American Electric Power
1 Riverside Plaza
Columbus, OH 43215
aep.com

Via Electronic Filing

June 4, 2018

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

**Subject: Constantine Hydroelectric Project (FERC No. 10661)**
**Notice of Intent and Pre-Application Document**

Dear Secretary Bose:

Indiana Michigan Power Company (I&M or Applicant), a unit of American Electric Power (AEP), is submitting to the Federal Energy Regulatory Commission (FERC or Commission) the Notice of Intent (NOI) to file an application for a subsequent license and Pre-Application Document (PAD) for the Constantine Hydroelectric Project (FERC No. 10661) (Project) located on the St. Joseph River in St. Joseph County, Michigan. The existing FERC license for the Project expires on September 30, 2023.

The Applicant is distributing this letter to the stakeholders listed on the distribution list in Appendix A of the PAD. For stakeholders listed in Appendix A who have provided an email address, the Applicant is distributing this letter via e-mail; otherwise, the Applicant is distributing this letter via U.S. mail. Stakeholders interested in the relicensing process may obtain a copy of the NOI and PAD electronically through FERC's eLibrary at https://elibrary.ferc.gov/idmws/search/fercgensearch.asp under docket number P-10661 or on the Applicant's website www.aephydro.com/HydroPlant/Constantine. If any stakeholder would like to request a CD containing an electronic copy of the NOI and PAD, please contact the undersigned at the information listed below. In addition, the Applicant is providing two courtesy paper copies of the NOI and PAD to Commission Staff in the Office of Energy Projects and Office of General Counsel – Energy Projects, as required by the Commission's filing guidelines. The NOI and PAD are available for review at the Applicant's business office during regular business hours located at 1 Riverside Plaza Columbus, OH 43215.

Appendix D of the PAD includes a single-line electrical diagram of the Project and an existing Exhibit F Project drawing, as required by the Commission's PAD content requirements under 18 CFR § 5.6(d)(2)(iii)(D). The information contained in these drawings are deemed as Critical Energy Infrastructure Information (CEII) under 18 CFR §388.113, thus Appendix D of the PAD is not being distributed to the public. The Applicant is filing Appendix D under the Commission's eFiling guidelines for filing CEII.

In accordance with 18 CFR §5.5(e) of the Commission's regulations, the Applicant requests that the Commission designate I&M as the Commission's non-federal representative for purposes of

consultation under Section 106 of the National Historic Preservation Act (NHPA), 16 U.S.C. § 470f and the NHPA implementing regulations at 36 CFR Part 800.

In addition, the Applicant requests that FERC designate I&M as the non-federal representative for the Project for the purpose of consultation with the U.S. Fish and Wildlife Service and National Marine Fisheries Service, pursuant to Section 7 of the Endangered Species Act (ESA) and the joint agency ESA implementing regulations at 50 CFR Part 402.

We look forward to working with the Commission's staff, resource agencies, Indian Tribes, local governments, non-governmental organizations, members of the public, toward developing a license application for this renewable energy facility. If there are any questions regarding this letter or the NOI or PAD, please contact me at jmmagalski@aep.com or via phone at (614) 716-2240.

Sincerely,

Jonathan M. Magalski
Environmental Specialist Consultant
American Electric Power Service Corporation, Environmental Services

# Constantine Hydroelectric Project (FERC No. 10661)
# Distribution List

**Federal Agencies**

Mr. John Eddins
Office of Federal Agency Programs
Advisory Council on Historic Preservation
401 F Street NW, Suite 308
Washington, DC 20001-2637

Ms. Kimberly Bose
Secretary
Federal Energy Regulatory Commission
888 1st St NE
Washington, DC 20426

FEMA Region 5
536 South Clark Street, 6th Floor
Chicago, IL 60605

Mr. John Bullard
Regional Administrator
NOAA Fisheries Service
Greater Atlantic Regional Fisheries Office
55 Great Republic Drive
Gloucester, MA 01930-2276

Mr. Martin J. Rosek
State Soil Scientist
US Department of Agriculture
Natural Resources Conservation Service
3001 Coolidge Road, Suite 250
East Lansing, MI 48823

Ms. Mary Manydeeds
Bureau of Indian Affairs, Midwest Region
US Department of the Interior
Norman Pointe II Building
5600 W. American Boulevard, Suite 500
Bloomington, MN 55437

Office of the Solicitor
US Department of the Interior
1849 C Street, NW
Washington, DC 20240

Ms. Lindy Nelson
Regional Environmental Officer, Office of Environmental Policy & Compliance
US Department of the Interior
Philadelphia Region
Custom House, Room 244
200 Chestnut Street
Philadelphia, PA 19106

Ms. Liz Pelloso
Wetland/Environmental Scientist, Region 5
US Environmental Protection Agency
77 West Jackson Boulevard (E19-J)
Chicago, IL 60604

Mr. Ken Westlake
Chief, NEPA Implementation Section - Region 5
US Environmental Protection Agency
77 West Jackson Boulevard (E19-J)
Chicago, IL 60604

Mr. Jack Dingledine
Assistant Field Office Supervisor/Michigan
Ecological Services Field Office
US Fish and Wildlife Service
2652 Coolidge Road, #101
East Lansing, MI 48823

Ms. Alisa Shull
Chief, Endangered Species - Midwest Region (Region 3)
US Fish and Wildlife Service
5600 American Boulevard West, Suite 990
Bloomington, MN 55437-1458

Mr. Derrick Hubbell
Michigan Water Science Center
US Geological Survey
6520 Mercantile Way, Suite 5
Lansing, MI 48911-5991

Mr. Tom Weaver
Michigan Water Science Center
US Geological Survey
6520 Mercantile Way, Suite 5
Lansing, MI 48911-5991

US Geological Survey
1451 Green Road
Ann Arbor, MI 48105

Hon. Aaron Miller
US Congressman, 59th District
US House of Representatives
N-993 House Office Building
PO Box 30014
Lansing, MI 48909

# Constantine Hydroelectric Project (FERC No. 10661)
# Distribution List

Acting Director, Headquarters
US National Park Service
1849 C Street, NW
Washington, DC 20240

Hon. Gary Peters
US Senate
Hart Senate Office Building
Washington, DC 20510

Hon. Debbie Stabenow
US Senate
713 Hart Senate Office Building
Washington, DC 20510-2204

**State Agencies**

Michigan Department of Agriculture
525 West Allegan Street
Lansing, MI 48933

Mr. Chris Antieau
Great Lakes Shorelands Unit - Water Resources Division
Michigan Department of Environmental Quality
525 West Allegan Street
PO Box 30473
Lansing, MI 48909-7973

Kalamazoo District Office
Michigan Department of Environmental Quality
7953 Adobe Road
Kalamazoo, MI 49009-5025

Ms. Jessica Mistak
Michigan Department of Natural Resources
PO Box 30028
Lansing, MI 48909

Mr. Kyle Kruger
Senior Fisheries Biologist
Michigan Department of Natural Resources
Mio Field Office
191 S. Mt. Tom Road
Mio, MI 48647

Ms. Kesiree Thiamkeelakul
Michigan Department of Natural Resources
Mio Field Office
191 S. Mt. Tom Road
Mio, MI 48647

Mr. Brian D. Conway
State Historic Preservation Officer, Lansing Office
State Historic Preservation Office
735 East Michigan Avenue
PO Box 30044
Lansing, MI 48909

**Local Governments**

Ms. Korie Blyveis
District Manager
Cass County Conservation District
1127 East State St.
Cassopolis, MI 49031

Mr. Robert Hile
Mayor
City of Sturgis
130 North Nottawa
Sturgis, MI 49091

Friends of the St. Joe River Association, Inc.
PO Box 1794
South Bend, IN 46634

St. Joseph County
PO Box 189
Centreville, MI 49032

Ms. Carolyn Grace
Administrator
St. Joseph County Conservation District
693 E. Main Street
Centerville, MI 49032

3. Local Governments
Mr. Keith Shears
President
Town of Centreville
221 West Main
PO Box 399
Centreville, MI 49032

# Constantine Hydroelectric Project (FERC No. 10661)
# Distribution List

Mr. Mark R. Brown
Supervisor
Township of Constantine
425 Centreville Street
Constantine, MI 49042

Mr. George E. Morse
Supervisor
Township of Sturgis
70669 Stubey Road
Sturgis, MI 49091

Mr. Donald E. Gloy, Jr.
Supervisor
Township of White Pigeon
16825 Tomahawk Trail
White Pigeon, MI 49099

Mr. Gary Mathers
President
Village of Constantine
115 White Pigeon Street
Constantine, MI 49042

Mr. Tyler Royce
President
Village of White Pigeon
103 South Kalamazoo
PO Box 621
White Pigeon, MI 49099

**Tribes**

Mr. Michael LaRonge
Tribal Historic Preservation Officer
Forest County Potawatomi Community
5320 Wensaut Lane
PO Box 340
Crandon, WI 54520

Ms. Kelly Curran
Pokagon Band of Potawatomi Indians
58620 Sink Road
PO Box 180
Dowagiac, MI 49047

Nottawaseppi Huron Band of the Potawatomi
1485 Mno-Bmadzewen Way
Fulton, MI 49052

**Non-governmental Organizations**

Mr. John Seebach
American Rivers
1104 14th St NW, Suite 1400
Washington, DC 20005

Mr. Kevin Richard Colburn
National Stewardship Director
American Whitewater
PO Box 1540
Cullowhee, NC 28779

Michigan Audubon Society
2311 Science Parkway, Suite 200
Okemos, MI 48864

Michigan Citizens for Water Conservation
PO Box 1
Mecosta, MI 49332

Michigan Environmental Council
602 West Ionia Street
Lansing, MI 48933

Mr. Bob Stuber
Fisheries Biologist
Michigan Hydropower Relicensing Coalition
1620 High Street
Traverse City, MI 49684

Michigan Loon Preservation Association
10181 Sheridan Road
Millington, MI 48746

Michigan Nature Association
2310 Science Parkway, Suite 100
Okemos, MI 48864

Mr. Matt Meersman
Director
St. Joseph River Basin Commission
227 West Jefferson Boulevard
1120 County-City Boulevard
South Bend, IN 46601

# CONSTANTINE HYDROELECTRIC PROJECT
# FERC PROJECT NO. 10661
# NOTICE OF INTENT TO FILE APPLICATION FOR SUBSEQUENT LICENSE

Indiana Michigan Power Company ("I&M" or "Licensee"), a unit of American Electric Power (AEP) and the Licensee of the existing Constantine Hydroelectric Project (FERC Project No. 10661), hereby notifies the Federal Energy Regulatory Commission ("FERC" or "Commission") of its intent to file an Application for Subsequent License for the Constantine Hydroelectric Project.

Pursuant to 18 C.F.R. §5.5(b) of the Commission's regulations, I&M provides the following information:

**(1) Licensee's Name, Address, and Phone Number:**

Indiana Michigan Power Company
1 Riverside Plaza
Columbus, OH 43215
Phone: (614) 716-2240

**(2) FERC Project Number:**

FERC Project No. 10661

**(3) License Expiration Date:**

September 30, 2023

**(4) Statement of Intent to File Application for New License:**

I&M hereby unequivocally declares its intent to file an Application for New License for the Constantine Hydroelectric Project on or before September 30, 2021. I&M will utilize the Commission's Integrated Licensing Process (ILP) in support of this relicensing.

**(5) Principal Works of the Constantine Hydroelectric Project:**

Project works consist of: (a) an uncontrolled concrete gravity overflow spillway dam with a height of about 12 feet, a total length of 241.25 feet, including an abandoned 4-foot-wide fish chute at the left abutment which is now a sluice gate, and topped with 11-¼-inch-high flashboards; (b) a reinforced-concrete headgate structure 68 feet long and 20 feet high containing seven wooden gates about 7.75 feet wide by 15 feet high; (c) a 70-foot-long earthen embankment between the headgate structure and overflow spillway; (d) an earthfill reservoir impoundment dike with a maximum height of about 20 feet and a length of 650 feet located about 1,500 feet east from the left abutment of the main dam; (e) a reservoir with a surface area of 525 acres at a normal water surface elevation of

782.94 feet, National Geodetic Vertical Datum (NGVD); (f) a 1,270-foot-long power canal with a bottom width of 60 feet; (g) a brick powerhouse with dimensions of 140 feet by 30 feet containing four vertical-shaft Francis turbines connected to four 300-kilowatt (kW) generating units for a total installed capacity of 1,200 kW; (h) a switchyard adjacent to the powerhouse containing three step-up transformers; (i) a 2.4-kilovolt (kV) transmission line about 50 feet long; and (j) appurtenant facilities and equipment.

**(6) Project Location:**

The Constantine Project is located on the St. Joseph River in the Village of Constantine in St. Joseph County, Michigan.

**(7) Plant Installed Capacity:**

The Project's installed capacity is 1.2 megawatts (MW).

**(8)(i) The names and mailing addresses of every county in which any part of the project is located and in which any federal facility that is used by the project is located are:**

J. Patrick Yoder
County Administrator
St. Joseph County
125 W. Main St.
P.O. Box 189
Centreville, MI 49032

There are no federal lands or facilities associated with the Project.

**(8)(ii)(A) The names and mailing addresses of every city, town, or similar political subdivision in which any part of the project is or is to be located and any federal facility that is or is to be used by the project is located:**

Mark Honeysett
Village Manager
Village of Constantine
115 White Pigeon St.
Constantine, MI 49042

There are no federal lands or facilities associated with the Project.

**(8)(ii)(B) The names and mailing addresses of every city, town, or similar political subdivision that has a population of 5,000 or more people and is located within 15 miles of the Project dam:**

Verba DeMauro
Township Trustee
25600 County Road 4
Elkhart, IN 46514

Ruth Eash
Township Trustee
117 North Main Street
Middlebury, IN 46540

Mark Grabill
Township Trustee
228 Waterfall Drive
Suite A
Elkhart, IN 46516

Brandie Fitch
Township Trustee
365 East Main Street
PO Box 184
Shipshewana, IN 46565

Beuford Lee
Township Trustee
3503 Fox Chase
Bristol, IN 46507

Thomas Lowry
Mayor
53 ½ North Main Street
Three Rivers, MI 49093

James Weldy
Township Trustee
58518 State Road 15
Goshen, IN 46528

Mike Hughes
City Manager
130 North Nottawa Street
Sturgis, MI 49091

**(8)(iii) The names and mailing addresses of every irrigation district, drainage district, or similar special purpose political subdivision (A) in which any part of the project is located, and any federal facility that is or is proposed to be used by the project is located, or (B) that owns, operates, maintains, or uses any project facility or any federal facility that is or is proposed to be used by the project:**

There are no irrigation or drainage districts or similar special purpose political subdivisions associated with or in the general area of the Project. There are no federal lands or facilities associated with the Project.

**8(iv) The names and mailing addresses of every other political subdivision in the general area of the project that there is reason to believe would likely be interested in or affected by the notification:**

Carolyn Grace
Administrator
St. Joseph County Conservation District
693 E. Main Street
Centerville, MI 49032

**8(v) The names and mailing addresses of affected Indian Tribes:**

Lac du Flambeau Band of Lake Superior Chippewa Indians
PO Box 67
Lac du Flambeau, WI 54538

Menominee Indian Tribe of Wisconsin
PO Box 910
Keshena, WI 54135

Citizen Potawatomi Nation
1601 South Gordon Cooper Drive
Shawnee, OK 74801

Forest County Potawatomi
5320 Wensaut Lane
P.O. Box 340
Crandon, Wisconsin 54520

Miami Tribe of Oklahoma
PO Box 1326
Miami, OK 74355

Pokagon Band of Potawtomi Indians
58620 Sink Road
PO Box 180
Dowagiac, MI 49047

Little Traverse Bay Bands of Odawa Indians
7500 Odawa Circle
Harbor Springs, MI 49740

Sault Ste. Marie Tribe of Chippewa Indians
523 Ashmun Street
Sault Ste. Marie, MI 49783

I&M is filing this NOI concurrently with a Pre-Application Document (PAD). In accordance with 18 C.F.R. §5.5(c), the Licensee is sending notification of these filings to the distribution list included in Appendix A of the PAD; the list includes applicable resource agencies, local governments, Indian Tribes, and non-government organizations.

In accordance with 18 C.F.R. §5.5(e), I&M is requesting designation as the non-federal representative for consultation under Section 7 of the Endangered Species Act and Section 106 of the National Historic Preservation Act.

If there are any questions concerning this NOI or the PAD, please contact the undersigned at the address or telephone number listed.

Respectfully submitted,

David P. Hoffman
Managing Director, Field and Support Services
American Electric Power
c/o American Electric Power Service Corporation
1 Riverside Plaza
Columbus, OH 43215
(614) 716-1772

# PRE-APPLICATION DOCUMENT

## Constantine Hydroelectric Project
## FERC NO. 10661

Indiana Michigan Power Company

*June 2018*

INDIANA MICHIGAN POWER℠

An AEP Company

BOUNDLESS ENERGY℠

# CONSTANTINE HYDROELECTRIC PROJECT
# FERC PROJECT NO. 10661
# PRE-APPLICATION DOCUMENT

## TABLE OF CONTENTS

**TABLE OF CONTENTS**
**CONTINUED**

**TABLE OF CONTENTS**
**CONTINUED**

**TABLE OF CONTENTS**
**CONTINUED**



**LIST OF APPENDICES**

## LIST OF FIGURES

## LIST OF TABLES

## LIST OF PHOTOS

# LIST OF ACRONYMS

| | |
|---|---|
| °C | degrees Celsius |
| °F | degrees Fahrenheit |
| ADA | American with Disabilities Act |
| AEP | American Electric Power |
| AIRs | Additional Information Requests |
| APE | area of potential effect |
| CEII | Critical Energy Infrastructure Information |
| CFR | Code of Federal Regulations |
| cfs | cubic feet per second |
| DO | dissolved oxygen |
| EA | Environmental Analysis |
| EIS | Environmental Impact Statement |
| EPT | Ephemeroptera, Plecoptera, and Trichoptera taxa |
| ESA | Endangered Species Act |
| FERC or Commission | Federal Energy Regulatory Commission |
| FPA | Federal Power Act |
| fps | feet per second |
| GLEC | Great Lakes Environmental Center, Inc. |
| HPMP | Historic Properties Management Plan |
| I&M | Indiana Michigan Power Company or Licensee |
| ILP | Integrated Licensing Process |
| K&A | Kieser & Associates, LLC |
| kV | kilovolt |
| kW | kilowatt |
| M | magnitude |
| MDEQ | Michigan Department of Environmental Quality |
| MDNR | Michigan Department of Natural Resources |
| MDOT | Michigan Department of Transportation |
| mg/L | milligram per liter |

| | |
|---|---|
| MiSWIMS | Michigan Surface Water Information Management System |
| MNFI | Michigan Natural Features Inventory |
| msl | mean sea level |
| MW | megawatt |
| MWh | megawatt hour |
| NEPA | National Environmental Policy Act |
| NGO | non-governmental organization |
| NGVD | National Geodetic Vertical Datum |
| NHPA | National Historic Preservation Act of 1966 |
| NMFS | National Marine Fisheries Service |
| NOI | Notice of Intent |
| NPDES | National Pollutant Discharge Elimination System |
| NPS | National Park Service |
| NRHP | National Register of Historic Places |
| NRI | Nationwide Rivers Inventory |
| NWI | National Wetland Inventory |
| PAD | Pre-Application Document |
| PCBs | Polychlorinated Biphenyls |
| PLC | programmable logic controller |
| PM&E | protection, mitigation, or enhancement |
| PSP | Proposed Study Plan |
| PURPA | Public Utility Regulatory Policies Act of 1978 |
| RSP | Revised Study Plan |
| RTE | rare, threatened, or endangered |
| S.U. | standard units |
| SCORP | State Comprehensive Outdoor Recreation Plan |
| SD1 | Scoping Document 1 |
| SD2 | Scoping Document 2 |
| Section 106 | Section 106 of the National Historic Preservation Act of 1966 |

| | |
|---|---|
| SHPO | State Historic Preservation Office |
| STORET | Storage and Retrieval data warehouse (USEPA) |
| TCP | traditional cultural properties |
| THPO | Tribal Historic Preservation Officer |
| TMDL | Total Maximum Daily Loads |
| USACE | U.S. Army Corps of Engineers |
| USC | United States Code |
| USCB | U.S. Census Bureau |
| USDA | U.S. Department of Agriculture |
| USEPA | U.S. Environmental Protection Agency |
| USFWS | U.S. Fish and Wildlife Service |
| USGS | U.S. Geological Survey |

## Section 1
# Introduction and Background

Indiana Michigan Power Company (I&M or Licensee), a unit of American Electric Power (AEP), is the Licensee, owner, and operator of the run-of-river, 1,200-kilowatt (kW) Constantine Hydroelectric Project (Project) (Project No. 10661), located on the St. Joseph River in the Village of Constantine in St. Joseph County, Michigan.

The Constantine Project consists primarily of an uncontrolled concrete gravity overflow spillway dam, a concrete headgate structure, an earthern embankment between the headgate structure and overflow spillway, an earthfill reservoir impoundment dike, a power canal, and a powerhouse. The Project was constructed in 1873 by the Constantine Hydraulic Company. The original timber crib dam and powerhouse were replaced with the existing dam and powerhouse in 1923. Today the Project is operated by I&M in a run-of-river manner, generating approximately 5,000 megawatt hours (MWh) annually of renewable energy.

The Project is currently licensed by the Federal Energy Regulatory Commission (FERC or Commission) under the authority granted to FERC by Congress through the Federal Power Act (FPA), 16 United States Code (USC) §791(a), et seq., to license and oversee the operation of non-federal hydroelectric projects on jurisdictional waters and/or federal land. There are no federal lands associated with the Project. The Project underwent original licensing in the early 1990s, and the current operating license for the Project expires on September 30, 2023. In accordance with FERC's regulations at 18 Code of Federal Regulations (CFR) §16.9(b), I&M must file its application for a new license with FERC no later than September 30, 2021.

In support of preparing an application for a new license, I&M has elected to use the Commission's Integrated Licensing Process (ILP). The ILP is designed to bring efficiencies to the licensing process by integrating the applicant's pre-filing consultation activities with FERC's National Environmental Policy Act (NEPA) scoping responsibilities. The Licensee believes that the ILP will be the most effective and efficient process for this relicensing. The ILP is formally initiated by I&M's filing with FERC this Pre-Application Document (PAD) and Notice of Intent (NOI) to relicense the Project. The PAD and NOI are distributed to federal and state resource agencies, local governments, Indian Tribes, and interested members of the public simultaneously with its filing with FERC. By regulation, I&M's PAD and NOI must be filed with FERC no earlier than April 1, 2018 and no later than October 1, 2018 (18 CFR §§5.5(d), 5.6(a)).

Under 18 CFR §5.8 of the Commission's regulations, FERC will review this PAD and associated NOI and, within 60 days of receipt, notice the commencement of the licensing proceeding, request comments on the PAD, and issue Scoping Document 1 (SD1). A public scoping meeting and site visit will then be conducted within 30 days of issuing SD1, or within 90 days of the submittal of the PAD.

## Section 2
# Purpose of the Pre-Application Document

The filing of this PAD and the associated NOI by I&M marks the formal start of the relicensing process for the Constantine Hydroelectric Project. The purpose of the PAD is to provide a description of the existing Project facilities and operations, and to provide existing, relevant, and reasonably available information related to the Project area. Further, the PAD is intended to assist the Commission, resource agencies, Indian Tribes, non-governmental organizations (NGOs), and other interested parties in identifying potential resource areas of interest and informational needs, to develop study requests, and to establish the information necessary to analyze the license application (18 CFR §5.6(b)).

## 2.1 Search for Existing, Relevant, and Reasonably Available Information

In support of preparing this PAD, HDR, Inc. (HDR), on behalf of and in collaboration with I&M, has undertaken an extensive search to identify and review information that is reasonably available and relevant to the Project. These efforts consisted of the following five primary activities:

1. A comprehensive search of I&M's files and documentation;
2. The distribution of a PAD information questionnaire to 50 parties requesting any information related to the Project, Project area, and the region;
3. A search and review of publicly available sources and databases;
4. Consultation with select resource agencies and other relicensing parties with potential information applicable to the Project area; and
5. A review of the Michigan State and Federal Comprehensive Plans relevant to the Project.

A copy of the PAD information questionnaire and associated distribution list is provided in Appendix A. Copies of completed questionnaires provided by Project stakeholders are included in Appendix B. I&M and HDR reviewed the responses and information applicable to the Project. Relevant information has been summarized in the applicable resource sections of this PAD.

## 2.2 Description of Consultation Process Undertaken by I&M Prior to the Submittal of the PAD

I&M performed preliminary consultation with potential stakeholders in support of preparing this PAD to obtain available information, to determine the potential relationship between stakeholders' interests and Project operations, and to identify potential information gaps and study needs in advance of the formal relicensing process.

I&M's preliminary consultation began with the identification of parties that may have an interest in the Constantine Hydroelectric Project relicensing. Based on the information obtained during this process, a stakeholder list of 50 parties was compiled and used as the distribution list for the PAD information questionnaire. Existing, relevant, and reasonably available information regarding the Project and the surrounding environment were requested. Parties were also requested to identify resource areas of interest. Section 6 provides additional details regarding the consultation performed to date and responses to the PAD information questionnaire.

Additionally, I&M has conducted initial consultation with the Michigan Natural Features Inventory (MNFI) and the U.S. Fish and Wildlife Service (USFWS) regarding rare, threatened, and endangered species. Furthermore, I&M has consulted with the Michigan Department of Environmental Quality (MDEQ) to confirm that the Project is located outside the state's coastal zone. I&M has consulted with the Michigan Department of Natural Resources (MDNR) and the MDEQ to collect additional information regarding fisheries and water quality data in the Project vicinity.

Section 3

# Process Plan, Schedule, and Communication Protocol

## 3.1 Overall Process Plan and Schedule

I&M proposes to use the Commission's ILP in support of obtaining a new license for the Project. As presented in Table 3.1-1, I&M has prepared a Process Plan and Schedule that incorporates the overall ILP schedule for this relicensing.

**Table 3.1-1**
**Constantine ILP Process Plan and Schedule**

| Activity | Responsible Party | Timeframe | Proposed Date |
|---|---|---|---|
| File NOI and PAD (18 CFR §5.5(d)) | I&M | As early as 5.5 years, but no later than 5 years prior to license expiration | 6/4/2018 |
| Initial Tribal Consultation Meeting (18 CFR §5.7) | FERC | No later than 30 days of filing NOI and PAD | 7/4/2018 |
| Issue notice of NOI/PAD and SD1 (18 CFR §5.8(a)) | FERC | Within 60 days of filing NOI and PAD | 8/3/2018 |
| Conduct scoping meetings and site visit (18 CFR §5.8(b)(viii)) | FERC | Within 30 days of NOI/PAD notice and SD1 issuance | 9/2/2018 |
| Comments on PAD, SD1, and Study Requests (18 CFR §5.9(a)) | Stakeholders | Within 60 days of NOI/PAD notice and issuance of SD1 | 10/2/2018 |
| File Proposed Study Plan (PSP) (18 CFR §5.11) | I&M | Within 45 days of deadline for filing comments on PAD | 11/16/2018 |
| Issuance of Scoping Document 2 (SD2), if necessary (18 CFR §5.10) | FERC | Within 45 days of deadline for filing comments on SD1 | 11/16/2018 |
| PSP Meeting (18 CFR §5.11(e)) | I&M | To be held within 30 days of filing PSP | 12/16/2018 |
| Comments on PSP (18 CFR §5.12) | Stakeholders | Within 90 days after PSP is filed | 2/14/2019 |
| File Revised Study Plan (RSP) (18 CFR §5.13(a)) | I&M | Within 30 days of deadline for comments on PSP | 3/16/2019 |
| Comments on RSP (18 CFR §5.13(b)) | Stakeholders | Within 15 days following RSP | 3/31/2019 |
| Issuance of Study Plan Determination (18 CFR §5.13(c)) | FERC | Within 30 days of RSP | 4/15/2019 |
| Formal Study Dispute Resolution Process if requested (18 CFR §5.14(a)) | Agencies with mandatory conditioning authority | Within 20 days of study plan determination | 5/5/2019 |

| Activity | Responsible Party | Timeframe | Proposed Date |
|---|---|---|---|
| Dispute Resolution Panel Convenes (18 CFR §5.14(d)) | Dispute Resolution Panel | Within 20 days of notice of study dispute | 5/25/2019 |
| Comments on Study Plan Disputes (18 CFR §5.14(i)) | I&M | Within 25 days of notice of study dispute | 5/30/2019 |
| Third Panel Member Selection Due (18 CFR §5.14(d)(3)) | Dispute Resolution Panel | Within 15 days of when Dispute Resolution Panel convenes | 6/9/2019 |
| Dispute Resolution Panel Technical Conference (18 CFR §5.14(j)) | Dispute Resolution Panel, I&M, Stakeholders | Prior to engaging in deliberative meetings | - |
| Dispute Resolution Panel Findings and Recommendations (18 CFR §5.14(k)) | Dispute Resolution Panel | No later than 50 days after notice of dispute | 6/24/2019 |
| Study Dispute Determination (18 CFR §5.14(1)) | FERC | No later than 70 days after notice of dispute | 7/14/2019 |
| Conduct First Season of Studies (18 CFR §5.15) | I&M | -- | March to September 2019 |
| Study Progress Reports (18 CFR §5.15(b)) | I&M | I&M will provide summary updates every 3 months | June 2019 to September 2020 |
| Initial Study Report (18 CFR §5.15(c)) | I&M | Pursuant to the Commission-approved study plan and schedule provided in §5.13 or no later than 1 year after Commission approval of the study plan | 4/14/2020 |
| Initial Study Report Meeting (18 CFR §5.15(c)(2)) | I&M and Stakeholders | Within 15 days of filing the initial study report | 4/29/2020 |
| File Initial Study Report Meeting Summary (18 CFR §5.15(c)(3)) | I&M | Within 15 days of study results meeting | 5/14/2020 |
| File Meeting Summary Disagreements (18 CFR §5.15(c)(4)) | Stakeholders | Within 30 days of study results meeting summary | 6/13/2020 |
| File Responses to Meeting Summary Disagreements (18 CFR §5.15(c)(5)) | I&M | Within 30 days of filing meeting summary disagreements | 7/13/2020 |
| Resolution of Disagreements (18 CFR §5.15(c)(6)) | FERC | Within 30 days of filing responses to disagreements | 8/12/2020 |
| Conduct Second Season of Studies (if necessary) | I&M | -- | March to September 2020 |
| File Updated Study Report (18 CFR §5.15(f)) (if necessary) | I&M | Pursuant to the Commission-approved study plan and schedule provided in §5.13 or no later than 2 years after Commission approval | 4/14/2021 |

| Activity | Responsible Party | Timeframe | Proposed Date |
|---|---|---|---|
| Updated Study Report Meeting (18 CFR §5.15(f)) (if necessary) | I&M and Stakeholders | Within 15 days of updated study report | 4/29/2021 |
| File Updated Study Report Meeting Summary (18 CFR §5.15(f)) (if necessary) | I&M | Within 15 days of updated study report meeting | 5/14/2021 |
| File Meeting Summary Disagreements (18 CFR §5.15(f)) | Stakeholders | Within 30 days of study results meeting summary | 6/13/2021 |
| File Responses to Meeting Summary Disagreements (18 CFR §5.15(f)(5)) | I&M | Within 30 days of filing meeting summary disagreements | 7/13/2021 |
| Resolution of Disagreements (18 CFR §5.15(f)) | FERC | Within 30 days of filing responses to disagreements | 8/12/2021 |
| File Draft License Application (18 CFR §5.16(a)) | I&M | No later than 150 days prior to the deadline for filing a new or subsequent license application | 5/3/2021 |
| Comments on Draft License Application (18 CFR §5.16(a)) | Stakeholders | Within 90 days of filing Preliminary License Proposal or Draft License Application | 8/1/2021 |
| File License Application (18 CFR §5.17) | I&M | No later than 24 months before the existing license expires | 9/30/2021 |
| Tendering Notice (18 CFR §5.19) | FERC | Within 14 days of filing of License Application | 10/14/2021 |
| Commission Decision on Any Outstanding Pre-filing Additional Information Requests (AIRs) (18 CFR §5.19) | FERC | Within 30 days of filing of License Application | 10/30/2021 |
| Notice of Acceptance and Notice of Ready for Environmental Analysis (EA) (18 CFR §5.22) | FERC | Within 60 days of issuance of Tendering Notice | 12/13/2021 |
| File 401 Water Quality Certification Application with Ohio Environmental Protection Agency and proof of application with FERC (18 CFR §5.23) | I&M | Within 60 days of issuance of Notice of Ready for EA | 2/11/2022 |
| Comments, Interventions, Preliminary Terms and Conditions (18 CFR §5.23) | Stakeholders | Within 60 days of issuance of Notice of Acceptance and Ready for EA | 2/11/2022 |
| Parties Submit Alternatives | Stakeholders and I&M | Within 30 days of Comments, Interventions, Preliminary Terms and Conditions | 3/13/2022 |
| Parties Request Trial-Type Hearing | Stakeholders and I&M | Within 30 days of Comments, Interventions, Preliminary Terms and Conditions | 3/13/2022 |

| Activity | Responsible Party | Timeframe | Proposed Date |
|---|---|---|---|
| Reply Comments | Stakeholders and I&M | Within 45 days of Comments, Interventions, Preliminary Terms and Conditions | 3/28/2022 |
| Interventions and Responses | Stakeholders | Within 15 days of Parties Requesting Trial-Type Hearing | 3/28/2022 |
| Agency Response to Trial-Type Hearing | Mandatory Conditioning Agency | Within 30 days of Interventions and Responses | 4/27/2022 |
| Agency Hearing Referral | Mandatory Conditioning Agency | Within 5 days of agency response to trial type hearing | 5/2/2022 |
| Trial Type Hearing Decision | Mandatory Conditioning Agency | Within 90 days of agency hearing referral | 7/31/2022 |
| Commission issues Non-Draft EA (18 CFR §5.24) | FERC | Within 75 days of reply comments deadline | 6/11/2022 |
| Comments on Non-Draft EA (18 CFR §5.24) | Stakeholders | Within 30-45 days of Commission issuance of Non-Draft EA or Environmental Impact Statement (EIS) | 7/26/2022 |
| Modified Terms and Conditions Based on Any Hearing Decision, Comments, and Proposed Alternatives (18 CFR §5.24) | Stakeholders | Within 60 days of filing of comments on Draft EA or EIS | 9/24/2022 |
| Commission issues License Order (18 CFR §5.25) | FERC | -- | 9/30/2023 |

1. If the due date falls on a weekend or holiday, the deadline is the following business day.
2. All Director's determinations are subject to request for rehearing to FERC pursuant to 18 CFR § 375.301(a) and 385.713. Any request for rehearing must be filed within 30 days of determination.
3. Shaded actions are not necessary if there are no study disputes.
4. This schedule is based upon FERC's issuance of a Non-Draft EA. FERC can also issue a Draft EA, which would modify the schedule slightly.

## 3.2 Scoping Meeting and Site Visit

Pursuant to 18 CFR §5.8(b), FERC will hold a Scoping Meeting and Site Visit to the Project within 30 days of issuing notice of the NOI and PAD (estimated to be on or before September 2, 2018) in accordance with its responsibilities under NEPA. The Scoping Meeting will be held at a location to be selected by FERC in the general vicinity of the Project. FERC will issue a public notice regarding the Scoping Meeting and Site Visit that will include the meeting date, meeting location, and additional instructions for attending the meeting and Site Visit. Additional information may also be obtained by contacting Lee Emery at FERC at (202) 502-8379.

## 3.3 ILP Participation

I&M has provided this PAD to representatives of relevant agencies, local governments, Indian Tribes, NGOs, and members of the public included on the distribution list attached to the cover letter transmitting this PAD. Any party that desires to be added to or removed from the distribution list should send a request to either of the individuals listed below:

Mr. Jonathan Magalski
Environmental Specialist Consultant
American Electric Power Service Corporation
c/o Indiana Michigan Power Company
1 Riverside Plaza
Columbus, OH 43215
(614) 716-2240
jmmagalski@aep.com

Ms. Elizabeth Parcell
Process Supervisor
c/o Indiana Michigan Power Company
40 Franklin Road SW
Roanoke, VA 24011
(540) 985-2441
ebparcell@aep.com

## 3.4 Communication Protocol

During the course of the Project relicensing process, communication will take place through public meetings, conference calls, and written correspondence. In order to establish the formal consultation record, all phases of formal correspondence require adequate documentation. The intent of the Communication Protocol is to provide a flexible framework for the dissemination of information and for documenting consultation among the participants throughout the relicensing proceeding. The Communication Protocol will remain in effect until issuance of the Project's New License by the Commission.

### 3.4.1 Distribution of Relicensing Materials

I&M will distribute relicensing materials via email (informal communications) and/or by emailing notifications (to the established mailing list) of the availability of formal relicensing filings and documents online. If I&M has not been provided with a stakeholder's email address, I&M will mail notification of the availability of documents online via regular mail. Documents filed with the Commission will be available on I&M's public relicensing website (www.aephydro.com) and from FERC's eLibrary at www.ferc.gov/docs-filing/elibrary.asp by searching under Docket P-10661.

Requests for hard copies of relicensing documents should be sent to Mr. Jonathan Magalski using the contact information provided in Section 3.3 and should clearly indicate the document name, publication

date (if known), and FERC Project No. 10661. A reproduction charge and postage costs may be assessed for hard copies requested by the public. Federal, state, and tribal entities will not be subject to document processing or postage fees.

Certain documents are restricted from general distribution. These documents include: (1) those covered under the FERC's regulations protecting Critical Energy Infrastructure Information (CEII) (18 CFR §388.113); (2) archaeological survey reports or other information identifying the locations of historic properties; and (3) reports that contain information regarding the locations of rare, threatened, or endangered (RTE) species.

### 3.4.2 FERC Communication

FERC has presently assigned Lee Emery of its staff to serve as the relicensing coordinator in support of this relicensing process. The role of the FERC relicensing coordinator will be in accordance with the rules and regulations for the ILP under 18 CFR Part 5. For questions related to FERC communications, please contact Lee Emery at lee.emery@ferc.gov or at (202) 502-8379.

All communications to FERC regarding Project relicensing must reference the **Constantine Hydroelectric Project FERC No. P-10661 - Application for New License**.

FERC strongly encourages paperless electronic filing of comments and interventions through its eFiling or eComment systems. Information and links to these systems can be found at the FERC webpage http://www.ferc.gov/docs-filing/ferconline.asp. In order to eFile comments and/or interventions, interested parties must have an eRegistration account. After preparing the comment or motion to intervene go to www.ferc.gov and select the eFiling link. Select the new user option and follow the prompts. Users are required to validate their account by accessing the site through a hyperlink sent to the registered email account.

An additional method to eFile comments is through the "Quick Comment" system available via a hyperlink on the FERC homepage. "Quick Comments" do not require the users to have a subscription; the comments are limited to 6,000 characters, and all information must be public. Commenters are required to enter their names and email addresses. They will then receive an email with detailed instructions on how to submit "Quick Comments."

Stakeholders without internet access may submit comments to FERC at the address below via hard copy, but should be aware that documents sent to FERC by regular mail can be subject to docket-posting delays:

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

Section 4

# Project Location, Facilities, and Operations

## 4.1 Authorized Agent

The exact name, business address, telephone number, and email address of each person authorized to act as an agent for I&M is listed below.

Mr. David P. Hoffman,
Director Field & Support Services
c/o Mr. Jonathan Magalski,
Environmental Specialist Consultant
American Electric Power Service Corporation
1 Riverside Plaza
Columbus, OH 43215
(614) 716-2240
jmmagalski@aep.com

## 4.2 Project Location

The Constantine Hydroelectric Project is located at approximately river mile 101.4 on the St. Joseph River in the Village of Constantine in St. Joseph County, Michigan. The reservoir formed by the Project is approximately six miles long. Figure 4.2-1 provides an overview of the Project location and setting. Figure 4.2-2 provides an overview of the Project facilities described further in Section 4.3. The Project area is primarily agricultural, with scattered single-family homes, multi-family homes, community facilities, and farmsteads in or surrounding the Village of Constantine. The existing Project boundary map for the Constantine Project is provided in Appendix C.

**Figure 4.2-1**
**Project Location Map**

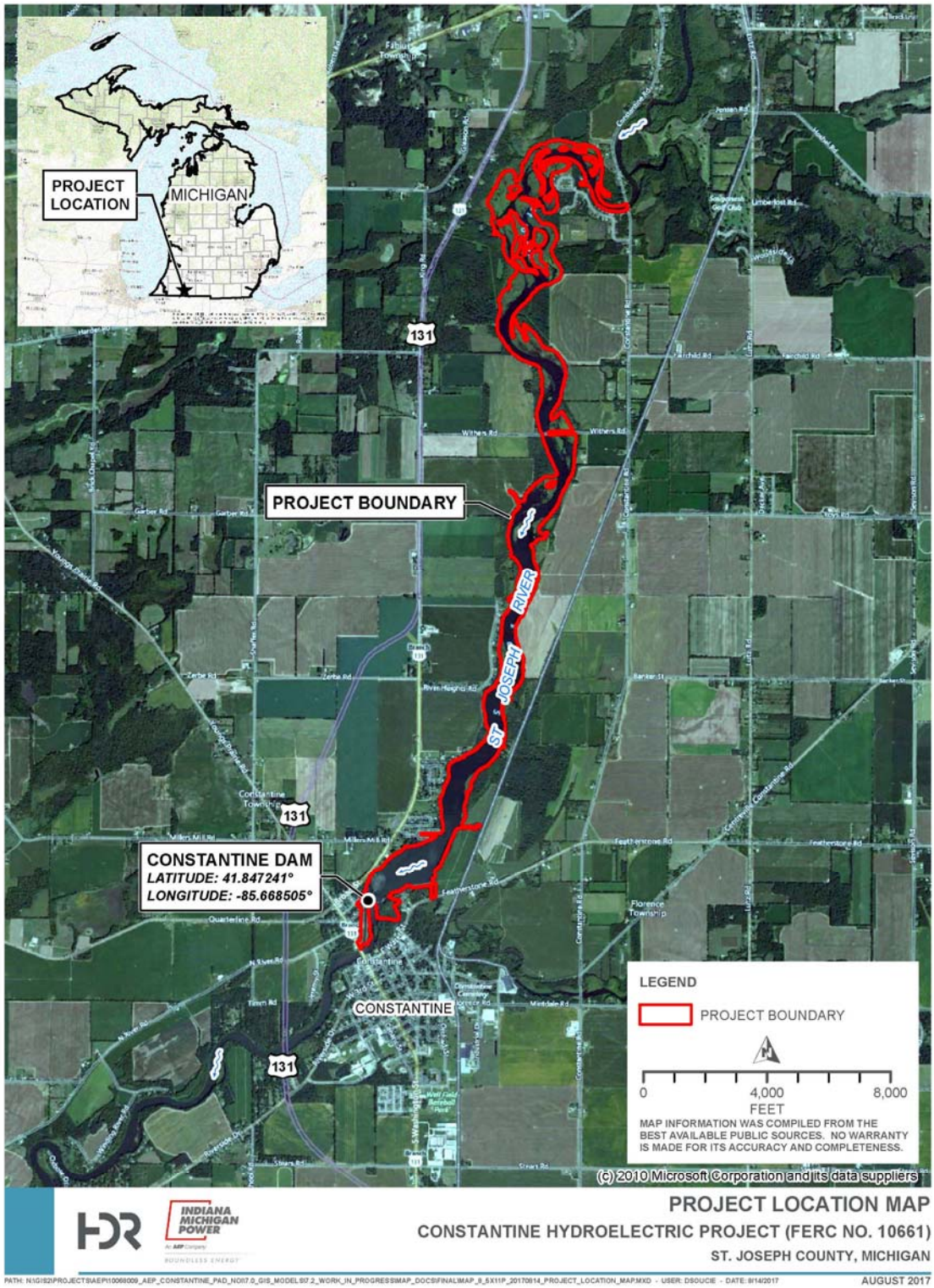


**Figure 4.2-2**
**Aerial View of Project Facilities**

## 4.3 Project Facilities

On October 17, 1873, the St. Joseph County Board of Supervisors granted approval to construct a dam across the St. Joseph River to the Constantine Hydraulic Company. The Constantine Hydraulic Company operated the hydroelectric plant through 1917. The Project was purchased by Michigan Gas and Electric Company, the predecessor to I&M, in 1917 and subsequently placed under their operation. On October 20, 1993, I&M obtained a FERC license for the Project.

The licensed Project works consist of: (a) an uncontrolled concrete gravity overflow spillway dam with a height of about 12 feet, a total length of 241.25 feet, including an abandoned 4-foot-wide fish chute at the left abutment which is now a sluice gate, and topped with 11-¼-inch-high flashboards; (b) a reinforced-concrete headgate structure 68 feet long and 20 feet high containing seven wooden gates about 7.75 feet wide by 15 feet high; (c) a 70-foot-long earthen embankment between the headgate structure and overflow spillway; (d) an earthfill reservoir impoundment dike with a maximum height of about 20 feet and a length of 650 feet located about 1,500 feet east from the left abutment of the main dam; (e) a reservoir with a surface area of 525 acres at a normal water surface elevation of 782.94 feet, National Geodetic Vertical Datum (NGVD); (f) a 1,270-foot-long power canal with a bottom width of 60 feet; (g) a brick powerhouse with dimensions of 140 feet by 30 feet containing four vertical-shaft Francis turbines connected to four 300- (kW generating units for a total installed capacity of 1,200 kW; (h) a switchyard adjacent to the powerhouse containing three step-up transformers; (i) a 2.4-kilovolt (kV) transmission line about 50 feet long; and (j) appurtenant facilities and equipment.

The facilities and structures listed above are detailed further below and are also depicted in the Project drawings included in Appendix D, which is filed as CEII in accordance with 18 CFR §388.112. The average annual production for the Project typically ranges between 4,574 and 5,438 MWh.

### 4.3.1 Dam and Spillway

The abutment embankment to the left of the spillway is about 250 feet in length and up to 22.5 feet in height (adjacent to the spillway). The crest elevation is at 790 feet at the embankment. In 2009, the low areas on the embankment were raised to elevation 790 feet beyond the left end of the embankment.

The concrete spillway section has a total crest length of 241.25 feet including the abandoned fish ladder. The actual effective spillway width is 240.25 feet if the 1-foot-wide pier between the flashboard section and the fish chute is not included. Flashboards are mounted on the crest. The flashboards are 11-¼ inches high and use wood pins to maintain the boards vertically. The crest elevation of the flashboards is 782.90 feet. The fixed crest of the spillway structure is elevation 781.96 feet. A steel sheet pile wall extends across the upstream side of the spillway and upstream along the spillway's

abutment wall. The tip elevation of this sheeting is about elevation 760 feet, 10.5 feet below the base of the structure. During 1991, a new 2-foot-thick concrete cap was constructed on top of the left abutment wall of the spillway. The width of the spillway from the upstream to downstream end of its apron is about 54.5 feet, 24.5 feet of which is the width of the spillway. The spillway is a slab-and-buttress-type structure with 19 bays of 18 foot width (pier face to pier face) plus an additional short bay of 14.83 feet under the fish chute. The bays are separated by 2-foot-wide buttresses.

There is a concrete-capped, grouted rubble apron extending 30 feet downstream of the spillway. The top elevation of the apron is 775.0 feet at the interface with the spillway and elevation 772.5 at the downstream end. The elevation of the bottom of the apron and underlying rubble fill is elevation 770.5 feet.

The reservoir embankment (also referred to as the reservoir dike, detached dike or embankment, or saddle dike) is approximately 650 feet long. The dike has a maximum height of about 20 feet and is constructed of sand. The reservoir embankment has undergone various modifications since 1987 for improved stability, and in 2014, the top of the embankment was raised to elevation 790 feet.

### 4.3.2 Reservoir

Normal headpond elevation at the Project (with flashboards in place) is 782.94 feet. The headpond elevation without the flashboards is 782.0 feet. The normal tailwater elevation is about 771.5 feet. The normal maximum surface area of the reservoir formed by the impounding structures at the Project is 525 acres. Additional details about the Project reservoir are included in Table 4.3-1.

**Table 4.3-1**
**Reservoir Data**

| | |
|---|---|
| Drainage area | 1,554 square miles |
| Shoreline length | 12 miles |
| Typical surface area | 525 acres |
| Maximum Depth | 12 feet[1] |
| Permanent crest of dam elevation | 790 feet mean sea level (msl) |
| Typical normal surface water elevation | 782.94 feet msl |
| Operations | run-of-river |
| Storage capacity | 5,750 acre-feet |

[1] Source: MDEQ 2000.

### 4.3.3 Forebay and Intake

The canal headgate structure (also referred to as the headworks) is located at the upstream end of the power canal, adjacent to the spillway. The headworks are 73.75 feet long and 33 feet wide, with a deck elevation of 790.0 feet. The masonry structure has seven vertical slide gates. Each gate is 7-feet, 10-inches wide, except the gate on the right side which is 6-feet, 9-inches wide. The gate sill is at elevation 770.00 feet. The headgates are opened using a rack-and-pinion gearing system driven by a portable electric motor driver that can open two gates at a time. In May 1990, the headgates were repaired; new gates, stems, and gate guides were installed. The headgate structure is protected against piping by steel sheet piling to an elevation of about 753.5 feet under the wing walls and along the upstream and downstream toe of the structure.

### 4.3.4 Power Canal

The power canal is approximately 1,270 feet long and extends from the headgate structure to the powerhouse. Earthen embankments are located on either side of the canal. The right (land side) embankment is approximately 12 feet high, and the left (river side) embankment is approximately 20 feet high. The embankments have a top width of 12 feet, with a nominal crest elevation of 788.0 feet. The invert of the canal is about elevation 772 feet, making the water about 11 feet deep during normal reservoir levels. The width of the canal, from edge of crest to edge of crest of the embankments is about 120 feet. The invert width is about 50 feet.

### 4.3.5 Powerhouse and Intakes

The two-level concrete and masonry powerhouse contains four vertical S. Morgan Francis units. Each unit has a rated capacity of 300 kW at 12.5 feet of head. Discharge at full gate and normal full reservoir level is about 400 cubic feet per second (cfs), for a total plant discharge of 1,600 cfs if all four units are operating. The powerhouse is approximately 140 feet long and 58 feet wide. The generator floor level is about elevation 787.0 feet. The heel and toe elevations of the powerhouse are at about elevation 769.0 and 758.0 feet, respectively.

The forebay intake section is approximately 114 feet long and located directly below the upper level of the powerhouse. Each bay is faced with a continuous run of trashracks consisting of 1/2-inch-long by 4-inch, epoxy-coated steel bars. Each bar is 16 feet in length and angled toward the powerhouse at 25 degrees to vertical. The bars are spaced 3 ½ inches center-to-center and oriented to provide a clear space of 3 inches.

The invert of the turbine pit (forebay) is at elevation 771.5 feet. The draft tube invert is at about elevation 760.0 feet.

### 4.3.6 Bypass Reach

The bypass reach runs parallel to the Project's power canal and is approximately 1,300 feet long. The bypass reach is typically inundated by backwater from the Mottville Project (FERC No. 1750) located downstream. The Fawn River flows into the St. Joseph River about 500 feet downstream of the spillway, adding about 210 cfs to the bypass reach. A small gravel bar, located at mid-channel in the bypass reach adjacent to the mouth of the Fawn River, is exposed when the tailwater elevation drops to its lowest level.

### 4.3.7 Turbines and Generators

The Project includes four vertical-shaft Francis units that were installed in 1927. The Project has a total installed capacity of 1.2 megawatts (MW). In 1991, a major electrical upgrade was completed in the powerhouse. New static exciters were installed along with new switch gear and controls. The upgrade included automated operation of the generating equipment. The turbine and generator data is presented in Table 4.3-2.

**Table 4.3-2**
**Turbine and Generator Data**

| | |
|---|---|
| ***Turbines*** | |
| Number of Units | 4 |
| Year Installed | 1927 |
| Type | Vertical Francis (S. Morgan Smith 48" Type S) |
| Design Head | 12.5 feet |
| Rated Capacity | 300 kW (each) |
| Rated Horsepower | 426 |
| Rated Speed | 100 rotations per minute |
| Minimum Hydraulic Capacity | 141 cfs |
| Maximum Hydraulic Capacity | 430 cfs |
| ***Generators*** | |
| Type | AC generators manufactured by General Electric |
| Rated Capacity | 300kW (each) |
| Phase | 3-phase |
| Voltage | 2,300 volts |
| Frequency | 60 Hertz |
| Synchronous Speed | 100 rotations per minute |

### 4.3.8 Transmission

The transmission line associated with this Project is a 2.4-kV transmission line that is approximately 50 feet long. The Project's single-line electrical diagram is included in Appendix D (CEII).

## 4.4 Project Operations

The Project is operated as a run-of-river facility for the purpose of generating electric power. The Project is not staffed full time, but is tended five days per week by personnel who split their time between the Constantine Project and I&M's Mottville Project, located about 7 miles downstream. The generating units are operated locally by computer or manually. The Project is monitored remotely by I&M's Columbus Operation Center in Columbus, Ohio, which is staffed 24-hours per day, 365 days per year.

The generation units are operated locally through a programmable logic controller (PLC) and float controller. Flows in excess of the powerhouse's hydraulic turbine capacity (382 cfs/unit for a total of 1,528 cfs at a head of 11.3 feet; 430 cfs/unit for a total of 1,720 cfs at a head of 12.5 feet) are discharged by the uncontrolled overflow spillway.

The flashboards are usually in place on the spillway crest, thereby creating a normal reservoir elevation of 782.9 feet. The tailwater at Constantine is controlled by the gated spillway structure at the Mottville Project approximately 7 miles downstream. The normal pool elevation at Mottville is 771.0 feet.

During high water events, the flashboards on the spillway generally fail when the water level is about elevation 785.0 feet.

### 4.4.1 Generation and Outflow Records

The Project operates in a run-of-river mode and inflows to the Project are controlled by upstream flows. Table 4.4-1 provides a summary of monthly and annual Project generation for a period of five years in gross MWh. Average annual generation at the Project from 2012 through 2016 is 4,933 MWh.

**Table 4.4-1**
**Monthly and Annual Generation (MWh)**
**(January 1, 2012 to December 31, 2016)**

| Period | 2012 | 2013 | 2014 | 2015 | 2016 | Average Monthly |
|---|---|---|---|---|---|---|
| January | 689 | 484 | 371 | 172 | 626 | 468 |
| February | 704 | 603 | 349 | 279 | 536 | 494 |
| March | 716 | 653 | 511 | 415 | 726 | 604 |

| Period | 2012 | 2013 | 2014 | 2015 | 2016 | Average Monthly |
|---|---|---|---|---|---|---|
| April | 616 | 513 | 566 | 498 | 690 | 577 |
| May | 501 | 473 | 445 | 391 | 623 | 487 |
| June | 172 | 455 | 350 | 566 | 243 | 357 |
| July | 106 | 360 | 345 | 556 | 274 | 328 |
| August | 161 | 176 | 275 | 388 | 508 | 302 |
| September | 196 | 87 | 400 | 269 | 378 | 266 |
| October | 307 | 127 | 484 | 265 | 177 | 272 |
| November | 315 | 331 | 462 | 341 | 205 | 331 |
| December | 426 | 312 | 580 | 462 | 452 | 446 |
| **Gross Annual Generated** | **4,909** | **4,574** | **5,139** | **4,604** | **5,438** | **4,933** |

Source: I&M, 2017, personal communication.

Monthly and annual daily average Project outflows for 2011 through 2015 are shown in Table 4.4-2.

**Table 4.4-2**
**Monthly and Annual Average Project Outflows (cfs)**
**(January 1, 2011 to December 31, 2015)**

| Period | 2011 | 2012 | 2013 | 2014 | 2015 | Monthly Average |
|---|---|---|---|---|---|---|
| January | 879 | 2,745 | 1,019 | 1,738 | 1,294 | 1,535 |
| February | 1,217 | 2,477 | 1,900 | 1,597 | 1,002 | 1,645 |
| March | 2,467 | 2,894 | 1,750 | 2,607 | 1,570 | 2,258 |
| April | 2,283 | 1,948 | 2,912 | 2,746 | 1,431 | 2,264 |
| May | 2,789 | 1,379 | 2,137 | 1,736 | 1,198 | 1,848 |
| June | 2,207 | 635 | 1,418 | 1,635 | 2,409 | 1,661 |
| July | 911 | 340 | 1,379 | 1,466 | 2,178 | 1,255 |
| August | 835 | 411 | 830 | 644 | 921 | 728 |
| September | 739 | 451 | 636 | 846 | 780 | 690 |
| October | 1,245 | 620 | 705 | 1,053 | 729 | 870 |
| November | 1,564 | 650 | 1,212 | 1,174 | 871 | 1,094 |
| December | 3,225 | 807 | 1,154 | 1,334 | 1,108 | 1,526 |
| **Annual Average** | **1,405** | **1,610** | **1,333** | **1,505** | **1,364** | **1,446** |

### 4.4.2 Dependable Capacity

Dependable capacity is generally defined as the amount of load a hydroelectric plant can carry under adverse hydrologic conditions during a period of peak demand; for example, during the hot, dry conditions typical in late summer in the Project area. Under the current license, the Project's estimated dependable capacity is approximately 170 kW.

## 4.5 Current License Requirements and Compliance History

### 4.5.1 Current License Requirements

The Project's current license was issued by FERC on October 20, 1993. The license was amended by subsequent orders (1995, 1996, 1997, and additional orders modifying plans developed pursuant to license articles). As presently licensed, the primary compliance requirements associated with the operation of the Project is to operate the Project as run-of-river and to provide flows over the spillway to maintain a minimum water surface elevation of 770.0 feet NGVD downstream of the Project (tailwater elevation).

- Article 403 – Run-of-river operation.
- Article 404 – Provide flows over the spillway to maintain a minimum water surface elevation of 770.0 feet NGVD downstream of the Project (tailwater elevation).
- Article 405 – Monitor water surface elevation and compliance with run-of-river operation. Continue to operate and maintain the U.S. Geological Survey (USGS) gage at Three Rivers.
- Article 406 – Reservation of fishway prescription by Commission.
- Article 408 – Indiana bat protection.
- Article 409 – Wildlife management and land use plan to provide provisions for monitoring distribution and abundance of purple loosestrife and Eurasian milfoil in Project waters at least annually.
- Article 410 – State Historic Preservation Officer (SHPO) consultation prior to land-clearing or land-disturbing activities.
- Article 411 – Recreation Plan.
- Article 412 – Removal of old storage building located next to the powerhouse.

### 4.5.2 Compliance History

Based on a review of historical records, there have been no reoccurring license violations. The most recent FERC Environmental Inspection occurred in May 2004 in which it was noted that there were no issues of noncompliance.

## 4.6 Current Net Investment

The current net investment in the Constantine Hydroelectric Project (through the end of 2017) is approximately $1,884,989. This value should not be interpreted as the fair market value of the Project.

## 4.7 Potential for New Project Facilities

While I&M does not presently propose any new Project facilities or upgrades, I&M continually evaluates the potential for such improvements. If I&M intends to propose any new Project facilities or upgrades in the final license application that would affect the scope of relicensing studies, I&M will inform the FERC and licensing participants of this proposal at a time early enough in the pre-filing consultation process to ensure that the effects of any new facilities or upgrades are appropriately evaluated as part of the relicensing process.

## 4.8 PURPA Benefits

I&M will not be seeking benefits under Section 210 of the Public Utility Regulatory Policies Act (PURPA) of 1978 for qualifying hydroelectric small power production facilities in §292.203 of this chapter.

# Section 5
# Description of Existing Environment and Resource Impacts

## 5.1 Description of the River Basin

The St. Joseph River Watershed is located in the southwest portion of the lower peninsula of Michigan and northwestern portion of Indiana. It is the third largest river basin in Michigan and spans the Michigan-Indiana border and empties into Lake Michigan at St. Joseph, Michigan. The watershed drains 4,685 square miles from 15 counties (Berrien, Branch, Calhoun, Cass, Hillsdale, Kalamazoo, St. Joseph, and Van Buren in Michigan and De Kalb, Elkhart, Kosciusko, Lagrange, Noble, St. Joseph, and Steuben in Indiana). The watershed includes 3,742 river miles and flows through and near the Kalamazoo-Portage, the Elkhart-Goshen, the South Bend, and the St. Joseph/Benton Harbor metropolitan areas. The drainage area for the Constantine Project is 1,554 square miles (Friends of the St. Joseph River Association 2005).

### 5.1.1 Stream Description

The St. Joseph River is approximately 206 miles long, in southern Michigan and northern Indiana, and empties into Lake Michigan. It drains a primarily rural farming area in the watershed of Lake Michigan (Trout Unlimited undated).

The St. Joseph River is a large river, and its flow can become intense during high water events. Large deep runs and pools are found throughout its length (Trout Unlimited undated).

### 5.1.2 Major Land and Water Uses

The watershed is predominantly agricultural with approximately 70 percent of the land used for crop and animal production, while 17 percent remains forested, and roughly 6 percent is wetlands. A significant remaining portion of the watershed is comprised of residential and commercial uses, particularly along the main stem (Friends of the St. Joseph River Association 2005).

The major water use category in St. Joseph County is irrigation with 87 percent of all water being withdrawn for irrigation purposes. Groundwater is the source of 83 percent of all water withdrawn in St. Joseph County with the other 17 percent from inland surface water. Groundwater is the source of all public drinking water withdrawals, 87 percent of industrial withdrawals, 81 percent of irrigation withdrawals, and almost 100 percent of commercial withdrawals (MDEQ 2014).

Land use in the Project area near the dam and powerhouse along the river ranges from low- to high-intensity development with some woody wetlands along the left descending bank near the Fawn River

(Figure 5.1-1). The majority of land use in the general Project area is for cultivated crops, but is mostly located outside of the Project boundary.

### 5.1.3 Dams and Diversion Structures within the Basin

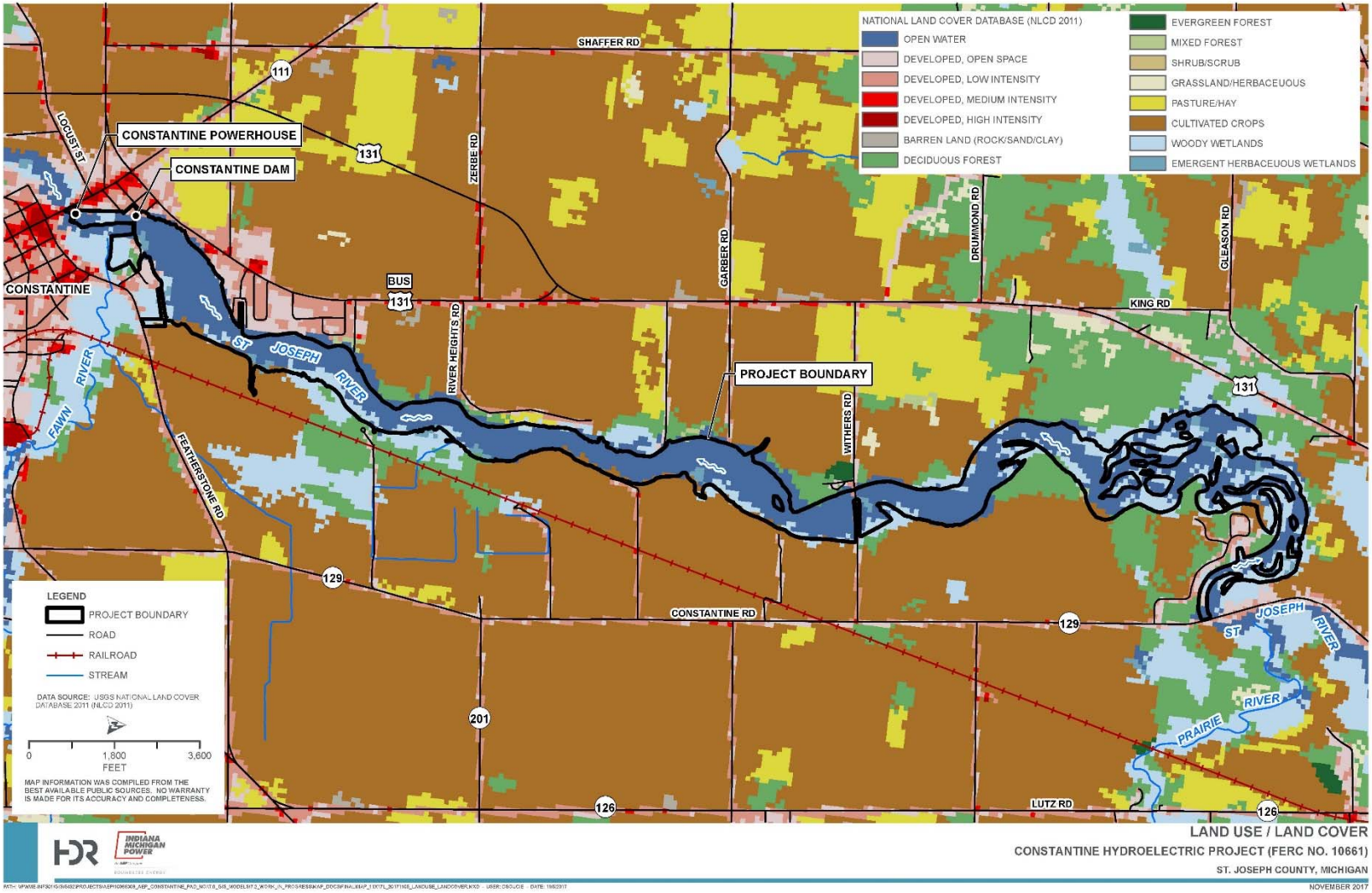
Within the St. Joseph River watershed there are 190 dams registered with MDEQ and the Indiana Department of Natural Resources, 17 of which are located on the main stem. The majority of these dams are classified according to their purpose: 29 for hydroelectric power generation (11 retired), 5 for irrigation, 105 for recreation, 9 for flood control, 4 for water supply, and 19 for miscellaneous reasons (private ponds, public ponds, hatchery ponds, etc.) (Friends of the St. Joseph River Association 2005).

There are eight FERC-licensed hydroelectric Projects located on the St. Joseph River (Table 5.1-1). The Three Rivers Hydroelectric Project (FERC No. 11797) is located approximately 9 miles upstream of the Constantine Project's dam. Approximately 7 miles downstream of the Constantine Project is the Mottville Hydroelectric Project (FERC No. 401), which is also owned and operated by I&M. In addition to these eight facilities, there is the Berrien Springs hydroelectric plant, which is also owned and operated by I&M and is located downstream of Buchanan. Berrien Springs was authorized by an act of Congress and, therefore, is not licensed by FERC.

**Table 5.1-1**
**Licensed Hydroelectric Projects on the St. Joseph River**

| Project No. | Project Name | Authorized Capacity (kW) | Licensee | State |
|---|---|---|---|---|
| P-2964 | Sturgis Dam | 2,720 | City of Sturgis | Michigan |
| P-11797 | Three Rivers | 900 | Grande Pointe Power Corporation | Michigan |
| P-10661 | Constantine | 1,200 | Indiana Michigan Power Company | Michigan |
| P-401 | Mottville | 1,750 | Indiana Michigan Power Company | Michigan |
| P-2651 | Elkhart | 3,440 | Indiana Michigan Power Company | Indiana |
| P-2579 | Twin Branch | 4,800 | Indiana Michigan Power Company | Indiana |
| P-10624 | French Paper | 1,300 | French Paper Company | Michigan |
| P-2551 | Buchanan | 4,105 | Indiana Michigan Power Company | Michigan |

**Figure 5.1-1**
**Land Use and Cover Map**



### 5.1.4 Tributary Rivers and Streams

Major tributaries to the St. Joseph River Watershed include the Prairie, Pigeon, Fawn, Portage, Coldwater, Elkhart, Little Elkhart, Dowagiac, and Paw Paw Rivers. According to the Michigan Center for Geographic Information and the USGS, the St. Joseph River Watershed is comprised of 217 subwatershed units (Friends of the St. Joseph River Association 2005). The Prairie River converges with the St. Joseph River approximately six miles upstream of the Project dam while the Fawn River joins the St. Joseph River approximately 500 feet below the Project dam.

## 5.2 Geology

### 5.2.1 Physiography and Topography

The Project area is located in the Three Rivers Lowlands physiographic region. This physiographic region is characterized by a well-drained, upland plain with low relief, regionally sloping from northwest to southeast (Michigan State University Department of Geography undated).

The landforms of southwest Michigan and northern Indiana are largely a result of the activities of the extensive glaciation of the Pleistocene epoch (from about 2 million years ago until 10,000 years ago). Six major ice sheets advanced across Michigan during that time, but it was the most recent ice advances during the Wisconsin event that by and large formed and sculpted the current St. Joseph River Valley. The advance and retreat of the Wisconsin ice sheet and subsequent changes to the Lake Michigan Basin caused major changes in the size, profile and direction of the St. Joseph River and left behind a landscape dominated by moraines, till plains, and outwash plains and the heterogeneous grab bag of soils that overlay the shale and sandstone bedrock of the basin (Friends of St. Joseph River Association 2005).

### 5.2.2 Bedrock Geology

The Michigan Basin dominates Michigan geology, covering the entire Lower Peninsula and the eastern portion of the Upper Peninsula. The Michigan Basin is defined by the Canadian Shield to the northwest and northeast, the Wisconsin and Kankakee Arches to the southwest and the Findlay and Algonquin Arches to the southeast. During the Paleozoic era, sedimentary rock was deposited in the Michigan Basin in layers like nested bowls with the oldest layers outcropping at the margins of the basin and buried deep near the center of the basin. The layers of sedimentary rock reach a maximum thickness of about 16,000 feet over basement terranes of Precambrian plutonic and volcanic igneous rock and metamorphic rock (Gillespie et al. 2008). Bedrock in the Project area is Mississippian age shale (MDNR 1999a). Solution-prone carbonate rocks of sedimentary origin are not present in the Project area in the vicinity of the dam (I&M 2016).

### 5.2.3 Surficial Geology

The St. Joseph River has moderately stable flows due to a thick surficial layer of coarse-textured glacial deposits and pervious soils (MDNR 1999b). The local surface geology at the Project consists of thick, sandy lacustrine and outwash deposits. Based on previous subsurface exploration programs (AEP 1987) and borings conducted at the site (Barr 1999), the foundations for the Project structures generally consist of sands, silty sands, and silts. The underlying foundation strata vary from loose to dense in relative density.

### 5.2.4 Mineral Resources

St. Joseph County has two mineral resources, gold and calcite (State of Michigan undated(a)). In general, gold is present in over 100 places in Michigan and has been discovered in 27 of the 68 counties in the Lower Peninsula and 6 of the 15 counties in the Upper Peninsula (Michigan State University undated). Reported discoveries of gold within the county occur in Marcellus, St. Joseph County, and Burr Oak, St. Joseph County. However, the gold located in Burr Oak is most likely pyrite (State of Michigan 1980). The Calcite limestone/dolomite quarry, near Rogers City Michigan, is the largest limestone quarry in the world (State of Michigan undated(b)). The Calcite quarry has been active for over 85 years and measures approximately 7 kilometers long by 4 kilometers wide (NASA 2006).

### 5.2.5 Topography

Drainage conditions are mostly well drained with variable areas from poorly to excessively well-drained. Moderately well to well-drained portions of the outwash are used for agriculture, but poorly drained outwash deposits remain as swamp or marsh (Albert et al. 1986).

### 5.2.6 Project Area Soils

Soils in the section of the St. Joseph River from Mendon, Michigan, to Elkhart, Indiana, are mainly characterized by silt loam or loam soils, but with a mixture of clay loam, silty clay loam, sandy clay, silty clay, or clay. In low lying areas near Three Rivers, there are pockets of organic soils used for muck farming and peat mining (MDNR 1999b).

The overburden materials in the Project region are a result of past glaciation. Soils tend to be sand and gravels resulting from glacial outwash and lacustrine deposition (I&M 2016). According to the U.S. Department of Agriculture (USDA), the mapped soils in the vicinity of the Project are mainly sandy loam (Figure 5.2-1).

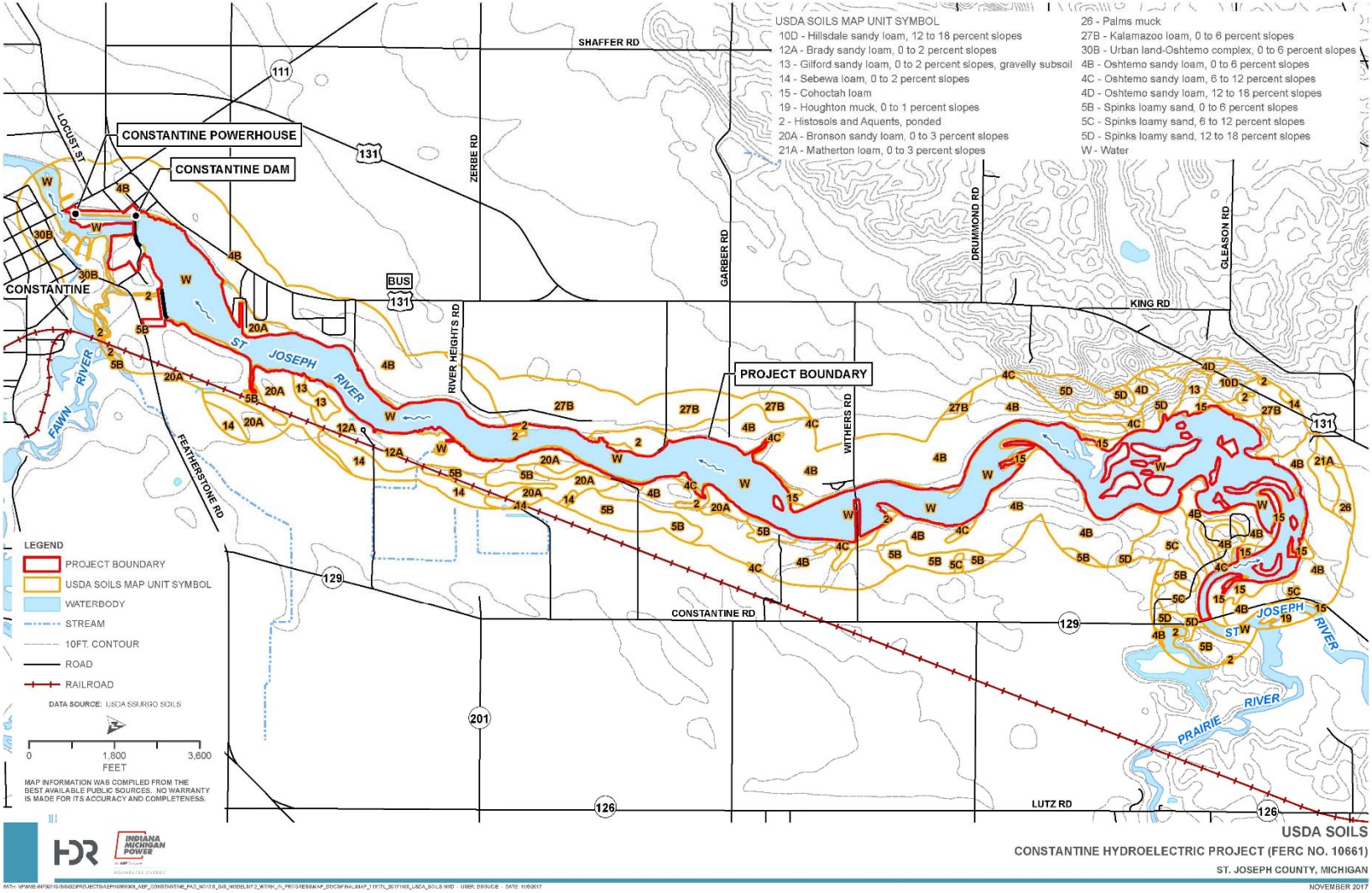
### 5.2.7 Reservoir Shoreline and Stream Banks

As discussed in Section 4.3.2, the reservoir embankment is approximately 650 feet long. The dike has a maximum height of about 20 feet and is constructed of sand. In 2014, the top of the embankment was raised to elevation 790. The downstream side of the embankment was reshaped to the present slope in 1987 and 2004. In 2004, sheet piles were installed on the downstream right end of the embankment (the length of the line of sheeting was 150 feet). The side slopes are about 2 H to 1 V (estimated in the field) on the upstream side and 2 H to 1 V to nearly flat (flush with native ground) on the downstream side (I&M 2016).

The upstream shoreline is surrounded by forested land, with nearby residential housing with minimal-to-moderate slope. Towards the Project dam, there is a boat launch, reservoir fishing access, and paved walking trails upstream of the dam. Canopy vegetation is present in the reservoir area, as well as groundcover layers of vegetation (shrubs, small trees, perennials) that thrive under tree canopies. Upstream of the dam, the river is flanked by farmland, residential neighborhoods, and forested land. The shoreline downstream of the Project's dam is also surrounded by forested land and residential housing and has a similar composition as lands upstream of the Project dam. The shoreline downstream of the Project can also be classified as having minimal-to-moderate sloping.

In 2011, the west downstream riverbank was repaired due to erosion, which has since been repaired and is monitored (I&M 2016). However, there is no current evidence of erosion, slumping, or slope instability around the reservoir shoreline.

**Figure 5.2-1**
**Mapped Soils in the Vicinity of the Project**



### 5.2.8 Seismicity

The Project region is considered tectonically stable. Seismicity is not deterministically associated with faults in this region. An inactive fault, the Royal Center Fault in Indiana, has been mapped about 35 miles south of the Project area (I&M 2016). Additionally, a new fault was discovered approximately 28 miles northeast of the Project area after a magnitude (M) 4.2 event near Scotts, Michigan (USGS 2015).

While no seismicity can be deterministically associated with known fault systems in southern Michigan and Northern Indiana, the area is subjected from time to time to randomly located earthquakes of mild to moderate strength. The most highly active seismic area associated with the region is the central Mississippi Valley area (New Madrid seismic area), located to the southwest at about 600 kilometers or more from the Dam site (I&M 2016).

The earliest record of an earthquake felt in the Project was from the great series of shocks centered near New Madrid, Missouri, in 1811 and 1812. As many as nine tremors from the New Madrid earthquake series were reportedly felt distinctly at Detroit. The four (possibly five) New Madrid earthquakes of 1811-12 (all estimated at M 8 or greater) are the largest intra-plate earthquakes to have been recorded in the world. The Mississippi River changed its course, the land surface sunk to form new lakes, and the violent shaking snapped off trees. These seismic events were centered about 680 kilometers to the southwest of the Project site. Based on the mid-continent attenuation relationship of Toro, Abrahamson and Schneider (1997), it is estimated that the peak ground acceleration of this event at the dam site was likely on the order of 0.01g (I&M 2016).

The closest historic event to the Project of M 4.0 or greater was a M 4.6 on August 10, 1947, and it was approximately 55 kilometers from the Project. The largest historic event within about 400 kilometers (250 miles) was a M 5.4 on September 27, 1909, and was approximately 261 kilometers from the Project. There have been 14 events over M 2.5 reported within 400 kilometers of the Project site from 1999 through 2018; the largest was M 4.2. (USGS undated).

## 5.3 Water Resources

### 5.3.1 Drainage Area

The St. Joseph River Watershed drains 4,685 square miles. The watershed includes 3,742 river miles and flows through and near the Kalamazoo-Portage, the Elkhart-Goshen, the South Bend, and the St. Joseph/Benton Harbor metropolitan areas. The drainage area for the Constantine Project is 1,554 square miles (Friends of the St. Joseph River Association 2005).

### 5.3.2 Flows

The median stream flow of the St. Joseph River is approximately 1,374 cfs. Monthly daily average flows for the Project for the period of record range from 858 cfs to 2,235 cfs (Table 5.3 1).

**Table 5.3-1**
**Daily Flow Data**
**(1987-2016)**

| Period | Minimum (cfs) | 90% Exceedance (cfs) | Average (cfs) | 10% Exceedance (cfs) | Maximum (cfs) |
|---|---|---|---|---|---|
| January | 583 | 809 | 1,847 | 3,165 | 6,708 |
| February | 604 | 974 | 1,874 | 3,009 | 5,120 |
| March | 637 | 1,365 | 2,235 | 3,265 | 6,443 |
| April | 614 | 1,291 | 2,154 | 3,333 | 5,287 |
| May | 680 | 1,141 | 1,866 | 2,773 | 4,188 |
| June | 306 | 709 | 1,578 | 2,666 | 8,873 |
| July | 185 | 439 | 1,028 | 1,800 | 3,043 |
| August | 280 | 458 | 858 | 1,308 | 3,261 |
| September | 287 | 481 | 936 | 1,517 | 6,167 |
| October | 374 | 568 | 1,097 | 1,825 | 4,488 |
| November | 454 | 662 | 1,343 | 2,083 | 3,715 |
| December | 549 | 783 | 1,579 | 2,365 | 3,958 |
| **Annual** | **187** | **638** | **1,526** | **2,648** | **8,487** |

### 5.3.3 Flow Duration Curves

Annual and monthly flow duration curves have been developed for the Project using flow data from the downstream USGS gage 04099000 at Mottville. These flow duration curves can be found in Appendix E.

### 5.3.4 Existing and Proposed Uses of Project Waters

Several industries in St. Joseph County use groundwater and surface water including commercial-institutional, industrial-manufacturing, irrigation, and public water supply among others (MDEQ 2014) (Table 5.3-2).

**Table 5.3-2**
**Michigan Water Use Data – Annual Water Use Volumes**
**for St. Joseph County in 2014**

| Sector | From Great Lakes | From Groundwater | From Inland Surface | Total All Sources |
|---|---|---|---|---|
| | Gallons | | | |
| Commercial-Institutional | 0 | 23,732,087 | 6,340 | 23,738,427 |
| Electric Power Generation | 0 | 0 | 0 | 0 |
| Industrial-Manufacturing | 0 | 603,812,247 | 88,974,334 | 692,786,581 |
| Irrigation | 0 | 16,932,162,494 | 3,921,251,437 | 20,853,413,931 |
| Livestock | 0 | 0 | 0 | 0 |
| Other | 0 | 1,017,311,783 | 0 | 1,017,311,783 |
| Public Water Supply | 0 | 1,266,312,235 | 0 | 1,266,312,235 |
| Total | 0 | 19,843,330,846 | 4,010,232,111 | 23,853,562,957 |

Source: MDEQ 2014.

The MDEQ issues National Pollutant Discharge Elimination System (NPDES) individual permits for all discharges into surface waters of the State that are not covered by general NPDES permits. A search was conducted for NPDES individual permits within the Project boundary on the Michigan Surface Water Information Management System (MiSWIMS). Results from the search identified one active NPDES-permitted facility within the Project area that was issued for Michigan Milk Producers Association (Individual Permit Number MI0001414).

### 5.3.5 Existing Instream Flow Uses

Existing instream flow uses of waters of the St. Joseph River within the Project boundary include various recreational activities (e.g., fishing) and hydroelectric generation.

### 5.3.6 Federally Approved Water Quality Standards

The State of Michigan's Part 4 Rules, Water Quality Standards (of Part 3, Water Resources Protection, of Act 451 of 1994), specify water quality standards which shall be met in all waters of the state. Michigan's Part 4 Water Quality Standards require that all designated uses of the receiving water be protected (MDEQ 2017a). Designated uses are defined in R 323.1100 and include at a minimum:

agriculture, navigation, industrial water supply, warmwater fishery, other indigenous aquatic life and wildlife, fish consumption, and partial body contact recreation. Additional designated uses (i.e. trout stream, public water supply) may be applied to specific waters. The St. Joseph River has no additional designations (i.e. trout stream or public water supply). Water quality standards for pH, dissolved oxygen (DO), and water temperature in the St. Joseph River are identified in Table 5.3-3.

**Table 5.3-3**
**Water Quality Standards for the St. Joseph River**

| Parameter | Standard | |
|---|---|---|
| pH | The pH shall be maintained within the range of 6.5 to 9.0 S.U. in all surface waters of the state, except for those waters where the background pH lies outside the range of 6.5 to 9.0 S.U. | |
| Dissolved oxygen | A minimum of 5 milligrams per liter (mg/L) of dissolved oxygen shall be maintained. | |
| Water temperature | Rivers, streams, and impoundments naturally capable of supporting warmwater fish shall not receive a heat load which would warm the receiving water at the edge of the mixing zone more than 5 degrees Fahrenheit (ºF) above the existing natural water temperature.<br><br>Rivers, streams, and impoundments naturally capable of supporting warmwater fish shall not receive a heat load which would warm the receiving water at the edge of the mixing zone to temperatures greater than the following monthly maximum temperatures: | |
| | January | 50 ºF |
| | February | 50 ºF |
| | March | 55 ºF |
| | April | 65 ºF |
| | May | 75 ºF |
| | June | 85 ºF |
| | July | 85 ºF |
| | August | 85 ºF |
| | September | 85 ºF |
| | October | 70 ºF |
| | November | 60 ºF |
| | December | 56 ºF |

S.U. = standard units.

### 5.3.7 Existing Water Quality Data

I&M collected DO and water temperature data at the Project in the summer of 1990 prior to its licensing as well as in 1995 and 1996 from May through October, after the Project was issued its license. The lowest DO concentration recorded during monitoring efforts was recorded in June of 1996 and was 6.4 mg/L. Additionally, concentrations appeared to generally increase by approximately 1.0 mg/L downstream of the Project. Generally, it is during the summer months when the air temperature is the hottest that DO and water temperature conditions are most likely to be detrimental for fishery resources. All recorded DO concentrations were well above the state standards during all monitoring periods. Water temperature at the Project was generally well below state maximum criteria. The three years of collected water quality data were well within the state water quality standards (FERC 1997).

A search was conducted for water quality data within the Project area on the MiSWIMS. Data were collected by the MDEQ in the northern (750007 MDEQ Sampling Station Description: Saint Joseph River at Constantine Road; Lockport ship SEC31) and southern end of the Project boundary (750011 MDEQ Sampling Station Description: Saint Joseph River at Washington Street in Constantine). These data met state standards and are presented in Table 5.3-4. A search for water quality data was also conducted using the U.S. Environmental Protection Agency's (USEPA) STOrage and RETrieval (STORET) data warehouse, but no relevant data was found in close proximity to the Project.

**Table 5.3-4**
**MDEQ Water Quality Data Collected at Two Sites in the Project Area**

| MDEQ Station No. | Date | Dissolved Oxygen (mg/L) | Specific Conductance (umho/cm) | pH (S.U.) |
|---|---|---|---|---|
| 750007 | 8/11/2005 | 5.4 | 518 | - |
| | 8/17/2005 | 6.6 | 516 | - |
| | 8/23/2005 | 7.2 | 508 | - |
| | 9/1/2005 | 6.4 | 519 | - |
| 750011 | 8/17/2005 | 7.3 | 496 | - |
| | 8/23/2005 | 8.0 | 495* | 8.2 |
| | 9/1/2005 | 6.4 | 504 | - |

*average calculated.
Source: MiSWIMS.

On June 20, 2000, the MDEQ conducted water quality sampling approximately 300 feet upstream of the Constantine Dam. Water quality profile data was collected at two foot increments from the surface to the lake bottom. Temperature, DO, conductivity and pH data are listed in Table 5.3-5. The sampling data revealed essentially no variability in temperature or DO from the surface to bottom, suggesting the reservoir was not thermally or oxygen stratified at that time.

**Table 5.3-5**
**MDEQ Water Quality Data Collected in Constantine Reservoir**

| Depth | Temperature | Dissolved Oxygen (mg/L) | Specific Conductance (umho/cm) | pH |
|---|---|---|---|---|
| Surface | 73.7 | 8.4 | 491 | 8.0 |
| 2 feet | 73.7 | 8.3 | 491 | 8.0 |
| 4 feet | 73.7 | 8.3 | 491 | 8.0 |
| 6 feet | 73.7 | 8.3 | 491 | 8.0 |
| 8 feet | 73.7 | 8.3 | 491 | 8.0 |
| 10 feet | 73.7 | 8.3 | 491 | 8.0 |
| 12 feet | 73.7 | 8.3 | 490 | 8.0 |

Source: MDEQ 2000.

#### *5.3.7.1 Impairment Listing*

Every two years, the MDEQ prepares and submits an Integrated Report to the USEPA to satisfy the requirements of Sections 303(d), 305(b), and 314 of the federal Clean Water Act. The Integrated Report describes the status of water quality in Michigan and includes a list of waterbodies that are not attaining Michigan Water Quality Standards and require the establishment of pollutant Total Maximum Daily Loads (TMDL). A TMDL is used to determine the total amount of a pollutant that a waterbody can handle without resulting in the impaired status of that waterbody (MDEQ 2017b).

Waters downstream (6.9 mile reach of the St. Joseph River from Pigeon River upstream to Fawn River [HUC 40500010904-01]) and upstream of the Project (300 acres of the impoundment at Three Rivers [HUC 40500010904-02]) were assessed separately in the 2016 303(d) Water Quality Assessment Integrated Report (MDEQ 2017a). Uses including navigation, industrial water supply, and agriculture were identified as being fully supported in both reaches. Uses including total/partial body contact recreation, warmwater fishery, other indigenous aquatic life and wildlife, and coldwater fishery were not assessed in either reach. Fish consumption downstream of the Constantine Project were identified as not supported due to polychlorinated biphenyls (PCBs) in fish tissue and the water column, but were fully supported in the reach upstream of the Project. A TMDL for PCBs has been scheduled for 2022 (MDEQ 2017b).

### 5.3.8 Gradient for Downstream Reaches

The topography of the St. Joseph River watershed ranges from gently to moderately sloping. Below the Constantine Dam, the bypass reach extends approximately 1,300 feet to the powerhouse, with the river bed sloping at an average rate of approximately 76 feet per mile. For the reach 1 mile below the powerhouse, the river bed slopes at an average rate of approximately 40 feet per mile.

## 5.4 Fish and Aquatic Resources

### 5.4.1 Aquatic Habitat

The middle reach of the St. Joseph River from Mendon, Michigan, to Elkhart, Indiana, as defined by Wesley and Duffy (1999), meanders unconfined in a broad glacial fluvial valley. The width of the river doubles between Three Rivers (180 feet) and Elkhart (364 feet) due to tributary inflows. Substrate is mostly sand and gravel with some silt (Wesley and Duffy 1999). Stream bank cover is abundant in the upper half of this section; whereas, the lower section of this segment is urbanized and has very little stream bank cover. Based on available aerial imagery, the stream bank cover appears to be abundant within the Project boundary.

Habitat in the bypassed reach between the Constantine Dam and the Project powerhouse encompasses about 1,300 feet of the St. Joseph River. This area is typically inundated by backwater from the Mottville Project and supports a warmwater fishery.

### 5.4.2 Existing Fish and Aquatic Resources

The St. Joseph River is characterized as a warmwater stream (I&M 1988), and the middle reach (from Mendon, Michigan, to Elkhart, Indiana) of the St. Joseph River is managed for channel catfish (*Ictalurus punctatus*), smallmouth bass (*Micropterus dolomieui*), and walleye (*Sander vitreus*) (Wesley and Duffy 1999). Historically, the MDNR has stocked walleye and channel catfish in this reach of the St. Joseph River (Wesley and Duffy 1999). Over the past eleven years (2006 to 2016) nearly 275,000 walleye (just over an inch long) have been stocked in the St. Joseph River in St. Joseph County (Table 5.4-1). Stocking occurred in 2006, 2012, 2014, and 2016 (MDNR 2017b). Channel Catfish have not been stocked in this area of the St. Joseph River since 1999 (MDNR 2017b).

**Table 5.4-1**
**MDNR Walleye Stocking Efforts in the St. Joseph River, St Joseph County, from 2006 to 2016 (MDNR 2017b)**

| Year | Number of fish |
|---|---|
| 2006 | 34,966 |
| 2012 | 80,273 |
| 2014 | 85,250 |
| 2016 | 72,998 |
| TOTAL | 273,487 |

A number of fish surveys have been conducted throughout the St. Joseph River. In 2007, the MDNR conducted roving and access site angler surveys at seven sites along the St. Joseph River, two of the sites were located in Constantine (MDNR 2007). Surveys were conducted via boat and on shore on both weekend days and two randomly selected weekdays during each week from April 1 to November 30. Surveys were not collected on holidays. Smallmouth bass, bluegill *(Lepomis macrochirus)*, and rock bass (*Ambloplites rupestris*) were the most collected species and were often released (MDNR 2007) Table 5.4-2.

**Table 5.4-2**
**MDNR Roving and Access Site Angler Surveys at Seven Sites along the St. Joseph River from April through November 2007 (MDNR 2007)**

| Common Name | Scientific Name | Harvested | | Released | | Total Harvested/ Released |
|---|---|---|---|---|---|---|
| | | Total Catch | Catch/ Hour | Total Catch | Catch/ Hour | |
| Black crappie | *Pomoxis nigromaculatus* | 93 | 0.0072 | 201 | 0.0155 | 294 |
| Bluegill | *Lepomis macrochirus* | 1,288 | 0.0993 | 3,504 | 0.2702 | 4,792 |
| Brown bullhead | *Ameiurus nebulosus* | 180 | 0.0139 | 5 | 0.0004 | 185 |
| Carp | *Cyprinus carpio* | - | - | 118 | 0.0091 | 118 |
| Channel catfish | *Ictalurus punctatus* | 67 | 0.0052 | - | - | 67 |
| Largemouth bass | *Micropterus salmoides* | 9 | 0.0007 | 1,964 | 0.1515 | 1,973 |
| Northern pike | *Esox lucius* | 6 | 0.0005 | 18 | 0.0014 | 24 |
| Pumpkinseed | *Lepomis gibbosus* | 138 | 0.0107 | 93 | 0.0071 | 231 |
| Redhorse | *Moxostoma spp.* | - | - | 27 | 0.0021 | 27 |
| Rock bass | *Ambloplites rupestris* | 299 | 0.0230 | 2,396 | 0.1848 | 2,695 |
| Smallmouth bass | *Micropterus dolomieui* | 13 | 0.0010 | 5,593 | 0.4314 | 5,606 |
| Walleye | *Sander vitreus* | 308 | 0.0237 | 792 | 0.0611 | 1,100 |
| Yellow perch | *Perca flavecens* | 20 | 0.0015 | 12 | 0.0010 | 32 |
| Other | - | 19 | 0.0015 | - | - | 19 |
| | TOTAL* | 2,440 | 0.1881 | 14,724 | 1.136 | 17,164 |

*Calculated.

In 1998, the MDNR conducted a general survey to evaluate the fish community and the walleye stocking program upstream of the Constantine Dam using electroshocking, trap nets, and gill nets in June and July (MDNR 1998). The fish community was diverse and nineteen species were collected during the survey (Table 5.4-3). Bluegill, black crappie (*Pomoxis nigromaculatus*), channel catfish, walleye, and smallmouth bass were identified as the primary sport fish. Bluegills were the most abundant fish and accounted for 47 percent of the catch by number. They ranged in size from 2 to 10 inches and 86 percent were of acceptable harvesting size. Black crappie accounted for approximately 7 percent of the catch and 82 percent of fish were considered to be of acceptable

harvesting size. Smallmouth bass were present, but were not of legal harvesting size. Only 13 largemouth bass (*Micropterus salmoides*) were collected, but their size was fair with 43 percent above the legal harvesting size. All sport fish were at or above the state average growth rate except smallmouth bass, which were an inch below the state average. Only 14 walleye were collected, which were from two different year classes. Walleye growth was excellent and averaged two inches above the state average (MDNR 1998).

**Table 5.4-3**
**MDNR Fish Community and Walleye Survey Upstream of the Constantine Dam in June and July 1998 (MDNR 1998)**

| Common Name | Scientific Name | Number | Percent |
|---|---|---|---|
| Black crappie | *Pomoxis nigromaculatus* | 45 | 7.1 |
| Bluegill | *Lepomis macrochirus* | 296 | 46.7 |
| Bowfin | *Amia calva* | 1 | 0.2 |
| Bullhead catfishes (family) | Ictaluridae | 2 | 0.3 |
| Common carp | *Cyprinus carpio* | 18 | 2.8 |
| Channel catfish | *Ictalurus punctatus* | 29 | 4.6 |
| White sucker | *Catostomus commersonii* | 3 | 0.5 |
| Hybrid sunfish | *Lepomis sp.* | 4 | 0.6 |
| Largemouth bass | *Micropterus salmoides* | 13 | 2.1 |
| Longnose gar | *Lepisosteus osseus* | 16 | 2.5 |
| Logperch | *Percina caprodes* | 2 | 0.3 |
| Northern pike | *Esox lucius* | 1 | 0.2 |
| Pumpkinseed | *Lepomis gibbosus* | 9 | 1.4 |
| Redhorse | *Moxostoma spp.* | 95 | 15.0 |
| Rock bass | *Ambloplites rupestris* | 4 | 0.6 |
| Smallmouth bass | *Micropterus dolomieui* | 34 | 5.4 |
| Spotted sucker | *Minytrema melanops* | 44 | 6.9 |
| Walleye | *Sander vitreus* | 14 | 2.2 |
| Yellow perch | *Perca flavecens* | 4 | 0.6 |
| | TOTAL | 634 | 100.0 |

Source: MDNR 1998.

In 1996, a walleye survey was conducted by the MDNR below Constantine Dam (MDNR 1996). A total of 38 walleye were collected and ranged from 8 to 16 inches in length. Walleye growth was determined to be excellent and the mean growth index for all age groups was 2.7 inches above the state average growth rate (MDNR 1996).

In the summer of 1972, the MDNR conducted a fish survey along the St. Joseph River using electroshocking and fyke nets. Fifty-two sampling locations were established along the mainstem of the river from its headwaters to the mouth, one segment included below the dam in Three Rivers,

Michigan, to the Constantine Dam and another segment included from Constantine Dam to the Mottville Dam (Shepherd 1975, as cited in I&M 1988). Twenty-two taxa were collected in the segments upstream and downstream of the Constantine Dam (Table 5.4-4). Although abundance data were not available from this study, Wesley and Duffy (1999) summarized the Shepherd (1975) survey and indicated bluegills, black crappie, and smallmouth bass were the most abundant sport fish collected. Redhorse (*Moxostoma spp.*), spotted sucker (*Minytrema melanops*), longnose gar (*Lepisosteus osseus*), and golden shiners (*Notemigonus crysoleucas*) were also abundant (Shepherd 1975, as cited in I&M 1988; Wesley and Duffy 1999). The survey found that there were lower fish numbers, species, and weights downstream of Three Rivers Dam, which were attributed to discharges occurring at the City of Three Rivers, Michigan (I&M 1988). Studies conducted by I&M in 1990 suggested that the fishery has improved in the river both upstream and downstream from the Project since 1972 (FERC 1993a).

**Table 5.4-4**
**Fish Species Collected in Two Study Reaches of the St. Joseph River**

| Common Name | Scientific Name | Three Rivers Dam to Constantine Dam | Constantine Dam to Mottville Dam |
|---|---|---|---|
| Black crappie* | *Pomoxis nigromaculatus* | X | X |
| Bluegill sunfish* | *Lepomis macrochirus* | X | X |
| Bluntnose minnow | *Pimephales notatus* | | X |
| Common carp | *Cyprinus carpio* | X | X |
| Common shiner | *Luxilus cornutus* | X | |
| Golden shiner | *Notemigonus crysoleucas* | | X |
| Green sunfish* | *Lepomis cyanellus* | | X |
| Northern hogsucker | *Hypentelium nigricans* | | X |
| Largemouth bass* | *Micropterus salmoides* | X | X |
| Logperch | *Percina caprodes* | X | X |
| Longnose gar | *Lepisosteus osseus* | X | X |
| Northern pike* | *Esox lucius* | X | X |
| Pumpkinseed sunfish* | *Lepomis gibbosus* | X | X |
| Redhorse | *Moxostoma spp.* | X | X |
| Rock bass* | *Ambloplites rupestris* | X | X |
| Smallmouth bass* | *Micropterus dolomieui* | X | X |
| Spotfin shiner | *Cyprinella spiloptera* | | X |
| Spotted gar | *Lepisosteus oculatus* | | X |
| Spotted sucker | *Minytrema melanops* | X | X |
| Warmouth bass* | *Lepomis gulosus* | | X |
| White sucker | *Catostomus commersonii* | X | X |
| Yellow bullhead | *Ameiurus natalis* | X | |

*Identified as game fish, X indicates fish present.
Source: Shepherd 1975, as cited in I&M 1988.

#### *5.4.2.1 Anadromous fish*

There are no anadromous fish species in the Project area. Coho salmon (*Oncorhynchus kisutch*), chinook salmon (*Oncorhynchus tshawytscha*) (spring and fall running), steelhead trout (*Oncorhynchus mykiss*), brown trout (*Salmo trutta*), and lake trout (*Salvelinus namaycush*) ascend the St. Joseph River from Lake Michigan during the spawning season and support a salmonid sport fishery in the lower reach of the river (FERC 1993a). However, the upstream movement of fish is currently limited by multiple dams downstream of the Project including the Mottville Project (immediately downstream of the Constantine Project), as well as the Elkhart and Twin Branch Projects (immediately downstream of the Mottville Project) and there are currently no plans on record to install fish passage at these facilities. Additionally, FERC determined that upstream fish passage for resident fish was not necessary at the Mottville Project because a healthy fishery with suitable habitats for key lifestages of various resident species exists upstream and downstream of the Project (FERC 2002). In general, a lack of suitable substrate and the low velocities in the Constantine Project's reservoir would preclude anadromous fish spawning.

#### *5.4.2.2 Entrainment*

I&M presented entrainment and mortality estimates for fish in 1991. Entrainment rates were based on site-specific studies, whereas mortality estimates were derived from studies conducted at the Buchanan Project, which is located on the St. Joseph River and has similar turbines, hydraulic head, and resident fish community. Entrainment rates were typically low for all species except the mimic shiner (*Notropis volucellus*), but the estimated mortality rate for this species was only 7 percent; therefore, annual mortality estimates of mimic shiners were also relatively low (2,220 fish). I&M estimated annual entrainment mortality at the Project to be 7,750 fish. The study concluded that the amount of entrainment and mortality at the Project was insignificant and would have an insignificant effect on the fish community (FERC 1993b).

In support of the original licensing, in May 1988, field investigations of flow in the headrace were conducted utilizing a portable current meter. Velocities were measured through the trashracks, at the face of the trashracks, within the headrace approximately 800 feet downstream of the headgates, and through the headgates. The velocity of flow through the trashrack bars was measured as 1.8 feet per second (fps) through the trashracks, and 1.3 fps at the face of the trashracks. Both of these values were higher than the calculated velocities at these locations (1.0 and 0.9 fps, respectively), which was attributed primarily to the accumulation of debris on the face of the trashracks during the measurement. The measured velocities are expected to be similar to the current velocity of the free-flowing portion

of St. Joseph River. Therefore, the intake velocities would be easily avoided by most fish. As there have been no change to Project operations or modification of significant Project features; it is believed that existing velocities at the face of and through the trashracks are consistent with previously measured values.

### 5.4.3 Essential Fish Habitat

Based on a review of the National Marine Fisheries Service (NMFS) online database, no essential fish habitat under the Magnuson-Stevens Fishery Conservation and Management Act or established by the NMFS has been identified in the vicinity of the Project.

### 5.4.4 Temporal and Spatial Distribution of Fish Communities

As discussed in Section 5.4.2, the MDNR in 1972 (Shepherd 1975, as cited in I&M 1988) found that there were lower fish numbers, species, and weights downstream of Three Rivers Dam, which were attributed to discharges occurring at the City of Three Rivers, Michigan (I&M 1988). However, studies conducted by I&M in 1990 suggested that the fishery has improved in the river both upstream and downstream from the Project since 1972 (FERC 1993a). No additional temporal and spatial information is available for the fish communities in the Project area.

### 5.4.5 Spawning Run Timing and Extent and Location of Spawning, Rearing, Feeding, and Wintering Habitats

The St. Joseph River is managed for channel catfish, smallmouth bass, and walleye (Wesley and Duffy 1999). Therefore, the life-history characteristics of these species are described below. Threatened or endangered fish or aquatic species are discussed in Section 5.7.

#### *5.4.5.1 Channel Catfish*

Channel catfish live in a diverse array of habitats including inland lakes and medium to large rivers. In rivers, young channel catfish are generally found in shallow riffles, whereas adults typically inhabit deep pools with log jams or rocks for cover during the day and move into shallow water at night. Channel catfish feed both day and night. They take a large part of their food from the bottom, but also feed at the surface. In the late spring or early summer, male channel catfish build nests in dark, secluded areas (e.g., undercut banks, log jams, or rocks). The female leaves the nest soon after depositing the eggs on it. The male stays behind to protect and fan the eggs. Eggs hatch in 5 to 10 days. Fry remain in the nest for about seven days after hatching (MDNR 2017a).

#### *5.4.5.2 Smallmouth Bass*

Smallmouth bass are found in inland lakes, rivers, and Great Lakes bays where waters are cool and clear and the bottom consists of rock or gravely substrate. Spawning activity begins in the spring when water temperatures are 60°F or warmer. Males build a nest, usually near shore, where they will guard the nest and fry. Eggs hatch in 2 to 3 days. The fry will leave the nest in a couple of weeks after hatching. At first, they eat microcrustaceans, but soon add insects and fish to their diet as they grow (MDNR 2017a).

#### *5.4.5.3 Walleye*

Walleye prefer cool waters and are often found next to ledges, large rocks, underwater islands, large logs, edges of large beds of aquatic vegetation, along old riverbed channels, and along reefs and bars. In the spring and fall, walleye congregate in shallow bay waters of the Great Lakes and other inland lakes, where they are found in rocky areas and submerged bars (MDNR 2017a). Spawning occurs from March to May over rock shoals in tributaries or lakes. Walleye are known to migrate to upstream tributaries to spawn, but they will spawn in lakes over rocky or gravel shoals or clean, low-growing emergent vegetation (MDNR 2017a).

### 5.4.6 Benthic Macroinvertebrates Habitat and Life-History Information

Benthic macroinvertebrates are an important component of riverine systems. They are an important fish food and are useful indicators of environmental stress. Often, the presence of pollution-intolerant species, or EPT taxa (Ephemeroptera [mayflies], Plecoptera [stoneflies], and Trichoptera [caddisflies]) can be indicative of a healthy stream. However, this is only one of many indices that can be used to assess the biological integrity of a stream. The diversity of invertebrates in southwest Michigan is considered to be high because it is in the junction of three major ecoregions (Wesley and Duffy 1999). Historical data exists on tributaries of the St. Joseph River (MDEQ 2007, 2011), but limited data was available for the mainstem of the river within the Project area.

### 5.4.7 Freshwater Mussels

The distribution of mussels have been documented in several reports (Van der Schalie 1930, Horvath et al. 1994, Sherman 1997, and Fisher 1998) and is summarized in Wesley and Duffy (1999). Data collected in these studies that is in close proximity to the Project are provided in Table 5.4-5. No additional data was available for these sites.

**Table 5.4-5**
**Mussels Found at Two Study Reaches near the Constantine Project in the St. Joseph River**

| Common Name | Scientific Name | St. Joseph River by Three Rivers | St. Joseph River at Mottville |
|---|---|---|---|
| Creeper | *Stophitus undulatus*[1] | X | X |
| Cylindrical Papershell | *Anodontoides ferussacianus* | | X |
| Elktoe | *Alasmidonta marginata* | X | X |
| Ellipse | *Venustaconcha ellipsiformis* | X | X |
| Fluted-Shell | *Lasmigona costata* | | X |
| Giant Floater | *Pyganodon grandis*[2] | X | |
| Mucket | *Actinonaias carinata* | | X |
| Ohio Pigtoe | *Pleurobema cordatum* | | X |
| Pocketbook | *Lampsilis cardium* | | X |
| Purple Wartyback[3] | *Cyclonaias tuberculata* | | X |
| Rainbow Shell | *Villosa iris* | | X |
| Spike | *Elliptio dilatata* | X | X |
| Wabash Pigtoe | *Fusconaia flava* | X | X |

[1] Identified in report as *Stophitus rugosus* - not recognized as a valid taxon.
[2] Identified in report as *Anodonta grandis* - not recognized as a valid taxon.
[3] State threatened.
Source: Wesley and Duff 1999.

### 5.4.8 Invasive Aquatic Species

The Asian clam (*Corbicula fluminea*) and zebra mussel (*Dreissena polymorpha*) have been identified in the St. Joseph River (Wesley and Duffy 1999, Bandra 2004); however, there is no indication that they are found in the Project area. The Asiatic clam is a small bivalve, which can be found at the sediment surface or slightly buried. It is a filter feeder and removes particles from the water column. It reproduces rapidly and is intolerant to cold temperatures, which can produce fluctuations in annual population sizes. The invasive clam substantially alters benthic substrate and competes with native species for limited resources. There have also been problems with this species biofouling on power plant and industrial water systems (USGS 2017a). I&M has not experienced any operational impacts related to zebra mussels at the Project.

Zebra mussels are a small shellfish named for the striped pattern on its shell. It is typically found attached to objects, surfaces, or other mussels by threads extending from underneath the shells. They are notorious for their biofouling capabilities and colonizing the pipes of hydropower and nuclear power plants, public water supply plants, and industrial facilities. Zebra mussels can affect ecosystems by substantially reducing phytoplankton and other suspended material in the water column. Biomagnification of PCBs is also another effect associated with zebra mussels (USGS 2017b).

## 5.5 Wildlife and Botanical Resources

### 5.5.1 Botanical Resources

Southwest Michigan lies in the Beech-Maple Association of the Eastern Deciduous Forest Province (Bailey 1978). In the Project vicinity, vegetation is a mixed hardwood community of predominantly oak, with some ash, beech, hickory, maple, cottonwood, and aspen (I&M 1988).

The area surrounding the Constantine reservoir is largely agricultural. Along its lower third, the reservoir is largely within pre-existing river banks and is bordered by a fringe of trees, while along the upper two-thirds of the reservoir the river often covers more extensive (up to 1,200 feet) widths of lowland areas (I&M 1988).

Observations of aquatic vegetation were made as part of a MDNR survey of the entire St. Joseph River during the summer low-flow period of 1972 (Shepherd 1975). In general, they found aquatic vegetation to be sparse, especially in more turbid sections (Shepherd 1975).

Four stations were observed between Three Rivers Dam and Constantine Dam. In the vicinity of the sewage treatment plant below the Three Rivers Dam, vegetation was sparse (some *Potamogeton*, also some clumps of floating algae). Still in the flowing water segment, but further downstream, vegetation was sparse (some *Sagittaria*). In the upper impounded section, vegetation was moderate and dominated by Nuphar. At a station in the lower pool [where greater depths would be encountered], vegetation (*Nuphar* and *Sagittaria*) was again sparse (Shepherd 1975). Aquatic and riparian vegetation is further described in Section 5.6.

### 5.5.2 Wildlife

The Project area supports a number of mammals, avifauna, reptiles, and amphibians as described in the sections below.

#### *5.5.2.1 Mammals*

Mammals such as white-tailed deer (*Odocoileus virginianus*), red fox (*Vulpes fulva*), squirrels, and bats have been known to occur in the vicinity of the Project (FERC 1993a). Federally endangered Indiana bat and the federally threatened northern long-eared bat may occur within the Project's vicinity. These species could potentially use the Project area for foraging corridors adjacent to the St. Joseph River during the non-hibernating period.

I&M maintained and monitored artificial Indiana bat structures for a total of five years (1994-1999) at the Project in accordance with the approved Wildlife Management Plan under Article 409 of the current license. During the monitoring period, there was no evidence that Indiana bat or any other species of

bat had used the artificial structures. On July 14, 2000, FERC issued an order amending the Wildlife Management Plan to remove the requirement to maintain the artificial nesting structures for the Indiana bat.

#### *5.5.2.2 Avifauna*

Waterfowl that use the area for feeding and resting periodically during the year are mallard (*Anas platyrhynchos*), Canada goose (*Branta canadensis*), blue-winged teal (*Anas discors*), wood duck (*Aix sponsa*), great blue heron (*Ardea Herodias*), green heron (*Ardea Herodias*), American bittern (*Botaurus lentiginosus*), and spotted sandpiper (*Actitis macularius*). Raptors in the Project area include sharp-shinned (*Accipiter striatus*), Cooper's (*Accipiter cooperii*), red-tailed (*Buteo jamaicensis*), rough legged (*Buteo lagopus*), and broad-winged (*Buteo platypterus*) hawks, American kestrel (*Falco sparverius*), marsh hawk (*Circus cyaneus*), and osprey (*Pandion haliaetus*) (FERC 1993a).

Article 409 of the current FERC license required I&M to develop a wildlife management and land use plan. Under the approved Wildlife Management Plan, I&M is required to install and monitor avian nesting structures within the Project boundary. A total of eight nesting structures were installed within the Project boundary, including four wood duck boxes and four mallard hen houses.

Great Lakes Environmental Center, Inc. (GLEC) has been contracted by I&M to maintain and monitor the eight nesting structures each year. Specifically, nesting structures are examined for damage and repaired, as necessary, and inhabitance, egg count, and nest structure vandalism or parasitism are noted for each structure (GLEC 2016). Based on the results of the monitoring conducted by GLEC in 2016, it was noted that none of the four wood duck boxes or the four mallard hen houses were occupied during the 2016 monitoring period. Three of the mallard hen house structures received minor repairs. Three of the mallard hen houses were also relocated in October 2016 because sedimentation and emergent vegetation precluded safe access to perform monitoring activities (GLEC 2016).

All four wood duck boxes and all four mallard hen houses were present within the Project boundary in March of 2016. All wood duck boxes and mallard hen houses were in good condition during the last visit of the 2016 monitoring period, and each wood duck box was covered to prevent damage during the 2016/2017 winter (GLEC 2016).

None of the eight nesting structures present within the Project boundary were occupied at any time during the 2016 monitoring period, and no nesting structures were occupied in 2015 (GLEC 2015). Given the lack of nesting activities associated with these structures, GLEC recommended that I&M should consider abandoning the existing locations (excluding the three mallard hen houses relocated in October 2016) and relocating the structures to new areas in 2017.

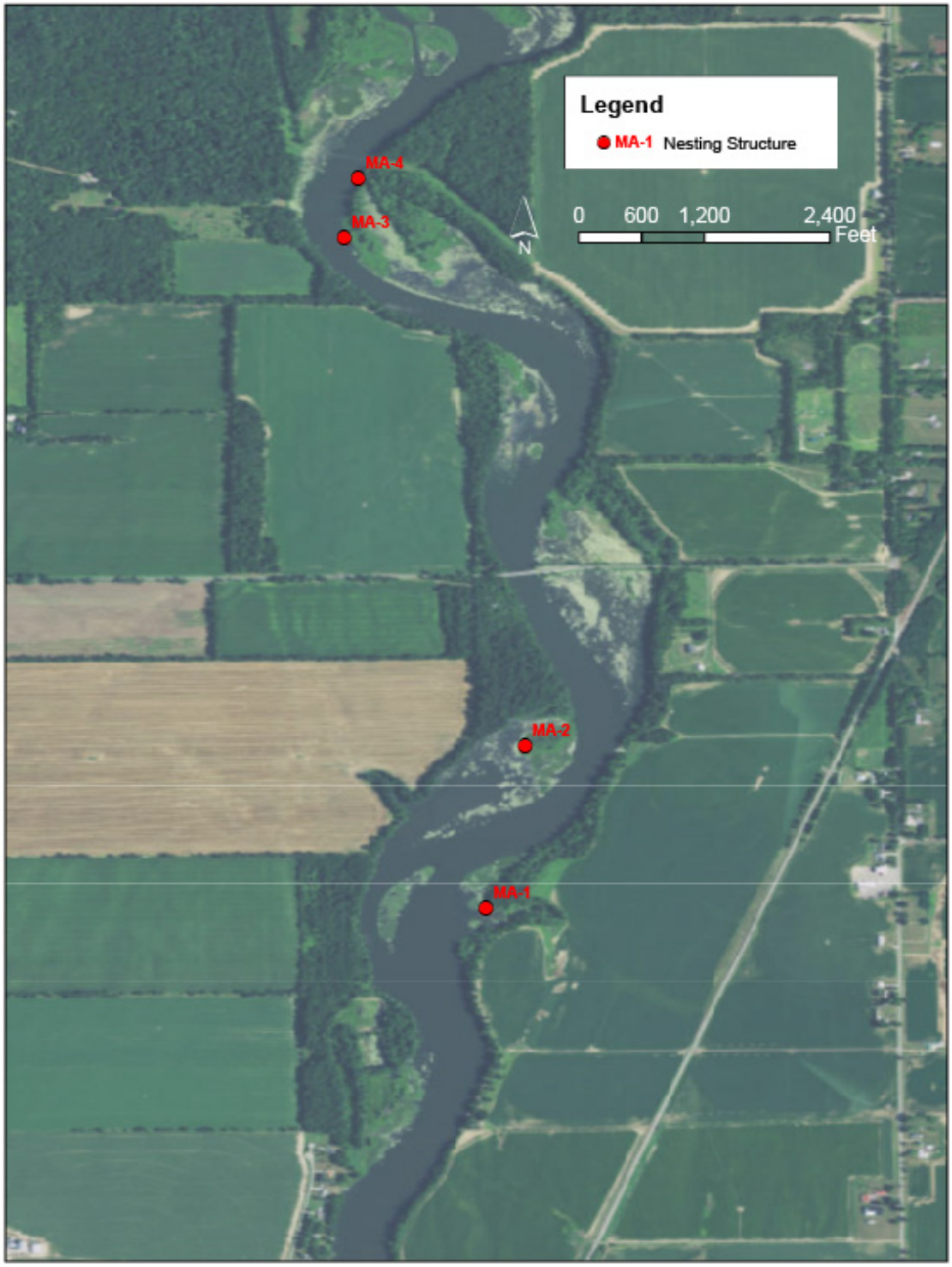
In March 2017, all eight nesting structures were present within the Project boundary, however one of the mallard hen houses required minor repair. One wood duck box was also relocated in October 2017 to a habitat that is potentially more suitable for nesting. Specifically, the nesting structure was moved due to clustering of the nesting structures which may cause competition between courting pairs. Clustering of boxes may also attract the attention of raccoons which will prey on ducks. Finally, some of the nesting structures were elevated to potentially increase nesting success (GLEC 2017a). All wood duck boxes and mallard hen houses were in good condition during the last visit, and each wood duck box was covered to prevent damage during the 2017/2018 winter. Locations of nesting structures within the Project area are provided in Figure 5.5-1 and Figure 5.5-2.

One of the eight nesting structures present within the Project boundary was occupied during the 2017 monitoring period, which is more than what was observed in both 2015 and 2016 (GLEC 2016). Many of the nesting structures also may provide shelter for non-target species, although occupancy by target species was not observed in 2017. Given this recent success and the fact that several structures were moved within the last year, GLEC recommended that I&M should continue to maintain nesting structures within the Project boundary.

GLEC also recommended that if poor nesting success is observed in 2018 that I&M should consider reducing the number of structures that are maintained within the Project boundary or moving structures to alternative locations to maximize the probability of nesting success of target species (GLEC 2017a).

**Figure 5.5-1**
**Location of Avian Nesting Structures at the Constantine Project (2017)**

**Figure 5.5-2**
**Location of Avian Nesting Structures at the Constantine Project (2017)**



#### *5.5.2.3 Reptiles and Amphibians*

Reptile and amphibian species inhabit various habitat types such as woodland, riparian, scrub-shrub or early successional areas, and grasslands. Use of these areas may shift during different life stages and/or times of year. Reptiles and amphibian habitat preferences are primarily influenced by food and reproductive requirements. Table 5.5-1 lists the reptiles and amphibians that are known to occur in Michigan and may potentially occur in the Project vicinity.

**Table 5.5-1**
**Reptiles and Amphibians Known to Occur in Michigan**

| Common name | Scientific name |
|---|---|
| **Snakes** | |
| Butler's garter snake | *Thamnophis butleri* |
| Smooth green snake | *Liochlorophis vernalis* |
| Eastern milk snake | *Lampropeltis triangulum* |
| Northern water snake | *Nerodia sipedon* |
| Queen snake | *Regina septemvittata* |
| Brown snake | *Storeria dekayi* |
| Red-bellied snake | *Storeria occipitomaculata* |
| Eastern garter snake | *Thamnophis sirtalis* |
| Northern ribbon snake | *Thamnophis sauritus septrentrionalis* |
| Ring-necked snake | *Diadophis punctatus edwardii* |
| Eastern hognose snake | *Heterodon platirhinos* |
| Blue racer | *Coluber constrictor foxi* |
| Black rat snake | *Elaphe obsoleta* |
| Fox snake | *Elaphe vulpine and Elaphe gloydi* |
| Kirtland's snake | *Clonophis kirtlandii* |
| Eastern massasauga rattlesnake | *Sistrurus catenatus* (T) |
| Copperbelly water snake | *Nerodia erythrogaster neglecta* (T) |
| **Frogs and Toads** | |
| Fowler's toad | *Bufo fowleri* |
| Green frog | *Rana clamitans* |
| Mink frog | *Rana septentrionalis* |
| Western chorus frog | *Pseudacris triseriata* |
| Gray treefrog | *Hyla versicolor and H. chrysoscelis* |
| Eastern American toad | *Bufo americanus* |

| Common name | Scientific name |
|---|---|
| Bullfrog | *Rana catesbeianus* |
| Wood frog | *Rana sylvatica* |
| Northern leopard frog | *Rana pipiens* |
| Pickerel frog | *Rana palustris* |
| Northern spring peeper | *Pseudacris crucifer* |
| Blanchard's cricket frog | *Acris crepitans blanchardi* |
| **Salamanders** | |
| Western lesser siren | *Siren intermedia nettingi* |
| Red-backed salamander | *Plethodon cinereus* |
| Small-mouthed salamander | *Ambystoma texanum* |
| Eastern tiger salamander | *Ambystoma tigrinum* |
| Mudpuppy | *Necturus maculosus* |
| Four-toed salamander | *Hemidactylium scutatum* |
| Spotted salamander | *Ambystoma maculatum* |
| Eastern newt | *Notophthalmus viridescens* |
| Marbled salamander | *Ambystoma opacum* |
| Blue-spotted salamander | *Ambystoma laterale* |
| **Turtles** | |
| Easter box turtle | *Terrapene carolina* |
| Spiny soft-shell turtle | *Apalone spinifera* |
| Common snapping turtle | *Chelydra serpentine* |
| Common musk turtle | *Sternotherus odoratus* |
| Blanding's turtle | *Emys blandingii* |
| Painted turtle | *Chrysemys picta* |
| Red-eared slider | *Trachemys scripta elegans* |
| Common map turtle | *Graptemys geographica* |
| Wood turtle | *Glyptemys insculpta* |
| Spotted turtle | *Clemmys guttata* |
| **Lizards** | |
| Five-lined skink | *Eumeces fasciatus* |

Source: MDNR 2017c.
T: Federally listed as threatened.

#### *5.5.2.4 Invasive Terrestrial Species*

The MDNR maintains a watch list of terrestrial invasive species that have been identified as posing an immediate and significant threat to Michigan's natural resources (Table 5.5-2). These species have either never been confirmed in Michigan, have very limited distribution, or are localized (MDNR 2017d). There are no records indicating that any of these invasive species have been documented or have been known to occur in the vicinity of the Project.

**Table 5.5-2**
**Terrestrial Invasive Species Watch List for Michigan**

| Common name | Scientific name | Category |
|---|---|---|
| Asian longhorned beetle | Anoplophora glabripennis | Insect |
| Asiatic sand sedge | Carex kobomugi Ohwi | Herbaceous Plant |
| Balsam woolly adelgid | Adelges piceae | Insect |
| Chinese yam | Dioscorea oppositifolia L. | Vine |
| Hemlock woolly adelgid | Adelges tsugae | Insect |
| Himalayan balsam | Impatiens glandulifera | Herbaceous Plant |
| Japanese stiltgrass | Microstegium vimineum (Trin.) A. Camus | Herbaceous Plant |
| Kudzu | Pueraria montana var. lobata | Woody Vine |
| Mile-a-minute weed | Persicaria perfoliata | Herbaceous Plant |
| Nutria | Myocastor coypus | Mammal |
| Thousand cankers disease | Pityophthorus juglandis, Geosmithia morbida | Tree Disease |

Source: MDNR 2017d.

## 5.6 Wetlands, Riparian, and Littoral Habitat

Wetlands are generally defined as those areas that are inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support vegetation typically adapted for life in saturated soil conditions. The State of Michigan administers Section 404 of the federal Clean Water Act regulating wetlands in most areas of the state through the MDEQ. The U.S. Army Corps of Engineers (USACE) retains jurisdiction over traditionally navigable waters including the Great Lakes and connecting channels and wetlands directly adjacent to these waters.

The USFWS (Cowardin 1979) defines wetlands as:

> …lands transitional between terrestrial and aquatic systems where the water table is usually at or near the surface or the land is covered by shallow water. For purposes of this classification, wetlands must have one or more of the following three attributes: (1) at least

periodically, the land supports predominately hydrophytes; (2) the substrate is predominantly undrained hydric soil; and (3) the substrate is nonsoil and is saturated with water or covered by shallow water at some point during the growing season of the year.

### 5.6.1 Wetland and Riparian Vegetation

The Project area is in the Beach-Maple Association of the Eastern Deciduous Forest Province (Bailey 1980). Dominant vegetation in the Project area is a mixed hardwood community consisting of oak, some ash, beach, hickory, maple, cottonwood, and aspen. The Project boundary also includes six palustrine wetland habitat types as classified by Cowardin (1979). The Project boundary includes one palustrine emergent, three palustrine forested, and two palustrine scrub-shrub wetland habitats. Willow species dominate the plant community in the scrub-shrub areas and maple, sycamore, and cottonwood dominate the forested wetlands. Other species of the palustrine forested areas include ash, sumac, walnut, and oaks. Plant species of the aquatic bed community include water-lily, watermilfoil, and the crisp pondweed. Arrow arum is a dominant species in the emergent wetland class. Cattails are a minor component of the wetland plant community in the Constantine reservoir (FERC 1993a).

#### *5.6.1.1 Invasive Plants*

Invasive species occurring within the Project boundary are purple loosestrife (*Lythrum salicaria*), Eurasian watermilfoil (*Myriophyllum spicatum*) and Carolina fanwort (*Cabomba caroliniana*). Carolina fanwort is not widely distributed in Michigan and is listed as “prohibited”, whereas purple loosestrife and Eurasian watermilfoil are established in the state and are listed as “restricted”. Often, management or control techniques are not available for prohibited species (State of Michigan 2018). Article 409 of the license requires I&M to conduct surveys for purple loosestrife and Eurasian watermilfoil within the Project’s reservoir. The surveys are to be conducted annually between late July and early August, the time during which Eurasian watermilfoil is at or near peak growth and purple loosestrife is in bloom. GLEC was contracted by I&M to complete the survey in 2017, the results of which are briefly described below.

*Purple Loosestrife*

Purple loosestrife was documented at a total of 170 locations in the Constantine reservoir in 2017 (Figure 5.6-1 through 5.6-3). The majority of these infestations were characterized by a single plant or a few scattered plants. However, there were 22 documented instances of moderate purple loosestrife infestations and ten heavy purple loosestrife infestations, characterized by nearly pure stands of purple loosestrife. Site photographs depicting examples of light, moderate, and heavy purple loosestrife

infestations observed in the Project reservoir in 2017 are provided in Photo 5.6-1, Photo 5.6-2, and Photo 5.6-3, respectively (GLEC 2017b).

Historical purple loosestrife infestations in the Project reservoir indicate that light infestations have consistently increased between 1998 and 2017, whereas moderate infestations have remained relatively stable over the same period of time. Heavy purple loosestrife infestations were relatively stable between 1998 and 2011. Between 2012 and 2017 the number of heavy purple loosestrife infestations increased from three to ten (GLEC 2017b).

*Purple Loosestrife Biological Control Pilot*

I&M had authorized Kieser & Associates, LLC (K&A) to design and implement a biological control pilot project at the Constantine Project. This pilot project was designed to test the feasibility of biological controls for purple loosestrife using the *Galerucella sp.* beetle. The pilot project was a three-year study which began in 2015 and concluded in 2017. Data from the three-year project were evaluated to determine if there was evidence to suggest that the release of the beetles in 2015 and 2016 may have impacted the purple loosestrife population at the Test site. The metrics of plant damage, stem height and flower head length were all considered in the evaluation (K&A 2017).

The initial data collected from 2015 through 2017 suggest that there may be emerging signs of impacts on the purple loosestrife following two years of targeted beetle releases at the Test site however, it may be premature to conclude that this is sufficient to establish sustained biocontrol effectiveness. Research on the use of the beetle for purple loosestrife biocontrol has shown that it may take five to seven years and multiple targeted yearly beetle releases to achieve a self-sustaining beetle population, and to see changes in plant species composition. Two years of release and follow-up may not be adequate to realize significant measurable results, though initial observations are encouraging (K&A 2017). I&M will continue to consider and analyze various potential control measures at the Project including biocontrol using beetles, herbicides, physical removal, or a combination of multiple control measures.

**Figure 5.6-1**
**Invasive Species Mapped in the Project Area (Map 1 of 3)**

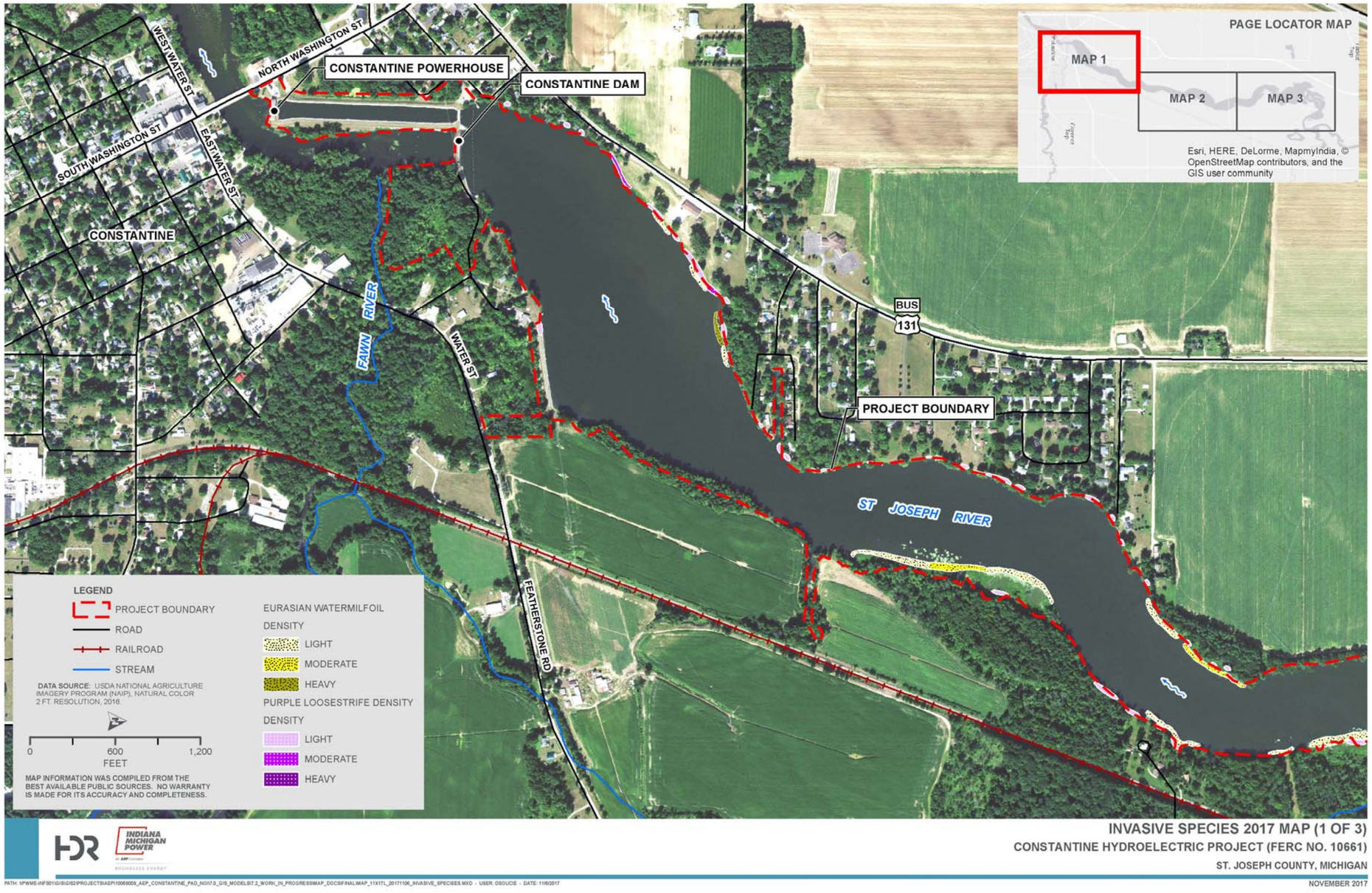


**Figure 5.6-2**
**Invasive Species Mapped in the Project Area (Map 2 of 3)**

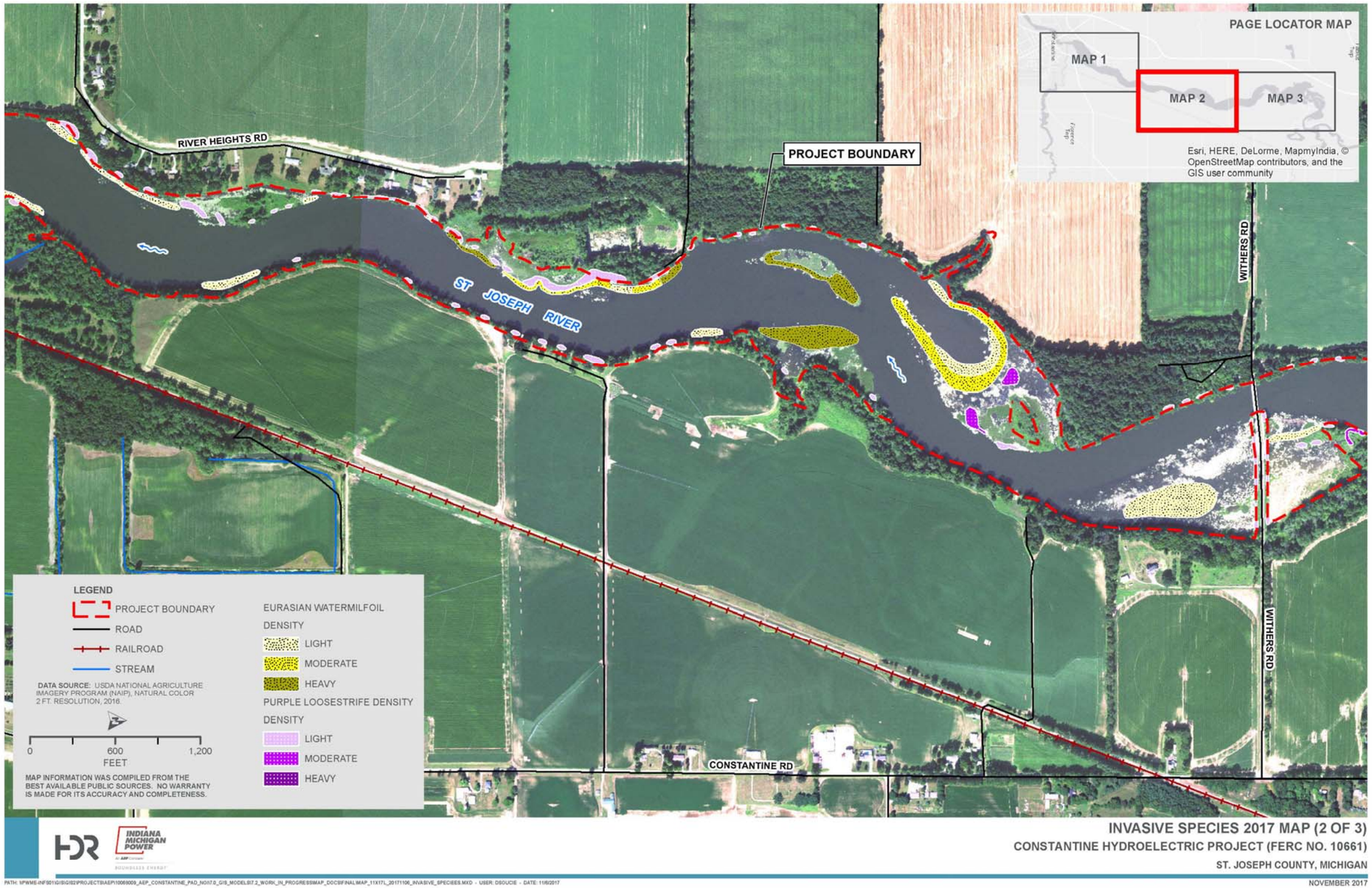


**Figure 5.6-3**
**Invasive Species Mapped in the Project Area (Map 3 of 3)**

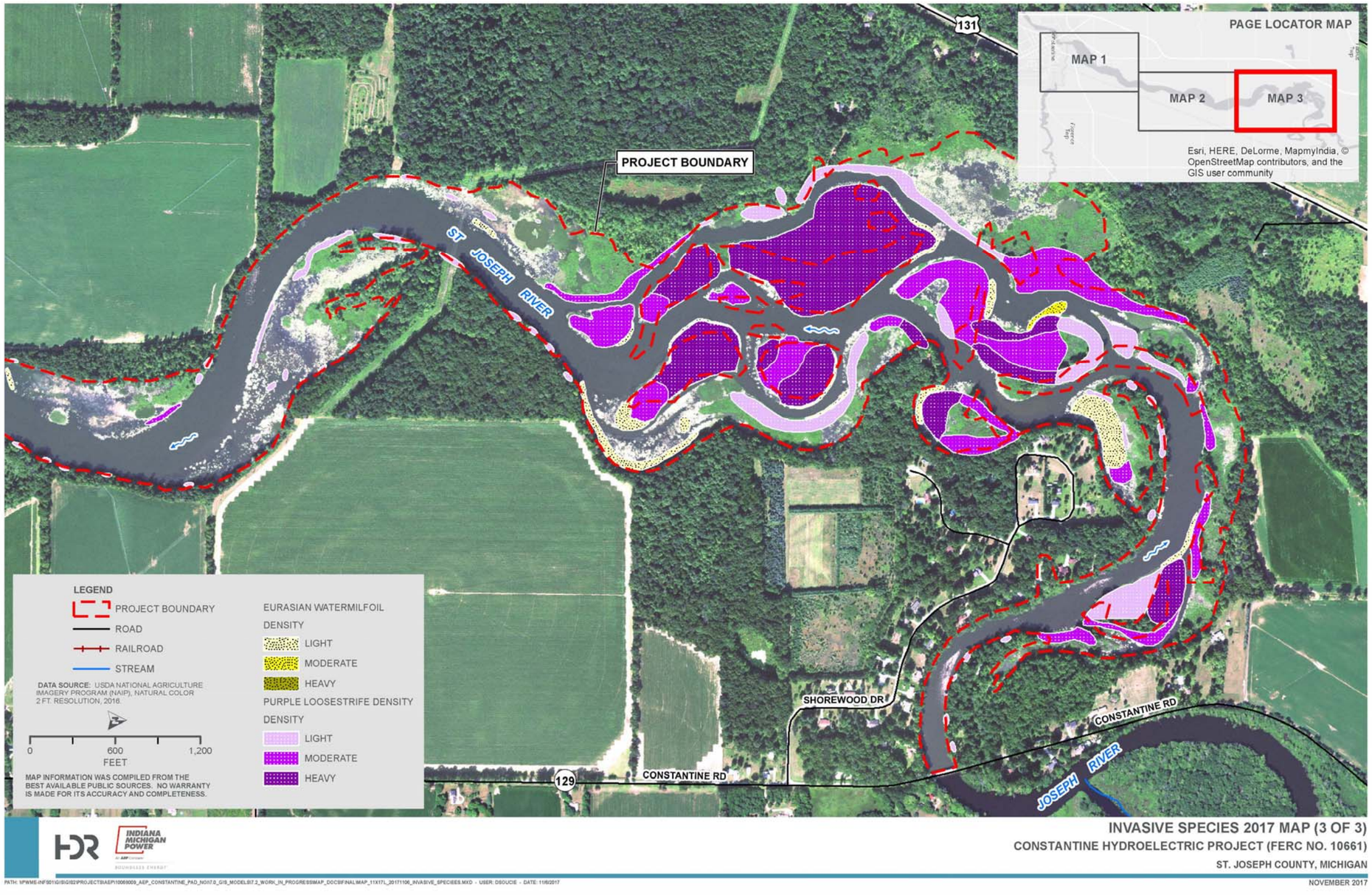


**Photo 5.6-1**
**Example of a Light Infestation of Purple Loosestrife**
**Observed in the Constantine Project Reservoir in 2017**

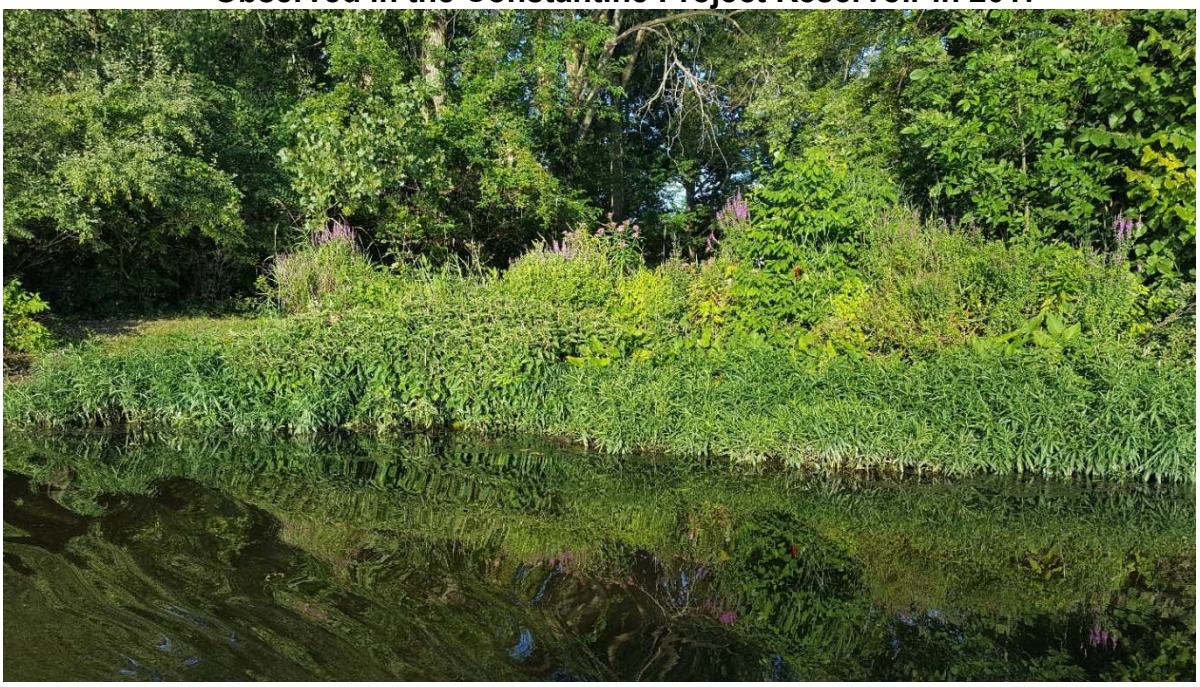


**Photo 5.6-2**
**Example of a Moderate Infestation of Purple Loosestrife**
**Observed in the Constantine Project Reservoir in 2017**

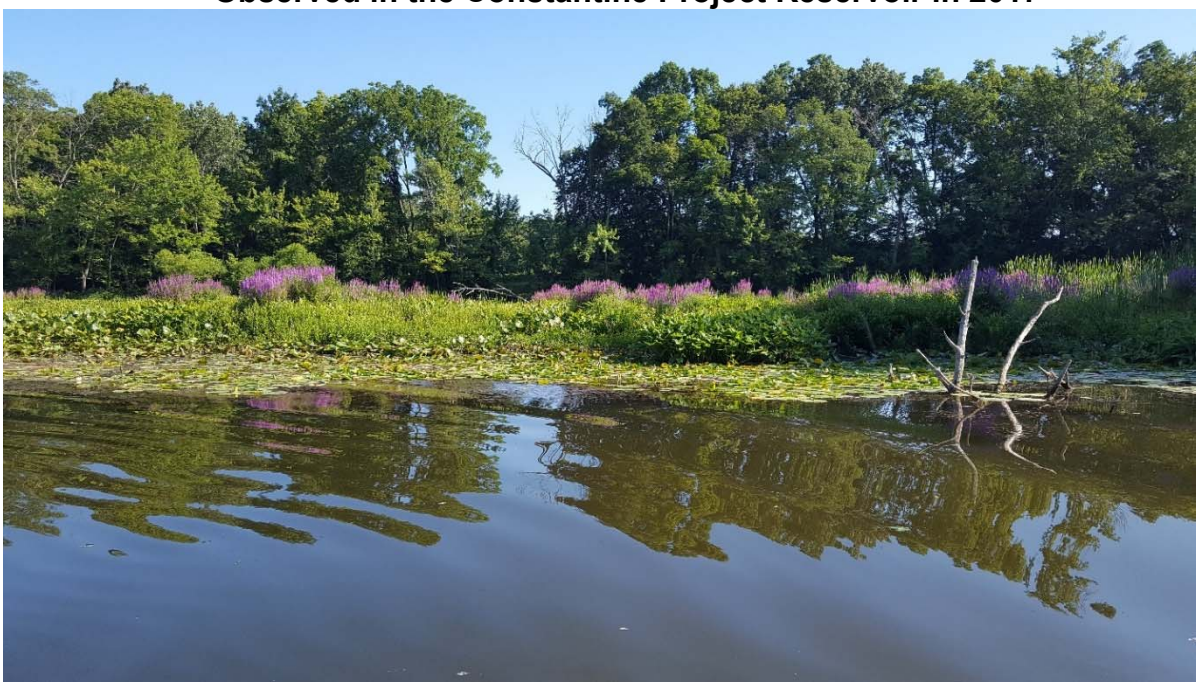


**Photo 5.6-3**
**Example of a Heavy Infestation of Purple Loosestrife**
**Observed in the Constantine Project Reservoir in 2017**

*Eurasian Watermilfoil*

A total of 46 Eurasian watermilfoil infestations were observed in the Project reservoir in 2017 (Figure 5.6-1 through 5.6-3). Most of these infestations were characterized by a single plant or a few scattered plants, but there were seven instances of moderate infestations and five instances characterized by dense plants crowding out native vegetation, often as a pure stand. Where not choking out native vegetation, Eurasian watermilfoil was often mixed with coontail (*Ceratophyllum demersum*), pondweeds (*Potamogeton* sp.), and Carolina fanwort. Site photographs depicting examples of light, moderate, and heavy Eurasian watermilfoil infestations observed in the Project reservoir in 2017 are provided in Photo 5.6-4, Photo 5.6-5, and Photo 5.6-6, respectively (GLEC 2017b).

Excluding year-to-year variability, light infestations of Eurasian watermilfoil in the Project reservoir have marginally increased since 1998. Moderate and heavy infestations of Eurasian watermilfoil have generally increased since 1998, with a particularly significant increase observed between 2011 and 2012. Since 2012 the numbers of moderate and heavy infestations of Eurasian watermilfoil have generally decreased (GLEC 2017b).

**Photo 5.6-4**
**Example of a Light Infestation of Eurasian Watermilfoil**
**Observed in the Constantine Project Reservoir in 2017**

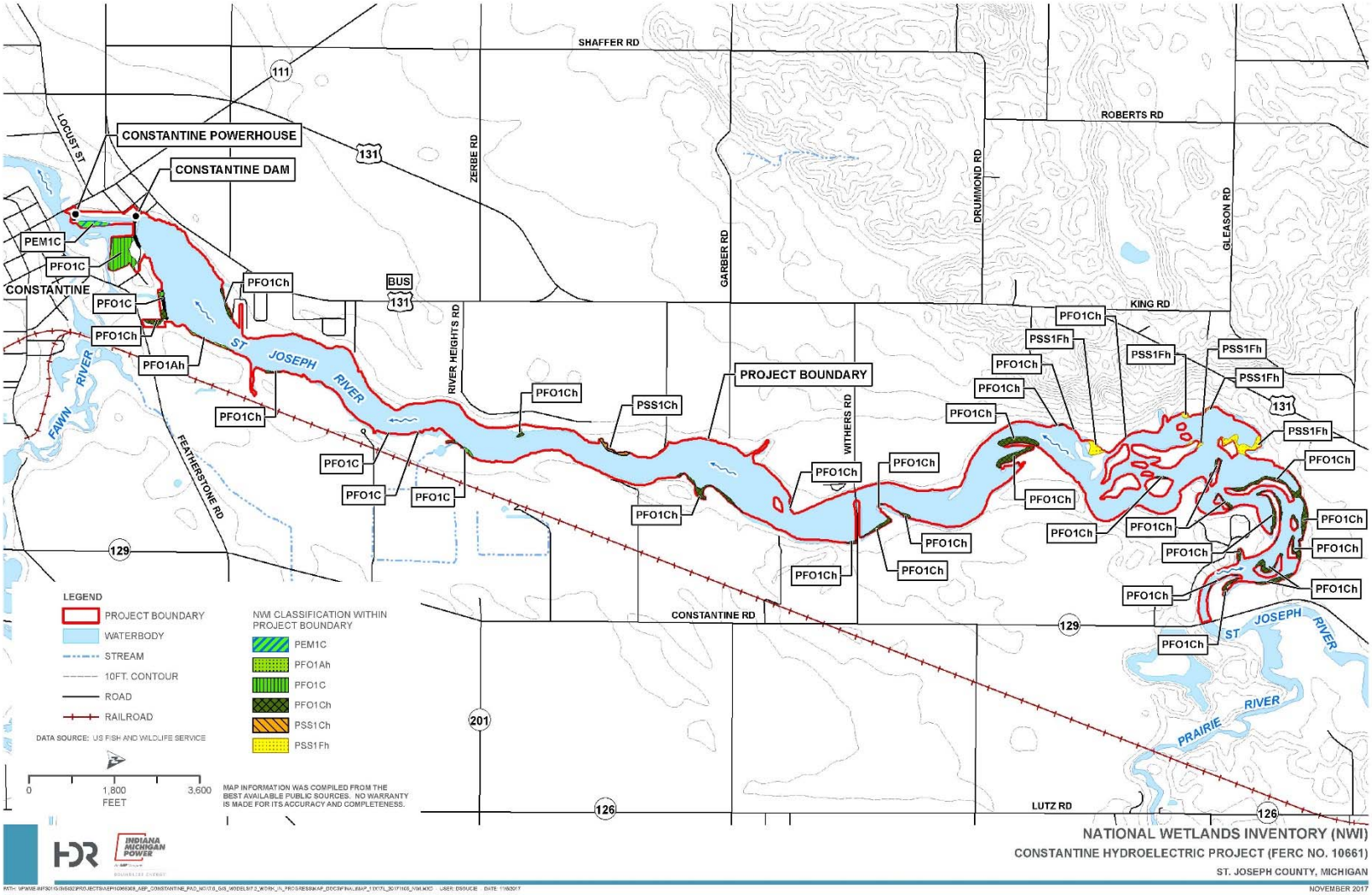
**Photo 5.6-5**
**Example of a Moderate Infestation of Eurasian Watermilfoil**
**Observed in the Constantine Project Reservoir in 2017**

**Photo 5.6-6**
**Example of a Heavy Infestation of Eurasian Watermilfoil**
**Observed in the Constantine Project Reservoir in 2017**

### 5.6.2 Wetland and Riparian Wildlife

Information on specific wildlife known to occur in wetland and riparian habitats in the Project vicinity is not available. However, many species likely to occur within the Project vicinity typically use wetland or riparian habitats at some point in their lives. Many of the species mentioned in Section 5.5 may utilize riverine and lacustrine habitat within the Project boundary for permanent, temporary, or transient uses.

**Figure 5.6-4**
**USFWS Wetlands in the Vicinity of the Project**



### 5.6.3 Wetland, Riparian Zone, and Littoral Maps

A map of wetland habitats existing in the Project vicinity is presented in Figure 5.6-4. Table 5.6-1 defines the National Wetland Inventory (NWI) classification system associated with the wetlands maps (USFWS NWI undated) and provides the available acreage of each classification of wetlands within the Project vicinity.

**Table 5.6-1**
**National Wetlands Inventory Classification System and Estimated Acreage**

| Wetland Code | System | Class | Subclass | Regime | Qualifier | Estimated Acres |
|---|---|---|---|---|---|---|
| PEM1C | Palustrine | Emergent | Persistent | Seasonally Flooded | None | 1.4 |
| PFO1Ah | Palustrine | Forested | Broad-Leaved Deciduous | Temporary Flooded | Diked/ Impounded | 0.5 |
| PFO1C | Palustrine | Forested | Broad-Leaved Deciduous | Seasonally Flooded | None | 7.6 |
| PFO1Ch | Palustrine | Forested | Broad-Leaved Deciduous | Seasonally Flooded | Diked/ Impounded | 20.8 |
| PSS1Ch | Palustrine | Scrub-Shrub | Broad-Leaved Deciduous | Seasonally Flooded | Diked/ Impounded | 0.8 |
| PSS1Fh | Palustrine | Scrub-Shrub | Broad-Leaved Deciduous | Semipermanently Flooded | Diked/ Impounded | 4.7 |

Source: USFWS NWI undated.

### 5.6.4 Estimates of Wetland, Riparian Zone, and Littoral Acreage

#### *5.6.4.1 Wetland Acreage*

The NWI wetlands in the vicinity of the Constantine Project, excluding the reservoir, encompass approximately 35.8 acres.

#### *5.6.4.2 Littoral and Riparian Zone Acreage*

The littoral zone, in the context of a large river system, is the habitat between about a half-meter of depth and the depth of light penetration (Wetzel 1975). The littoral width varies based on the geomorphology and rate of sedimentation of the stretch of river (Wetzel 1983). Based on the NWI maps and review of aerial photography of the Project area, some potential littoral habitats for wildlife were identified within the island complex approximately 4 miles upstream from the Constantine Dam.

For the purposes of this section, the term “riparian” shall be used to refer to anything connected or immediately adjacent to the shoreline or bank of the St. Joseph River. Although the term “riparian buffer” generally refers to the naturally vegetated shoreline, floodplain, or upland forest adjacent to a surface water body, the quantification of riparian habitat requires the calculation of a buffer size from which to base the amount of riparian habitat located within a specified area.

The riparian zone serves as the primary interface between riverine and upland habitats, influencing both the primary productivity and food resources within the river. The majority of riparian habitat within the Project boundary is located within the woody wetlands cover type. Table 5.6-2 lists the estimated land use acreages within the Project boundary.

**Table 5.6-2**
**Estimated Land Use Acreage within the Project Boundary**

| Land Use | Estimated Acres |
|---|---|
| Cultivated Crops | 20.3 |
| Deciduous Forest | 7.0 |
| High Intensity Development | 0.2 |
| Low Intensity Development | 3.8 |
| Medium Intensity Development | 0.4 |
| Developed Open Space | 5.6 |
| Emergent Herbaceous Wetlands | 13.8 |
| Hay/Pasture | 0.2 |
| Mixed Forest | 0.8 |
| Open Water | 417.0 |
| Woody Wetlands | 114.0 |

Source: USGS 2014.

## 5.7 Rare, Threatened, and Endangered Species

As part of the information-gathering process conducted to support the development of this PAD, I&M requested information from the MNFI and USFWS regarding federal and state-listed rare, threatened, or endangered species, critical habitat, sensitive natural communities, and species of special concern within the Project’s vicinity.

### 5.7.1 Federally Listed Threatened, Endangered, and Candidate Species

I&M conducted a review of federally listed threatened, endangered, and candidate species using USFWS' IPaC online system on August 15, 2017. A total of six threatened, endangered, or candidate species have the potential to occur within the Project boundary (Table 5.7-1).

**Table 5.7-1**
**Federally Listed Species Potentially Occurring within the Project Boundary**

| Common Name | Scientific Name | Status |
|---|---|---|
| Indiana bat | *Myotis sodalis* | Endangered |
| Mitchell's satyr butterfly | *Neonympha mitchellii* | Endangered |
| Northern long-eared bat | *Myotis septentrionalis* | Threatened |
| Copperbelly water snake | *Nerodia erythrogaster neglecta* | Threatened |
| Eastern massasauga | *Sistrurus catenatus* | Threatened |
| Eastern prairie fringed orchid | *Platanthera leucophaea* | Threatened |

Source: USFWS IPaC consultation (USFWS 2017b).

#### *5.7.1.1 Indiana Bat*

Indiana bats are found over most of the eastern half of the United States (USFWS 2006). The Indiana bat is small with dark-brown to black fur, usually weighing only one-quarter of an ounce, with a wingspan of 9 to 11 inches. The Indiana bat is similar in appearance to many other related species, but can be distinguished by comparing the structure of the foot and color variations in the fur (USFWS 2006).

Indiana bats hibernate during winter in caves or occasionally in abandoned mines. They hibernate in cool, humid caves with stable temperatures under 10 degrees Celsius (°C), but above freezing. Very few caves are known to have these characteristics. After hibernation, Indiana bats migrate to their summer habitat in wooded areas where they roost under loose tree bark on dead or dying trees. They forage in or along the edges of forested areas (USFWS 2006).

Indiana bats mate during the fall before they enter hibernation, but fertilization is delayed until the spring after they emerge from the caves. Females migrate to summer colonies where they roost and give birth to a single pup (USFWS 2006).

The Indiana bat is endangered due to human disturbance, cave commercialization and improper gating, summer habitat loss or degradation, and pesticides and environmental contaminants (USFWS 2006).

#### *5.7.1.2 Northern Long-eared Bat*

The northern long-eared bat is found across much of eastern and north-central United States and all Canadian provinces from the Atlantic Ocean west to the southern Yukon Territory and British Columbia (USFWS 2015). It is a medium-sized bat, measuring 3.0 to 3.7 inches, with a wingspan of 9 or 10 inches. Its fur color can be medium to dark brown on the back and tawny to pale-brown on the underside (USFWS 2015). The bat is distinguished by its longer ears relative to other bats in the genus Myotis (USFWS 2015).

The northern long-eared bat spends winters hibernating in caves and mines, preferring hibernacula with very high humidity. During the summer months, the northern long-eared bat prefers to roost singly or in colonies underneath bark, in cavities, or in the crevices of live or dead trees. Breeding begins in late summer or early fall when males swarm near hibernacula. After a delayed fertilization, pregnant females migrate to summer colonies where they roost and give birth to a single pup. Young bats start flying 18 to 21 days after birth, and adult northern long-eared bats can live up to 19 years (USFWS 2015).

Northern long-eared bats emerge at dusk and fly through the understory of forested hillsides feeding on moths, flies, leafhoppers, caddisflies, and beetles. They also feed by gleaning motionless insects from vegetation and water (USFWS 2015).

The most severe and immediate threat to the northern long-eared bat is white-nose syndrome. As a result of this disease, numbers have declined by 99 percent in the northeast. Other significant sources of mortality include impacts to hibernacula from human disturbance. Loss or degradation of summer habitat as a result of highway or commercial development, timber management, surface mining, and wind facility construction and operation can also contribute to mortality (USFWS 2015).

#### *5.7.1.3 Copperbelly Water Snake*

The copperbelly water snake is found in two geographically separated areas. The northern population segment includes southern Michigan, northeastern Indiana, and northwestern Ohio. Surveys of this population segment over the last 20 years have shown a continuing decline in the overall number of snakes. At present, only five small sub-populations persist within the tri-state area. The southern population, that includes portions of southern Indiana, southern Illinois, and northwestern Kentucky, is not protected by the Endangered Species Act (USFWS 2013).

The copperbelly water snake is a non-venomous snake that feeds mainly on frogs and tadpoles and grows approximately 2 to 4 feet in length. It has a solid dark (usually black) back with a bright orange-red belly. Females generally grow larger than males, with most copperbellies over 30 inches being females (USFWS 2013).

Copperbelly water snakes prefer shallow wetlands or floodplain wetlands surrounded by forested uplands. Seasonally flooded wetlands without fish are favored foraging areas, and copperbellies frequently move from one wetland to another. Copperbellies hibernate, often in crayfish burrows, in forested wetlands and immediately adjacent to forested uplands and remain underground from late October until late April (USFWS 2013).

Only a couple hundred snakes remain in the northern population segment. This ongoing decline can be attributed, in part, to habitat loss and fragmentation, collection, and predation (USFWS 2013).

#### *5.7.1.4 Eastern Massasauga*

Eastern massasaugas are known to occur in 10 states and 1 Canadian province, from central New York and southern Ontario to south-central Illinois and eastern Iowa. Historically, the snake's range covered this same area, but within this large area the number of populations and numbers of snakes within populations have steadily declined. Generally, only small, isolated populations remain. The eastern massasauga is listed as endangered, threatened, or a species of concern in every state and province where it is found (USFWS 2016).

Massasaugas are generally small snakes with thick bodies, heart-shaped heads, and vertical pupils with an average adult length of about 2 feet. Adult massasaugas are gray or light brown with large, light-edged chocolate brown blotches on the back and smaller blotches on the sides. Young snakes have the same markings, but are more vividly colored (USFWS 2016).

Massasaugas live in wet areas including wet prairies, marshes, and low areas along rivers and lakes. They also use adjacent uplands during part of the year in many areas. They often hibernate in crayfish burrows but may also be found under logs and tree roots or in small mammal burrows (USFWS 2016).

Like all rattlesnakes, massasaugas bear live young. Depending on their health, adult females may bear young every year or every other year. When food is especially scarce they may only have young every three years. Most massasaugas mate in late summer and give birth about a year later with litter sizes ranging from 5 to 20 young (USFWS 2016).

The eastern massasauga has been listed as threatened due to human eradication based on fear, habitat loss, and lack of management and improper timing of management (USFWS 2016).

#### *5.7.1.5 Mitchell's Satyr Butterfly*

The Mitchell's satyr butterfly is one of the most geographically restricted eastern butterflies. Historically, the Mitchell's satyr was found in New Jersey, Ohio, Michigan, Indiana, and possibly Maryland. However, currently, the butterfly can be found in only 13 locations in Michigan and 2 locations in Indiana (USFWS 1999a). The Mitchell's satyr's habitat is restricted to fen wetlands which are rare, low-nutrient systems that receive carbonate-rich groundwater from seeps and springs (USFWS 1999a).

This butterfly is medium sized with a 1-¾-inch wingspan. It has an overall rich brown color and a distinctive series of orange-ringed black circular eyespots with silvery centers on the lower surfaces of both pairs of wings (USFWS 1999a).

There is little is known about the Mitchell's satyr's three life stages. The eggs are likely laid on the young leaves of low, tender plants with the eggs hatching into caterpillars in about a week. The caterpillar grows throughout the year, shedding its skin many times. The fourth stage caterpillar hibernates under the snow and emerges in the spring. The caterpillar eventually makes a cocoon and then emerges as an adult butterfly, only living approximately two weeks (USFWS 1999a).

The greatest threat to the Mitchell's satyr is habitat destruction. Pesticides, fertilizer, and nutrient runoff from adjacent agriculture, including livestock production, also pose a threat to the butterfly's habitat. It is also believed that some populations have been eliminated by butterfly collectors (USFWS 1999a).

#### *5.7.1.6 Eastern Prairie Fringed Orchid*

The eastern prairie fringed orchid is primarily distributed in the mid-western United States and Canada, from Oklahoma to Ontario, with a limited distribution in the northern mid-Atlantic and New England regions (North American Orchid Conservation Center 2017).

This plant ranges from 8 to 40 inches tall and has a leafy stem with a flower cluster called an inflorescence. Each plant has one single flower spike composed of 5 to 40 white flowers. Each flower has a three-part fringed lip that is less than 1 inch long and a nectar spur which is about 1 to 2 inches long (USFWS 2005).

The eastern prairie fringed orchid can be found in moist prairies and meadows, bogs, marshes, and fens (North American Orchid Conservation Center 2017). It requires full sun for optimum growth and flowering and a grassy habitat with little or no woody encroachment. This orchid is a perennial herb with flowering generally beginning from late June to early July and lasting for 7 to 10 days. Seed capsules mature over the growing season and are dispersed by the wind from late August through September (USFWS 2005).

The current decline of this plant is mainly due to the loss of habitat from the drainage and development of wetlands. Succession to woody vegetation, competition from non-native species, and over-collection are other reasons for the decline of this species.

### 5.7.2 Biological Opinions, Status Reports, and Recovery Plans of Threatened and Endangered Species

Several biological opinions have been developed for the Indiana bat, northern long-eared bat, eastern massasauga, Mitchell's satyr butterfly, and eastern prairie fringed orchid; however, none of these biological opinions are specific to the Project area (USFWS 2017a). No biological opinions have been developed for the copperbelly water snake.

#### *5.7.2.1 Status Reports*

No official status reports exist for the Indiana bat, northern long-eared bat, copperbelly water snake, eastern massasauga, Mitchell's satyr butterfly, or eastern prairie fringed orchid. However, the general status of these species, the associated listing, fact sheets, range maps, and other important information is available on the USFWS website.

#### *5.7.2.2 Recovery Plans*

Recovery plans have been developed for the Indiana bat (USFWS 2007), copperbelly water snake (USFWS 2008), Mitchell's satyr butterfly (USFWS 1998), and eastern prairie fringed orchid (1999b). The USFWS has not developed recovery plans for the northern long-eared bat and eastern massasauga rattlesnake.

### 5.7.3 Critical Habitat

When a species is proposed for listing as endangered or threatened under the Endangered Species Act (ESA), the USFWS must consider whether there are areas of habitat believed to be essential to the species' conservation. Those areas may be proposed for designation as critical habitat. Critical habitat is a specific geographic area(s) that contains features essential for the conservation of a threatened or endangered species and that may require special management and protection. Through consultation with the USFWS, no critical habitat has been designated under the ESA for species in the Project vicinity.

### 5.7.4 Temporal and Spatial Distribution of Federally Listed Threatened and Endangered Species

#### *5.7.4.1 Indiana Bat*

Indiana bats are found over most of the eastern half of the United States, but almost half of all Indiana bats hibernate in caves in southern Indiana (USFWS 2006). The Indiana bat is a migratory bat, hibernating in caves and mines in the winter and can migrate long distances to summer habitat. Migratory females may migrate up to 357 miles to form maternity colonies to bear and raise their young. Both males and females return to hibernacula in late summer or early fall to mate and enter hibernation (USFWS 2007).

#### *5.7.4.2 Northern Long-eared Bat*

The spatial distribution for the northern long-eared bat extends from Montana and Wyoming in the West, south to eastern Texas, across the northern portions of Mississippi, Alabama, Georgia, and North Carolina, north to Maine, and across the Great Lakes. As this species generally winters in local or regional hibernacula, it does not migrate extensive distances and, therefore, does not have a significant temporal distribution.

#### *5.7.4.3 Copperbelly Water Snake*

The copperbelly water snake is found in southern Michigan, northeastern Indiana, northwestern Ohio, southern Indiana, southern Illinois, and northwestern Kentucky. This species often hibernates in forested wetlands and immediately adjacent forested wetlands from late October until late April (USFWS 2013).

#### *5.7.4.4 Eastern Massasauga*

Eastern massasaugas are known to occur in 10 states and 1 Canadian province, from central New York and southern Ontario to southcentral Illinois and eastern Iowa (USFWS 2016). They generally occupy wetland habitats in the spring, fall, and winter, but in the summer these snakes migrate to drier, upland sites that range from forest openings to old fields, agricultural lands, and prairies (Beltz 1992).

#### *5.7.4.5 Mitchell's Satyr Butterfly*

Currently, the Mitchell's satyr butterfly can be found in only 13 locations in Michigan and 2 locations in Indiana (USFWS 1999a). The Mitchell's satyr's habitat is restricted to fen wetlands which are rare, low-nutrient systems that receive carbonate-rich groundwater from seeps and springs (USFWS 1999a).

#### *5.7.4.6 Eastern Prairie Fringed Orchid*

The eastern prairie fringed orchid is primarily distributed in the mid-western United States and Canada, from Oklahoma to Ontario, with a limited distribution in the northern mid-Atlantic and New England

regions (North American Orchid Conservation Center 2017). This plant can be found in a variety of habitats from mesic prairies to sedge meadows, marsh edges, and even bogs. The plants flower from late June to early July lasting for 7-10 days with seed capsules dispersed by the wind from late August through September (USFWS 2005).

### 5.7.5 State-listed Threatened, Endangered, and Candidate Species

By letter dated September 11, 2017 (included in Appendix B), the MNFI indicated that three state-listed species have been documented in the vicinity of the Project. The MNFI indicated that the state-threatened purple wartyback mussel (*Cyclonaias tuberculata*), water willow (*Justicia americana*), and the yellow-throated warbler *(Setophaga dominica*) are state-listed species that could potentially occur in the Project area.

MNFI's letter also provided a list of Michigan State-listed plants and animals that have been documented within 1.5 miles of the Project site at one time, but have not been documented there in at least 25 years, and/or there is uncertainty regarding their continued presence. These species are listed in Table 5.7-2. Additionally, MNFI's letter provided a list of special concern species and rare natural communities within 1.5 miles of the Project, which are listed in Table 5.7-3.

#### *5.7.5.1 Purple Wartyback Mussel*

According to the MNFI, the state-threatened purple wartyback mussel has been known to occur in the St. Joseph River near the Project site. The purple wartyback mussel inhabits medium to large rivers that have gravel or mixed sand and gravel substrates. Suitable habitat for fish host species must be present for purple wartyback reproduction to be successful. Known hosts for the purple wartyback are the yellow bullhead (*Ameiurus natalis*) and channel catfish, but there may be others. Purple wartybacks can live to over 25 years of age. Freshwater mussels require a fish host to complete their life cycle as eggs are fertilized, and develop into larvae within the gills of the female mussel. These larvae, called glochidia, are released into the water and must attach to a suitable fish host to survive and transform into the adult mussel. The purple wartyback is a summer breeder with fertilized eggs and glochidia released during one summer (MNFI 2017).

Major threats to freshwater mussels are habitat degradation, poor water quality, flow alterations, water temperature changes, heavy metals, organic pollution, sedimentation, and siltation (MNFI 2017).

#### *5.7.5.2 Water Willow*

The state-threatened water willow is a mat-forming perennial of river slackwater areas; leaves opposite, narrowly elliptical; flowers pale violet marked with dark purple, borne in axillary clusters near top of plant. It primarily occurs in large river systems and less commonly in lakes. It is almost always

found along muddy banks at the edge of the shore (MNFI 2017). Flowering begins in June and may continue to September depending on location (USDA 2017). This species is found from Texas, Oklahoma, Kansas, Iowa, and Michigan east to New York and Vermont, and south to Florida. It also occurs in northern Ontario and Quebec (USDA 2017).

#### *5.7.5.3 Yellow-Throated Warbler*

The MNFI indicated that the state-threatened, yellow-throated warbler has been known to occur in the Project area. Michigan's yellow-throated warbler population largely occurs in areas with mature sycamore trees, which are associated with bottomland and river floodplain forests. They have also been found in areas comprised of mature silver maples and American basswood. The yellow-throated warbler usually returns to Michigan in the spring from mid-April to mid-May. Nests are generally placed in sycamores, far from the trunk and a substantial distance from the ground. Most individuals leave the breeding grounds by August (MNFI 2017).

**Table 5.7-2**
**State-Protected Species with Historical Records within 1.5 Miles of the Project (MNFI 2017)**

| Common Name | Scientific Name | State Listing | First Siting of Species | Last Siting of Species | Heritage Conservation Status |
|---|---|---|---|---|---|
| **Plants** | | | | | |
| Fleshy stitchwort | *Stellaria crassifolia* | Endangered | 1890 | 1890-06-07 | S1 |
| Dwarf burhead | *Echinodorus tenellus* | Endangered | 1837 | 1837-08-11 | S1 |
| Cut-leaved water parsnip | *Berula erecta* | Threatened | 1952 | 1952-07-28 | S2 |
| Rosepink | *Sabatia angularis* | Threatened | 1837 | 1837-08-18 | S2 |
| Bog bluegrass | *Poa paludigena* | Threatened | 1890 | 1890-06-06 | S2 |
| **Birds** | | | | | |
| Cerulean warbler | *Setophaga cerulea* | Threatened | 1992-07-02 | 1992-07-02 | S3 |

**Table 5.7-3**
**State Special Concern Species and Rare Natural Communities within 1.5 Miles of the Project (MNFI 2017)**

| Common Name | Scientific Name | First Siting of Species | Last Siting of Species | Heritage Conservation Status |
|---|---|---|---|---|
| **Plants** | | | | |
| Missouri rock-cress | *Boechera missouriensis* | 1890 | 1890-06-04 | S2 |
| Eared foxglove | *Agalinis auriculata* | 1837 | 1837-08-23 | SX |
| Leadplant | *Amorpha canescens* | 2007-11-07 | 2013-09-03 | S3 |
| False boneset | *Brickellia eupatorioides* | 2009-10-02 | 2009-10-02 | S2 |
| **Mussels** | | | | |
| Rainbow | *Villosa iris* | 2009-06 | 2009-09 | S3 |
| Ellipse | *Venustaconcha ellipsiformis* | 1930 | 2013-07-16 | S3 |
| **Community** | | | | |
| Rich Forest, Central Midwest Type | *Mesic Southern Forest* | 2009-09-08 | 2009-10-02 | S3 |

## 5.8 Recreation and Land Use

### 5.8.1 Existing Recreation Facilities and Opportunities

The Constantine Project provides several formal (licensed) recreational facilities located upstream and downstream of the Constantine dam that are maintained and operated by I&M and open to the public. The Project amenities include a boat launch, a portage, reservoir fishing access, tailwater fishing access, Americans with Disabilities Act (ADA) accessible portable toilets, and a picnic area.

The tailwater fishing platform is located just downstream of the powerhouse with an associated parking lot with the capacity for approximately 14 vehicles. The Constantine boat launch is located adjacent to the west abutment of the spillway. There is a small fishing dock next to the one-lane boat launch with a parking area for approximately 10 vehicles, and additional space for trailers. Located on the east side of the Constantine dam, there is a portage trail that allows individuals to transport canoes and kayaks around the dam, as well as providing limited access to the reservoir for fishing, and a picnic area. There is no official parking area at the portage site. However, street-side parking is available for approximately 5 vehicles, close to the intersection of Hull Street and Wells Street.

**Photo 5.8-1**
**View from Washington Street Looking East Toward Tailwater Fishing Access**

**Photo 5.8-2**
**Tailwater Fishing Access Below Constantine Powerhouse**


**Photo 5.8-3**
**Southwest to Northeast View of Boat Launch**

**Photo 5.8-4**
**West to East View of the Constantine Boat Launch**

**Photo 5.8-5**
**Constantine Portage Park Looking North**

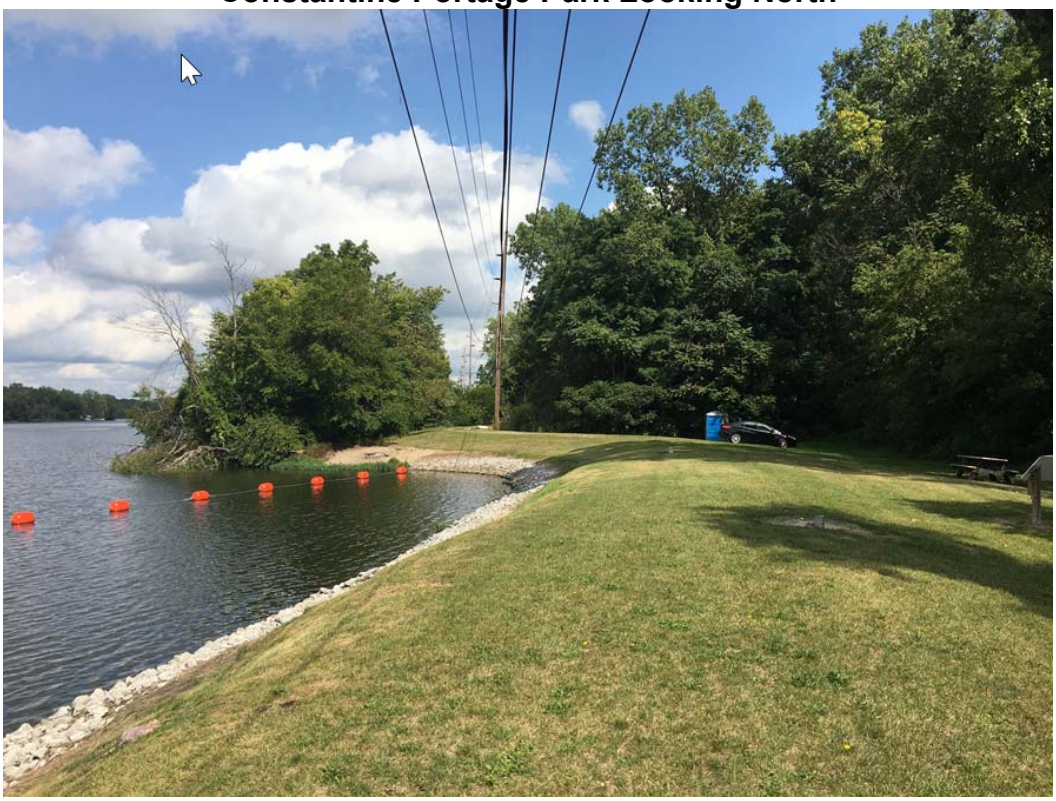


**Photo 5.8-6**
**Constantine Portage Park Looking Southwest**

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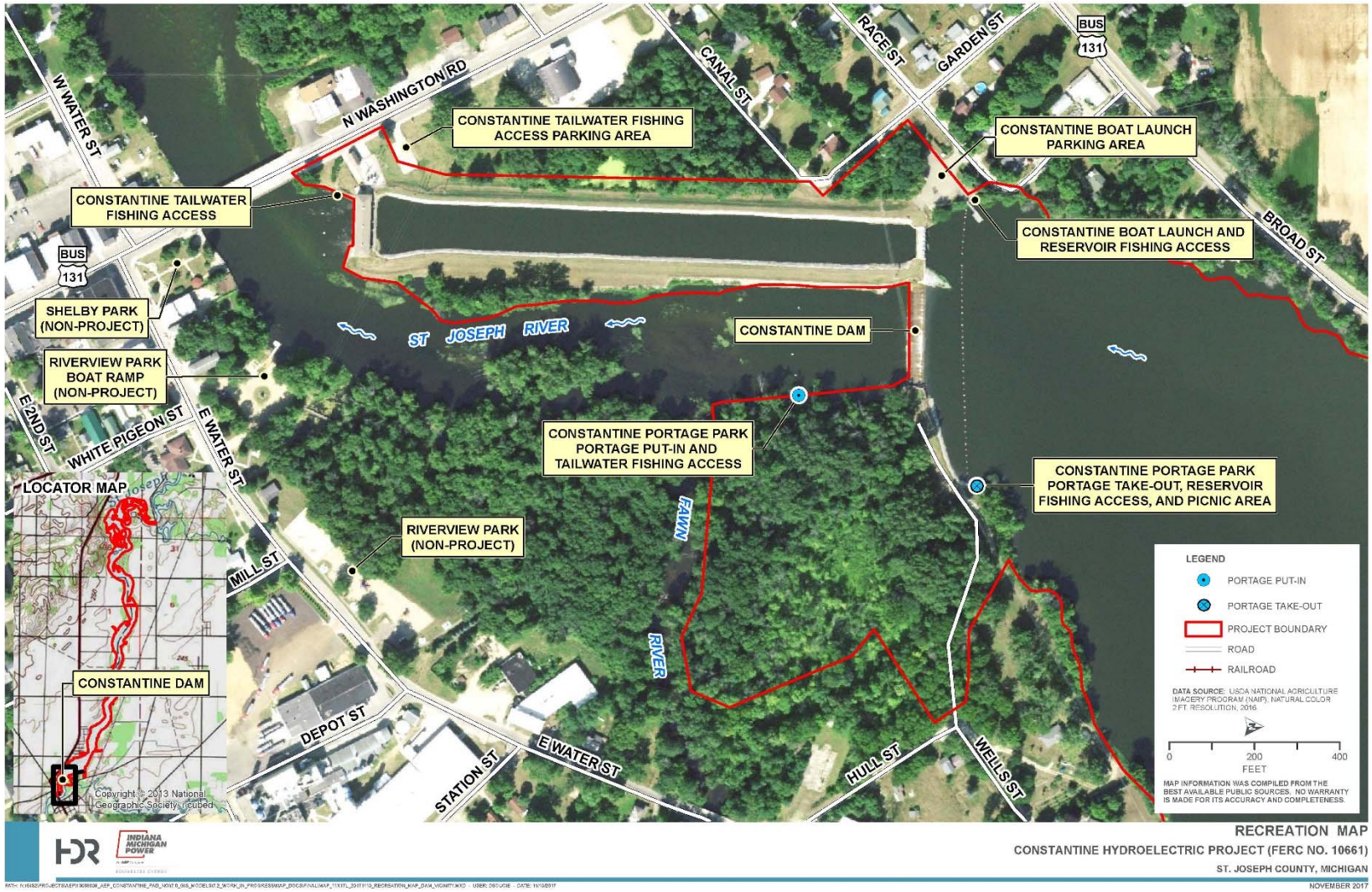
**Figure 5.8-1**
**Location Map of Recreation Areas in the Vicinity of the Project**



### 5.8.2 Current Project Recreation Use Levels and Restrictions

Recreation use levels have been documented as required in the FERC Licensed Hydropower Development Recreation Report (FERC Form 80). As of 2015, the number of annual visits to the recreational areas at the Constantine Project was estimated to be 11,851 daytime and 2,963 nighttime visits. A copy of the most recent FERC Form 80 (2015) has been included as Appendix F to this PAD. None of the licensed recreation facilities appear to be utilized to the maximum capacity, with all sites under 50 percent utilization.

### 5.8.3 Existing Shoreline Buffer Zones

As a run-of-river facility, the Constantine Project is operated in a way that minimally affects the reservoir level and, therefore has limited impacts on the shoreline. The flashboards are usually in place on the spillway crest, thereby creating a normal reservoir elevation of 782.9 feet. The majority of the area surrounding the Project reservoir is agricultural lands with limited land within the Project boundary. The lower third of the reservoir is largely within pre-existing river banks and is bordered by a fringe of trees, while along the upper two-thirds of the reservoir the river often covers more extensive (up to 1,200 feet) widths of lowland areas (I&M 1988). I&M maintains a boat launch, portage, and reservoir fishing access site upstream of the Project's dam as well as a tailrace fishing area below the powerhouse.

### 5.8.4 Recreation Needs Identified in Management Plans

Michigan offers a wide range of outdoor recreation activities from the traditional (e.g., camping, hunting, fishing, snowmobiling, and off-road vehicle trails) to the new and emerging (e.g., adventure racing, disc golf, whitewater paddling). Recreation opportunities can be found in the hundreds of state-owned parks, recreation areas, forests, campgrounds, and trails, as well as the thousands of community playgrounds, parks, trails, nature preserves, and beaches, and more than 30 federally owned parks, lakeshores, heritage/historic areas, scenic trails, forests, wilderness areas, wildlife refuges, and marine sanctuaries. Some of these facilities are highly developed with modern infrastructure, and others are more natural, remote places. They are located all over the state, in rural communities as well as in the heart of some of urban centers. Every community in Michigan is within 50 miles of a State Park or Recreation Area and even closer to numerous local and regional parks or recreation spaces (MDNR 2012).

All of these resources play an important role in Michigan's expansive outdoor recreation system, both individually and collectively. They provide numerous social, health, economic, and environmental benefits and are places that continue to attract residents and out-of-state visitors alike (MDNR 2012).

Michigan's Statewide Comprehensive Outdoor Recreation Plan (SCORP) is a five-year strategic plan that shapes investment by the state and local communities in priority outdoor recreation infrastructure and programming. The Plan is designed to evaluate ongoing and emerging outdoor recreation trends, needs, and issues, and establish priority strategies for achieving outdoor recreation goals. The state and its local outdoor recreation partners utilize the SCORP as an ongoing framework and action plan for guiding their outdoor recreation management and policy decisions (MDNR 2012).

In developing the 2013–2017 SCORP update, the MDNR undertook a variety of efforts to engage the public, recreation providers, and other outdoor recreation stakeholders in identifying key recreational assets, priorities, and strategies for the coming five years. These stakeholders provided significant direction on how the state and local communities could better collaborate to approach management of Michigan's entire system of parks and outdoor recreation spaces, and many of these stakeholders will be active partners in implementing the objectives and strategies identified in the SCORP (MDNR 2012).

Outdoor recreation continues to be an important and popular activity for residents of Michigan. Public Sector Consultants conducted a public opinion survey for the 2013-2017 SCORP and found the following:

- Nearly 84 percent of Michigan residents feel that outdoor recreation is very important or moderately important to their household.
- More than three-quarters of respondents are *satisfied* or *very satisfied* with the amount and quality (around 79 and 77 percent, respectively) of outdoor recreation in Michigan.
- Walking outdoors, including dog walking, was identified by 21 percent of users as the most important outdoor activity to them.
- Over 33 percent of those who selected camping and 35 percent of those who selected hunting or trapping as their most important activity are willing to drive more than 6 hours, on average, to participate.
- Almost two-thirds (65 percent) of Michigan outdoor recreation users went outside 51 or more days in the year for outdoor recreation of any type (including dog walking), with about half doing so for more than 100 days. This compares to only 48 percent of adults aged 25 and older at the national level (although dog walking was not included as an outdoor recreation activity) (Outdoor Foundation 2012).
- Over 75 percent of respondents feel that the children in their household participate as much as or more in outdoor recreation than they did as a child.

- 33 percent of all respondents said their participation in outdoor recreation has increased in the last five years.

Table 5.8-1 shows the top ten outdoor recreation activities in Michigan identified by survey participants (Public Sector Consultants 2012).

**Table 5.8-1**
**Top 10 Outdoor Recreation Activities**

| Rank | Type of Activity | Percentage Participating |
|---|---|---|
| 1 | Biking, all types, combined | 25 |
| 2 | Camping | 24 |
| 3 | Fishing | 23 |
| 4 | Walking outdoors, including dog walking | 21 |
| 5 | Hiking, all types, combined | 20 |
| 6 | Play outdoor games/sports (soccer, basketball, baseball, etc.) | 17 |
| 7 | Hunting or trapping | 15 |
| 8 | Swimming, all types, combined | 13 |
| 9 | Boating | 11 |
| 10 | Visit playgrounds | 10 |

Source: MDNR 2012.

### 5.8.5 Licensee's Shoreline Permitting Policies

The Project's reservoir is owned and operated by I&M. I&M maintains a boat launch, portage, and reservoir fishing access upstream of the dam that provides access to the Project's reservoir. Approximately 2.5 percent of the Project's reservoir is available for public use. There is no shoreline management plan or policy with regard to permitting of piers, docks, or other shoreline facilities.

### 5.8.6 Specially Designated Recreation Areas

#### *5.8.6.1 Wild, Scenic, and Recreational Rivers*

No portion of the Project has been designated under the National Wild and Scenic Rivers System.

#### *5.8.6.2 Nationwide Rivers Inventory*

Approximately 210 miles of the St. Joseph River has been listed by the National Park Service (NPS) under the Nationwide Rivers Inventory (NRI). Sections from the mouth to Berrien Springs Dam

(25 miles) and Berrien Springs Dam to the dam at Jonesville (185 miles) were listed in 1982 and proposed for study for inclusion in the State Natural Rivers System. The Outstandingly Remarkable Value identified by the NPS for this section of the river is recreation (NPS 2009).

#### *5.8.6.3 Scenic Byways*

The Project is not located in close proximity to a National Scenic Byway.

#### *5.8.6.4 National Trails System and Wilderness Areas*

No portion of the Project has been designated as wilderness area, recommended for such designation, or designated as a wilderness study area under the Federal Wilderness Act.

### 5.8.7 Regionally or Nationally Significant Recreation Areas

The Fabius State Game Area is located approximately four and a half miles upstream of the Constantine Project. The Fabius State Game Area is managed by the MDNR. This facility is used primarily for hunting as full access to the property and the St. Joseph River is limited due to terrain and foliage impediments.

### 5.8.8 Recreational Attractions in the Vicinity of the Project

*Additional I&M-Owned Recreational Facilities at Other Projects*

The Mottville Hydroelectric Project, which is located approximately seven river miles downstream of the Constantine Project, provides a tailwater fishing platform just downstream of the powerhouse on the western shore of the St. Joseph River and launching, picnic and fishing facilities on the eastern shore. Mill Creek Park, within the reservoir area, provides additional recreation opportunities.

*Community Parks*

There are several community parks in the vicinity of the Project, including Shelby Park and Riverview Park. Shelby Park is a one-acre park located east of the St. Joseph River with an open space with benches and picnic tables (Michigan Department of Transportation [MDOT] 2008). Riverview Park is also located on the east side of the river within the Village of Constantine. Facilities at Riverview Park include a boat launch, fishing platform, boardwalk, playground, and benches.

The Wahbememe Memorial Park is located in White Pigeon, Michigan, within five miles of the Project. The park is owned and operated by the St. Joseph County Parks Commission. The park is listed on the National Register of Historic Places and is a monument to Chief White Pigeon, who is buried at the site. A monument provided by the Alba Columbia Club in 1909 is located on the site. The park is

maintained by the neighboring Welders Supplies and Gas Inc., under a 1986 agreement with the St. Joseph County Parks Commission. In addition to the Wahbememe Historical Monument, the park features a small grassy area as well as a sitting area. (MDOT 2008).

**Photo 5.8-7**
**Shelby Park on the East Side of the River Directly Across from Powerhouse**

**Photo 5.8-8**
**Riverview Park Picnic Area and Boat Launch on the East Side of the River**

**Photo 5.8-9**
**Riverview Park Playground on East Side of the River**

*U.S. Title Series Annual Boat Races*

The U.S. Title Series was founded in 1982 and is recognized as the premier professional outboard racing series in the United States. The U.S. Title Series' guiding vision is to establish a class of outboard racing competitions between the best professional outboard racing teams that boat racing has to offer; promote the sport of powerboat racing by using any and all means available; and develop a series of outboard racing competitions across the country, putting the sport on a national level as any other professional sport (U.S. Title Series undated).

The U.S. Title Series Championship Racing Association hosts annual hydroplane and runabout boat races upstream of the Constantine powerhouse on the Constantine reservoir. The event consists of a 2-3 day program generally with testing and practice laps on Friday and professional racing on Saturday and Sunday. The racing program averages a 3-4 hour time frame each day (U.S. Title Series undated).

*Other Recreational Opportunities*

The American Legion maintains a boat launch upstream of the Constantine Dam. This site is a popular place for members to launch boats on the Project reservoir, especially during the hydroplane and runabout boat races that are held by the U.S. Title Series Championship Racing Association annually at Constantine American Legion Post 223. The Constantine Project typically experiences the highest peak amenity use during this event (I&M 2015).

### 5.8.9 Non-Recreational Land Use and Management

Land use within the Project area is primarily agricultural, with scattered single-family homes, multi-family homes, community facilities, and farmsteads in or surrounding the Village of Constantine. Agriculture is the largest land use in St. Joseph County and produces over $94 million dollars of product, including seed corn, snap beans, potatoes, and pickles. Of the 231,000 acres of agricultural land, 44 percent is irrigated, amounting to 23 percent of all irrigated land in Michigan. More than half of the cropland is dedicated to corn production, predominately seed corn (St. Joseph County 2007).

## 5.9 Aesthetic Resources

The Constantine Project is located on the west bank of the St. Joseph River in the Village of Constantine, Michigan. The Project consists of a concrete gravity overflow spillway dam, powerhouse, concrete headgate structure containing seven wooden gates, transmission line, and appurtenant facilities (See Section 4).

The 525-acre Project reservoir and the 1,600-foot-long reach of the river between the Project dam and powerhouse visually dominate the area landscape and are the landscape's principle aesthetic

features. The Project's powerhouse, substation, and storage building are located next to the U.S. Route 131 bridge over the St. Joseph River in the Village of Constantine. These facilities are also fully visible from two village parks, one located immediately adjacent to the complex and the other situated directly across the river from the complex. The Project dam and headgate structure, both located about 1,300 feet upstream from the powerhouse, and a connecting headrace canal are concealed from view from these vantage points by the grass-covered embankments that line both sides of the canal and by the woodlands that surround the Project site area (FERC 1993a). The Constantine Project was constructed in 1873 and has been part of the landscape in the community for more than a century.

Article 412 of the current license for the Project required the removal of an old storage building located next to the powerhouse and U.S. Route 131 to improve the quality of the visual resources at the Project. Per license article 412 and the FERC-approved building removal plan, I&M removed the old storage building and landscaped the area to include trees, shrubs, and grass areas to screen the switchyard from the view of passing motorists on U.S. Route 131. Additionally, a fence that originally aligned with the right-of-way along Route 131 was removed and a new fence was installed to separate the powerhouse entrance and switchyard from the publicly accessible areas.

**Photo 5.9-1**
**View of Powerhouse from Riverview Park on East Side of River**

## 5.10 Cultural Resources

In considering a new license for the Project, FERC has the lead responsibility for compliance with applicable federal laws, regulations, and policies pertaining to historic properties, including the

National Historic Preservation Act of 1966 (NHPA), as amended.[1] Section 106 of the NHPA (Section 106)[2] requires federal agencies to take into account the effects of their undertakings on historic properties and to afford the Advisory Council on Historic Preservation a reasonable opportunity to comment.

The Section 106 process (defined at 36 CFR Part 800) is intended to accommodate historic preservation concerns with the needs of federal undertakings through a process of consultation with agency officials, the SHPO, federally recognized Indian Tribes, and other parties with a potential interest in an undertaking's effects on historic properties. The goals of the Section 106 process are to:

- Identify historic properties that may be affected (directly and/or indirectly) by an undertaking;
- Assess the effects of an undertaking on historic properties; and
- Seek ways to avoid, minimize, or mitigate adverse effects on historic properties through consultation.

Historic properties are defined in 36 CFR Part 800 as any pre-contact or historic period district, site, building, structure, or individual object listed in or eligible for inclusion in the National Register of Historic Places (NRHP). This term includes artifacts, records, and remains that are related to and located within historic properties, as well as properties of traditional religious and cultural importance (often referred to as "traditional cultural properties" or TCPs) that meet the NRHP criteria.

The Secretary of the Interior has established the criteria for evaluating properties for inclusion in the National Register (36 CFR Part 60). In accordance with the criteria, properties are eligible if they are significant in American history, architecture, archaeology, engineering, or culture. The quality of significance is present in historic properties that possess integrity of location, design, setting, materials, workmanship, feeling, and association, and:

- Are associated with events that have made a significant contribution to the broad patterns of our history; or
- Are associated with the lives of persons significant in our history; or

[1] 54 USC §300101 et seq.
[2] 54 USC §306108

- Embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant or distinguishable entity whose components may lack individual distinction; or
- Have yielded or may be likely to yield information important in prehistory or history.

In anticipation of Project relicensing, HDR conducted a review of existing archaeological study reports and NRHP records to identify previously reported archaeological and historic resources within the Project's vicinity.

### 5.10.1 Area of Potential Effects

An area of potential effect (APE) is defined as the geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist. The APE is influenced by the scale and nature of an undertaking and may be different for different kinds of effects caused by the undertaking. The Commission has not yet defined an APE for the Project. In the context of the relicensing process, FERC generally defines the APE as follows: "The APE includes all lands within the Project boundary. The APE also includes any lands outside the Project boundary where cultural resources may be affected by Project-related activities that are conducted in accordance with the FERC license."

Because the Project boundary encompasses all lands that are necessary for Project purposes, all Project-related operations, potential enhancement measures, and routine maintenance activities associated with the implementation of a license issued by the Commission are expected to take place within the Project boundary. The proposed APE is consistent with the potential scope of Project effects and the manner in which the Commission has defined the APEs for other hydroelectric relicensings.

### 5.10.2 Archaeological Resources

In 1989, I&M conducted a Phase I Archaeological Investigation. Background research was queried at the State Historic Preservation Office and the Michigan State Library in Lansing, Michigan. Examination of cultural resource management reports indicated that limited archaeological investigations have been conducted in the area; which may account for the absence of recorded sites in the Project area. A preliminary study of the Project area conducted in 1989 by Louis Berger and Associates Inc. suggested a moderate to high potential of prehistoric archaeological resources, since the Project parcels are near the St. Joseph River. In contrast, the potential for historic archaeological sites was evaluated as moderate to low, based on the distribution of known historic sites in this area (I&M 1990).

Archaeological fieldwork was conducted in the three parcels of the Constantine Project, which included visual inspection, pedestrian survey, and subsurface testing. Fieldwork was completed in May 1990. The archaeological investigation concluded that there were no historic or prehistoric archaeological sites recorded for the Project site.

The visual inspection conducted in this area at the inception of fieldwork revealed that the majority of the area was intensively disturbed, including the station yard and the west bank of the canal. These areas were evaluated as having limited potential for intact cultural deposits, and the archaeological fieldwork of these areas did not extend beyond the initial visual inspection.

There are no proposed modifications to the physical plant or major operational changes for the Project at this time. Therefore, relicensing activities are not expected to have any effect on any archaeological resources in the Project area.

### 5.10.3 Historic Architectural Resources

No properties listed on or eligible for listing on the NRHP have been identified in the Project boundary. The NRHP-listed Constantine Historic Commercial District is located approximately 400 feet downstream from the Project along river right (across from the powerhouse) and includes 28 contributing commercial and residential structures representing examples of mid-nineteenth to early-twentieth century Greek Revival and Italianate styles. The Constantine Historic Commercial District was listed in the NRHP in 1985. The Art Gallery Building located at 156 Street Washington Street is a contributing resource to the Constantine Historic Commercial District and was also individually listed on the NRHP in 1980.

In addition to the Constantine Historic Commercial District, the Gov. John S. Barry House located at 280 North Washington Street in Constantine was also individually listed in the NRHP in 1972. The house was built by John S. Barry, Michigan's fourth governor, in a vernacular style and is currently operated as a museum. The John S. Barry House is located approximately 800 feet southwest from the Constantine Dam.

### 5.10.4 Existing Discovery Measures

Article 410 of the existing license for the Project includes measures to protect and manage historic properties:

> Article 410. The Licensee, before starting any land-clearing or land-disturbing activities, other than those specifically authorized in this license, shall consult with the State Historic Preservation Officer (SHPO).

If the Licensee discovers previously unidentified archeological or historic properties while constructing or developing project works or other facilities at the project, the Licensee shall stop all land-clearing and land-disturbing activities in the vicinity of the properties and consult with the SHPO.

As discussed above, I&M conducted a Phase I Archaeological Investigation of the Constantine Project in 1990. The investigation determined that there were no historic or prehistoric archaeological sites in the Project area.

### 5.10.5 Identification of Indian Tribes and Traditional Cultural Properties

By letter dated October 12, 2017, the Commission invited the Lac du Flambeau Band of Lake Superior Chippewa Indians, Menominee Indian Tribe of Wisconsin, Citizen Potawatomi Nation, Forest County Potawatomi Community, Hannahville Indian Community, Prairie Band Potawatomi Nation, Miami Tribe of Oklahoma, Pokagon Band of Potawatomi Indians, Little Traverse Bay Bands of Odawa Indians, and Sault Ste. Marie Tribe of Chippewa Indians to participate in the relicensing process for the Project.

By letters dated October 26, 2017, the Forest County Potawatomi Community and the Miami Tribe of Oklahoma filed comments with regards to the Constantine Project relicensing[3]. Following their filing on October 26, the Tribal Historic Preservation Officer (THPO) for the Forest County Potawatomi Community reached out to FERC by email on December 28, 2017 expressing an interest in the Project, specifically cultural resources surveys and SHPO comments. FERC contacted the THPO for the Prairie Band of Potawatomi Nation on January 22, 2018 and the THPO requested additional copies of the initial consultation letter and a map of the Project location. The Citizen Potawatomi Nation, the Miami Tribe of Oklahoma, and the Little Traverse Bay Band of Odawa Indians stated that they have no interest in the Project. To date, no Indian Tribe has notified I&M about properties of traditional religious or cultural significance within or adjacent to the Project's boundary, and the Licensee is not aware of any TCPs within the vicinity of the Project.

## 5.11 Socioeconomic Resources

The Project is located within St. Joseph County, which is 1 of 83 counties in Michigan. The 2010 census reported that approximately 61,295 people reside in St. Joseph County, which encompasses approximately 500 $mi^2$ with a population density of 122.4 persons per square mile. The

[3] The Forest County Potawatomi Community's comments were filed with the Commission as "Privileged;" accordingly, I&M has not been able to review these comments. The Miami Tribe of Oklahoma indicated in their comments that the Tribe does not object to the relicensing of the Project and is not aware of any cultural or historic sites in the Project area.

estimated 2016 population residing in St. Joseph County is 60,853, which is a 0.7-percent decrease over the seven-year period between 2010 and 2016 (U.S. Census Bureau [USCB] undated). The 2010 census reported that approximately 2,076 people reside within the Village of Constantine (CensusViewer 2012).

From 2011-2015 the median household income for St. Joseph County was $44,449 which compares to the statewide median household income of $53,783 for the same time period (USCB undated). The annual unemployment rate for St. Joseph County in August 2017 was 4.4 percent, compared to 4.6 percent unemployment in Michigan (Bureau of Labor Statistics [BLS] 2017b), and a national unemployment rate of 4.2 percent as of September 2017 (BLS 2017a).

From 2014 to 2015, employment in St. Joseph County grew at a rate of 4.15 percent, from 25,283 employees to 26,332 employees. St. Joseph County has approximately 1,154 businesses that employ over 19,000 people. The most common job groups are Production & Transportation (32.1%), Management, Business, Science, and Arts (23.9%), and Sales and Office (19.3%). The most common employment sectors for those who live in St. Joseph County, are Manufacturing (36.4%), Healthcare and Social Assistance (17.1%), and Retail trade (8.7%) (DataUSA 2015).

Section 6

# Preliminary Issues, Project Effects, and Potential Studies List

## 6.1 Consultation to Date

To date, I&M has performed the following consultation activities.

- PAD information questionnaires were distributed to 50 potential Project stakeholders.
- MDEQ was consulted regarding the applicability of the State's Coastal Zone Policy to the Project.
- USFWS and MNFI were contacted regarding federal- or state-listed threatened or endangered species, critical habitat, sensitive natural communities, and species of special concern within the Project's vicinity.

Documentation associated with the consultation conducted by I&M in support of the PAD is provided in Appendix B.

## 6.2 Project Effects, Studies Needed, and Summary of Relevant Issues for the Project Relicensing

### 6.2.1 Geology and Soils

#### *6.2.1.1 Potential Issues*

Shoreline erosion is a common concern at hydroelectric project reservoirs. I&M believes that the existing run-of-river mode of Project operation, in combination with the vegetated nature of the shorelines in the Project boundary provide protection against bank erosion. The continued operation and maintenance of the run-of-river Project associated with power generation is not anticipated to have additional cumulative impacts to the geologic or soil resources. No potential issues related to geology have been raised.

#### *6.2.1.2 Proposed Studies*

While the run-of-river mode of Project operation provides protection against erosion, I&M recognizes that aspects of the Project's geological setting may contribute to the potential for shoreline erosion. To provide updated information about existing Project conditions, as well as to evaluate the need for any erosion control measures at specific areas of concern, I&M proposes to conduct a Shoreline Stability Assessment at the Project. I&M anticipates that this assessment will consist of a survey of the Project's

reservoir to locate any sites of erosion or shoreline instability. I&M proposes to inventory, map, and photograph any such areas, using a scoring or ranking system (e.g., Bank Erosion Hazard Index) to try to identify areas that have the potential to erode at unnaturally high rates and to prioritize any areas where remedial action may be needed.

#### *6.2.1.3 Potential Protection, Mitigation, or Enhancement (PM&E) Measures*

No protection, mitigation, or enhancement (PM&E) measures are proposed at this time related to geology and soils.

### 6.2.2 Water Resources

#### *6.2.2.1 Potential Issues*

Existing uses of Project waters include municipal and industrial water supply, recreation, and hydroelectric generation. DO and water temperature data were collected at the Project prior to operation in the summer of 1990. Although data met state standards, annual water quality monitoring was required per Article 401 of the existing license in 1993. DO and water temperature data were collected immediately upstream and downstream of the Project in 1995 and 1996. Similarly, these data also met state standards. The lowest DO concentration recorded during monitoring efforts was 6.4 mg/L and concentrations appeared to generally increase by approximately 1.0 mg/L downstream of the Project. Water temperatures at the Project were generally well below state maximum criteria. The three years of water quality data were well within the state water quality standards; therefore, per FERC Order dated April 29, 1997, additional water quality monitoring was not required.

Due to the existing and proposed run-of-river operations and the short retention time of the reservoir, the Project has little to no effect on water quality in the St. Joseph River. Project operation has the potential to locally alter water quality in the bypass reach during periods of minimum flow and high air temperatures.

The St. Joseph River has been identified by USEPA as the biggest contributor of atrazine to Lake Michigan and a significant contributor of sediments and toxic substances such as mercury and PCBs (Friends of the St. Joseph River Association 2005). Sewage overflows and agricultural practices in the river basin contribute to contamination of sediments from pesticides, herbicides, and fertilizers. It is expected that continued operation of the Project will have no effect on sediment contamination in the St. Joseph River.

#### *6.2.2.2 Proposed Studies*

I&M will coordinate with the MDEQ to obtain a §401 Water Quality Certification in support of relicensing. At this time, I&M proposes to conduct a temperature and DO study from May through October (time at which any potential thermal or DO excursion would occur) at the Project to confirm water quality standards and designated uses are being attained. Locations of monitoring equipment will be established through further consultation with MDEQ and other stakeholders. The scope of this study would be limited to the FERC-approved Project boundary.

To characterize sediments in the Project's reservoir, I&M will conduct sediment contaminant sampling at locations in the reservoir identified in consultation with the MDEQ and other stakeholders. Sediment samples will be analyzed at a qualified laboratory facility to determine the types and concentration of any contaminants in the samples. I&M anticipates that up to six samples will be collected and analyzed (approximately one sample per mile from the six-mile-long reservoir).

#### *6.2.2.3 Potential PM&E Measure*

No PM&E measures are proposed at this time related to water resources.

### 6.2.3 Fish and Aquatic Resources

#### *6.2.3.1 Potential Issues*

Aquatic resources (freshwater fish, mussels, and macroinvertebrates) within the Project area are potentially affected by Project operations and maintenance. Potential fishery resource concerns at the Project primarily deal with bypass flows, entrainment and impingement, and angling opportunities. Fish passage facilities are not currently available at the downstream Mottville, Elkhart, or Twin Branch Projects. Channel catfish, smallmouth bass, and walleye are the most common species found at the Project. There have been no federally listed fish or aquatic species identified to occur in the vicinity of the Project.

In past studies, several species of mussels have been documented upstream and downstream of the Project. According to the MNFI, the state-threatened purple wartyback mussel has been known to occur in the St. Joseph River, near the Project site. The purple wartyback mussel inhabits medium to large rivers that have gravel or mixed sand and gravel substrates. Suitable habitat for fish host species must be present for purple wartyback reproduction to be successful. Known hosts for the purple wartyback are the yellow bullhead and channel catfish, but there may be others. It is expected that continued operation of the Project will have very little to no adverse effects on current distributions of RTE aquatic species.

#### *6.2.3.2 Proposed Studies*

I&M proposes to conduct late spring/early summer and late summer/early fall fish species composition surveys of the reservoir and bypass reach to collect information on the current fish community present in the Project area. I&M will consult with agencies and other stakeholders to determine appropriate sampling methods and locations. The scope of this study would be limited to the FERC-approved Project boundary. As a component of the fisheries surveys, I&M will collect fish tissue samples during one survey event in the fall. Tissue samples will be analyzed for mercury and PCB concentrations at a qualified laboratory facility.

In addition to baseline fisheries surveys, I&M proposes to conduct a mussel assessment to identify any mussel populations that may be present within the Project area. I&M anticipates that a summer mussel assessment will be conducted at two location downstream from the Constantine dam and at three locations in the Project's reservoir, with specific locations to be identified in consultation with resource agencies and stakeholders.

Based on the detailed entrainment study conducted for the previous relicensing and no significant changes in Project equipment or operations since that time, I&M does not propose to conduct a desktop entrainment study at this time, but will compare the newly collected fisheries data with that previously assessed to confirm species compositions have not changed any assumptions.

#### *6.2.3.3 Potential PM&E Measures*

No PM&E measures beyond those already in place at the Project are proposed at this time related to fish and aquatic resources.

### 6.2.4 Wildlife and Botanical Resources (Including Related RTE Resources)

#### *6.2.4.1 Potential Issues*

The Project has been in operation for over 100 years, and the existing terrestrial environment has developed in response to the current and proposed Project operations. There are no anticipated significant cumulative impacts to wildlife or botanical resources associated with the Project. The continued operation and maintenance of the Project associated with power generation, including current recreational sites is not anticipated to have significant cumulative impacts to terrestrial wildlife or botanical resources.

Article 409 of the current FERC license requires I&M to develop a wildlife management and land use plan. Under the approved Wildlife Management Plan, I&M is required to install and monitor avian

nesting structures within the Constantine Project boundary. A total of eight nesting structures were installed within the Project boundary, including four wood duck boxes and four mallard hen houses.

I&M has continued to maintain and monitor these nesting structures in accordance with the terms of the existing FERC license. None of the eight nesting structures present within the Project boundary were occupied at any time during the 2016 monitoring period, and no nesting structures were occupied in 2015 (GLEC 2015).

One of the eight nesting structures present within the Project boundary was occupied during the 2017 monitoring period, which is more than what was observed in both 2015 and 2016 (GLEC 2016). Many of the nesting structures also may provide shelter for non-target species, although occupancy by target species was not observed in 2017. Given this recent success and the fact that several structures were moved within the last year, GLEC recommended that I&M should continue to maintain nesting structures within the Project boundary.

GLEC also recommended that if poor nesting success is observed in 2018 that I&M should consider reducing the number of structures that are maintained within the Project boundary or moving structures to alternative locations to maximize the probability of nesting success of target species (GLEC 2017a).

The federally endangered Indiana bat and the federally threatened northern long-eared bat may occur within the Project's vicinity. These species could potentially use the Project area for foraging corridors adjacent to the St. Joseph River during the non-hibernating period. No impacts to foraging bats are anticipated from continued Project operation.

I&M maintained and monitored artificial Indiana bat structures for a total of five years (1994-1999) at the Project in accordance with the approved Wildlife Management Plan under Article 409 of the current license. During the monitoring period, there was no evidence that Indiana bat or any other species of bat had used the artificial structures. On July 14, 2000, FERC issued an order amending the Wildlife Management Plan to remove the requirement to maintain the artificial nesting structures for the Indiana bat.

#### *6.2.4.2 Proposed Studies*

No studies are being proposed. Based on the low nesting success rates reported during previous monitoring periods, I&M will consult with resource agencies regarding the need to maintain and monitor nesting structures.

#### *6.2.4.3 Potential PM&E Measure*

No PM&E measures are being proposed at this time related to wildlife and botanical resources and terrestrial RTE species.

### 6.2.5 Wetlands and Riparian Habitat

#### *6.2.5.1 Potential Issues*

The Project does not regulate river flows. It is not anticipated that wetland or riparian habitats, beyond those already impacted as a result of the original Project construction, will be affected by the Project's continued operation and maintenance.

Invasive species occurring within the Project boundary are purple loosestrife and Eurasian watermilfoil. Article 409 of the license requires I&M to conduct surveys for purple loosestrife and Eurasian watermilfoil within the Project's reservoir. The surveys are to be conducted annually between late July and early August, the time during which Eurasian watermilfoil is at or near peak growth and purple loosestrife is in bloom.

Based on the annual purple loosestrife surveys, it appears that in general the light and heavy infestations within the Project area have increased over time, with moderate infestations remaining relatively stable. Eurasian watermilfoil within the Project area has generally increased since 1998. However, since 2012 the numbers of moderate and heavy infestations of Eurasian watermilfoil have generally decreased.

#### *6.2.5.2 Proposed Studies*

To characterize wetland and riparian habitat within the Project boundary, I&M will conduct a desktop review of USFWS NWI maps, aerial photographs, and information available from the MDEQ regarding mapped wetlands. Following this desktop review, I&M will field-verify mapped wetlands within the Project boundary.

Due to the ongoing monitoring of invasive species under Article 409 of the existing license and no proposed activities or Project operations that would impact existing resources, no additional studies are being proposed with respect to invasive species.

#### *6.2.5.3 Potential PM&E Measure*

I&M proposes to continue monitoring purple loosestrife and Eurasian watermilfoil in the Project area and evaluating options to control the potential spread of invasive species throughout the Project.

### 6.2.6 Recreation and Land Use

#### *6.2.6.1 Potential Issues*

The Project provides several FERC-approved recreational facilities located upstream and downstream of the Constantine Dam, which include a boat launch, a portage, reservoir fishing access, tailwater fishing access, ADA accessible portable toilets, and picnic area. No potential issues related to recreation and land use have been raised. In addition to the recreational opportunities within the Project boundary, there are various recreational opportunities adjacent to the Project and within the Project vicinity. No issues have been identified relevant to recreation or land use issues.

#### *6.2.6.2 Proposed Studies*

Although several recreational opportunities exist at the Project, I&M intends to evaluate the need for any improvements to the existing recreational facilities. I&M plans to conduct a recreational assessment of the Project to assess recreational opportunities and potential improvements. The scope of this study would be limited to within the FERC-approved Project boundary.

#### *6.2.6.3 Potential PM&E Measure*

I&M may propose potential recreational PM&E measures after conducting a recreational assessment of the Project and further consultation with stakeholders.

### 6.2.7 Aesthetic Resources

#### *6.2.7.1 Potential Issues*

Per Article 412 of the current license and the FERC-approved building removal plan for the Project, I&M has removed an old storage building located next to the powerhouse and U.S. Route 131 to improve the quality of the visual resources at the Project. The area has also been landscaped to improve the visual quality of the Project area. No additional issues have been identified relevant to aesthetic resources.

#### *6.2.7.2 Proposed Studies*

No studies are being proposed.

#### *6.2.7.3 Potential PM&E Measure*

No PM&E measures beyond those already in place at the Project are proposed at this time related to aesthetic resources.

### 6.2.8 Cultural and Tribal Resources

#### *6.2.8.1 Potential Issues*

The Project will undergo cultural resources consultation under the Section 106 process. The Section 106 process (defined at 36 CFR Part 800) is intended to accommodate historic preservation concerns with the needs of federal undertakings through a process of consultation with agency officials, the SHPO, federally recognized Indian Tribes, and other parties with a potential interest in an undertaking's effects on historic properties. The Phase I Archaeological Investigation conducted by I&M in 1990 concluded that there were no historic or prehistoric archaeological sites recorded at the Project.

The Licensee believes that the potential for continued operation of Project to impact historic and cultural properties is limited. However, if present, archaeological resources may be impacted as a result from ground-disturbing associated with maintenance activities over the term of the license. Currently this potential impact to cultural and archaeological resources are managed in accordance with Article 410 of the existing license for the Project that requires consultation with SHPO prior to land-clearing or land disturbance and in the event of discovery of any previously unidentified archeological or historic properties.

#### *6.2.8.2 Proposed Studies*

I&M will assess the potential for Project effects (if any) on identified historic and archeological resources and the need for any additional archaeological site file search, evaluation of Project facilities, and/or Phase I investigation of the Project's APE through consultation with the Michigan SHPO and federally recognized Indian Tribes.

#### *6.2.8.3 Potential PM&E Measure*

No PM&E measures beyond those already in place at the Project are proposed at this time related to cultural and tribal resources. In the event that resources are identified within the APE that may potentially be impacted by Project operation during the term of the new license, I&M would expect to develop a Historic Properties Management Plan (HPMP) to provide for the protection and management of historic properties within the Project's APE throughout the term of the new license. The HPMP will be prepared in accordance with FERC and the Advisory Council on Historic Preservation's 2002 *Guidelines for the Development of Historic Properties Management Plans for FERC Hydroelectric Projects* and will provide appropriate management measures for historic and archaeological resources within the APE.

### 6.2.9 Socioeconomic Resources

#### *6.2.9.1 Potential Issues*

No issues have been identified relevant to socioeconomic resources.

#### *6.2.9.2 Proposed Studies*

No studies are being proposed. I&M expects that the detailed information to be included in the license application exhibits will provide sufficient data for FERC's analysis of any socioeconomic impacts of relicensing the Project.

#### *6.2.9.3 Potential PM&E Measure*

No PM&E measures are being proposed related to socioeconomic resources.

## 6.3 Potential Studies or Information Needs List

I&M respectfully requests that resource agencies, Indian Tribes, and other licensing parties that may request a study consider FERC's study request criteria set forth in 18 CFR §5.9(b) and outlined below:

- Describe the goals and objectives of each study proposal and the information to be obtained;
- If applicable, explain the relevant resource management goals of the agencies or Indian Tribes with jurisdiction over the resource to be studied;
- If the requester is not a resource agency, explain any relevant public interest considerations in regard to the proposed study;
- Describe existing information concerning the subject of the study proposal and the need for additional information;
- Explain any nexus between Project operations and effects (direct, indirect, and/or cumulative) on the resource to be studied and how the study results would inform the development of license requirements;
- Explain how any proposed study methodology (including any preferred data collection and analysis techniques, or objectively quantified information, and a schedule including appropriate field season(s) and the duration) is consistent with generally accepted practice in the scientific community or, as appropriate, considers relevant tribal values and knowledge; and
- Describe considerations of the level of effort and cost, as applicable, and why any proposed alternative studies would not be sufficient to meet the stated information needs.

## Section 7
# Comprehensive Plans

In accordance with 18 CFR §5.6(d)(4)(III and IV), HDR, on behalf of I&M, has reviewed the July 2017 FERC List of Comprehensive Plans applicable to Michigan and adopted by FERC under Section 10(a)(2)(A) of the FPA, 16 USC §803(a)(2)(A). Of the 66 comprehensive plans relevant to Michigan, six are being considered applicable to the Project.

1. Michigan Department of Environmental Quality. 2002. Non-indigenous aquatic nuisance species, State management plan: A strategy to confront their spread in Michigan. Lansing, Michigan.

2. Michigan Department of Natural Resources. 1999. St. Joseph River assessment and appendix; St. Joseph River Management Plan. Lansing, Michigan. September 1999.

3. Michigan Department of Natural Resources. Statewide Comprehensive Outdoor Recreation Plan (SCORP): 2013-2017. 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. 2012. North American waterfowl management plan. Department of the Interior. Environment Canada.

6. U.S. Fish and Wildlife Service. 2007. Upper Mississippi River & Great Lakes Region joint venture implementation plan: A component of the North American waterfowl management plan. March 1993.

Based on a review of the six comprehensive plans, HDR, on behalf of I&M, believes that the Project, as currently operated, is consistent with each of these plans. I&M anticipates additional consultation with the relicensing parties to confirm consistency.

## Section 8
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# APPENDICES

# APPENDIX A

# PAD QUESTIONNAIRE AND DISTRIBUTION LIST

August 15, 2017

**Subject: Constantine Hydroelectric Project (FERC No. 10661)**
**Relicensing Pre-Application Document Questionnaire**

To the Attached Distribution List:

Indiana Michigan Power Company (I&M) is the Licensee and operator of the Constantine Hydroelectric Project (FERC No. 10661) (Project) located on the St. Joseph River in St. Joseph County, Michigan. The Project is licensed by the Federal Energy Regulatory Commission (FERC).

The existing FERC license for the Project expires on September 30, 2023. I&M intends to pursue a new license for the Project and is preparing the Pre-Application Document (PAD) required by FERC's relicensing process. I&M has retained HDR, Inc. (HDR) for assistance with the relicensing process, including development of the PAD.

The PAD provides FERC and other entities with existing, relevant, and reasonably available information pertaining to the Project. This information is intended to help identify items of interest and related information needs, develop study requests and study plans, and prepare documents related to analyzing the relicensing application to be prepared by I&M. To prepare the PAD, I&M will use information in its possession and information obtained from others. On behalf of I&M, HDR is currently gathering information to support preparation of the PAD. Consistent with this effort, the purpose of this letter is to:

1) Notify interested governmental agencies, local governments, non-governmental organizations, Indian tribes, and individuals of the upcoming relicensing proceeding, and

2) Request your help in identifying existing, relevant, and reasonably available information related to the existing Project environment or known impacts or benefits of the Project.

I&M's goal is to produce a final comprehensive PAD by the end of 2017 and to file the PAD with the FERC in 2018. We are asking for your help to identify additional information of which you may be aware. To facilitate the information search, we have prepared the attached Pre-Application Document Information Questionnaire (PAD Questionnaire).

hdrinc.com

440 S Church Street, Suites 900 & 1000, Charlotte, NC 28202-2075
(704) 338-6700

I&M is requesting that you provide any relevant information for the PAD. Relevant information would include site-or-region specific studies, data, reports, or management plans on any of the following resource areas:

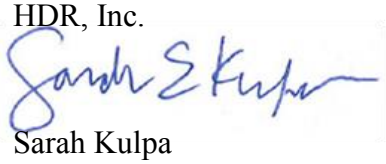
- Geology and soils
- Recreation and land use
- Water resources
- Aesthetic resources
- Fish and aquatic resources
- Cultural resources
- Wildlife and botanical resources
- Socioeconomic resources
- Wetlands, riparian, and littoral habitat
- Tribal resources
- Rare, threatened, and endangered species

To help ensure that your relevant information and resources are available for inclusion in the PAD, please fill out the attached PAD Questionnaire and return to Sarah Kulpa (of HDR) via email at sarah.kulpa@hdrinc.com or in the enclosed self-addressed, stamped envelope.

HDR intends to include relevant information in the PAD. Therefore, we respectfully request a response within 30 days of receipt of this letter. This will allow time for follow-up contacts that may be necessary. If we do not receive a response from you within 30 days, this will indicate you are not aware of any existing, relevant, and reasonably available information that describes the Project environment or known potential impacts of the Project, and that, unless you are representative of an Indian tribe or federal or state agency, you do not wish to remain on the distribution list for this relicensing process.

We want to thank you in advance for helping identify information that meets the criteria for inclusion in the PAD. We appreciate your assistance and look forward to working with you during the relicensing process. If you have any questions regarding this request or would like additional information, please contact me at sarah.kulpa@hdrinc.com or via phone at (704) 248-3620 or Jonathan Magalski who represents I&M at jmmagalski@aep.com or via phone at (614) 716-2240.

Sincerely,
HDR, Inc.



Sarah Kulpa
Project Manager

Attachment
cc: Jonathan Magalski, on behalf of I&M

DISTRIBUTION LIST
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1849 C Street, NW
Washington, DC 20240

Lindy Nelson, US Dept of the Interior,
Philadelphia Region
Custom House, Room 244
200 Chestnut Street
Philadelphia , PA 19106

Ken Westlake
US Environmental Protection Agency
77 West Jackson Boulevard (E19-J)
Chicago, IL 60604

Liz Pelloso
US Environmental Protection Agency
77 West Jackson Boulevard (E19-J)
Chicago, IL 60604

Alisa Shull
US Fish and Wildlife Service
5600 American Blvd West, Suite 990
Bloomington, MN 55437-1458

Lisa Fischer
US Fish and Wildlife Service
2651 Coolidge Road, #101
East Lansing, MI 48823

US Geological Survey
6520 Mercantile Way, Suite 5
Lansing, MI 48911-5991

US Geological Survey
1451 Green Road
Ann Arbor, MI 48105

Aaron Miller
US House of Representatives
N-993 House Office Building
PO Box 30014
Lansing, MI 48909

Debbie Stabenow
US Senate
713 Hart Senate Office Building
Washington, DC 20510-2204

Gary Peters
US Senate
Hart Senate Office Building
Washington, DC 20510

Michael Reynolds
US National Park Service
1849 C Street, NW
Washington, DC 20240

Dena Sanford, US National Park Service, c/o Agate Fossil Beds National Monument
301 River Road
Harrison, NE 69346-2743

Kyle Kruger
MI Dept of Natural Resources
Mio Field Office
191 S. Mt. Tom Road
Mio, MI 48647

Keith Creagh
Michigan Department of Natural Resources
PO Box 30028
Lansing, MI 48909

Bob Stuber
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Traverse City, MI 49684

Chris Antieau
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PO Box 30473
Lansing, MI 48909-7973

Michigan Dept of Environmental Quality
7953 Adobe Road
Kalamazoo, MI 49009-5025

Brian D. Conway
State Historic Preservation Office
735 East Michigan Avenue
PO Box 30044
Lansing, MI 48909

Michigan Department of Agriculture
525 West Allegan Street
Lansing, MI 48933

St. Joseph County
PO Box 189
Centreville, MI 49032

Gary Mathers
Village of Constantine
115 White Pigeon Street
Constantine, MI 49042

Mark R. Brown
Township of Constantine
425 Centreville Street
Constantine, MI 49042

Keith Shears
Town of Centreville
221 West Main
PO Box 399
Centreville, MI 49032

DISTRIBUTION LIST
Constantine Hydroelectric Project (FERC No. 10661)

Robert Hile
City of Sturgis
130 North Nottawa
Sturgis, MI 49091

George E. Morse
Township of Sturgis
70669 Stubey Road
Sturgis, MI 49091

Donald E. Gloy, Jr.
Township of White Pigeon
16825 Tomahawk Trail
White Pigeon, MI 49099

Tyler Royce
Village of White Pigeon
103 South Kalamazoo
PO Box 621
White Pigeon, MI 49099

Carolyn Grace
St. Joseph County Conservation District
693 E. Main Street
Centerville, MI 49032

Korie Blyveis
Cass County Conservation District
1127 East State St.
Cassopolis, MI 49031

Michigan Environmental Council
602 West Ionia Street
Lansing, MI 48933

Pokagon Band of Potawatomi Indians
58620 Sink Road
PO Box 180
Dowagiac, MI 49047

Nottawaseppi Huron Band of the Potawatomi
1485 Mno-Bmadzewen Way
Fulton, MI 49052

John Seebach
American Rivers
1104 14th St NW, Suite 1400
Washington, DC 20005

Kevin Richard Colburn
American Whitewater
PO Box 1540
Cullowhee, NC 28779

Lisa Camstra
Nature Conservancy of Michigan
101 East Grand River
Lansing, MI 48906

Michigan Citizens for Water Conservation
PO Box 1
Mecosta, MI 49332

Michigan Loon Preservation Association
10181 Sheridan Road
Millington, MI 48746

Michigan Nature Association
2310 Science Parkway, Suite 100
Okemos, MI 48864

Michigan Audubon Society
2311 Science Parkway, Suite 200
Okemos, MI 48864

Matt Meersman
Friends of the St. Joe River Association, Inc.
PO Box 1794
South Bend, IN 46634

Matt Meersman
St. Joseph River Basin Commission
227 West Jefferson Boulevard
1120 County-City Boulevard
South Bend, IN 46601

# Constantine Hydroelectric Project (FERC Project No. 10661)
# Relicensing Pre-Application Document Information Questionnaire

Indiana Michigan Power Company (I&M) is the Licensee and operator of the Constantine Hydroelectric Project (FERC No. 10661) (Project), located along the St. Joseph River in St. Joseph County, Michigan (see attached map). I&M, with assistance from HDR, Inc. (HDR), is beginning the Federal Energy Regulatory Commission (FERC) relicensing process for the Project. Accordingly, I&M is preparing a Pre-Application Document (PAD). The PAD provides FERC and other entities with existing, relevant, and reasonably available information pertaining to the Project.

This information is intended to help identify items of interest and related information needs, develop study requests and study plans, and prepare documents related to analyzing the relicensing application to be prepared by I&M. To prepare the PAD, I&M will use information in its possession and information obtained from others. This PAD Questionnaire will be used by I&M to help identify sources of existing, relevant, and reasonably available information that is not currently in I&M's possession. Comments and/or questions regarding this request may be sent to Sarah Kulpa with HDR via email at sarah.kulpa@hdrinc.com or via phone at (704) 248-3620, or to Jonathan Magalski who represents I&M at jmmagalski@aep.com or via phone at (614) 716-2240.

Please return this questionnaire in the enclosed, self-addressed, stamped envelope within 30 days of receipt to allow for any follow-up contact by I&M's or HDR's representative that may be needed. Not responding within 30 days indicates that you are not aware of any existing, relevant, and reasonably available information that describes the existing Project environment or known potential impacts of the Project.

I&M and HDR respectfully request the following information:

1. Information about person completing the questionnaire:

| | |
|---|---|
| Name & Title | |
| Organization | |
| Address | |
| Phone | |
| Email Address | |

2. Do you or your organization know of existing, relevant and reasonably available information that describes the existing Constantine Hydroelectric Project's environment (i.e., information regarding the St. Joseph River in or close to the Constantine Hydroelectric Project)?

___ Yes (*If yes, please complete 2a through 2e)* __ No (*If no, go to 3*)

a. If yes, please circle the specific resource area(s) that the information relates to:

- Geology and soils
- Water resources
- Fish and aquatic resources
- Wildlife and botanical resources
- Wetlands, riparian, and littoral habitat
- Rare, threatened & endangered species
- Recreation and land use
- Aesthetic resources
- Cultural resources
- Socio-economic resources
- Tribal resources
- Other resource information

b. Please briefly describe the information referenced above or list available documents *(additional information may be provided on page 4 of this questionnaire).*

c. Where can I&M obtain this information?

d. Please indicate whether there is a specific representative you wish to designate for a potential follow-up contact by I&M's or HDR's representative for the resource area(s) checked above *(additional information may be provided on page 4 of this questionnaire).*

**Representative Contact Information**

| | |
|---|---|
| Name | |
| Address | |
| Phone | |
| Email Address | |

| | |
|---|---|
| Name | |
| Address | |
| Phone | |
| Email Address | |

e. Based on the specific resources listed in 2a, are you aware of any specific issues or improvements pertaining to the identified resource area(s)? *(Additional information may be provided on page 4 of this questionnaire.)*

___ Yes *(please list specific issues below)* ___ No

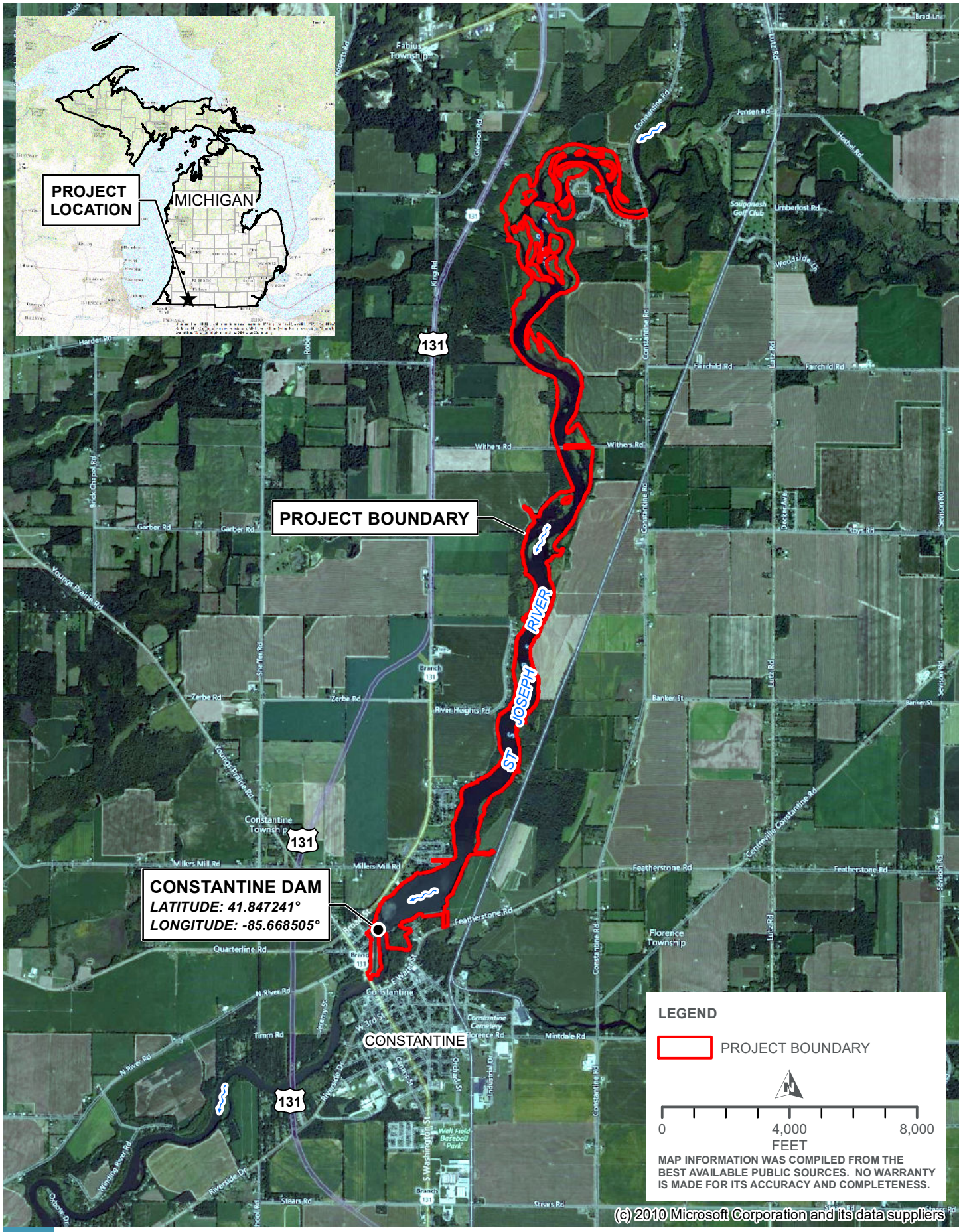
| Resource Area | Specific Issue |
|---|---|
| | |
| | |
| | |
| | |
| | |

3. Do you or your organization plan to participate in the Constantine Hydroelectric Project relicensing proceeding? ___ Yes ___ No

4. We are interested in your comments. If you have comments and/or questions regarding the Constantine Hydroelectric Project or the relicensing process, please provide below. In addition, this questionnaire has been sent to the people/organizations shown on the attached distribution list; please let us know if there is anyone else you believe should receive this questionnaire that is not included on the attached distribution list.

*(Comments and/or questions may be sent via email to: sarah.kulpa@hdrinc.com or jmmagalski@aep.com)*

As noted above, please return this questionnaire in the enclosed, self-addressed, stamped envelope within 30 days of receipt to allow for any follow-up contact by I&M's or HDR's representative that may be needed. Not responding within 30 days indicates that you are not aware of any existing, relevant, and reasonably available information that describes the existing Project environment or known potential impacts of the Project.




# PROJECT LOCATION MAP

## CONSTANTINE HYDROELECTRIC PROJECT (FERC NO. 10661)

### ST. JOSEPH COUNTY, MICHIGAN

PATH: N:\GIS2\PROJECTS\AEP\10068009_AEP_CONSTANTINE_PAD_NOI\7.0_GIS_MODELS\7.2_WORK_IN_PROGRESS\MAP_DOCS\FINAL\MAP_8_5X11P_20170814_PROJECT_LOCATION_MAP.MXD - USER: DSOUCIE - DATE: 8/14/2017

AUGUST 2017

# APPENDIX B

# CONSULTATION CORRESPONDENCE AND PAD QUESTIONNAIRE RESPONSES

August 15, 2017

**Subject: Constantine Hydroelectric Project (FERC No. 10661)**
**Relicensing Pre-Application Document Questionnaire**

To the Attached Distribution List:

Indiana Michigan Power Company (I&M) is the Licensee and operator of the Constantine Hydroelectric Project (FERC No. 10661) (Project) located on the St. Joseph River in St. Joseph County, Michigan. The Project is licensed by the Federal Energy Regulatory Commission (FERC).

The existing FERC license for the Project expires on September 30, 2023. I&M intends to pursue a new license for the Project and is preparing the Pre-Application Document (PAD) required by FERC's relicensing process. I&M has retained HDR, Inc. (HDR) for assistance with the relicensing process, including development of the PAD.

The PAD provides FERC and other entities with existing, relevant, and reasonably available information pertaining to the Project. This information is intended to help identify items of interest and related information needs, develop study requests and study plans, and prepare documents related to analyzing the relicensing application to be prepared by I&M. To prepare the PAD, I&M will use information in its possession and information obtained from others. On behalf of I&M, HDR is currently gathering information to support preparation of the PAD. Consistent with this effort, the purpose of this letter is to:

1) Notify interested governmental agencies, local governments, non-governmental organizations, Indian tribes, and individuals of the upcoming relicensing proceeding, and

2) Request your help in identifying existing, relevant, and reasonably available information related to the existing Project environment or known impacts or benefits of the Project.

I&M's goal is to produce a final comprehensive PAD by the end of 2017 and to file the PAD with the FERC in 2018. We are asking for your help to identify additional information of which you may be aware. To facilitate the information search, we have prepared the attached Pre-Application Document Information Questionnaire (PAD Questionnaire).

hdrinc.com

440 S Church Street, Suites 900 & 1000, Charlotte, NC 28202-2075
(704) 338-6700

I&M is requesting that you provide any relevant information for the PAD. Relevant information would include site-or-region specific studies, data, reports, or management plans on any of the following resource areas:

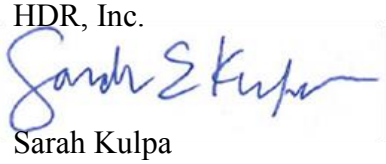
- Geology and soils
- Recreation and land use
- Water resources
- Aesthetic resources
- Fish and aquatic resources
- Cultural resources
- Wildlife and botanical resources
- Socioeconomic resources
- Wetlands, riparian, and littoral habitat
- Tribal resources
- Rare, threatened, and endangered species

To help ensure that your relevant information and resources are available for inclusion in the PAD, please fill out the attached PAD Questionnaire and return to Sarah Kulpa (of HDR) via email at sarah.kulpa@hdrinc.com or in the enclosed self-addressed, stamped envelope.

HDR intends to include relevant information in the PAD. Therefore, we respectfully request a response within 30 days of receipt of this letter. This will allow time for follow-up contacts that may be necessary. If we do not receive a response from you within 30 days, this will indicate you are not aware of any existing, relevant, and reasonably available information that describes the Project environment or known potential impacts of the Project, and that, unless you are representative of an Indian tribe or federal or state agency, you do not wish to remain on the distribution list for this relicensing process.

We want to thank you in advance for helping identify information that meets the criteria for inclusion in the PAD. We appreciate your assistance and look forward to working with you during the relicensing process. If you have any questions regarding this request or would like additional information, please contact me at sarah.kulpa@hdrinc.com or via phone at (704) 248-3620 or Jonathan Magalski who represents I&M at jmmagalski@aep.com or via phone at (614) 716-2240.

Sincerely,
HDR, Inc.



Sarah Kulpa
Project Manager

Attachment
cc: Jonathan Magalski, on behalf of I&M

DISTRIBUTION LIST
Constantine Hydroelectric Project (FERC No. 10661)

Charlene Dwin Vaughn
Advisory Council on Historic Preservation
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Washington, DC 20001-2637

Kimberly Bose
Federal Energy Regulatory Commission
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Washington, DC 20426

FEMA Region 5
536 South Clark Street, 6th Floor
Chicago, IL 60605

John Bullard
NOAA Fisheries Service
Greater Atlantic Reg. Fisheries Office
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Gloucester, MA 01930-2276

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Natural Resources Conservation Service
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US Department of the Interior
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Washington, DC 20240

Lindy Nelson, US Dept of the Interior
Philadelphia Region
Custom House, Room 244
200 Chestnut Street
Philadelphia , PA 19106

US Environmental Protection Agency
Ralph Metcalfe Federal Building
77 West Jackson Boulevard
Chicago, IL 60604-3590

Alisa Shull
US Fish and Wildlife Service
5600 American Blvd West, Suite 990
Bloomington, MN 55437-1458

Burr Fisher
US Fish and Wildlife Service
2651 Coolidge Road, #101
East Lansing, MI 48823

US Geological Survey
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Lansing, MI 48911-5991

US Geological Survey
1451 Green Road
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US House of Representatives
N-993 House Office Building
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Lansing, MI 48909

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US Senate
713 Hart Senate Office Building
Washington, DC 20510-2204

Gary Peters
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Hart Senate Office Building
Washington, DC 20510

Michael Reynolds
US National Park Service
1849 C Street, NW
Washington, DC 20240

Dena Sanford
US National Park Service
c/o Agate Fossil Beds Nat'l Monument
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Kyle Kruger
Michigan Department of Natural Resources Mio Field Office
191 S. Mt. Tom Road
Mio, MI 48647

Keith Creagh
Michigan Department of Natural Resources
PO Box 30028
Lansing, MI 48909

Michigan Environmental Council
602 West Ionia Street
Lansing, MI 48933

Ronda Wuycheck
Michigan Dept of Environmental Quality
525 West Allegan Street
PO Box 30473
Lansing, MI 48909-7973

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7953 Adobe Road
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St. Joseph County
PO Box 189
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Village of Constantine
115 White Pigeon Street
Constantine, MI 49042

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Township of Constantine
425 Centreville Street
Constantine, MI 49042

Keith Shears
Town of Centreville
221 West Main
PO Box 399
Centreville, MI 49032

Robert Hile
City of Sturgis
130 North Nottawa
Sturgis, MI 49091

DISTRIBUTION LIST
Constantine Hydroelectric Project (FERC No. 10661)

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Sturgis, MI 49091

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Township of White Pigeon
16825 Tomahawk Trail
White Pigeon, MI 49099

Tyler Royce
Village of White Pigeon
103 South Kalamazoo
PO Box 621
White Pigeon, MI 49099

Carolyn Grace
St. Joseph County Conservation District
693 E. Main Street
Centerville, MI 49032

Korie Blyveis
Cass County Conservation District
1127 East State St.
Cassopolis, MI 49031

Matt Meersman
St. Joseph River Basin Commission
227 West Jefferson Boulevard
1120 County-City Boulevard
South Bend, IN 46601

Pokagon Band of Potawatomi Indians
58620 Sink Road
PO Box 180
Dowagiac, MI 49047

Nottawaseppi Huron Band of the Potawatomi
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Fulton, MI 49052

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Friends of the St. Joe River Assoc., Inc.
PO Box 1794
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St. Joseph River Basin Commission
227 West Jefferson Boulevard
1120 County-City Boulevard
South Bend, IN 46601

# Constantine Hydroelectric Project (FERC Project No. 10661)
# Relicensing Pre-Application Document Information Questionnaire

Indiana Michigan Power Company (I&M) is the Licensee and operator of the Constantine Hydroelectric Project (FERC No. 10661) (Project), located along the St. Joseph River in St. Joseph County, Michigan (see attached map). I&M, with assistance from HDR, Inc. (HDR), is beginning the Federal Energy Regulatory Commission (FERC) relicensing process for the Project. Accordingly, I&M is preparing a Pre-Application Document (PAD). The PAD provides FERC and other entities with existing, relevant, and reasonably available information pertaining to the Project.

This information is intended to help identify items of interest and related information needs, develop study requests and study plans, and prepare documents related to analyzing the relicensing application to be prepared by I&M. To prepare the PAD, I&M will use information in its possession and information obtained from others. This PAD Questionnaire will be used by I&M to help identify sources of existing, relevant, and reasonably available information that is not currently in I&M's possession. Comments and/or questions regarding this request may be sent to Sarah Kulpa with HDR via email at sarah.kulpa@hdrinc.com or via phone at (704) 248-3620, or to Jonathan Magalski who represents I&M at jmmagalski@aep.com or via phone at (614) 716-2240.

Please return this questionnaire in the enclosed, self-addressed, stamped envelope within 30 days of receipt to allow for any follow-up contact by I&M's or HDR's representative that may be needed. Not responding within 30 days indicates that you are not aware of any existing, relevant, and reasonably available information that describes the existing Project environment or known potential impacts of the Project.

I&M and HDR respectfully request the following information:

1. Information about person completing the questionnaire:

| | |
|---|---|
| Name & Title | |
| Organization | |
| Address | |
| Phone | |
| Email Address | |

2. Do you or your organization know of existing, relevant and reasonably available information that describes the existing Constantine Hydroelectric Project's environment (i.e., information regarding the St. Joseph River in or close to the Constantine Hydroelectric Project)?

___ Yes (*If yes, please complete 2a through 2e)* __ No (*If no, go to 3*)

a. If yes, please circle the specific resource area(s) that the information relates to:

- Geology and soils
- Water resources
- Fish and aquatic resources
- Wildlife and botanical resources
- Wetlands, riparian, and littoral habitat
- Rare, threatened & endangered species
- Recreation and land use
- Aesthetic resources
- Cultural resources
- Socio-economic resources
- Tribal resources
- Other resource information

b. Please briefly describe the information referenced above or list available documents *(additional information may be provided on page 4 of this questionnaire).*

c. Where can I&M obtain this information?

d. Please indicate whether there is a specific representative you wish to designate for a potential follow-up contact by I&M's or HDR's representative for the resource area(s) checked above *(additional information may be provided on page 4 of this questionnaire).*

**Representative Contact Information**

| | |
|---|---|
| Name | |
| Address | |
| Phone | |
| Email Address | |

| | |
|---|---|
| Name | |
| Address | |
| Phone | |
| Email Address | |

e. Based on the specific resources listed in 2a, are you aware of any specific issues or improvements pertaining to the identified resource area(s)? *(Additional information may be provided on page 4 of this questionnaire.)*

___ Yes *(please list specific issues below)* ___ No

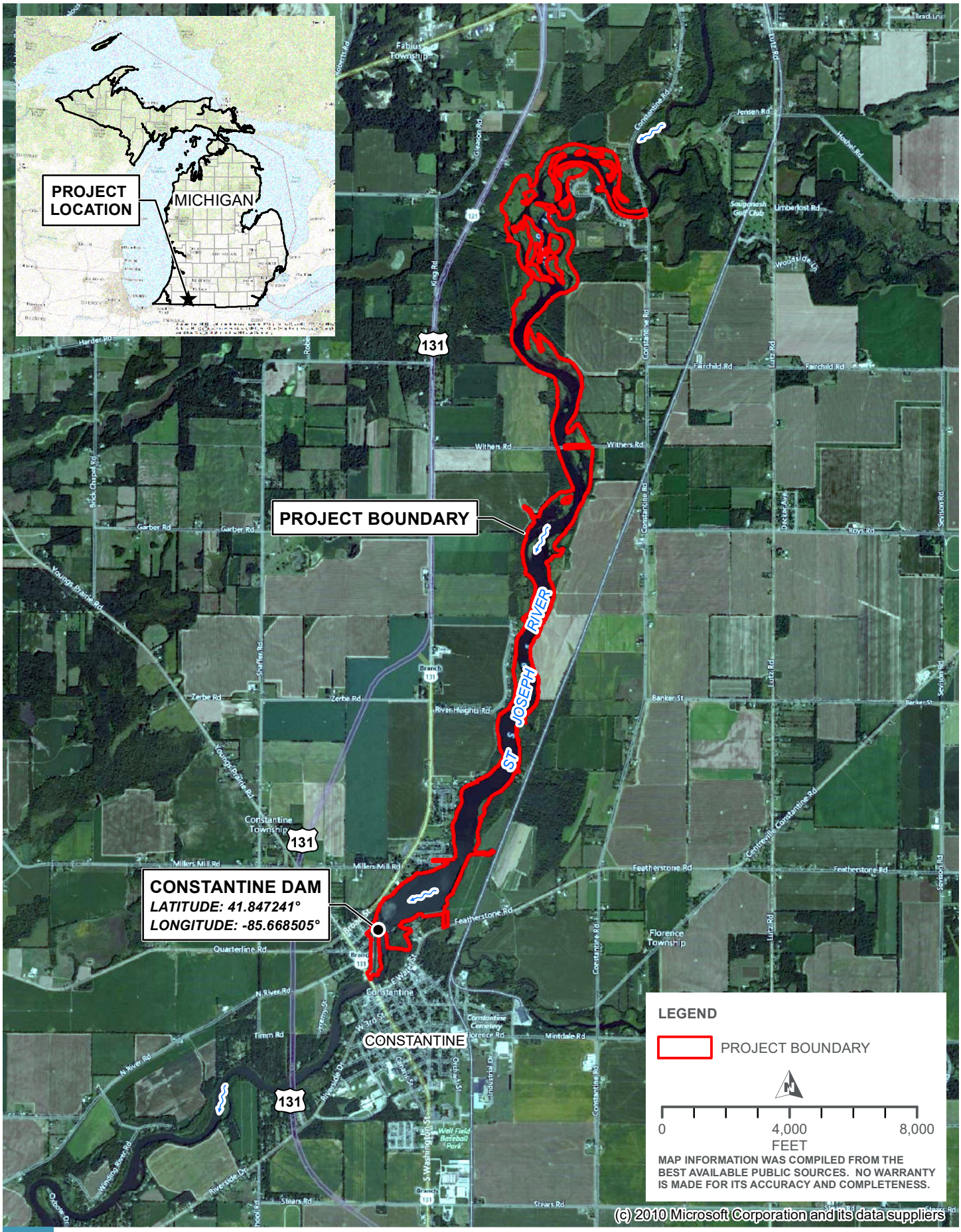
| Resource Area | Specific Issue |
|---|---|
| | |
| | |
| | |
| | |
| | |

3. Do you or your organization plan to participate in the Constantine Hydroelectric Project relicensing proceeding? ___ Yes ___ No

4. We are interested in your comments. If you have comments and/or questions regarding the Constantine Hydroelectric Project or the relicensing process, please provide below. In addition, this questionnaire has been sent to the people/organizations shown on the attached distribution list; please let us know if there is anyone else you believe should receive this questionnaire that is not included on the attached distribution list.

*(Comments and/or questions may be sent via email to: sarah.kulpa@hdrinc.com or jmmagalski@aep.com)*

As noted above, please return this questionnaire in the enclosed, self-addressed, stamped envelope within 30 days of receipt to allow for any follow-up contact by I&M's or HDR's representative that may be needed. Not responding within 30 days indicates that you are not aware of any existing, relevant, and reasonably available information that describes the existing Project environment or known potential impacts of the Project.




# PROJECT LOCATION MAP

## CONSTANTINE HYDROELECTRIC PROJECT (FERC NO. 10661)

### ST. JOSEPH COUNTY, MICHIGAN

PATH: N:\GIS2\PROJECTS\AEP\10068009_AEP_CONSTANTINE_PAD_NOI\7.0_GIS_MODELS\7.2_WORK_IN_PROGRESS\MAP_DOCS\FINAL\MAP_8_5X11P_20170814_PROJECT_LOCATION_MAP.MXD - USER: DSOUCIE - DATE: 8/14/2017

AUGUST 2017

August 15, 2017

Alisa Shull, Chief
United States Fish and Wildlife Service
Midwest Region 3
5600 American Boulevard West, Suite 990
Bloomington, MN 55437-1458

**Subject: Constantine Hydroelectric Project (FERC No. 10661)**
**Request for Threatened and Endangered Species Information**

Dear Ms. Shull,

On behalf of Indiana Michigan Power Company (I&M), HDR, Inc. (HDR) is gathering information in support of the Pre-Application Document (PAD) for the upcoming Federal Energy Regulatory Commission (FERC) relicensing of the Constantine Hydroelectric Project (FERC No. 10661) (Project). In support of this process, HDR has requested an official species list regarding any threatened or endangered species and any critical habitat within the Project area using the United States Fish and Wildlife Service's (USFWS) IPaC system online.

The Constantine Hydroelectric Project is located on the St. Joseph River in St. Joseph County, Michigan. The attached report was generated from the USFWS' IPaC system and includes a map that shows the area of interest for which the information was requested and the general location of the facility.

It is our intent to include these results in the PAD. Therefore, we respectfully request your concurrence that this information is accurate within 30 days of the date of this letter. If you have any questions or need additional information regarding this Project or its location, please feel free to contact me at (704) 248-3620 or sarah.kulpa@hdrinc.com.

Thank you for your assistance with this request.

Sincerely,
HDR, Inc.

Sarah Kulpa
Project Manager

hdrinc.com

440 S Church Street, Suites 900 & 1000, Charlotte, NC 28202-2075
(704) 338-6700

Attachment

cc: Jonathan Magalski, on behalf of I&M

# United States Department of the Interior

FISH AND WILDLIFE SERVICE
Michigan Ecological Services Field Office
2651 Coolidge Road Suite 101
East Lansing, MI 48823-6360
Phone: (517) 351-2555 Fax: (517) 351-1443
http://www.fws.gov/midwest/endangered/section7/s7process/step1.html

In Reply Refer To: August 15, 2017
Consultation Code: 03E16000-2017-SLI-0677
Event Code: 03E16000-2017-E-01267
Project Name: Constantine Hydroelectric Project

Subject: List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project

To Whom It May Concern:

The attached species list identifies any federally threatened, endangered, proposed and candidate species that may occur within the boundary of your proposed project or may be affected by your proposed project. The list also includes designated critical habitat if present within your proposed project area or affected by your project. This list is provided to you as the initial step of the consultation process required under section 7(c) of the Endangered Species Act, also referred to as Section 7 Consultation.

Section 7 of the Endangered Species Act of 1973 requires that actions authorized, funded, or carried out by Federal agencies not jeopardize federally threatened or endangered species or adversely modify designated critical habitat. To fulfill this mandate, Federal agencies (or their designated non-federal representative) must consult with the Fish and Wildlife Service if they determine their project may affect listed species or critical habitat.

There are several important steps in evaluating the effects of a project on listed species. Please use the species list provided and visit the U.S. Fish and Wildlife Service's Region 3 Section 7 Technical Assistance website at http://www.fws.gov/midwest/endangered/section7/s7process/index.html. This website contains step-by-step instructions to help you determine if your project may affect listed species and lead you through the section 7 consultation process.

Under 50 CFR 402.12(e) (the regulations that implement section 7 of the Endangered Species Act), the accuracy of this species list should be verified after 90 days. You may verify the list by visiting the ECOS-IPaC website (http://ecos.fws.gov/ipac/) at regular intervals during project planning and implementation and completing the same process you used to receive the attached list.

For all **wind energy projects** and **projects that include installing towers that use guy wires or are over 200 feet in height**, please contact this field office directly for assistance, even if no federally listed plants, animals or critical habitat are present within your proposed project area or may be affected by your proposed project.

**Migratory Birds**: In addition to responsibilities to protect threatened and endangered species under the Endangered Species Act (ESA), there are additional responsibilities under the Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle Protection Act (BGEPA) to protect native birds from project-related impacts. Any activity, intentional or unintentional, resulting in take of migratory birds, including eagles, is prohibited unless otherwise permitted by the U.S. Fish and Wildlife Service (50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)). For more information regarding these Acts see http://www.fws.gov/migratorybirds/RegulationsandPolicies.html.

Although no longer listed under the Endangered Species Act, bald eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 et seq.) and Migratory Bird Treaty Act (16 U.S.C. 703 et seq), as are golden eagles. Projects affecting these species may require measures to avoid harming eagles or may require a permit. If your project is near an eagle nest or winter roost area, see our Eagle Permits website at http://www.fws.gov/midwest/midwestbird/EaglePermits/index.html to help you avoid impacting eagles or determine if a permit may be necessary.

The MBTA has no provision for allowing take of migratory birds that may be unintentionally killed or injured by otherwise lawful activities. It is the responsibility of the project proponent to comply with these Acts by identifying potential impacts to migratory birds and eagles within applicable NEPA documents (when there is a federal nexus) or a Bird/Eagle Conservation Plan (when there is no federal nexus). Proponents should implement conservation measures to avoid or minimize the production of project-related stressors or minimize the exposure of birds and their resources to the project-related stressors. For more information on avian stressors and recommended conservation measures see http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/BirdHazards.html.

In addition to MBTA and BGEPA, Executive Order 13186: Responsibilities of Federal Agencies to Protect Migratory Birds, obligates all Federal agencies that engage in or authorize activities that might affect migratory birds, to minimize those effects and encourage conservation measures that will improve bird populations. Executive Order 13186 provides for the protection of both migratory birds and migratory bird habitat. For information regarding the implementation of Executive Order 13186, please visit http://www.fws.gov/migratorybirds/AboutUS.html.

We appreciate your concern for threatened and endangered species. Please include the Consultation Tracking Number in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List

- USFWS National Wildlife Refuges and Fish Hatcheries
- Migratory Birds
- Wetlands

# Official Species List

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

**Michigan Ecological Services Field Office**
2651 Coolidge Road Suite 101
East Lansing, MI 48823-6360
(517) 351-2555

# Project Summary

Consultation Code: 03E16000-2017-SLI-0677

Event Code: 03E16000-2017-E-01267

Project Name: Constantine Hydroelectric Project

Project Type: DAM

Project Description: Indiana Michigan Power Company (I&M) is the Licensee and operator of the 1.2 megawatt Constantine Hydroelectric Project (FERC No. 10661) (Project) located on the St. Joseph River in St. Joseph County, Michigan. The Project is licensed by the Federal Energy Regulatory Commission (FERC).

The existing FERC license for the Project expires on September 30, 2023. I&M intends to pursue a new license for the Project and is preparing the Pre-Application Document (PAD) required by FERC's relicensing process. As part of the data collection for the PAD, I&M is requesting information regarding rare, threatened and endangered species and critical habitat within the Project area.

Project Location:

Approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/place/41.87959257458019N85.65104621179555W


Counties: St. Joseph, MI

# Endangered Species Act Species

There is a total of 6 threatened, endangered, or candidate species on this species list. Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species. Note that 1 of these species should be considered only under certain conditions. See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

## Mammals

| NAME | STATUS |
|---|---|
| Indiana Bat *Myotis sodalis*<br>There is a **final** critical habitat designated for this species. Your location is outside the designated critical habitat.<br>Species profile: https://ecos.fws.gov/ecp/species/5949 | Endangered |
| Northern Long-eared Bat *Myotis septentrionalis*<br>No critical habitat has been designated for this species.<br>Species profile: https://ecos.fws.gov/ecp/species/9045 | Threatened |

## Reptiles

| NAME | STATUS |
|---|---|
| Copperbelly Water Snake *Nerodia erythrogaster neglecta*<br>Population: Indiana north of 40 degrees north latitude, Michigan, Ohio<br>No critical habitat has been designated for this species.<br>Species profile: https://ecos.fws.gov/ecp/species/7253 | Threatened |
| Eastern Massasauga (=rattlesnake) *Sistrurus catenatus*<br>No critical habitat has been designated for this species.<br>This species only needs to be considered under the following conditions:<br>▪ All Projects: Project is Within EMR Range<br>Species profile: https://ecos.fws.gov/ecp/species/2202 | Threatened |

## Insects

| NAME | STATUS |
|---|---|
| Mitchell's Satyr Butterfly *Neonympha mitchellii mitchellii*<br>No critical habitat has been designated for this species.<br>Species profile: https://ecos.fws.gov/ecp/species/8062 | Endangered |

## Flowering Plants

| NAME | STATUS |
| --- | --- |
| Eastern Prairie Fringed Orchid *Platanthera leucophaea* | Threatened |

No critical habitat has been designated for this species.
Species profile: https://ecos.fws.gov/ecp/species/601

## Critical habitats

There are no critical habitats within your project area under this office's jurisdiction.

# USFWS National Wildlife Refuges And Fish Hatcheries

Any activity proposed on National Wildlife Refuge lands must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

There are no refuges or fish hatcheries within your project area.

# Migratory Birds

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any activity that results in the take of migratory birds or eagles is prohibited unless authorized by the U.S. Fish and Wildlife Service[3]. There are no provisions for allowing the take of migratory birds that are unintentionally killed or injured.

Any person or organization who plans or conducts activities that may result in the take of migratory birds is responsible for complying with the appropriate regulations and implementing appropriate conservation measures.

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1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.
3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

The migratory birds species listed below are species of particular conservation concern (e.g. Birds of Conservation Concern) that may be potentially affected by activities in this location. It is not a list of every bird species you may find in this location, nor a guarantee that all of the bird species on this list will be found on or near this location. Although it is important to try to avoid and minimize impacts to all birds, special attention should be made to avoid and minimize impacts to birds of priority concern. To view available data on other bird species that may occur in your project area, please visit the AKN Histogram Tools and Other Bird Data Resources. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

| NAME | SEASON(S) |
|---|---|
| Black Tern *Chlidonias niger*<br>https://ecos.fws.gov/ecp/species/3093 | On Land: Breeding |
| Bobolink *Dolichonyx oryzivorus* | On Land: Breeding |
| Least Bittern *Ixobrychus exilis*<br>https://ecos.fws.gov/ecp/species/6175 | On Land: Breeding |
| Marsh Wren *Cistothorus palustris* | On Land: Breeding |
| Rusty Blackbird *Euphagus carolinus* | On Land: Wintering |
| Wood Thrush *Hylocichla mustelina* | On Land: Breeding |
| Brown Thrasher *Toxostoma rufum* | On Land: Breeding |

| | |
|---|---|
| Golden-winged Warbler *Vermivora chrysoptera*<br>https://ecos.fws.gov/ecp/species/8745 | On Land: Breeding |
| Black-billed Cuckoo *Coccyzus erythropthalmus*<br>https://ecos.fws.gov/ecp/species/9399 | On Land: Breeding |
| American Bittern *Botaurus lentiginosus*<br>https://ecos.fws.gov/ecp/species/6582 | On Land: Breeding |
| Pied-billed Grebe *Podilymbus podiceps* | On Land: Breeding |
| Blue-winged Warbler *Vermivora pinus* | On Land: Breeding |
| Dickcissel *Spiza americana* | On Land: Breeding |
| Henslow's Sparrow *Ammodramus henslowii*<br>https://ecos.fws.gov/ecp/species/3941 | On Land: Breeding |
| Prothonotary Warbler *Protonotaria citrea* | On Land: Breeding |
| Upland Sandpiper *Bartramia longicauda*<br>https://ecos.fws.gov/ecp/species/9294 | On Land: Breeding |
| Red-headed Woodpecker *Melanerpes erythrocephalus* | On Land: Breeding |
| Bald Eagle *Haliaeetus leucocephalus*<br>https://ecos.fws.gov/ecp/species/1626 | On Land: Year-round |
| Peregrine Falcon *Falco peregrinus*<br>https://ecos.fws.gov/ecp/species/8831 | On Land: Breeding |
| Short-eared Owl *Asio flammeus*<br>https://ecos.fws.gov/ecp/species/9295 | On Land: Wintering |
| Willow Flycatcher *Empidonax traillii*<br>https://ecos.fws.gov/ecp/species/3482 | On Land: Breeding |
| Common Tern *Sterna hirundo*<br>https://ecos.fws.gov/ecp/species/4963 | On Land: Breeding |

Additional information can be found using the following links:

- Birds of Conservation Concern http://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php
- Conservation measures for birds http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservation-measures.php
- Year-round bird occurrence data http://www.birdscanada.org/birdmon/default/datasummaries.jsp

# Wetlands

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

FRESHWATER EMERGENT WETLAND

- PEMC

FRESHWATER FORESTED/SHRUB WETLAND

- PFO1Ch
- PFO1C
- PSS1Ch
- PSS1Fh
- PFO1Ah

FRESHWATER POND

- PUBG

LAKE

- L1UBHh
- L2EM2G

RIVERINE

- R2UBHx
- R2UBH

August 15, 2017

Keith Creagh, Director
Michigan Department of Natural Resources
PO Box 30028
Lansing, MI 48909

**Subject: Constantine Hydroelectric Project (FERC No. 10661)**
**Request for Threatened and Endangered Species Information**

Dear Mr. Creagh,

On behalf of Indiana Michigan Power Company (I&M), HDR, Inc. (HDR) is gathering information in support of the Pre-Application Document (PAD) for the upcoming Federal Energy Regulatory Commission (FERC) relicensing of the Constantine Hydroelectric Project (FERC No. 10661) (Project). In support of this process, HDR is requesting information regarding the following within the Project area:

- State-listed threatened or endangered species;
- Species proposed for listing as threatened or endangered, or species of concern;
- Designated or proposed critical habitat; and
- Candidate species.

The Constantine Hydroelectric Project is located on the St. Joseph River in St. Joseph County, Michigan. The attached map shows the area of interest for which the information is being requested and the general location of the facility.

It is our intent to include the results of this request in the PAD. Therefore, we respectfully request a response to this request within 30 days of the date of this letter. If you have any questions or need additional information regarding this Project or its location, please feel free to contact me at (704) 248-3620 or sarah.kulpa@hdrinc.com.

Thank you for your assistance with this request.

Sincerely,
HDR, Inc.

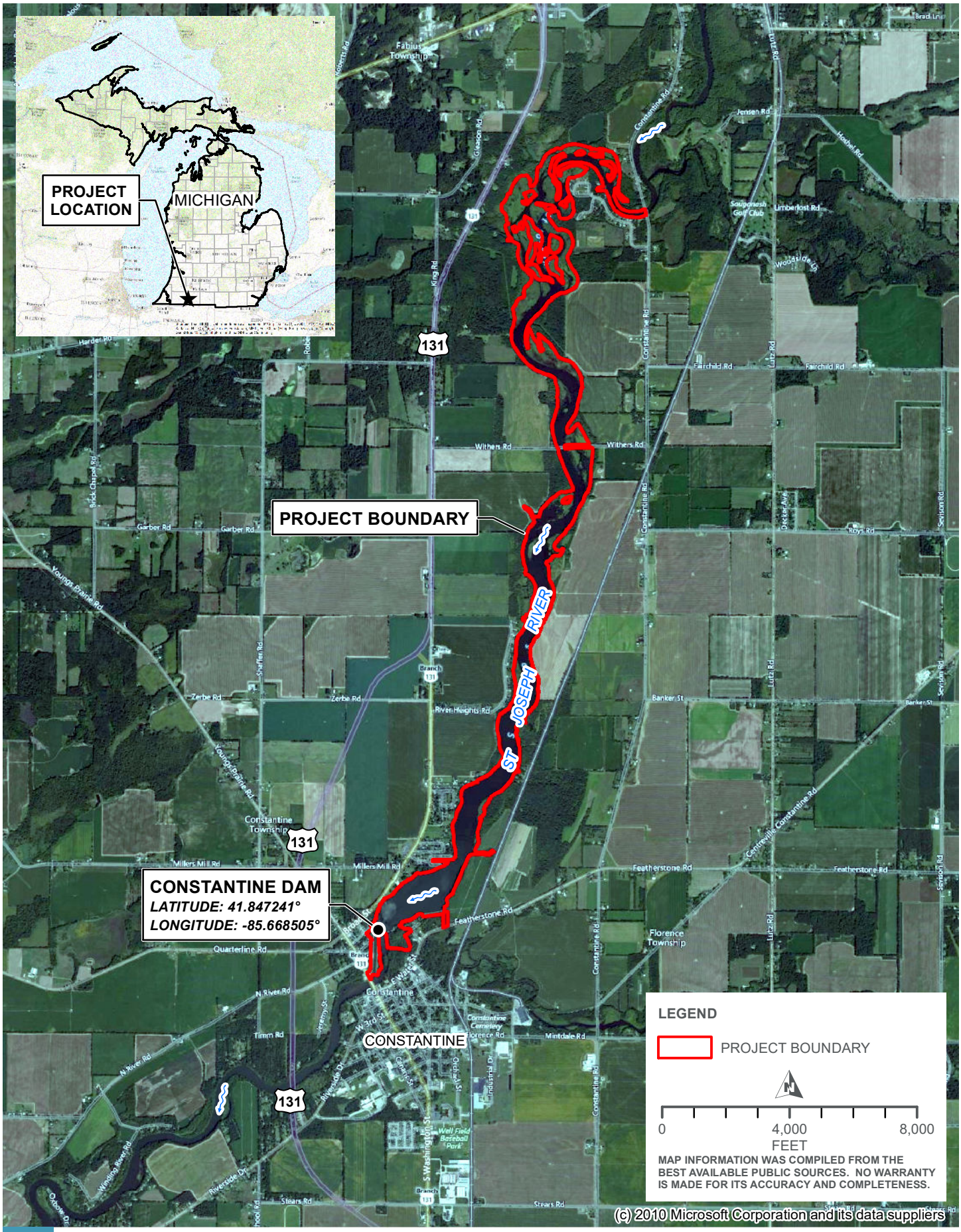
Sarah Kulpa
Project Manager

hdrinc.com

440 S Church Street, Suites 900 & 1000, Charlotte, NC 28202-2075
(704) 338-6700

Attachment

cc: Jonathan Magalski, on behalf of I&M




# PROJECT LOCATION MAP

## CONSTANTINE HYDROELECTRIC PROJECT (FERC NO. 10661)

### ST. JOSEPH COUNTY, MICHIGAN

PATH: N:\GIS2\PROJECTS\AEP\10068009_AEP_CONSTANTINE_PAD_NOI\7.0_GIS_MODELS\7.2_WORK_IN_PROGRESS\MAP_DOCS\FINAL\MAP_8_5X11P_20170814_PROJECT_LOCATION_MAP.MXD - USER: DSOUCIE - DATE: 8/14/2017

AUGUST 2017

August 15, 2017

Ronda Wuycheck, Chief
Michigan Department of Environmental Quality
Coastal Zone Management Program
525 West Allegan Street
PO Box 30473
Lansing, MI 48909-7973

**Subject: Constantine Hydroelectric Project (FERC No. 10661)**
**Coastal Zone Consistency Determination**

Dear Ms. Wuycheck,

On behalf of Indiana Michigan Power Company (I&M), HDR, Inc. (HDR) is gathering information in support of the Pre-Application Document (PAD) for the upcoming Federal Energy Regulatory Commission (FERC) relicensing of the Constantine Hydroelectric Project (FERC No. 10661) (Project).

Consistent with this effort, HDR is requesting a determination from your office regarding the applicability of the State's Coastal Zone Policies to the Project, which is located on the St. Joseph River in St. Joseph County, Michigan. Based on a review of applicable information, we do not believe that the Project is located within the State's Coastal Zone and are requesting confirmation of this determination from your office. In support of this confirmation, we have included a map indicating the location of this facility.

It is our intent to include the results of the determination in the PAD. Therefore, we respectfully request a response to this determination within 30 days of the date of this letter. If you have any questions or need additional information regarding this Project or its location, please feel free to contact me at (704) 248-3620 or sarah.kulpa@hdrinc.com.

Thank you for your assistance with this request.

Sincerely,
HDR, Inc.

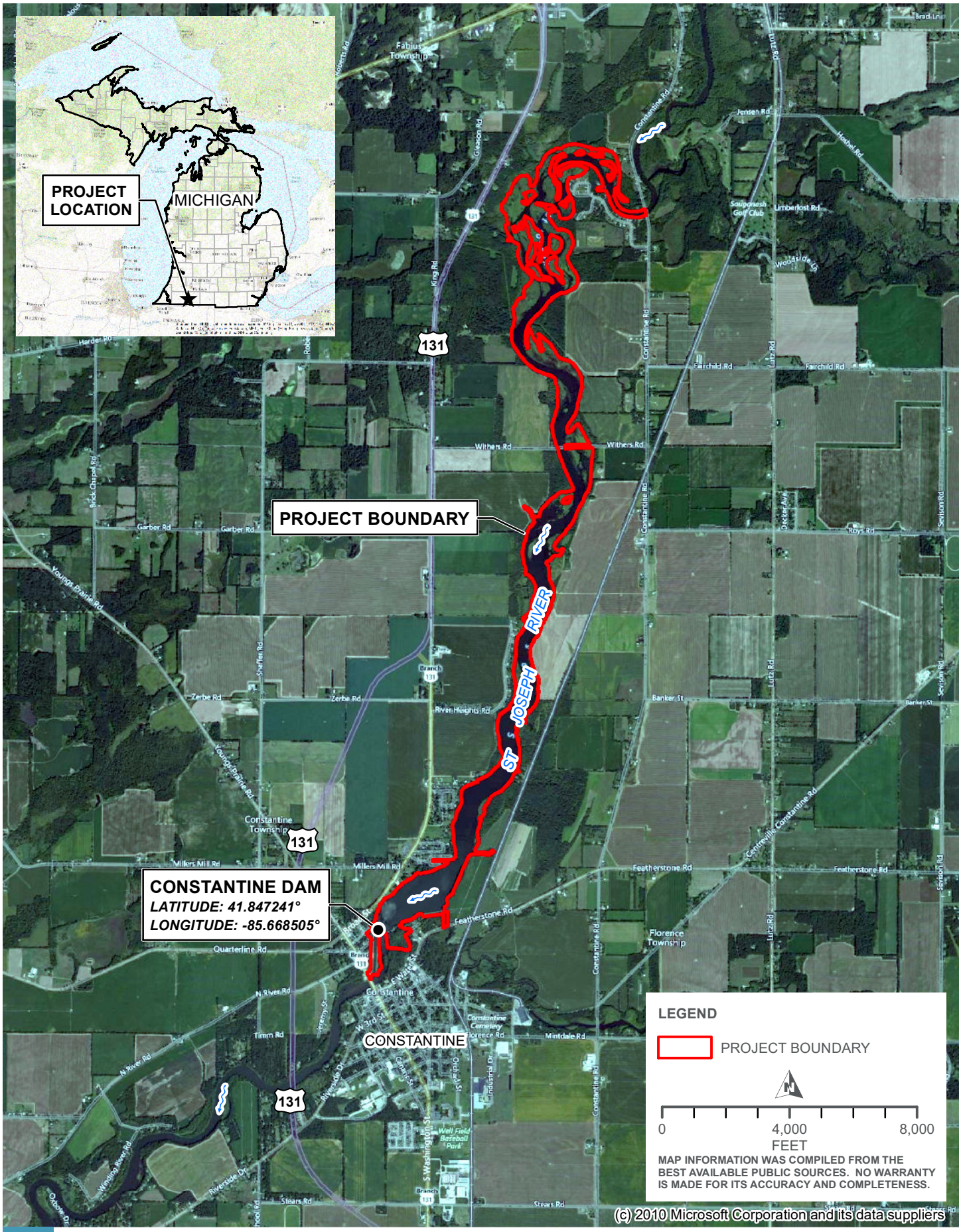
Sarah Kulpa
Project Manager

hdrinc.com

440 S Church Street, Suites 900 & 1000, Charlotte, NC 28202-2075
(704) 338-6700

Attachment

cc: Jonathan Magalski, on behalf of I&M




# PROJECT LOCATION MAP

## CONSTANTINE HYDROELECTRIC PROJECT (FERC NO. 10661)

### ST. JOSEPH COUNTY, MICHIGAN

PATH: N:\GIS2\PROJECTS\AEP\10068009_AEP_CONSTANTINE_PAD_NOI\7.0_GIS_MODELS\7.2_WORK_IN_PROGRESS\MAP_DOCS\FINAL\MAP_8_5X11P_20170814_PROJECT_LOCATION_MAP.MXD - USER: DSOUCIE - DATE: 8/14/2017

AUGUST 2017

STATE OF MICHIGAN
DEPARTMENT OF ENVIRONMENTAL QUALITY
LANSING

RICK SNYDER
GOVERNOR

C. HEIDI GRETHER
DIRECTOR

August 21, 2017

Sarah Kulpa
Project Manager
HRD, Inc.
440 S Church Street
Suites 900 & 1000
Charlotte, NC 28202-2075

Dear Ms. Kulpa:

SUBJECT: Federal Consistency Review of Proposed Constantine Hydroelectric Project (FERC No. 10661), St. Joseph County, Michigan

Staff of the Water Resources Division has reviewed this phase of the project for consistency with the Michigan Coastal Management Program (MCMP), as required by Section 307 of the Coastal Zone Management Act, PL 92-583, as amended (CZMA). Thank you for providing the opportunity to review this proposed activity. Our review indicates that portions of this project will impact areas located within Michigan's coastal management boundary and are subject to consistency requirements.

Our review indicates that this project is located outside of Michigan's coastal management boundary. No adverse impacts to coastal resources are anticipated from this proposed activity as described in the information you forwarded to our office. Therefore, this phase of the project is consistent with MCMP.

This consistency determination does not waive the need for permits that may be required under other federal, state or local statutes. Please call me if you have any questions regarding this review.

Sincerely,

Chris Antieau
Great Lakes Shorelands Unit
Water Resources Division
517-290-5732

MICHIGAN STATE UNIVERSITY | Extension

Danielle Hanson
Environmental Scientist
HDR
6592 E. 34th Lane
Yuma, AZ 85365

September 11, 2017

**Re: Rare Species Review #2027 –Constantine Hydroelectric Project, St. Joseph County, MI**

Ms. Hanson:

The location for the proposed project was checked against known localities for rare species and unique natural features, which are recorded in the Michigan Natural Features Inventory (MNFI) natural heritage database. This continuously updated database is a comprehensive source of existing data on Michigan's endangered, threatened, or otherwise significant plant and animal species, natural plant communities, and other natural features. Records in the database indicate that a qualified observer has documented the presence of special natural features. The absence of records in the database for a particular site may mean that the site has not been surveyed. The only way to obtain a definitive statement on the status of natural features is to have a competent biologist perform a complete field survey.

Under Act 451 of 1994, the Natural Resources and Environmental Protection Act, Part 365, Endangered Species Protection, "a person shall not take, possess, transport, …fish, plants, and wildlife indigenous to the state and determined to be endangered or threatened," unless first receiving an Endangered Species Permit from the Michigan Department of Natural Resources (MDNR), Wildlife Division. Responsibility to protect endangered and threatened species is not limited to the lists below. Other species may be present that have not been recorded in the database.

Several legally protected species have been documented within 1.5 miles of the project site and it is **possible** that negative impacts will occur. Keep in mind that **MNFI cannot fully evaluate this project without visiting the site.** MNFI offers several levels of Rare Species Reviews, including field surveys which I would be happy to discuss with you.

Sincerely,

Daria A. Hyde

Daria A. Hyde
Conservation Planner/Zoologist
Michigan Natural Features Inventory

**MSU EXTENSION**

**Michigan Natural Features Inventory**

PO Box 13036
Lansing MI 48901

(517) 284-6200
Fax (517) 373-9566

mnfi.anr.msu.edu

**Comments for Rare Species Review #2027:** It is important to note that it is the applicant's responsibility to comply with both state and federal threatened and endangered species legislation. Therefore, if a state listed species occurs at a project site, and you think you need an endangered species permit please contact: Lori Sargent, Nongame Wildlife Biologist, Wildlife Division, Michigan Department of Natural Resources, P.O. Box 30444, Lansing, MI 48909, 517-284-6216, or SargentL@michigan.gov. If a federally listed species is involved and, you think a permit is needed, please contact Carrie Tansy, Endangered Species Program, U.S. Fish and Wildlife Service, East Lansing office, 517-351-8375 or carrie_tansy@fws.gov. Please consult MNFI's Rare Species Explorer for additional information regarding the listed species.

**Federally Endangered**

**Indiana Bat - although there are no documented occurrences, there appears to be suitable habitat within the standard 1.5 mile search buffer. Indiana bats** (*Myotis sodalis*) are found only in the eastern United States and are typically confined to the southern three tiers of counties in Michigan. Indiana bats that summer in Michigan winter in caves in Indiana and Kentucky. This species forms colonies and forages in riparian and mature floodplain habitats. Nursery roost sites are usually located under loose bark or in hollows of trees near riparian habitat. Indiana bats typically avoid houses or other artificial structures and typically roost underneath loose bark of dead elm, maple and ash trees. Other dead trees used include oak, hickory and cottonwood. Foraging typically occurs over slow-moving, wooded streams and rivers as well as in the canopy of mature trees. Movements may also extend into the outer edge of the floodplain and to nearby solitary trees. A summer colony's foraging area usually encompasses a stretch of stream over a half-mile in length. Upland areas isolated from floodplains and non-wooded streams are generally avoided.

**Conservation strategies:** The suggested seasonal tree cutting range for Indiana bat is between October 1 and March 31 (i.e., no cutting April 1-September 30). This applies throughout the Indiana bat range in Michigan.

**Table 1: Legally protected species within 1.5 mile of RSR #2027**

| ELCAT | SNAME | SCOMNAME | USESA | SPROT | G_RANK | S_RANK | FIRSTOBS | LASTOBS |
|---|---|---|---|---|---|---|---|---|
| Plant | *Stellaria crassifolia* | Fleshy stitchwort | | E | G5 | S1 | 1890 | 1890-06-07 |
| Plant | *Echinodorus tenellus* | Dwarf burhead | | E | G5? | S1 | 1837 | 1837-08-11 |
| Plant | *Berula erecta* | Cut-leaved water parsnip | | T | G4G5 | S2 | 1952 | 1952-07-28 |
| Plant | *Sabatia angularis* | Rosepink | | T | G5 | S2 | 1837 | 1837-08-18 |
| Plant | *Poa paludigena* | Bog bluegrass | | T | G3 | S2 | 1890 | 1890-06-06 |
| Animal | *Setophaga cerulea* | Cerulean warbler | | T | G4 | S3 | 1992-07-02 | 1992-07-02 |
| Animal | *Cyclonaias tuberculata* | Purple wartyback | | T | G5 | S2 | 2006-09-25 | 2006-09-25 |
| Plant | *Justicia americana* | Water willow | | T | G5 | S2 | 2006-09-26 | 2006-09-26 |
| Animal | *Setophaga dominica* | Yellow-throated warbler | | T | G5 | S3 | 1997-05-16 | 1997-05-16 |

**Of concern:** The state threatened **purple wartyback mussel** (*Cyclonaias tuberculata*) has been known to occur in the St. Joseph River, near the project site in Sec. 26, T7S R12W. The purple wartyback mussel inhabits medium to large rivers that have gravel or mixed sand and gravel substrates. Suitable habitat for fish host species must be present for purple wartyback reproduction to be successful. Known hosts for the purple wartyback are the yellow bullhead (*Ameiurus natalis*) and channel catfish (*Ictalurus punctatus*), but there may be others. If allowed, purple wartybacks likely live to over 25 years of age. Freshwater mussels (Unionidae) require a fish host to complete their life cycle. Eggs are fertilized and develop into larvae within the gills of the female mussel. These larvae, called glochidia, are released into the water and must attach to a suitable fish host to survive and transform into the adult mussel. The purple wartyback is a summer breeder with fertilized eggs and glochidia released during one summer.

**Management and Conservation:** Like other mussels, threats are varied and include: habitat degradation, poor water quality, flow alterations, water temperature changes, heavy metals, organic pollution, sedimentation, and siltation. Maintenance or establishment of vegetated riparian buffers can help protect mussel habitats from many of these threats. Control of zebra mussels is critical to preserving native mussels. As with all mussels, fish host requirements also need to be considered. Due to the unique life cycle of unionids, fish hosts must be present in order for reproduction to occur. The loss of habitat for these hosts can cause the extirpation of unionid populations. Barriers to the movement of fish hosts such as dams and impoundments also prevent unionid migration and exchange of genetic material among populations that helps maintain genetic diversity within populations.

**Of concern:** The state threatened **water willow** (*Justicia americana*) is a mat-forming perennial of river slackwater areas; leaves opposite, narrowly elliptical; flowers pale violet marked with dark purple, borne in axillary clusters near top of plant. It primarily occurs in large river systems and less commonly in lakes. It is almost always found along muddy banks at the edge of the shore.
**Management and Conservation:** Water-willow requires the protection of hydrology. Changing the course of rivers or adding impoundments negatively impacts this species. Agricultural run-off also likely has negative impacts.

**Of concern:** The state threatened **yellow-throated warbler** *(Setophaga dominica*) has been known to occur in the area. Michigan's yellow-throated warbler population is closely associated with mature sycamore trees, which are associated with bottomland and river floodplain forests. They have also been associated with mature silver maples and American basswood. The yellow-throated warbler is one of the earliest to return to Michigan in the spring, arriving in the state from mid-April to mid-May. Nests are generally placed in sycamores, far from the trunk and a substantial distance from the ground. Most individuals leave the breeding grounds by August. This warbler is an opportunistic feeder that gleans or "flycatches" a wide range of insect species.

**Management and Conservation**: Preserve and expand existing floodplain habitat and reduce human encroachment into the floodplain. This includes no logging of sycamores within the floodplain and very limited logging of other species outside of the nesting season. Maintain a natural stream channel with soft, vegetated banks so it can meander and periodically overtop its banks which will allow regeneration of the sycamores that the bird relies on for nesting. Reducing the levels of pollution in the streams may also increase prey abundance and reduce any toxic effects on the birds. Any construction activities within 1/2 mile of known breeding locations should be scheduled for the non-breeding season (August to March).

**Table 2: Special concern species and rare natural communities within 1.5 miles of RSR #2023**

| ELCAT | SNAME | SCOMNAME | USESA | SPROT | G_RANK | S_RANK | FIRSTOBS | LASTOBS |
|---|---|---|---|---|---|---|---|---|
| Plant | *Boechera missouriensis* | Missouri rock-cress | | SC | G5T3?Q | S2 | 1890 | 1890-06-04 |
| Plant | *Agalinis auriculata* | Eared foxglove | | X | G3 | SX | 1837 | 1837-08-23 |
| Plant | *Boechera missouriensis* | Missouri rock-cress | | SC | G5T3?Q | S2 | 1890 | 1890-06-04 |
| Plant | *Amorpha canescens* | Leadplant | | SC | G5 | S3 | 2007-11-07 | 2013-09-03 |
| Community | *Mesic Southern Forest* | Rich Forest, Central Midwest Type | | | G2G3 | S3 | 2009-09-08 | 2009-10-02 |
| Animal | *Villosa iris* | Rainbow | | SC | G5Q | S3 | 2009-06 | 2009-09 |
| Animal | *Venustaconcha ellipsiformis* | Ellipse | | SC | G4 | S3 | 1930 | 2013-07-16 |
| Plant | *Brickellia eupatorioides* | False boneset | | SC | G5 | S2 | 2009-10-02 | 2009-10-02 |

**Species of special concern are not protected under state endangered species legislation, but are considered to be rare in Michigan and should be protected to prevent future listing.**

**Of concern:** The special concern **rainbow mussel** (*Villosa iris*) has been known to occur in the St. Joseph River and the Prairie River near the project site. Rainbow mussels inhabit small to medium streams in coarse sand or gravel where moderate currents prevail. Freshwater mussels (*Unionida*) require a fish host to complete their life cycle. Eggs are fertilized and develop into larvae within the gills of the female mussel. These larvae, called glochidia, are released into the water and must attach to a suitable fish host to survive and transform into the adult mussel. Likely fish hosts include smallmouth bass, green sunfish, largemouth bass, rainbow darter, and yellow perch.

**Management and Conservation**: Like other mussels, threats to the rainbow include: natural flow alterations, siltation, channel disturbance, point and non-point source pollution, and exotic species. Maintenance/establishment of vegetated riparian buffers can help protect mussel habitats from many threats. Control of zebra mussels is critical to preserving native mussels. And as with all mussels, protection of their hosts' habitat is also crucial.

**Of concern:** The special concern **ellipse mussel** (*Venustaconcha ellipsiformis*) has been documented in the Prairie River which flows into the St. Joseph River near the project site. The ellipse occurs in the swift currents of riffles or runs of clear, small to medium sized streams in gravel or sand and gravel substrates. The host fish is unknown. The ellipse is known only from the Midwest United States and has declined considerably in its historic distribution and abundance due to habitat alterations, modification in river flows, and pollution.

**Management and Conservation**: Like other mussels, threats to the ellipse include: natural flow alterations, siltation, channel disturbance, point and non-point source pollution, and exotic species. Maintenance or establishment of vegetated riparian buffers can help protect mussel habitats from many of their threats. Control of zebra mussels is critical to preserving native mussels. And as with all mussels, protection of their hosts' habitat is also crucial.

**Of concern:** The special concern **leadplant** *(Amorpha canescens)* inhabits prairies, dry bluffs and hills, sandy roadsides and clearings. Its leaves are pinnately compound, leaflets pubescent, 1-2 cm; flowers small, purple, in dense terminal spikes. Flowering occurs in June and July.

**Management and Conservation:** The habitat of this species has been severely degraded and diminished. This species likely requires natural disturbances associated with prairie habitat such as prescribed fire and brush removal. Prevent invasive species from entering the site.

**Of concern:** The special concern **false boneset** (*Kuhnia eupatorioides*) has been known to occur in the vicinity of the project area. This plant is a tall forb (1 m); leaves narrowly lanceolate, dotted with glands beneath, mostly sessile; flowers creamy-white, borne in terminal clusters. False boneset inhabits sandy fields, prairies, disturbed areas including roadsides and bluffs. Flowering occurs from late July to October.

**Management and Conservation:** Prescribed burns are necessary to maintain prairie habitat for this species.

## Codes for Tables:

**State Protection Status Code Definitions (SPROT)**
E: Endangered
T: Threatened
SC: Special concern

**Federal Protection Status Code Definitions (USESA)**
LE = listed endangered
LT = listed threatened
LELT = partly listed endangered and partly listed threatened
PDL = proposed delist
E(S/A) = endangered based on similarities/appearance
PS = partial status (federally listed in only part of its range)
C = species being considered for federal status

**Global Heritage Status Rank Definitions (GRANK)**
The priority assigned by NatureServe's national office for data collection and protection based upon the element's status throughout its entire world-wide range. Criteria not based only on number of occurrences; other critical factors also apply. Note that ranks are frequently combined.
G1 = critically imperiled globally because of extreme rarity (5 or fewer occurrences range-wide or very few remaining individuals or acres) or because of some factor(s) making it especially vulnerable to extinction.
G2 = imperiled globally because of rarity (6 to 20 occurrences or few remaining individuals or acres) or because of some factor(s) making it very vulnerable to extinction throughout its range.
G3: Either very rare and local throughout its range or found locally (even abundantly at some of its locations) in a restricted range (e.g. a single western state, a physiographic region in the East) or because of other factor(s) making it vulnerable to extinction throughout its range; in terms of occurrences, in the range of 21 to 100.
G4: Apparently secure globally, though it may be quite rare in parts of its range, especially at the periphery.
G5: Demonstrably secure globally, though it may be quite rare in parts of its range, especially at the periphery.
Q: Taxonomy uncertain

**State Heritage Status Rank Definitions (SRANK)**
The priority assigned by the Michigan Natural Features Inventory for data collection and protection based upon the element's status within the state. Criteria not based only on number of occurrences; other critical factors also apply. Note that ranks are frequently combined.
S1: Critically imperiled in the state because of extreme rarity (5 or fewer occurrences or very few remaining individuals or acres) or because of some factor(s) making it especially vulnerable to extirpation in the state.
S2: Imperiled in state because of rarity (6 to 20 occurrences or few remaining individuals or acres) or because of some factor(s) making it very vulnerable to extirpation from the state.
S3: Rare or uncommon in state (on the order of 21 to 100 occurrences).
S4 = apparently secure in state, with many occurrences.
S5 = demonstrably secure in state and essentially ineradicable under present conditions.
SX = apparently extirpated from state.

**Rare Species Review #2027**
**Constantine Hydroelectric Project FERC No. 10661**
**St. Joseph County, MI**
**September 11, 2017**

**For projects involving Federal funding or a Federal agency authorization**

The following information is provided to assist you with **Section 7 compliance** of the Federal Endangered Species Act (ESA). The ESA directs all Federal agencies "to work to conserve endangered and threatened species. Section 7 of the ESA, called "Interagency Cooperation, is the means by which Federal agencies ensure their actions, including those they authorize or fund, do not jeopardize the existence of any listed species."

The project falls within the range of six (6) federally listed/proposed species which have been identified by the U.S. Fish and Wildlife Service (USFWS) to occur in **St. Joseph County, Michigan**:

**Federally Endangered**

**Indiana Bat** - **although there are no documented occurrences, there appears to be suitable habitat within the standard 1.5 mile search buffer. Indiana bats** (*Myotis sodalis*) are found only in the eastern United States and are typically confined to the southern three tiers of counties in Michigan. Indiana bats that summer in Michigan winter in caves in Indiana and Kentucky. This species forms colonies and forages in riparian and mature floodplain habitats. Nursery roost sites are usually located under loose bark or in hollows of trees near riparian habitat. Indiana bats typically avoid houses or other artificial structures and typically roost underneath loose bark of dead elm, maple and ash trees. Other dead trees used include oak, hickory and cottonwood. Foraging typically occurs over slow-moving, wooded streams and rivers as well as in the canopy of mature trees. Movements may also extend into the outer edge of the floodplain and to nearby solitary trees. A summer colony's foraging area usually encompasses a stretch of stream over a half-mile in length. Upland areas isolated from floodplains and non-wooded streams are generally avoided.

**Conservation strategies:** The suggested seasonal tree cutting range for Indiana bat is between October 1 and March 31 (i.e., no cutting April 1-September 30). This applies throughout the Indiana bat range in Michigan.

**Mitchell's Satyr Butterfly** - **there doesn't appear to be suitable habitat within the standard 1.5 mile search buffer.** The state and federally endangered **Mitchell's satyr butterfly** (*Neonympha mitchellii mitchelliiis*) restricted to calcareous wetlands known as prairie fens. In Michigan, this habitat is characterized by scattered tamaracks, poison sumac, and dogwood with a ground cover of sedges, shrubby cinquefoil, and a variety of herbaceous species with prairie affinities. Adult Mitchell's satyr butterflies are active two to three weeks each summer, with males emerging before females. Adult flight dates are from mid-June to mid-July. Larvae hibernate near the bottom of a sedge. The larval food plant is thought to be several species of sedge. The caterpillar is green with white stripes.

**Federally Threatened**

**Copperbelly Water Snake** – **although there are no documented occurrences, there appears to be suitable habitat within the standard 1.5 mile search buffer**. **Copperbelly water snakes** (*Nerodia erythrogaster neglecta)* are usually found in or near shrub swamps, ponds, lakes, oxbox sloughs, fens, and slow-moving streams. They can also be found in mature or second-growth woodlands and in more open habitats adjacent to wetland areas. In spring these snakes often inhabit the open edges of shallow ponds and buttonbush swamps and frequently

bask on shoreline vegetation, muskrat lodges, or woody debris. When temperatures rise and these seasonal waters begin to dry up in early summer, the snakes migrate to permanent waters (lake and stream edges), often using fairly dry wooded or grassy upland corridors. They may become largely nocturnal during hot weather.

Unlike the northern water snake *(Nerodia sipedon)*, this species may spend considerable periods of time in relatively dry habitats away from water, apparently by choice as well as necessity. Declining temperatures in fall appear to trigger migration to hibernation sites. Copperbelly water snakes are typically dormant from late October or November until sometime in April. They usually seek shelter in burrows or debris piles that are higher than the nearby wetlands. These snakes are migratory, moving from seasonally wet areas in spring and fall to permanently wet areas in summer. Please inform field crews that snakes should not be killed, harmed, or harassed. Any copperbelly water snake sightings should be reported to this office.

**Northern Long-eared Bat** - **Although no known hibernacula or roost trees have been documented within 1.5 miles of the project area, this activity occurs within the designated WNS zone (i.e., within 150 miles of positive counties/districts impacted by WNS. In addition, suitable habitat does exist in and outside of our 1.5 mile search buffer.** The USFWS has prepared a dichotomous key to help determine if this action may cause prohibited take of this bat. Please consult the USFWS Endangered Species Page for more information.

**Northern long-eared bat** (*M. septentrionalis*) numbers in the northeast US have declined up to 99 percent. Loss or degradation of summer habitat, wind turbines, disturbance to hibernacula, predation, and pesticides have contributed to declines in Northern long-eared bat populations. However, no other threat has been as severe to the decline as White-nose Syndrome (WNS). WNS is a fungus that thrives in the cold, damp conditions in caves and mines where bats hibernate. The disease is believed to disrupt the hibernation cycle by causing bats to repeatedly awake thereby depleting vital energy reserves. This species was federally listed in May 2015 primarily due to the threat from WNS.

Also called northern bat or northern myotis, this bat is distinguished from other *Myotis* species by its long ears. In Michigan, northern long-eared bats hibernate in abandoned mines and caves in the Upper Peninsula; they also commonly hibernate in the Tippy Dam spillway in Manistee County. This species is a regional migrant with migratory distance largely determined by locations of suitable hibernacula sites.

Northern long-eared bats typically roost and forage in forested areas. During the summer, these bats roost singly or in colonies underneath bark, in cavities or in crevices of both living and dead trees. These bats seem to select roost trees based on suitability to retain bark or provide cavities or crevices. Common roost trees in southern Lower Michigan included species of ash, elm and maple. Foraging occurs primarily in areas along woodland edges, woodland clearings and over small woodland ponds. Moths, beetles and small flies are common food items. Like all temperate bats this species typically produces only 1-2 young per year.

**Conservation strategies:** When there are no known roost trees or hibernacula in the project area, we encourage you to conduct tree-cutting activities and prescribed burns in forested areas during October 1 through March 31 when possible, but you are not required by the ESA to do so. When that is not possible, we encourage you to remove trees prior to June 1 or after July 31, as that will help to protect young bats that may be in forested areas, but are not yet able to fly.

**Eastern Prairie Fringed Orchid** - **there does not appear to be suitable habitat within the 1.5 mile search buffer.** The **Eastern prairie fringed orchid** (*Platanthera leucophaea*) occurs in a wide variety of habitats, from mesic prairie to wetlands such as sedge meadows, marsh edges, even bogs. It requires full sun for optimum growth and flowering and a grassy habitat with little or no woody encroachment. The white blossoms produce a heavy

fragrance at dusk that attracts many moths, including the primary pollinators of *P. leucophaea*, hawkmoths (Lepidoptera: Sphingidae). Hawkmoths are likely co-adapted pollinators, since their tongues are long enough to reach the nectar that lies deep in the spur of the flower. Capsules mature in September, releasing hundreds of thousands of airborne seeds. Plants may not flower every year but frequently produce only a single leaf above ground, possibly even becoming dormant when conditions are unsuitable, such as the onset of drought.

**Federal Candidate Species**

**Eastern Massasauga Rattlesnake** - **although there are no documented occurrences, there appears to be suitable habitat within the standard 1.5 mile search buffer.** Michigan's only venomous snake is found in a variety of wetland habitats including bogs, fens, shrub swamps, wet meadows, marshes, moist grasslands, wet prairies, and floodplain forests. **Eastern massasaugas** (*Sistrurus catenatus catenatus*) occur throughout the Lower Peninsula, but are not found in the Upper Peninsula. Populations in southern Michigan are typically associated with open wetlands, particularly prairie fens, while those in northern Michigan are better known from lowland coniferous forests, such as cedar swamps. These snakes normally overwinter in crayfish or small mammal burrows often close to the groundwater level and emerge in spring as water levels rise. During late spring, these snakes move into adjacent uplands they spend the warmer months foraging in shrubby fields and grasslands in search of mice and voles, their favorite food.

Often described as "shy and sluggish", these snakes avoid human confrontation and are not prone to strike, preferring to leave the area when they are threatened. However, like any wild animal, they will protect themselves from anything they see as a potential predator. Their short fangs can easily puncture skin and they do possess potent venom. Like many snakes, the first human reaction may be to kill the snake, but it is important to remember that all snakes play vital roles in the ecosystem. Some may eat harmful insects. Others like the massasauga, consider rodents a delicacy and help control their population. Snakes are also a part of a larger food web and can provide food to eagles, herons, and several mammals.

Any sightings of these snakes should be reported to the Michigan Department of Natural Resources, Wildlife Division. Reports can be submitted online at: Eastern Massasauga Observation Report. If possible, a photo of the live snake is also recommended. As a species of special concern, the massasauga is not protected under state or federal endangered species legislation, but it is becoming rare throughout its range and it **is protected under the authority of the Department of Natural Resources Director's Order, Regulations on the Take of Reptiles and Amphibians, dated October 12, 2001 (section 324 of PA 451).** Efforts to minimize impacts to the species now may eliminate the need to list the species in the future.

USFWS Section 7 Consultation Technical Assistance can be found at:
http://www.fws.gov/midwest/endangered/section7/sppranges/michigan-cty.html
The website offers step-by-step instructions to guide you through the Section 7 consultation process with prepared templates for documenting "no effect." as well as requesting concurrence on "may affect, but not likely to adversely affect" determinations.

Please let us know if you have questions.

Daria Hyde
Conservation Planner/Zoologist
hydeda@msu.edu
517-284-6189

# United States Department of the Interior

FISH AND WILDLIFE SERVICE

2651 Coolidge Road, Suite 101
East Lansing, Michigan 48823-6360

IN REPLY REFER TO:

September 11, 2017

Ms. Sarah Kulpa
HDR, Inc.
440 South Church Street
Suites 900&1000
Charlotte, North Carolina 28202-2075

Re: Constantine Hydroelectric Project (FERC No. 10661) Request for Concurrence on Threatened and Endangered Species Information

Dear Ms. Kulpa:

Thank you for your letter from August 15, 2017, requesting our concurrence that you have received an accurate report on federally threatened and endangered species and any critical habitat within the project's area of interest. The project is located on the St. Joseph River in St. Joseph County, Michigan.

The generated species list from IPaC outlined six species currently listed under the Endangered Species Act. We concur that the species list is accurate. If the project is modified or new information becomes available that indicates listed species or critical habitat may be within the project area, you should ask for an updated official species list.

We appreciate the opportunity to cooperate with you in conserving threatened and endangered species. If you have any questions regarding these comments, please contact Lisa Fischer, of this office, at (517) 351-5293 or lisa_fischer@fws.gov.

Sincerely,

Scott Hicks
Field Supervisor

# United States Department of the Interior

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Sincerely,

Scott Hicks
Field Supervisor

## Constantine Dam Hydroelectric Project, FERC Project No. P-10661

## Pre-Application Document Information Questionnaire for FERC Licensing

Indiana Michigan Power Company (I&M) is the Licensee and operator of the Constantine Hydroelectric Project (FERC No. P-10661) (Project), located along the St. Joseph River in St. Joseph County, Michigan. I&M, with assistance from HDR, Inc. (HDR), is beginning the Federal Energy Regulatory Commission (FERC) relicensing process for the Project, and HDR is providing assistance with preparation of a Pre-Application Document (PAD). The PAD provides the Federal Energy Regulatory Commission (FERC) and other entities with existing, relevant, and reasonably available information pertaining to the Project.

This information is intended to help identify items of interest and related information needs, develop study requests and study plans, and prepare documents related to the relicensing application. To prepare the PAD, I&M/HDR will use information in its possession and information obtained from others. This PAD Questionnaire will be used to help identify sources of existing, relevant, and reasonably available information that is not currently in I&M/HDR's possession.

Comments and/or questions regarding this request may be sent to Sarah Kulpa with HDR via email at sarah.kulpa@hdrinc.com or via phone at (704) 248-3620, or to Jonathan Magalski who represents I&M at jmmagalski@aep.com or via phone at (614) 716-2240.

1. Contact Information for person completing the questionnaire:

| | |
|---|---|
| **Name & Title:** | Liz Pelloso, wetland/environmental scientist |
| **Organization:** | USEPA Region 5 – NEPA Implementation Section |
| **Address:** | 77 W Jackson Blvd (E19-J) |
| | Chicago, IL 60604 |
| **Phone:** | 312-886-7425 |
| **Email Address:** | pelloso.elizabeth@epa.gov |

2. Do you know of any reasonably available materials or information related to the Project or the Project's environment?

☒ Yes *(If yes, please complete 2.a. thru 2.e.)* ☐ No *(If no, please go to 3.)*

a. Please indicate the specific resource area(s) for which you have information:

- ☐ Geology and soils
- ☒ Water resources
- ☐ Fish and aquatic resources
- ☐ Wildlife and botanical resources
- ☐ Wetlands, riparian, and littoral habitat
- ☐ Rare, threatened & endangered species
- ☐ Recreation and land use
- ☐ Aesthetic resources
- ☐ Cultural resources
- ☐ Socio-economic resources
- ☐ Tribal resources
- ☐ Other resource information

b. Please briefly describe the information or list available documents: *(Additional information may be provided on a separate page.)*

The St. Joseph River is listed as impaired on the Clean Water Act Section 303(d) list of impaired waterbodies in Michigan. Several impairments exist.

c. Where and how can HDR obtain this information?

*EPA recommends you access and use several of our databases to obtain environmental information pertaining to the project area:*

- NEPAssist: https://www.epa.gov/nepa/nepassist
- WATERS: https://www.epa.gov/waterdata/waters-watershed-assessment-tracking-environmental-results-system
- Envirofacts: https://www3.epa.gov/enviro/
- EJSCREEN: https://www.epa.gov/ejscreen
- Enviromapper: https://www.epa.gov/emefdata/em4ef.home
- Clean Water Act Section 303(d) impaired waters: https://www.epa.gov/exposure-assessment-models/303d-listed-impaired-waters
- NAAQS: http://www.epa.state.oh.us/dapc/general/naaqs.aspx and https://www.epa.gov/green-book

EPA also suggests I&M/HDR undertake early coordination as follows:

- Coordination with the U.S. Fish and Wildlife Service to determine if the project will have any detrimental effects on federally listed threatened or endangered species or their critical habitat.
- Initiation of a Rare Species Review with the Michigan Natural Features Inventory (MNFI). A Rare Species Review involves a refined review of the rare species in the immediate vicinity of your project. The Rare Species Review corresponds to the Endangered Species Assessment previously provided by the Wildlife Division of the Michigan Department of Natural Resources (MDNR), as MDNR ceased to accept review requests to the Environmental Review (ER) Program after

September 16, 2011. These consultations are required to determine if any Federally- or state-listed endangered or threatened species are present within the project boundaries, and if project implementation would or could detrimentally affect any listed species or their critical habitat. As on-site surveys vary by species, and in certain instances must be completed during specific short seasonal timeframes, EPA strongly encourages timely coordination with USFWS and MNFI.

d. Please provide the names of other persons in your organization whom you wish to designate for a potential follow-up contact by HDR's representative for the resource area(s) checked above. If you know of others who are not part of your organization but who may have relevant information, please provide their name(s) and contact information as well. ***(Additional contacts may be provided on a separate page.)***

**Representative Contact Information**

| | |
|---|---|
| **Name & Title:** | Ken Westlake, Chief, NEPA Implementation Section |
| **Organization:** | USEPA Region 5 – NEPA Implementation Section |
| **Address:** | 77 W Jackson Blvd (E19-J) |
| | Chicago, IL 60604 |
| **Phone:** | 312-886-2910 |
| **Email Address:** | westlake.kenneth@epa.gov |

e. Based on the resources listed in 2a., are you aware of any specific issues pertaining to the identified resource area(s) such as water quality, wildlife habitat, endangered species or cultural resources that may be affected by the Project operations? ***(Additional information may be provided on a separate page.)***

☒ Yes *(Please list specific issues below)* ☐ No

| **Resource Area** | **Specific issue** |
|---|---|
| The St. Joseph River is already listed as impaired. | The project should not further degrade water quality. |
| | |
| | |
| | |
| | |
| | |
| | |

3. Do you or your organization plan to participate in the Dam licensing process?

☒ Yes *(Please list specific issues below)* ☐ No

We are interested in your comments. If you have comments and/or questions regarding the Project, the Pre-Application Document, or FERC licensing, please note them below:

| |
|---|
| EPA will participate by reviewing NEPA documents required to be completed by FERC. |
| Please send future NEPA documents to EPA's NEPA program in Chicago for review. |
| This request was received by EPA R5's NEPA Program via US Mail on 8/24/2017. |
| Today's date: 9/20/2017 |

STATE OF MICHIGAN
DEPARTMENT OF NATURAL RESOURCES
LANSING

RICK SNYDER
GOVERNOR

KEITH CREAGH
DIRECTOR

September 20, 2017

Ms. Sarah Kulpa
Project Engineer
HDR
440 S. Church Street, Suites 900 & 1000
Charlotte, NC 28202-2075

**RE: CONSTANTINE HYDROELECTRIC PROJECT (FERC NO. 10661) RELICENSING PAD INFORMATION REQUST**

Dear Ms. Kulpa,

The Michigan Department of Natural Resources (Department) is in receipt of your information request for the relicensing of the Constantine Hydroelectric Project (project) on the Saint Joseph River, Saint Joseph County, Michigan. From your we will try to direct you to sources to help you move forward on relicensing the Constantine Hydroelectric Project.

I have enclosed a copy of the MDNR Fisheries Division's relicensing study guidelines to help you determine what items you will need to begin preparing for the licensing process from our perspective.

For the fisheries resources related to the project, I suggest you contact Mr. Brian Gunderman, Southern Lake Michigan Management Unit Supervisor at our Plainwell Office (269-685-6851 or GundermanB@michigan.gov). Mr. Gunderman can provide you more specific fisheries information for the vicinity of the project. In addition, you may want to review the Saint Joseph River Assessment. You can download a copy from the following site:

www.michigandnr.com/PUBLICATIONS/PDFS/ifr/ifrlibra/Special/Reports/sr24.pdf

For specific recreational needs, you can contact Parks and Recreation Division. For more general information on recreation trends and needs, The Michigan Statewide Comprehensive Outdoor Recreation Plan 2013–2017 can be found online at:

http://www.michigan.gov/documents/dnr/SCORPfnlrprt_513881_7.pdf

For the current and existing recreational facilities and use, you will need to acquire that information from the project owner.

For wildlife resources you will need to contact Wildlife Division for any plans or species of concern to the Department. You should be able to get that information from the Plainwell Customer Service Center, Plainwell, Michigan (269-685-6851).

For endangered species distribution or communities of special concern in the area, you should contact Michigan Natural Features Inventory (https://mnfi.anr.msu.edu) . They should be able to help you determine if any endangered or species of special concern are in the area of influence of the project.

For soils and geology, you'll need to contact the Soil Conservation Service and review their soil maps. They may also have information on underlying geology.

Wetland determinations can be acquired through the US Fish and Wildlife Service. I believe they have resources on wetland delineation online.

For coastal zone management, you'll have to contact Michigan Department of Environmental Quality (MDEQ) and the Army Corps of Engineers. They should be able to inform you where the delineations between regulatory authorities are drawn.

You will also need to contact MDEQ for the requirements monitoring water quality and any studies you may need to conduct for applying for the Water Quality Certification that FERC will require for the license.

If you have any further questions or need clarification, please feel free to contact me at: Michigan Department of Natural Resources, Mio Field Office, 191 S. Mt. Tom Rd., Mio, MI 48647.

Sincerely,

Kyle Kruger
Senior Fisheries Biologist
Habitat Assessment Unit
FISHERIES DIVISION
(989) 826-3211 x 7073

cc Brian Gunderman, Fisheries, Plainwell
Enclosures

# Michigan Department of Natural Resources
# Recommended Review Criteria
# And Study Guidance
# For the Federal Energy Regulatory Commission
# Licensing Process
# 2003

**Table of Contents**

MICHIGAN DEPARTMENT OF NATURAL RESOURCES RECOMMENDED
REVIEW CRITERIA AND STUDY GUIDANCE
FOR THE FEDERAL ENERGY REGULATORY COMMISSION LICENSING PROCESS
February 4, 2003

The following are Michigan Department of Natural Resources (MDNR) review criteria, data needs and study guidelines for the Federal Energy Regulatory Commission (FERC) licensing process. These guidelines are intended to facilitate the FERC licensing and re-licensing process by informing licensees of MDNR positions and by detailing studies that will fulfill and facilitate this process. These criteria and study guidelines are not binding on the applicant and are intended to be used in conjunction with applicable FERC licensing statutes, rules, and regulations. These criteria and guidelines were developed in 1986, and revised in 1988, 1989, 1990, 1991, 1992, 1994, 1996, 1998, 2001, and 2003. This document will be reviewed and resubmitted to FERC on an annual basis.

## MDNR Positions

1) Plant Operation

A) Daily Operation

i) Facilities with Riverine Tailwaters - We will recommend to FERC that the project(s) be operated as a run-of-river project (instantaneous inflow equals instantaneous outflow). The project will be limited to pond levels fluctuating $\leq$ 3" over the entire year.

ii) Facilities with Reservoir Tailwaters - We may recommend that FERC allow some minimal peaking operations with site-specific minimum flow and ramping rate requirements.

B) Operational Verification

We will recommend that data to verify the operation of the plant be provided and funded by the licensee. This will be accomplished using continuous gage stations on the reservoir to determine instantaneous headwater elevation, and continuous gage stations below the reservoir to determine instantaneous tailwater elevation. To provide independent data on project operation, we will recommend that the licensee fund the installation and maintenance of the appropriate number of United States Geological Survey (USGS) gages in the vicinity of the project. We may also recommend to FERC additional site-specific needs on a case by case basis.

2) Habitat

A) Comparative Aquatic Habitat Studies

We will recommend to FERC that all facilities with riverine tailwaters that choose not to operate their facilities as run-of-river operations conduct the following studies:

- Instream Flow Incremental Methodology (IFIM) studies on downstream river reaches for a comparative analysis of aquatic habitat under the proposed project operation(s) to run-of-river project operation
- Habitat Evaluation Procedures (HEP) studies on the reservoir to compare reservoir habitat under the proposed project operation(s) to run-of-river project operation

These studies are to assure that the appropriate amount of data is collected for an analysis of all operating scenarios. However, we will recommend run-of-river operation at all facilities to FERC in our final comments.

3) Fisheries

A) Fish Passage

We will recommend to FERC that appropriately designed, constructed, and operated fish passage facilities (for anadromous or other migratory fish species) be provided at all FERC projects. The recommendations for fish passage will consist either of fish passage facility construction and operation by the FERC licensee or dam removal. These recommendations will include time frames that may range from immediate to future implementation, depending upon the management goals for the river system. We will recommend that all passage and protective devices be evaluated for their effectiveness. MDNR may recommend that an escrow account be established to provide funds for the fish passage facility design and construction.

The purpose of fish passage is to: 1) regain access to spawning areas; 2) allow for the establishment of self-sustaining fish stocks; and 3) establish "special" fisheries of either state-wide or regional importance. In addition to upstream passage, downstream protection will be required at all projects.

B) Turbine and Spillway Entrainment and Mortality

We will recommend to FERC that the project be operated in a manner such that the entrainment and subsequent turbine and spillway mortality of fish will be minimized. To meet this request, the licensee can either immediately install protective devices to prevent entrainment and mortality or may decide to determine the extent of the problem via studies. The

results of all studies and protective devices will be evaluated to determine minimum mitigation measures and effectiveness.

4) Woody Debris Transport and Management

We will recommend to FERC that the licensee develop a plan to improve aquatic habitat by maintaining and increasing the amount of large woody debris and vegetative material at the project. This woody debris plan shall be consistent with FERC boating safety requirements and any fish/watershed management plans.

5) Wildlife

We will recommend to FERC that all projects maintain and enhance wildlife resources found on their lands and develop plans to implement wildlife management.

6) Recreation

We will recommend to FERC that all project lands be open to public access. Project lands shall include boat launching facilities on the reservoir, fishing access sites and related facilities on the tailwater area, a safe marked canoe portage around the dam, and other facilities which MDNR views as necessary to optimize recreation on the project. All facilities should conform to the Americans with Disabilities Act (ADA).

All new recreation facilities should be constructed and maintained by the licensee. If public recreation facilities exist on the project, MDNR will recommend to FERC that the licensee provide maintenance funds or actual maintenance for those sites. If only private or leased facilities exist, MDNR will recommend to FERC that the licensee purchase the land and associated facilities. If this cannot be accomplished, MDNR will recommend that the licensee either purchase easements of lands or provide for free access to the project. The licensee always has the option to purchase and operate outright any recreational facility that it intends to use to satisfy FERC requirements. All recreational facilities used to meet FERC licensing requirements should be free of charge for public use.

7) Water Quality

Prior to development of a 401 water quality certification, we will recommend to FERC that flows for the facility, in addition to minimum flow, be maintained to alleviate any water quality problems that may be

identified as having an adverse effect on restoring and maintaining productive aquatic resources.

The conditions that are established in the Section 401 certificate should govern the project operation in respect to water quality.

8) Coastal Zone

Federal Consistency is the Coastal Zone Management Act requirement that federal actions that have reasonably foreseeable effects on any land or water use or natural resource of the coastal zone (also referred to as coastal uses or resources, or coastal effects) must be consistent with the enforceable policies of a coastal state's federally approved Coastal Management Program.

Typically the Coastal Zone buffer extends not less than 1000' landward from the ordinary high water mark of the Great Lakes, but in many cases it extends significantly further inland (including coastal lakes and large river systems). The coastal zone does include the water areas around the coast such as rivers and lakes.

9) Mitigation Plan

We recommend to FERC that the licensee develop a mitigation plan to alleviate any adverse impacts and compensate for the loss of riverine habitat caused by plant operation. This plan should include a continuous program of analyzing and monitoring all planning, construction, and operational activities with respect to adverse impacts on the river ecosystem. We will also recommend that the licensee implement all measures necessary to correct any harmful effects identified during this ongoing monitoring program as a result of constructing, rehabilitating, operating, and maintaining the project.

## Overview of Project Information and Impact Data Needs

1) Plant Operation and Engineering
   - A) Present plant design of all facilities
   - B) Daily operation and maintenance records
   - D) Plant hydraulic characteristics

2) Fisheries (Aquatic) Habitat
   - A) Hydrographic maps of the reservoir and the tailwater areas, to include 500 meters downstream of the project
   - B) An aquatic habitat inventory, may include IFIM and HEP studies if required by the proposed project
   - C) A determination of the impact of plant operation on habitat availability and quality

3) Fisheries Data
   - A) Fisheries community inventory of the riverine and pond areas, to include endangered, threatened, and sensitive species
   - B) The adequacy of the any existing fish passage facility
   - C) The impact of plant operations on the existing fish passage structure
   - D) If the project proposes to study the facility entrainment/mortality problem, a two-stage study plan should be used to examine the extent of the problem: 1) A reconnaissance study to determine the gross extent of facility entrainment and mortality, which should include turbines and spillways; and 2) If necessary, a more intensive study to keenly determine facility entrainment and mortality of fish. Our guidelines for these studies are attached in Appendix 4.
   - E) Aquatic habitat management plans

4) Wildlife (Terrestrial) Habitat
   - A) Terrestrial and wetland habitat inventory
   - B) Determination of the impact of plant operation on habitat availability and quality
   - C) Forest management plans of the project area
   - D) Topographical maps which show all project lands

5) Wildlife
   - A) Wildlife community inventory of the riverine and pond areas, including endangered, threatened, and sensitive species
   - B) Wildlife management plans in the project area, as determined by MDNR personnel

6) Recreation
   A) Inventory of recreational facilities in the project area, including written descriptions, maps, and diagrams of locations. This information will be used by MDNR to evaluate adequacy of facilities.

7) Water Quality
   A) All NPDES permits, Act 307, and Super Fund sites in the drainage basin should be identified
   B) All water management models and plans should be detailed
   C) The impact of the proposed project operation on water quality should be determined

8) Coastal Zone
   A) Federal and State Consistency must be determined under the Coastal Zone Management Act.
   B) Lands which fall within the Coastal Zone buffer should be identified.

## Project Operation and Engineering Information

Project Design Information

1) The present plant design for all facilities should include the following details:
   A) Plant engineering designs
   B) Type, number, kW, blade number, RPM, and design of turbines
   C) Elevation, peripheral velocity, and diameter of the runners
   D) Minimum and maximum blade clearance between runner and wicket gates for Francis Type Units, and runner and the ring for Kaplan Type Units
   E) Cavitation at the plant
   F) Project map which includes all lands, roads (including condition), and right of ways
   G) An updated turbine output-water use and spillway/gate rating curves for all project components

Daily Operation and Maintenance Records

1) The present daily operation of facilities should include :
   A) kW
   B) Wicket gate openings
   C) Efficiency
   D) Hours of use of each unit
   E) Bypass gate openings for the previous and current year, as well as low, average, and high water years
   F) Use mean, minimum, and maximum daily data for kW, wicket gate openings, efficiency, each unit's hours of use, and openings of bypass gates. This information should be used to calculate weekly mean values as well as mean weekly minimum and maximum values.

2) A record for the last 5 years of plant outages and length of outages

3) Any plans for plant operation automation, construction, major maintenance, or plant retirement

4) An estimation of the longevity of the existing facilities including powerhouse(s), penstock(s), reservoir(s) capacity, dam(s)

5) All dam safety reports should be summarized and made available to MDNR.

Project Hydrology Information

1) The daily fluctuation in the tailwater, any by-passed side channels, and reservoir should be reported for the previous year as well as average, high, and low water years. This should be reported in terms of discharge and elevation using mean, minimum, and maximum daily data to calculate weekly mean values, and mean weekly minimum and maximum values.

2) Monthly flow duration curves should be estimated for the river "without" plant operation and "with" plant operation for the assessment of minimum flow needs.

3) The operational compliance plan for all project operating conditions needs to thorough and should include continuous (at least hourly basis) monitoring water level gages in the reservoirs, headwater, and tailwater areas. Specifications for all gaging equipment should be completely described and submitted along with the provisions to provide for both the establishment and maintenance of a new continuous monitoring USGS gage or the maintenance of one existing continuous monitoring USGS gaging at each operating facility of the project. Plans should also include procedures for calibration and maintenance of gages. All other site-specific needs as determined by MDNR should also be documented in the compliance plan.

**Fisheries (Aquatic) Habitat Information**

Study Area

1. To include all reservoirs and stream reaches (including tributaries) from one-quarter mile above the high water level of the uppermost reservoir on the system to the downstream site of no project influence, as defined as follows:

   A. Mainstem of the River- From a point one-quarter of a mile upstream of the normal high water mark of the impoundment and downstream to the normal high water mark of the dam on the river. If the project has acceptable data that indicates that project influence zone is less than the recommended zone, the zone may be adjusted to reflect these changes in influence zone boundary after consultation and concurrence from the MDNR.

Hydrographic Maps

1. Hydrographic maps of the reservoir, any de-watered river reach, and the tailwater areas (to include 500 meters downstream of the facility) are required of all sites with transects every 10 meters. If recent existing maps are available, data verification studies can be substituted for mapping with MDNR concurrence. Additional FERC study justification is in Appendix 1.

   Maps should delineate the following habitat inventory data:

   A. Reservoirs - Predominant substrate (as classified using the Modified Wentworth Scale) and emergent and submergent plant beds (classified by dominant plant species complex) should be mapped on the hydrographic maps at all water levels. Other structure items such as logs, log complexes, and rock piles should also be denoted on the reservoir map.

   B. Tailwater areas - Predominant substrate (as classified using the Modified Wentworth Scale) and emergent and submergent plant beds (classified by dominant plant species complex) should be mapped on the hydrographic maps at all water levels. Other structure items such as logs, log complexes, and rock piles should also be denoted on the tailwater map.

   C. Other Project Impacted River Reaches - Predominant substrate, aquatic vegetation, and approximate mean depths should be indicated on river maps for all water levels.

Aquatic Habitat Inventory

1. Comparative Riverine Habitat Studies - Comparative riverine habitat studies will be recommended at all sites with riverine tailwaters that will not be operated as run-of-river facilities and that have no by-passed river reaches. The objective of this study is to compare resource impacts of the proposed project operation(s) to run-of-river operations. IFIM studies will be recommended at all sites unless another methodology is accepted by the MDNR. Additional study justification is in Appendix 2.

   The following guidelines should be followed in development of an IFIM study plan:

   A) The IFIM study plan will require close agency coordination on the following items:

      i. Study Purpose

      ii. Study Boundaries - The IFIM study boundaries should include all riverine tailwaters to the next lake or impoundment. In addition, we recommend that a pre-study be conducted determine the extent of downstream water fluctuations from each hydroelectric facility operations. This will be used to delineate modeling boundaries on the river.

      iii. Time Constraints –on dates for critical decisions and field studies.

      iv. Specific Study Objectives - Concurrence with MDNR needs to occur on the type of study and expected results. We suggest the following as an objective statement:

         The objective of this study is to determine the optimal flow regime from the hydroelectric facility to protect and enhance the aquatic resources of the river system. The IFIM study should provide recommendations that, at a minimum, protect the instantaneous needs of the aquatic community and provide data on the habitat usability of the river system(s) under a number of alternative operational schemes, including the proposed peaking operation and the strict run-of-river (instantaneous inflow equals instantaneous outflow) modes.

      v. Target Species - We need to discuss the target species desired and come to an agreement on those species.

      vi. Methodology - After agreeing upon the target species, we need to determine what habitat suitability criteria are available, which curves will

be used, if any modifications are needed, and what data is needed. Decisions will also need to be made jointly on which models will be used in the study. We recommend that the attached two-flow analysis guidelines be followed to examine peaking impacts (Appendix 3).

vii. Hydrologic Baseline - After compilation of all available data on the river system, we need to jointly discuss and determine the "base" hydrologic conditions for present conditions.

viii. Stream Segmentation and Study Area Selection - We need to scope the river system and determine the logical study boundaries for each segment from a macro and microhabitat perspective. We need to determine and agree where microhabitat and macrohabitat measures are to be taken.

B) We recommend that the IFIM scoping document be organized in the following manner:

i. Introduction - To include:
- Purpose of the study
- Study objectives
- Existing management objectives for each section of river
- Important background data
- Existing flow agreements

ii. Study Plan - To include:
- general approach
- Study area and reaches with detailed maps and reasoning

iii. Study Tasks - To include:
- Study area reconnaissance and macrohabitat segmentation
- Habitat characterization and reach selections
- Hydraulic data acquisition (includes transect selection and placement procedures with maps, candidate transect location, measurement methods and materials which include target measurement discharges, anticipated logistics and field activities schedule, acquisition and handling of field data)
- Hydraulic modeling approach (includes microhabitat simulations, evaluation species/life species and suitability criteria, models used and two flow analysis technique)
- Data analysis and reporting (includes model output composites and report preparation)

iv. Study Schedule

v. Study Plan Agreement

2. Comparative Reservoir Level Fluctuation Studies - Comparative Reservoir level fluctuation and habitat studies will be recommended at all sites that are not to be operated as run-of-river facilities. The study objective is to compare resource impacts of the proposed project operation(s) to run-of-river operations. Habitat Evaluation Procedures (HEP) methodology, to predict changes in fish community structure based on habitat changes, will be recommended at all sites unless another methodology is accepted by the MDNR. Additional justification is attached as Appendix 2.

3. By-passed River Channel Minimum Flow Studies - On all projects that have by-passed river channels, we recommend that minimum flow studies be conducted on all by-passed river channels. IFIM studies will be recommended at all sites unless another methodology is accepted by the MDNR. Additional justification is attached as Appendix 2.

4. All aquatic habitat management plans should be identified

**Fisheries**

Aquatic Species Inventory

1. For all aquatic species, subdivide the systems by reservoirs and streams. Identify the relative abundance and species composition of each system using all available data sources which should include MDNR Fisheries, Michigan Department of Environmental Quality (MDEQ) Surface Water Quality Division, U.S. Fish and Wildlife Service, U.S. Environmental Protection Agency, Scientific Publications, and Universities. If acceptable survey data is unavailable, the necessary surveys will be conducted according to MDNR standards.

Threatened, Endangered, and Sensitive Species

1. Species to include all Federal listed, proposed, candidate, endangered, or threatened species. The list should also include Federal species of management concern, State-listed endangered or threatened species, and State species of special concern

2. For all species, determine whether they are present and map their location if possible. If existing surveys are unavailable, new surveys should be conducted according to MDNR standards. Surveys should be limited to identifying those species likely to occur within the available habitat types.

Upstream Fish Passage Device Inventory and Guidelines

1. All currently installed fish passage devices, both upstream and downstream, should be documented with operational designs included.

2. The current use of all upstream and downstream fish passage facilities should be described and include the fish species and number using the facility for all years that data are available.

3. The current project impact on any upstream or downstream fish passage facility should be documented. Additional studies on the adequacy of the facility may be required on a site-specific basis.

4. Fish passage designs, which should include upstream and downstream passage as well as prevention of turbine entrainment, will be recommended at some facilities as elected by MDNR. All passage designs should be developed using the fish species of interest as determined by MDNR. We will recommend that all passage devices be evaluated for their effectiveness.

Downstream Fish Passage Guidelines

1. We will recommend to FERC that plant operation minimize entrainment and subsequent turbine and spillway mortality of fish. The project can either immediately install protective devices to prevent entrainment and mortality or decide to determine entrainment and mortality via studies. We will recommend that all passage and protective devices be evaluated for their effectiveness along with minimum mitigation for any fish losses.

2. We recommend that the any turbine entrainment and mortality study follow the attached MDNR guidelines (Appendix 4). Additional justification for this study is provided in Appendix 5.

**Woody Debris Transport and Management**

1. We will recommend to FERC that the woody debris plan include procedures for:

   A) Passing large woody debris and vegetative material collected near the project trashracks and log booms into each project's tailrace

   B) Leaving currently existing instream and impoundment large woody debris unless it directly interferes with safe project operation

   C) Installing instream or impoundment structures for fish habitat or addition of large woody debris to the river below the projects when opportunities arise.

**Wildlife (Terrestrial) Habitat Information**

Study Area

1. For terrestrial species and associated habitat, include all lands within the project boundaries and influence zone.

2. For wetland and aquatic species, include reservoirs and stream reaches from one-quarter mile above the high water level of the uppermost reservoir on the system to the downstream site of no project influence, as defined as follows:

   A. Mainstem of the River- From a point one-quarter of a mile upstream of the normal high water mark of the impoundment and downstream to the normal high water mark of the dam on the river. If the project has acceptable data that indicates that project influence zone is less than the recommended zone, the zone may be adjusted to reflect these changes in influence zone boundary after consultation and concurrence from the MDNR.

3. For fish-eating birds including, but not limited to bald eagles, ospreys, herons, and other colonial nesting birds, incorporate an area of one mile on either side of the stream reaches and reservoirs defined under item 2.A.

Terrestrial Habitat Inventory

1. Collect and map terrestrial habitat data using MDNR approved classification systems. Provide percentage and acreage of each habitat type in the application

2. Collect and map wetland habitat data using USFWS mapping system (Cowardin et al.). Provide percentage and acreage of each wetland type in the application

4. Identify all forest management plans and terrestrial management plans

Shoreline Management Plan

1. Create a detailed shoreline management plan for licensee-owned lands and easements abutting project waters (within 1000 feet of the high water elevation for lakes and within 300 feet of the high water elevation for streams) that are determined to be needed for project-related purposes, such as providing public access for recreation or protecting sensitive, unique, or scenic areas. The plan shall include, but need not be limited to:

   (1) a description of those lands covered by the plan including a drawing or map showing their location relative to project facilities or project waters (those lands shall be included within the project boundary);

(2) for each parcel of shoreline covered by the plan, a description of how the land will be managed and used;

(3) a critical habitat inventory of the shoreline;

(4) development of strategies and methods to educate property owners and reservoir users about the beneficial values of shoreline vegetation and shallow water habitats;

(5) a discussion of how the plan addresses the following considerations: selection of lands that are largely undisturbed and free from any observable past alterations that may have impaired their ability to provide the necessary protection and enhancement of wildlife and plant species; selection of additional lands to provide additional buffering capacity against adjacent land disturbances in ecologically sensitive areas; and selection of lands that would protect existing upper-canopy trees and their suitability for raptor use;

(6) development standards which include a setback of 200 feet from ordinary high water mark for all structures except piers, boat hoists, and boathouses; shoreline vegetation removal in the 35 foot strip adjacent to the ordinary high water mark will be limited; no more than 30 feet in any 100 feet may be clear cut (clear cut zone is limited to 10 feet in width); only 30% of the vegetation between 35 and 75 feet of the ordinary high water mark may be removed; and require that land uses be screened as viewed from the water and that the scenic beauty of the shoreline be maintained

(7) an implementation schedule.

The licensee shall prepare the plan after consultation with the Michigan Department of Natural Resources (MDNR), the U.S. Fish and Wildlife Service (USFWS), and the Wisconsin Department of Natural Resources (WDNR) and U.S. Forest Service (USFS) where applicable.

**Wildlife**

Wildlife Species Inventory

1. For wetland and aquatic species, subdivide the reservoirs and stream reaches into segments. Identify the relative abundance (common, uncommon, absent) of species in each area. Species should include water birds (seasonal designations will be needed for migratory use), marsh birds and the following mammals: otter, mink, muskrat and beaver. In particular, efforts should be made to determine the number of furbearers, water birds, and marsh birds breeding in the project influence zone and the nest or den locations. All existing data bases maintained by MDNR, WDNR (where applicable), USFWS, EPA, Michigan Breeding Bird Atlas, and universities should be examined and data compiled for this section. If no surveys exist, then field surveys should be conducted according to MDNR standards.

2. The following information may be recommended to evaluate timber management or other changes proposed to terrestrial habitat depending upon the project characteristics:

   a) The relative abundance of the following management indicator species: black throated green warbler, chestnut-sided warbler, eastern bluebird, pileated woodpecker, ruffed grouse, and white-tailed deer

   b) The relative abundance of owls and raptors not previously identified as threatened or sensitive

Threatened, Endangered and Sensitive Species

1. Species to include all Federal listed, proposed, candidate, endangered, or threatened species. The list should also include Federal species of management concern, State-listed endangered or threatened species, and State species of special concern

2. For all species, determine whether they are present and map their location if possible. If existing surveys are unavailable, new surveys should be conducted during the reproductive season (e.g., nesting, flowering) appropriate to each species. Surveys should be limited to identifying those species likely to occur within the available habitat types.

Bald Eagle Information

1. Map both active and inactive nest sites

2. Identify available habitat (described as relatively undisturbed areas with super-canopy trees)

3. Identify potential habitat areas within project boundaries, this will include areas where timber management could be used to develop appropriate habitat

4. Conduct a winter survey to determine over-wintering use and roost sites

5. Conduct a nest watch program during breeding seasons on at least two active nest sites per river system in order to determine the following information:
   - Extent of human disturbance to nest (identified by distance to nest site)
   - Food base (species and relative abundance)
   - Foraging locations on the reservoir or river systems
   - Roost sites, especially those used for foraging

6. For all other nest sites, including inactive nests, determine the extent of human disturbance by analyzing distances to roads, trails, rights of way, and other human activities

**Recreation Information**

Study Area

1. To include all reservoirs and stream reaches (including tributaries) from one-quarter mile above the high water level of the uppermost reservoir on the system to the downstream site of no project influence, as defined as follows:

   A. Mainstem of the River- From a point one-quarter of a mile upstream of the normal high water mark of the impoundment and downstream to the normal high water mark of the dam on the river. If the project has acceptable data that indicates that project influence zone is less than the recommended zone, the zone may be adjusted to reflect these changes in influence zone boundary after consultation and concurrence from the MDNR.

2. Project county areas for certain sections of the off-site inventory. This should include surrounding counties.

Data Needs

1) For the above project area, the following information is needed for each recreation site (developed and undeveloped):

   a) Map location

   b) Map key should indicate:
      1) Type of facility (see list below)
      2) Provider of facility (State, Company, Private)
      3) Size of facility (area, capacity)
      4) Level of use (heavy, light)
      5) Condition of site

   c) Summary table of facility type, condition, and provider

   d) Non-company facilities in the project boundary and their relationship (if any) to the company

   e) Commercial operators in the project boundary (e.g., liveries, bait shops, campgrounds serving the project area) and their name, location, size, etc.

2) A general description of relevant off-site recreation facilities within the county or counties where the project is located, along with a table of numerical totals of facilities and a description of major off site facilities. This description is for the purpose of examining overall recreational use, availability of similar recreational opportunities, and recreational experience demand of the facility influence zone.

3) Identify any recreation plans that the licensee has written for the project.

4) Identify and summarize all existing data on recreational resources in the project influence area. Data sources include MDNR, Wisconsin Department of Natural Resources (WDNR) where applicable, U.S. Fish and Wildlife Service (USFWS), U.S. Environmental Protection Agency (EPA), local governments, and universities.

5) A study will need to be conducted to determine the present and future use of all recreation facilities.

Recreation Facility Type Categories
Shore fishing site
Fishing dock or pier
Boat launch with ramp
Carry-in small boat access
Canoe portage
Beach for swimming or sunbathing
Trail (ORV, hiking, horse, fishing, other)
ORV/snowmobile area
Picnic sites
Campsites
Playgrounds
General use site (use for a variety of purposes)
Support facilities (rest rooms, fish cleaning stations etc.)
Other

## APPENDIX 1. MDNR Justification for Mapping Studies

The following is the Michigan Department of Natural Resources (MDNR) justification for the recommended habitat mapping and hydrographic study at your facilities. This document fulfills the requirement of Subpart B, Section 16.8

(i)-(vi) of the recently adopted FERC rules governing resource agency recommendations for necessary studies and information relating to a recommendation for the comparative habitat study.

Data Recommended For Analysis of Issue by MDNR

1. Provide quantitative data that documents the extent of each habitat type in the tailwater and the reservoir. If the above information is not available, then the applicant should arrange to collect the information.

Determination Basis of Resource Issue

Hydropower operations impact our water resources by: 1) altering normal stream flows for generating purposes; 2) de-watering river channels by diversion or peaking operations; and 3) fluctuating reservoir levels for either peaking operations or for storage purposes. All of the above influences could be found at your project. The impacts of hydro operations that potentially could exist at your facility include the flushing of riverine reaches by generating with flood flows during the peak power periods and de-watering of riverine reaches at other periods. The de-watering of riverine habitat reduces the algae and aquatic plant life which are important as food for aquatic insects and which provide important fish nursery areas. Further, it reduces fish growth and survival by reducing available habitat and stranding fish, and changes the benthic invertebrate community to smaller, less useful, fish foods. The fluctuations cause downstream erosion and sedimentation that destroys fish habitat and can disrupt fish migratory patterns. In addition, hydro operations cause reservoir fluctuations that de-water and disrupt fisheries habitat, which could be up to 3 foot on a daily basis, in the same fashion as the tailwater habitats.

MDNR needs quantitative habitat data to examine the severity and extent of habitat loss under any proposed operational mode. Without a baseline map of depth contours and habitat types in the impoundments and tailwaters, it is impossible for our agency to determine the impacts of the present or proposed operational modes. These maps will provide the background data for recommendations on operations at the projects that will adequately protect this river system.

Fisheries Goals and Objectives

MDNR's overall aquatic habitat protection goal is:

To minimize and mitigate the negative impacts of hydroelectric facilities by operating these projects in a fashion that offers aquatic resources and users near natural riverine and reservoir conditions, protects and maintains aquatic environments and fish communities and rehabilitates those now degraded.

1) Riverine tailwater facilities to be operated in a run-of-river mode

2) Reservoir tailwater facilities to be operated with minimal tailwater and headwater fluctuation

3) Bypassed and/or diverted river facilities to be operated in a manner which maintains healthy aquatic resources of the river

Michigan's river systems provide a significant fishery and public trust resource. The fisheries resource includes important populations of game fish which include largemouth bass, smallmouth bass, northern pike, walleye, bluegills, yellow perch, black crappie, rock bass, channel catfish, suckers (including redhorse) and bullheads. The habitat availability for aquatic species is limited by the operational mode of project.

Our specific fisheries habitat goal at your facility is to protect and enhance the fish communities in the river and tributaries by maximizing and stabilizing available aquatic habitat. In our agency's professional opinion, this is best accomplished by recommending run-of-river-operating conditions. Run-of-river is defined as instantaneous inflow to the project impoundment equals instantaneous outflow downstream of the project tailwater.

Study Methodology Appropriateness

The recommended study methodologies for predominant habitat type inventory and hydrographic maps of the impoundment and tailwater are essential. This baseline data will allow MDNR the opportunity to examine the impacts of water development and to recommend further study plans if necessary. This standard baseline information will also produce documentation of habitat types and depth contours that are needed to analyze the impacts of hydro projects.

Study Data Utilization

This study will provide initial data on the potential availability of fish habitat under a range of operating modes. This information will serve as qualifying data for our

recommendations regarding IFIM and HEP study designs, if necessary. Ultimately, this data will allow for the determination of the operational mode under which the project will best protect the aquatic environment.

Our goals for protection and enhancement of the fish community call for the prevention of resource damage from hydroelectric generation and the optimal long term maintenance of the riverine fish community by maximizing and stabilizing the amount of available aquatic habitat. These data would provide the necessary background data to make the appropriate project operation recommendations to protect aquatic habitat in this river system.

## APPENDIX 2. MDNR Justification for Comparative Habitat Studies

For those projects that propose peaking operation, the following is the Michigan Department of Natural Resources (MDNR) justification for the recommended

comparative habitat studies using Instream Flow Incremental Methodology (IFIM) and Habitat Evaluation Procedures (HEP). This explanation fulfills the requirement of Subpart B, Section 16.8 (i)-(vi) of the recently adopted FERC rules governing resource agency recommendations for necessary studies and information relating to a recommendation for the comparative habitat study.

Data Recommended For Analysis of Issue by MDNR

1. Provide quantitative data that documents habitat availability in the tailwater and the reservoir under the proposed operational mode, run-of-river, and other operational modes. If the above information is not available, then the applicant should arrange to collect the information.

Determination Basis of Resource Issue

At a minimum, hydropower operations impact our water resources by: 1) altering normal stream flows for generating purposes; 2) de-watering river channels by diversion or peaking operations; and 3) fluctuating reservoir levels for either peaking operations or for storage purposes. The impacts of peaking and semi-peaking operations include the flushing of riverine reaches by generating with flood flows during the peak power periods and de-watering of riverine reaches at other periods. The de-watering of riverine habitat reduces the algae and aquatic plant life that are important as food for aquatic insects and provide important fish nursery areas. Further, it reduces fish growth and survival by reducing available habitat, stranding fish, and changing the benthic invertebrate community to smaller, less useful, fish foods. The fluctuations cause downstream erosion and sedimentation that destroy fish habitat and can disrupt fish migratory patterns. In addition, peaking operations cause reservoir and tailwater fluctuations (up to 3 foot per day), resulting in de-watered and disrupted fisheries habitat.

The resource agencies have requested that all hydro projects operate in a run-of-river mode, defined as instantaneous inflow equals instantaneous outflow, with essentially no pond elevation fluctuation. If you decide to operate your project in a peaking mode, the MDNR will need quantitative habitat data to examine the severity and extent of habitat loss under the proposed operational mode of semi-peaking. Both IFIM and HEP allow for meaningful comparisons of operational strategies and will provide the background data for recommendations on the project operation that will adequately protect this river system.

Fisheries Goals and Objectives

The Michigan Department of Natural Resources' overall aquatic habitat protection goal is:

To minimize and mitigate the negative impacts of hydroelectric facilities by operating these projects in a fashion that offers aquatic resources and users near natural riverine and reservoir conditions, protects and maintains aquatic environments and fish communities and rehabilitates those now degraded.

1) Riverine tailwater facilities to be operated in a run-of-river mode

2) Reservoir tailwater facilities to be operated with minimal tailwater and headwater fluctuation

3) Bypassed and/or diverted river facilities to be operated in a manner which maintains healthy aquatic resources of the river

Michigan's river systems provide a significant fishery and public trust resource. The fisheries resource includes important populations of game fish which include largemouth bass, smallmouth bass, northern pike, walleye, bluegills, yellow perch, black crappie, rock bass, channel catfish, suckers (including redhorse) and bullheads. The present habitat availability would be limited by any proposed peaking operational mode at the project.

Our specific fisheries habitat goal at your facility is to protect and enhance the fish community in the river and its tributaries by maximizing and stabilizing available aquatic habitat. This is best accomplished by recommending run-of-river-operating conditions. Run-of-river is defined as instantaneous inflow to the project impoundment equals instantaneous outflow downstream of the project tailwater

Study Methodology Appropriateness

The recommended study methodologies IFIM and HEP are commonly used techniques to examine the impacts of water development. Both methodologies will produce documentation on habitat availability under a range of operational strategies that are needed to analyze the impacts of these facilities.

Study Data Utilization

This study will provide data on the potential availability of fish habitat under a range of operating modes that will provide for meaningful comparisons of the options available to the resource agencies and the city. These data will provide the basis for our recommendations on which operation of the project will best protect the aquatic environment.
Our goals of protection and enhancement of the fish community would be furthered by the prevention of resource damage from hydroelectric generation

and provide for the optimal long term maintenance of the riverine fish community by maximizing and stabilizing the amount of available aquatic habitat. This study would provide the necessary data to make the appropriate project operation recommendations to protect aquatic habitat in this river system.

## APPENDIX 3. MDNR IFIM Two Flow Analysis Guidelines October 1990

Introduction

Peaking operations cause impacts at both the low and high flow events. Low flow events mainly limit habitat by reducing both stream depth (de-watering habitat and stranding organisms) and water velocity. High flow events mainly limit habitat by increasing velocities beyond that used by organisms. The use of optimal flows from HABTAT and/or HABTAV for benthos and fish habitat only addresses low flow impacts, thus two flow analyses are needed to examine operational impacts at low and high flows. The following guidelines are for two-flow peaking analysis as discussed in Milhous et al. (1989).

Recommended Analytical Methodology

The intent in this type of study is to: 1) determine the actual peaking impact when movements ranges are known or to bracket the peaking impact when the actual movement ranges for species in question is unknown; and 2) compare the peaking operation to run-of-river conditions. Run-of-river should be simulated using the average daily discharge at peaking operations. The bracketing should be done by documenting the most conservative and liberal estimate of peaking impacts from both life stage (the movement question) and study area perspectives (independence of study reach question).

Two approaches to handle movement concerns for individual life stages should be used and are dependent upon whether the life stage or species was classified as a mobile or non-mobile. Non-mobile life stages and species are benthos, spawning and fry. Juvenile and adult life stages are should be classified as mobile. Recreational activities should also be classified as mobile. These approaches follow the procedures in Milhous et al. (1989) and communications with Milhous and Bartholow (personal communication, 1990). These approaches are described below:

Non-mobile species and life stages Peaking impacts on non-mobile life stages should be determined using the HABEF program. This program uses output files from HABTAT or HABTAV and examines WUA for each cell at both the generation and base flow. The lowest WUA of the two flows is then assigned to the cell for the summation of WUA for the reach. This approach assumes that no migration or movement occurs between cells, a realistic assumption for the non-mobile life stages and species. Run-of-river WUA should be determined using HABTAT or HABTAV results for the particular flow of interest. WUA percentage loss estimates for both the reach and whole study area should be calculated by dividing the appropriate peaking WUA (as determined by HABEF) by the appropriate run-of-river WUA (as determined by HABTAT) at each possible peaking discharge and multiplying these figures by 100.

Mobile life stages The impacts on mobile life stages with unknown home ranges should be determined using a combination of HABEF output and a comparison of whole reach generation and base flow WUA from HABTAT or HABTAV. The impacts should bracketed by presenting the results of the two extremes of movement which are: 1) no migration between cells or reaches as modeled by HABEF; and 2) complete migration through the entire reach as modeled by comparing HABTAT or HABTAV WUA results for generation and base flow for each case and using the minimum value of the two to represent the peaking impact. The actual impact has to be somewhere within this impact window between these two scenarios as it is unlikely that juvenile and adult fish will not move at all in response to changes in stage and flow, and it is equally unlikely that fish will travel through an entire reach multiple times per day in response to the changes in stage and flow.

The individual reach WUA estimate of peaking impacts that allows total movement within the reach should be determined using the minimum of generation and base flow WUA from HABTAT or HABTAV for a given reach. The no migration within a reach case WUA should be determined using HABEF output for a given reach as described above for the non-mobile species and life stages. Individual reach run-of-river WUA and percent loss for a individual reach should be determined as described above for the non-mobile species and life stages.

When the actual home ranges are known and are not greater than the cross sectional distance of the transects, then HABTAM can be used as the best estimate of the peaking impact. Individual reach run-of-river WUA and percent loss for a individual reach should be determined as described above for the non-mobile species and life stages.

Literature Cited

Milhous, R.T., M.A. Updike, and D.M. Schnieder. 1989. Physical Habitat Simulation System Reference Manual - Version II. Instream Flow Information Paper No. 26. U.S. Fish and Wildlife Service Biological Report 89 (16). v.p.

## APPENDIX 4. MDNR Fish Entrainment and Turbine Mortality Study Plan Guidelines

Introduction

The Michigan Department of Natural Resources (MDNR) has determined that a study to quantify the magnitude of potential turbine-induced injury or mortality on the fishery resources is needed. The overall study has been broken down into two main components: monitoring fish entrainment and mortality rates and controlled turbine mortality experiments. The fish entrainment and mortality rate study (Phase 1) should be conducted initially. Based on the results of Phase 1 studies, the need for a more formalized turbine mortality study (Phase 2) will be determined. A phased approach to addressing the turbine mortality issue will preclude a potential applicant from conducting a, perhaps, unnecessary turbine mortality study. The MDNR may accept a potential applicant's proposal to conduct Phase 1 and Phase 2 studies concurrently, however. The MDNR may recommend that components of the studies be redone if the studies are not conducted as agreed to or if the results are not representative.

The potential applicant may opt to implement fish protective measures at the outset of after Phase 1 studies. In this case, the potential applicant will be required to conduct studies to develop appropriate mitigation measures. In all cases, licensees will be required to monitor the effectiveness of fish protective or mitigation measures once they are implemented. These studies will need to be coordinated with the MDNR.

The guidelines presented below identify the critical elements that must be included in a detailed plan of study developed by the potential applicant. Specific details, such as design of sampling equipment, sampling schedules, etc., will require coordination with the MDNR. The final study plan must be approved by the MDNR before studies are begun.

This document contains exact technical specifications that should be used to design an entrainment study. These specifications should be used in obtaining bid and study designs from consultants. These specifications are minimum specifications subject to discussion only when site-specific conditions warrant.

## Phase 1 - Assessment of Fish Entrainment and Preliminary Mortality Rates

All entrainment studies should be designed to meet the following specific data objectives:

1. Estimates of the total number of each fish species (greater than one and a half inches) passing through the project during the study;

2. Estimates of the size distribution of fish entrained;

3. Estimates of the vertical and horizontal distribution of fish passing through the intake in one meter increments (pertains to hydroacoustic studies only); and

4. Estimates of the daily and hourly fish passage numbers through each turbine.

When an applicant is requested to perform an entrainment study, the protocol should be as follows:

1. Agency study specifications (this document) are provided to the applicant. MDNR and applicants may hold initial meetings to clarify the design or address specific concerns. Applicants should use the agency specifications as basis for obtaining consultants bids or scopes of work.

2. Applicant or consultant perform proof-of-concept study (POC) to verify that the procedures, equipment, and analyses proposed by the consultant will, in fact, provide the information promised

3. MDNR and applicant meet to review POC study results and develop scope of work for the entrainment study

4. Applicant conducts the entrainment study according to an agency-approved scope of work

Proof of Concept Study (POC)

To verify that the proposed study design will provide the data required for evaluating entrainment, a "proof-of-concept" (POC) study is required. The purpose of the POC is to determine the appropriate methodology to use at the site to determine entrainment. If hydro acoustics are proposed, then the POC should be designed to determine whether entrainment can be accurately estimated using this methodology and include tracking of live test fish. Ground truth netting should be used in the POC study to show an initial relationship between hydro acoustic sampling and tailwater netting. If a netting only study is proposed, the POC should show that entrainment can be accurately estimated using this method.

The POC study should be conducted for at least a two-week period to verify the applicability of the methodology selected. This study must be completed and reviewed by MDNR prior to the initiation of the scope of work. Each POC study must specifically address all of the technical and design parameters that are listed below. The procedures used must be fully documented.

A test-netting program must be conducted over a two-week period. This should include the installation and monitoring of the nets described below, a net efficiency study, and a visual evaluation by a SCUBA diver to confirm that the net support system is adequate and that the tailrace area is free of any obstructions that could tear the net or effect net fishability. Measures should be taken to prevent downstream infiltration of fish in areas where the net seal is not sufficient. In particular, the bottom seal should be examined as this is the area where infiltration problems usually occur.

The tailwater net efficiency study should include the introduction of at least 150 marked fish of various sizes and species into the turbine(s). A recapture rate of at least 70% of these fish is necessary to show that the nets are fishing properly. MDNR representatives should be notified prior to this test so they may observe and evaluate the operation.

Actual Entrainment Study

The following specific technical and design parameters must be incorporated into all studies. If site-specific conditions warrant the modification of these parameters, full justification and details of alternative methods must be provided to the MDNR. The MDNR must approve any deviation from the original plan of study prior to the start of the study.

If a hydro acoustic assessment is proposed:

1. Transducers should be placed so that at least 50% of the intake openings in all turbine bays that are sampled. Each transducer should operate for a period of no less than thirty minutes every hour. Near and far field dead zones must be fully measured and accounted for in consideration of the 50% coverage and vertical distribution requirements. Monitoring must be conducted 24 hours a day for at least one full year.

2. Single beam transducers should be used because they are less sensitive to noise and provide wide coverage. However, one dual beam transducer per site is needed to develop a target strength distribution and effective beam angle.

3. The pulse width used should be 0.5 milliseconds or less

4. A scientific echo sounder with a frequency of at least 400 kHz should be used

5. An accurate 40 log R Time Varied Gain (TVG) must be used to account for range-related signal loss

6. The echo signal processor-sampling rate must be no less than 15,000 samples per second

7. The pulse repetition rate must be 10-15 pulses per second to ensure that targets will be fully tracked

8. All transducers and equipment will be properly calibrated. The actual equipment used in the study must be calibrated using standard Naval Lab hydrophones before and after the study. If the study lasts more than one year, this calibration should be conducted annually. In situ calibration should be conducted at the start and end of the study as well as every three months during the study. This calibration consists of cable and transducer impedance measurements, TVG shape, and standard target return. All calibration measurements must be maintained and reported with the study results.

9. Studies must use the echo-counting analysis technique unless the proportion of multiple targets exceeds 5%. Echo integration techniques are not recommended and are rarely necessary.

10. All data extrapolations and calculations must use the effective beam width as measured at calibration based on the target strengths appropriate for the species and sizes of fish expected to be seen at that site. Calculations based on manufacturers nominal beam widths are not acceptable.

11. Instrument specifications must be provided to the MDNR and copies of all equipment manuals must be available upon request.

12. Target-tracking/recognition processing can be used to differentiate fish from noise and debris. All tracking parameters, including filters must be agreed on up front in the scope of the work. In situ field measurements of representative fish targets should be conducted as part of the POC study.

13. A direct fish-counting fish flux estimation procedure is recommended because it directly incorporates target tracking. However, a mean density analysis procedure may be used if acceptable target recognition

adjustments can be incorporated. In situ field trials may be needed to determine the efficacy of the two methods.

14. Target strength distributions and length relationships used to develop length distributions and effective beam width calculations must be fully documented. In situ lab measurements of batches of representative species and size fish should be conducted as part of the POC study. Correct all-aspect equations should be used where appropriate.

15. Site-specific noise levels must be adequately measured and mapped for each turbine bay. This should be conducted as part of the POC study. These should be incorporated into transducer placement plans and detection level estimates. The minimum effective detection threshold should be a signal return corresponding to a fish 1.5" in length.

16. All data extrapolation procedures must be fully documented prior to study initiation and use statistically valid procedures.

17. All hydro acoustics sampling must be accompanied by an appropriate level of tailwater netting (see below) to determine size ranges and species composition of fish seen in the hydro acoustics.

18. Hydro acoustics entrainment estimates must be correlated to net catch. Discrepancies suggest a design or configuration deficiency and should be addressed prior to study start. Calculations must be done at a minimum on a monthly basis with analysis of hourly counts on the time step, so those problems can be detected and corrected. These calculations should be included in the bimonthly reports.

Criteria for netting:

1. If a netting only study is proposed, at least 72 hours of netting at each unit should be done each week during the ice-free period (April-October). During winter months (November-March), 72 hours of sampling should be conducted on a biweekly basis assuming safe sampling conditions exist. If netting is done to ground truth hydroacoustics, a minimum of 24 hours should be done each week, April-October, and 24 hours biweekly, November-March. Sampling effort should be stratified on a weekly basis to make sure there is adequate coverage of all time periods.

2. The recovery net(s) should be constructed of dark colored (to minimize fish avoidance) 1/4 inch bar mesh, knotless nylon, with a removable live box attached to the cod end of the net. A fyke net should be incorporated into the net, near the live box, to prevent escapement. The effects of the

recovery net(s) and live box on the mortality or injury of fish must be determined through suitably designed experiments. Divers should inspect all nets to ensure nets are fishing according to specifications. Nets should be appropriately marked immediately following inspection so that proper placement can be gauged each time the net is installed.

3. The recovery net(s) should sample the entire turbine discharge. A marked fish study should be conducted to determine the capture efficiency of the recovery net(s) and to obtain preliminary turbine mortality estimates. The capture efficiency of the net(s) must be quantified by releasing known lot sizes of marked live and dead fish at the intake. At least two capture efficiency/turbine mortality bouts should be done in addition to the bout conducted during the POC study. Species should be determined in consultation with the MDNR. The capture efficiency of the recovery net(s) must be based on the release and subsequent recovery of marked live and dead fish. Preliminary estimates of turbine mortality will be based on the release of marked live fish; live fish used in the preliminary turbine mortality study may be used concurrently as part of the study to quantify capture efficiency of the recovery net(s). The two size classes of each species, juvenile and adult, as defined in consultation with the MDNR, should be used. Three groups of fish of each species and size group are needed for these studies: 1) a control group of 10 fish per species and size class to examine handling and marking mortality, 2) a net control group of 10 fish per species and size class to examine net mortality, and 3) a test group of 50 fish per species and size class to examine turbine passage and net efficiency. Fish may be of hatchery, wild, or commercial catch origin.

   Suitably designed assemblies to introduce live and dead fish at the turbine intake must be used. Fish must be released at an appropriate location within the intake chamber to ensure entrainment of all released fish.

   All fish used in the marked fish studies should be held for a minimum of 48 hours to determine latent mortality.

4. If more than one operational turbine unit exists, selection of the units to be sampled should be done through consultation with the MDNR, but with the overall goal of estimating entrainment to ± 10%.

5. Installed nets should be flushed before the tests begin to remove as many "resident" fish as possible from the draft tube/tailwater area.
6. The species, size, and condition (live, dead, or injured) of all captured fish should be recorded. A randomly selected 10 percent of all fish used in the marked fish studies should be examined for internal injuries. Voucher

samples of each species captured should be preserved so that MDNR can verify species identifications.

For all studies:

1. Environmental variables - data that should be recorded during the collection of each sample include a total river discharge (in cubic feet per second), percent gate opening (load level) and discharge (in cfs) of each sampled unit and of other operational turbine units, water temperature, dissolved oxygen, and transparency (Secchi disk), and other variables as identified by the MDNR. Also a velocity vs. depth profile to include vertical and horizontal velocity profiles should be obtained from directly upstream of the trash racks during low, average, and high water discharges.

2. Data analysis - a description of all statistical tests proposed for data analyses, including assumptions and how such assumptions will be addressed, significance levels, confidence levels, etc. must be provided and approved by the MDNR prior to study initiation.

3. Reports

   A. Written progress reports should be provided to the MDNR on a bimonthly basis throughout the study period, and should include a description of any intentional or unintentional deviations from the approved study plan.

   B. Reports should contain the following data:

      1. Hydro acoustic data

         a. Amount of time sampled by day and explanations of any down time in sampling
         b. Total daily fish passage
         c. Daily fish passage by hour
         d. Fish passage by location in the water column and across the intake structure
         e. Fish passage by size

      2. Netting data

         a. Amount of time sampled by day and explanation of any down time in sampling
         b. All fish data should be broken down by species and should include numbers and size (length)

c. Data should be presented to on an hourly, daily, monthly and annual basis, and by net location.
d. All fish with external and internal turbine passage damage should be documented

3. Environmental and Plant Parameters

a. Daily mean and hourly river flow in cubic feet per second (cfs)
b. Daily mean and hourly river temperature (°F) and dissolved oxygen (mg/l)
c. Daily mean and hourly headwater level
d. An hourly description of plant operation (units operating, each unit's discharge, % gate opening and Kw)
e. A daily summary of weather

C. A final study report is to be submitted to the MDNR within three (3) months after completion of the study.

D. The MDNR will provide written comments within three (3) months after receipt of the final report and will include any recommendations for further study, i.e., Phase 2, or for the need of appropriate fish exclusion or mitigation measures.

**Phase 2 Study- Assessment of Turbine Mortality and Injury to Fish**

This study is designed to develop intensive data on actual turbine-induced injury and mortality, based on the release and recovery of known lot sizes of marked

test and control fish. Phase 2 studies are needed to more accurately quantify the occurrence and extent of turbine-related impacts to entrained fish.

1. Fish species of concern - target species and sizes to be studied will be determined through further consultation with the MDNR.

2. Sampling equipment

   A. Suitably designed assemblies to introduce test and control fish at the turbine intake and discharge must be used. Test fish must be released at an appropriate location within the intake chamber to ensure entrainment of all released fish.

   B. Total recovery net(s), if used, are to be located in the tailrace(s) as described above.

   C. Ichthyoplankton sampling equipment details will be provided by the MDNR if ichthyoplankton studies are deemed necessary.

3. Sampling protocol

   A. Fish injury and mortality experiments should be appropriately frequency as determined through consultation with the MDNR. In addition, the experimental design should include provisions for adequate sample sizes and an adequate number of replicates. Experiments should be conducted over the full range of normal project operating conditions, e.g., peak and off-peak.

   B. Live test and control fish selected from the same lot of fish should be acclimated to the project water for at least 24 hours. A third group of fish not subjected to the test and control procedures, selected from the same lot of control fish, should be held separately in holding cages in the tailrace to permit an assessment of non-test impacts.

   C. The effects of the fish introduction assemblies, the recovery net(s), and fish marking techniques (e.g., fin clipping, dye immersion) on the injury and mortality of test and control fish must be determined.

   D. The condition of captured fish should be categorized according to the following criteria.
   - Live with no visible external injury
   - Live with obvious external injury
   - Dead with no visible external injury
   - Dead with obvious external injury

Live test and control fish (with and without apparent external injury) recovered from the recovery net(s) should be held 48 hours in suitably designed holding cages secured in the tailrace to determine latent mortality of fish. Fish should be segregated by species and size to minimize stress and predation.

E. The number, species, condition, and size of all fish released and recovered in each trial must be recorded.

4. Environmental variables - see above

5. Data analysis - see above

6. Reports - see above. The MDNR will provide written comments within three (3) months after receipt of the final report and will include any recommendations for the need for appropriate fish exclusion or mitigation measures.

## APPENDIX 5. MDNR Turbine Entrainment and Mortality Study Justification

The following is the Michigan Department of Natural Resources (MDNR) justification for the recommended turbine entrainment and mortality study at your facility. This document fulfills the requirement of Subpart B, Section 16.8 (i)-(vi)

of the recently adopted FERC rules governing resource agency recommendations for necessary studies and information relating to a recommendation for a standard turbine mortality/entrainment study.

Data Recommended For Analysis of Issue by MDNR

1. Provide quantitative estimates of the number, species composition and size distribution of fish being entrained at the project; or acceptable quantitative estimates of the above parameters from a comparable project; or acceptable quantitative evidence that installed protective devices are preventing fish entrainment.

2. Provide quantitative estimates of the mortality rate of fish being entrained at the project and the source of the mortality (turbine mortality, impingement on intake screens, etc.); or acceptable quantitative estimates of the above parameters from a comparable project; or acceptable quantitative evidence that installed protective devices are preventing fish mortalities.

   If the above information is not available, then the applicant should arrange to collect the information using recommended survey procedures provided by the MDNR.

Determination Basis of Resource Issue

Numerous studies have been conducted to determine the extent of fish entrainment at hydroelectric projects nationwide with many of them summarized in Eicher et al. 1987. Unfortunately, most of these studies have been conducted at West Coast facilities and deal with migrating salmonid smolts. A number of entrainment studies have also been done on the east coast, targeting on anadromous species such as shad, striped bass, alewife, blueback herring and Atlantic salmon. These studies have shown that mortalities can be significant and range between 5-90% per facility. Very few entrainment studies have been done in the Midwest, where the hydroelectric facilities and their design, fish community composition and fish sizes are very different from those examined in the literature. Thus, little is known concerning turbine entrainment and mortality in the Midwest.

In the past, many fisheries biologists felt that the fish species indicative of Midwestern rivers were fairly sedentary and did not move long distances. These "resident" fish have recently been found to move long distances putting themselves at risk from turbine mortality. Studies by WDNR personnel on walleye in the Mississippi River, smallmouth bass in the Embarrass River, and channel catfish in the lower Wisconsin River all have shown movement of each of these species in excess of 30 miles over one year. In addition, studies on the

threatened lake sturgeon in the Menominee River by Tom Thuemler have shown yearly movements of at least 20 miles with some radio tagged fish moving through hydroelectric facilities.

Summaries of the few recent entrainment studies on Midwestern rivers have shown large amounts of movement through hydroelectric facilities. The Morrow Dam Study, using tailwater netting, on the Kalamazoo River in Michigan estimated 45,987 fish passing the facility consisting of 21 species, ranging in size form 1.8 to 32.4 inches, in 6.5 months of sampling. Hydro acoustic studies at the Park Mill facility on the Menominee River showed daily movements of from 216 to 10,017 fish and hydro acoustic/netting studies at the Vanceburg hydroelectric plant on the Ohio River estimated hourly movement at from 282 to 6,000 fish.

The magnitude of resident Midwestern fish movements, available Midwestern data on entrainment and the wide range of known fish mortalities have led us to determine that turbine entrainment and mortality occurs at our facilities. Legally, all fish are property of the State of Michigan, under Public Act 165 of 1929 and any fish killed by any non-legal means are to be compensated for. Therefore, we are requesting a turbine entrainment and mortality study be conducted at your facility to determine the nature and degree of mortality, and to determine the necessary mitigation for those losses.

Fisheries Goals and Objectives

The overall Michigan Department of Natural Resources' goal on hydroelectric facility entrainment and mortality is:

> To minimize and mitigate for the loss of fish at every hydroelectric facility from either turbine or spillway passage to protect and maintain fish communities, and rehabilitate those now degraded.

Michigan’s river systems provide a significant fishery and public trust resource. The fisheries resource includes important populations of game fish which include largemouth bass, smallmouth bass, northern pike, walleye, bluegills, yellow perch, black crappie, rock bass, channel catfish, suckers (including redhorse) and bullheads. Our fisheries goal in respect to entrainment and mortality at your facilities is to protect and enhance the fish community in the river and its tributaries by minimizing and mitigating for fish losses from hydroelectric facility entrainment and mortality.

Study Methodology Appropriateness

In order to adequately determine turbine entrainment and mortality a direct sampling system is needed. The joint agency, MDNR, WDNR and the U.S. Fish

and Wildlife Service, sampling guidelines use a two-phase approach. Phase I is designed to determine entrainment and to estimate the magnitude of mortality. If mortality is found to be a problem then more detailed mortality studies are recommended as part of Phase II. Our hope and intent is that most of the studies should stop at Phase I, instead of requiring both phases to be done at once.

This overall methodology is preferable and less costly than trying to determine whole system effects. Whole system effects would require detailed and long-term population dynamics of each member of the fish community. Turbine entrainment and mortality data would still need to be collected and compared to natural mortality and year class strengths. By using just direct sampling techniques, mitigation measures can be more easily determined, and the very large and costly sampling effort can be avoided. This overall methodology also follows the methodology the State of Michigan uses to determine mitigation for fish kills. For example, if farmer X kills fish in drain A, we require direct compensation for those fish killed not a river system wide impact statement as these fish are property of the State of Michigan killed in an illegal method. We view turbine mortality as a chronic fish kill situation.

This overall methodology has been used before in numerous turbine mortality studies including Morrow Pond, Park Mill and Vanceburg studies. The actual methodologies recommended, hydro acoustics and tailwater netting, are commonly used as can be seen in the review by Eicher et al. (1987).

Study Data Utilization

This study will provide data on the numbers entrained and the mortality of each member of the fish community of the river and its tributaries at your hydroelectric facility. These data will then be converted to a mitigation value by either a lost angler day determination or some other acceptable technique. These mitigation values will be used to determine if the problem is severe enough to require screening, which is always an alternative to the study, or some other mitigation to replace the lost resource value.

Our goals of protection and enhancement of the coolwater fish community would be furthered by the replacement of lost resource values from hydroelectric generation if the losses are not severe enough to warrant protective devices or the complete exclusion of fish, by protective devices, if the losses are significant. Thus, no net loss of the fisheries resource value would occur in either case because of the results of this study.

Literature Cited

Eicher, G.J., M.C. Bell, C.J. Campbell, R.E. Craven and M.A. Wert. 1987. Turbine Related Fish Mortality: Review and Evaluation of Studies. Electric Power Research Institute Report No. AP-5480.

# Constantine Hydroelectric Project (FERC Project No. 10661)
# Relicensing Pre-Application Document Information Questionnaire

Indiana Michigan Power Company (I&M) is the Licensee and operator of the Constantine Hydroelectric Project (FERC No. 10661) (Project), located along the St. Joseph River in St. Joseph County, Michigan (see attached map). I&M, with assistance from HDR, Inc. (HDR), is beginning the Federal Energy Regulatory Commission (FERC) relicensing process for the Project. Accordingly, I&M is preparing a Pre-Application Document (PAD). The PAD provides FERC and other entities with existing, relevant, and reasonably available information pertaining to the Project.

This information is intended to help identify items of interest and related information needs, develop study requests and study plans, and prepare documents related to analyzing the relicensing application to be prepared by I&M. To prepare the PAD, I&M will use information in its possession and information obtained from others. This PAD Questionnaire will be used by I&M to help identify sources of existing, relevant, and reasonably available information that is not currently in I&M's possession. Comments and/or questions regarding this request may be sent to Sarah Kulpa with HDR via email at sarah.kulpa@hdrinc.com or via phone at (704) 248-3620, or to Jonathan Magalski who represents I&M at jmmagalski@aep.com or via phone at (614) 716-2240.

Please return this questionnaire in the enclosed, self-addressed, stamped envelope within 30 days of receipt to allow for any follow-up contact by I&M's or HDR's representative that may be needed. Not responding within 30 days indicates that you are not aware of any existing, relevant, and reasonably available information that describes the existing Project environment or known potential impacts of the Project.

I&M and HDR respectfully request the following information:

1. Information about person completing the questionnaire:

| | |
|---|---|
| Name & Title | Bob Stuber, Fisheries Biologist<br>Michigan Hydropower Relicensing Coalition Consultant |
| Organization | Michigan Hydro Relicensing Coalition (MHRC) |
| Address | 1620 High Street<br>Traverse City, MI 49684 |
| Phone | 231-775-4321 |

2. Do you or your organization know of existing, relevant and reasonably available information that describes the existing Constantine Hydroelectric Project's

environment (i.e., information regarding the St. Joseph River in or close to the Constantine Hydroelectric Project)?

_x__ Yes (*If yes, please complete 2a through 2e)* __ No (*If no, go to 3*)

a. If yes, please circle the specific resource area(s) that the information relates to:

- ■ Geology and soils
- ■ Water resources
- ■ Fish and aquatic resources
- ■ Wildlife and botanical resources
- ■ Wetlands, riparian, and littoral habitat
- ■ Rare, threatened & endangered species
- ■ Recreation and land use
- ■ Aesthetic resources
- ■ Cultural resources
- ■ Socio-economic resources
- ■ Tribal resources
- ■ Other resource information

b. Please briefly describe the information referenced above or list available documents *(additional information may be provided on page 4 of this questionnaire).*

Michigan Department of Natural Resources St. Joseph River Fisheries Assessment
Fisheries Special Report No. 24 (Wesley and Duffy 1999)

c. Where can I&M obtain this information?

Michigan Department of Natural Resources Fisheries Division Library (http://www.michigan.gov/dnr/0,4570,7-153-10364_52259_19056---,00.html)

Please also refer to Michigan Department of Natural Resources Fisheries Division correspondence dated September 20, 2017 (Kyle Kruger to Ms. Sarah Kulpa HDR). Listing of issues and areas of study for PAD.

d. Please indicate whether there is a specific representative you wish to designate for a potential follow-up contact by I&M's or HDR's representative for the resource area(s) checked above *(additional information may be provided on page 4 of this questionnaire).*

**Representative Contact Information**

| | |
|---|---|
| Name | |
| Address | |
| Phone | |
| Email Address | |

| | |
|---|---|
| Name | |
| Address | |
| Phone | |
| Email Address | |

e. Based on the specific resources listed in 2a, are you aware of any specific issues or improvements pertaining to the identified resource area(s)? *(Additional information may be provided on page 4 of this questionnaire.)*

___ Yes *(please list specific issues below)* _x__ No

| Resource Area | Specific Issue |
|---|---|
| | |
| | |
| | |
| | |
| | |

3. Do you or your organization plan to participate in the Constantine Hydroelectric Project relicensing proceeding? _x_ Yes ___ No

4. We are interested in your comments. If you have comments and/or questions regarding the Constantine Hydroelectric Project or the relicensing process, please provide below. In addition, this questionnaire has been sent to the people/organizations shown on the attached distribution list; please let us know if

there is anyone else you believe should receive this questionnaire that is not included on the attached distribution list.

*(Comments and/or questions may be sent via email to: sarah.kulpa@hdrinc.com or jmmagalski@aep.com)*

As noted above, please return this questionnaire in the enclosed, self-addressed, stamped envelope within 30 days of receipt to allow for any follow-up contact by I&M's or HDR's representative that may be needed. Not responding within 30 days indicates that you are not aware of any existing, relevant, and reasonably available information that describes the existing Project environment or known potential impacts of the Project.

FOREST COUNTY POTAWATOMI
NATURAL RESOURCES
5320 WENSAUT LANE • PO BOX 340 • CRANDON, WI 54520 • (715) 478-7222 • Fax: (715) 478-7225

October 26, 2017

Coleen Corballis
Midwest Branch
Division of Hydropower Licensing
Federal Energy Regulatory Commission
888 First Street N.E.
Washington D.C. 20426

Re: Project Number 10661-000-MI, Constantine Hydroelectric Project in the Village of Constantine, St. Joseph County, Michigan.

Dear Ms. Corballis,

Pursuant to consultation under Section 106 of the National Historic Preservation Act (1966 as amended) the Forest County Potawatomi as a Federally Recognized Native American Tribe reserves the right to comment on Federal undertakings, as defined under the act. Thank you for your participation in the process.

This response is regarding the project mention above. The Tribal Historic Preservation Office for the Forest County Potawatomi Community has submitted comments to this project which may contain information exempt from the Freedom of Information Act under Section 304 of the National Historic Preservation Act.

Respectfully,

Michael LaRonge
Tribal Historic Preservation Officer
Natural Resources Department
Forest County Potawatomi Community
5320 Wensaut Lane
P.O. Box 340
Crandon, Wisconsin 54520
Phone: 715-478-7354
Fax: 715-478-7225
Email: Michael.LaRonge@FCPotawatomi-nsn.gov

Document Content(s)

Miami Tribe of Oklahoma, Miami, OK.
October 26, 2017

Re: Constantine Project No. 10661-000-MI – Comments of the Miami Tribe of Oklahoma

To Whom It May Concern:

Aya, kikwehsitoole – I show you respect. My name is Diane Hunter, and I am the Tribal Historic Preservation Officer for the Federally Recognized Miami Tribe of Oklahoma. In this capacity, I am the Miami Tribe's point of contact for all Section 106 issues.

The Miami Tribe offers no objection to the above-mentioned project at this time, as we are not currently aware of existing documentation directly linking a specific Miami cultural or historic site to the project site. However, as this site is within the aboriginal homelands of the Miami Tribe, if any human remains or Native American cultural items falling under the Native American Graves Protection and Repatriation Act (NAGPRA) or archaeological evidence is discovered during any phase of this project, the Miami Tribe requests immediate consultation with the entity of jurisdiction for the location of discovery. In such a case, please contact me at 918-541-8966 or by email at dhunter@miamination.com to initiate consultation.

The Miami Tribe accepts the invitation to serve as a consulting party to the proposed project. In my capacity as Tribal Historic Preservation Officer I am the point of contact for consultation.

Respectfully,

Diane Hunter
Tribal Historic Preservation Officer
Miami Tribe of Oklahoma
P.O. Box 1326
Miami, OK 74355

Document Content(s)

# Constantine Hydroelectric Project (FERC Project No. 10661)
# Relicensing Pre-Application Document Information Questionnaire

Indiana Michigan Power Company (I&M) is the Licensee and operator of the Constantine Hydroelectric Project (FERC No. 10661) (Project), located along the St. Joseph River in St. Joseph County, Michigan (see attached map). I&M, with assistance from HDR, Inc. (HDR), is beginning the Federal Energy Regulatory Commission (FERC) relicensing process for the Project. Accordingly, I&M is preparing a Pre-Application Document (PAD). The PAD provides FERC and other entities with existing, relevant, and reasonably available information pertaining to the Project.

This information is intended to help identify items of interest and related information needs, develop study requests and study plans, and prepare documents related to analyzing the relicensing application to be prepared by I&M. To prepare the PAD, I&M will use information in its possession and information obtained from others. This PAD Questionnaire will be used by I&M to help identify sources of existing, relevant, and reasonably available information that is not currently in I&M's possession. Comments and/or questions regarding this request may be sent to Sarah Kulpa with HDR via email at sarah.kulpa@hdrinc.com or via phone at (704) 248-3620, or to Jonathan Magalski who represents I&M at jmmagalski@aep.com or via phone at (614) 716-2240.

Please return this questionnaire in the enclosed, self-addressed, stamped envelope within 30 days of receipt to allow for any follow-up contact by I&M's or HDR's representative that may be needed. Not responding within 30 days indicates that you are not aware of any existing, relevant, and reasonably available information that describes the existing Project environment or known potential impacts of the Project.

I&M and HDR respectfully request the following information:

1. Information about person completing the questionnaire:

| | |
|---|---|
| Name & Title | Martin J. Rosek<br>State Soil Scientist |
| Organization | USDA - Natural Resources Conservation Service |
| Address | 3001 Coolidge Road<br>East Lansing, MI 48823 |
| Phone | 517-324-5241 |
| Email Address | martin.rosek@mi.usda.gov |

2. Do you or your organization know of existing, relevant and reasonably available information that describes the existing Constantine Hydroelectric Project's environment (i.e., information regarding the St. Joseph River in or close to the Constantine Hydroelectric Project)?

___ Yes (*If yes, please complete 2a through 2e)* _x_No (*If no, go to 3*)

a. If yes, please circle the specific resource area(s) that the information relates to:

- Geology and soils
- Water resources
- Fish and aquatic resources
- Wildlife and botanical resources
- Wetlands, riparian, and littoral habitat
- Rare, threatened & endangered species
- Recreation and land use
- Aesthetic resources
- Cultural resources
- Socio-economic resources
- Tribal resources
- Other resource information

b. Please briefly describe the information referenced above or list available documents *(additional information may be provided on page 4 of this questionnaire).*

c. Where can I&M obtain this information?

d. Please indicate whether there is a specific representative you wish to designate for a potential follow-up contact by I&M's or HDR's representative for the resource area(s) checked above *(additional information may be provided on page 4 of this questionnaire).*

**Representative Contact Information**

| | |
|---|---|
| Name | |
| Address | |
| Phone | |
| Email Address | |

| | |
|---|---|
| Name | |
| Address | |
| Phone | |
| Email Address | |

e. Based on the specific resources listed in 2a, are you aware of any specific issues or improvements pertaining to the identified resource area(s)? *(Additional information may be provided on page 4 of this questionnaire.)*

___ Yes *(please list specific issues below)* ___ No

| Resource Area | Specific Issue |
|---|---|
| | |
| | |
| | |
| | |
| | |

3. Do you or your organization plan to participate in the Constantine Hydroelectric Project relicensing proceeding? ___ Yes __X__ No

4. We are interested in your comments. If you have comments and/or questions regarding the Constantine Hydroelectric Project or the relicensing process, please provide below. In addition, this questionnaire has been sent to the people/organizations shown on the attached distribution list; please let us know if there is anyone else you believe should receive this questionnaire that is not included on the attached distribution list.

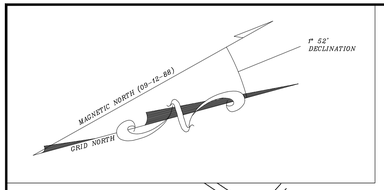
The Natural Resources Conservation Service (NRCS) under Part 523 of the Farmland Protection Policy Act has reviewed the Constantine Hydroelectric Project. This review was conducted with respect to the effect(s) that the proposal may have on prime and/or unique farmland. Since there are no prime and/or unique farmed lands in the proposed projects extent, we have concluded that this proposal will have no negative impact on prime and/or unique farmland.

*(Comments and/or questions may be sent via email to: sarah.kulpa@hdrinc.com or immagalski@aep.com)*

As noted above, please return this questionnaire in the enclosed, self-addressed, stamped envelope within 30 days of receipt to allow for any follow-up contact by I&M's or HDR's representative that may be needed. Not responding within 30 days indicates that you are not aware of any existing, relevant, and reasonably available information that describes the existing Project environment or known potential impacts of the Project.

# APPENDIX C

# EXISTING PROJECT BOUNDARY (EXHIBIT G)




PROJECT BOUNDARY
TRANSMISSION LINE
SUBSTATION
US 131
HEADGATES
DAM AND SPILLWAY
ACCESS ROAD
TRANSMISSION LINE (NON-PROJECT)
HYDRO PLANT
REFERENCE POINT 1-3
N: 131316.17
E: 12770126.43
PLS #025
PLS #024
PLS #014
PLS #013
PROJECT BOUNDARY (EL. 782.94' MSL)
ST. JOSEPH RIVER
REFERENCE POINT 1-2
N: 136571.73
E: 12770133.77
PLS #014
PLS #011
PLS #013
PLS #012
CONSTANTINE TWP.
FLORENCE TWP.
PENN CENTRAL RR
REFERENCE POINT 1-1
N: 136582.75
E: 12774135.60
FLORENCE TWP.
CONSTANTINE TWP.
PLS #012
PLS #007
MATCHLINE G-2

## METES AND BOUNDS TABLE

| Course | Direction | Distance (ft) |
|---|---|---|
| 1 | S60° 58' 30"E | 194.1 |
| 2 | S89° 41' 43"E | 105.6 |
| 3 | S83° 28' 49"E | 59.4 |
| 4 | S33° 53' 29"E | 88.6 |
| 5 | S56° 59' 52"W | 260.6 |
| 6 | S50° 37' 21"E | 81.6 |
| 7 | S22° 36' 4"E | 311.3 |
| 8 | S20° 38' 46"W | 8.6 |
| 9 | S23° 5' 48"W | 88.9 |
| 10 | S79° 45' 55"W | 128.9 |
| 11 | N65° 42' 7"W | 114.5 |
| 12 | N85° 4' 55"W | 380.2 |
| 13 | S81° 24' 59"W | 47.2 |
| 14 | Tailrace Elevation | In Upstream Direction |
| 15 | N89° 0' 16"W | 242.5 |
| 16 | S2° 21' 24"E | 39.7 |
| 17 | Tailrace Elevation | In Downstream Direction |
| 18 | N27° 23' 1"W | 236.4 |
| 19 | N65° 9' 27"E | 89.9 |
| 20 | N15° 19' 17"E | 114.3 |
| 21 | N1° 6' 34"E | 857.9 |
| 22 | N47° 43' 35"E | 44.9 |
| 23 | N41° 33' 0"W | 266.4 |
| 24 | N50° 44' 16"E | 224.3 |
| 25 | N29° 55' 53"W | 57.5 |
| 26 | Contour 782.94' (M.S.L) | In Upstream Direction |
| 27 | S14° 28' 13"E | 193.4 |
| 28 | Contour 782.94' (M.S.L) | In Downstream Direction |
| 29 | S6° 1' 56"W | 158.4 |
| 30 | N82° 32' 22"E | 123.4 |
| 31 | S0° 44' 21"E | 451.7 |
| 32 | S73° 50' 34"W | 162.3 |
| 33 | N0° 11' 59"E | 418.2 |
| 34 | S82° 26' 56"W | 632.0 |
| 35 | N21° 59' 28"W | 81.7 |
| 36 | Contour 782.94' (M.S.L) | Downstream to Point of Origin |

LEGEND

- PROJECT BOUNDARY
- PUBLIC LAND SURVEY (PLS) LINES
- WATERLINES (BASED ON IMAGERY DATED SEPTEMBER 8, 2014)
- TRANSMISSION LINES
- TOWNLINE
- RR LINE

**SURVEYOR STATEMENT**

I here by state, to the best of my knowledge and belief, that the project boundary, as shown on this Exhibit G drawing, is depicted within reasonable accuracies, as required in Title 18 CFR Sec. 4.41, which states in part, the "boundary data must be positionally accurate to +/- 40 feet" and "comply with the National Map Accuracy Standards for maps at a 1:24,000 scale." The Project Boundary Line was adjusted, as necessary, to best fit the map graphically and was not field surveyed.

By: B E Todd, PS Date: 5/2/16

STATE OF OHIO · BRADY E. TODD · 7075 · REGISTERED PROFESSIONAL SURVEYOR

NOTES:
1. AEP IS THE OWNER AND OPERATOR OF ALL EXISTING PROJECT FACILITIES AND EITHER OWNS OR HAS RIGHTS TO ALL PROJECT LANDS.
2. COORDINATES GIVEN ARE IN NAD83 MICHIGAN STATE PLANE, SOUTH ZONE, US FOOT HORIZONTAL DATUM.
3. FERC PROJECT #10661 IS LOCATED IN THE CITY OF CONSTANTINE TWP., COUNTY OF ST. JOSEPH, IN THE STATE OF MICHIGAN.

400 0 400 800 1600
SCALE IN FEET
SCALE: 1 inch = 400 ft

PREPARED BY:

Kleinschmidt
141 Main Street P.O. Box 650
Pittsfield, Maine 04967
Telephone: (207) 487-3328
Fax: (207) 487-3124
www.KleinschmidtGroup.com


PLAN KEY
SCALE: N.T.S.

EXHIBIT G SHEET 1 of 2

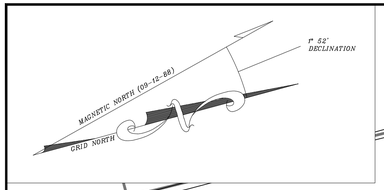
CONSTANTINE HYDROELECTRIC PROJECT
FERC PROJECT NO. 10661

ST. JOSEPH COUNTY, MICHIGAN

CONSTANTINE PROJECT BOUNDARY

AMERICAN ELECTRIC POWER COMPANY

May. 3, 2016 - 1:28 PM J:\843\101\Drawings\Working Drawings\Licensing Drawings\843-101_G-1_Project Boundary_XX-XX-XXXX.dwg




US 131

REFERENCE POINT 2-2
N: 144486.52
E: 12770214.93

WITHERS RD.

FABIUS TWP.
CONSTANTINE TWP.

PROJECT BOUNDARY
(EL. 782.94' MSL)

ST. JOSEPH RIVER

CONSTANTINE TWP.
FLORENCE TWP.

26

MATCHLINE G-1

REFERENCE POINT 2-3
N: 141967.83
E: 12775489.93

PLS #012
PLS #007
PLS #001
PLS #006

PENN CENTRAL RR

PROJECT BOUNDARY
(EL. 782.94' MSL)

REFERENCE POINT 2-1
N: 152425.95
E: 12775626.80

PLS #025
PLS #030
PLS #036
PLS #031

FABIUS TWP.
LOCKPORT TWP.

PLS #001
PLS #006
PLS #036
PLS #031

FLORENCE TWP.
LOCKPORT TWP.

TRANSMISSION LINES
(NON-PROJECT)

CONSTANTINE RD.

ST. JOSEPH RIVER

27

LEGEND

- PROJECT BOUNDARY
- PUBLIC LAND SURVEY (PLS) LINES
- WATERLINES (BASED ON IMAGERY DATED SEPTEMBER 8, 2014)
- TRANSMISSION LINES
- TOWNLINE
- RR LINE

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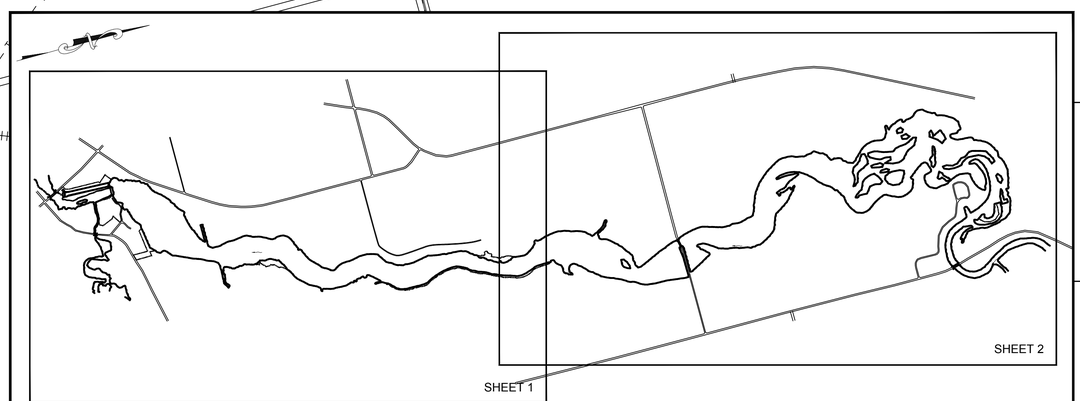
400 0 400 800 1600
SCALE IN FEET

SCALE: 1 inch = 400 ft




PLAN KEY
SCALE: N.T.S.

SURVEYOR STATEMENT

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By: B E Todd, PS Date: 5/2/16

STATE OF OHIO
BRADY E TODD
7575
REGISTERED
PROFESSIONAL SURVEYOR

EXHIBIT G SHEET 2 of 2

CONSTANTINE HYDROELECTRIC PROJECT
FERC PROJECT NO. 10661

ST. JOSEPH COUNTY, MICHIGAN

CONSTANTINE PROJECT BOUNDARY

AMERICAN ELECTRIC POWER COMPANY

PREPARED BY:

Kleinschmidt
141 Main Street P.O. Box 650
Pittsfield, Maine 04967
Telephone: (207) 487-3328
Fax: (207) 487-3124
www.KleinschmidtGroup.com

May 3, 2016 - 1:28 PM J:\1843\101\Drawings\Working Drawings\Licensing Drawings\1843-101_G-1_Project Boundary_XX-XX-XXXX.dwg

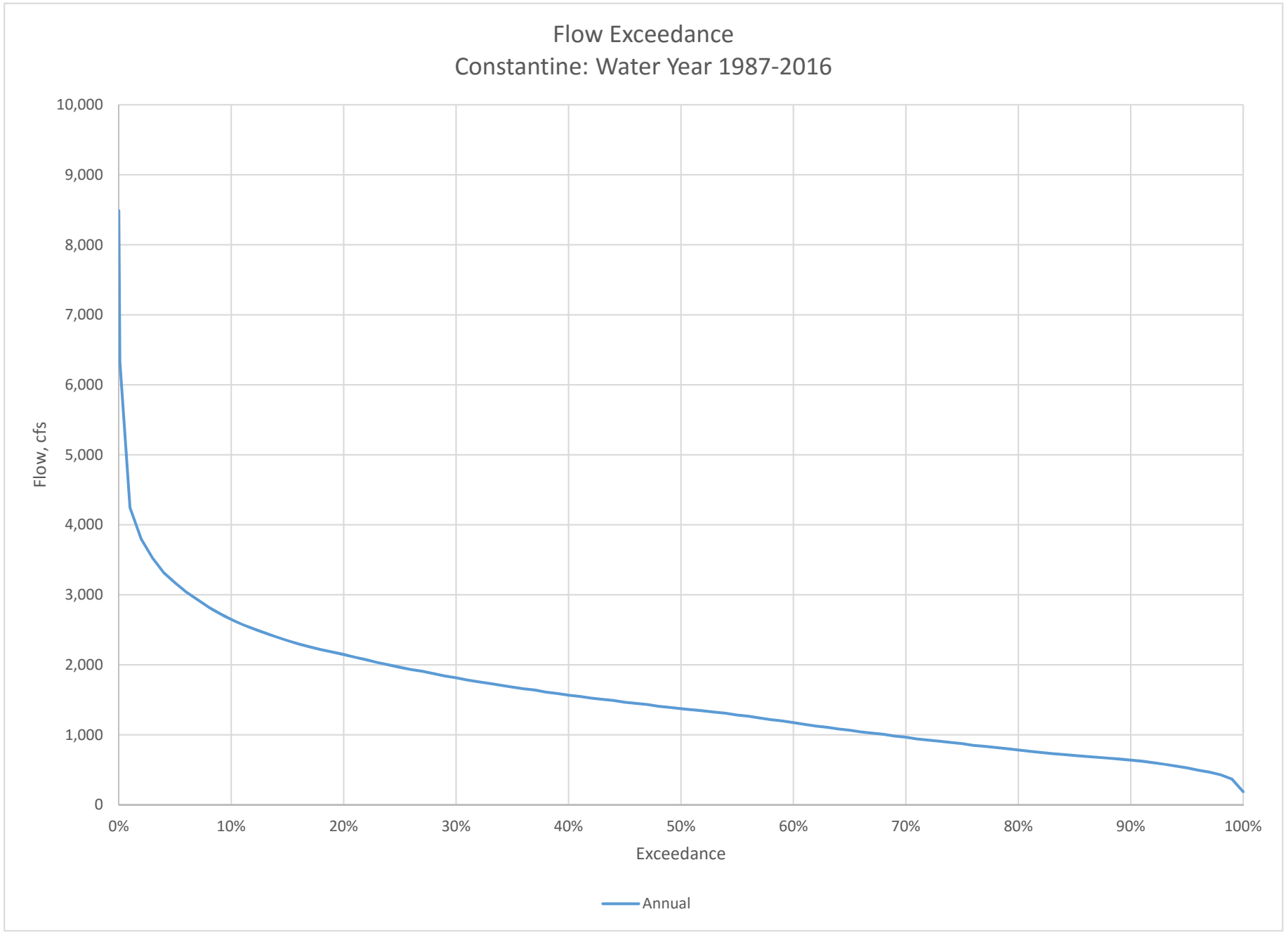
# APPENDIX D

# SINGLE LINE ELECTRICAL DIAGRAM AND EXISTING EXHIBIT F PROJECT DRAWINGS (CEII)

# APPENDIX E

# FLOW DURATION CURVES

| % Exceedance | Annual | January | Febuary | March | April | May | June | July | August | September | October | November | December |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 100.00% | 187 | 583 | 604 | 637 | 614 | 680 | 306 | 185 | 280 | 287 | 374 | 454 | 549 |
| 99.00% | 367 | 627 | 637 | 700 | 858 | 899 | 418 | 271 | 312 | 352 | 438 | 511 | 601 |
| 98.00% | 428 | 657 | 651 | 842 | 1,008 | 954 | 464 | 298 | 327 | 368 | 470 | 536 | 627 |
| 97.00% | 467 | 668 | 661 | 898 | 1,033 | 1,008 | 515 | 309 | 337 | 390 | 487 | 549 | 653 |
| 96.00% | 495 | 693 | 677 | 949 | 1,083 | 1,033 | 569 | 337 | 368 | 420 | 497 | 567 | 682 |
| 95.00% | 528 | 714 | 716 | 1,032 | 1,132 | 1,045 | 596 | 360 | 401 | 431 | 506 | 581 | 704 |
| 94.00% | 553 | 734 | 782 | 1,122 | 1,182 | 1,066 | 634 | 372 | 415 | 440 | 517 | 608 | 717 |
| 93.00% | 578 | 760 | 832 | 1,266 | 1,208 | 1,099 | 659 | 389 | 425 | 446 | 530 | 625 | 730 |
| 92.00% | 601 | 776 | 906 | 1,283 | 1,249 | 1,108 | 672 | 401 | 438 | 456 | 545 | 644 | 742 |
| 91.00% | 624 | 791 | 933 | 1,332 | 1,258 | 1,133 | 689 | 419 | 447 | 471 | 559 | 654 | 771 |
| 90.00% | 638 | 809 | 974 | 1,365 | 1,291 | 1,141 | 709 | 439 | 458 | 481 | 568 | 662 | 783 |
| 89.00% | 655 | 841 | 1,017 | 1,382 | 1,315 | 1,166 | 722 | 455 | 467 | 487 | 584 | 674 | 814 |
| 88.00% | 666 | 887 | 1,038 | 1,399 | 1,324 | 1,174 | 747 | 475 | 476 | 492 | 595 | 686 | 823 |
| 87.00% | 679 | 914 | 1,074 | 1,424 | 1,341 | 1,206 | 759 | 498 | 479 | 503 | 606 | 693 | 839 |
| 86.00% | 691 | 933 | 1,091 | 1,441 | 1,357 | 1,224 | 781 | 519 | 485 | 522 | 621 | 704 | 858 |
| 85.00% | 705 | 961 | 1,124 | 1,460 | 1,374 | 1,233 | 798 | 539 | 491 | 531 | 629 | 732 | 869 |
| 84.00% | 720 | 1,008 | 1,162 | 1,482 | 1,399 | 1,255 | 809 | 548 | 497 | 540 | 635 | 749 | 891 |
| 83.00% | 732 | 1,066 | 1,174 | 1,499 | 1,407 | 1,274 | 821 | 563 | 509 | 551 | 645 | 760 | 899 |
| 82.00% | 748 | 1,091 | 1,199 | 1,509 | 1,431 | 1,283 | 831 | 571 | 519 | 564 | 654 | 787 | 916 |
| 81.00% | 765 | 1,124 | 1,216 | 1,524 | 1,457 | 1,299 | 849 | 581 | 528 | 573 | 659 | 821 | 933 |
| 80.00% | 784 | 1,158 | 1,236 | 1,549 | 1,474 | 1,307 | 858 | 590 | 537 | 587 | 662 | 841 | 949 |
| 79.00% | 802 | 1,174 | 1,256 | 1,566 | 1,497 | 1,316 | 881 | 597 | 545 | 597 | 670 | 849 | 967 |
| 78.00% | 819 | 1,216 | 1,274 | 1,582 | 1,531 | 1,324 | 891 | 601 | 551 | 608 | 677 | 866 | 983 |
| 77.00% | 833 | 1,230 | 1,291 | 1,607 | 1,557 | 1,341 | 906 | 612 | 560 | 616 | 683 | 883 | 1,016 |
| 76.00% | 849 | 1,258 | 1,299 | 1,616 | 1,574 | 1,357 | 914 | 627 | 570 | 626 | 688 | 899 | 1,041 |
| 75.00% | 874 | 1,274 | 1,307 | 1,626 | 1,582 | 1,374 | 924 | 637 | 578 | 631 | 693 | 916 | 1,058 |
| 74.00% | 891 | 1,291 | 1,324 | 1,641 | 1,599 | 1,391 | 941 | 645 | 588 | 636 | 698 | 924 | 1,091 |
| 73.00% | 908 | 1,299 | 1,341 | 1,656 | 1,624 | 1,406 | 958 | 658 | 599 | 640 | 702 | 941 | 1,124 |
| 72.00% | 924 | 1,324 | 1,357 | 1,674 | 1,641 | 1,424 | 974 | 661 | 608 | 651 | 707 | 958 | 1,158 |
| 71.00% | 941 | 1,332 | 1,371 | 1,691 | 1,657 | 1,436 | 999 | 670 | 621 | 657 | 715 | 972 | 1,183 |
| 70.00% | 966 | 1,341 | 1,382 | 1,713 | 1,666 | 1,449 | 1,016 | 679 | 630 | 664 | 721 | 980 | 1,191 |
| 69.00% | 983 | 1,349 | 1,399 | 1,732 | 1,674 | 1,457 | 1,024 | 704 | 636 | 668 | 726 | 1,008 | 1,208 |
| 68.00% | 1,008 | 1,357 | 1,416 | 1,749 | 1,682 | 1,466 | 1,049 | 707 | 640 | 673 | 733 | 1,024 | 1,227 |
| 67.00% | 1,024 | 1,374 | 1,424 | 1,757 | 1,699 | 1,474 | 1,058 | 726 | 644 | 678 | 737 | 1,033 | 1,249 |
| 66.00% | 1,041 | 1,381 | 1,449 | 1,782 | 1,713 | 1,491 | 1,074 | 738 | 653 | 683 | 745 | 1,041 | 1,274 |
| 65.00% | 1,066 | 1,407 | 1,461 | 1,800 | 1,732 | 1,492 | 1,083 | 748 | 660 | 690 | 752 | 1,066 | 1,284 |
| 64.00% | 1,083 | 1,416 | 1,482 | 1,815 | 1,757 | 1,507 | 1,099 | 758 | 667 | 696 | 764 | 1,080 | 1,299 |
| 63.00% | 1,108 | 1,432 | 1,499 | 1,838 | 1,766 | 1,513 | 1,113 | 768 | 670 | 698 | 776 | 1,091 | 1,316 |
| 62.00% | 1,124 | 1,441 | 1,507 | 1,849 | 1,791 | 1,532 | 1,133 | 778 | 676 | 705 | 784 | 1,104 | 1,332 |
| 61.00% | 1,149 | 1,457 | 1,524 | 1,868 | 1,815 | 1,549 | 1,141 | 784 | 681 | 712 | 792 | 1,116 | 1,341 |
| 60.00% | 1,174 | 1,474 | 1,539 | 1,907 | 1,824 | 1,566 | 1,163 | 793 | 685 | 718 | 806 | 1,129 | 1,354 |
| 59.00% | 1,199 | 1,491 | 1,549 | 1,915 | 1,845 | 1,582 | 1,183 | 804 | 694 | 720 | 817 | 1,146 | 1,366 |
| 58.00% | 1,216 | 1,507 | 1,563 | 1,932 | 1,857 | 1,599 | 1,191 | 814 | 701 | 723 | 824 | 1,166 | 1,374 |
| 57.00% | 1,241 | 1,516 | 1,591 | 1,949 | 1,887 | 1,607 | 1,208 | 825 | 709 | 725 | 831 | 1,183 | 1,391 |
| 56.00% | 1,266 | 1,524 | 1,607 | 1,965 | 1,903 | 1,624 | 1,224 | 841 | 721 | 730 | 841 | 1,191 | 1,399 |
| 55.00% | 1,283 | 1,541 | 1,632 | 1,990 | 1,920 | 1,633 | 1,249 | 849 | 729 | 732 | 849 | 1,208 | 1,408 |
| 54.00% | 1,307 | 1,557 | 1,657 | 2,010 | 1,937 | 1,649 | 1,262 | 866 | 733 | 739 | 858 | 1,216 | 1,419 |
| 53.00% | 1,324 | 1,574 | 1,674 | 2,032 | 1,957 | 1,657 | 1,287 | 883 | 745 | 743 | 871 | 1,229 | 1,432 |
| 52.00% | 1,341 | 1,591 | 1,682 | 2,040 | 1,970 | 1,666 | 1,324 | 891 | 754 | 750 | 874 | 1,249 | 1,448 |
| 51.00% | 1,357 | 1,609 | 1,707 | 2,075 | 1,999 | 1,684 | 1,341 | 901 | 761 | 757 | 883 | 1,266 | 1,457 |
| 50.00% | 1,374 | 1,624 | 1,724 | 2,099 | 2,007 | 1,703 | 1,366 | 924 | 773 | 764 | 891 | 1,283 | 1,466 |
| 49.00% | 1,391 | 1,647 | 1,732 | 2,124 | 2,032 | 1,716 | 1,382 | 933 | 782 | 770 | 908 | 1,307 | 1,482 |
| 48.00% | 1,407 | 1,657 | 1,749 | 2,141 | 2,044 | 1,741 | 1,391 | 941 | 792 | 778 | 916 | 1,328 | 1,491 |
| 47.00% | 1,432 | 1,674 | 1,790 | 2,165 | 2,057 | 1,757 | 1,411 | 952 | 803 | 786 | 927 | 1,332 | 1,507 |
| 46.00% | 1,449 | 1,682 | 1,807 | 2,187 | 2,074 | 1,763 | 1,445 | 972 | 811 | 797 | 933 | 1,349 | 1,516 |
| 45.00% | 1,466 | 1,691 | 1,832 | 2,199 | 2,099 | 1,773 | 1,466 | 983 | 819 | 805 | 949 | 1,357 | 1,541 |
| 44.00% | 1,491 | 1,707 | 1,849 | 2,215 | 2,115 | 1,782 | 1,491 | 999 | 830 | 816 | 966 | 1,366 | 1,557 |
| 43.00% | 1,507 | 1,732 | 1,864 | 2,240 | 2,127 | 1,799 | 1,507 | 1,008 | 833 | 820 | 983 | 1,382 | 1,582 |
| 42.00% | 1,524 | 1,749 | 1,882 | 2,257 | 2,157 | 1,815 | 1,532 | 1,033 | 848 | 830 | 991 | 1,391 | 1,597 |
| 41.00% | 1,549 | 1,766 | 1,897 | 2,283 | 2,182 | 1,833 | 1,544 | 1,041 | 858 | 841 | 999 | 1,399 | 1,625 |
| 40.00% | 1,566 | 1,799 | 1,915 | 2,307 | 2,190 | 1,869 | 1,557 | 1,049 | 866 | 849 | 1,008 | 1,411 | 1,652 |
| 39.00% | 1,591 | 1,821 | 1,924 | 2,343 | 2,215 | 1,896 | 1,582 | 1,058 | 874 | 858 | 1,016 | 1,424 | 1,682 |
| 38.00% | 1,610 | 1,832 | 1,940 | 2,357 | 2,240 | 1,915 | 1,616 | 1,074 | 874 | 866 | 1,033 | 1,436 | 1,691 |
| 37.00% | 1,641 | 1,857 | 1,962 | 2,376 | 2,274 | 1,934 | 1,632 | 1,091 | 891 | 878 | 1,041 | 1,452 | 1,724 |
| 36.00% | 1,657 | 1,874 | 1,974 | 2,415 | 2,282 | 1,978 | 1,660 | 1,104 | 899 | 891 | 1,062 | 1,466 | 1,737 |
| 35.00% | 1,682 | 1,890 | 1,982 | 2,440 | 2,299 | 1,997 | 1,691 | 1,116 | 908 | 899 | 1,081 | 1,474 | 1,757 |
| 34.00% | 1,707 | 1,915 | 2,007 | 2,473 | 2,307 | 2,017 | 1,735 | 1,124 | 908 | 916 | 1,092 | 1,482 | 1,782 |
| 33.00% | 1,732 | 1,940 | 2,015 | 2,494 | 2,332 | 2,036 | 1,766 | 1,149 | 920 | 933 | 1,108 | 1,491 | 1,807 |
| 32.00% | 1,757 | 1,957 | 2,032 | 2,507 | 2,348 | 2,088 | 1,793 | 1,166 | 933 | 941 | 1,122 | 1,507 | 1,830 |
| 31.00% | 1,782 | 1,974 | 2,057 | 2,523 | 2,384 | 2,115 | 1,826 | 1,174 | 941 | 960 | 1,141 | 1,516 | 1,849 |
| 30.00% | 1,815 | 2,007 | 2,090 | 2,557 | 2,409 | 2,140 | 1,849 | 1,208 | 958 | 974 | 1,168 | 1,527 | 1,882 |
| 29.00% | 1,840 | 2,040 | 2,107 | 2,582 | 2,440 | 2,170 | 1,874 | 1,237 | 966 | 991 | 1,187 | 1,549 | 1,912 |
| 28.00% | 1,874 | 2,057 | 2,132 | 2,622 | 2,473 | 2,190 | 1,918 | 1,258 | 974 | 1,008 | 1,207 | 1,566 | 1,932 |
| 27.00% | 1,907 | 2,082 | 2,165 | 2,648 | 2,490 | 2,217 | 1,951 | 1,274 | 984 | 1,016 | 1,249 | 1,582 | 1,950 |
| 26.00% | 1,932 | 2,102 | 2,182 | 2,694 | 2,517 | 2,257 | 1,999 | 1,291 | 999 | 1,033 | 1,261 | 1,607 | 1,990 |
| 25.00% | 1,965 | 2,147 | 2,207 | 2,715 | 2,557 | 2,274 | 2,042 | 1,305 | 1,016 | 1,051 | 1,291 | 1,624 | 2,030 |
| 24.00% | 1,999 | 2,165 | 2,224 | 2,757 | 2,600 | 2,299 | 2,082 | 1,324 | 1,024 | 1,066 | 1,307 | 1,641 | 2,057 |
| 23.00% | 2,032 | 2,190 | 2,233 | 2,793 | 2,640 | 2,340 | 2,124 | 1,332 | 1,035 | 1,074 | 1,316 | 1,659 | 2,082 |
| 22.00% | 2,074 | 2,212 | 2,249 | 2,850 | 2,657 | 2,365 | 2,140 | 1,354 | 1,049 | 1,101 | 1,324 | 1,691 | 2,107 |
| 21.00% | 2,107 | 2,274 | 2,284 | 2,890 | 2,682 | 2,398 | 2,174 | 1,374 | 1,058 | 1,126 | 1,366 | 1,701 | 2,115 |
| 20.00% | 2,149 | 2,325 | 2,315 | 2,931 | 2,708 | 2,432 | 2,202 | 1,391 | 1,076 | 1,149 | 1,391 | 1,716 | 2,132 |
| 19.00% | 2,182 | 2,398 | 2,357 | 2,973 | 2,750 | 2,457 | 2,257 | 1,416 | 1,091 | 1,183 | 1,436 | 1,741 | 2,153 |
| 18.00% | 2,215 | 2,465 | 2,382 | 3,006 | 2,807 | 2,480 | 2,290 | 1,449 | 1,108 | 1,217 | 1,457 | 1,774 | 2,172 |
| 17.00% | 2,257 | 2,574 | 2,415 | 3,031 | 2,868 | 2,498 | 2,324 | 1,482 | 1,133 | 1,258 | 1,491 | 1,807 | 2,199 |
| 16.00% | 2,299 | 2,705 | 2,461 | 3,056 | 2,958 | 2,540 | 2,373 | 1,519 | 1,152 | 1,299 | 1,532 | 1,833 | 2,207 |
| 15.00% | 2,344 | 2,812 | 2,506 | 3,081 | 3,008 | 2,573 | 2,415 | 1,552 | 1,166 | 1,341 | 1,566 | 1,882 | 2,229 |
| 14.00% | 2,398 | 2,915 | 2,535 | 3,123 | 3,048 | 2,606 | 2,457 | 1,590 | 1,190 | 1,374 | 1,591 | 1,907 | 2,249 |
| 13.00% | 2,457 | 2,967 | 2,606 | 3,183 | 3,140 | 2,642 | 2,509 | 1,659 | 1,216 | 1,417 | 1,607 | 1,950 | 2,274 |
| 12.00% | 2,515 | 3,036 | 2,757 | 3,198 | 3,168 | 2,682 | 2,582 | 1,712 | 1,254 | 1,450 | 1,695 | 1,982 | 2,295 |
| 11.00% | 2,573 | 3,081 | 2,912 | 3,231 | 3,273 | 2,732 | 2,607 | 1,749 | 1,274 | 1,482 | 1,749 | 2,015 | 2,324 |
| 10.00% | 2,648 | 3,165 | 3,009 | 3,265 | 3,333 | 2,773 | 2,666 | 1,800 | 1,308 | 1,517 | 1,825 | 2,083 | 2,365 |
| 9.00% | 2,732 | 3,292 | 3,117 | 3,315 | 3,399 | 2,823 | 2,707 | 1,844 | 1,332 | 1,551 | 1,890 | 2,124 | 2,418 |
| 8.00% | 2,823 | 3,439 | 3,239 | 3,384 | 3,498 | 2,870 | 2,782 | 1,899 | 1,391 | 1,600 | 1,988 | 2,183 | 2,487 |
| 7.00% | 2,932 | 3,539 | 3,381 | 3,439 | 3,565 | 2,981 | 2,865 | 1,965 | 1,457 | 1,658 | 2,215 | 2,250 | 2,540 |
| 6.00% | 3,040 | 3,606 | 3,614 | 3,548 | 3,673 | 3,034 | 2,915 | 2,024 | 1,541 | 1,707 | 2,415 | 2,432 | 2,642 |
| 5.00% | 3,173 | 3,736 | 3,870 | 3,682 | 3,782 | 3,148 | 2,959 | 2,090 | 1,621 | 1,833 | 2,570 | 2,507 | 2,775 |
| 4.00% | 3,315 | 3,920 | 4,003 | 3,935 | 3,856 | 3,302 | 3,165 | 2,224 | 1,723 | 2,024 | 2,722 | 2,657 | 2,873 |
| 3.00% | 3,525 | 4,190 | 4,285 | 4,169 | 3,932 | 3,426 | 3,448 | 2,316 | 1,926 | 2,183 | 2,968 | 2,782 | 3,100 |
| 2.00% | 3,796 | 4,507 | 4,489 | 4,374 | 4,115 | 3,658 | 3,724 | 2,523 | 2,252 | 2,482 | 3,188 | 2,923 | 3,412 |
| 1.00% | 4,246 | 5,194 | 4,701 | 4,796 | 4,339 | 3,849 | 4,560 | 2,635 | 2,746 | 3,292 | 3,457 | 3,323 | 3,612 |
| 0.10% | 6,335 | 6,674 | 5,108 | 6,338 | 5,273 | 4,181 | 8,537 | 3,002 | 3,226 | 6,134 | 4,404 | 3,500 | 3,825 |
| 0.01% | 8,487 | 6,708 | 5,120 | 6,443 | 5,287 | 4,188 | 8,873 | 3,043 | 3,261 | 6,167 | 4,488 | 3,715 | 3,958 |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Constantine: Water Year 1987-2016
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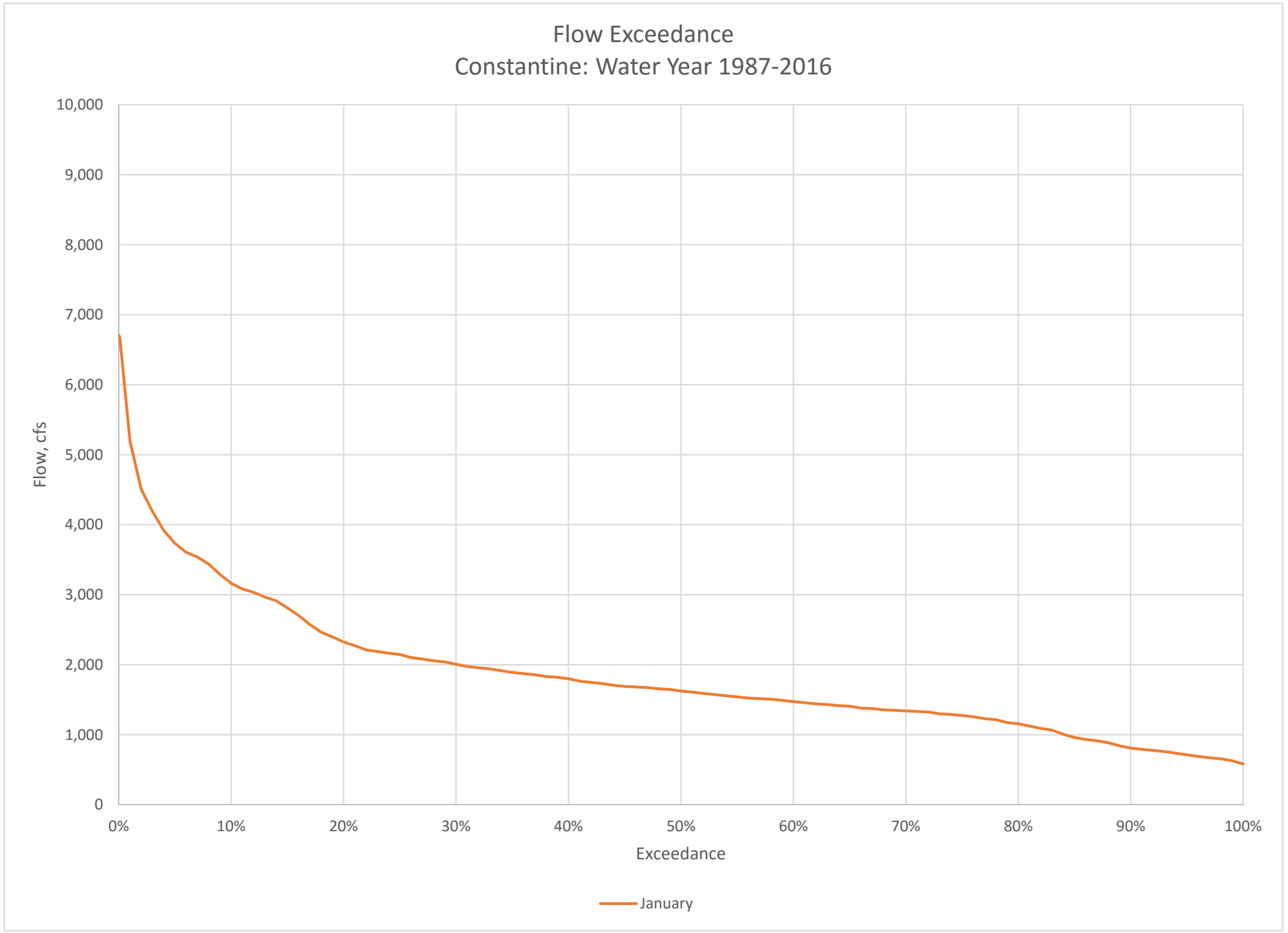
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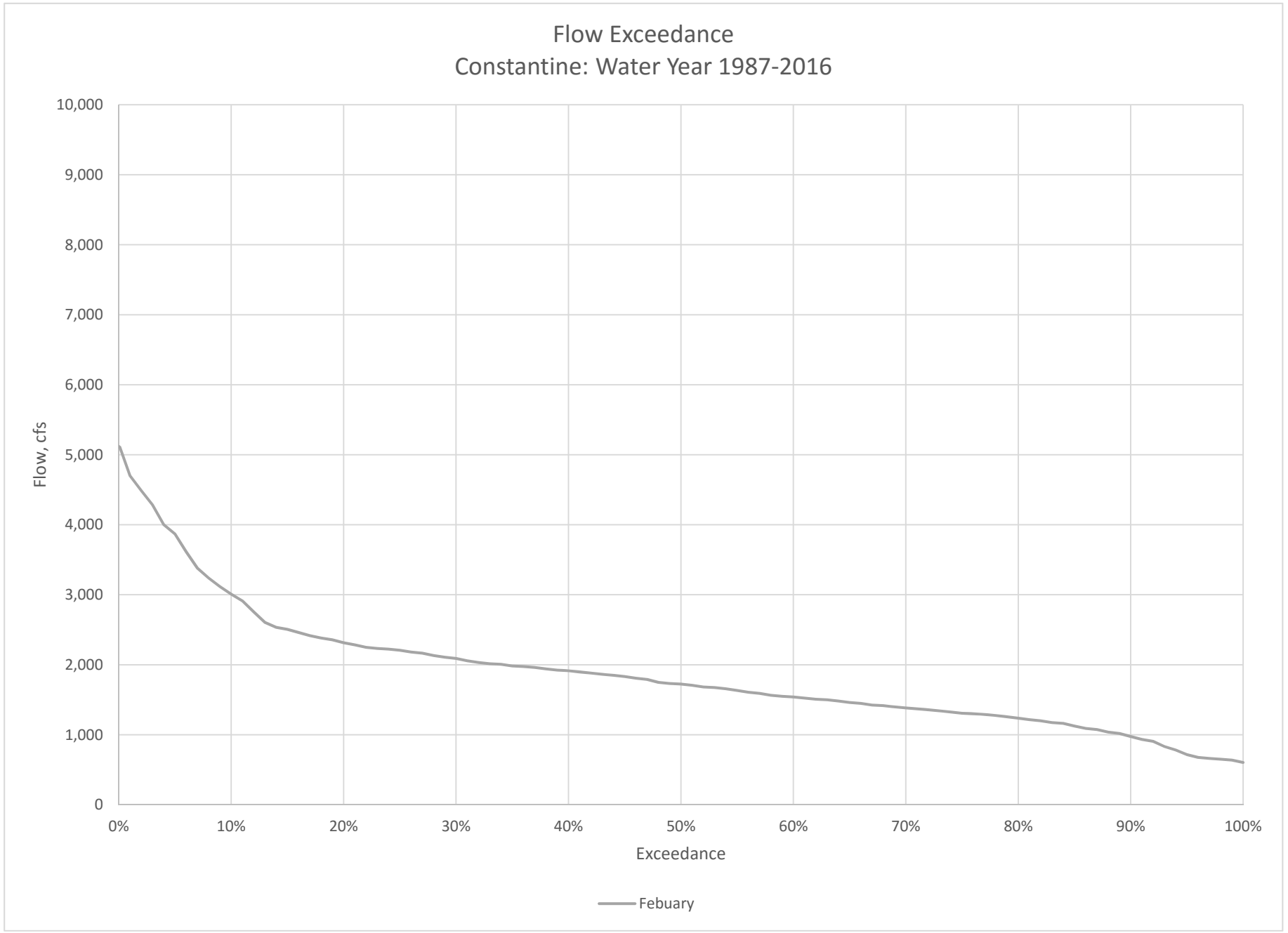
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Exceedance
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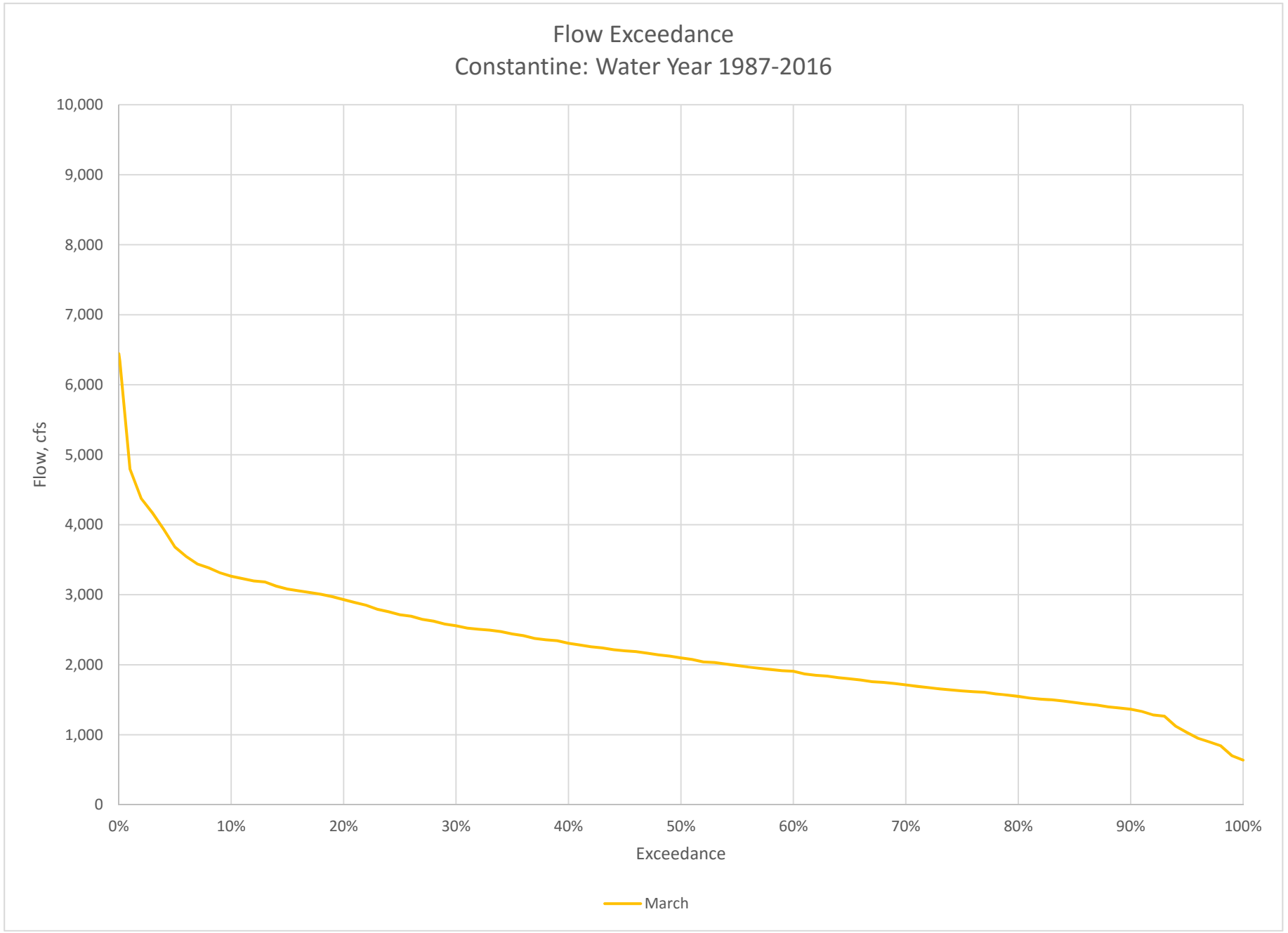
Flow Exceedance
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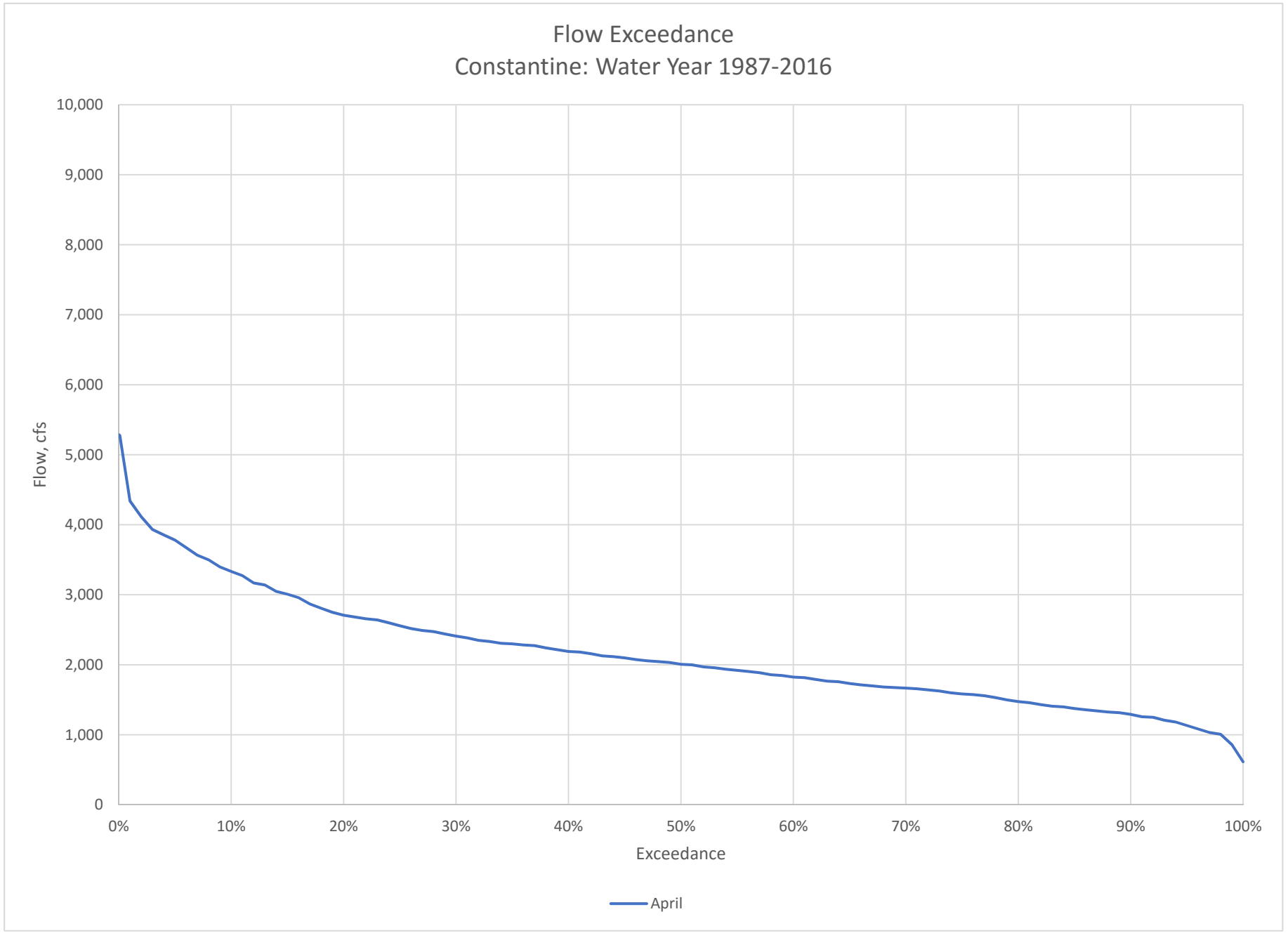
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Exceedance
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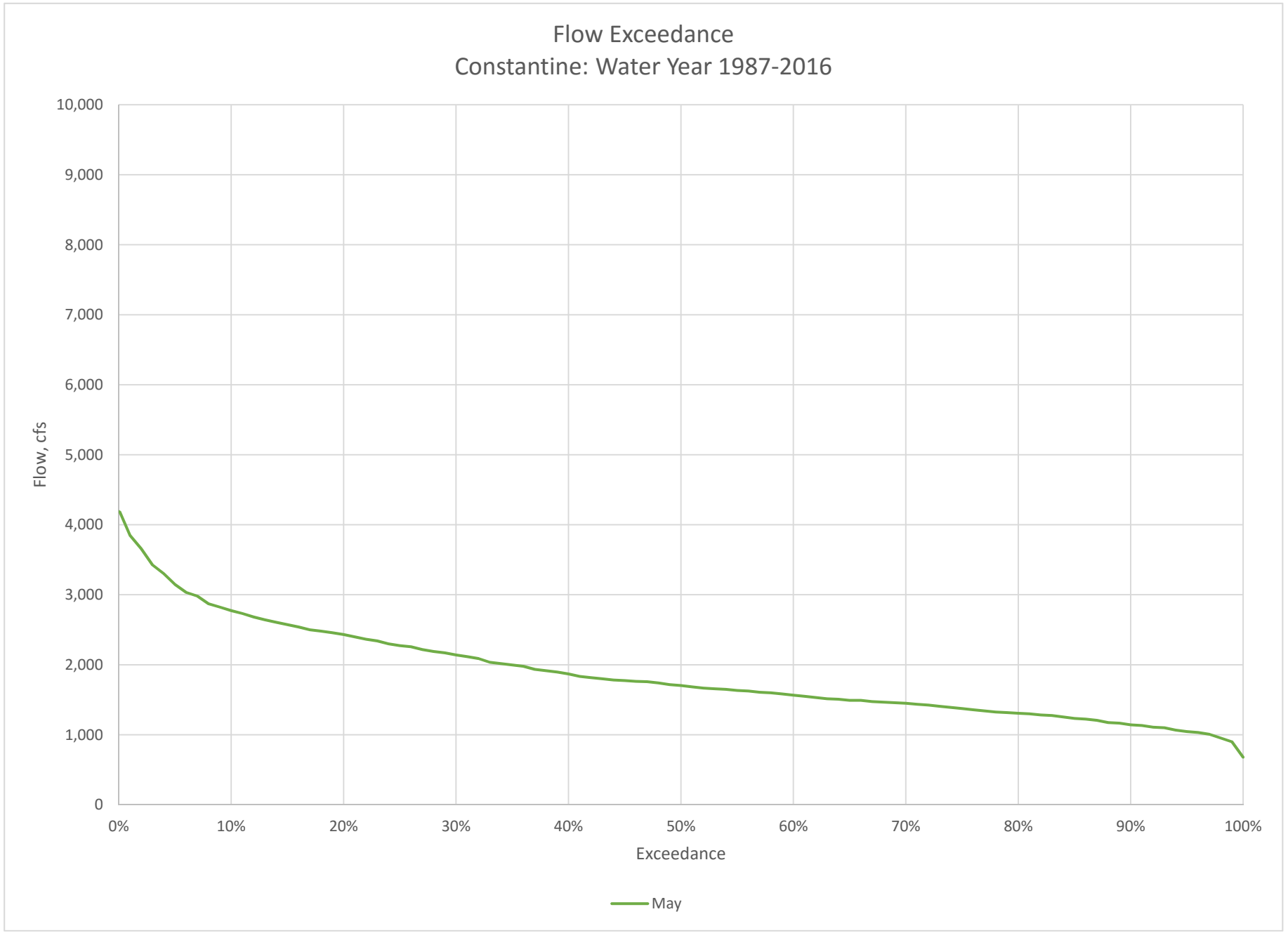
Flow Exceedance
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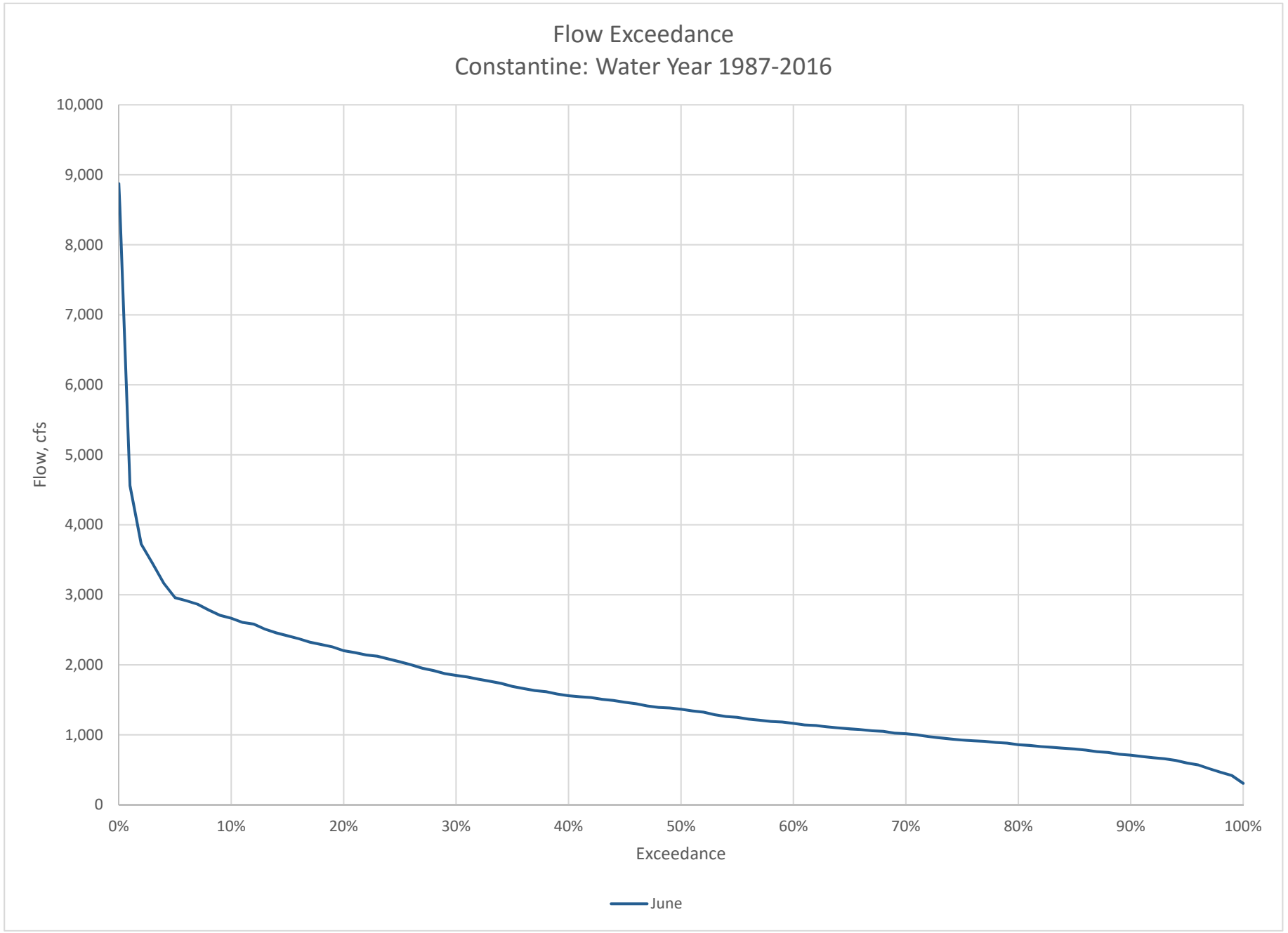
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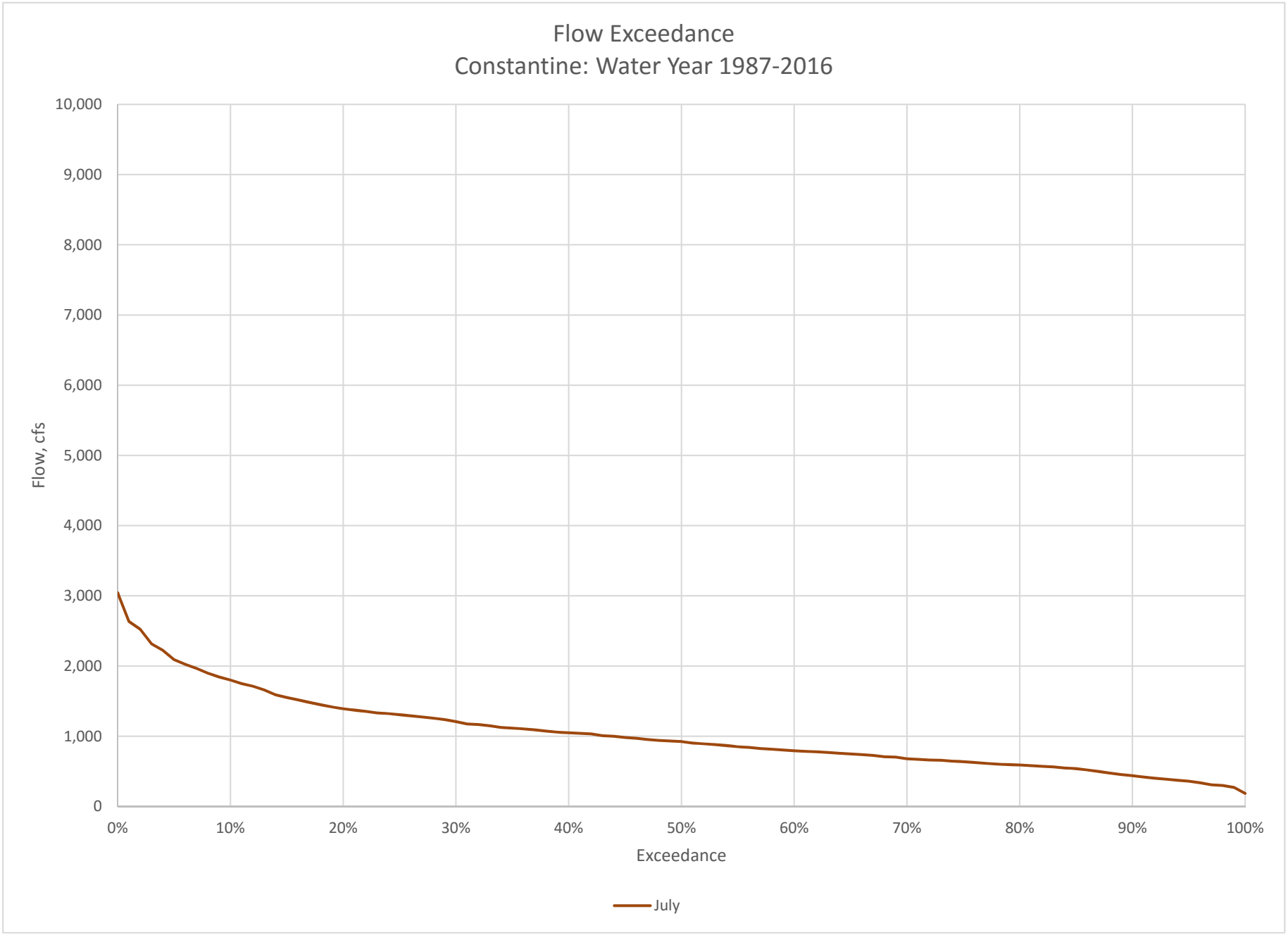
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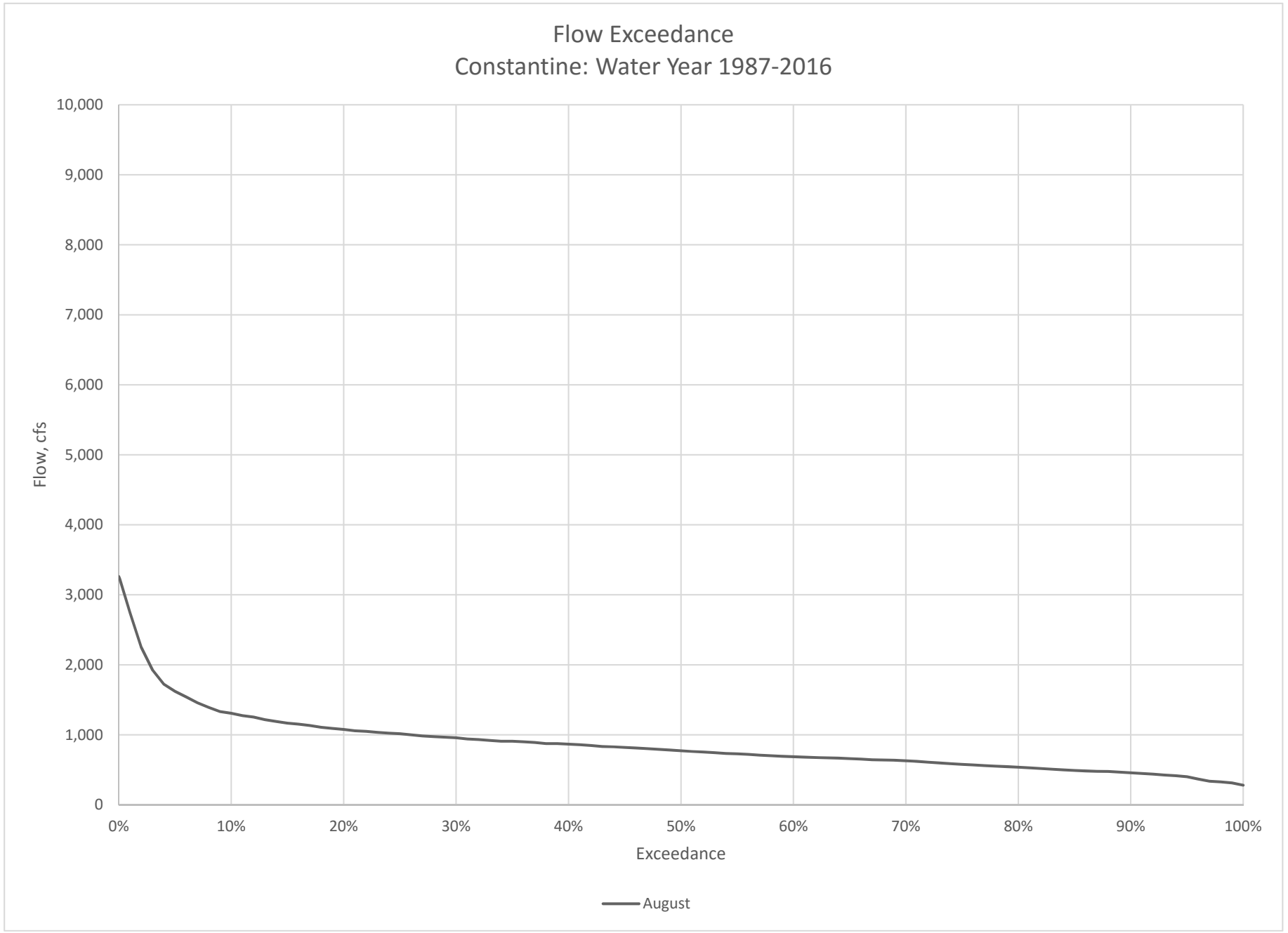
Flow Exceedance
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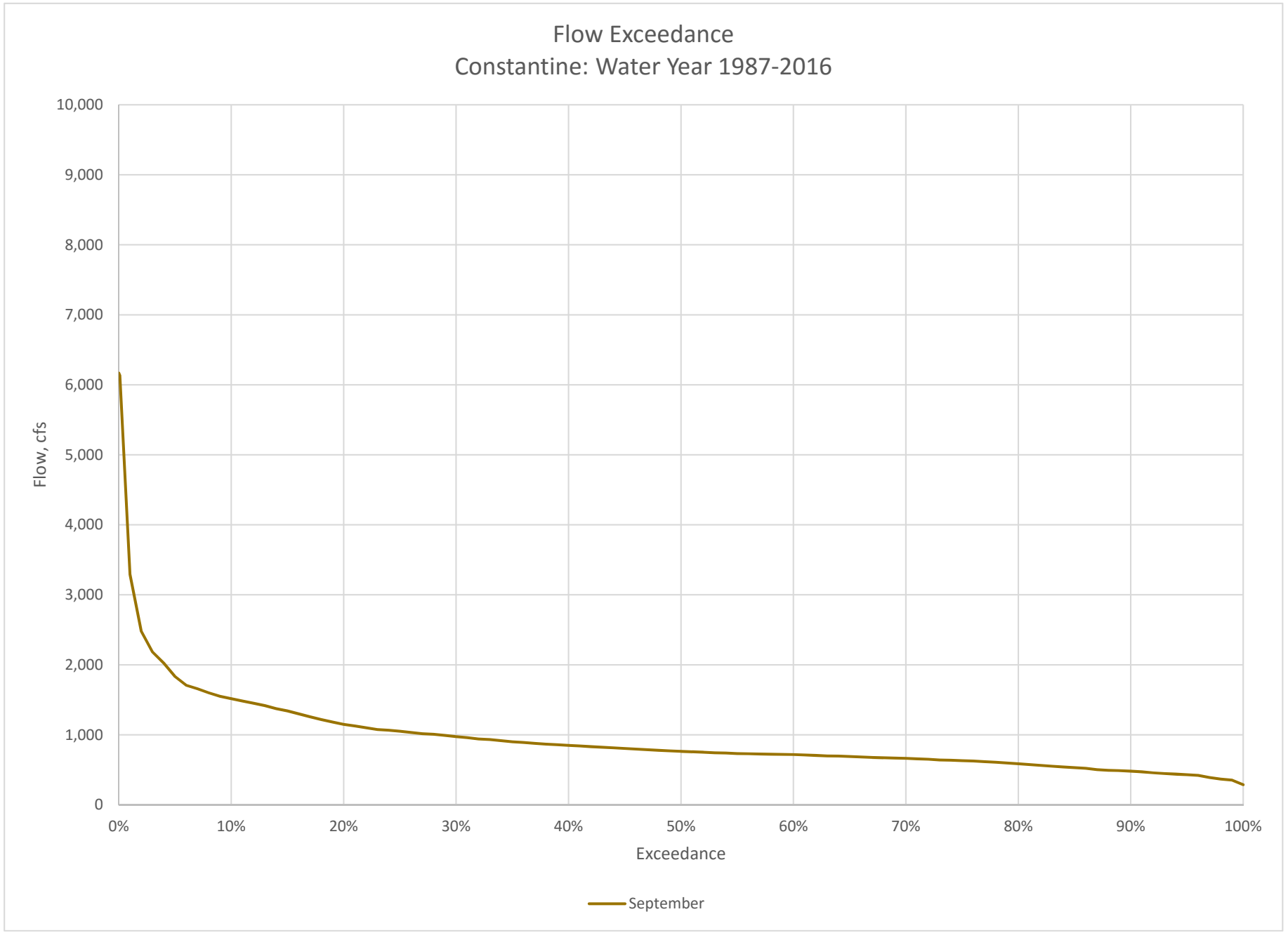
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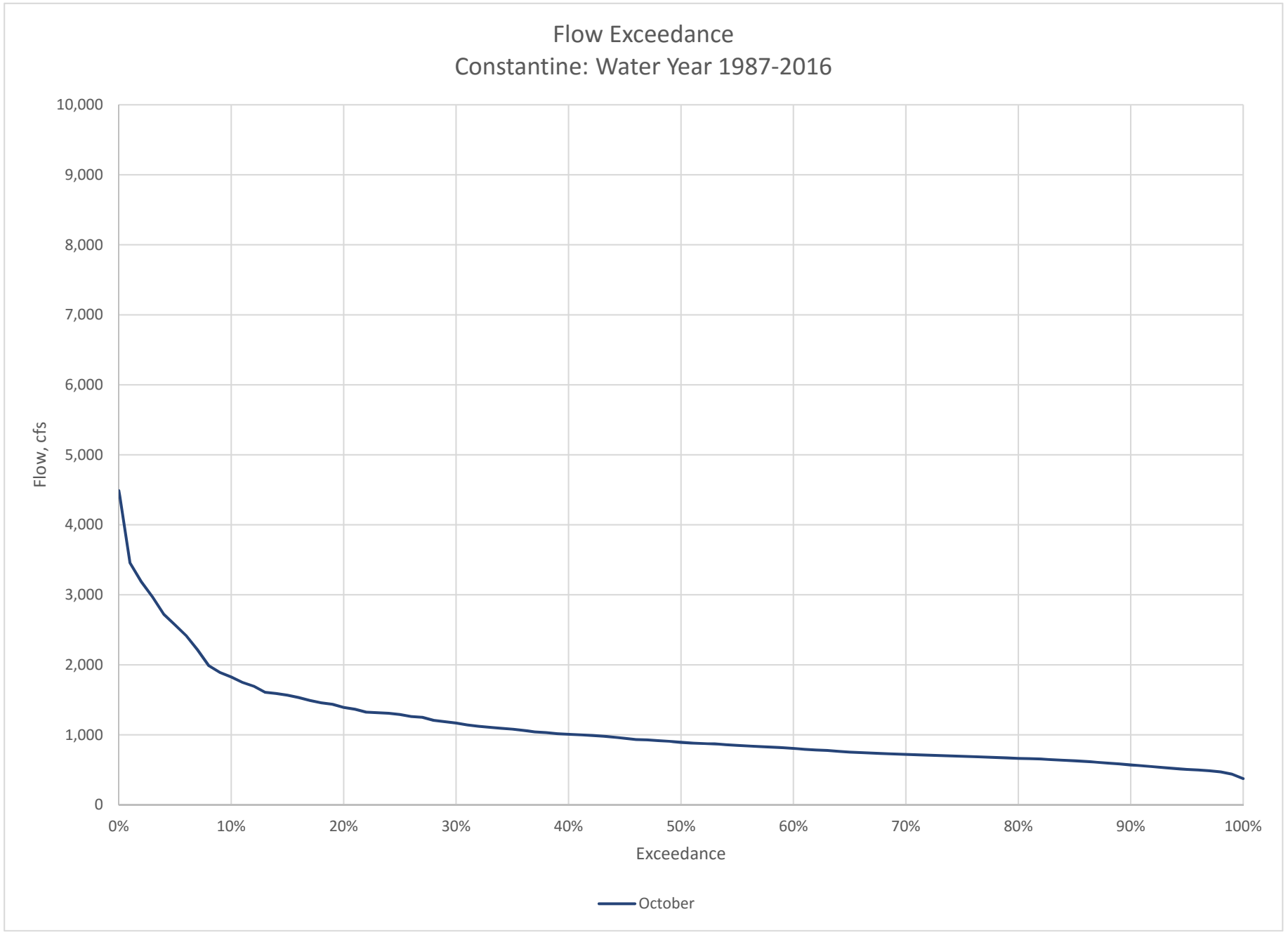
Flow Exceedance
Constantine: Water Year 1987-2016
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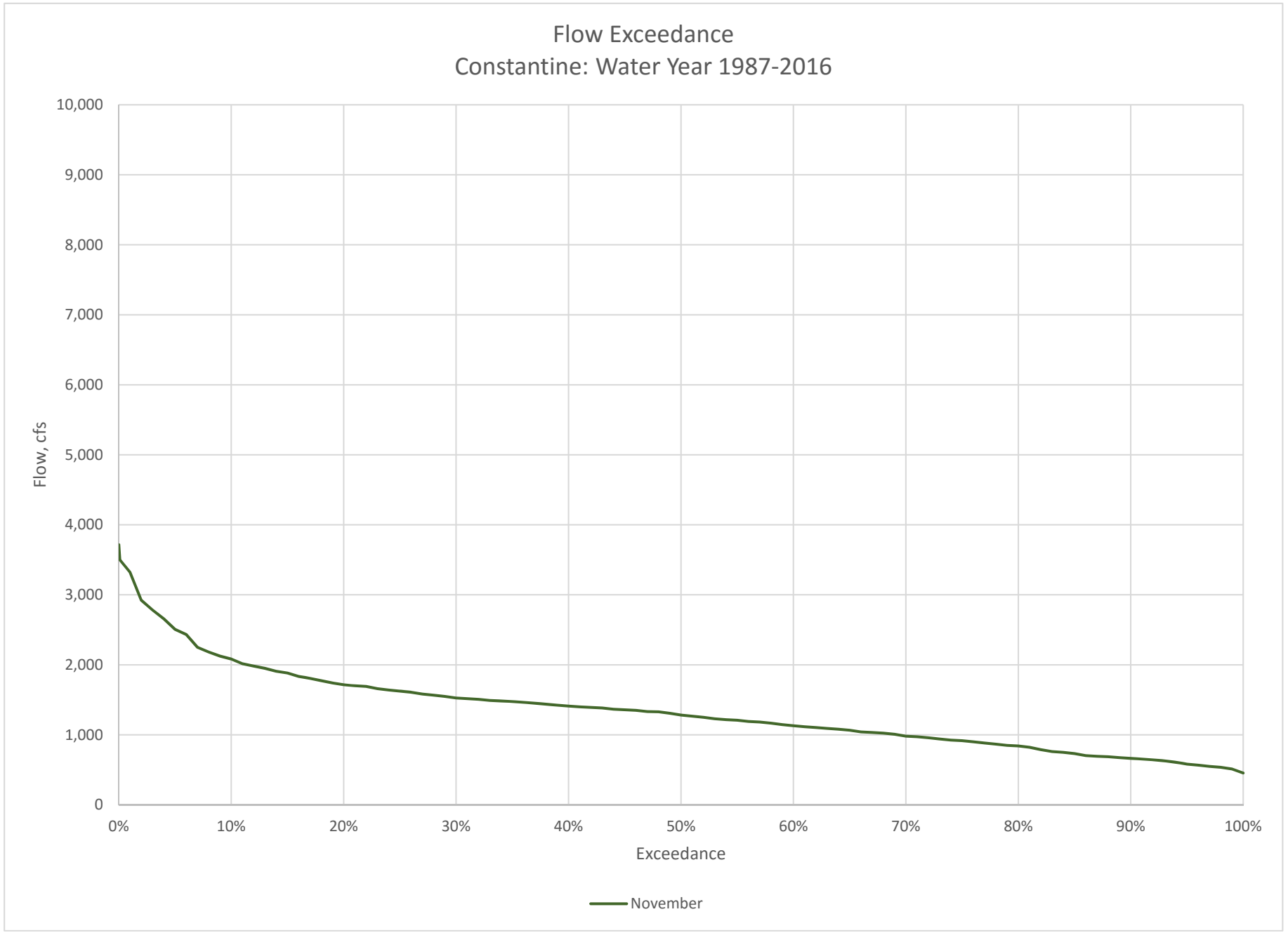
Exceedance
October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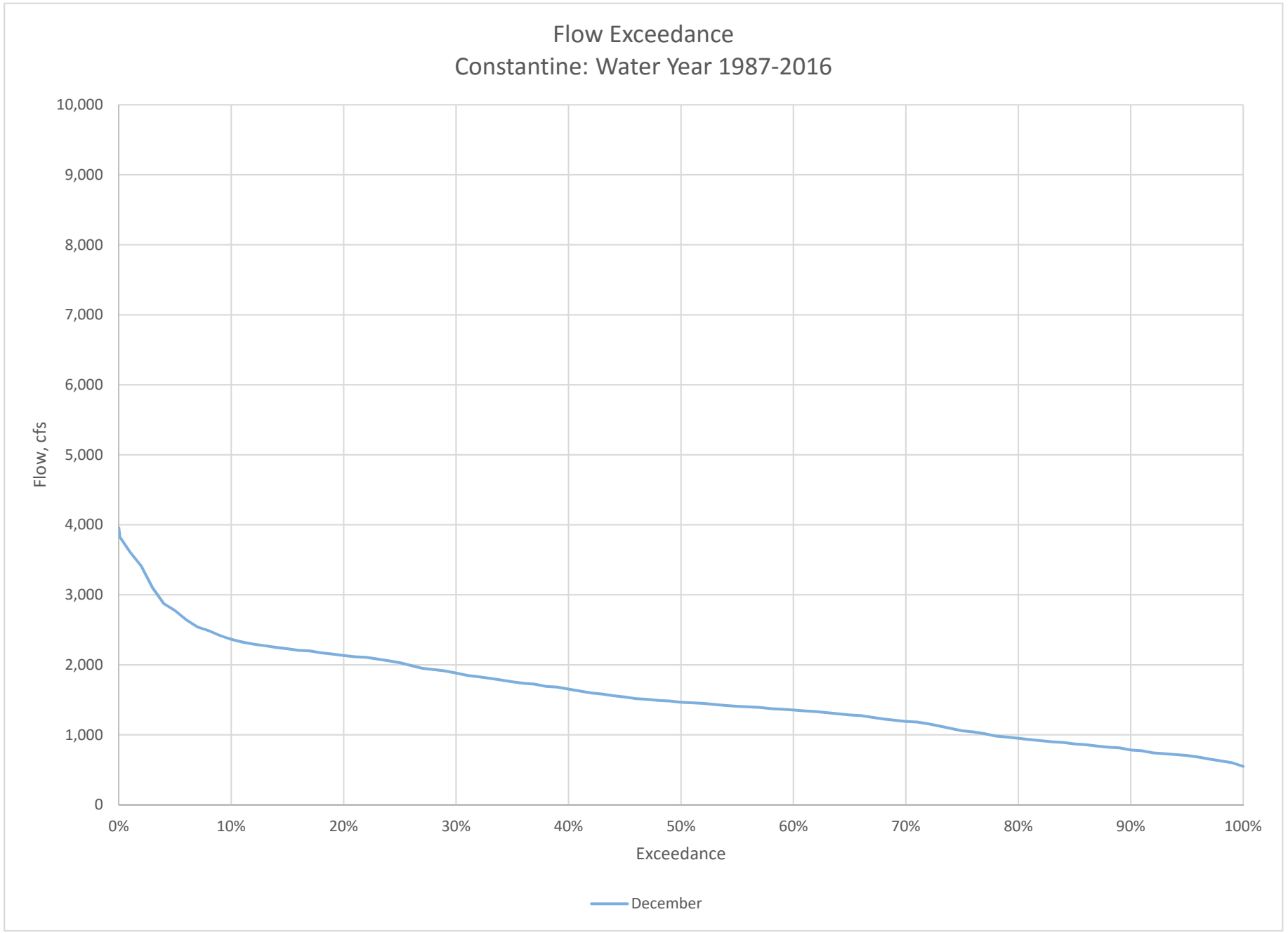
Exceedance
November


Flow Exceedance
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Exceedance
December

# APPENDIX F

# FERC FORM 80

Federal Energy Regulatory Commission (FERC)
FERC Form 80

# Licensed Hydropower Development Recreation Report

Form Approved
OMB No. 1902-0106
Expires: 09/30/2016
Burden 3.0 hours

**General Information:**
This form collects data on recreation amenities at projects licensed by FERC under the Federal Power Act (16 USC 791a-825r). This form must be submitted by licensees of all projects except those specifically exempted under 18 CFR 8.11 (c). For regular, periodic filings, submit this form on or before April 1, 2015. Submit subsequent filings of this form on or before April 1, every 6th year thereafter (for example, 2021, 2027, etc.). For initial Form No. 80 filings (18CFR 8.11(b)), each licensee of an unconstructed project shall file an initial Form No. 80 after such project has been in operation for a full calendar year prior to the filing deadline. Each licensee of an existing (constructed) project shall file an initial Form No. 80 after such project has been licensed for a full calendar year prior to the filing deadline. Filing electronically is preferred. (See http://www.ferc.gov for more information.) If you cannot file electronically, submit an original and two copies of the form to the: Federal Energy Regulatory Commission, Office of the Secretary, 888 First St., NE, Washington, DC 20426.

The public burden estimated for this form is three hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing the collection of information. Send comments regarding the burden estimate or any aspect of this collection of information, including suggestions for reducing burden, to: FERC via e-mail DataClearance@ferc.gov; or mail to 888 First Street NE, Washington, DC 20426 (Attention: Information Clearance Officer) and Office of Management and Budget (OMB), via e-mail to oira_submission@omb.eop.gov; or mail to OMB, Office of Information and Regulatory Affairs, Attention: Desk Officer for FERC, Washington, DC 20503. Include OMB Control Number 1902-0106 as a point of reference. No person shall be subject to any penalty for failing to comply with a collection of information if the collection of information does not display a valid control number (44 U.S.C. § 3512 (a)).

**Instructions:**
a. All data reported on this form must represent publicly available recreation amenities and services located within the project boundary.
b. To ensure a common understanding of terms, please refer to the Glossary on page 3.
c. Report actual data for each item. If actual data are unavailable, then please estimate.
d. Submit a completed form for each development at your project.

**Schedule 1. General Data**

1. Licensee Name: INDIANA MICHIGAN POWER CO
2. Project Name: CONSTANTINE
3. Project Number: 10661
4. Development Name: CONSTANTINE

**Complete the following for each development if more than one.**

8. Reservoir Surface Area at Normal Pool (acres): 608.00
9. Shoreline Miles at Normal Pool: 12.00
10. Percent of Shoreline Available for Public Use: 2.50

States Development/Project Traverses (List state with largest area within the development/project boundary first):

5. State #1: MI
6. State #2: _____

7. Type of Project License: (check one) Major _____ Minor _____

11. Data Collection Methods (enter percent for each method used; total must equal 100%):

75.00 traffic count/trail count
_____ attendance records
20.00 staff observation
_____ visitor counts or surveys
5.00 estimate (explain)
Explanation Included in Methods Filed Separate

For 2014, enter only the licensee's annual recreational construction, operation, and maintenance costs for the development (project). Also, enter the annual recreational revenues for that year.

| Item | Licensee's Annual Recreation Costs and Revenues (In Whole Dollars) | |
|---|---|---|
| | Construction, Operation and Maintenance Costs | Recreation Revenues for Calendar Year |
| 12. Dollar Values | $3,000.00 | $0.00 |

13. Length of Recreation Season: Summer: From (MM/DD) 4/1 To 10/31 Winter: From (MM/DD) 11/1 To 1/31

| Period | Number of visits to all recreational areas at development/project (in Recreation Days) | |
|---|---|---|
| | Annual Total | Peak Weekend Average (see Glossary) |
| 14. Daytime | 11,851 | 67 |
| 15. Nighttime | 2,963 | 17 |

Respondent Certification: The undersigned certifies that he/she examined this report; and to the best of his/her knowledge, all data provided herein are true, complete, and accurate.

| Frank M. Simms | Plant Manager - Hydro | (540) 985-2875 |
|---|---|---|
| Legal Name | Title | Area Code/Phone No. |
| _____ | 02/24/15 | 2014 |
| Signature | Date Signed | Reporting Year Ending |

Title 18 U.S.C.1001 makes it a crime for any person knowingly and willingly to make to any Agency or department of the United States any false, fictitious or fraudulent statement or misrepresentation as to any matter within its jurisdiction.

# Schedule 2. Inventory of Publicly Available Recreation Amenities Within the Project Boundary

16. Enter data for each Recreation Amenity Type (a). For User Free (b) and User Fee (c) enter the number of publicly available recreation amenities, located within the project boundary, regardless of provider. For FERC Approved (d) enter the number of amenities identified under User Free (b) and User Fee (c) for which the licensee has an ongoing responsibility for funding or maintenance (see Glossary for further detail). For Capacity Utilization(f), of the total publicly available amenities (b) + (c), compare the average non-peak weekend use (see Glossary) for each recreation amenity type (during the recreation season, with the highest use, reported on Schedule 1, Item 13) with the total combined capacity of each amenity type and enter a percentage that indicates their overall level of use. For example, if all public boat launches are used to half capacity during the non-peak weekend days, enter 50% (should use exceed capacity for an amenity type, enter the appropriate percentage above 100).

| Recreation Amenity Type (a) | Number of Recreation Amenities | | | Total Units (e) | Capacity Utilization (%) (f) |
|---|---|---|---|---|---|
| | User Free (b) | User Fee (c) | FERC Approved (d) | | |
| **Boat Launch Areas.** Improved areas having one or more boat launch lanes (enter number in column e) and are usually marked with signs, have hardened surfaces, and typically have adjacent parking. | 1 | 1 | 1 | 2 Lanes | 48 |
| **Marinas.** Facilities with more than 10 slips on project waters, which include one or more of the following: docking, fueling, repair and storage of boats; boat/equipment rental; or sell bait/food (see Glossary FERC approved). | | | | N/A | |
| **Whitewater Boating.** Put-ins/Take-outs specifically designated for whitewater access. | | | | N/A | |
| **Portages.** Sites designed for launching and taking out canoes/kayaks and the improved, designated, and maintained trails connecting such sites (enter length of trail in column e). | 1 | | 1 | 528 Feet | 5 |
| **Tailwater Fishing.** Platforms, walkways, or similar structures to facilitate below dam fishing. | 1 | | 1 | N/A | 44 |
| **Reservoir Fishing.** Platforms, walkways, or similar structures to facilitate fishing in the reservoir pool or feeder streams. | 2 | | 2 | N/A | 9 |
| **Swim Areas.** Sites providing swimming facilities (bath houses, designated swim areas, parking and sanitation facilities). | | | | Acres | |
| **Trails.** Narrow tracks used for non-automobile recreation travel which are mapped and designated for specific use(s) such as hiking, biking, horseback riding, snowmobiling, or XC skiing (excludes portages, paths or accessible routes; See Glossary). | | | | Miles | |
| **Active Recreation Areas.** Playground equipment, game courts/fields, golf/disc golf courses, jogging tracks, etc. | | | | Acres | |
| **Picnic Areas.** Locations containing one or more picnic sites (each of which may include tables, grills, trash cans, and parking). | 1 | | 1 | 1 Sites | 6 |
| **Overlooks/Vistas.** Sites established to view scenery, wildlife, cultural resources, project features, or landscapes. | | | | Acres | |
| **Visitor Centers.** Buildings where the public can gather information about the development/project, its operation, nearby historic, natural, cultural, recreational resources, and other items of interest. | | | | N/A | |
| **Interpretive Displays.** Signage/Kiosks/Billboards which provide information about the development/project, its operation, nearby historic, natural, cultural, recreational resources, and other items of interest. | 1 | | 1 | N/A | N/A |
| **Hunting Areas.** Lands open to the general public for hunting. | | | | Acres | |
| **Winter Areas.** Locations providing opportunities for skiing, sledding, curling, ice skating, or other winter activities. | | | | Acres | |
| **Campgrounds.** Hardened areas developed to cluster campers (may include sites for tents, trailers, recreational vehicles [RV], yurts, cabins, or a combination, but excludes group camps). | | | | Acres | N/A |
| **Campsites.** Sites for tents, trailers, recreational vehicles [RV], yurts, cabins, or a combination of temporary uses. | | | | N/A | |
| **Cottage Sites.** Permanent, all-weather, buildings rented for short-term use, by the public, for recreational purposes. | | | | N/A | |
| **Group Camps.** Areas equipped to accommodate large groups of campers that are open to the general public (may be operated by public, private, or non-profit organizations). | | | | Sites | |
| **Dispersed Camping Areas.** Places visitors are allowed to camp outside of a developed campground (enter number of sites in clmn. e). | | | | Sites | |
| **Informal Use Areas.** Well used locations which typically do not include amenities, but require operation and maintenance and/or public safety responsibilities | | | | | |
| **Access Points.** Well-used sites (not accounted for elsewhere on this form) for visitors entering project lands or waters, without trespassing, for recreational purposes (may have limited development such as parking, restrooms, signage). | | | | N/A | |
| **Other.** Amenities that do not fit in the categories identified above. Please specify (if more than one, separate by commas): | | | | | |

# Glossary of FERC Form 80 Terms

**Data Collection Methods.** (Schedule 1, Item 11) – If a percentage is entered for the estimate alternative, please provide an explanation of the methods used (if submitted on a separate piece of paper, please include licensee name, project number, and development name)

**Development.** The portion of a project which includes:
(a) a reservoir; or
(b) a generating station and its specifically-related waterways.

**Exemption from Filing.** Exemption from the filing of this form granted upon Commission approval of an application by a licensee pursuant to the provisions of 18 CFR 8.11(c).

**General Public.** Those persons who do not have special privileges to use the shoreline for recreational purposes, such as waterfront property ownership, water-privileged community rights, or renters with such privileges.

**Licensee**. Any person, state, or municipality licensed under the provisions of Section 4 of the Federal Power Act, and any assignee or successor in interest. For the purposes of this form, the terms licensee, owner, and respondent are interchangeable *except where:*
(a) the *owner* or licensee is a subsidiary of a parent company which has been or is required to file this form; or
(b) there is more than one owner or licensee, of whom only one is responsible for filing this form. Enter the name of the entity that is responsible for filing this report in Schedule 1, Item 2.1.

**Major License.** A license for a project of more than 1,500 kilowatts installed capacity.

**Minor License.** A license for a project of 1,500 kilowatts or less installed capacity.

**Non-Peak Weekend.** Any weekend that is not a holiday and thus reflects more typical use during the recreation season.

**Number of Recreation Amenities.** Quantifies the availability of natural or man-made property or facilities for a given recreation amenity type. This includes all recreation resources available to the public within the development/project boundary. The resources are broken into the following categories:

**User Free** (Schedule 2, column b) - Those amenities within the development/project that are free to the public;

**User Fee** (Schedule 2, column c) - Those amenities within the development/project where the licensee/facility operator charges a fee;

**FERC Approved** (Schedule 2, column d) – Those amenities within the development/project required by the Commission in a license or license amendment document, including an approved recreation plan or report. Recreation amenities that are within the project boundary, but were approved by the licensee through the standard land use article or by the Commission through an application for non-project use of project lands and waters, are typically not counted as FERC approved, unless they are available to the public, but may be counted as either user free or user fee resources. The total FERC approved amenities column does not necessarily have to equal the sum of user free and user fee amenities.

**Peak Use Weekend.** Weekends when recreational use is at its peak for the season (typically Memorial Day, July 4$^{th}$ & Labor Day). On these weekends, recreational use may exceed the capacity of the area to handle such use. Include use for all three days in the holiday weekends when calculating Peak Weekend Average for items 14 & 15 on Schedule 1.

**Recreation Day.** Each visit by a person to a development (as defined above) for recreational purposes during any portion of a 24-hour period.

**Revenues.** Income generated from recreation amenities at a given project/development during the previous calendar year. Includes fees for access or use of area.

**Total Units** (Schedule 2, column e) – Provide the total length, or area, or number that is appropriate for each amenity type using the metric provided.

**Trails**. Narrow tracks used for non-automobile recreation travel which are mapped and designated for specific use(s) such as hiking, biking, horseback riding, snowmobiling, or XC skiing. Trails are recreation amenities which provide the opportunity to engage in recreational pursuits, unlike paths (means of egress whose primary purpose is linking recreation amenities at a facility) or accessible routes (means of egress which meets the needs of persons with disability and links accessible recreation amenities and infrastructure at a facility).