0.25 feet on an annual basis, except during events beyond the control of French Hydro, including naturally low flows.

1.2 Upon Federal Energy Regulatory Commission (FERC) license issuance, French Hydro shall operate the French Paper Hydroelectric Project in a run-of-river mode at all times, except for the 72-hour shutdown for downstream fish passage in May as required by the 2004 Michigan Department of Natural Resources agreement, which is included in the pre-application document. Run-of-river means the instantaneous flow downstream of the French Paper Project Powerhouse shall approximately equal instantaneous inflow to the French Paper Project impoundment.

1.3 French Hydro shall, within six months of the FERC license issuance, install a calibrated staff gauge referenced to the National Geodetic Vertical Datum, in the French Paper Project impoundment at a location approved by Michigan Department of Environmental Quality clearly visible to the public. The staff gauge shall be accompanied by a sign that shows the operating levels required by Section 1.1 of this Certification. The French Paper Project impoundment level shall be recorded at least hourly. An annual summary report of all recorded French Paper Project impoundment levels shall be submitted by March 31 each year to the Michigan Department of Environmental Quality. In addition, any recorded French Paper Project impoundment level data shall be submitted within two business days to the Michigan Department of Environmental Quality or the Michigan Department of Natural Resources, upon request.

1.4 French Hydro shall maintain a minimum flow of 120 cubic feet per second in the bypassed natural river channel immediately downstream of the French Paper Project Dam. French Hydro shall cooperate with the

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[70] In April 2019, the Michigan Department of Environmental Quality was restructured as the Michigan Department of Environment, Great Lakes and Energy.

[71] *See* footnote number 15.

Michigan Department of Natural Resources and provide the required minimum flow to operate the fish ladder and to provide flows to the tailrace during an unexpected plant shutdown during low flow periods.

1.5 French Hydro shall continue to provide the current annual level of funding for the United States Geological Survey (USGS) Gauge (Number 04101500), located 0.9 miles downstream of the project, for the duration of the FERC license.

1.6 French Hydro shall, within one year of the FERC license issuance, provide a plan for approval by the Michigan Department of Environmental Quality to monitor the flow of the St. Joseph River downstream of the French Paper Hydroelectric Project on an hourly basis. The USGS Gauge (Number 04101500) shall be used as a compliance point for stream flow. This plan shall be implemented immediately after all approvals required by the FERC license, including Michigan Department of Environmental Quality approval, are obtained. The plan shall include annual submission of summary results to the Michigan Department of Environmental Quality with a copy to the Michigan Department of Natural Resources and a provision for submission of all flow data to the Michigan Department of Environmental Quality or the Michigan Department of Natural Resources within two business days, upon request.

1.7 A three-year test period beginning after the flow monitoring plan in Section 1.6 is implemented shall be used to determine the French Hydro's ability to comply with the requirements listed in Sections 1.1, 1.2, and 1.4 of this Certification. Within 90 days after the end of the three-year test period, French Hydro shall submit a report to the Michigan Department of Environmental Quality that documents French Hydro's ability to comply with the requirements in Sections 1.1, 1.2, and 1.4. If the Michigan Department of Environmental Quality concludes that French Hydro is not able to comply with all of the requirements in Sections 1.1, 1.2, and 1 .4, then French Hydro shall, within one year, in cooperation with the Michigan Department of Environmental Quality and Michigan Department of Natural Resources, develop a corrective action plan and implementation schedule to meet those requirements. French Hydro shall implement the corrective action plan upon approval by the Michigan Department of Environmental Quality and any other agency specified in the FERC license.

1.8 During adverse conditions such as periods of naturally low stream flow when the requirements in Sections 1.1, 1.2, and 1.4 cannot be met, French Hydro shall, within two business days, consult with the Michigan Department of Environmental Quality, Kalamazoo District Supervisor, and the Michigan Department of Natural Resources, regarding emergency actions taken or planned to meet the requirements. Consultation during the

adverse conditions shall continue following a mutually agreed upon schedule. Upon cessation of the adverse conditions, French Hydro shall resume the normal operations.

2.0 Water Quality Limitations:

2.1 French Hydro shall not at any time warm the St. Joseph River downstream from the French Paper Hydroelectric Project, by operation of the project, to temperatures in degrees Fahrenheit higher than the following monthly maximum temperatures:

Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
50	50	55	65	75	85	85	85	85	70	60	50

This Section (2.1) shall not apply when the natural temperatures of the St. Joseph River measured upstream of the French Paper Project impoundment exceed the above monthly maximum temperature values. In such cases the St. Joseph River water temperature downstream from the French Paper Project dam should not exceed the upstream water temperature.

2.2 French Hydro shall not cause the DO concentration measured in the St. Joseph River downstream of the French Paper Hydroelectric Project, by operation of the project, to be less than 5.0 milligrams per liter at any time.

2.3 The compliance point for the temperature and DO limits shall be in the St. Joseph River within 500 feet downstream of the powerhouse, unless upon demonstration by French Hydro, a different compliance point is appropriate and approved by the Michigan Department of Environmental Quality.

2.4 In the event that any of the water quality limitations listed in Sections 2.1 and 2.2 of this certification are not met, French Hydro shall inform the Michigan Department of Environmental Quality, Kalamazoo District Supervisor in writing, within two business days of the problem, how they plan to resolve the issue, and the expected time frame. French Hydro shall inform the Michigan Department of Environmental Quality when they are back in compliance.

3.0 Water Quality Monitoring and Reporting:

3.1 French Hydro shall monitor the temperature and DO of the St. Joseph River hourly from June 1 through September 30 at the compliance point downstream of the French Paper Hydroelectric Project, and at a representative location upstream of the facility (as approved by Michigan Department of Environmental Quality per section 3.4), beginning the first year after the monitoring plan is approved by the Michigan Department of Environmental Quality.

Temperature and DO profile monitoring shall also be conducted in the deepest part of the impoundment every two weeks from June 1 through September 30. Measurements shall be made at 0.5-meter increments or less. Secchi disc depth measurements shall be made at the same time and location as the profiling.

After one year of monitoring, French Hydro may send a written request to the Michigan Department of Environmental Quality to change the frequency of the temperature and DO monitoring. Alternative monitoring frequencies for temperature and DO may be implemented by French Hydro upon written approval from the Michigan Department of Environmental Quality.

3.2 Ten years after the issuance of the FERC license and every ten years thereafter, French Hydro shall analyze the sediments in the impoundment for the following parameters:

Oil and Grease	Total Arsenic
Total Cadmium	Total Chromium
Total Copper	Total Lead
Total Mercury	Total Nickel
Total Selenium	Total Phosphorus
Total Zinc	Total PCBs
Total Silver	

Other sediment data of adequate quality less than three years old from the French Paper Hydroelectric Project impoundment may be substituted upon approval of the Michigan Department of Environmental Quality.

3.3 Beginning one year after the issuance of the FERC license and every ten years thereafter, French Hydro shall monitor the edible portion of fish from the French Paper Project impoundment for total mercury and PCBs. The sample shall consist of ten legal size resident predator fish of one species and ten bottom feeder fish of one species that are representative of the sizes normally consumed by anglers. Fish shall be individually analyzed. Other fish tissue data of adequate quality less than five years old from the impoundment may be substituted upon approval of the Michigan Department of Environmental Quality.

3.4 French Hydro shall, within six months of the FERC license issuance, submit a plan for approval by the Michigan Department of Environmental Quality, for the monitoring specified in Sections 3.1-3.3, including consideration of Quality Assurance/Quality Control (QA/QC) protocols.

All analytical methods used shall be those approved by the United States Environmental Protection Agency pursuant to Title 40 of the Code of Federal Regulations, Part 136, or methods approved by the Michigan Department of Environmental Quality. An annual report of the data generated to comply with Sections 3.1-3.3 shall be submitted to the Michigan Department of Environmental Quality within three months of completing the analysis or, for Sections 3.2 and 3.3, within 3 months of Michigan Department of Environmental Quality approval to use other fish tissue or sediment data if such approval is given. The report shall include a summary of quality assurance data.

Monitoring reports shall include, at a minimum, the following provisions:

A. A determination of the daily minimum, daily average, and daily maximum DO and temperature for each monitoring station. Data shall not be censored. An accounting shall be made for the entire monitoring period. Data gaps shall be fully explained.

B. An upstream/downstream comparison of the DO and temperature, including the frequency and magnitude of any values that exceed or violate the MWQS at each station.

C. An evaluation of the relation between any observed temperature and DO violations and other environmental factors that were monitored, and operating characteristics of the French Paper Hydroelectric Project.

3.5 Alternative frequencies for the monitoring required in this section may be implemented upon written approval from the Michigan Department of Environmental Quality.

4.0 Bank Erosion Control:

4.1 Within one year of FERC license issuance, French Hydro shall submit and implement a plan to the Michigan Department of Environmental Quality for a periodic inspection program to promptly identify any new erosion caused by the French Paper Hydroelectric Project. Prior to implementation, the plan shall be approved by the Michigan Department of Environmental Quality. The plan shall specify the scope of the areas to be inspected, the criteria for identifying erosion needing corrective measures, and prompt action when corrective measures are needed. The plan shall be effective immediately following all approvals required in the FERC license.

5.0 Natural Organic Debris Maintenance:

5.1 French Hydro shall, within one year of the issuance of the FERC license, develop and submit for approval by the Michigan Department of Environmental Quality, a plan to pass natural debris (logs, stumps, sticks, limbs, leaves) collected on the trashracks and log booms over the dam.

French Hydro shall remove and properly dispose of all other materials collected in the trashracks and spill gates including aquatic plants. The plan shall include appropriate safety provisions and a schedule for implementation.

6.0 Schedule Modification:

6.1 The Michigan Department of Environmental Quality may modify the specified implementation schedules within this Certification upon written request from French Hydro, in the event French Hydro, despite their good faith effort, is unable to meet the schedules specified within this Certification because of events beyond their control.

7.0 Temporary Modification of Operational Requirements:

7.1 Operational requirements specified in Section 1.0 of this Certification may be temporarily suspended for completion of necessary inspections, maintenance activities, dam safety activities, or in response to emergency requests from government agencies provided that prior written approval is obtained from the Michigan Department of Environmental Quality, Kalamazoo District Supervisor, and the Michigan Department of Natural Resources.

8.0 Natural Resource Damages and Penalties:

8.1 The state reserves the right to seek civil and/or criminal penalties and liabilities under applicable law for natural resource damages that may occur.

9.0 Permits and Approvals:

9.1 The issuance of this Certification does not authorize violation of any federal, state, or local laws or regulations, nor does it obviate the necessity of obtaining such permits, including any Michigan Department of Environmental Quality permits, or approvals from other units of government as may be required by law. For all proposed drawdowns and refills for dam maintenance purposes, French Hydro shall obtain any necessary state of Michigan permits.

10.0 Right of Entry:

10.1 French Hydro shall allow the Michigan Department of Environmental Quality, or any agent appointed by the Michigan Department of Environmental Quality, upon the presentation of credentials, to enter upon French Hydro's premises at reasonable times, to have access to, and copy any records required to be kept under the conditions of this Certification, and to inspect the facilities or to conduct any environmental sampling.

Michigan Department of Environmental Quality agents shall comply with French Hydro personnel safety requirements while on French Hydro property unless more stringent safety procedures are required by the State of Michigan.

11.0 Changes:

11.1 French Hydro shall provide written notification to the Michigan Department of Environmental Quality and a copy to the Michigan Department of Natural Resources within ten days of any change that has occurred or may occur in the structures or operation of the French Paper Hydroelectric Project, which may affect compliance with this Certification or the water quality standards.

12.0 Revocation:

12.1 If the Michigan Department of Environmental Quality determines that the French Paper Hydroelectric Project can no longer comply with Section 401 (a) of the Clean Water Act and the water quality standards, then this Certification may be revoked or modified after appropriate notice.