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DEPARTMENT OF ENERGY
Federal Energy Regulatory Commission

[Project No. 3030-019]

Antrim County; Notice Of Availability Of Environmental Assessment

In accordance with the National Environmental Policy Act of 1969 and the Federal Energy Regulatory Commission's (Commission or FERC) regulations, 18 Code of Federal Regulations Part 380 (Order No. 486,52 Federal Register 47879), the Office of Energy Projects has reviewed Antrim County's application for a subsequent license for the Elk Rapids Hydroelectric Project (FERC No. 3030), located on the Elk River in the Village of Elk Rapids in Antrim, Grand Traverse, and Kalkaska Counties, Michigan, and prepared an environmental assessment (EA).

In the EA, Commission staff analyze the potential environmental effects of relicensing the project, and conclude that issuing a subsequent license for the project, with appropriate environmental measures, would not constitute a major federal action significantly affecting the quality of the human environment.

A copy of the EA is available for review at the Commission in the Public Reference Room or may be viewed on the Commission's web site at www.ferc.gov using the "eLibrary" link. Enter the docket number, excluding the last three digits, in the docket number field to access the document. For assistance, contact FERC Online Support at FERCOnlineSupport@ferc.gov or toll-free number at 1-866-208-3676, or for TTY, 202-502-8659.

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For further information, please contact Patrick Ely by telephone at (202) 502-8570 or by email at Patrick.Ely@ferc.gov.

Dated: May 15, 2015

Kimberly D. Bose,
Secretary.

**ENVIRONMENTAL ASSESSMENT
FOR
HYDROPOWER LICENSE**

Elk Rapids Hydroelectric Project
FERC Project No. 3030-019
Michigan

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

May 2015

TABLE OF CONTENTS

TABLE OF CONTENTS	ii
LIST OF TABLES	v
ACRONYMS AND ABBREVIATIONS.....	vi
EXECUTIVE SUMMARY.....	vii
1.0 INTRODUCTION.....	1
1.1 APPLICATION.....	1
1.2 PURPOSE OF ACTION AND NEED FOR POWER	1
1.2.1 Purpose of Action.....	1
1.2.2 Need for Power	2
1.2 STATUTORY AND REGULATORY REQUIREMENTS	5
1.2.1 Federal Power Act	5
1.2.2 Clean Water Act.....	5
1.2.3 Endangered Species Act.....	6
1.2.4 Coastal Zone Management Act.....	6
1.2.5 National Historic Preservation Act.....	7
1.3 PUBLIC REVIEW AND COMMENT	7
1.3.1 Scoping.....	7
1.3.2 Interventions	8
1.3.3 Comments on the Application.....	8
2.0 PROPOSED ACTION AND ALTERNATIVES	9
2.1 NO-ACTION ALTERNATIVE	9
2.1.1 Existing Project Facilities	9
2.1.2 Project Safety	11
2.1.3 Existing Project Operation.....	11
2.2 APPLICANT'S PROPOSAL	13
2.2.1 Proposed Project Facilities	13
2.2.2 Proposed Project Operation.....	13
2.2.3 Proposed Environmental Measures	13
2.3 STAFF ALTERNATIVE	13
2.4 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED STUDY	14
2.4.1 Issuing a Non-power License	14
2.4.2 Federal Government Takeover of the Project	14
2.4.3 Retiring the Project.....	15
3.0 ENVIRONMENTAL ANALYSIS.....	16
3.1 GENERAL DESCRIPTION OF THE RIVER BASIN.....	16
3.2 SCOPE OF CUMULATIVE EFFECTS ANALYSIS	18
3.3 PROPOSED ACTION AND ACTION ALTERNATIVES	18
3.3.1 Aquatic Resources	19
3.3.2 Terrestrial Resources.....	32

3.3.3	Threatened and Endangered Species	33
3.3.4	Recreation, Land Use, and Aesthetic Resources	37
3.3.5	Cultural Resources.....	43
3.4	NO-ACTION ALTERNATIVE	44
4.0	DEVELOPMENTAL ANALYSIS	45
4.1	POWER AND ECONOMIC BENEFITS OF THE PROJECT.....	45
4.2	COMPARISON OF ALTERNATIVES.....	46
4.2.1	No-Action Alternative	47
4.2.2	Applicant’s Proposal	47
4.2.3	Staff Alternative	47
4.3	COST OF ENVIRONMENTAL MEASURES	48
5.0	CONCLUSIONS AND RECOMMENDATIONS.....	52
5.1	COMPREHENSIVE DEVELOPMENT AND RECOMMENDED ALTERNATIVE	52
5.1.1	Measures Proposed by Antrim County	52
5.1.2	Additional Measures Recommended by Staff.....	53
5.1.3	Measures Not Recommended by Staff.....	54
5.1.4	Conclusion	55
6.0	CONSISTENCY WITH COMPREHENSIVE PLANS	56
7.0	FINDING OF NO SIGNICANT IMPACT	57
8.0	LITERATURE CITED	58
9.0	LIST OF PREPARERS	63

LIST OF FIGURES

Figure 1. Location of the Elk Rapids Hydroelectric Project, Michigan (Source: Antrim County, 2012; as modified by staff).	4
Figure 2. Project facilities for the Elk Rapids Project (Source: Antrim County, 2012)..	10
Figure 3. Elk Rapids Project vicinity and direction of water flow through the chain-of-lakes (Source: Antrim County, 2012; as modified by staff).	17
Figure 4. Public access sites around the Elk Rapids Project reservoir (Source: Antrim County, 2012; as modified by staff).	40
Figure 5. Recreation facilities in the Elk Rapids Project boundary (Source: Antrim County, 2012).....	41

LIST OF TABLES

Table 1. Calculated monthly flows at the Elk Rapids Project intake from 2001-2011. (Source: Michigan DNR, 2011; Antrim County, 2011; as modified by staff).	21
Table 2. NPDES Permits within the Elk Rapids Project Vicinity [Source: U.S. Environmental Protection Agency (EPA), 2012a].	22
Table 3. EPA and State of Michigan attainment goals at the Elk Rapids Project reservoir for Cold Water Fishery, Agriculture, Public Water Supply, and Navigation. (Source: Staff)	23
Table 4. Summary of state water quality standards for DO and water temperature applicable to the Elk Rapids Project boundary (Source: State of Michigan, 1994, as modified by staff).	23
Table 5. Public Water Access Sites at the Elk Rapids Project. (Source: Staff).....	37
Table 6. Parameters for the economic analysis of the Elk Rapids Project (Source: Antrim County, 2012; as modified by staff).	46
Table 7. Summary of annual cost of alternative power and annual project cost for the action alternatives for the Elk Rapids Project (Source: Antrim County, 2012; as modified by staff staff).....	47
Table 8. Cost of environmental mitigation and enhancement measures considered in assessing the environmental effects of continued operation of the Elk Rapids Project (Source: Staff).....	49

ACRONYMS AND ABBREVIATIONS

APE	area of potential effects
cfs	cubic feet per second
chain-of-lakes	Elk River Chain of Lakes
Commission	Federal Energy Regulatory Commission
Consumers Energy	Consumers Energy Company
CWA	Clean Water Act
CZMA	Coastal Zone Management Act
dam gage datum	Elk Rapids dam gage datum
DO	dissolved oxygen
EA	environmental assessment
Elk Rapids Hydro	Elk Rapids Hydroelectric Power, LLC
Elk Rapids Project or project	Elk Rapids Hydroelectric Project
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
°F	degrees Fahrenheit
FERC	Federal Energy Regulatory Commission
FPA	Federal Power Act
FWS	U.S. Fish and Wildlife Service
Interior	U.S. Department of Interior
Lakes Association	Three Lakes Association
mg/l	milligrams per liter
Michigan DEQ	Michigan Department of Environmental Quality
Michigan DNR	Michigan Department of Natural Resources
Michigan SHPO	Michigan State Historic Preservation Officer
MISO	Midcontinent Independent System Operator, Inc.
MiSWIMS	Michigan Surface Water Information Management System
MW	megawatt
MWh	megawatt-hour
National Register	National Register of Historic Places
NERC	North American Electric Reliability Corporation
NHPA	National Historic Preservation Act
NPDES	National Pollution Discharge Elimination System
RFC	ReliabilityFirst Corporation
USGS	United State Geological Survey
Watershed Council	Tipp of the Mitt Watershed Council
WQC	Water Quality Certification

EXECUTIVE SUMMARY

Proposed Action

On December 21, 2012, Antrim County filed an application with the Federal Energy Regulatory Commission (Commission) for a new license for the continued operation and maintenance its Elk Rapids Hydroelectric Project No. 3030-019 (Elk Rapids Project or project).¹ The 0.700 megawatt (MW) project is located on the Elk River in the Village of Elk Rapids in Antrim, Grand Traverse, and Kalkaska Counties, Michigan. Antrim County does not propose any increase in the project's generating capacity or any new construction. The project does not occupy any federal land.

Project Description

The Elk Rapids Project consists of the following existing facilities: (1) a reservoir that includes the 2,560-acre Skegemog Lake and the 7,730-acre Elk Lake; (2) a 121-foot-long, 52-foot-high, 26-foot-wide powerhouse that spans the north channel of the Elk River, with an approximate operating head of 10.5 feet; (3) intake trashracks having a 1.75-inch clear bar spacing; (4) four intake bays, each 22 feet wide with sliding head gates; (5) two 525 horsepower Francis turbines, each coupled to a generator with an installed capacity of 0.350 MW, for a total installed capacity of 0.700 MW; (6) two turbine gate cases used to spill excess water through the two intake bays that do not contain turbines and generators; (7) a 14-foot-wide overflow spillway located about 400 feet south of the powerhouse on the south channel of the Elk River; (8) a 4.16-kilovolt (kV) transmission line that extends about 30 feet from the powerhouse to a 20-foot by 30-foot substation enclosure; (9) a 50-foot-long underground 12.5-kV transmission line; and (10) appurtenant facilities. Recreation facilities at the project include an angler walkway that is attached to the tailrace side of the powerhouse and a parking lot adjacent to the powerhouse. The average annual generation is about 2,422 megawatt-hours.

Antrim County operates the project in a modified run-of-river mode.² The water surface elevation of the project reservoir (measured as Elk Rapids dam gage datum (dam gage datum) is maintained at 590.8 feet dam gage datum from April 15 through

¹ The project is owned by Antrim County and is manually operated by Elk Rapids Hydroelectric Power, LLC.

² The project is operated in a modified run-of-river mode, whereby the flows through the powerhouse and bypassed spillway approximately equals inflow of the Elk River, but are modified so as to maintain the seasonal water levels of Elk and Skegemog Lakes, as required by the order approving settlement and amending license. *See* 88 FERC ¶ 62, 158 (1999).

November 1 and at 590.2 feet dam gage datum from November 1 through April 15.³ Flows greater than the capacities of the project's two operating turbine / generator units are passed through one or both of the two overflow turbine gate cases. When flows in the Elk River are too low to operate one turbine / generator unit, the overflow turbine gate case is used with decreased gate openings to maintain a modified run-of-river mode of operation.

Proposed Environmental Measures

Antrim County proposes to continue operating the project in a modified run-of-river mode to maintain existing seasonal lake levels. Antrim County also proposes to continue to operate and maintain the existing angler walkway and associated parking lot. No other environmental measures are proposed.

Public Involvement

Before filing its license application, Antrim County conducted pre-filing consultation under the Commission's Traditional Licensing Process. The intent of the Commission's pre-filing process is to initiate public involvement early in the project planning process and to encourage citizens, governmental entities, tribes, and other interested parties to identify and resolve issues prior to an application being formally filed with the Commission.

Before preparing this environmental assessment (EA), staff conducted scoping to determine what issues and alternatives should be addressed. A scoping document was distributed to interested parties on August 29, 2013, which solicited comments, recommendations, and information on the project. Two scoping meetings were held on September 19, 2013, in Elk Rapids, Michigan. On December 26, 2013, staff issued a ready for environmental analysis notice, requesting comments, recommendations, terms and conditions, and prescriptions.

Alternatives Considered

This EA considers the following alternatives: (1) Antrim County's proposal; (2) Antrim County's proposal with staff modifications (staff alternative); and (3) no action, meaning the project would continue to be operated as it presently with no changes. The staff alternative includes Antrim County's proposed measures with some additions as described below. Staff's recommended additional environmental measures

³ The elevations 590.80 and 590.20 feet dam gage datum are equivalent to 588.26 and 587.66 feet International Great Lakes Datum of 1955, respectively.

include, or are based on, recommendations made by federal and state resource agencies that have an interest in resources that may be affected by operation of the proposed project.

The staff alternative includes the following additional measures:

- (1) an operation compliance monitoring plan that includes a description of project operation and the equipment and procedures necessary to maintain and monitor compliance with the operational mode required in any license issued;
- (2) posting signage that describes proper boat maintenance techniques to reduce the spread of invasive plant and mussel species; and
- (3) if archaeological resources are discovered during project operation or other project-related activities, cease all activities related to the disturbance and discovery area, and consult with the Michigan State Historic Preservation Officer (Michigan SHPO) to determine appropriate treatment.

Under the no-action alternative, the project would continue to operate and the terms of the existing license. No new environmental protection, mitigation, or enhancement measures would be implemented.

Environmental Impacts and Measures of the Staff Alternative

The primary issue associated with relicensing the Elk Rapids Project is the regulation of the reservoir elevation, invasive species, and recreational opportunities. Below we summarize the environmental effects associated with staff's alternative and the measures recommended to address those effects.

Aquatic Resources

Operating the project in a modified run-of-river mode would enable the project to continue to maintain seasonal lake levels in Elk and Skegemong Lakes. Because the project currently operates in a modified run-of-river mode, minimal changes to aquatic habitat are expected in the reservoir, bypassed reach, and within the project tailrace by continuing this mode of operation.

An operation compliance monitoring plan that includes a description of project operation and the equipment and procedures that would be used by Antrim County to monitor project operation would provide a means to verify compliance with the operational requirements of any license issued for the project. Verifying compliance would, in turn, prevent possible misunderstandings of project operation and reduce the likelihood of noncompliance.

Invasive curlyleaf pondweed, Eurasian watermilfoil, and zebra mussels, which are all primarily transferred to other waterbodies by boat, are found within and adjacent to the project boundary and are present in the Elk River Chain of Lakes (chain-of-lakes) watershed.⁴ Zebra mussels are so pervasive throughout the chain-of-lakes, Michigan DEQ has no plan to control or eradicate the in the chain-of-lakes watershed. Posting signage that describes proper boat maintenance techniques to reduce the spread of curlyleaf pondweed, Eurasian watermilfoil, and zebra mussels would limit the spread of these invasive species to other waterbodies, benefiting native species.

Terrestrial Resources

Current project operation and the presence of the project powerhouse have been successful in preventing invasive fish species in Lake Michigan from passing upstream of project into the chain-of-lakes. Antrim County's proposal to continue current project operation would ensure that invasive fish species are blocked from passing upstream of the powerhouse.

Threatened and Endangered Species

Kirtland's warbler, Rufa red knot, Pitcher's thistle, Houghton's goldenrod, and northern long-eared bat are known to occur in Antrim, Grand Traverse, and/or Kalkaska Counties, Michigan; however, no federally listed threatened or endangered species are known to occur within the project affected area. Continued operation of the project would not affect the federally listed Kirtland's warbler, Rufa red knot, Pitcher's thistle, and Houghton's goldenrod because each species requires specialized habitat that does not exist within the project boundary or in areas potentially affected by the project.

Continued operation of the project would not affect the federally listed northern long-eared bat. The project is located in an area that does not contain habitat needed for winter hibernation. Also, although a limited amount of dispersed riparian and wetland habitat in the project boundary could be used by northern long-eared bats for roosting, foraging, and breeding, this habitat would not be affected because there would be no changes to project operation, no new construction, and there would be no changes to seasonal water levels. Also, any maintenance activities would be restricted to areas around the powerhouse and transmission lines, which do not contain habitat for the northern long-ear bat.

⁴ The chain-of-lakes watershed is a 75-mile-long waterway consisting of 14 lakes (including Elk and Skegemog Lakes) and connecting rivers that discharge to empty into Grand Traverse Bay, Lake Michigan.

Recreation, Land Use, and Aesthetics

There are 38 public access points and three marinas around the project reservoir or downstream of the project. In addition, Antrim County owns and operates an existing angler walkway and parking lot. Antrim County proposes to continue to operate and maintain the existing angler walkway and parking lot, and does not propose any changes to current project operation. The project would have no effect on existing recreational use because there would be no change in existing lake levels, recreational opportunities, or access.

Cultural Resources

The project would not affect any known properties eligible for, or listed on, the National Register of Historic Places. However, there is a possibility that unknown archaeological resources may be discovered during project operation or project-related activities. To ensure proper treatment of any such unknown archaeological resources that may be discovered, Antrim County would cease all land-disturbing activities and notify the Michigan SHPO of any unknown archaeological resources that are discovered, and follow the Michigan SHPO's guidance regarding the evaluation of the archaeological resource and, if necessary, ways to avoid, lessen, or mitigate for any adverse effects.

Conclusions

Based on our analysis, we recommend licensing the project as proposed by Antrim County, with staff modifications and additional measures.

In section 4.2 of the EA, *Comparison of Alternatives*, we estimate the likely cost of alternative power for each of the alternatives identified above. Our analysis shows that during the first year of operation under the no-action alternative, project power would cost \$50,378, or \$20.80/megawatt hour (MWh), more than the likely alternative cost of power. Under Antrim County's proposal, project power would cost \$50,644, or \$20.91/MWh, more than the likely alternative cost of power. Under the staff alternative, project power would cost \$51,346, or \$21.20/MWh, more than the likely alternative cost of power.

Based on our independent review of agency comments filed on this project and our review of the environmental and economic effects of the proposed project and its alternatives, we selected the staff alternative, as the preferred option. The staff alternative includes the applicant's proposal with additional staff-recommended measures.

We chose the staff alternative as the preferred alternative because: (1) the project would continue to provide a dependable source of electrical energy for the local area; (2) the 0.700 MW of electric capacity comes from a renewable resource that does not contribute to atmospheric pollution, including greenhouse gases; and (3) the environmental measures proposed by Antrim County, as modified by staff, would adequately protect and enhance environmental resources affected by the project. The overall benefits of the staff alternative would be worth the cost of the recommended environmental measures.

We conclude that issuing a subsequent license for the project, with the environmental measures we recommend, would not be a major federal action significantly affecting the quality of the human environment.

ENVIRONMENTAL ASSESSMENT

**Federal Energy Regulatory Commission
Office of Energy Projects
Division of Hydropower Licensing
Washington, D.C.**

**Elk Rapids Hydroelectric Project
FERC Project No. 3030-019 - Michigan**

1.0 INTRODUCTION

1.1 APPLICATION

On December 21, 2012, Antrim County (or applicant) filed an application with the Federal Energy Regulatory Commission (Commission) for a subsequent license for the existing Elk Rapids Hydroelectric Project (Elk Rapids Project or project).⁵ The 0.700 megawatt (MW) project is located on the Elk River in the Village of Elk Rapids in Antrim, Grand Traverse, and Kalkaska Counties, Michigan (figure 1). The project does not occupy any federal lands. The project generates an average of about 2,422 megawatt-hours (MWh) of energy annually. Antrim County is not proposing any change in operation, new construction, or new generating capacity.

1.2 PURPOSE OF ACTION AND NEED FOR POWER

1.2.1 Purpose of Action

The purpose of the Elk Rapids Project is to continue to provide a source of hydroelectric power to meet the region's power needs. Therefore, under the provisions of the Federal Power Act (FPA), the Commission must decide whether to issue a license to Antrim County for the Elk Rapids Project and what conditions should be placed on any license issued. In deciding whether to issue a license for a hydroelectric project, the Commission must determine that the project will be best adapted to a comprehensive plan for improving or developing a waterway. In addition to the power and developmental purposes for which licenses are issued (such as flood control, irrigation, 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

⁵ The project is owned by Antrim County and is manually operated by Elk Rapids Hydroelectric Power, LLC (Elk Rapids Hydro).

wildlife resources; (3) the protection of recreational opportunities; and (4) the preservation of other aspects of environmental quality.

Issuing a subsequent license for the project would allow Antrim County to generate electricity at the project for the term of a subsequent license, making electric power from a renewable resource available for sale to Consumers Energy Company (Consumers Energy).

In this environmental assessment (EA), we assess the environmental and economic effects of continuing to operate the project: (1) as proposed by Antrim County; and (2) with staff's recommended measures (staff alternative). We also consider the effects of the no-action alternative. Important issues that are addressed include the project's effects on aquatic, terrestrial, threatened and endangered species, and recreation resources.

1.2.2 Need for Power

The Elk Rapids Project would provide hydroelectric generation to meet part of the region's power requirements, resource diversity, and capacity needs. The project would have an installed capacity of 0.700 MW and generate approximately 2,422 MWh per year.

The North American Electric Reliability Corporation (NERC) annually forecasts electrical supply and demand nationally and regionally for a 10-year period. The Elk Rapids Project is located in the ReliabilityFirst Corporation (RFC) regional entity of NERC. However, the NERC assessment was performed on the Midcontinent Independent System Operator, Inc. (MISO) area although the Elk Rapids Project belongs to the RFC regional entity. These assessment boundaries were intended to more accurately reflect the planning and operational properties of the bulk power system. MISO anticipates a system-wide growth rate of approximately 0.72 percent, causing Total Internal Demands of 96,879 MW and 103,056 MW in 2014 and 2023, respectively. The MISO summer Adjusted Potential Planning Reserve Margin⁶ is forecasted to range from 24.55 percent in 2014 to 20.28 percent in 2023. The MISO winter Adjusted Potential Planning Reserve Margin is forecasted to range from 50.81 percent in 2014/2015 to 44.70 percent in 2023/2024. Throughout the assessment period, neither the summer nor the winter Adjusted Planning Potential Reserve Margins are forecasted to fall below the Reference Margin Level of 14.20 percent. However, the MISO summer Anticipated Planning Reserve Margin is forecasted to range from 18.28 percent in 2014

⁶ Planning Reserve Margin is approximately equivalent to the following: [(capacity minus demand) divided by demand]. Planning Reserve Margin replaced Capacity Margin for NERC assessments in 2009.

to 3.44 percent in 2023. The MISO winter Anticipated Planning Reserve Margin is forecasted to range from 43.22 percent in 2014/2015 to 24.44 percent in 2023/2024. Based on MISO's current awareness of projected retirements and the resource plans of its membership, Planning Reserve Margins would erode over the course of the next couple of years and would not meet the 14.2 percent Reference Margin Level. The impacts of environmental regulations and economic factors contribute to a potential shortfall of 6,750 MW, or a 7.0 percent Anticipated Planning Reserve Margin (7.2 percentage points below the Reference Margin Level) by summer 2016. Accordingly, Existing-Certain resources are projected to be reduced by 10,382 MW because of retirement and suspended operation. At a 7.0 percent Anticipated Reserve Margin in 2016, MISO does not have enough Planning Resources to effectively manage risk associated with load uncertainty and system outages and has an 87.0 percent chance of shedding firm load on 2016 peak (NERC, 2013).

We conclude that power from the Elk Rapids Project would help meet a need for power in the MISO 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.

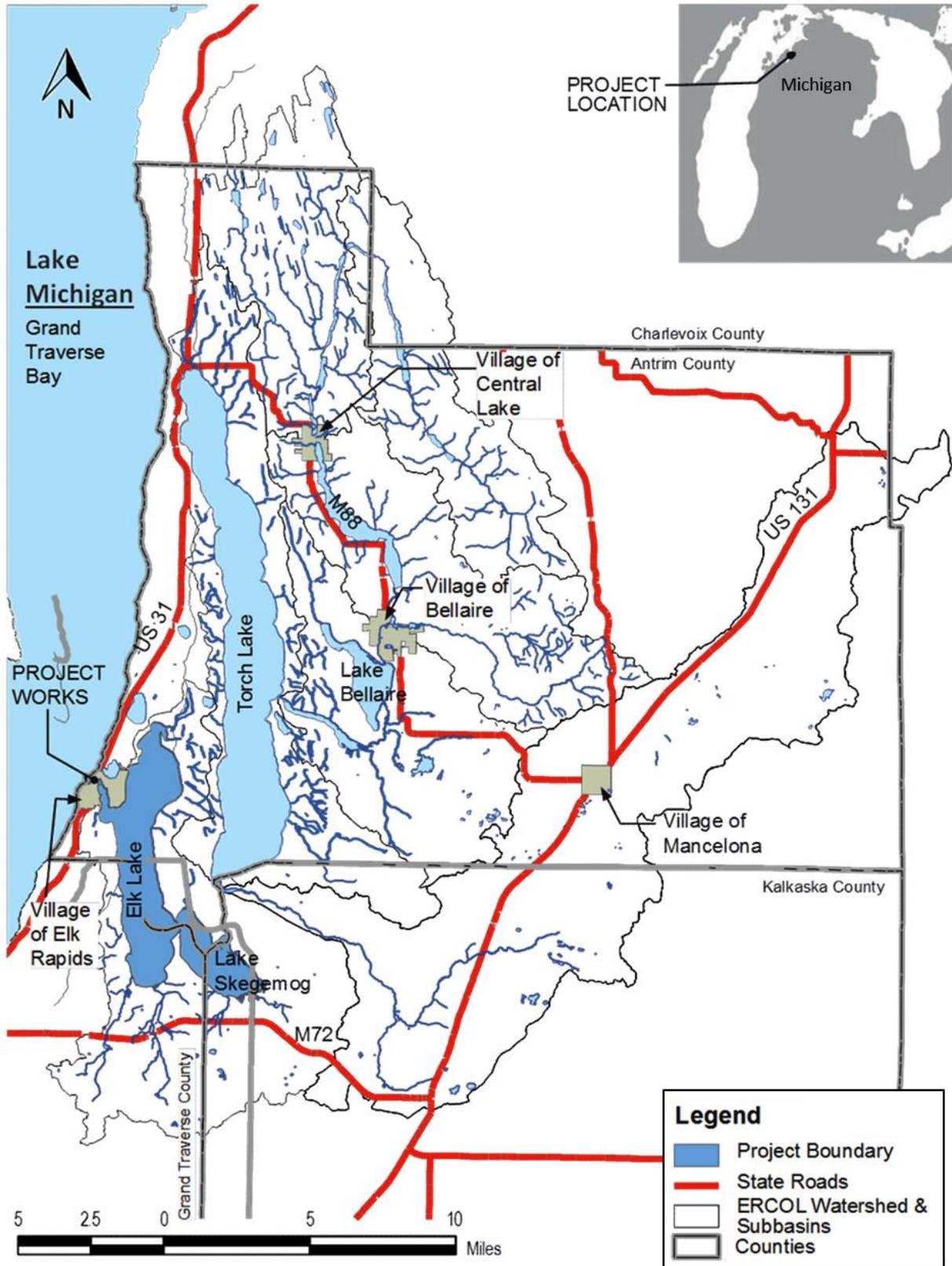


Figure 1. Location of the Elk Rapids Hydroelectric Project, Michigan (Source: Antrim County, 2012; as modified by staff).

1.2 STATUTORY AND REGULATORY REQUIREMENTS

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

1.2.1 Federal Power Act

1.2.1.1 Section 18 Fishway Prescriptions

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

1.2.1.2 Section 10(j) Recommendations

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

1.2.2 Clean Water Act

Under section 401 of the Clean Water Act (CWA), a license applicant must obtain certification from the appropriate state pollution control agency verifying compliance with the CWA. On September 21, 2009, Antrim County applied to the Michigan Department of Environmental Quality (Michigan DEQ) for a section 401 water quality certification (WQC) for the Elk Rapids Project. Michigan DEQ issued the WQC for the Elk Rapids Project on June 26, 2012; however, because Michigan DEQ did not act on the request within 1 year from receipt of the request, the WQC is considered waived.⁷

⁷ Although the 401 WQC issued by Michigan DEQ is considered waived, relevant conditions of the 401 WQC have been analyzed in this EA as recommendations pursuant to section 10(a) of the FPA.

1.2.3 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 U.S. Fish and Wildlife Service (FWS) records in April 2015 indicate that one federally listed endangered species, the Kirtland's warbler (*Setophaga kirtlandii*), and 4 federally listed threatened species: (1) the Northern long-eared bat (*Myotis septentrionalis*); (2) Rufa red knot (*Calidris canutus rufa*); (3) Pitcher's thistle (*Cirsium pitcher*); (4) and Houghton's goldenrod (*Solidago houghtonii*) are listed as occurring within one or more of the counties where the Elk Rapids Project exists.⁸ There is no designated critical habitat for these species.

The types of habitats needed for the Kirtland's warbler, Rufa red knot, Pitcher's thistle, and Houghton's goldenrod are not present at the project. Although a limited amount of dispersed riparian and wetland habitat in the project boundary could be used for foraging, roosting, and breeding by northern long-eared bats, this habitat would not be affected because there would be no changes to project operation, no new construction, and no trees would be removed as part of the proposed relicensing of the project. Also, maintenance activities would be restricted to areas around the powerhouse and transmission lines, which do not contain habitat for the northern long-ear bat. We conclude that licensing the Elk Rapids Project, as proposed by Antrim County and with staff recommended measures, would not affect listed species and no further consultation under section 7 is needed.

1.2.4 Coastal Zone Management Act

Under section 307(c)(3)(A) of the Coastal Zone Management Act (CZMA), 16 United States Code [U.S.C.] §1456(3)(A), the Commission cannot issue a license for a project within or affecting a state's coastal zone unless the state CZMA agency concurs with the license applicant's WQC 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 WQC.

By letter dated September 28, 2012, and filed with the license application, Michigan DEQ stated that the project is located within the state-designated coastal

⁸ Except for the federally threatened Houghton's goldenrod, which is only listed in Kalkaska County, all of the other federally listed species are listed as occurring in Antrim, Grand Traverse, and Kalkaska Counties.

management boundary. However, Michigan DEQ determined that if the Commission's license requirements would be implemented, there would be no adverse effects to coastal resources from the relicensing of the project. Michigan DEQ concluded that the project would be considered consistent with the CZMA.

1.2.5 National Historic Preservation Act

Section 106 of the National Historic Preservation Act (NHPA)⁹ requires that every federal agency "take into account" how each of 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).

By letter dated October 28, 2010, and filed with the license application, the Michigan State Historic Preservation Officer (Michigan SHPO) determined that there are no historic properties within the project's area of potential effects (APE). We have determined that there are no historic properties within the project's APE and that the project would not affect historic properties. Therefore, the Commission's regulatory requirements pertaining to section 106 of the NHPA have been satisfied.

1.3 PUBLIC REVIEW AND COMMENT

The Commission's regulations (18 CFR § 4.38) require that applicants 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, ESA, NHPA, and other federal statutes. Pre-filing consultation must be complete and documented according to the Commission's regulations.

1.3.1 Scoping

Before preparing this EA, we conducted scoping to determine what issues and alternatives should be addressed in the EA. A scoping document was distributed to interested agencies and other stakeholders on August 29, 2013. The scoping meeting was noticed in the Federal Register on September 6, 2013. Two scoping meetings were held on September 19, 2013, in Elk Rapids, Michigan, to request oral comments on the project. 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.

⁹ 54 U.S.C. § 306108 (2014).

1.3.2 Interventions

On December 26, 2013, the Commission issued a notice accepting Antrim County's application to license the Elk Rapids Project and soliciting protests and motions to intervene. This notice set February 24, 2013, as the deadline for filing protests and motions to intervene. In response to the notice, Michigan DNR filed a timely motion to intervene on February 14, 2013.

1.3.3 Comments on the Application

A notice requesting terms, conditions, prescriptions, and recommendations was issued on December 26, 2013. The notice also stated that the application was ready for environmental analysis. No entities filed comments.

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 existing license, and no new environmental protection, mitigation, or enhancement measures would be implemented. We use this alternative to establish the baseline environmental conditions for comparison with other alternatives.

2.1.1 Existing Project Facilities

The Elk Rapids Project consists of the following existing facilities: (1) a project reservoir that includes the 2,560-acre Skegemog Lake and the 7,730-acre Elk Lake; (2) a 121-foot-long, 52-foot-high, 26-foot-wide powerhouse that spans the north channel of the Elk River, with an approximate operating head of 10.5 feet; (3) intake trashracks having a 1.75-inch clear bar spacing; (4) four intake bays, each 22 feet wide with sliding head gates; (5) two 525 horsepower Francis turbines, each coupled to a generator with an installed capacity of 0.350 MW, for a total installed capacity of 0.700 MW; (6) two turbine gate cases used to spill excess water through the two intake bays that do not contain turbines and generators; (7) a 14-foot-wide overflow spillway located about 400 feet south of the powerhouse on the south channel of the Elk River, which consists of two adjacent concrete drop structures, each with a 7-foot-long stop log to control the lake level, with each drop structure leading to a 62.5-foot-long by 4.5-foot-diameter culvert that passes under Dexter Street; (8) a 4.16-kilovolt (kV) transmission line that extends about 30 feet from the powerhouse to a 20-foot by 30-foot substation enclosure; (9) a 50-foot-long underground 12.5-kV transmission line to connect the project substation to Consumers Energy Company's distribution lines; (10) an angler walkway that is attached to the tailrace side of the powerhouse and a parking lot adjacent to the powerhouse; and (11) appurtenant facilities.

The proposed project boundary would fully enclose all permanent project features, including the powerhouse, overflow spillway, and the project reservoir, which consists of Skegemog Lake, Elk Lake, and the upper Elk River (i.e., the portion of Elk River upstream of the project's powerhouse).

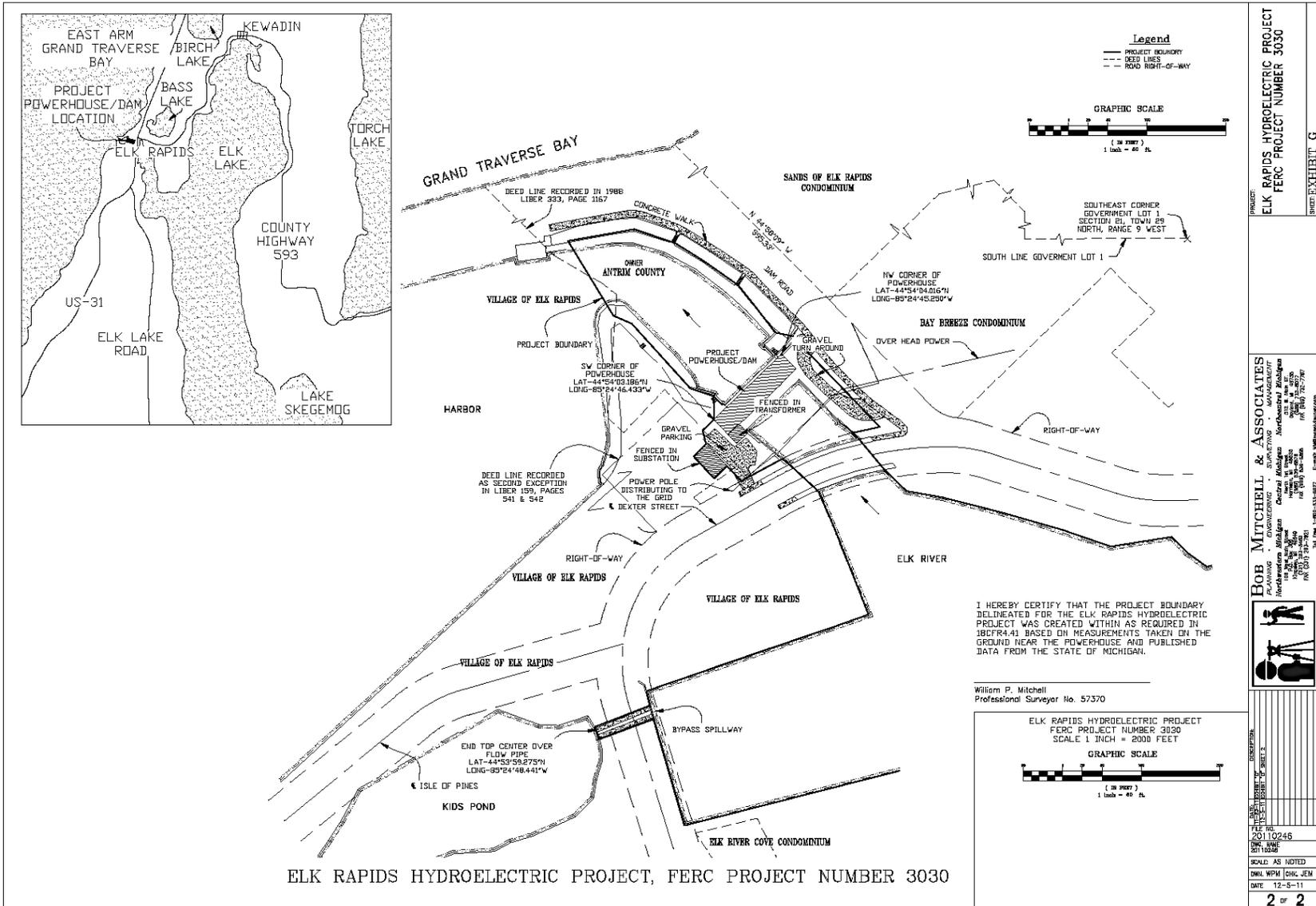


Figure 2. Project facilities for the Elk Rapids Project (Source: Antrim County, 2012).

2.1.2 Project Safety

The project has been operating for more than 33 years under the existing license and 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 proposed project 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 subsequent license term to assure continued adherence to Commission-approved plans and specifications, special license articles relating to construction (if any), operation and maintenance, and accepted engineering practices and procedures.

2.1.3 Existing Project Operation

The Elk Rapids Project is operated as a modified run-of-river facility.¹⁰ The project is manually operated by Elk Rapids Hydro's personnel. The powerhouse operation is checked by Elk Rapids Hydro two to three times each day, seven days a week.

Water flows to the project facilities by way of the Elk River Chain of Lakes (chain-of-lakes)¹¹ from the Torch River into Skegemog Lake, then to Elk Lake and then into the Elk River located immediately upstream of the project. Skegemog Lake is connected to Elk Lake through a 0.25-mile-long, 0.25-mile-wide, 5-foot-deep section of water known as the Narrows. The Narrows does not restrict flow between Skegemog and Elk Lakes, and therefore does not cause a surface level difference between the lakes. Elk and Skegemog Lakes have seasonal lake levels required by a court order issued in 1973 by the Circuit Court in Antrim County, Michigan.¹² The court order requires lake levels

¹⁰ The project is operated in a modified run-of-river mode, whereby the flows through the powerhouse and bypassed spillway approximately equals inflow of the Elk River and are modified so as to maintain the seasonal water levels of Elk and Skegemog Lakes, as required by the order approving settlement and amending license. *See* 88 FERC ¶ 62, 158 (1999).

¹¹ The chain-of-lakes watershed is a 75 mile-long waterway consisting of 14 lakes and connecting rivers that discharge to empty into Grand Traverse Bay on Lake Michigan.

¹² Circuit Court for the County of Antrim, dated September 25, 1973, in the Matter of the Petition of the Antrim County Board of Commissioners for a Determination of the

(continued)

for the period from November 1 to April 15 to be maintained at 590.2 feet dam gage datum and 590.8 feet dam gage datum from April 15 (or the breakup of ice, whichever date is later) through November 1.¹³ During the semi-annual lake level change (every April and November), generation and water flow through the project is adjusted gradually over a period of two weeks to achieve the required lake level. The project is responsible for maintaining the court ordered lake levels through its normal operations.

The project's normal operating head is about 10.5 feet. On the intake side of the powerhouse, the reservoir level is dictated by the required seasonal lake levels for Elk and Skegemog Lakes. At the powerhouse, the two north bays contain the operating turbines and generator units, and the two south bays, which don't have turbines or generating units, are used to spill excess water and provide flows when one or both of the generating units in the north bays are out of service for maintenance, when the grid goes down, or as needed to maintain the modified run-of-river operation. The project tailrace is directly connected to Grand Traverse Bay, Lake Michigan. As a result, the water levels in the tailrace are the same as water levels in Lake Michigan, and the project's net head varies as water levels in Lake Michigan rise and fall.

The two turbines, located in bays #3 and #4 at the north end of the powerhouse, each have a maximum hydraulic capacity of 504 cubic feet per second (cfs). The spill control gate case at bay #1, the southernmost bay, has a maximum hydraulic capacity of 239 cfs. The spill control gate case at bay #2 has a maximum hydraulic capacity of 442 cfs. The maximum hydraulic capacity of all four units in the powerhouse flowing at the same time is 1,620 cfs, which is less than the sum of the individual units because of flow interference between individual units. For the period from April 15 (or ice breakup on Elk and Skegemog Lakes, whichever occurs later) to November 1 the minimum flow increases because of the 0.6-foot higher lake level. Therefore, the project has a maximum hydraulic capacity of 1,675 cfs during the warmer months and 1,655 cfs during the colder months. Although the 1 percent flood is 1,800 cfs, the project can pass this flood because of the attenuation from significant storage in Elk and Skegemog Lakes.

About 400 feet adjacent (south) of the powerhouse, the upper Elk River's south channel diverts into a 14-foot-wide overflow spillway pond that is stop log controlled with two 5-foot-diameter culverts. During the winter, when the lake level is 590.2 feet dam gage datum, the south channel spillway provides a minimum flow of 35 cfs. During the summer, when the lake level is raised to 590.8 feet dam gage datum, the south

Normal Height and Level of the Waters of Elk and Skegemog Lakes situated in the County (sic) of Antrim, Grand Traverse and Kalkaska, Michigan file #962-CZ.

¹³ The elevations 590.2 and 590.8 feet dam gage datum are equivalent to 587.66 and 588.26 feet International Great Lakes Datum of 1955, respectively.

channel spillway provides a minimum flow of 55 cfs. Flows over the spillway enter the Kids' Fishing Pond then continue as a small stream and discharge directly into Grand Traverse Bay.

When flows are too low to operate one turbine/generator with a minimum of efficiency and stability of operation, bays #1 and/or #2 are used at smaller gate openings to maintain modified run-of-the-river operation. This minimum level of operation and increasing instability occurs at about 0.070 MW, which corresponds to a flow value of about 280 cfs.

Because of actively flowing water at the intakes, ice generally does not form in the project forebay area; however, during very cold weather, ice sheets can form in the forebay and sometimes these ice sheets break and become submerged and block flows through the trashracks. When sheet ice prevents project operation, different units are opened/started and/or closed/shut down simultaneously to shift the ice within the forebay so it becomes fractured, disperses among the four intake bays, and melts the flowing water.

The project's average annual energy produced during the period from 2001 to 2011 ranged from 2,162 MWh to 2,711 MWh, with an estimated average annual generation of 2,422 MWh.

2.2 APPLICANT'S PROPOSAL

2.2.1 Proposed Project Facilities

Antrim County does not propose to construct any new facilities or modify any existing project facilities.

2.2.2 Proposed Project Operation

Antrim County proposes to operate the project as it has been operated under the existing license.

2.2.3 Proposed Environmental Measures

Antrim County proposes to operate and maintain the existing angler walkway, which is attached to the tailrace side of the powerhouse, and associated parking lot.

2.3 STAFF ALTERNATIVE

Under the staff alternative, the project would include Antrim County's proposed measures and the following modifications and additional measures:

- an operation compliance monitoring plan that includes a description of project operation and the equipment and procedures necessary to maintain and monitor compliance with the operational mode required in any license issued;
- posting signage that describes proper boat maintenance techniques to reduce the spread of invasive plant and mussel species; and
- if archaeological resources are discovered during project operation or other project-related activities, cease all activities related to the disturbance and discovery area, and consult with the Michigan SHPO to determine appropriate treatment.

2.4 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED STUDY

We considered several alternatives to the applicant's proposal, but eliminated them from further analysis because they are not reasonable in the circumstances of this case. They are: (1) issuing a non-power license; (2) Federal Government takeover of the project; and (3) retiring the project.

2.4.1 Issuing a Non-power License

A non-power license is a temporary license the Commission would terminate whenever it determines that another governmental agency will assume regulatory authority and supervision over the lands and facilities covered by the non-power license. At this time, no agency has suggested a willingness or ability to do so. No party has sought a non-power license, and we have no basis for concluding that the project should no longer be used to produce power. Thus, we do not consider issuing a non-power license a realistic alternative to relicensing the project in this circumstance.

2.4.2 Federal Government Takeover of the Project

We do not consider federal takeover to be a reasonable alternative. Federal takeover and operation of the project would require Congressional approval. Although that fact alone would not preclude further consideration of this alternative, there is no evidence to indicate that federal takeover should be recommended to Congress. No party has suggested federal takeover would be appropriate, and no federal agency has expressed an interest in operating the project.

2.4.3 Retiring the Project

Project retirement could be accomplished with or without the removal of the powerhouse or overflow spillway. Either alternative would involve denial of the license application and surrender or termination of the existing license with appropriate conditions. No participant has suggested that the removal of the powerhouse or overflow spillway would be appropriate in this case, and we have no basis for recommending it. The project reservoir (i.e., Elk and Skegemog Lakes) formed by the powerhouse and overflow spillway serve other important purposes, such as use for recreational activities and in providing water for irrigation. Thus, removal of the powerhouse and overflow spillway is not a reasonable alternative to relicensing the project with appropriate protection, mitigation, and enhancement measures.

The second project retirement alternative would involve retaining the powerhouse and overflow spillway, and disabling or removing equipment used to generate power. Project works would remain in place and could be used for historic or other purposes. This alternative would require us to identify another government agency with authority to assume regulatory control and supervision of the remaining facilities. No agency has stepped forward, no participant has advocated this alternative, nor have we any basis for recommending it. Because the power supplied by the project is needed, a source of replacement power would have to be identified. In these circumstances, we do not consider removal of the electric generating equipment to be a reasonable alternative.

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 other recommended environmental measures. Sections are organized by resource area (aquatic, recreation, etc.). Under each resource area, historic and current conditions are first described. 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 mitigation, protection, and enhancement measures, and any potential cumulative effects of the proposed action and alternatives. Staff conclusions and recommended measures are discussed in section 5.1, *Comprehensive Development and Recommended Alternative* of the EA.¹⁴

3.1 GENERAL DESCRIPTION OF THE RIVER BASIN

The chain-of-lakes watershed is a 75-mile-long waterway consisting of fourteen lakes (including Elk Lake and Skegemog Lake) and connecting rivers in the northwestern section of the Lower Peninsula of the state of Michigan, which empties into Lake Michigan. The total drainage area of the entire chain-of-lakes covers about 512 square miles across five counties (Antrim, Grand Traverse, Kalkaska, Charlevoix and Otsego) in northwestern Michigan.

The project is located within the Elk-Skegemog subwatershed of the chain-of-lakes (figure 3). The total drainage area of the Elk-Skegemog subwatershed is about 214 square miles. Within the Elk-Skegemog subwatershed, water flows from the Torch River into Skegemog Lake, which is the meeting point of Antrim, Grand Traverse, and Kalkaska Counties. Skegemog Lake then connects to Elk Lake, and flows from Elk Lake into the Elk River upstream of the project (i.e., upper Elk River). Flows from the upper Elk River are then released into the section of the Elk River downstream of the project (i.e., lower Elk River) or over an overflow spillway through the Kids' Fishing Pond, and then into the east arm of Grand Traverse Bay, Lake Michigan (figure 3).

¹⁴ Unless otherwise indicated, our information is taken from the application for license filed by Antrim County on December 21, 2012, and the response to deficiencies and requests for additional information filed on October 16, 2013.

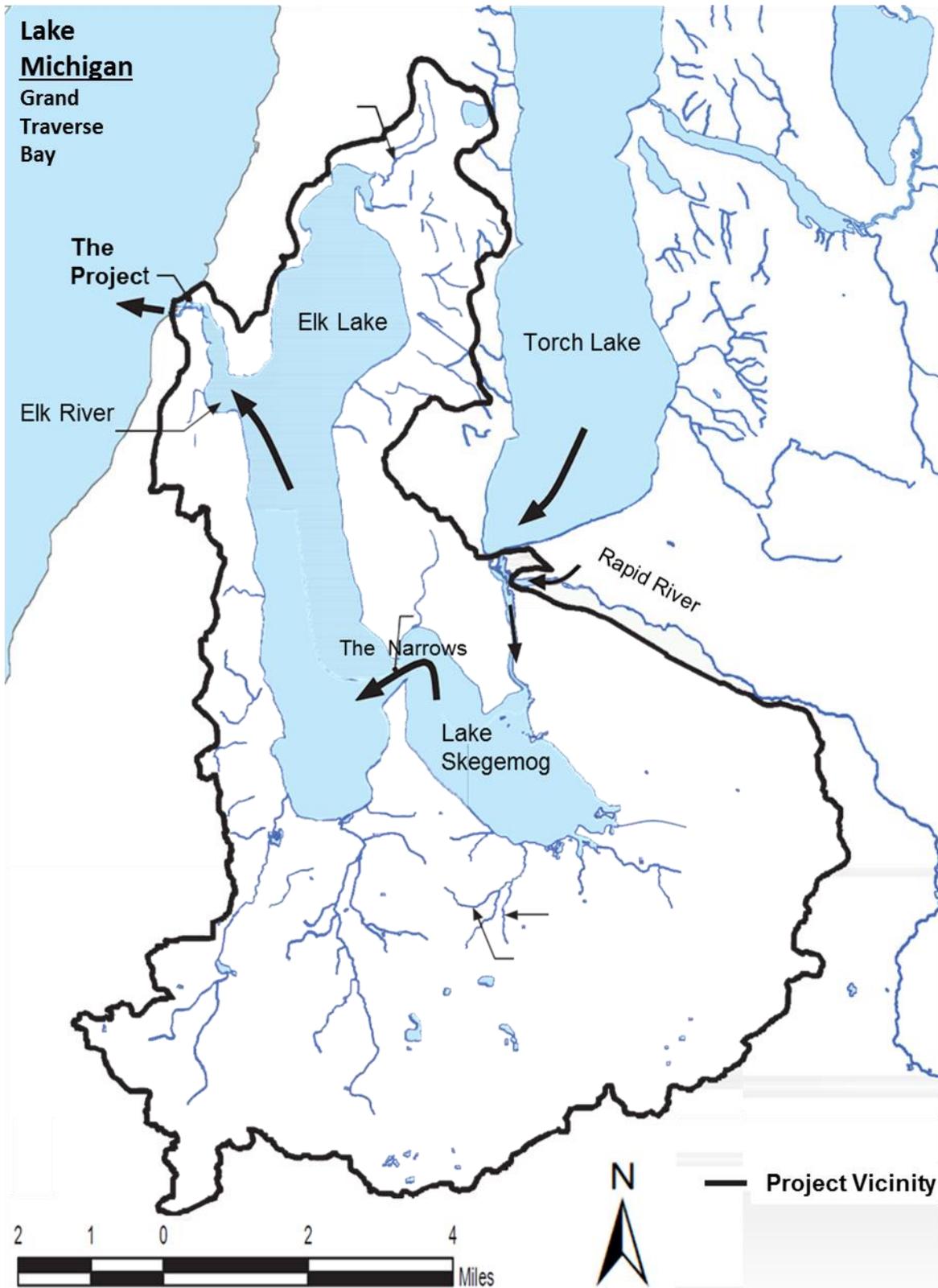


Figure 3. Elk Rapids Project vicinity and direction of water flow through the chain-of-lakes (Source: Antrim County, 2012; as modified by staff).

The project is located on the Elk River in the Village of Elk Rapids in Antrim, Grand Traverse, and Kalkaska Counties, Michigan. The project powerhouse is located approximately 1,000 feet upstream from the confluence of the lower Elk River with Grand Traverse Bay, Lake Michigan. The project's physical structures are located on a 3.7-acre parcel of land owned by Antrim County, which extends from the west edge of Dexter Road to Grand Traverse Bay (Lake Michigan) and includes a narrow strip of land on both sides of the Elk River. Dam Road borders the north side of the project. The project occupies about 0.46 acres of the land parcel, and the remainder of the parcel is leased to the Village of Elk Rapids under a 99-year lease for use as public open space and recreational use.

3.2 SCOPE OF CUMULATIVE EFFECTS ANALYSIS

According to the Council on Environmental Quality's regulations for implementing the National Environmental Policy Act (40 C.F.R. § 1508.7), a cumulative effect is the impact on the environment that results from the incremental impact of the action when added to other past, present and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such actions. Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time, including hydropower and other land and water developmental activities.

Based on our review of the license application and agency and public comments, we have determined that no resources would be cumulatively affected by the continued operation of the project. The project is located in a where there is no proposed future hydropower development other than the Elk Rapid Project.

3.3 PROPOSED ACTION AND ACTION ALTERNATIVES

Only resources that would be affected, or about which comments have been received, are addressed in detail in this EA and discussed in this section. We have not identified any substantive issues related to soils and geology or socioeconomics associated with the proposed action; therefore, we do not assess environmental effects on these resources in this EA. We present our recommendations in section 5.1, *Comprehensive Development and Recommended Alternative* section.

3.3.1 Aquatic Resources

3.3.1.1 Affected Environment

Water Quantity

Project Reservoir

Skegemog Lake, Elk Lake, and the upper Elk River have the same water surface elevation and constitute the project reservoir. Waterways upstream of the reservoir (e.g., Torch Lake) are not included in the project boundary because their surface water levels do not influence the surface levels of Elk and Skegemog Lakes.¹⁵

Skegemog Lake has a surface area of four square miles (2,560 acres) and a volume of 30,700 acre-feet, with a flushing rate of 24 days. Skegemog Lake has a maximum depth of about 29 feet and an average depth of about 12 feet. Skegemog Lake's shoreline is approximately 11 miles.

Elk Lake, which is the last lake in the chain-of-lakes, has a surface area of 12 square miles (7,730 acres) and a volume of 548,830 acre-feet, with a flushing rate of 365 days. Elk Lake has a maximum depth of about 192 feet and an average depth of about 71 feet. Elk Lake's shoreline is approximately 26 miles.

Water flows to the project by way of the reservoir. Skegemog Lake is connected to Elk Lake via a 0.25-mile-long, 0.25-mile-wide, 5-foot-deep section of water known as the Narrows (figure 3). The Narrows does not restrict flow between the lakes and therefore does not cause a surface level difference between the lakes. As discussed in section 2.1.3, *Existing Project Operation*, Elk and Skegemog Lakes have the same seasonal, legally established lake levels. The lake level for the period from November 1 to April 15 are maintained at 590.2 feet dam gage datum and 590.8 feet dam gage datum from April 15 (or the breakup of ice, whichever date is later) through November 1. During the semi-annual lake level change (every April and November), power generation and water flow through the project is adjusted gradually over a period of two weeks to achieve the required lake levels. The project is responsible for maintaining the court ordered lake levels through its normal operations.

The project's normal operating head is about 10.5 feet. On the intake side of the powerhouse, the reservoir level is dictated by the court ordered lake levels for Elk and

¹⁵ The Torch River, which connects Torch Lake with Skegemog Lake (see figure 1), has a flow restriction that creates a surface level difference between Torch Lake and Skegemog Lake.

Skegemog Lakes. At the powerhouse, the two north bays contain the operating turbines and generator units, and the two south bays, which don't have turbines or generating units, are used to spill excess water and provide flows into the lower Elk River when one or both of the generating units in the north bays are out of service for maintenance. The project tailrace is directly connected to Grand Traverse Bay, Lake Michigan. As a result, the water levels in the tailrace are the same as water levels in Lake Michigan, and the project's net head varies as water levels in Lake Michigan rise and fall.

Project Outflow

Historical generation data was used to calculate a continuous record of accurate outflow for the Elk River drainage basin from 2001-2011. Generation data from the project was gathered from Consumers Energy. The generation data was converted into daily flow values using the United State Geological Survey's (USGS) calibrated turbine rating curves. Historic operation logs from the previous plant operator, Traverse City Light and Power,¹⁶ were used to modify the resulting data for bypassed flows that were encountered during repairs or down time of the generating units. Further adjustments were made to the data twice annually to offset the effects of raising and lowering the Elk Lake level during the legally mandated spring and fall seasons. A final adjustment was made by adding the flow through the spillway located on south channel of the Elk River. The results showed that the highest mean monthly flow on record is 720 cfs for the month of May and the lowest is 412 cfs for September, while the maximum monthly flow on record is 1,049 cfs for June and the minimum monthly flow is 247 cfs for September (table 1).

¹⁶ The project was operated under contract on Antrim County's behalf by Traverse City Light and Power until 2007 when Antrim County entered into the current operating agreement with Elk Rapids Hydro.

Table 1. Calculated monthly flows at the Elk Rapids Project intake from 2001-2011. (Source: Michigan DNR, 2011; Antrim County, 2011; as modified by staff).

Month	Max (cfs)	Mean (cfs)	Min (cfs)
January	933	663	369
February	805	656	391
March	857	644	375
April	1,044	714	370
May	1,016	720	396
June	1,049	661	386
July	792	497	349
August	753	454	308
September	904	412	247
October	871	537	301
November	951	651	363
December	823	636	355

About 400 feet adjacent (south) of the powerhouse, the upper Elk River’s south channel spillway diverts into a 14-foot-wide overflow spillway pond (i.e., Kids’ Fishing Pond) that is stop log controlled with two 5 foot diameter culverts. During the winter, when the lake level is 590.2 feet dam gage datum, the south channel spillway provides a minimum flow of 35 cfs. During the summer, when the lake level is raised to 590.8 feet dam gage datum, the south channel spillway provides a minimum flow of 55 cfs. The flows then continue unimpeded after leaving the Kids’ Fishing Pond as a small stream that discharges directly into Grand Traverse Bay.

Water Use

The project was originally constructed to produce hydropower. Presently, the project continues to generate hydropower and provides recreational opportunities (e.g., fishing, boating, and wildlife viewing) to the area. The Village of Elk Rapids withdraws surface water for fire protection and for limited irrigation of parks and public properties at four locations, two upstream of the project and two downstream.¹⁷ In addition, riparian landowners and golf courses are permitted to withdraw surface water for irrigation; some

¹⁷ Upstream of the project, water is withdrawn from the north channel of the Elk River off the west side of U.S. 31 south of Dexter Street and at a location east of U.S. 31. Along the south channel of the Elk River, water is withdrawn downstream of the project at Memorial Park and on Dexter Street near the Kids’ Fishing Pond.

riparian landowners also have seasonal pumps that they use for irrigating their lawns and gardens.

There are two National Pollution Discharge Elimination System (NPDES) permits for discharges within the project, all of which are monitored by Michigan DEQ (table 2). The outfall pipe for the Village of Elk Rapids Water Treatment Plant (NPDES Permit MIG570208) is located immediately downstream of the powerhouse and discharges into the tailrace. The outfall for Burnette Foods is an unnamed tributary downstream of the south channel bypass of the Elk River.

Table 2. NPDES Permits within the Elk Rapids Project Vicinity [Source: U.S. Environmental Protection Agency (EPA), 2012a].

Location	Permit Holder	NPDES
Elk River	Village of Elk Rapids Wastewater	MIG570208
Elk River	Burnette Foods, Inc.	MI0000485

Water Quality

The Michigan DEQ sets surface water quality standards based on specified designated uses. State water quality standards specify which uses (such as industrial or aquatic life use) individual waters should support (EPA, 2010). According to the Michigan Surface Water Information Management System (MiSWIMS) database (MiSWIMS, 2014), and the EPA (EPA, 2013 and 2014), the surface waters in the project boundary have been recently assessed for the following designated uses:

- Agriculture
- Public water supply
- Navigation
- Coldwater fishery

Results show that the overall status of the project reservoir is considered “good”, meaning that the reservoir is meeting its attainment goals for Cold Water Fishery, Agriculture, Public Water Supply, and Navigation (table 3) (EPA, 2013 and 2014; MiSWIMS, 2014).

Table 3. EPA and State of Michigan attainment goals at the Elk Rapids Project reservoir for Cold Water Fishery, Agriculture, Public Water Supply, and Navigation. (Source: Staff)

Designated Use*	Designated Use Group**	Project Reservoir
Agriculture	Agricultural	Good
Cold Water Fishery	Fish, Shellfish, and Wildlife Protection and Propagation	Good
Public Water Supply	Industrial	Good
Navigation	Other	Good

* State water quality standards specify which uses individual waters should support.

** The parent designated use represents an EPA-assigned, general categorization for the specific, state-reported designated use.

Michigan DEQ administers federal and state surface water quality standards for wastewater, non-point source pollution, seepage and NPDES permits. State water quality standards for temperature and dissolved oxygen (DO) applicable to the project area are summarized in table 4.¹⁸

Table 4. Summary of state water quality standards for DO and water temperature applicable to the Elk Rapids Project boundary (Source: State of Michigan, 1994, as modified by staff).

Parameter	Application	Standard
Dissolved Oxygen	All surface waters of the State	Min. 7 milligrams per liter (mg/L) in designated coldwater fisheries; Min. 5 mg/L in designated warmwater fisheries.

¹⁸ Michigan water quality standards are described in detail in *Part 4 Rules of Part 31 of the Water Resources Protection Act 451 of 1994*.

Parameter		Application	Standard									
Temperature		Inland Lakes	No receipt of a heat load is permitted that will increase the receiving water's temperature more than 3° Fahrenheit (°F) above the existing natural water temperature. No receipt of a head load is permitted that will increase the temperature of the hypolimnion (the dense, cooler layer of water at the bottom of a lake) or decrease its volume.									
		Great Lakes and connecting waters	1) No receipt of a heat load is permitted that will increase the receiving water's temperature more than 3° F above the existing natural water temperature. 2) No receipt of a heat load is permitted that will increase the receiving water's temperature more than the following monthly maximum temperature (° F):									
Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	
38	38	48	54	65	68	68	68	63	56	48	40	

The Tip of the Mitt Watershed Council (Watershed Council) has been collecting water quality data in the project boundary since 1992, and is currently the primary source for water quality information for Elk River, Elk Lake, and Skegemog Lake. Other general water quality data comes from Michigan DEQ who periodically collects data from Elk and Skegemog Lakes. The Michigan DEQ last collected water quality data from Elk Lake in 1985 and from Skegemog Lake in 2003. Overall, the data indicates that water quality within the project reservoir have remained relatively consistent over the past 10-20 years and typically meets state water quality standards.

Elk and Skegemog Lakes experience thermal stratification¹⁹ during summer. Results from a 2007 water quality study at Elk Lake (Watershed Council, 2008),

¹⁹ Thermal stratification is a seasonal phenomenon that refers to a change in water temperatures at different depths in a lake. This phenomenon is caused by the seasonal changes of water temperatures that result in changes in water density (i.e., cold water sinks because it is denser than warm water). Because of this density-temperature relationship, a lake can stratify, that is, separate into distinct layers within the water column.

demonstrates that water temperatures are similar throughout the water column during the spring, meaning that Elk Lake is unstratified (i.e., completely mixed). By late June, Elk Lake is completely stratified, and surface water temperatures throughout the summer (i.e., late June through August) can occasionally exceed the state standard for temperature of 20°C (i.e., 68 °F). Results from previous water quality studies conducted in Elk Lake during 1985 and 1993 support these recent findings, where water surface temperatures ranged from 21.0 to 24.3 °C (i.e., 69.8 to 75.7 °F) during July and August (Weiss, 1995; Antrim County, 2012).

Elk Lake is classified as an oligotrophic lake, which are characteristically deep, clear, nutrient poor (i.e., low algal biomass), and with abundant levels of DO. Low algal biomass in the lake allows deeper light penetration into the lake resulting in less decomposition of vegetative material, which decreases DO levels. Because oxygen is more soluble in colder water, DO concentrations may therefore increase with depth below the thermocline²⁰ in Elk Lake.

According to the Watershed Council (2008), results from monitoring Elk Lake from 1998 through 2006 show that high DO concentrations persist in the deeper waters of the lake throughout the most of the summer, and only slightly decline in the deepest portions of the lake toward the end of summer. The Watershed Council (2008) also states that during the course of the 2007 water quality study, DO levels in Elk Lake throughout the water column were consistently around 8 mg/l, and have only been recorded below the state standard of 7 mg/l on one occasion in late summer at the very bottom of the lake (i.e., around 192 feet deep). Results from previous water quality studies conducted in Elk Lake during 1985 and 1993 support these findings, where bottom DO levels in the lake ranged from 8.9 to 10.2 mg/l and surface DO levels in the lake ranged from 8.1 to 9.6 mg/l during July and August (Weiss, 1995; Antrim County, 2012).

Fishery Resources

Fish Community

Skegemog Lake supports a mixed warmwater/coolwater fishery. Typical fish species found in Skegemog Lake include largemouth bass, northern pike, smallmouth bass, sucker species, sunfish, walleye, rock bass, muskellunge, and yellow perch (Michigan DNR, 2014).

²⁰ A thermocline is the transition layer between the mixed layer at the surface and the deep water layer.

Elk Lake, the last lake in the chain-of-lakes, is classified as a coldwater fishery. Because of its cold, deep, and well oxygenated waters, Elk Lake is managed by the Michigan DNR for coldwater species and supports populations of lake trout, lake whitefish, lake herring (i.e., cisco), burbot, and deepwater sculpin. Coolwater species (e.g., smallmouth bass, rock bass, muskellunge, walleye) can be found throughout both Elk and Skegemog Lakes, but tend to concentrate around the Narrows.

The most recent fish survey in the project reservoir (i.e., Elk and Skegemog Lakes) was conducted by Michigan DNR (2011) from April 2008 through March 2009. During the 2008–2009 survey, a total of 21 species were captured using netting and electrofishing techniques; the most abundant species was rock bass, followed by white sucker, yellow perch, and smallmouth bass.

The less than 0.5-mile-long Elk River is a mixed warmwater/coolwater/coldwater fishery. Coldwater species from Lake Michigan, including steelhead trout and other salmonids, are present in the lower Elk River downstream of the project. The south channel bypass pond (Kids' Fishing Pond) is about three acres and also provides a mixed warmwater/coolwater/coldwater fishery; species in the Kids' Fishing Pond include bullhead, largemouth Bass, rainbow trout, suckers, sunfish, and yellow perch (Michigan DNR, 2013).

Aquatic Habitat

Unlike Skegemog Lake, which has an abundance of submerged woody debris along its shoreline (Diana et al., 2014), naturally occurring fish cover (e.g., woody debris) in Elk Lake is limited as a result of shoreline development. In an effort to improve fish habitat by adding structural cover in Elk Lake and other lakes within the chain-of-lakes, a five year collaborative program headed by the Three Lakes Association (Lakes Association), which started in 2012, is currently underway in which man-made fish shelters (e.g., crates, slab trees, and tree stumps) are being deployed in areas devoid of natural habitat (Varga, 2012). At present, 15 fish shelters have been deployed in Elk Lake (Lakes Association, 2014).

The addition of these types of cover structures into Elk Lake and other water bodies is an accepted practice and is a suitable form of habitat enhancement, particularly in areas where cover is limiting fish production (Roni et al., 2005). Researchers have shown that the addition of physical habitat may increase juvenile fish survival in lakes where cover is limited (Bolding et al. 2004). For example, Tugend et al. (2002) referenced two studies that showed increases in production of age-0 fish (i.e., young-of-the-year fish) as a result of habitat improvement efforts.

Invasive Aquatic Plants

According to Antrim County, Eurasian watermilfoil and curly-leaf pondweed are present in the chain-of-lakes and within and adjacent to the project boundary.

Invasive Mussels

Zebra Mussels are an invasive species that were introduced into the Great Lakes in the late 1980s and have invaded most water bodies in the chain-of-lakes, including Elk Lake and Skegemog Lake. There is no plan to control or eradicate the zebra mussel in the chain-of-lakes watershed because it is so pervasive (Michigan DEQ, 2002).

Invasive Fish Species

Sea lamprey, round goby, alewife, common carp, and white perch are all invasive fish species that are currently known to inhabit Lake Michigan. At present, none of these species have been detected within the project boundary or upstream of the project (i.e., within the chain-of-lakes watershed).

3.3.1.2 Environmental Effects

Project Operation

Antrim County proposes to continue to operate the project as currently operated. The project would operate in a modified run-of-river mode, whereby outflows from the powerhouse and overflow spillway approximately equals inflow from the chain-of-lakes and are modified to maintain a seasonal reservoir water surface elevations of 590.2 feet dam gage datum from November 1 through April 15 and 590.8 feet dam gage datum from April 15 (or the breakup of ice, whichever date is later) through November 1. Also, the project would continue to meet the lake levels by gradually adjusting the project's water surface levels over a two-week period during each seasonal changeover period (i.e., every April and November).

Michigan DEQ recommends that during adverse conditions, when the operational requirements specified in the 1973 court order cannot be met, Antrim County should consult with the Supervisor for Michigan DEQ, Water Resources Division, regarding emergency actions taken or proposed measures that are planned to meet project operation. Michigan DEQ additionally recommends that when operational requirements specified in the court order are temporarily suspended for maintenance activities, inspections, or dam safety related issues, Antrim County should provide prior notice of these actions to the Supervisor for Michigan DEQ, Water Resources Division.

Our Analysis

Operating the project in a modified run-of-river mode, as proposed by Antrim County, would enable existing project operation to continue to meet the seasonal lake levels. Because the project currently operates in a modified run-of-river mode, minimal changes to aquatic habitat are expected in the reservoir, bypassed reach, and within the project tailrace by continuing this mode of operation.

Scheduled maintenance activities and dam safety inspections have the potential to create situations whereby Antrim County may deviate from its modified run-of-river operation requirements. Also, adverse conditions or emergency situations may create situations whereby Antrim County is unable to comply with its modified run-of-river operation. However, providing notification to not only the Michigan DEQ, but also to the Michigan DNR before or after such incidents and consulting with both agencies until normal project operation can resume, would allow for the state resource agencies to be promptly alerted to these non-compliance events which could potentially affect resources under their respective jurisdictions. Additionally, providing such notification to the Commission that details the cause of the deviation would assist the Commission with administering compliance directives for any license issued for the project.

Developing a compliance monitoring operation plan, after consultation with Michigan DEQ and Michigan DNR, would be beneficial in that it would document the procedures Antrim County would employ to demonstrate compliance with any license requirements for operating the project, including but not limited to, operating in a modified run-of-river mode, maintaining lake level requirements, and meeting reservoir drawdown and refill protocols. A detailed description of the equipment and procedures necessary to maintain, monitor, and report compliance would prevent possible misunderstandings of project operation and reduce the likelihood of complaints regarding project operation.

Water Quality and Monitoring

Michigan DEQ recommends that Antrim County operate the project in such a manner as to adhere to state water quality standards (for temperature and DO) in the Elk River downstream of the powerhouse. Specifically, Michigan DEQ recommends that project operation not cause the waters of the Elk River downstream of the powerhouse to exceed the following state standard monthly average temperatures (shown in °F):

Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
38	38	48	54	65	68	68	68	63	56	48	40

However, Michigan DEQ states that deviations from these water temperature standards would be acceptable when natural temperatures of Elk Lake, as measured in the

Elk River upstream of the project, exceed these specified monthly average temperature values. Michigan DEQ also recommends that project operation does not cause DO concentrations to be less than the state standard of 7.0 mg/L in the Elk River downstream of the powerhouse at any time.

To verify project-related effects on water quality, Michigan DEQ recommends that Antrim County monitor temperature and DO concentrations in the Elk River downstream of the project on an hourly basis from July 1 through August 31 beginning the first year after license issuance, for a minimum of one year.

Our Analysis

Recent and previous water quality studies demonstrate that surface water temperatures of Elk Lake occasionally exceed state standards (Weiss, 1995; Watershed Council, 2008; Antrim County, 2012), usually in late summer, in shallow, nearshore areas as a result of the effects of the thermocline, a naturally occurring phenomenon. Michigan DEQ states that deviations from the state water quality standards for temperature would be acceptable when natural temperatures of Elk Lake, as measured in the Elk River upstream of the project, exceed the specified monthly average temperature values.

Monitoring water temperature downstream of the project would only reflect water temperatures that are entering the project, which typically meeting state standards and any deviations in water temperatures would be caused by natural phenomena and not project operation; therefore, monitoring water temperature downstream of the project would not provide any additional benefits.

According to a condition of the 1999 settlement agreement, the project is required to operate in such a manner as to be in compliance with state water quality standards. Water quality assessments of Skegemog Lake, Elk Lake, and Elk River have demonstrated that temperature and DO levels within the reservoir have remained relatively consistent over the past 10 to 20 years and that water surface DO concentrations are typically at or above 8 mg/L throughout the summer months. Additionally, a recent study by Rediske et al. (2010) showed that DO levels within Grand Traverse Bay, near the project, were at or above 10 mg/l during July and August. Given that downstream of the project, the less than 0.5-mile-long Elk River flows directly into Grand Traverse Bay, any temporary decreases in DO levels that may occur in the tailrace would be quickly mitigated by the high DO levels occurring in the bay. Therefore, continued operations of the project in the same mode of operation it has used in the past, would have little effect on water quality in the Elk River downstream of the powerhouse and that the state DO standard of 7 mg/L would continue to be met and monitoring DO downstream of the project would not be necessary.

Fish Impingement and Entrainment

The operation of the project has the potential to result in some fish impingement on the project trashracks and fish entrainment through the project turbines. Antrim County does not propose any additional measures to minimize fish mortality related to entrainment and impingement.

Our Analysis

The level of fish entrainment and impingement at the project is dependent upon many factors; including age, swim speeds, size, and the seasonality of entrainment and impingement patterns of fish present at the site (EPRI, 1992). Although turbine passage mortality rate estimates can be relatively variable, some trends have been recognized. For example, certain species typically dominate entrainment collections, and the dominant fishes entrained usually represent those species that are highly abundant (FERC, 1995) and are usually fish species that are very fecund (i.e., high reproductive rates). However, fish size rather than species is usually the critical factor influencing the rates of turbine-related mortality. In general, most fish entrained at hydroelectric projects tend to be smaller fish less than 4 to 5 inches long and are often juvenile fish or species such as minnows that never exceed a length of 3 or 4 inches (FERC, 1995; EPRI, 1997).

The velocity of water surrounding a hydroelectric water intake is also an important component in determining the level of potential fish entrainment and impingement. At the project, when the turbines are operated at full gate, the intake velocity in front of the trashrack is 2.0 feet/sec; however, because the project operates at 90 percent of full gate whenever possible (about 98 percent of the time), the intake velocity is typically 1.8 feet/sec. Research has shown that a fish can swim about 8 to 12 body lengths per second in a burst mode that can last up to 20 seconds (Bell, 1986; Videler and Wardle, 1991; Aadland, 2010). For example, a four-inch long fish would have a burst speed of around 2.7 to 4.0 feet/sec. Therefore, most fish species greater than 4 inches in length exposed to the 1.8-2.0 feet/sec velocity at the project intake are likely to escape impingement and entrainment.

Although impingement and turbine entrainment at the project likely causes some losses of resident fish, these losses do not approach a magnitude that adversely affects fish populations. Evidence supporting this conclusion is that the reservoir is currently meeting its designated use attainment goal as a Coldwater Fishery. Also, there is no evidence that existing levels of fish impingement, entrainment, and related mortality, are adversely affecting fish communities in the project area. Therefore, continued operation of the project in the same mode of operation it has used in the past, would likely have little to no adverse effect on the overall fish community in the project reservoir.

Aquatic Invasive Plant and Mussel Species

Aquatic invasive species compete with native species for food and habitat, and can directly or indirectly kill or displace native species, degrade habitat and alter food webs. Eurasian milfoil and curly-leaf pondweed are present in the chain-of-lakes and within and adjacent to the project boundary. Also, the zebra mussel invaded the chain-of-lakes in the 1980s and is still present in the watershed, including in Elk Lake and Skegemog Lake. Antrim County does not propose any measures to address invasive species within the project boundary.

Our Analysis

Dense growth of curlyleaf pondweed and Eurasian watermilfoil reduces populations of native submersed plant species and alters the ecosystem so that it is inhospitable to fish and other fauna (Wolf, 2009; Madsen, 2009). Because curlyleaf pondweed and Eurasian watermilfoil can each form dense mats on the water's surface in May and June, they can inhibit fishing, boating, and other types of water recreation (Madsen, 2009).

Because curlyleaf pondweed and Eurasian watermilfoil may become tangled on the nets, ropes, and propellers of recreational boats, the spread of these species into new waters is often the result from overland dispersal by recreational boaters (Leung et al., 2006).

The zebra mussel, based on its ecological and economic effects, is considered the most aggressive freshwater invaders in the Northern hemisphere (Nalepa and Schloesser, 1993; Karatayev et al., 2014). The zebra mussel is a prolific filter feeder, removing substantial amounts of phytoplankton and suspended particulates from the host water body adversely affecting aquatic ecosystems by altering food webs (USGS, 2013). Zebra mussels have high reproductive potential, planktonic free-swimming larvae called veligers, and an attached benthic adult stage. This life history facilitates their success as invaders, allowing it to spread rapidly across landscapes, and become extremely abundant when introduced into a new waterbody (Karatayev et al., 2014). Because zebra mussels can attach to the hulls of boats, and their veligers (i.e., planktonic larvae) may be taken up and carried in the bilge water of recreational vessels, the majority of new invasions result from overland dispersal by recreational boaters (Leung et al., 2006).

Curlyleaf pondweed, Eurasian watermilfoil, and zebra mussels are all transferred to other waterbodies primarily by boats. While there is no plan to control or eradicate the zebra mussel in the chain-of-lakes watershed because it is so pervasive, public education may reduce the transfer of the invasive mussel to other water bodies. Also, public education on how to minimize transfer of curlyleaf pondweed and Eurasian watermilfoil could reduce the likelihood of further invasions of project waters and other waterbodies. As discussed in section 3.3.4.1, *Regional Recreation Resources*, the project's recreation

site is near a marina. Developing signage, in consultation with the Michigan DNR and Michigan DEQ, regarding cleaning and drying of boats between launches, and posting the signage at the project recreation site, would help inform the public of proper management techniques to reduce the spread of curlyleaf pondweed, Eurasian watermilfoil, and zebra mussels.

Invasive Fish Species

Invasive fish species are known to spread quickly and out-compete native fish for food and habitat, which can cause a decline in the diversity of aquatic ecosystems. Sea lamprey, round goby, alewife, common carp, and white perch are all invasive fish species that are currently known to inhabit Lake Michigan. At present, none of these species have been detected upstream of the project powerhouse (i.e., within the chain-of-lakes watershed). Once established in a water body (e.g., Lake Michigan), invasive fish species primarily spread to new water bodies (e.g., inland lakes) by way of direct hydrologic connection.

Our Analysis

To date, project operation and the presence of the project powerhouse have been successful in preventing the invasive fish species identified above from passing upstream into the reservoir. No invasive fish species have been collected upstream of the project powerhouse during the surveys conducted by Michigan DNR in 1990, 1996, and 2011. Therefore, continuing to operate the project in a modified run-of-river mode, and maintaining the project powerhouse, as proposed by Antrim County, would likely continue to block invasive fish species from passing upstream of the project.

3.3.2. Terrestrial Resources

3.3.2.1 Affected Environment

Botanical Resources

The chain-of-lakes watershed is classified as a flat lake plain with well-drained sand, dominated by northern hardwoods in the uplands, conifer swamps in the lowlands and American beech/hemlock forests in between (Michigan Natural Features Inventory, 1999). The Northern Hardwood forest community is the northernmost deciduous forest community in eastern North America. In general, this community is dominated by three deciduous tree species: yellow birch, sugar maple, and American beech. Two coniferous species, eastern hemlock and white pine, are also typically found in abundance in this forest community.

Wetland acreage within the project vicinity totals about 4,090 acres; of those, about 3,155 acres are classified as forested, 560 acres as emergent, and 376 as scrub-shrub. The Watershed Council classifies many of the wetlands within the project vicinity as “high quality”. They define high quality wetlands as wetlands that are large, contiguous wetlands on a major lake or stream, approximately 50 acres or greater in size, and identified on a USGS topographic map.

The riparian zone in the project vicinity is about 80 percent developed. Preliminary estimates indicate that the Skegemog Lake shoreline is 80 percent developed, with patches of wetlands located on 74 percent of the shoreline parcels. Elk Lake is estimated to be 78 percent developed with patches of wetlands on 50 percent of the shoreline parcels (Fuller, 2001). Over 80 percent of the Elk River’s shoreline has been armored with seawall and riprap.

Wildlife Resources

The upland habitat supports a variety of bird species such as songbirds and woodpeckers, raptors (hawks, bald eagle), and upland game birds (wild turkey, ruffed grouse). Larger species such as black bear, bobcat, coyotes, and white-tailed deer are also found in the uplands of the project vicinity. Habitat for populations of songbirds, waterfowl, shorebirds, muskrat, mink, and raccoon are provided by the wetlands and lakeshores. The predominant small mammal species found near the project are squirrel, fox, raccoon, mink, muskrat, skunk, and rabbit (Village of Elk Rapids, 2013).

3.3.2.1 Environmental Effects

Antrim County does not propose any changes to project operation, and does not propose any new construction.

Our Analysis

Based on the fact there would be no changes to project operation, and there would be no changes to seasonal water levels in the reservoir, the project would not affect wildlife resources and their habitats.

3.3.3 Threatened and Endangered Species

3.3.3.1 Affected Environment

FWS records indicate that that one federally listed endangered species, the Kirtland's warbler (*Setophaga kirtlandii*), and 4 federally listed threatened species: (1) the Northern long-eared bat (*Myotis septentrionalis*); (2) Rufa red knot (*Calidris canutus rufa*); (3) Pitcher's thistle (*Cirsium pitcher*); (4) and Houghton's goldenrod (*Oligoneuron*

houghtonii) are listed as occurring within one or more of the counties where the Elk Rapids Project exists.²¹

Kirtland's Warbler

The Kirtland's warbler is federally listed as endangered. The bird species primarily breeds in Michigan's Upper and Lower Peninsulas, but have also been documented nesting in Wisconsin and Canada since 2007 (FWS, 2012). The Kirtland's warbler nests only in young jack pine forests of 80 acres or larger that grow on a special type of sandy soil and contain numerous small, grassy openings (FWS, 2015a). The species is also migratory, and winters throughout the Bahama Islands. Factors limiting Kirtland's Warbler populations include their highly specialized habitat requirements, narrow geographic range, and cowbird nest parasitism.²² No critical habitat has been designated for the Kirtland's warbler.

Rufa Red Knot

The Rufa red knot is federally listed as threatened. The bird species is a regular, low-density spring migrant that uses the shores of the Great Lakes as stopover areas to rest and forage between wintering and breeding areas (FWS, 2013 and 2014a). Some Rufa red knots fly more than 9,300 miles from south to north every spring and repeat the trip in reverse every autumn, making this bird one of the longest-distance migrants (FWS, 2013). The Rufa red knot is imperiled due to losses of both breeding and nonbreeding habitat, as well as a reduction in its primary prey, horseshoe crab eggs. No critical habitat has been designated for the Rufa red knot.

Northern Long-eared Bat

The northern long-eared bat is federally listed as threatened. The range of the northern long-eared bat includes much of the eastern and north central United States, as well as the southern and central provinces of Canada. The species hibernates in caves and mines during winter months, and typically prefers those with large passages and entrances, constant temperatures, and high humidity. In the summer, northern long-eared bats roost singularly or in colonies underneath bark, in cavities, or in crevices of both live

²¹ Except for the federally threatened Houghton's goldenrod, which is only listed in Kalkaska County, all of the other federally listed species are known to occur in Antrim, Grand Traverse, and Kalkaska Counties.

²² Cowbirds lay one or more eggs in a Kirtland's warbler nest and their young typically hatch first and overpower the smaller Kirtland's nestlings (Mayfield, 1992).

and dead trees (FWS, 2015b). Males and non-reproductive females may also roost in cooler places, like caves and mines, and foraging primarily occurs within forested hillsides and ridgelines with moths, flies, and other insects serving as the main food source. White-nose syndrome, a fungal disease known to affect only bats, is the largest threat to the northern long-eared bat, and according to the FWS (2015c), the species would likely not be imperiled were it not for this disease. No critical habitat has been designated for the northern long-eared bat.

Houghton's Goldenrod

The Houghton's goldenrod is federally listed as threatened. The plant species occurs primarily in the northernmost regions of Lakes Huron and Michigan. Habitat of the Houghton's goldenrod is restricted to calcareous beach sands, cobble and rocky shores, beach flats, and most commonly the shallow, trough-like interdunal wetlands that parallel shoreline areas (Penskar et al., 2000). Fluctuating water levels of the Great Lakes play a role in maintaining the species. During high water years, colonies of Houghton's Goldenrod may be submerged; when water levels recede some plants survive the inundation and new seedlings establish on the moist sand (Michigan DNR, 2015). The species is threatened by habitat loss or modification caused by residential development and recreational activities, particularly off-road vehicles. No critical habitat has been designated for the Houghton's goldenrod.

Pitcher's Thistle

Pitcher's thistle is federally listed as threatened. The range of the plant species is primarily within Michigan's borders, occurring along the entire shoreline of Lake Michigan, with localities along the more limited dunes of Lake Huron and a few sites along the shores of Lake Superior. Pitcher's thistle is most commonly found on large, intact, active dunes of the Great Lakes; the species requires sand dune habitat that is subject to natural disturbance processes to maintain its early successional habitat (Higman and Penskar, 2000). The plant's survival is threatened by shoreline development, dune stabilization, recreation, and invasive non-native plants and insects. No critical habitat has been designated for Pitcher's thistle.

3.3.3.1.1 Environmental Effects

Antrim County does not propose any changes to project operation, and does not propose any new construction. No comments regarding these species were provided by any resource agency or interested party.

Our Analysis

The Kirtland's warbler nests only in young jack pine forests growing on a special type of sandy soil that are about 80 acres or larger with numerous small, grassy openings. Because this type of habitat is not present at the project, we conclude that continued operation of the project would have no effect on this species.

The Rufa red knot and Pitcher's thistle each require specialized coastal shoreline habitat of the Great Lakes that does not exist within the project boundary and are not affected by project operations. Furthermore, new construction is proposed for the project. Therefore, we conclude that continued operation of the project would have no effect on these species.

The Houghton's goldenrod is restricted to specialized coastal habitat primarily consisting of interdunal wetlands and its ability to reproduce is dependent on the natural fluctuating water levels of the Great Lakes. There are no interdunal wetlands within the project boundary. Furthermore, because outflow from the project has no effect on water levels in Lake Michigan, continued operation of the project would have no effect on this species.

Northern long-eared bats could potentially occur in any area with forested habitat in any county in Michigan; however, the project boundary is highly developed. According to the FWS (2014b),²³ trees found in developed urban areas, such as the lands located around the project powerhouse, are extremely unlikely to be suitable habitat for northern long-eared bats. Additionally, the project is not located in an area that contains karst geologic features (Gillespie et al., 2008), which can support cave and mine habitat needed for hibernation and roosting. Although a limited amount of dispersed riparian and wetland habitat in the project area could be used for foraging, roosting, and breeding by northern long-eared bats, this habitat would not be affected because there would be no changes to project operation and therefore no changes to seasonal water levels. Moreover, Antrim County does not propose any new construction and no trees would be removed as part of the proposed relicensing of the project. Also, maintenance activities would be restricted to areas around the powerhouse and transmission lines, which do not contain habitat or trees at or nearby the facilities. Therefore, we conclude that continuing to operate the project would have no effect on this species.

²³ [Online] URL:
<http://www.fws.gov/northeast/virginiafield/pdf/NLEBinterimGuidance6Jan2014.pdf>.
Accessed May 7, 2015.

3.3.4 Recreation, Land Use, and Aesthetic Resources

3.3.4.1 Affected Environment

Regional Recreation Resources

Regional recreation resources in Antrim County include opportunities for camping, hiking, biking, hunting, fishing, boating, swimming, picnicking, wildlife viewing and nature photography, ice skating, skiing, snowmobiling, and parks and fields for a variety of playground and sport activities. Within the county, outdoor recreation abounds with the availability of parks, trails, ponds, lakes, trails, natural areas, and nature preserves. Battle Creek and Kewadin Wetlands natural areas, along with Palustra-Holm Nature Preserve surround Elk Lake. Around Lake Skegemog are North Skegemog Nature Preserve and Skegemog Lake Wildlife Area. Cumulatively, these sites provide 3,300 acres of habitat and wildlife view surrounding both lakes.

Elk River, Elk Lake, and Lake Skegemog constitute the project’s water bodies. Together, the lakes have a surface area of 16 square miles and a shoreline length of 37 miles. Elk River is less than a half mile long. There are 38 public access points and three marinas around the reservoir or downstream of the project. The public access points consist of paved boat launches, street ends, beaches, parks, overlooks, and walking trails. Table 5 identifies all public water access sites and marinas around Elk Lake and Lake Skegemog, while figure 4 provides a map of marinas and water access sites around Elk Lake and Lake Skegemog, and figure 5 provides a detailed map of the same facilities near the powerhouse.

Table 5. Public Water Access Sites at the Elk Rapids Project. (Source: Staff)

Elk Lake		
Access Site	Manager	Facilities
Bussa Road Extension	Antrim County	Launch, beach
Chippewa Trail Extension	Antrim County	Launch, beach, swimming
Easily Road Extension	Antrim County	Launch, parking
East Elk Lake Drive / Schweitzer Lane Addition	Antrim County	Launch, parking
Elk Lake Access	Antrim County	Launch, swimming, picnic area, seasonal floating pier and slip, parking
Elk Lake Access—East 3 rd	Village of Elk Rapids	Launch, parking
Elk Rest Drive	Milton Township	Beach, parking
Hoopfer Road Extension	Antrim County	Overlook
Kewadin Access	Milton Township	Paved launch, parking

Milton Township Beach	Milton Township	Beach, swimming, volleyball, nature trail, parking
Milton Township Park Annex—East Elk Lake Drive	Milton Township	Pavilions, picnic area, parking
Quail Street Extension	Antrim County	Paved launch, parking
Rex Terrace Extension	Antrim County	Launch, parking
Ringler Road Park—Site #38	Milton Township	Beach, parking
Rotary Park	Village of Elk Rapids	Pavilions, picnic area, parking
Schweitzer Lane	Michigan DNR	Launch, beach, restrooms, parking
Terrace Avenue Extension	Antrim County	Launch
Townline Road Extension	Antrim County	Beach, picnic area, swimming, volleyball, parking
Wahboos Road Extension	Antrim County	Launch, parking
Whitewater Township Park	Whitewater Township	Paved launch, beach, fishing, swimming, pavilions, picnic area, electric campsites, restrooms and showers, volleyball, parking
Williams Drive	Milton Township	Launch, beach, fishing, swimming, parking
Elk River		
Bridge Street Access	Village of Elk Rapids	Paved launch, parking
Dexter Street Walkway	Village of Elk Rapids	Walkway, picnic area
Elk Rapids Dam Fishing Park	Village of Elk Rapids	Fishing, restrooms, parking
Elk Rapids Upper Harbor	Village of Elk Rapids	Marina, slips and docks, picnic area, restrooms, parking
Elk River Access—East 3 rd	Village of Elk Rapids	Launch, parking
Elk River Access—US31	Village of Elk Rapids	Paved launch, parking
Elk River Boardwalk	Village of Elk Rapids	Boardwalk, seasonal floating slips
Elk River Marina	Private	Marina, slips, seasonal boat storage and dry docks, restrooms, boat rentals, customer parking
4 th Street	Village of Elk Rapids	Launch, parking
Millers Park Road North	Village of Elk Rapids	Access
Millers Park Road South	Village of Elk Rapids	Access, parking
West Meguzee Point Road	Village of Elk Rapids	Launch

Elk River Spillway		
Kids' Fishing Pond	Village of Elk Rapids	Fishing, picnic area, parking
Grand Traverse Bay		
Dam Beach	Village of Elk Rapids	Beach, swimming, picnic area, restrooms, volleyball, parking
Elk Rapids Lower Harbor	Village of Elk Rapids	Marina, paved launch, slips, beach, fishing, pavilions, picnic area, restrooms, parking
Lake Skegemog		
Baggs Landing	Michigan DNR	Paved launch, restrooms, parking
Fairmont Drive—Site #48	Milton Township	Launch
Hoiles Drive NW	Clearwater Township	Launch, parking
Skegemog Lake Wildlife Area Viewing Platform	Michigan DNR	Viewing platform, nature trail, parking
Skegemog Swamp Pathway	Michigan DNR	Nature trail, parking

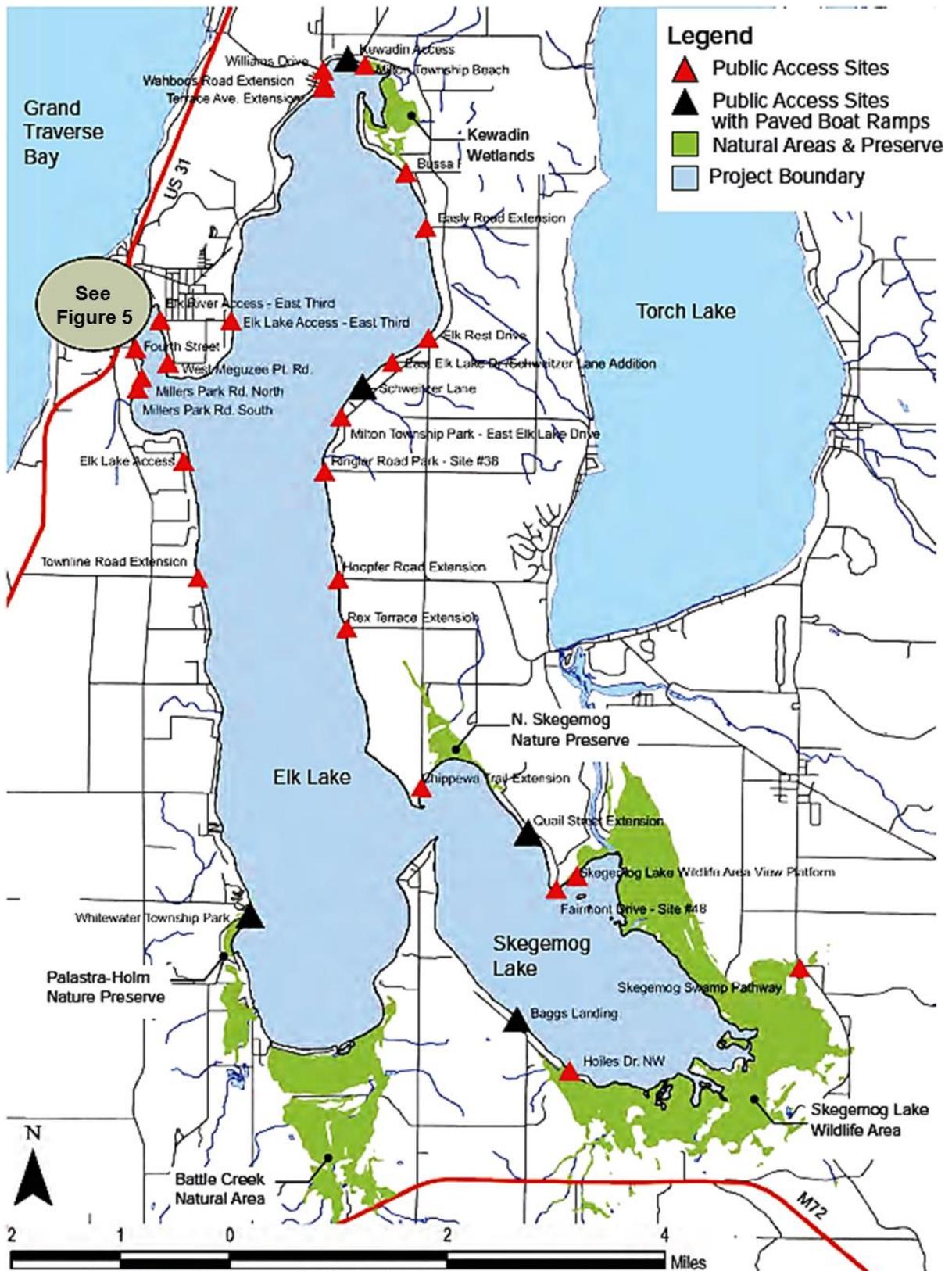


Figure 4. Public access sites around the Elk Rapids Project reservoir (Source: Antrim County, 2012; as modified by staff).



Figure 5. Recreation facilities in the Elk Rapids Project boundary (Source: Antrim County, 2012).

Existing Project Recreation Facilities

Within the project boundary, Antrim County owns and maintains an angler’s walkway, attached to the tailrace side of the powerhouse, which anglers use to access the tailrace for fishing. Antrim County also owns and maintains the project’s parking lot, located adjacent to the powerhouse, which is where anglers can park their vehicles to access the walkway.

Recreation Use

The reservoir is located in the Village of Elk Rapids and the Elk Rapids, Milton, Clearwater, and Whitewater Townships. These communities all have small residential populations that nearly double during the summer when seasonal residents and tourists arrive. Many of the area’s seasonal homes are converting to permanent homes as people retire, and there is a general demographic shift towards an older permanent population. A site inventory and field survey were conducted on August 28, 2011, and reported all marinas, access sites, and recreation sites to be in good to excellent condition.

Land Use

Land use on the reservoir's shorelines is 80 percent developed, with primary uses being residential, commercial, and parks/open space. Seawall and riprap cover over 80 percent of the Elk River's shoreline to protect the lawns of restaurants, condominiums, and other residential development along the river.

3.3.4.1 Environmental Effects

Antrim County does not propose any construction or changes to current project operation or recreation enhancements. Antrim County proposes to continue operation and maintenance of angler's walkway, attached to the tailrace side of the powerhouse, and the project's adjacent parking lot, which is where anglers can park their vehicles.

Our Analysis

The continued operation of the angler's walkway and the adjacent parking lot would ensure that anglers have access to fishing in the tailrace of the project. In addition, the project's proposed operation would not change; therefore, the existing recreational access sites would remain accessible at current water elevations.

Numerous opportunities for public recreation and access to the project reservoir exist, which are owned, operated, and maintained by either Antrim County; the Village of Elk Rapids; the Elk Rapids, Milton, Clearwater, or Whitewater townships; or the Michigan DNR.

Antrim County reviewed the most current relevant state, county, and local planning documents to assess whether the existing recreation along the reservoir are sufficient to meet current and future needs. Following document review, Antrim County conducted interviews with county and local officials to determine: (1) whether county and local plans and priorities had changed since the publication of the most recent plan; (2) whether additional recreational needs had since been identified; and (3) if the local officials anticipated any changes in recreational access needs in the future.

Based on the aforementioned document review and interviews, Antrim County determined that existing water access to the reservoir would be sufficient to meet current and future recreational needs. No quantitative information was used to aid in this determination; however, local jurisdictions stated that the facilities are adequate, and no additional recreation or access points are needed to accommodate current and future recreation needs.

By 2020, the population for the towns and villages adjacent to the project is estimated to grow between 3 to 6 percent. The existing recreational access and facilities around the project's reservoir should be sufficient for future recreation needs. However, if existing recreation access or facilities were to reach or exceed capacity, the FERC Form 80 - Licensed Hydropower Development Recreation Report, which requires a licensee to collect recreation use data every 6 years, would provide a forum for adding additional recreation facilities.

3.3.5 Cultural Resources

3.3.5.1 Affected Environment

Area of Potential Effect

Under section 106 of the NHPA of 1966, as amended, the Commission must take into account whether any historic property within project's APE could be affected by the project and allow the Advisory Council on Historic Preservation a reasonable opportunity to comment if any adverse effects on historic properties²⁴ are identified within the project's APE. The APE is defined 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. In this case, the APE for the project is the lands enclosed by the project boundary.

Regional History

The Village of Elk Rapids was established in the 1850s, among many other "boom towns," that sprang up along the mouths of northern Michigan's rivers to ship the area's natural resources, like semi-finished iron and lumber, to larger cities further south. The Dexter-Noble Company, later known as the Elk Rapids Iron Company, bought land and timber rights in the area and merged with the Elk Rapids Iron Company, monopolizing all commerce and industry within the village. The Elk Rapids Iron Company set up an industrial park on the east side of Elk River, which consisted of a chemical works, charcoal kilns, and a pig iron blast furnace. Today, the only surviving evidence is part of the furnace's brick hearth and a Michigan State Historic Marker stating that the furnace was "one of the nation's greatest producers of charcoal iron."

The first water-powered sawmill was installed in the early 1850s on the site of the project's current spillway, but by 1871, the Elk Rapids Iron Company had also

²⁴ Historic properties are defined as any district, site, building, structure, or object that is included in or eligible for inclusion in the National Register.

constructed a water-powered, 4-story gristmill and wooden powerhouse at the site. The saw mill went through a number of renovations and upgrades before being relocated to the site of the current powerhouse. During its period of operation, the sawmill produced 15 million board feet of lumber annually until the facility was razed in 1915, along with the powerhouse and gristmill, as a result of the depletion of Northern Michigan white pine.

The project's powerhouse was constructed in 1916 with a brick superstructure and housed two generation units in the two south bays. Equipment for Bay #2 was installed in 1918 and, in 1920, the turbine from the Elk Rapids Iron Company's old wooden powerhouse was installed in Bay #1. Bay #3 received a wooden superstructure and a turbine-generating unit in 1923. Between 1929 and 1930, the brick and wood superstructure was removed and the current building was built to cover all four bays. In preparation for the project's 1981 license application, the Michigan SHPO determined that the building was not eligible for the National Register.

3.3.5.2 Environmental Effects

Antrim County does not propose any changes to project operation or any new construction. In a letter dated October 28, 2010, and filed with the license application, the Michigan SHPO stated that based on the information provided for their review, no known historic properties would be affected by the project.

Our Analysis

The Elk Rapids Project would not affect any known historic properties; however, there is always a possibility that unknown archaeological resources may be discovered in the future as a result of the project's operation or project-related activities. To ensure the proper treatment of any archaeological resource that may be discovered, a provision should be included in any license issued to notify the Michigan SHPO of any such unanticipated discovery, follow the Michigan SHPO's guidance regarding an evaluation of the discovery, and, if the resource would be eligible for the National Register and adversely affected, implement ways to avoid, lessen, or mitigate for any adverse effects.

3.4 NO-ACTION ALTERNATIVE

Under the no-action alternative, the project would continue to operate as it has in the past. None of the applicant's proposed measures or the resource agencies' recommendations would be required. No new environmental protection, mitigation, or enhancement measures would be implemented.

4.0 DEVELOPMENTAL ANALYSIS

In this section, we look at the project's use of the Elk 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.*,²⁵ the Commission compares the current project cost to an estimate of the cost of obtaining the same amount of energy and capacity using a likely alternative source of power for the region (cost of alternative power). In keeping with Commission policy as described in *Mead Corp.*, our economic analysis is based on current electric power cost conditions and does not consider future escalation of fuel prices in valuing the hydropower project's power benefits.

For each of the licensing alternatives, our analysis includes an estimate of: (1) the cost of individual measures considered in the EA for the protection, mitigation, and enhancement of environmental resources affected by the project; (2) the cost of alternative power; (3) the total project cost (i.e., for continued operation of the project 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 6 summarizes the assumptions and economic information we use in our analysis. This information, except as noted, was provided by Antrim County in its license application filed with the Commission on December 21, 2012, and in deficiency and additional information request responses filed on October 16, 2013. We find that the values provided are reasonable for the purposes of our analysis. Cost items common to all alternatives include: (1) taxes and insurance costs; (2) estimated future capital investment required to maintain and extend the life of plant equipment and facilities; (3) licensing costs; and (4) normal operation and maintenance cost. Because the project

²⁵ See *Mead Corporation, Publishing Paper Division*, 72 FERC ¶ 61,027 (July 13, 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.

is operated by a municipality, no federal or local taxes were considered. Pursuant to 18 Code of Federal Regulations 11.1 (a)(1) a hydropower project's authorized installed capacity must be above 1.5 MW to be assessed annual charges. Therefore, no Commission fees are assessed. All dollars are year 2015.

Table 6. Parameters for the economic analysis of the Elk Rapids Project (Source: Antrim County, 2012; as modified by staff).

Economic Parameter	Value	Source
Installed capacity (MW)	0.700	Applicant
Average annual generation (MWh)	2,422	Applicant
Annual O&M cost	\$110,497 ^a	Applicant
Cost to prepare license application	\$179,046 ^a	Applicant
Undepreciated net investment	\$511,560 ^a	Applicant
Period of economic analysis	30 years	Staff
Term of financing	20 years	Staff
Cost of capital (Long-term interest rate) (%)	8.00	Staff
Short-term interest rate (during construction) (%)	8.00	Staff
Insurance rate (%)	0.25	Staff
Energy rate (\$/MWh) ^b	32.37	Staff
Capacity rate (\$/kilowatt-year)	162.00	Staff

- a Cost was provided by Antrim County in the application in \$2012. Cost was indexed to \$2015 using rates obtained from <http://www.usinflationcalculator.com/inflation/current-inflation-rates>.
- b Source: Energy Information Administration using rates obtained from [Annual Energy Outlook 2014](http://www.eia.gov/forecasts/aeo/index.cfm) at <http://www.eia.gov/forecasts/aeo/index.cfm>.

4.2 COMPARISON OF ALTERNATIVES

Table 7 summarizes the installed capacity, annual generation, cost of alternative power, estimated total project cost, and the difference between the cost of alternative power and total project cost for each of the action alternatives considered in this EA: (1) no-action; (2) Antrim County's proposal; and (3) the staff-recommended alternative.

Table 7. Summary of annual cost of alternative power and annual project cost for the action alternatives for the Elk Rapids Project (Source: Antrim County, 2012; as modified by staff staff).

	No-Action Alternative	Antrim County's Proposal	Staff- Recommended Alternative
Installed capacity (MW)	0.700	0.700	0.700
Annual generation (MWh)	2,422	2,422	2,422
Annual cost of alternative power (\$/MWh)	50.86	50.86	50.86
Annual project cost (\$/MWh)	71.66	71.77	72.06
Difference between the cost of alternative power and project cost (\$/MWh) ^a	(20.80)	(20.91)	(21.20)

a A number in parentheses denotes that the difference between the cost of alternative power and project cost is negative, thus the total project cost is greater than the cost of alternative power.

4.2.1 No-Action Alternative

Under the no-action alternative, Antrim County would continue to operate the project in its current mode of operation. The project would have an installed capacity of 0.700 MW and generate an average of 2,422 MWh of electricity annually. The average annual cost of alternative power would be \$123,183 or about \$50.86/MWh. The average annual project cost would be \$175,280 or \$71.66/MWh. Overall, the project would produce power at a cost that is \$50,378 or \$20.80/MWh, more than the cost of alternative power.

4.2.2 Applicant's Proposal

Under the applicant's proposal, the project would continue to operate in its current mode with an installed capacity of 0.700 MW and generate an average of 2,422 MWh of electricity annually. The average annual cost of alternative power would be \$123,183 or about \$50.86/MWh. The average annual project cost would be \$173,827, or about \$71.77/MWh. Overall, the project would produce power at a cost that is \$50,644 or \$20.91/MWh more than the cost of alternative power.

4.2.3 Staff Alternative

Under the staff alternative, the project would have an installed capacity of 0.700 MW, and generate an average of 2,422 MWh of electricity annually. Table 8

shows the staff-recommended additions and modifications to Antrim County's proposed environmental protection and enhancement measures and the estimated cost of each.

Based on an installed capacity of 0.700 MW and an average annual generation of 2,422 MWh, the cost of alternative power would be \$123,183 or \$50.86/MWh. The average annual cost of project power would be \$182,473 or \$72.06/MWh. Overall, the project would produce power at a cost which is \$51,346 or \$21.20/MWh, more than the cost of alternative power.

4.3 COST OF ENVIRONMENTAL MEASURES

Table 8 gives the cost of each of the environmental enhancement measure 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 8. Cost of environmental mitigation and enhancement measures considered in assessing the environmental effects of continued operation of the Elk Rapids Project (Source: Staff).

Enhancement/mitigation measure	Entities	Capital cost (2015 \$)	Annual cost (2015 \$)	Levelized cost (2015 \$)¹	Notes
Project Operations					
Operate the project in a modified run-of river mode, except as necessary to seasonally drawdown or refill the project reservoir.	Antrim County, Staff	\$0	\$0	\$0	a, b
Maintain the water surface elevation of the project reservoir at 590.8 feet dam gage datum April 15 to November 1 and 590.2 feet dam gage datum from November 1 to April 15, except as necessary to seasonally drawdown or refill the reservoir.	Antrim County, Staff	\$0	\$0	\$0	a, b
Develop an operation compliance monitoring plan in consultation with the Michigan DNR and Michigan DEQ.	Staff	\$2,000	\$325	\$508	a
Aquatic Resources					
Monitor water temperature and DO downstream of the project from July 1 through August 31 on an annual basis, unless upon Michigan DEQ approval, results indicate the monitoring requirements may be relaxed.	Michigan DEQ	\$1,500	\$250	\$158	a, f
Ensure project operation does not cause water temperatures or DO concentrations downstream of the project to exceed state water quality standards.	Michigan DEQ	\$0	\$0	\$0	a, e

Enhancement/mitigation measure	Entities	Capital cost (2015 \$)	Annual cost (2015 \$)	Levelized cost (2015 \$)¹	Notes
Consult with Michigan DEQ in the event of adverse conditions which prevent Antrim County from complying with operational requirements.	Michigan DEQ	\$0	\$0	\$0	a
Consult with the Commission, Michigan DEQ, and Michigan DNR in the event of adverse conditions which prevent Antrim County from complying with operational requirements.	Staff	\$0	\$0	\$0	a
Post signage that describes proper boat maintenance techniques to reduce the spread of curlyleaf pondweed, Eurasian watermilfoil, and zebra mussels	Staff	\$1,000	\$100	\$191	a
Recreation Resources					
Operate and maintain the existing angler walkway, which is attached to the tailrace side of the powerhouse, and parking lot.	Antrim County, Staff	\$0	\$252	\$252	d
Cultural Resources					
Cease project activities should archaeological resources be identified during project operation or other project-related activities and consult with the Michigan SHPO to determine appropriate treatment.	Staff	\$0	\$0	\$0	a, c

¹ Costs were rounded to the nearest dollar.

a Cost estimated by staff.

b This measure represents a continuation of existing conditions, so there would be no additional cost to implement this measure.

- c Staff estimates that the cost to implement this measure would be negligible.
- d Cost provided by Antrim County in its Additional Information Response filed on October 16, 2013.
- e Staff was unable to assign a cost for this measure, because the project currently has no ability to control water temperature.
- f The monitoring cost is \$250 for the first year only, which equates to an annualized cost of \$21.

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 licenses issued shall be such as in the Commission's judgment will be best adapted to a comprehensive plan for improving or developing waterway or waterways for all beneficial public uses. This section contains the basis for, and a summary of, our recommendations for the relicensing of the Elk Rapids Project. We weigh the costs and benefits of our recommended alternative against other proposed measures.

A. Recommended Alternative

Based on our independent review of agency comments filed on these projects and our review the environmental and economic effects of the proposed project and economic effects of the project and its alternatives, we selected the staff alternative as the preferred alternative. We recommend the staff alternative because: (1) issuance of a new hydropower license by the Commission would allow Antrim County to continue operating the project as a dependable source of electrical energy; (2) the 0.700 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 measures would protect and enhance aquatic and recreation resources.

In the following sections, we make recommendations as to which environmental measures recommended by agencies or other entities should be included in any license issued for the project. We also recommend additional staff-recommended environmental measures to be included in any license issued for the project and discuss which measures we do not recommend including in the license.

5.1.1 Measures Proposed by Antrim County

Based on our environmental analysis of Antrim County's proposal discussed in section 3 and the costs discussed in section 4, we conclude that the following environmental measure proposed by Antrim County 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 and maintain the existing angler walkway, which is attached to the tailrace side of the powerhouse, and associated parking lot.

5.1.2 Additional Measures Recommended by Staff

In addition to Antrim County's proposed measure noted above, we recommend including the following measures in any license issued for Antrim County:

- an operation compliance monitoring plan that includes a description of project operation and the equipment and procedures necessary to maintain and monitor compliance with the operational mode required in any license issued;
- posting signage that describes proper boat maintenance techniques to reduce the spread of invasive plant and mussel species; and
- if archaeological resources are discovered during project operation or other project-related activities, cease all activities related to the disturbance and discovery area, and consult with the Michigan SHPO to determine appropriate treatment.

Below, we discuss the basis for our additional staff-recommended measures.

Operation Compliance Monitoring Plan

Developing an operation compliance monitoring plan would provide a means to verify compliance with the operational requirements of any license issued for the project. An operation compliance monitoring plan would include a description of project operation and any mechanisms or structures that would be used to by Antrim County to monitor project operation. Therefore, we recommend that Antrim County develop, in consultation with Michigan DEQ and Michigan DNR, an operation compliance monitoring plan. Antrim County should file the plan for Commission approval, documenting consultation with these agencies, including any comments received on the plan and responses to those comments. The plan should also provide a detailed description of the protocols Antrim County would implement during scheduled and unscheduled project shutdowns, reservoir drawdown and refills, and a provision to file an annual report of the operational data with the Commission. Based on our review and analysis contained in section 3.3.1, *Aquatic Resources*, we find that the benefits of ensuring an adequate means by which the Commission could track compliance with the operations terms of any license issued for the project would be worth the estimated levelized annual cost of \$508.

Invasive Species Prevention

Aquatic invasive species compete with native species for food and habitat, and can directly or indirectly kill or displace native species, degrade habitat, and alter food webs. As discussed in section 3.3.1, *Aquatic Resources*, zebra mussels are found within the project boundary and throughout the chain-of-lakes watershed. Additionally, Eurasian milfoil and

curly-leaf pondweed are within and adjacent to the project boundary and present in the chain-of-lakes.

Curlyleaf pondweed, Eurasian watermilfoil, and zebra mussels are all transferred to other waterbodies primarily by boats. Zebra mussels are so pervasive throughout the chain-of-lakes that Michigan DEQ has no plan to control or eradicate them in the chain-of-lakes watershed. However, public education may help to minimize, and could reduce the likelihood of, transferring zebra mussels to other water bodies. Also, public education on how to minimize the transfer of curlyleaf pondweed and Eurasian watermilfoil could reduce the likelihood of further invasions of project waters. Therefore, we recommend that Antrim County develop signage, in consultation with the Michigan DNR and Michigan DEQ, which contains information on proper cleaning and drying of boats between launches to reduce the spread of curlyleaf pondweed, Eurasian watermilfoil, and zebra mussels. The project's recreation site is near a marina; therefore, we recommend posting the signage at the project recreation site to help inform the public of proper management techniques to reduce the spread of these invasive species.

We estimate that the levelized annual cost of the measure would be \$191, and conclude that the benefits of the measure would outweigh the costs.

Cultural Resources

As discussed in section 3.3.5, *Cultural Resources*, no historic properties would be affected by the Elk Rapids Project; however, there is a possibility that unknown archaeological resources may be discovered during project operation or project-related activities. To ensure proper treatment if any unknown archaeological resource may be discovered, we recommend that Antrim County notify and consult with the Michigan SHPO: (1) to determine if a discovered archaeological resource is eligible for the National Register; (2) if the resource is eligible, determine if the proposed project would adversely affect the historic property; and (3) if the historic property would be adversely affected, obtain guidance from the Michigan SHPO on how to avoid, lessen, or mitigate for any adverse effects.

5.1.3 Measures Not Recommended by Staff

Some of the measures recommended by Michigan DEQ would not contribute to the best comprehensive use of the Elk River water resources, do not exhibit sufficient nexus to project environmental effects, or would not result in benefits to non-power resources that would be worth their costs. The following discusses the basis for staff's conclusion not to recommend such measures.

Water Quality Monitoring

Michigan DEQ recommends that Antrim County operate the project in such a manner as to adhere to state water quality standards (for temperature and DO) in the Elk River downstream of the powerhouse. However, Michigan DEQ states that deviations from these water temperature standards would be acceptable when natural temperatures of Elk Lake, as measured in the Elk River upstream of the project, exceed these specified monthly average temperature values. Michigan DEQ also recommends that project operation not cause DO concentrations to be less than the state standard of 7.0 mg/L in the Elk River downstream of the powerhouse at any time. To verify project-related effects on water quality, Michigan DEQ recommends that Antrim County monitor temperature and DO concentrations in the Elk River downstream of the project on an hourly basis from July 1 through August 31 beginning the first year after license issuance, for a minimum of one year.

Continued operation of the project in the same mode of operation that it has been would likely result in the same water quality in the Elk River downstream of the dam. As discussed in section 3.3.1, *Aquatic Resources*, recent and previous water quality studies demonstrate that surface water temperatures of Elk Lake occasionally exceed state standards usually in late summer, while water surface DO concentrations typically exceed state minimum standards throughout the year. Because any deviations in water temperatures would be caused by natural phenomena and not project operation, monitoring water temperature downstream of the project would not provide any additional benefits.

Additionally, given that downstream of the project the less than 0.5-mile-long Elk River flows directly into Grand Traverse Bay, any temporary decreases in DO levels that may occur in the tailrace would be quickly mitigated by the high DO levels present in the bay. Therefore, continued operation of the project in the same mode of operation it has used in the past, would likely not effect water quality in the Elk River downstream of the powerhouse and that the state DO standard of 7 mg/L would continue to be met. For these reasons, we do not recommend adopting Michigan DEQ's water quality monitoring recommendations because the information obtained from conducting this water quality monitoring is not worth the estimated levelized annual costs of \$158.

5.1.4 Conclusion

Based on our review of the resource agency and public comments filed on the project and our independent analysis pursuant to sections 4(e), 10(a)(1), and 10(a)(2) of the FPA, we conclude that licensing the Elk Rapids Project, as proposed by Antrim County, with staff-recommended additional measures, would be best adapted to a plan for improving or developing the Elk River waterway.

6.0 CONSISTENCY WITH COMPREHENSIVE PLANS

Section 10(a)(2)(A) of the FPA, 16 U.S.C. §803(a)(2)(A), requires the Commission to consider the extent to which a project is consistent with the federal or state comprehensive plans for improving, developing, or conserving a waterway or waterways affected by the project. We reviewed eight comprehensive plans that are applicable to the project.²⁶ No inconsistencies were found.

²⁶ (1) Michigan Department of Environmental Quality. 1996. Non-indigenous aquatic nuisance species, State management plan: A strategy to confront their spread in Michigan. Lansing, Michigan; (2) Michigan Department of Natural Resources. 1994. Fisheries Division strategic plan. Lansing, Michigan. June 1994; (3) Michigan Department of Natural Resources. Statewide Comprehensive Outdoor Recreation Plan (SCORP): 2008-2012. Lansing, Michigan; (4) National Park Service. The Nationwide Rivers Inventory. Department of the Interior, Washington, D.C. 1993; (5) U.S. Fish and Wildlife Service. Canadian Wildlife Service. 1986. North American waterfowl management plan. Department of the Interior. Environment Canada. May 1986; (6) U.S. Fish and Wildlife Service. 1988; (7) The Lower Great Lakes/St. Lawrence Basin: A component of the North American waterfowl management plan. December 29, 1988; (8) U.S. Fish and Wildlife Service. 1993. Upper Mississippi River & Great Lakes region joint venture implementation plan: A component of the North American waterfowl management plan. March 1993.

7.0 FINDING OF NO SIGNICANT IMPACT

On the basis of our independent analysis, the issuance of a subsequent license for the Elk Rapids Hydroelectric Project with our recommended environmental measures would not constitute a major federal action significantly affecting the quality of the human environment.

8.0 LITERATURE CITED

- Aadland, L. P. 2010. Chapter 2: Nature-like Fishways p. 43-95. In Reconnecting Rivers: Natural Channel Design in Dam Removals and Fish Passage. Minnesota Department of Natural Resources - Ecological Resources Division. Fergus Falls, Minnesota. 196 pp.
- Antrim County. 2012. Elk Rapids Hydroelectric Project, FERC No. 3030. License Application. Prepared by Antrim County, Bellaire, MI. Filed December 21, 2012.
- Beall, M. 2005. Aquatic Invasive Species: A handbook for education efforts. Wisconsin Department of Natural Resources. Publication WT-825 2005.
- Bolding, B., S. Bonar, and M. Divens. 2004. Use of artificial structure to enhance angler benefits in lakes, ponds, and reservoirs: A literature review. *Reviews in Fisheries Science*. 12:75-96.
- Diana, J. S., Hanchin, P., and Popoff, N. 2014. Movement patterns and spawning sites of muskellunge *Esox masquinongy* in the Antrim chain of lakes, Michigan. *Environmental Biology of Fishes*, 1-12.
- _____. 2014. My WATERS Mapper. Waterbody ID: MI040601050404-01 [Online] URL: <http://watersgeo.epa.gov/>. Accessed November 17, 2014.
- Electric Power Research Institute (EPRI). 1992. Fish entrainment and turbine mortality review and guidelines. Prepared by Stone and Webster Environmental Services, Boston, Massachusetts. EPRI Report No. TR-101231, Project 2694-01. September 1992.
- _____. 1997. Turbine Entrainment and Survival Database – Field Tests. EPRI Report No. TR-108630. Prepared by Alden Research Laboratory, Inc. Holden, MA.
- Federal Energy Regulatory Commission (FERC). 1995. Preliminary assessment of fish entrainment at hydropower projects: a report on studies and protective measures. Paper No. DRP-10. Office of Hydropower Licensing, Washington, DC.
- Fuller, D.R. 2001. Fish of the Elk River Chain of Lakes: A Watershed Perspective. Tip of the Mitt Watershed Council. Petoskey, Michigan.
- Gillespie, R., W. B. Harrison III, and M.G. Grammer. 2008. Geology of Michigan and the

Great Lakes. Michigan Geological Repository for Research and Education.
Western Michigan University, Kalamazoo, MI. 37 pp.

Higman, P.J. and M.R. Penskar. 2000. Special plant abstract for *Cirsium pitcheri*. Michigan Natural Features Inventory, Lansing, MI. 3 pp.

Karatayev, A. Y., L. E. Burlakova, and D. K. Padilla. 2014. Zebra versus quagga mussels: a review of their spread, population dynamics, and ecosystem impacts. *Hydrobiologia*, 1-16.

Leung, B., J.M. Bossenbroek and D.M. Lodge. 2006. Boats, pathways, and aquatic biological invasions: Estimating dispersal potential with gravity models. *Biological Invasions* 8:241-254.

Madsen, J. D. 2009. Chapter 13.2: Eurasian Watermilfoil, pp. 95-98. In: *Biology and control of aquatic plants: a best management practices handbook* (Gettys LA, WT Haller and M Bellaud, eds.). Aquatic Ecosystem Restoration Foundation, Marietta GA. 210 pp.

Mayfield, H. F. 1992. Kirtland's warbler (*Dendroica Kirtlandii*). In A. Poole, P. Stettenheim, and F. Gill (editors). *The Birds of North America*, No. 19. The Academy of Natural Sciences, Philadelphia, Pennsylvania, and The American Ornithologists' Union, Washington, D.C. 16 pp.

Michigan Department of Environmental Quality (Michigan DEQ). 2002. Michigan's Aquatic Nuisance Species State Management Plan Update. Lansing, Michigan. October 2002. Available: <http://www.deq.state.mi.us/documents/deq-ogl-ANSPlan2002.pdf>. Accessed December 22, 2013.

Michigan Department of Natural Resources (Michigan DNR). 1990. Fish Population Survey - Elk Lake. Lansing, Michigan.

_____. 1996. Fish Population Survey - Skegemog Lake. Lansing, Michigan.

_____. 2011. Fish Population Survey Summary - Elk and Skegemog Lakes – 2008-2009. Available: http://www.michigan.gov/documents/dnr/Elk-Skegemog-lakes_242175_7.pdf. Accessed March 18, 2014.

_____. 2013. Elk River Bypass / Kids Pond. [Online] URL: http://www.michigan.gov/dnr/0,4570,7-153-10364_53405-302280--,00.html. Accessed December 12, 2013.

_____. 2014. Skegemog Lake. [Online] URL: http://www.michigan.gov/dnr/0,4570,7-153-10364_53405-302291--,00.html. Accessed November 10, 2014.

_____. 2015. Houghton's Goldenrod (*Solidago houghtonii*). [Online] URL: http://www.michigan.gov/dnr/0,4570,715310370_12146_1221361388,00.html. Accessed April 20, 2015.

Michigan Surface Water Information Management System (MiSWIMS). 2014. Map Search: designated uses. [Online] URL: <http://www.mcgi.state.mi.us/miswims/mapBasic.aspx>. Accessed December 3, 2014.

Michigan Natural Features Inventory. 1999. Land type Associations of the Leelanau and Grand Traverse Peninsula: Subsection VII.5. Lansing, Michigan.

_____. 2015. Watershed Element Data; listing of all known occurrences of threatened, endangered, and special concern species and high quality natural communities occurring within a watershed. HUC IDs: 04060105 – 0404, 0405, 0406, and 0407. Michigan State University Extension Services. [Online] URL: <http://mnfi.anr.msu.edu/data/watshd.cfm>. Accessed April 13, 2015.

Nalepa, T. F., and D.W. Schloesser. 1993. Zebra Mussels Biology, Impacts, and Control. Lewis Publishers, Boca Raton: 810.

North American Electric Reliability Corporation (NERC). 2013. 2013 Long - Term Reliability Assessment. Atlanta, GA. December 2013.

Penskar, M.R., P.J. Higman, and S.R. Crispin. 2000. Special plant abstract for *Solidago houghtonii* (Houghton's goldenrod). Michigan Natural Features Inventory, Lansing, MI. 3 pp.

Rediske, R.R., J. O'Keefe, K. Rieger, and J.D. Rediske. 2010. Assessment of *E. coli* and Microcystins in Cladophora Mats in the Nearshore Waters of Grand Traverse Bay, Little Traverse Bay, and Saginaw Bay. Scientific Technical Report 481062-07. Prepared For Michigan DEQ. Paper 13.

Roni, P., K. Hanson, T. J. Beechie, G. R. Pess, M. M. Pollock, and D. M. Bartley. 2005. Habitat rehabilitation for inland fisheries. Global review of effectiveness and guidance for rehabilitation of freshwater ecosystems. FAO (Food and Agriculture Organization of the United Nations) Fisheries Technical Paper 484. Rome, FAO. 116 pp.

State of Michigan. 1994. Part 4 Rules of Part 31 of the Michigan Water Resources Protection Act 451 of 1994, as amended.

- Tip of the Mitt Watershed Council (Watershed Council). 1994. A Cladophora Survey of Elk and Skegemog Lakes. December 1994. Petoskey, Michigan. 21 pp.
- Three Lakes Association (Lakes Associations). 2014. Elk River Chain of Lakes Fish Shelters Project Update - Watershed Protection Plan Implementation Team Project. Annual ERCOL-WPIT Meeting with local units of government. [Online] URL: www.3lakes.com. Accessed March 19, 2014.
- Tugend, K.I., M.S. Allen, and M. Webb. 2002. Use of artificial habitat structures in US lakes and reservoirs: A survey from the Southern Division AFS Reservoir Committee. *Fisheries*, 27(5): 22–27.
- U.S. Environmental Protection Agency (EPA). 2013. Waterbody Report for Skegemog Lake 2010. Mapped area of assessment: Elk and Skegemog Lakes. [Online] URL: http://ofmpub.epa.gov/waters10/attains_waterbody.control?p_au_id=MI040601050404-01&p_cycle=2010. Accessed December 16, 2013.
- United States Fish and Wildlife Service (FWS). 2012. Kirtland's Warbler (*Setophaga kirtlandii*) – Fact Sheet. [Online] URL: <http://www.fws.gov/midwest/endangered/birds/Kirtland/kiwafctsht.html>. Accessed April 20, 2015.
- _____. 2013. Red knot (*Calidris canutus rufa*) – Fact Sheet. [Online] URL: <http://www.fws.gov/northeast/redknot/facts.pdf>. Accessed April 20, 2015.
- _____. 2014a. Rufa red knot background information and threats assessment. Supplement to: Endangered and Threatened Wildlife and Plants; Final Threatened Status for the Rufa Red Knot (*Calidris canutus rufa*). Docket No. FWS–R5–ES–2013–0097; RIN AY17.
- _____. 2014b. Northern long-eared bat interim conference and planning guidance. USFWS Regions 2, 3, 4, 5, & 6. [Online] URL: <http://www.fws.gov/northeast/virginiafield/pdf/NLEBinterimGuidance6Jan2014.pdf>. Accessed May 7, 2015.
- _____. 2015a. IPaC Species Information. Life History for Kirtland's Warbler (*Setophaga kirtlandii*). [Online] URL: <http://ecos.fws.gov/ipac/wizard/speciesInformation!showSpeciesInformation.action?pcode=B03I>. Accessed April 20, 2015.

- _____. 2015b. Environmental Conservation Online System. Species Profile for Northern long-eared Bat (*Myotis septentrionalis*). [Online] URL: <http://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?sPCODE=A0JE>. Accessed April 23, 2015.
- _____. 2015c. Endangered and Threatened Wildlife and Plants; Threatened Species Status for the Northern Long-Eared Bat With 4(d) Rule. Docket No. FWS-R5-ES-2011-0024; 4500030113.
- Varga, L. 2012. Fish Shelter Project Handbook. Three Lakes Association. Available: <http://3lakes.com/wp-content/uploads/2012/09/TLA-Fish-Shelter-Handbook.pdf>. Accessed November 03, 2014.
- Videler, J.J. and Wardle, C.S. 1991. Fish swimming stride by stride: speed limits and endurance. *Reviews in Fish Biology and Fisheries* 1: 23-40.
- Village of Elk Rapids. 2013. Five Year Community Recreation Plan. Parks & Recreation Commission. Available: http://www.elkrapids.org/wp-content/uploads/2013/04/2013_VillageOfElkRapids_CommunityRecreationPlan_FINAL.pdf. Accessed November 19, 2014.
- Weiss, W.G. 1995. Compilation of Temperature and Dissolved Oxygen Data for Elk Lake, 1993 and 1994. Submitted to the Elk-Skegemog Lake Association, Elk Rapids, Michigan. February 28, 1995.
- Wolf, T. 2009. Chapter 7: mechanical control of aquatic weeds, pp. 41-46. In: *Biology and control of aquatic plants: a best management practices handbook* (Gettys LA, WT Haller and M Bellaud, eds.). Aquatic Ecosystem Restoration Foundation, Marietta GA. 210 pp.

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