minnesota power
AN ALLETE COMPANY

March 30, 2023 **VIA E-filing**

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

Subject: Little Falls Hydroelectric Project (FERC Project No. 2532)
Sylvan Hydroelectric Project (FERC Project No. 2454)
Pillager Hydroelectric Project (FERC Project No. 2663)
Notices of Intent and Volume I (Public) of the Pre-Application Document

Dear Secretary Bose:

Minnesota Power (MP or Licensee), a subsidiary of ALLETE, Inc., the Licensee of the Little Falls Hydroelectric Project (Little Falls Project) (FERC No. 2532), Sylvan Hydroelectric Project (Sylvan Project) (FERC No. 2454), and Pillager Hydroelectric Project (Pillager Project) (FERC No. 2663) (Licensee), herein collectively referred to as the "Projects," electronically files with the Federal Energy Regulatory Commission (Commission or FERC) the Notices of Intent (NOI) and Pre-Application Document (PAD) for the relicensing of the Projects in accordance with the requirements of 18 Code of Federal Regulation (CFR) Part 5. The FERC licenses for Projects expire on March 31, 2028. The Licensee plans to relicense the Projects using the Commission's Integrated Licensing Process (ILP), in accordance with FERC's regulations pursuant to 18 CFR Part 5. Due to the proximity of the Projects to each other, the Licensee proposes to conduct the relicensing processes concurrently, and requests that the Commission do the same. The Licensee is submitting individual NOIs and a single PAD for the Projects.

The Little Falls Project is a 4.72-megawatt (MW) run-of-river (ROR) facility located on the Mississippi River in Morrison County, Minnesota. The Sylvan Project is a 1.8 MW ROR facility located on the Crow Wing River in Cass, Crow Wing, and Morrison counties, Minnesota. The Pillager Project is a 1.52 MW ROR facility located on the Crow Wing River in Cass and Morrison counties, Minnesota.

The PAD contains two volumes. Volume I contains the public information required by 18 CFR § 5.6. Volume II of the PAD contains drawings of Project works that meet the definition of Critical Energy Infrastructure Information (CEII) pursuant to FERC's June 23, 2003 Order No. 630-A. Consistent with that order, the Licensee is filing Volume II as CEII under separate cover.

Pursuant to 18 CFR §4.38, §5.5(c), and §5.6(a), the NOIs and Volume I of the PAD are being distributed electronically to the relevant resource agencies, Tribes, non-governmental organizations, minnesota power

AN ALLETE COMPANY

and other potential interested parties included on the attached distribution list. The Licensee will also place the NOIs and Volume I of the PAD on the relicensing website at https://www.mnpower.com/Environment/Hydro.

As set forth in the ILP regulations pursuant to 18 CFR § 5.8, FERC will issue Scoping Document 1 (SD1) within 60 days of the filing date of the NOIs and PAD. In addition, FERC will provide public notice and schedule a public scoping meeting and site visit for the Projects within 30 days of issuing SD1. Based on the filing date for the NOIs and PAD, The Licensee proposes holding the FERC Scoping Meeting on June 21, 2023. FERC will notice the final dates, times, and location of the Scoping Meeting and publish that information in local papers shortly after the filing of the NOIs and PAD.

In accordance with 18 CFR §5.5(e), Section 7 of the Endangered Species Act and the joint agency regulations at 50 CFR part 402, Section 305(b) of the Magnuson-Stevens Fishery Conservation and Management Act, and the implementing regulations at 50 CFR 600.920, The Licensee hereby requests to be designated as the Commission's non-federal representative for the purposes of consultation under section 7 of the Endangered Species Act. The Licensee requests authorization to initiate consultation under section 106 of the National Historic Preservation Act and to implement regulations at 36 CFR Section 8000.2(c)(4).

Please direct any questions pertaining to the Projects to me by phone at (218) 355-3191 or email at gprom@mnpower.org.

Sincerely,

Greg Prom

Greg Prom
Senior Environmental Compliance Specialist
ALLETE, Inc., d.b.a Minnesota Power
30 West Superior Street
Duluth, Minnesota 55802-2093

Attachments: Distribution List
Notice of Intent for the Little Falls Project (FERC P-2532)
Notice of Intent for the Sylvan Project (FERC P-2454)
Notice of Intent for the Pillager Project (FERC P-2663)
Volume I (Public) of the Pre-Application Document for the Little Falls Project (FERC P-2532), Sylvan Project (FERC P-2454), and Pillager Project (FERC P-2663)

Little Falls (P-2532), Sylvan (P-2454), Pillager (P-2663) Hydroelectric Projects
Relicensing Distribution List

Federal Agencies
Timothy LaPointe
Director, Midwest Regional Office
U.S. Bureau of Indian Affairs
Midwest Region Regional Office
Indian Affairs
5600 West American Blvd, Suite 500
Bloomington, Minnesota 55437

Nanette Bischoff
FERC Coordinator
U.S. Army Corps of Engineers
Saint Paul District
190 5th St East Suite 700
Saint Paul, Minnesota 55101-1638

Darin Simpkins
Fish and Wildlife Biologist
U.S. Fish and Wildlife Service
2661 Scott Tower Drive
New Franken, Wisconsin 54229-9565

David Thomson
Hydropower Coordinator
National Park Service
601 Riverfront Drive
Omaha, Nebraska 68102-4226

Tribes
Durell Cooper
Chairman
Apache Tribe of Oklahoma
P.O. Box 1330
Anadarko, Oklahoma 73005

Michael Wiggins
Chairman
Bad River Band of Lake Superior Chippewa
Indians of the Bad River Reservation, Wisconsin
P.O. Box 39
Odanah, Wisconsin, 54861

Reggie Wassana
Governor
Cheyenne and Arapaho Tribes of Oklahoma
P.O. Box 38
Concho, Oklahoma 73022

Jeffery Stiffarm
President
Fort Belknap Indian Community of the Fort
Belknap Reservation of Montana
RR 1, Box 66
Harlem, Montana 59526

Timothy Rhodd
Chairman
Iowa Tribe of Kansas and Nebraska
3345 Thrasher Road
White Cloud, Kansas 66439

Doreen Blaker
President
Keweenaw Bay Indian Community, Michigan
16429 Beartown Road
Baraga, Michigan 49908

John Johnson
President
Lac du Flambeau Band of Lake Superior
Chippewa Indians of the Lac du Flambeau
Reservation of Wisconsin
P.O. Box 67
Lac du Flambeau, Wisconsin 54538

James Williams
Chairman
Lac Vieux Desert Band of Lake Superior
Chippewa Indians of Michigan
P.O. Box 249
Watersmeet, Michigan 49969

Ron Corn
Chairman
Menominee Indian Tribe of Wisconsin
P.O. Box 910
Keshena, Wisconsin 54135

Catherine Chavers
Chairman
Minnesota Chippewa Tribe - Bois Forte Band (Nett Lake)
5344 Lake Shore Drive
Nett Lake, Minnesota 55772

Kevin DuPuis
Chairman
Minnesota Chippewa Tribe - Fond du Lac Band
1720 Big Lake Road
Cloquet, Minnesota 55720

Robert Deschampe
Chairman
Minnesota Chippewa Tribe - Grand Portage Band
P.O. Box 428
Grand Portage, Minnesota 55605

Faron Jackson
Chairman
Minnesota Chippewa Tribe - Leech Lake Band
6530 U.S. Hwy 2 Northwest
Cass Lake, Minnesota 56633

Melanie Benjamin
Chief Executive
Minnesota Chippewa Tribe - Mille Lacs Band
43408 Oodena Drive
Onamia, Minnesota 56359

Michael Fairbanks
Chairman
Minnesota Chippewa Tribe - White Earth Band
P.O. Box 418 (Hwy 224)
White Earth, Minnesota 56591

Catherine Chavers
President
Minnesota Chippewa Tribe, Minnesota
P.O. Box 217
Cass Lake, Minnesota 56633

Christopher Boyd
Chairman
Red Cliff Band of Lake Superior Chippewa Indians of Wisconsin
88385 Pike Road Highway 13
Bayfield, Wisconsin 54814

Darrell Seki
Chairman
Red Lake Band of Chippewa Indians
P.O. Box 550
Red Lake, Minnesota 56671

Robert VanZile
Chairman
Sokaogon Chippewa Community, Wisconsin
3051 Sand Lake Road
Crandon, Wisconsin 54520

Kevin Jensvold
Chairman
Upper Sioux Community of Minnesota
P.O. Box 147
Granite Falls, Minnesota 56241

State Agencies

John Jaschke
Executive Director
Minnesota Board of Water & Soil Resources
520 Lafayette Road North
Saint Paul, Minnesota 55155-0001

Sarah Beimers
State Historic Preservation Office
Minnesota Department of Administration
203 Administration Building
50 Sherburne Avenue
Saint Paul, Minnesota 55155

Shannon Geshick
Executive Director
Minnesota Indian Affairs Council
161 Saint Anthony Avenue
Suite 919
Saint Paul, Minnesota 55103

Jill Townley
Environmental Review Supervisor
Minnesota Department of Natural Resources
500 Lafayette Road
Saint Paul, Minnesota 55155-4025

Dan O'Shea
River Ecology Unit/Ecological and Water Resource Division
Minnesota Department of Natural Resources
500 Lafayette Road
St. Paul, Minnesota 55155-4025

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Dam Safety Engineer
Minnesota Department of Natural Resources
500 Lafayette Road
Eco. Resources - Box 25
St. Paul, Minnesota 55155-4025

Eric Altena
Area Fisheries Supervisor
Minnesota Department of Natural Resources
16543 Haven Road
Little Falls, Minnesota 56345

Harvey Thorleifson
Director
Minnesota Geological Survey
2609 Territorial Road
Saint Paul, Minnesota 55114-1032

Jesse Anderson
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Minnesota Pollution Control Agency
525 South Lake Avenue
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Duluth, Minnesota 55802

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Watershed Project Manager
Minnesota Pollution Control Agency
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Suite 105
Baxter, Minnesota 56425

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Pollution Control Specialist
Minnesota Pollution Control Agency
520 Lafayette Rd. N.
St. Paul, Minnesota 55155

Daniel P. Wolf
Executive Secretary
Minnesota Public Utilities Commission
121 7Th Place East, Suite 350
Saint Paul, Minnesota 55101-2163

Local Governments

Josh Stevenson
Administrator
Cass County, Minnesota
P.O. Box 3000
Walker, Minnesota 56484

Timothy J Houle
County Administrator
Crow Wing County, Minnesota
326 Laurel Street
Suite 13
Brainerd, Minnesota 56401

Matt LeBlanc
Administrator
Morrison County, Minnesota
213 1st Avenue SE
Little Falls, Minnesota 56345

Wendy Zylka
City Clerk
City of Little Falls, Minnesota
100 Northeast Seventh Avenue
P.O. Box 244
Little Falls, Minnesota 56345-0244

Jon Radermacher
City Administrator
City of Little Falls, Minnesota
100 Northeast Seventh Avenue
P.O. Box 244
Little Falls, Minnesota 56345-0244

Amy Walker
Clerk of Rosing Township
8497 Azalea Road
Pillager, Minnesota 56473

Sylvan Township
12956 24th Avenue SW
Pillager, Minnesota 56473

Lori Blumke
City Clerk/Treasurer
City of Pillager
306 Elm Avenue West
Pillager, Minnesota 56473

Darrel Olson
Mayor
City of Baxter, Minnesota
13190 Memorywood Drive
Baxter, Minnesota 56425

Dave Badeaux
Mayor
Brainerd, Minnesota
501 Laurel Street
Brainerd, Minnesota 56401

Non-Governmental Organizations

Tim Terrill
Mississippi Headwaters Board
Land Services Building
322 Laurel Street
Brainerd, Minnesota 56401

Licensee

Nora Rosemore
Manager – Renewable Business Operations
Hydro Operations
Minnesota Power/ALLETE, Inc.
30 West Superior Street
Duluth, Minnesota 55802

Greg Prom
Senior Environmental Compliance Specialist
Minnesota Power/ALLETE, Inc.
30 West Superior Street
Duluth, Minnesota 55802

David Moeller
Senior Regulatory Counsel
Minnesota Power/ALLETE, Inc.
30 West Superior Street
Duluth, Minnesota 55802

Lesley Brotkowski
Senior Licensing Coordinator
Kleinschmidt Associates
233403 Stettin Ridge Court
Wausau, Wisconsin 54401

United States of America
Federal Energy Regulatory Commission

ALLETE, Inc. Project No. 2532

Notice of Intent
To File an Application for New License
For a Major Water Power Project, 10 Megawatts or Less
For the Little Falls Hydroelectric Project (FERC P-2532)

Pursuant to Section 5.5 of the Federal Energy Regulatory Commission's (FERC or Commission) regulations at Title 18 of the Code of Federal Regulations (CFR), Minnesota Power (MP or Licensee), a subsidiary of ALLETE, Inc., the Licensee of the existing Little Falls Hydroelectric Project (FERC Project No 2532), hereby notifies the Commission of its intention to file an Application for a New License for the Little Falls Hydroelectric Project (Little Falls Project). In accordance the 18 CFR §5.5 and §16.6(b), the following information is provided.

1. Licensee's Name and Address:

ALLETE, Inc.
30 West Superior Street
Duluth, Minnesota 55802-2093
Phone: (218) 279-5000

The Licensee requests that all correspondence and service of documents related to this notification and subsequent proceedings be addressed to:

Greg Prom
Senior Environmental Compliance Specialist
ALLETE, Inc., d.b.a. Minnesota Power
30 West Superior Street
Duluth, Minnesota 55802-2093
Phone: 218-355-3191
Email: gprom@allete.com

2. Project Number:

FERC Project No. 2532

3. License Expiration Date:

March 31, 2028

4. Unequivocal Statement of Intent:

MP hereby unequivocally declares its intent to file an Application for New License for the Little Falls Project on or before March 31, 2026. MP will utilize the Commission's Integrated Licensing Process (ILP) in support of this relicensing.

5. Principal Project Works:

The Little Falls Project works consist of: (a) a powerhouse containing two generating units with a total installed capacity of 800 kilowatts (kW) (Powerhouse #1); (b) 66-foot-long gated spillway (Bay Nos. 9, 10, 11) and switchgear building; (c) a second powerhouse containing four generating units with a total installed capacity of 3,920 kW (Powerhouse #2); (d) a 42-foot-long, 20.6-foot-high mass concrete ogee spillway topped with 2.5-foot-high flashboards (Spillway #1); (e) a 62-foot-long, 7.2-foot-high mass concrete ogee spillway topped with 2.5-foot-high flashboards (Spillway #2); (f) a 140-foot-long, 13.5-foot-high mass concrete ogee spillway topped with 2.5-foot-high flashboards (Spillway #3); (g) a 42-foot-long, 12-foot-high overflow section (Pier 8); (h) three-bay gated spillway with 8 foot wide log sluiceway, two 13.4-foot-wide Tainter gates (Gated Spillway [Log Sluice and Bay Nos. 1 and 2]); (i) a 152-foot-long, 22.2-foot-high mass concrete ogee spillway topped with 4.3-foot-high flashboards (Spillway #4); (j) Gated spillway with three 20-foot-wide bays and 4.5-foot-wide intermediate piers topped with 13.5-foot-tall Tainter gates (Gated Spillway [Bay Nos. 3, 4, 5]); (k) Gated spillway with three 15-foot-wide bays and 2.5-foot-wide intermediate piers topped with 6.5-foot-tall steel vertical lift gates (Gated Spillway [Bay Nos. 6, 7, 8]); (l) 150-foot-long concrete wall (Left Abutment Wall); (m) 130-foot-long embankment (Left Embankment); (n) a 575-acre reservoir; and (o) appurtenant facilities. The structures are primarily concrete. The dam has a maximum height of approximately 27 feet. There is also a power canal that was historically used for hydromechanical power, which has since been closed and partially filled, as described below.

6. Project Location:

State: Minnesota
County: Morrison
Stream or body of water: Mississippi River
Township or nearby town: Little Falls, Minnesota

7. Installed Plant Capacity:

The Little Falls Project installed capacity is 4.72 megawatts (MW).

8. The names and mailing address of:

i. Every county in which any part of the project is located, and in which any Federal facility that is used or to be used by the project is located:

Morrison County, Minnesota
213 1st Avenue SE
Little Falls, Minnesota 56345

There are no Federal facilities used by the Little Falls Project.

ii. Every city, town, or similar political subdivision:

A. 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:

City of Little Falls, Minnesota
100 Northeast Seventh Avenue
P.O. Box 244
Little Falls, Minnesota 56345-0244

B. That has a population of 5,000 or more people and is located within 15 miles of the existing or proposed project dam:

City of Little Falls, Minnesota
100 Northeast Seventh Avenue
P.O. Box 244
Little Falls, Minnesota 56345-0244

iii. Every irrigation district, drainage district, or similar special purpose political subdivision:

A. In which any part of the project is or is proposed to be located and any Federal facility that is or is proposed to be used by the project is located:

Mississippi Headwaters Board
Land Services Building
322 Laurel Street
Brainerd, Minnesota 56401

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:

None. The Little Falls Project uses no Federal facilities and occupies no Federal lands.

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

There are no other political districts or subdivisions that are likely to be interested in or affected by the notification.

v. Affected Native American Tribes:

The Licensee is not aware that the Little Falls Project affects any Native American Tribe. The following is a listing of Native American Tribes that may have some level of interest in the area surrounding the Little Falls Project and have been included on the relicensing Distribution List:

Apache Tribe of Oklahoma
P.O. Box 1330
Anadarko, Oklahoma 73005

Bad River Band of Lake Superior Chippewa Indians of the Bad River Reservation, Wisconsin
P.O. Box 39
Odanah, Wisconsin, 54861

Cheyenne and Arapaho Tribes of Oklahoma
P.O. Box 38
Concho, Oklahoma 73022

Fort Belknap Indian Community of the Fort Belknap Reservation of Montana
RR 1, Box 66
Harlem, Montana 59526

Iowa Tribe of Kansas and Nebraska
3345 Thrasher Road
White Cloud, Kansas 66439

Keweenaw Bay Indian Community, Michigan
16429 Beartown Road
Baraga, Michigan 49908

Lac du Flambeau Band of Lake Superior Chippewa Indians of the Lac du Flambeau Reservation of Wisconsin
P.O. Box 67
Lac du Flambeau, Wisconsin 54538

Lac Vieux Desert Band of Lake Superior Chippewa Indians of Michigan
P.O. Box 249
Watersmeet, Michigan 49969

Menominee Indian Tribe of Wisconsin
P.O. Box 910
Keshena, Wisconsin 54135

Minnesota Chippewa Tribe - Bois Forte Band (Nett Lake)
5344 Lake Shore Drive
Nett Lake, Minnesota 55772

Minnesota Chippewa Tribe - Fond du Lac Band
1720 Big Lake Road
Cloquet, Minnesota 55720

Minnesota Chippewa Tribe - Grand Portage Band
P.O. Box 428
Grand Portage, Minnesota 55605

Minnesota Chippewa Tribe - Leech Lake Band
6530 U.S. Hwy 2 Northwest
Cass Lake, Minnesota 56633

Minnesota Chippewa Tribe - Mille Lacs Band
43408 Oodena Drive
Onamia, Minnesota 56359

Minnesota Chippewa Tribe, Minnesota
P.O. Box 217
Cass Lake, Minnesota 56633

Minnesota Chippewa Tribe - White Earth Band
P.O. Box 418 (Hwy 224)
White Earth, Minnesota 56591

Red Lake Band of Chippewa Indians
P.O. Box 550
Red Lake, Minnesota 56671

Red Cliff Band of Lake Superior Chippewa Indians of Wisconsin
88385 Pike Road Highway 13
Bayfield, Wisconsin 54814

Sokaogon Chippewa Community, Wisconsin
3051 Sand Lake Road
Crandon, Wisconsin 54520

Upper Sioux Community of Minnesota
P.O. Box 147
Granite Falls, Minnesota 56241

9. Whether the application is for a power or a non-power license:

The Little Falls Project License Application will be for a power license.

Furthermore, in accordance with 18 CFR. Section 5.5, the Licensee must distribute to appropriate Federal, state, and interstate resource agencies, tribes, local governments, and members of the public likely to be interested in the proceeding this notification of intent. The Distribution List includes a listing of the notified agencies, tribes, local governments, and other potentially interested parties.

The information required to be made available to the public pursuant to 18 CFR Section 16.7 is located at the MP's offices at 30 West Superior Street, Duluth, Minnesota 55802 and will be available on MP's public relicensing website www.mnpower.com/Environment/Hydro.

United States of America
Federal Energy Regulatory Commission

ALLETE, Inc. Project No. 2454

Notice of Intent
To File an Application for New License
For a Major Water Power Project, 10 Megawatts or Less
For the Sylvan Hydroelectric Project (FERC P-2454)

Pursuant to Section 5.5 of the Federal Energy Regulatory Commission's (FERC or Commission) regulations at Title 18 of the Code of Federal Regulations (CFR), Minnesota Power (MP or Licensee), a subsidiary of ALLETE, Inc., the Licensee of the existing Sylvan Hydroelectric Project (FERC Project No 2454), hereby notifies the Commission of its intention to file an Application for a New License for the Sylvan Hydroelectric Project (Sylvan Project). In accordance the 18 CFR §5.5 and §16.6(b), the following information is provided.

1. Licensee's Name and Address:

ALLETE, Inc.
30 West Superior Street
Duluth, Minnesota 55802-2093
Phone: (218) 279-5000

The Licensee requests that all correspondence and service of documents related to this notification and subsequent proceedings be addressed to:

Greg Prom
Senior Environmental Compliance Specialist
Minnesota Power / ALLETE, Inc.
30 West Superior Street
Duluth, Minnesota 55802-2093
Phone: 218-355-3191
Email: gprom@allete.com

2. Project Number:

FERC Project No. 2454

3. License Expiration Date:

March 31, 2028

4. Unequivocal Statement of Intent:

MP hereby unequivocally declares its intent to file an Application for New License for the Sylvan Project on or before March 31, 2026. MP will utilize the Commission's Integrated Licensing Process (ILP) in support of this relicensing.

5. Principal Project Works:

The Sylvan Project works consist of: (a) a 78-foot-long left earth embankment with a concrete corewall; (b) a powerhouse with three generating units with a total installed capacity of 1,800 kW; (c) a 237-foot-long spillway with four vertical slide gates and two inflatable rubber dams; (d) a 41-foot-long right earth embankment with a concrete core wall; (e) a 730-foot-long earth embankment, approximately 4 to 6 feet tall (Dike 1); (f) 830-foot-long earth embankment, typically about 4 to 6 feet tall with some sections up to 9 feet tall, with an auxiliary spillway (Dike 2 and Auxiliary Spillway); (g) a 1,275-acre reservoir; and (h) appurtenant facilities. Other than the two dikes, the dam structures are situated in or adjacent to the main channel of the Crow Wing River. The dam has a general orientation of southwest to northeast and the maximum height is approximately 48 feet (top of concrete to bottom of concrete).

6. Project Location:

State: Minnesota
Counties: Cass, Crow Wing, and Morrison
Stream or body of water: Crow Wing River
Township or nearby town: Rosing Township, Minnesota

7. Installed Plant Capacity:

The Sylvan Project installed capacity is 1.8 megawatts (MW).

8. The names and mailing address of:

i. Every county in which any part of the project is located, and in which any Federal facility that is used or to be used by the project is located:

Cass County, Minnesota
P.O. Box 3000
Walker, Minnesota 56484

Crow Wing County, Minnesota
326 Laurel Street, Suite 13
Brainerd, Minnesota 56401

Morrison County, Minnesota
213 1st Avenue SE
Little Falls, Minnesota 56345

There are no Federal facilities used by the Sylvan Project.

ii. *Every city, town, or similar political subdivision:*

A. *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:*

Rosing Township
8497 Azalea Road
Pillager, Minnesota 56473

B. *That has a population of 5,000 or more people and is located within 15 miles of the existing or proposed project dam:*

City of Baxter, Minnesota
13190 Memorywood Drive
Baxter, Minnesota 56425

Brainerd, Minnesota
501 Laurel Street
Brainerd, Minnesota 56401

iii. *Every irrigation district, drainage district, or similar special purpose political subdivision:*

A. *In which any part of the project is or is proposed to be located and any Federal facility that is or is proposed to be used by the project is located:*

Mississippi Headwaters Board
Land Services Building
322 Laurel Street
Brainerd, Minnesota 56401

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:*

None. The Sylvan Project uses no Federal facilities and occupies no Federal lands.

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

There are no other political districts or subdivisions that are likely to be interested in or affected by the notification.

v. *Affected Native American Tribes:*

The Licensee is not aware that the Sylvan Project affects any Native American Tribe. The following is a listing of Native American Tribes that may have some level of interest in the area surrounding the Sylvan Project and have been included on the relicensing Distribution List:

Apache Tribe of Oklahoma
P.O. Box 1330
Anadarko, Oklahoma 73005

Bad River Band of Lake Superior Chippewa Indians of the Bad River Reservation, Wisconsin
P.O. Box 39
Odanah, Wisconsin, 54861

Cheyenne and Arapaho Tribes of Oklahoma
P.O. Box 38
Concho, Oklahoma 73022

Fort Belknap Indian Community of the Fort Belknap Reservation of Montana
RR 1, Box 66
Harlem, Montana 59526

Iowa Tribe of Kansas and Nebraska
3345 Thrasher Road
White Cloud, Kansas 66439

Keweenaw Bay Indian Community, Michigan
16429 Beartown Road
Baraga, Michigan 49908

Lac du Flambeau Band of Lake Superior Chippewa Indians of the Lac du Flambeau Reservation of Wisconsin
P.O. Box 67
Lac du Flambeau, Wisconsin 54538

Lac Vieux Desert Band of Lake Superior Chippewa Indians of Michigan
P.O. Box 249
Watersmeet, Michigan 49969

Menominee Indian Tribe of Wisconsin
P.O. Box 910
Keshena, Wisconsin 54135

Minnesota Chippewa Tribe - Bois Forte Band (Nett Lake)
5344 Lake Shore Drive
Nett Lake, Minnesota 55772

Minnesota Chippewa Tribe - Fond du Lac Band
1720 Big Lake Road
Cloquet, Minnesota 55720

Minnesota Chippewa Tribe - Grand Portage Band
P.O. Box 428
Grand Portage, Minnesota 55605

Minnesota Chippewa Tribe - Leech Lake Band
6530 U.S. Hwy 2 Northwest
Cass Lake, Minnesota 56633

Minnesota Chippewa Tribe - Mille Lacs Band
43408 Oodena Drive
Onamia, Minnesota 56359

Minnesota Chippewa Tribe, Minnesota
P.O. Box 217
Cass Lake, Minnesota 56633

Minnesota Chippewa Tribe - White Earth Band
P.O. Box 418 (Hwy 224)
White Earth, Minnesota 56591

Red Lake Band of Chippewa Indians
P.O. Box 550
Red Lake, Minnesota 56671

Red Cliff Band of Lake Superior Chippewa Indians of Wisconsin
88385 Pike Road Highway 13
Bayfield, Wisconsin 54814

Sokaogon Chippewa Community, Wisconsin
3051 Sand Lake Road
Crandon, Wisconsin 54520

Upper Sioux Community of Minnesota
P.O. Box 147
Granite Falls, Minnesota 56241

9. Whether the application is for a power or a non-power license:

The Sylvan Project License Application will be for a power license.

Furthermore, in accordance with 18 CFR Section 5.5, the Licensee must distribute to appropriate Federal, state, and interstate resource agencies, tribes, local governments, and members of the public likely to be interested in the proceeding this notification of intent. The Distribution List includes a listing of the notified agencies, tribes, local governments, and other potentially interested parties.

The information required to be made available to the public pursuant to 18 CFR Section 16.7 is located at the MP's offices at 30 West Superior Street, Duluth, Minnesota 55802 and will be available on MP's public relicensing website www.mnpower.com/Environment/Hydro.

United States of America
Federal Energy Regulatory Commission

ALLETE, Inc. Project No. 2663

Notice of Intent
To File an Application for New License
For a Major Water Power Project, 10 Megawatts or Less
For the Pillager Hydroelectric Project (FERC P-2663)

Pursuant to Section 5.5 of the Federal Energy Regulatory Commission's (FERC or Commission) regulations at Title 18 of the Code of Federal Regulations (CFR), Minnesota Power (MP or Licensee), a subsidiary of ALLETE, Inc., the Licensee of the existing Pillager Hydroelectric Project (FERC Project No 2663), hereby notifies the Commission of its intention to file an Application for a New License for the Pillager Hydroelectric Project (Pillager Project). In accordance the 18 CFR §5.5 and §16.6(b), the following information is provided.

1. Licensee's Name and Address:

ALLETE, Inc.
30 West Superior Street
Duluth, Minnesota 55802-2093
Phone: (218) 279-5000

The Licensee requests that all correspondence and service of documents related to this notification and subsequent proceedings be addressed to:

Greg Prom
Senior Environmental Compliance Specialist
Minnesota Power / ALLETE, Inc.
30 West Superior Street
Duluth, Minnesota 55802-2093
Phone: 218-355-3191
Email: gprom@allete.com

2. Project Number:

FERC Project No. 2663

3. License Expiration Date:

March 31, 2028

4. Unequivocal Statement of Intent:

MP hereby unequivocally declares its intent to file an Application for New License for the Pillager Project on or before March 31, 2026. MP will utilize the Commission’s Integrated Licensing Process (ILP) in support of this relicensing.

5. Principal Project Works:

The Pillager Project works consist of: (a) a 357-foot-long concrete gravity dam; (b) a 15-foot-high south earth embankment, extending 223 feet from the south side of the spillway to the natural earth embankment of the river; (c) a 25-foot-high earth embankment, with a 2-foot-wide concrete core wall, extending 225 feet from the north side of the powerhouse to the natural earth embankment of the river; (d) a low 1,330-foot-long earth dike along the north boundary of the reservoir which closes a low spot on the reservoir rim; (e) a reinforced concrete powerhouse with two generating units with a total installed capacity of 1,520 kW; (f) a reservoir (commonly known as Lake Placid) with a surface area of 768 acres; (g) a 85-foot-long earthfill dike; and (h) appurtenant facilities. The primary structures are concrete on a soil foundation flanked by earth embankments, with a maximum height of approximately 47 feet (top of concrete piers to bottom of concrete on the spillway).

6. Project Location:

State: Minnesota
Counties: Cass and Morrison
Stream or body of water: Crow Wing River
Township or nearby town: Pillager, Minnesota

7. Installed Plant Capacity:

The Pillager Project installed capacity is 1.52 megawatts (MW).

8. The names and mailing address of:

i. Every county in which any part of the project is located, and in which any Federal facility that is used or to be used by the project is located:

Cass County, Minnesota
P.O. Box 3000
Walker, Minnesota 56484

Morrison County, Minnesota
213 1st Avenue SE
Little Falls, Minnesota 56345

There are no Federal facilities used by the Pillager Project.

ii. *Every city, town, or similar political subdivision:*

A. *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:*

City of Pillager
306 Elm Avenue West
Pillager, Minnesota 56473

B. *That has a population of 5,000 or more people and is located within 15 miles of the existing or proposed project dam:*

City of Baxter, Minnesota
13190 Memorywood Drive
Baxter, Minnesota 56425

Brainerd, Minnesota
501 Laurel Street
Brainerd, Minnesota 56401

iii. *Every irrigation district, drainage district, or similar special purpose political subdivision:*

A. *In which any part of the project is or is proposed to be located and any Federal facility that is or is proposed to be used by the project is located:*

Mississippi Headwaters Board
Land Services Building
322 Laurel Street
Brainerd, Minnesota 56401

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:

None. The Pillager Project uses no Federal facilities and occupies no Federal lands.

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

There are no other political districts or subdivisions that are likely to be interested in or affected by the notification.

v. Affected Native American Tribes:

The Licensee is not aware that the Pillager Project affects any Native American Tribe. The following is a listing of Native American Tribes that may have some level of interest in the area surrounding the Pillager Project and have been included on the relicensing Distribution List:

Apache Tribe of Oklahoma
P.O. Box 1330
Anadarko, Oklahoma 73005

Bad River Band of Lake Superior Chippewa Indians of the Bad River Reservation, Wisconsin
P.O. Box 39
Odanah, Wisconsin, 54861

Cheyenne and Arapaho Tribes of Oklahoma
P.O. Box 38
Concho, Oklahoma 73022

Fort Belknap Indian Community of the Fort Belknap Reservation of Montana
RR 1, Box 66
Harlem, Montana 59526

Iowa Tribe of Kansas and Nebraska
3345 Thrasher Road
White Cloud, Kansas 66439

Keweenaw Bay Indian Community, Michigan
16429 Beartown Road
Baraga, Michigan 49908

Lac du Flambeau Band of Lake Superior Chippewa Indians of the Lac du Flambeau Reservation of Wisconsin
P.O. Box 67
Lac du Flambeau, Wisconsin 54538

Lac Vieux Desert Band of Lake Superior Chippewa Indians of Michigan
P.O. Box 249
Watersmeet, Michigan 49969

Menominee Indian Tribe of Wisconsin
P.O. Box 910
Keshena, Wisconsin 54135

Minnesota Chippewa Tribe - Bois Forte Band (Nett Lake)
5344 Lake Shore Drive
Nett Lake, Minnesota 55772

Minnesota Chippewa Tribe - Fond du Lac Band
1720 Big Lake Road
Cloquet, Minnesota 55720

Minnesota Chippewa Tribe - Grand Portage Band
P.O. Box 428
Grand Portage, Minnesota 55605

Minnesota Chippewa Tribe - Leech Lake Band
6530 U.S. Hwy 2 Northwest
Cass Lake, Minnesota 56633

Minnesota Chippewa Tribe - Mille Lacs Band
43408 Oodena Drive
Onamia, Minnesota 56359

Minnesota Chippewa Tribe, Minnesota
P.O. Box 217
Cass Lake, Minnesota 56633

Minnesota Chippewa Tribe - White Earth Band
P.O. Box 418 (Hwy 224)
White Earth, Minnesota 56591

Red Lake Band of Chippewa Indians
P.O. Box 550
Red Lake, Minnesota 56671

Red Cliff Band of Lake Superior Chippewa Indians of Wisconsin
88385 Pike Road Highway 13
Bayfield, Wisconsin 54814

Sokaogon Chippewa Community, Wisconsin
3051 Sand Lake Road
Crandon, Wisconsin 54520

Upper Sioux Community of Minnesota
P.O. Box 147
Granite Falls, Minnesota 56241

9. Whether the application is for a power or a non-power license:

The Pillager Project License Application will be for a power license.

Furthermore, in accordance with 18 CFR Section 5.5, the Licensee must distribute to appropriate Federal, state, and interstate resource agencies, tribes, local governments, and members of the public likely to be interested in the proceeding this notification of intent. The Distribution List includes a listing of the notified agencies, tribes, local governments, and other potentially interested parties.

The information required to be made available to the public pursuant to 18 CFR. Section 16.7 is located at the MP's offices at 30 West Superior Street, Duluth, Minnesota 55802 and will be available on MP's public relicensing website www.mnpower.com/Environment/Hydro.

PRE-APPLICATION DOCUMENT

LITTLE FALLS HYDROELECTRIC PROJECT
FERC P-2532

SYLVAN HYDROELECTRIC PROJECT
FERC P-2454

PILLAGER HYDROELECTRIC PROJECT
FERC P-2663

Prepared for:
ALLETE, Inc.

Prepared by:
Kleinschmidt Associates

March 2023

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DEFINITIONS OF TERMS, ACRONYMS, AND ABBREVIATIONS

APE	Area of Potential Effects
B.P.	Before Present
°C	degrees Celsius
CEII	Critical Energy Infrastructure Information
CFR	Code of Federal Regulations
cfs	cubic feet per second
Chl-a	chlorophyll-a
cm	centimeter
Commission	Federal Energy Regulatory Commission
CRMP	Cultural Resources Management Plan
d.b.a.	doing business as
DLA	Draft License Application
DO	dissolved oxygen
ECOS	Environmental Conservation Online System
ECS	Ecological Classification System
EDDMaps	Early Detection and Distribution Mapping System
EFH	Essential Fish Habitat
EJ	Environmental justice
El	Elevation
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
°F	degrees Fahrenheit
FERC	Federal Energy Regulatory Commission
FLA	Final License Application
FOIA	Freedom of Information Act
FPA	Federal Power Act
HUC	hydrologic unit code
IBI	index of biological integrity
ILP	Integrated Licensing Process
Installed Capacity	The nameplate MW rating of a generator or group of generators.
Interested Parties	The broad group of individuals and entities that have an interest in a proceeding
Interior	U.S. Department of the Interior
IPaC	Information, Planning, and Conservation
kV	kilovolt

kVa	kilovolt-amperes
kW	kilowatt
kWh	kilowatt-hour
Licensee	ALLETE, Inc.
Little Falls Project	Little Falls Hydroelectric Project, FERC P-2532
MAPP	Mid-continent Area Power Pool
mg	milligrams
µg/L	microgram per liter
mg/L	milligrams per liter
mi^2	square miles
Minnesota DNR	Minnesota Department of Natural Resources
Minnesota PCA	Minnesota Pollution Control Agency
ml	milliliter
MLRA	Major Land Resource Area
MP	Minnesota Power
µS	microsiemens
MS	Microsoft
msl	mean sea level
MW	megawatt
MWh	megawatt hours
N	nitrogen
NCA	Natural Character Area
NEPA	National Environmental Policy Act
NGO	non-governmental organization
NGVD29	National Geodetic Vertical Datum of 1929
NHD	National Hydrography Dataset
NLCD	National Land Cover Database Class
NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System
NPS	National Park Service
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NRI	National Rivers Inventory
NTU	Nephelometric Turbidity Units
NWI	National Wetlands Inventory
PA	Programmatic Agreement

PAD	Pre-Application Document
PCU	Platinum Cobalt Units
PDF	Portable Document Format
PF	power factor
Pillager Project	Pillager Hydroelectric Project, FERC P-2663
PLSS	Public Land Survey System
PME	Protection, Mitigation and Enhancement Measures
POR	Period of record
Project Vicinity	The area within ½ mile of the associated FERC Project Boundary, as depicted in this PAD on the Project Vicinity figures
PSP	Proposed Study Plan
PURPA	Public Utility Regulatory Policies Act
RM	river mile
ROR	run-of-river
RPM	revolutions per minute
RSP	Revised Study Plan
RTE	rare, threatened, and endangered species
SCORP	Statewide Comprehensive Outdoor Recreation Plan
SD1	Scoping Document 1
SHPO	State Historic Preservation Office
SU	Standard Units (pH)
Sylvan Project	Sylvan Hydroelectric Project, FERC P-2454
TBD	to be determined
TCP	Traditional Cultural Properties
Total P	Total phosphorus
TKN	Total Kjeldahl Nitrogen
TMDL	total maximum daily load
TNS	terrestrial nuisance species
USACE	U.S. Army Corps of Engineers
USC	U.S. Code
USDA	U.S. Department of Agriculture
USEPA	U.S. Environmental Protection Agency
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WMA	Wildlife Management Area

1.0 INTRODUCTION

Minnesota Power (MP or Licensee), a subsidiary of ALLETE, Inc., is the Licensee, owner, and operator of the Little Falls Hydroelectric Project (P-2532) (Little Falls Project), Sylvan Hydroelectric Project (P-2454) (Sylvan Project), and Pillager Hydroelectric Project (P-2663) (Pillager Project), herein collectively referred to as the "Projects." The Little Falls Project is a 4.72-megawatt (MW) run-of-river (ROR) facility located on the Mississippi River in Morrison County, Minnesota. The Sylvan Project is a 1.80 MW ROR facility located on the Crow Wing River in Cass, Crow Wing, and Morrison counties, Minnesota. The Pillager Project is a 1.52 MW ROR facility located on the Crow Wing River in Cass and Morrison counties, Minnesota.

The Projects are 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 Projects. The Little Falls Project FERC license was issued October 27, 1993.[1] The Sylvan Project FERC license was issued October 29, 1993.[2] The Pillager Project FERC license was issued April 27, 1998.[3] The current operating licenses for each of the Projects expire on March 31, 2028. In accordance with FERC's regulations at 18 Code of Federal Regulations (CFR) §16.9(b), the Licensee must file its applications for new licenses with FERC no later than March 31, 2026, for the Projects.

The Licensee plans to relicense these Projects using 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 plans to engage in concurrent relicensing efforts for the Projects with combined documents, meetings, and overall relicensing schedules.

1.1 Authorized Agent

The following person is authorized to act as agent for the Licensee pursuant to 18 CFR § 5.6(d)(2)(i):

Mr. Greg Prom
Senior Environmental Compliance Specialist
ALLETE, Inc., d.b.a. Minnesota Power
30 West Superior Street
Duluth, Minnesota 55802-2093
Phone: 218-355-3191
Email: gprom@allete.com

[1] 65 ¶ 62,084 (1993).
[2] 65 ¶ 62,094 (1993).
[3] 83 ¶ 62,073 (1998).

Mr. David R. Moeller
Senior Attorney
ALLETE, Inc., d.b.a. Minnesota Power
30 West Superior Street
Duluth, MN 55802
Phone: 218-723-3963
Email: dmoeller@allete.com

1.2 Pre-Application Document Content

This Pre-Application Document (PAD) follows the content and form requirements of 18 CFR § 5.6(c) and (d), with minor changes in form for enhanced readability. This PAD is organized into two volumes. Volume I contains the public information required by 18 CFR § 5.6(c) and (d) for distribution to federal and state resource agencies, local governments, applicable tribes, members of the public, and others likely to be interested in the relicensing proceeding. Volume 2 contains drawings of Project works that meet the definition of Critical Energy Infrastructure Information (CEII) pursuant to FERC's June 23, 2003 Order No. 630-A. Consistent with that order, the Licensee is distributing Volume II only to FERC.

Volume I (Public) of the PAD is organized as follows:

- Table of Contents; List of Tables; List of Figures; List of Appendices; and Definitions of Terms, Acronyms, and Abbreviations;
- Section 1.0 – Introduction;
- Section 2.0 – Plans, Schedule, and Protocols, per 18 CFR § 5.6(d)(1);
- Section 3.0 – General Description of River Basin, per 18 CFR § 5.6(d)(3)(xiii);
- Section 4.0 – Project Locations, Facilities, and Operations, per 18 CFR § 5.6(d)(2);
- Section 0 – Description of Existing Environment, per 18 CFR § 5.6(d)(3)(ii-xii);
- Section 6.0 – Preliminary Listing of Potential Issues, Informational Needs, and Mitigation, per 18 CFR § 5.6(d)(4)(i-ii);
- Section 7.0 – Relevant Resource Management Plans, per 18 CFR § 5.6(d)(4)(iii-iv);
- Appendices:
    - Appendix A – Summary of Contacts and Correspondence Made in Preparing the PAD, per 18 CFR § 5.6 (d)(5);
    - Appendix B – Flow Duration Curves; and
    - Appendix C – Rare Species Information.

Volume II (CEII) of the PAD is organized as follows:

- Single-line Diagrams for the Projects.

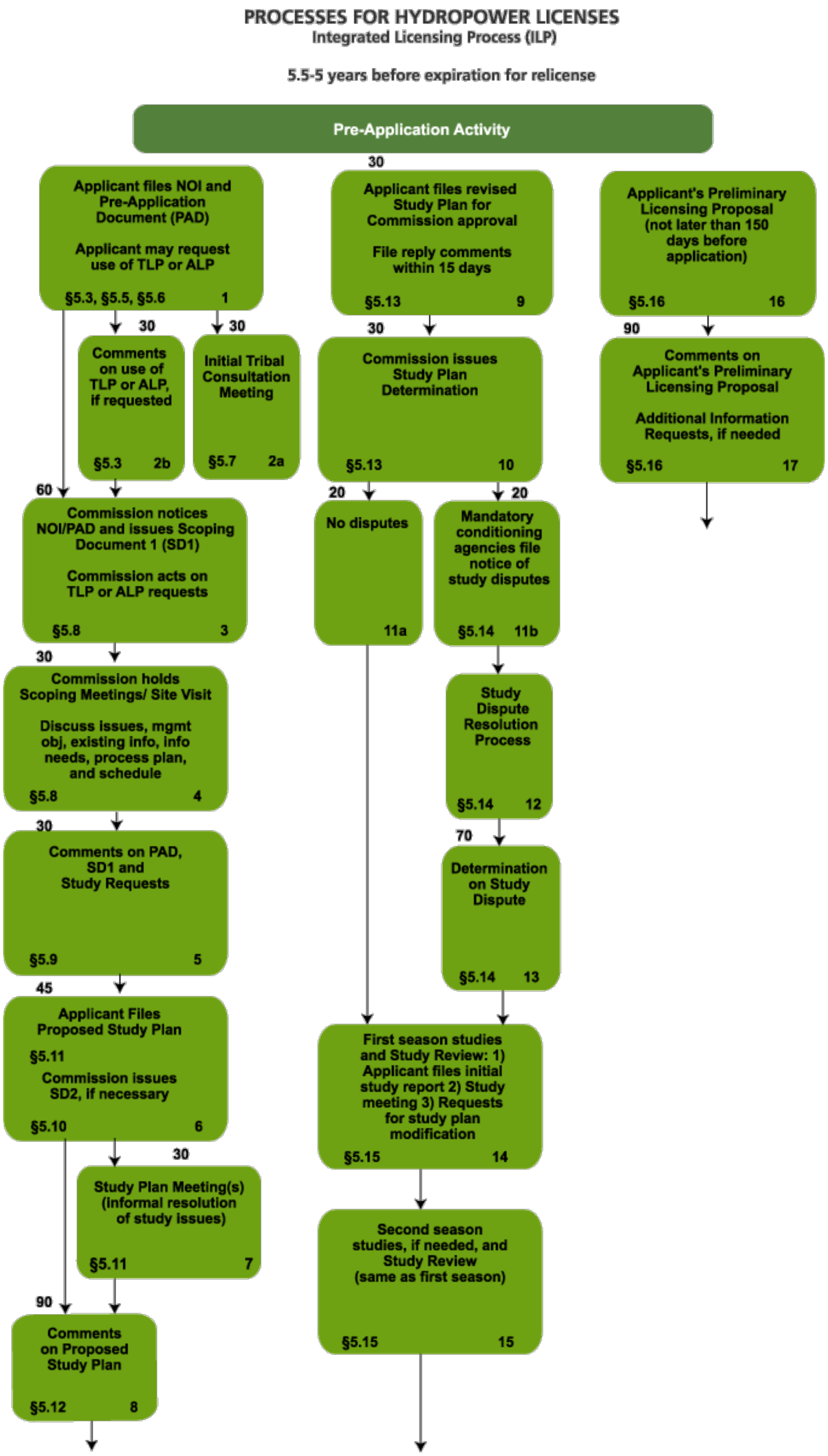
2.0 PLANS, SCHEDULE, AND PROTOCOLS (18 CFR § 5.6(D)(1))

18 CFR 5.6(d)(1) requires "The pre-application document must include a plan and schedule for all pre-application activity that incorporates the time frames for pre-filing consultation, information gathering, and studies set forth in this part. The plan and schedule must include a proposed location and date for the scoping meeting and site visit required by §5.8(b)(3)(viii)."

MP plans to relicense the Projects using the Commission's ILP. FERC's ILP regulations, found at 18 CFR § 5, define specific procedures and timelines for the relicensing process. The regulatory milestones of the ILP are depicted in

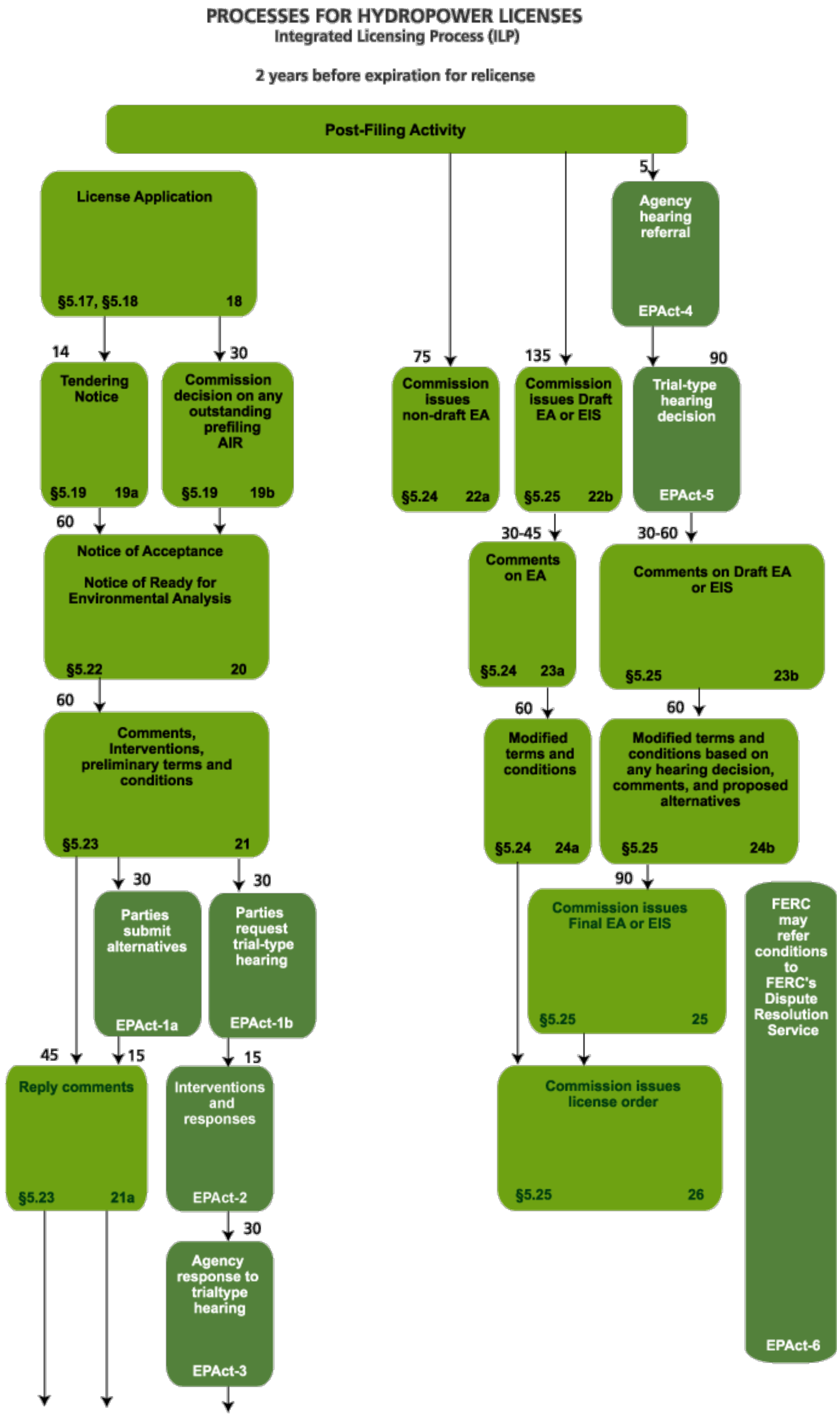
Figure 2-1 and Figure 2-2. FERC designed the ILP (the default relicensing process) to be a transparent process that involves all Interested Parties, including federal, state, and local agencies, tribes, non-governmental organizations (NGOs), and the public. As such, the Licensee will document the entire process, including any information received from the Interested Parties, as well as records of communications. To keep the Interested Parties informed of the process, the Licensee will maintain records of relicensing and other public information that, with the exception of restricted documents such as CEII (see Section 2.2.4), will be available to the public. The sections below outline the Process Plan and Schedule for the pre-application activity and the proposed communications protocols.

Figure 2-1: FERC Integrated Licensing Process Pre-Application Activity



Source: FERC 2020a

Figure 2-2: FERC Integrated Licensing Process Post-Application Activity



Source: FERC 2020b

2.1 Process Plan and Schedule through Filing of Final License Application

The Licensee's Process Plan and Schedule for these Projects outlines specific actions and deadlines required of FERC, the Licensee, and other participants in the ILP relicensing process through the filing of the Final License Application (FLA). The Process Plan and Schedule is available in Table 2-1. The Process Plan and Schedule is based upon the Notice of Intent (NOI) and PAD filing date of March 30, 2023, and subsequent dates given derive from that date. The FLA must be filed no later than two years before license expiration (i.e., by March 31, 2026), but may be filed earlier. Additionally, in developing the Process Plan and Schedule, the Licensee has included timeframes for Formal Study Plan Dispute Resolution (18 CFR § 5.14), even though any study plan disputes may be resolved through informal dispute resolution. Because there is adaptability in the dates given, the Process Plan and Schedule is subject to change throughout the relicensing process. Note that if a due date falls on a weekend or holiday, the due date for filing with FERC is the following business day.

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 in accordance with its responsibilities under NEPA. The Licensee requests that FERC hold the Scoping Meetings concurrently for the Projects. The Scoping Meeting will be held at a location to be selected by FERC in the general vicinity of the Projects. 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.

Table 2-1: Pre-filing Process Plan and Schedule

Responsible Party	Pre-filing Milestone	Tentative Date	Regulatory Reference
First Stage Consultation			
MP	File NOI And PAD (5 to 5.5 years before expiration)	3/30/2023	18 CFR § 5.5 & 5.6
MP	Request that FERC designate MP as Non-federal Representative for Section 106 Consultation	3/30/2023	18 CFR § 5.5(e)
MP	Request that FERC designate MP as Non-federal Representative for Endangered Species Act Consultation	3/30/2023	18 CFR § 5.5(e)
FERC	Host Tribal Meeting (within 30 days of NOI filing)	4/29/2023	18 CFR § 5.7
FERC	Notice of Commencement of Proceeding and issuance of SD1 (within 60 days of filing NOI/PAD)	5/29/2023	18 CFR § 5.8

Responsible Party	Pre-filing Milestone	Tentative Date	Regulatory Reference
FERC	Hold Site Visit and Scoping Meetings (within 30 days of FERC Notice of Proceeding)	6/21/2023	18 CFR § 5.8(b)(3)(viii)
Relicensing Participants	File comments on PAD/SD1 and Study Requests (within 60 days of FERC Notice of Proceeding)	7/28/2023	18 CFR § 5.9
FERC	Issue Scoping Document 2 (SD2) (within 45 days of SD1 comments)	9/11/2023	18 CFR § 5.10
MP	File Proposed Study Plan (PSP) (within 45 days of PAD comments)	9/11/2023	18 CFR § 5.11(a)
MP	Hold PSP Initial Meeting with Participants (within 30 days of PSP)	10/11/2023	18 CFR § 5.11(e)
Relicensing Participants	File comments on PSP (within 90 days of filing PSP)	12/10/2023	18 CFR § 5.12
MP	File revised Study Plan (RSP) (within 30 days of PSP comments)	1/9/2024	18 CFR § 5.13(a)
Relicensing Participants	File comments on RSP (within 15 days of RSP)	1/24/2024	18 CFR § 5.13(b)
FERC	Issue Study Plan Determination (SPD) (within 30 days of RSP)	2/8/2024	18 CFR § 5.13(c)
Relicensing Participants	File any Study Disputes (within 20 days of SPD)	2/8/2024	18 CFR § 5.14(a)
Dispute Resolution Panel	Dispute Resolution Panel convenes (within 20 days of dispute)	2/28/2024	18 CFR § 5.14(d)
MP	File comments and information regarding dispute (within 25 days of dispute)	3/4/2024	18 CFR § 5.14(i)
Dispute Resolution Panel	Issue dispute recommendations (within 50 days of dispute)	3/29/2024	18 CFR § 5.14(k)
FERC	Issue Director's Study Dispute Determination (within 70 days of dispute)	4/18/2024	18 CFR § 5.14(l)
MP	First study season	2024	18 CFR § 5.15
MP	File Initial Study Report (within 1 year of SPD)	1/31/2025	18 CFR § 5.15(c)(1)
MP	Hold Initial Study Report Meeting (within 15 days of Initial Study Report)	2/15/2025	18 CFR § 5.15(c)(2)

Responsible Party	Pre-filing Milestone	Tentative Date	Regulatory Reference
MP	File Initial Study Report Meeting summary/changes to Study Plan (within 15 days of Initial Study Report Meeting)	3/2/2025	18 CFR § 5.15(c)(3)
Relicensing Participants	File any Initial Study Report Meeting Summary Disputes or Study Plan Disputes/Amendment Requests (within 30 days of Initial Study Report Meeting Summary)	4/1/2025	18 CFR § 5.15(c)(4)
Relicensing Participants	File responses to any Study Plan Disputes/Amendment Requests (within 30 days of any Disputes/Amendment Requests)	5/1/2025	18 CFR § 5.15(c)(5)
FERC	Issue Director's Determination on any Study Plan Disputes/Amendment Requests (within 30 days of Responses)	5/31/2025	18 CFR § 5.15(c)(6)
MP	Second study season (if necessary)	2025	18 CFR § 5.15
MP	File Draft License Application (DLA) (no later than 150 days prior to the deadline for FLA)	10/15/2025	18 CFR § 5.16(c)
Relicensing Participants	File comments on DLA (within 90 days of DLA)	1/13/2026	18 CFR § 5.16(e)
MP	File Updated Study Report (within 2 years of SPD)	1/31/2026	18 CFR § 5.15(f)
MP	Hold Updated Study Report Meeting (within 15 days of Updated Study Report)	2/15/2026	18 CFR § 5.15(f)
MP	File Updated Study Report Meeting Summary/Changes to Study Plan (within 15 days of the Updated Study Report Meeting)	3/2/2026	18 CFR § 5.15(f)
MP	File FLA (within 24 months of license expiration)	3/31/2026	18 CFR § 5.17(a)
Relicensing Participants	File any Updated Study Report Meeting Summary Disputes or Study Plan Disputes/Amendment Requests (within 30 days of Updated Study Report Meeting Summary)	4/1/2026	18 CFR § 5.15(f)
MP	File Responses to any Study Plan Disputes/Amendment Requests	5/1/2026	18 CFR § 5.15(f)

Responsible Party	Pre-filing Milestone	Tentative Date	Regulatory Reference
	(within 30 days of any Disputes/Amendment Requests)		
FERC	Issue Director's Determination on any Study Plan Disputes/Amendment Requests (w/in 30 days of Responses)	5/31/2026	18 CFR § 5.15(f)
FERC	Expiration of Licenses	3/31/2028	-

Notes: Draft License Application (DLA), Federal Energy Regulatory Commission (FERC), Final License Application (FLA), Minnesota Power (MP), Proposed Study Plan (PSP), Study Plan Determination (SPD)

2.2 Proposed Communications Protocols

Effective communication is essential for meeting the relicensing consultation requirements. The Licensee anticipates that the means of communication will be email, meetings, documents, and telephone. The relicensing process for the Projects is open to the general public, and interested individuals and organizations are encouraged to participate. FERC provides additional information about participation at https://www.ferc.gov/industries-data/resources/how-get-involved. Additional information on the proposed communication protocols is provided below.

2.2.1 Parties to the Relicensing

In general, there are two categories of participation in a FERC relicensing – Interested Parties and Relicensing Participants. Interested Parties are a broad group of individuals, agencies, and NGOs that have an interest in the relicensing. Sometimes this group is referred to as "stakeholders." Relicensing Participants are a subset of Interested Parties. Relicensing Participants are the individuals and entities that actively participate in the relicensing process. Any Interested Party may elect to be a Relicensing Participant. Relicensing Participants generally have a specific interest in the relicensing and may receive communications related to their specific interest.

2.2.2 General Communications

The Licensee’s goal is to keep open communications during the relicensing process and provide all Interested Parties with easy access to relicensing information. The Licensee will use electronic communications, such as email, as a primary means of providing information during the relicensing process. Communications include public meetings, written correspondence, and notes from individual and conference telephone calls.

2.2.3 Meetings

The Licensee recognizes that a number of tribes, agencies, groups, and individuals may want to participate in the relicensing process. The Licensee will work with Relicensing Participants to develop meeting schedules that include practical locations and times to accommodate the majority of participants. In general, the Licensee will schedule meetings between the hours of 9:00 a.m. and 3:00 p.m. Central Standard Time. Meetings may be in-person or by conference call. The Licensee will endeavor to begin and end meetings in a timely manner.

To the extent possible, the Licensee will notify Relicensing Participants at least one week in advance of the next planned public meeting. At that time, the Licensee will provide a meeting agenda via email and/or by mail. The Licensee will also distribute any documents or other information that will be the subject of meeting discussions.

2.2.4 Documents

The Licensee will maintain copies of all public information including distribution lists, announcements, notices, communications, and other documents related to the relicensing of the Projects. Documents filed with the Commission will also be available on the Projects website: https://www.mnpower.com/Environment/Hydro. Documents submitted to and issued by the FERC for the Projects are available through FERC's eLibrary under Dockets P-2532, P-2454, and P-2663 (https://www.ferc.gov/ferc-online/elibrary). In addition, all materials filed with or issued by FERC will be available for review and copying at the FERC offices in Washington, DC[4]:

The Licensee prefers to receive all documents electronically in either portable document format (PDF) or an appropriate Microsoft (MS) Office format. Email electronic documents to the Licensee at the following email address: gprom@allete.com. Hard copy documents may be mailed to Minnesota Power, Attn: Little Falls, Sylvan, Pillager Relicensing at 30 West Superior Street, Duluth, Minnesota 55802-2093.

All applicable documents received will be incorporated into the consultation record for the relicensing and made available for distribution to the public.

Federal Energy Regulatory Commission
Public Reference Room, Room 2-A
Attn: Secretary
888 First Street, N.E.
Washington, DC 20426

[4] At the time of this PAD filing, the Commission has suspended access to the Commission's Public Reference Room due to the proclamation declaring a National Emergency concerning the Novel Coronavirus Disease (COVID–19), issued by the President on March 13, 2020. For assistance, contact FERC at FERCOnlineSupport@ferc.gov or call toll free, (886) 208–3676 or TTY (202) 502–8659.

The Licensee will maintain a hard copy of the NOI and PAD at the ALLETE, Inc. headquarters, which is located at 30 West Superior Street, Duluth, Minnesota. The background reference material is available via special request by contacting the Licensee via email at gprom@allete.com or via mail at the following address: Minnesota Power, Attn. Greg Prom, 30 West Superior Street, Duluth, MN 55802.

2.2.4.1 Restricted Documents

Certain documents may be restricted from public viewing for regulatory and statutory reasons. CEII (18 CFR § 388.113) relates to the design and safety of dams and appurtenant facilities. Access to CEII documents is restricted to protect national security and public safety. Anyone seeking CEII information from FERC must file a CEII request. FERC's website at https://www.ferc.gov/ceii-filing-guide contains additional details related to CEII.

Information related to protecting sensitive information is also restricted from public viewing. Archaeological or other culturally important information is restricted under Section 106 of the National Historic Preservation Act. Endangered and threatened species are protected by the federal Endangered Species Act of 1973 (16 USC §§ 1531-1543, P.L. 93-205) and Minnesota endangered species laws. While migratory birds are protected by the Migratory Bird Treaty Act of 1918 (16 USC §§ 703-712, July 3, 1918, as amended) and eagles are protected under the Bald and Golden Eagle Protection Act (16 USC 668-668d, 54 Stat. 250, as amended), specific species locations are not restricted. Anyone seeking this information from FERC must file a Freedom of Information Act (FOIA) request. Instructions for the FOIA request are available on FERC's website at https://www.ferc.gov/foia.

2.2.4.2 Study Requests

In developing the PAD, the Licensee has collected and summarized readily available information regarding the Projects and potential effects on the human and natural environments. The PAD, however, may also indicate areas where there is little, or no information, related to areas of potential concern with respect to the relicensing of the Projects. In those cases, Relicensing Participants may request additional studies or investigations, as detailed below, to add to the critical knowledge of the Projects. The ILP requires specific information from parties requesting studies related to the relicensing. Study requests must conform to the requirements of the FERC regulations.

As specified by 18 CFR §5.9(b) of FERC’s ILP regulations, any study request must do the following:

- 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 tribes with jurisdiction over the resource to be studied.
- If the requestor is not a resource agency, explain any relevant public interest consideration 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 the Projects' 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 seasons(s) and the duration) is consistent with generally accepted practice in the scientific community or, as appropriate, considers relevant tribal values and knowledge.
- Describe considerations of level of effort and cost, as applicable, and why any proposed alternative studies would not be sufficient to meet the stated information needs.

Parties submitting requests should also describe any available cost-share funds or in-kind services that the sponsor of the request may contribute towards the study effort. FERC's guide Understanding the Study Criteria: Integrated Licensing Process, available at https://www.ferc.gov/sites/default/files/2020-04/UnderstandingtheStudyCriteriaILP.pdf, is intended to explain the study criteria and help stakeholders craft study requests.

Study requests must be filed with FERC within 60 days following FERC's notice of consultation procedures. FERC's notice will set forth instructions on how to file study requests with FERC. In addition, Relicensing Participants should email study requests in MS Word or PDF format to gprom@allete.com.

2.2.4.3 Document Distribution

The Licensee will distribute, whenever possible, all documents electronically in standard MS Word format or PDF. Some documents may be distributed in hard copy for convenience or by request. Distribution of information will follow the guidelines presented in Table 2-2.

Table 2-2: Document Distribution for the Projects

Document	Method	Distribution
Meeting Agendas	Email or U.S. Mail*	Interested Parties
Meeting Summaries	Email or U.S. Mail*	On Request
Process Plan & Schedule	Email or U.S. Mail*	On Request
Major Documents: NOI, PAD, PSPs, Study Reports, DLA, FLA, etc.	Email or U.S. Mail	Notice of availability by U.S. Mail or Email to Interested Parties; all documents will be distributed electronically whenever possible.
PAD support documents	Licensee corporate office	On Request

* U.S. Mail service by special request.

Notes: NOI = Notice of Intent, PAD = Pre-Application Document, PSPs = Proposed Study Plans, DLA = Draft License Application; FLA = Final License Application

2.2.4.4 Mailing Lists

The Licensee will maintain a Distribution List of all Interested Parties including Relicensing Participants. Any interested entity or individual may request to be added to the Licensee's Distribution List by emailing gprom@allete.com. The list will include standard U.S. Post Office addresses and email addresses for distributing notices and documents for public review.

After the Licensee files the FLAs for the Projects, FERC will establish an official Service List for parties who formally intervene in the proceeding. Intervention is a formal legal process in the FERC regulations. Additional information may be found on FERC's website at http://ferc.gov/resources/guides/how-to/intervene.asp. Once FERC establishes a Service List, any written documents filed with FERC must also be sent by the originator to the Service List. A Certificate of Service must be included with documents filed with FERC.

Table 2-3: Mailing Lists for the Projects

Entity	Type	Description
Licensee	Projects P-2532, P-2454, and P-2663 Distribution List	A list of Interested Parties prepared by the applicant in anticipation of the Project relicensing proceeding.
FERC	Projects P-2532, P-2454, and P-2663 Mailing List	A mailing list of Interested Parties prepared and maintained by FERC throughout the Project relicensing proceeding.
FERC	Projects P-2532, P-2454, and P-2663 Service List	A mailing list of parties that have formally intervened in the relicensing proceeding; prepared and maintained by FERC after it accepts the FLA.

2.2.5 Telephone

The Licensee may hold additional meetings via conference call. These and any other routine telephone calls among Relicensing Participants that pertain to the Projects will be documented as part of consultation. After the FLAs for the Projects are filed, it is anticipated that FERC will provide public notice of any decisional telephone calls in which it participates prior to acceptance of the FLAs for the Projects. Additionally, FERC will provide prior public notice of any decisional telephone calls in which it participates after the Commission formally accepts the FLAs for the Projects.

2.3 References

Federal Energy Regulatory Commission (FERC). 2020a. Two-year-transition-period. Available online: https://www.ferc.gov/media/3508. Accessed: December 2022.

Federal Energy Regulatory Commission (FERC). 2020b. Post-Filing Activity. Available online: https://www.ferc.gov/media/4010. Accessed: December 2022.

3.0 GENERAL DESCRIPTION OF RIVER BASIN (18 CFR § 5.6(D)(3)(XIII))

18 CFR 5.6(d)(3)(xiii) requires "A general description of the river basin or sub-basin, as appropriate, in which the proposed project is located, including information on: (A) the area of the river basin or sub-basin and length of stream reaches therein; (B) Major land and water uses in the project area; (C) all dams and diversion structures in the basin or sub-basin, regardless of function; and (D) Tributary rivers and streams, the resources of which are or may be affected by project operations."

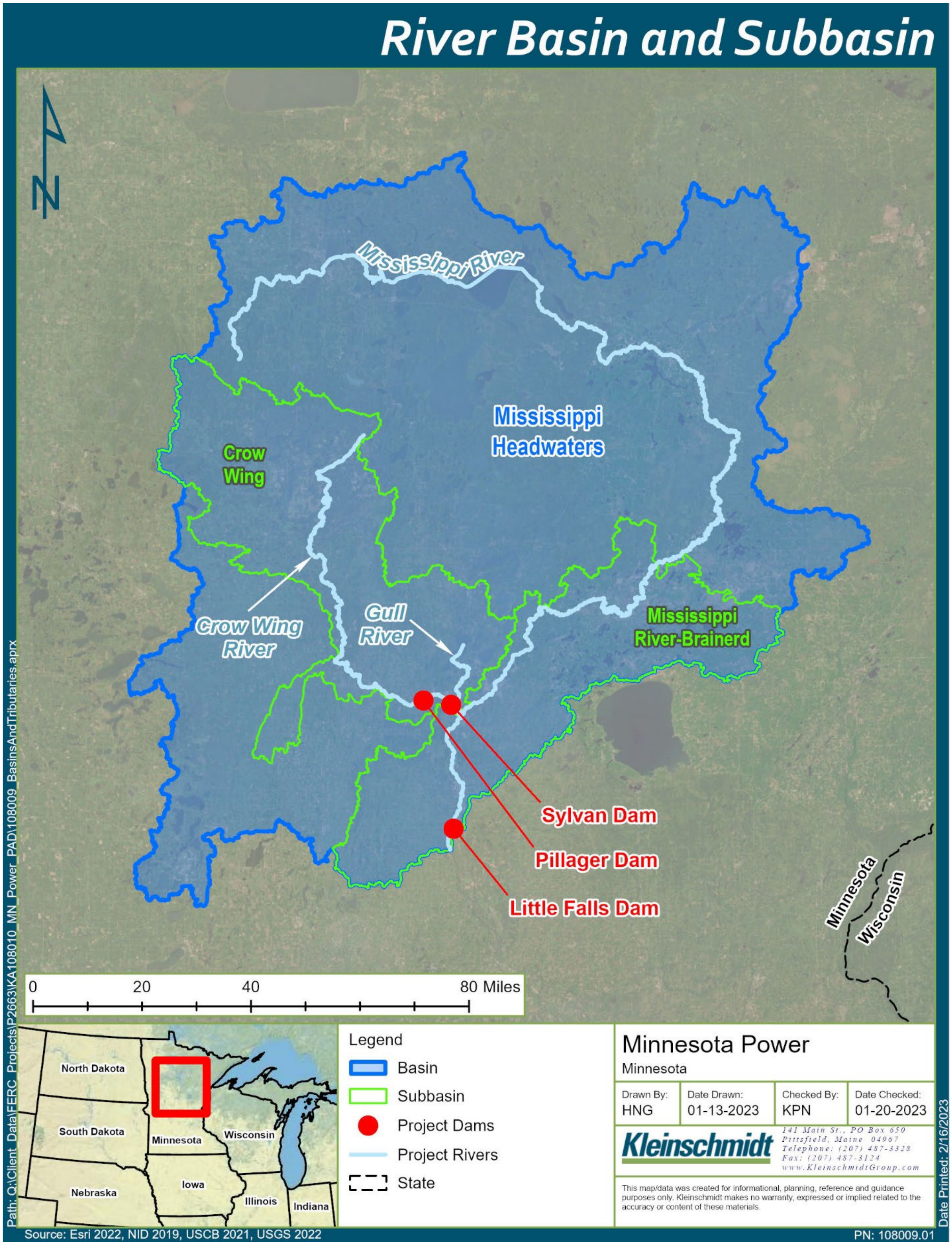
3.1 River Basin and Subbasin Descriptions

The Little Falls Project is located on the Mississippi River within the Mississippi River-Brainerd Watershed (Hydrologic Unit Code [HUC] 07010104). The Sylvan and Pillager Projects are both located on the Crow Wing River within the Crow Wing River Watershed (HUC 07010106). Both watersheds are part of the Mississippi River Headwaters Watershed (HUC 6-070101), which itself is within the larger Upper Mississippi watershed (HUC 2-07). Figure 3-1 illustrates the location of the Projects relative to the watersheds in which they operate.

The Mississippi River-Brainerd Watershed covers approximately 1,687 square miles in north central Minnesota (Minnesota PCA 2022a). From northeast to southwest, the watershed stretches 90 miles and encompasses parts of Aitkin, Crow Wing, Morrison, and Todd counties. It contains approximately 2,100 river miles (RMs) and over 200 lakes greater than 10 acres. The Mississippi River enters the watershed after its confluence with the Willow River, near Hassman, Minnesota. The Mississippi River then flows southwesterly approximately 119 miles to its confluence with the Swan River, until it reaches the southern boundary of the Mississippi River-Brainerd Watershed. (Minnesota PCA 2019).

The Crow Wing River Watershed is in the north central portion of Minnesota and originates through a series of 11 lakes, which were formed by the melting of blocks of ice that occurred following the glaciation period. These lakes are named sequentially from the First Crow Wing Lake through the Eleventh Crow Wing Lake (the uppermost headwater lake being the Eleventh Crow Wing Lake) and contain a combined surface area of 5,000 acres. The watershed covers approximately 1,946 square miles within Becker, Cass, Clearwater, Crow Wing, Hubbard, Morrison, Otter Tail, Todd, and Wadena counties. (Minnesota PCA 2014). The Crow Wing River Watershed includes over 627 lakes 10 acres in size or greater as well as 1,653 stream and river miles (Minnesota PCA 2022b). The Crow Wing River begins at the Eleventh Crow Wing Lake near Akeley, Minnesota and flows through the entire chain of lakes in a southward direction for approximately 20 miles. The Crow Wing River continues for approximately 80 more miles before entering the Mississippi River near Baxter, Minnesota. (Minnesota PCA 2014).

Figure 3-1: Watersheds and River Basins of the Projects

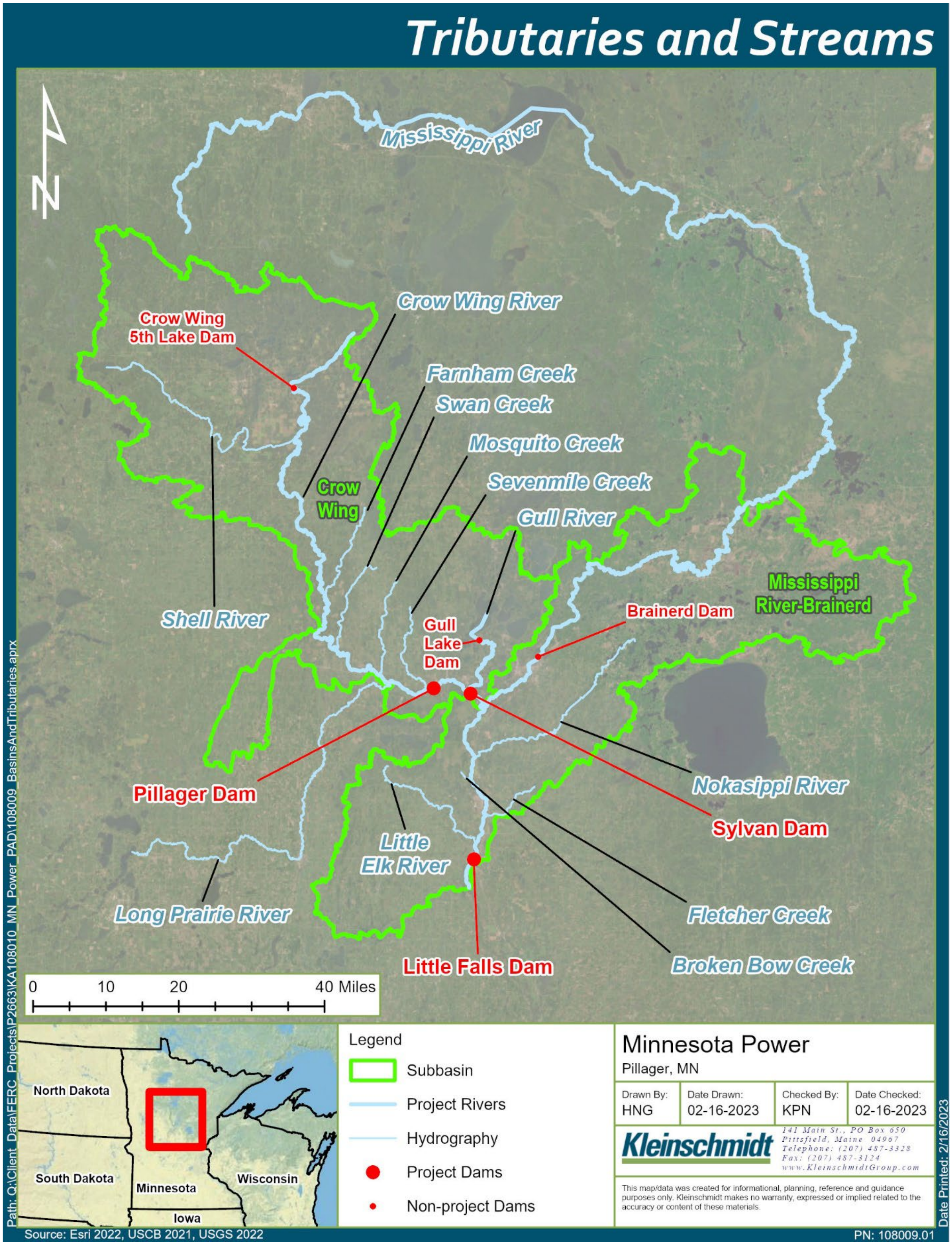


3.2 River Basin Tributaries and Dams

Major tributary streams to the Mississippi River within the Mississippi River-Brainerd Watershed include the Little Elk River, the Nokasippi River, Fletcher Creek, Broken Bow Creek, and many other smaller tributaries (Minnesota PCA 2019) (Figure 3-2). There are 27 dams within the Mississippi River-Brainerd Watershed, which range from small privately-owned control dams to larger hydroelectric facilities (USACE 2022). Dams located on the mainstems of the Mississippi, Crow Wing, and Gull rivers within the Mississippi River-Brainerd Watershed are included in Figure 3-2.

The Crow Wing River grows from a small headwater stream to a rather large fifth order stream as it meanders from Eleventh Crow Wing Lake to the Mississippi River. As the river forms and begins to flow to the southeast, it receives water from several major tributaries including the Gull River, Long Prairie River, Sevenmile Creek, Swan Creek, Farnham Creek, and the Shell River (Figure 3-2). The entrance of the Gull River is less than 0.5 miles from the Sylvan Project dam. The tributaries that contribute to the Crow Wing River have different sources, including wetlands and underground springs. (Minnesota PCA 2014). There are 23 dams within the Crow Wing River Watershed, which range from small privately-owned control dams to larger hydroelectric facilities (USACE 2022). Dams located on the mainstems of the Mississippi, Crow Wing, and Gull rivers within the Crow Wing River Watershed are included in Figure 3-2.

Figure 3-2: Tributaries and Dams on the Mainstems within the Projects' Watersheds and River Basins



3.3 Major Land Uses

The majority of the Upper Mississippi River – Brainerd Watershed is within the Level III North Central Hardwood Forests Ecoregion (ecoregion 51) with portions in the Northern Lakes and Forests Ecoregion (ecoregion 50). Historically, the watershed was dominated by old-growth forests, wetlands, and open water. Currently, the watershed is mostly forested (42 percent), with grasslands and shrub wetlands comprising 38 percent, followed by row crops (10 percent), water (6 percent), and the remaining land (4 percent) is considered urban. (Minnesota PCA 2022a).

The northwest and southeast portions of the Crow Wing River Watershed are within the Northern Lakes and Forests Ecoregion, with the remainder within the North Central Hardwoods Ecoregion. The majority of lands within the watershed are not highly erodible and suitable for agricultural use. Land use within the watershed is mostly forested and agriculture. Historically, the Crow Wing River was covered by oak savannah, prairie, forests, and wetland habitats. Currently, land use within the watershed is dominated by forest/shrub lands (55 percent) followed by rangeland (pasture) (14 percent), wetlands (11 percent), row crops (10 percent), water (7 percent) and developed land (i.e., residential, urban) (3 percent). (Minnesota PCA 2014).

3.4 Major Water Uses

The Minnesota Pollution Control Agency (Minnesota PCA) monitored rivers, streams, and lakes within the Upper Mississippi River – Brainerd Watershed and the waterbodies were assessed to determine if they met standards that are protective of aquatic life, aquatic recreation, and aquatic consumption (Minnesota PCA 2019)[5]. The majority of lakes within the Upper Mississippi River – Brainerd Watershed met aquatic recreation and aquatic life standards. Of the 141 lakes monitored, 92 had sufficient data to assess aquatic recreation (nutrients), and 61 had sufficient data to assess aquatic life (fish). Seventy-four lakes met the established standards for supporting aquatic recreation, and 18 did not support aquatic recreation. Fifty-seven lakes supported aquatic life and only four lakes did not meet aquatic life standards. The aquatic life in streams (as indicated by the fish and macroinvertebrate communities) is generally good. However, several streams are impaired[6] for aquatic life, likely as the result of low dissolved oxygen (DO), altered hydrology, and/or loss of stream connectivity with upstream resources. (Minnesota PCA 2019).

The Crow Wing River Watershed includes pristine, high-value recreational lakes and cold water streams that support trout (Minnesota PCA 2022b). The Minnesota PCA implemented an intensive

[5] Minnesota PCA's water management efforts are tied to the 1972 Federal Clean Water Act (CWA), which requires states to adopt water quality standards to protect their water resources and the designated uses of those waters, such as for drinking water, recreation, fish consumption and aquatic life (Minnesota PCA 2019).

[6] Waters that do not meet established standards are referred to as "impaired waters" and the state must make appropriate plans to restore these waters, including the development of total maximum daily loads (TMDLs) (Minnesota PCA 2019).

watershed monitoring effort for the Crow Wing River Watershed in 2010. Some lakes and a few tributaries do not meet water quality standards for beneficial uses such as aquatic recreation, drinking, and swimming. Sixty-eight sites on rivers and streams were sampled for biology, habitat, and water chemistry. Subsets (15) of these locations were selected for more intensive water chemistry monitoring. In addition, 111 lakes were sampled for water chemistry. The majority of lakes within the Crow Wing River Watershed demonstrate good water quality by meeting aquatic recreation standards. Of the 379 lakes (greater than ten acres), the trophic status of 111 lakes were assessed: 104 lakes supported aquatic recreation and seven lakes did not and are considered impaired. (Minnesota PCA 2014). The main lake pollutant within the Crow Wing River Watershed is phosphorus, which can cause algae blooms in summer months. (Minnesota PCA 2022b). Thirty-two stream assessment units fully support aquatic life, and 13 streams fully support aquatic recreation, with 19 not supporting aquatic life and/or aquatic recreation. None of the streams were impaired for turbidity, with aquatic life impairments due to low fish and macroinvertebrate Index of Biotic Integrity (IBI) scores and/or low dissolved oxygen. (Minnesota PCA 2014).

3.5 Climate

Minnesota is characterized as having a continental climate with warm summers and cold winters (Minnesota PCA 2019). The Upper Mississippi River – Brainerd Watershed has an average annual temperature of 41.6 degrees Fahrenheit (°F), with a 13.8 °F average in the winter (December to February) and 66.6 °F average in the summer (June to August). The Upper Mississippi River – Brainerd Watershed has an average annual minimum temperature of 31.3 °F and an average annual maximum temperature of 51.8 °F. The Upper Mississippi River – Brainerd Watershed has an average annual precipitation of 28.5 inches, with the majority occurring within the summer months. (Minnesota DNR 2019a).

The Crow Wing River Watershed has an average annual temperature of 40.8 °F, with a 12.3 °F average in the winter (December to February) and 66.3 °F average in the summer (June to August). The Crow Wing River Watershed has an average annual minimum temperature of 30.6 °F and an average annual maximum temperature of 50.9 °F. The Crow Wing River Watershed has an average annual precipitation of 26.2 inches, with the majority occurring within the summer months. (Minnesota DNR 2019b).

3.6 References

Minnesota Department of Natural Resources (Minnesota DNR). 2019a. Climate Summary for Watersheds: Mississippi River-Brainerd. Available online at: http://files.dnr.state.mn.us/natural_resources/water/watersheds/tool/watersheds/climate_summary_major_10.pdf. Accessed January 2023.

Minnesota Department of Natural Resources (Minnesota DNR). 2019b. Climate Summary for Watersheds: Crow Wing River. Available online at: http://files.dnr.state.mn.us/natural_resources/water/watersheds/tool/watersheds/climate_summary_major_12.pdf. Accessed January 2023.

Minnesota Pollution Control Agency (Minnesota PCA). 2022a. Mississippi River – Brainerd. Available online at: https://www.pca.state.mn.us/watershed-information/mississippi-river-brainerd. Accessed January 2023.

Minnesota Pollution Control Agency (Minnesota PCA). 2022b. Crow Wing River. Available online at: https://www.pca.state.mn.us/watershed-information/crow-wing-river. Accessed January 2023.

Minnesota Pollution Control Agency (Minnesota PCA). 2019. Upper Mississippi River-Brainerd Watershed monitoring and Assessment Report. Available online at: https://www.pca.state.mn.us/sites/default/files/wq-ws3-07010104b.pdf. Accessed January 2023.

Minnesota Pollution Control Agency (Minnesota PCA). 2014. Crow Wing River Watershed Monitoring and Assessment Report. Available online at: https://www.pca.state.mn.us/sites/default/files/wq-ws3-07010106c.pdf. Accessed January 2023.

U.S. Army Corps of Engineers (USACE). 2022. National Inventory of Dams. https://www.arcgis.com/sharing/rest/content/items/a4c195b7a6b74f278ff43e5d60c6915d/info/metadata/metadata.xml?format=default&output=html Accessed January 2023.

4.0 PROJECTS LOCATIONS, FACILITIES, AND OPERATIONS (18 CFR § 5.6(D)(2))

4.1 Projects Locations (18 CFR § 5.6(d)(2)(ii))

4.1.1 Little Falls Project

The Little Falls Project is located in Morrison County, Minnesota near the city of Little Falls, Minnesota. The Public Land Survey System (PLSS) location, including the township, range, and sections at which the area within the Little Falls Project Boundary is located, is provided in Table 4-1 and shown on Figure 4-1.

The Little Falls Project is located on the Mississippi River approximately 25 miles below the mouth of the Crow Wing River at approximately RM 965.2 (Minnesota DNR 2023a). The Brainerd Hydroelectric Project (P-2533), owned by the city of Brainerd, is located approximately 35 miles upstream on the Mississippi River. MP's Sylvan Project and Pillager Project are located upstream on the Crow Wing River, which flows into the Mississippi River downstream of Brainerd. MP's Blanchard Hydroelectric Project (P-346) is located approximately 8.5 miles downstream of the Little Falls Project.

There are no federal or tribal lands associated with the Little Falls Project.

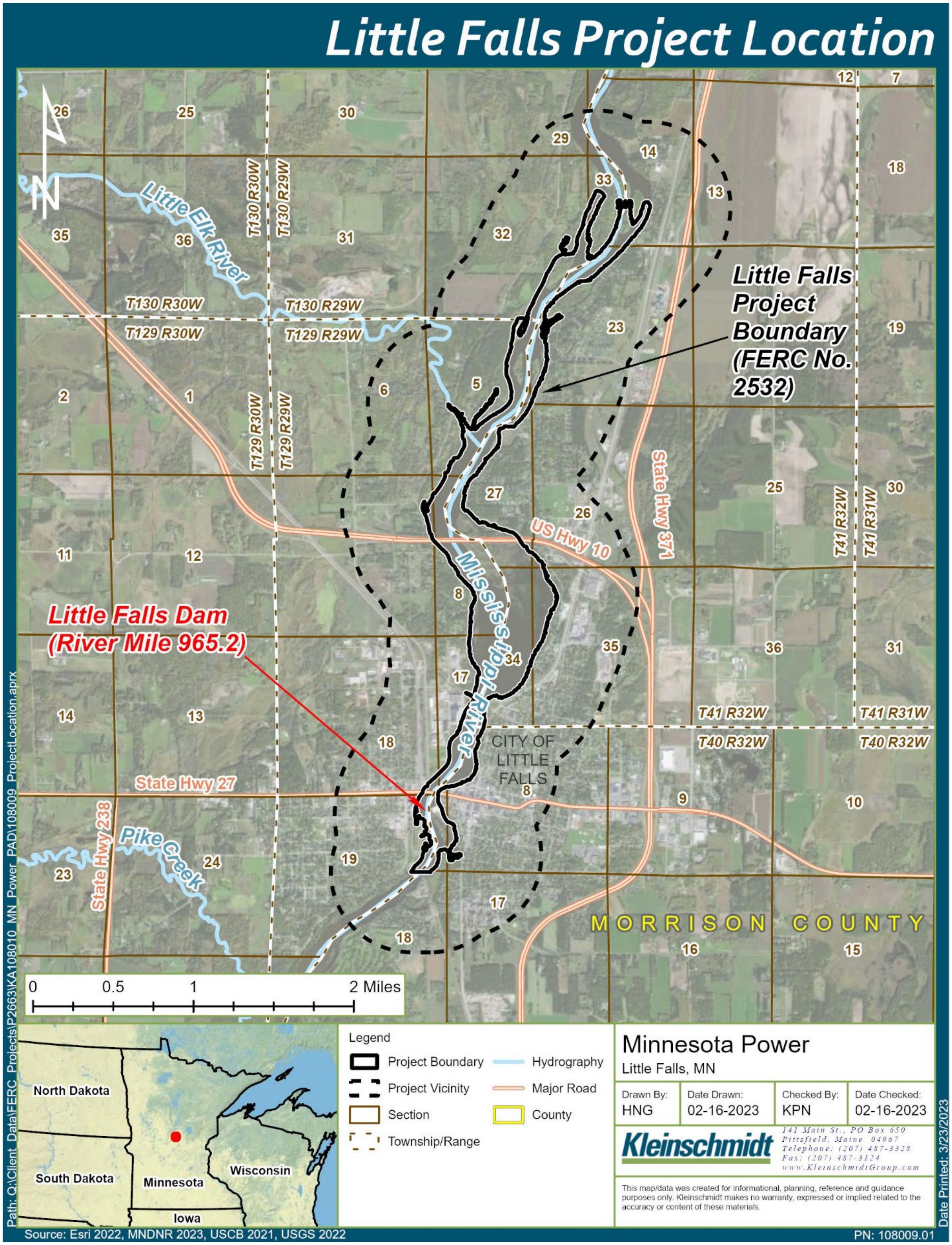
The location and FERC Project Boundary of the Little Falls Project are shown on Figure 4-1.

Table 4-1: PLSS Location of the Little Falls Project

Township	Range	Section	Label	County
40	32	8	T40 R32W	Morrison
40	32	7	T40 R32W	Morrison
40	32	18	T40 R32W	Morrison
41	32	14	T41 R32W	Morrison
41	32	23	T41 R32W	Morrison
41	32	22	T41 R32W	Morrison
41	32	27	T41 R32W	Morrison
41	32	26	T41 R32W	Morrison
41	32	34	T41 R32W	Morrison
41	32	35	T41 R32W	Morrison
129	29	5	T129 R29W	Morrison
129	29	7	T129 R29W	Morrison
129	29	8	T129 R29W	Morrison
129	29	18	T129 R29W	Morrison
129	29	17	T129 R29W	Morrison
129	29	19	T129 R29W	Morrison
130	29	32	T130 R29W	Morrison
130	29	33	T130 R29W	Morrison

Notes: PLSS = Public Land Survey System

Figure 4-1: Little Falls Project Boundary and Project Vicinity



4.1.2 Sylvan Project

The Sylvan Project is located in Cass, Crow Wing, and Morrison counties, Minnesota in between the cities of Pillager and Baxter and near Rosing Township, Minnesota. The city of Brainerd is located approximately 9 miles to the east. The PLSS location, including the township, range, and sections at which the Sylvan Project Boundary is located, is provided in Table 4-2 and shown on Figure 4-2.

The Sylvan Project dam is located on the Crow Wing River at approximately RM 4.0 (Minnesota DNR 2023b). The Pillager dam is located approximately 8 miles upstream of the Sylvan Project dam on the Crow Wing River. The U.S. Army Corps of Engineers' (USACE's) Gull Lake Dam is 10 miles upstream of the Sylvan Project on the Gull River, which flows into the Sylvan Project reservoir.

There are no federal or tribal lands associated with the Sylvan Project.[7]

The location and FERC Project Boundary of the Sylvan Project are shown on Figure 4-2.

Table 4-2: PLSS Location of the Sylvan Project

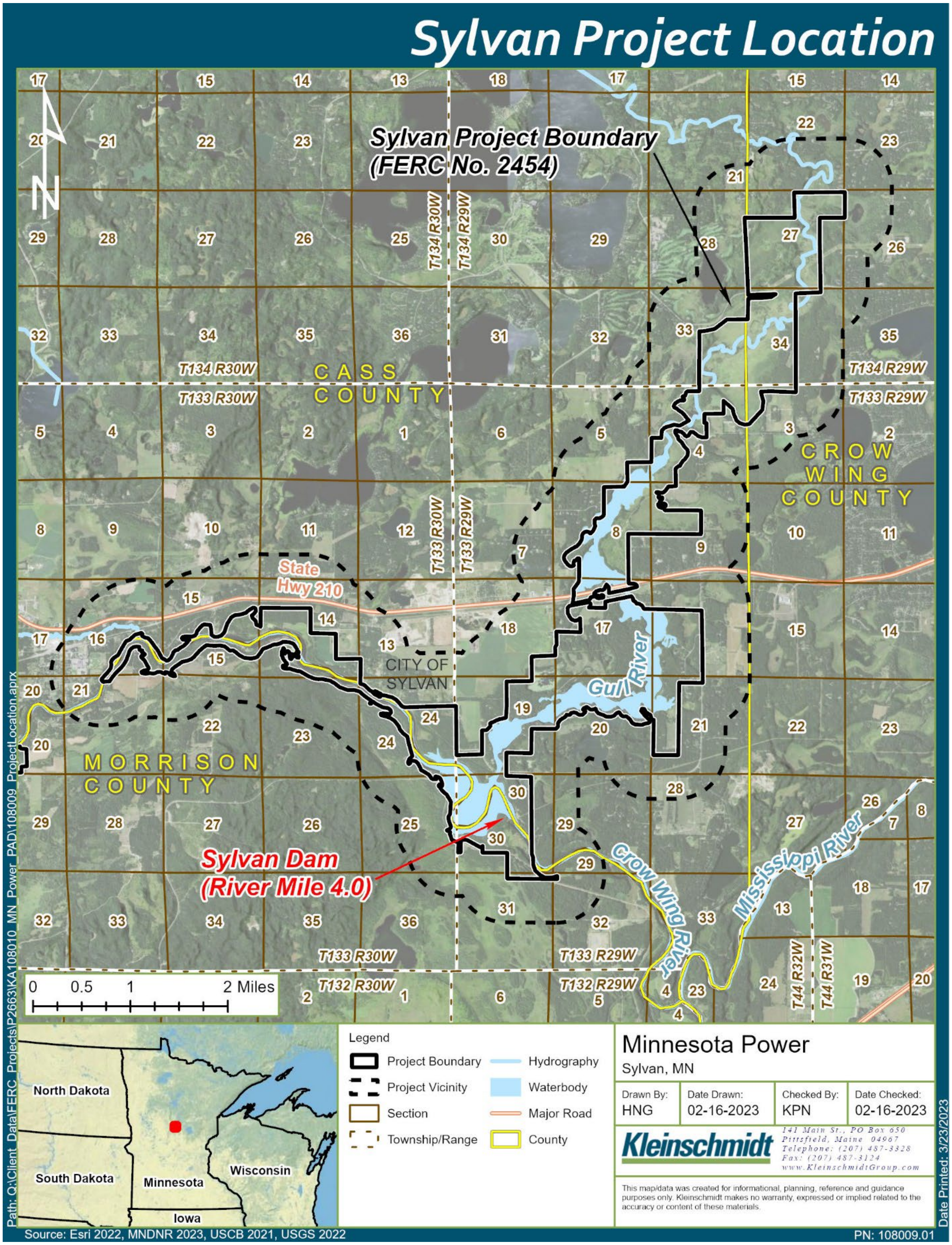
Township	Range	Section	Label	County
133	29	5	T133 R29W	Cass
133	29	4	T133 R29W	Cass
133	29	3	T133 R29W	Crow Wing
133	29	8	T133 R29W	Cass
133	29	9	T133 R29W	Cass
133	30	16	T133 R30W	Cass
133	30	15	T133 R30W	Cass
133	30	14	T133 R30W	Cass
133	30	13	T133 R30W	Cass
133	29	18	T133 R29W	Cass
133	29	17	T133 R29W	Cass
133	29	16	T133 R29W	Cass

[7] In the Sylvan Project Boundary on the south shore of the Crow Wing River is a portion of the Camp Ripley Military Reservation, which is operated by the Minnesota National Guard. The property owner name and address are Camp Ripley 15000 Highway 115, Little Falls, MN 56345. The Minnesota National Guard is under state jurisdiction.

Township	Range	Section	Label	County
133	30	14	T133 R30W	Morrison
133	30	16	T133 R30W	Morrison
133	30	15	T133 R30W	Morrison
133	30	21	T133 R30W	Morrison
133	30	21	T133 R30W	Cass
133	30	23	T133 R30W	Morrison
133	30	23	T133 R30W	Cass
133	30	24	T133 R30W	Cass
133	29	19	T133 R29W	Cass
133	29	20	T133 R29W	Cass
133	29	21	T133 R29W	Cass
133	30	24	T133 R30W	Morrison
133	29	19	T133 R29W	Morrison
133	29	30	T133 R29W	Cass
133	29	30	T133 R29W	Morrison
133	30	25	T133 R30W	Morrison
133	29	30	T133 R29W	Morrison
133	30	25	T133 R30W	Cass
133	29	29	T133 R29W	Morrison
133	29	31	T133 R29W	Morrison
133	29	32	T133 R29W	Morrison
134	29	22	T134 R29W	Crow Wing
134	29	28	T134 R29W	Cass
134	29	27	T134 R29W	Crow Wing
134	29	33	T134 R29W	Cass
134	29	34	T134 R29W	Crow Wing

Notes: PLSS = Public Land Survey System

Figure 4-2: Sylvan Project Boundary and Project Vicinity



4.1.3 Pillager Project

The Pillager Project is located Cass and Morrison counties, Minnesota near city of Pillager, Minnesota. The PLSS location, including the township, range, and sections at which the Pillager Project Boundary is located, is provided in Table 4-3 and shown on Figure 4-3.

The Pillager Project is located on the Crow Wing River at approximately RM 11.7 (Minnesota DNR 2023b). The Pillager Project dam is located approximately 8 miles upstream of the Sylvan Project dam on the Crow Wing River.

There are no federal or tribal lands associated with the Pillager Project.

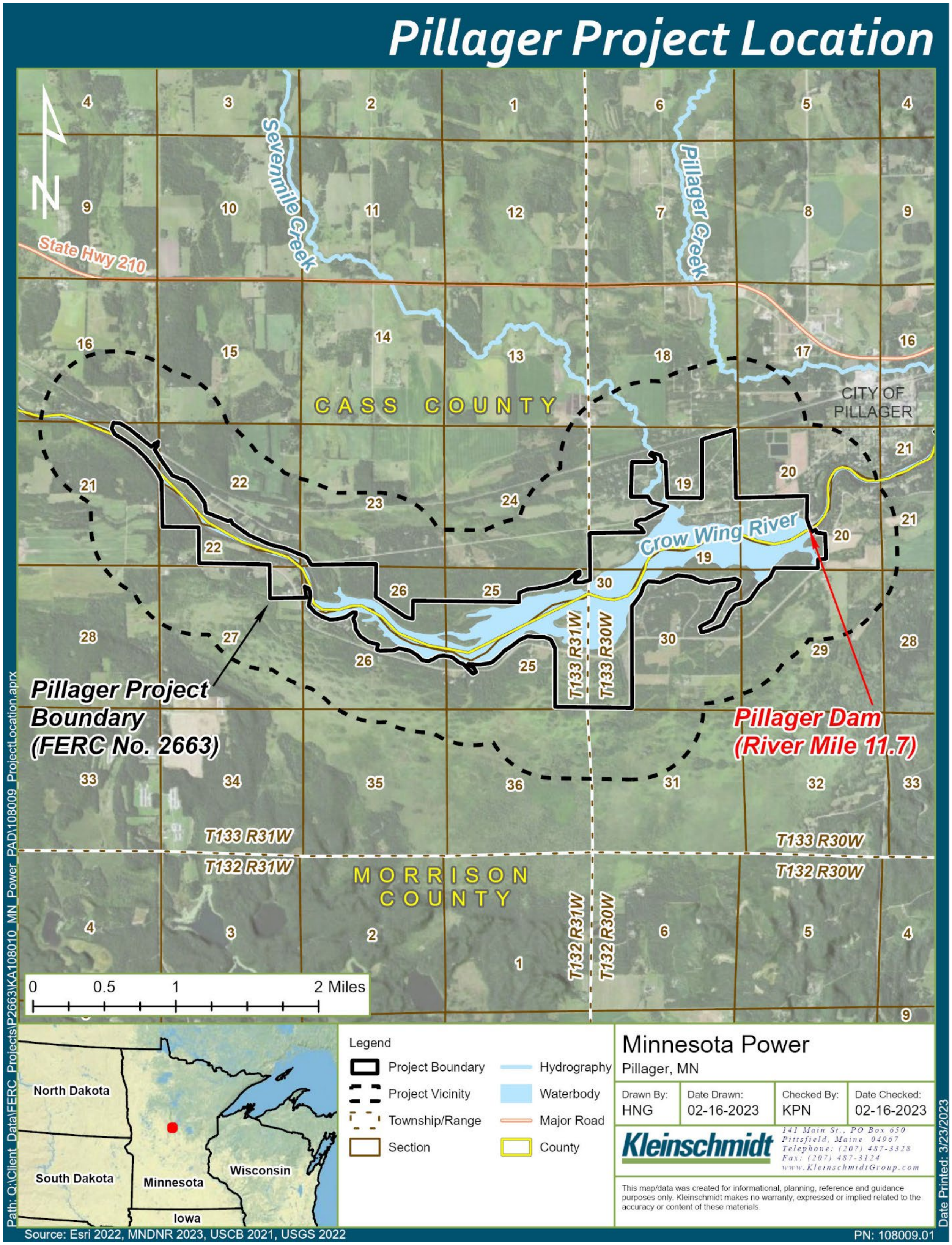
The location and FERC Project Boundary of the Pillager Project are shown on Figure 4-3.

Table 4-3: PLSS Location of the Sylvan Project

Township	Range	Section	Label	County
133	30	19	T133 R30W	Cass
133	30	20	T133 R30W	Cass
133	30	20	T133 R30W	Morrison
133	30	19	T133 R30W	Morrison
133	30	30	T133 R30W	Cass
133	30	30	T133 R30W	Morrison
133	30	29	T133 R30W	Morrison
133	31	21	T133 R31W	Morrison
133	31	21	T133 R31W	Cass
133	31	22	T133 R31W	Cass
133	31	23	T133 R31W	Cass
133	31	22	T133 R31W	Morrison
133	31	27	T133 R31W	Morrison
133	31	26	T133 R31W	Cass
133	31	27	T133 R31W	Cass
133	31	26	T133 R31W	Morrison
133	31	25	T133 R31W	Cass
133	31	25	T133 R31W	Morrison

Notes: PLSS = Public Land Survey System

Figure 4-3: Pillager Project Boundary and Project Vicinity



4.2 Projects Facilities (18 CFR § 5.6(d)(2)(iii))

Descriptions of the Projects' facilities are provided below. Please note that all elevations are in National Geodetic Vertical Datum of 1929 (NGVD29) (unless otherwise noted). References to "right" and "left" are with respect to looking downstream.

4.2.1 Current Facilities

4.2.1.1 Little Falls Project

Table 4-4 summarizes existing specifications at the Little Falls Project. The primary Little Falls Project facilities are depicted on Figure 4-4.

The Little Falls Project works consist of: (a) a powerhouse containing two generating units with a total installed capacity of 800 kilowatts (kW) (Powerhouse #1); (b) 66-foot-long gated spillway (Bay Nos. 9, 10, 11) and switchgear building; (c) a second powerhouse containing four generating units with a total installed capacity of 3,920 kW (Powerhouse #2); (d) a 42-foot-long, 20.6-foot-high mass concrete ogee spillway topped with 2.5-foot-high flashboards (Spillway #1); (e) a 62-foot-long, 7.2-foot-high mass concrete ogee spillway topped with 2.5-foot-high flashboards (Spillway #2); (f) a 140-foot-long, 13.5-foot-high mass concrete ogee spillway topped with 2.5-foot-high flashboards (Spillway #3); (g) a 42-foot-long, 12-foot-high overflow section (Pier 8); (h) three-bay gated spillway with 8 foot wide log sluiceway, two 13.4-foot-wide Tainter gates (Gated Spillway [Log Sluice and Bay Nos. 1 and 2]); (i) a 152-foot-long, 22.2-foot-high mass concrete ogee spillway topped with 4.3-foot-high flashboards (Spillway #4); (j) Gated spillway with three 20-foot-wide bays and 4.5-foot-wide intermediate piers topped with 13.5-foot-tall Tainter gates (Gated Spillway [Bay Nos. 3, 4, 5]); (k) Gated spillway with three 15-foot-wide bays and 2.5-foot-wide intermediate piers topped with 6.5-foot-tall steel vertical lift gates (Gated Spillway [Bay Nos. 6, 7, 8]); (l) 150-foot-long concrete wall (Left Abutment Wall); (m) 130-foot-long embankment (Left Embankment); (n) a 575-acre reservoir; and (o) appurtenant facilities. The structures are primarily concrete. The dam has a maximum height of approximately 27 feet. There is also a power canal that was historically used for hydromechanical power, which has since been closed and partially filled, as described below.

The power canal historically served a number of mills for hydromechanical power. The headgate structure is 88 feet long, 15 feet wide, and 19 feet tall from bedrock to top of bridge deck. There is no commercial/industrial usage of the canal water at present time. The last mill, Hennepin Paper Co., closed in 1998. MP constructed an earth embankment (closure dike) across the canal 250 feet downstream of the headgate structure in 2002. The closure dike is constructed of clayey sand and founded on bedrock. The city of Little Falls has since filled in the canal downstream of the closure dike and developed the former paper mill site into a park (Mill Park). The gates in the headgate structure are maintained in a closed position. The water in the remaining short section of canal is essentially stagnant, but the gates are not well sealed so there is some hydraulic connection to the reservoir.

The river at the Little Falls Project dam is divided into two channels by Mill Island, which has large rock outcrops. The powerhouses are on the west channel and the primary spillway sections are on the east channel. The Little Falls Project structures are founded directly on slate bedrock.

The single-line diagram for the Little Falls Project contains CEII and is included in Volume II of this PAD.

Table 4-4: Little Falls Project Specifications

Little Falls Project Description	Specification
General Information	
FERC Number	FERC P-2532
License Issuance Date	10/27/1993
License Expiration Date	3/31/2028
Licensed Capacity	4.72 MW
Project Location	Morrison County, Minnesota
Drainage Area	11,145 square miles
Operation Type	Run-of-river
Generation	
Average Annual Generation	32,615 MWh[8]
Dependable Capacity[9]	4.0 MW
Maximum Hydraulic Capacity	Unit 1: 665 (cubic feet per second (cfs)) Unit 2: 620 cfs Unit 3: 765 cfs Unit 4: 910 cfs Unit 5: 410 cfs Unit 6: 410 cfs Total: 3,780 cfs
Minimum Hydraulic Capacity	Unit 1: 175 cfs Unit 2: 155 cfs Unit 3: 235 cfs Unit 4: 450 cfs Unit 5: 95* cfs Unit 6: 115 cfs Total: 1,225 cfs *Minimum hydraulic capacity with one unit running is 95 cfs

[8] See Section 4.4.2 for additional information on generation.

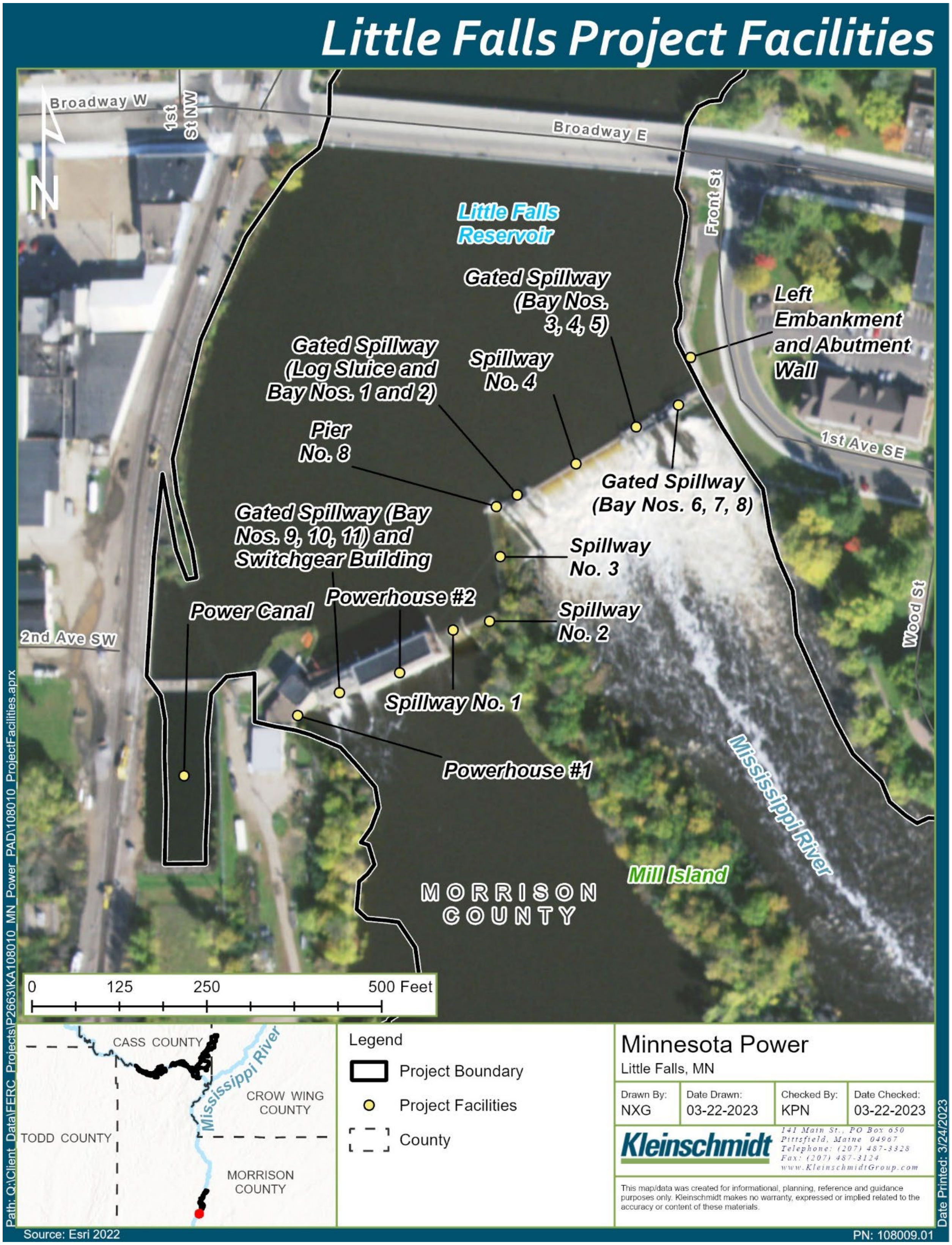
[9] Dependable capacity is based on Midcontinent Independent System Operator (MISO) median output.

Little Falls Project Description	Specification
Reservoir	
Surface Area of Reservoir	575 acres at normal pool (elevation 1,107.0 feet)
Storage Volume of Reservoir (normal pool elevation 1,107.5 feet)	4,600 acre-feet
Elevation of Reservoir (normal pool)	1,107.0 feet
Bottom of License Operating Band	1,106.5 feet
Top of the License Operating Band	1,107.5 feet
Zero Freeboard (left embankment crest)	1,111.1 feet
Powerhouses	
Number of Powerhouses	Two (2). Powerhouse #1 (Old Powerhouse – Units 5 and 6). Powerhouse #2 (Main/New Powerhouse – Units 1 through 4).
Powerhouse #1 Turbine Generators	Two (2) generating units (Units 5&6) with a total installed capacity of 800 kW
Powerhouse #2 Turbine Generators	Four (4) generating units (Units 1-4) with a total installed capacity of 3,920 kW
Unit 1	Installed Capacity: 800 kW RPM: 120 Type: Vertical Francis Manufacturer: J.Leffel/G.E. Year in Service: 1920
Unit 2	Installed Capacity: 800 kW RPM: 120 Type: Vertical Francis Manufacturer: J.Leffel/G.E. Year in Service: 1920
Unit 3	Installed Capacity: 1,120 kW RPM: 120 Type: Vertical Francis Manufacturer: J.Leffel/G.E. Year in Service: 1920
Unit 4	Installed Capacity: 1,200 kW RPM: 150 Type: Vertical Propeller Manufacturer: J.Leffel/G.E. Year in Service: 1979
Unit 5	Installed Capacity: 400 kW RPM: 150 Type: Horizontal Francis Manufacturer: Norcan/Westinghouse Year in Service: 1906-generators, 2009-turbines

Little Falls Project Description	Specification
Unit 6	Installed Capacity: 400 kW RPM: 150 Type: Horizontal Francis Manufacturer: Norcan/Westinghouse Year in Service: 1906-generators, 2009-turbines
Powerhouse #1 Configuration	Masonry superstructure on a reinforced concrete substructure; approximately 35 feet by 40 feet.
Powerhouse #2 Configuration	Steel-framed, masonry superstructure on a reinforced concrete substructure founded on bedrock; approximately 30 feet by 110 feet.
Dam / Spillways	
Gated Spillway (Bay Nos. 9, 10, 11) and Switchgear Building	66-foot-long. Gate 9 is 11.5 feet tall. Gates 10 and 11 are 10 feet tall.
Mass Concrete Ogee Spillway (Spillway 1)	42-foot-long, 20.6-foot-high. Topped with 2.5-foot-high flashboards.
Mass Concrete Ogee Spillway (Spillway 2)	61-foot-long, 7.2-foot-high. Topped with 2.5-foot-high flashboards.
Mass Concrete Ogee Spillway (Spillway 3)	140-foot-long, 13.5-foot-high. Topped with 2.5-foot-high flashboards.
Pier No. 8	12-foot-high, 42 feet in length. Becomes an overflow section and provides a small amount of spill capacity during flood events.
Gated Spillway (log sluice and Bay Nos. 1 and 2)	Three-bay gated spillway with log sluice slide gate and two Tainter gates. The log sluiceway is 8 feet wide and approximately 50 feet long. The log sluice gate is a 10.5-foot-tall steel vertical lift gate. Tainter Gates 1 and 2 are each 13.4 feet wide and 13.5 feet tall. Three 5-foot piers separate the log sluiceway, the Tainter gates, and Spillway #4.
Mass Concrete Ogee Spillway (Spillway 4)	152-foot-long, 22.2-foot-high. Topped with 4.3-foot-high flashboards.
Gated Spillway (Bay Nos. 3, 4, 5)	Gated spillway with three 20-foot-wide bays and 4.5-foot-wide intermediate piers. Topped with 13.5-foot-tall Tainter gates.
Gated Spillway (Bay Nos. 6, 7, 8)	Gated spillway with three 15-foot-wide bays and 2.5-foot-wide intermediate piers. 6.5-foot-tall steel vertical lift gates.
Left Abutment Wall	150-foot-long concrete wall. Height varies from 3 to 18 feet.
Left Embankment	130-foot-long embankment with 2-foot concrete corewall. Height varies, with maximum height of approximately 8 feet.

Little Falls Project Description	Specification
Interconnection Lines	
Number of Interconnection Lines	1
Length of Interconnection Lines	Approximately 30 feet
Interconnection Line Voltage	2.3 kV

Figure 4-4: Little Falls Project Facilities



4.2.1.2 Sylvan Project

Table 4-5 summarizes existing specifications at the Sylvan Project. The primary Sylvan Project facilities are depicted on Figure 4-5.

The Sylvan Project works consist of: (a) a 78-foot-long left earth embankment with a concrete corewall; (b) a powerhouse with three generating units with a total installed capacity of 1,800 kW; (c) a 237-foot-long spillway with four vertical slide gates and two inflatable rubber dams; (d) a 41-foot-long right earth embankment with a concrete core wall; (e) a 730-foot-long earth embankment, approximately 4 to 6 feet tall (Dike 1); (f) 830-foot-long earth embankment, typically about 4 to 6 feet tall with some sections up to 9 feet tall, with an auxiliary spillway (Dike 2 and Auxiliary Spillway); (g) a 1,275-acre reservoir; and (h) appurtenant facilities. Other than the two dikes, the dam structures are situated in or adjacent to the main channel of the Crow Wing River. The dam has a general orientation of southwest to northeast and the maximum height is approximately 48 feet (top of concrete to bottom of concrete). The dam structures are primarily concrete on a soil foundation.

The single-line diagram for the Sylvan Project contains CEII and is included in Volume II of this PAD.

Table 4-5: Sylvan Project Specifications

Sylvan Project Description	Specification
General Information	
FERC Number	FERC P-2454
License Issuance Date	10/29/1993
License Expiration Date	3/31/2028
Licensed Capacity	1.80 MW
Project Location	Cass, Crow Wing, and Morrison counties, Minnesota
Drainage Area	3,760 square miles
Operation Type	Run-of-river
Generation	
Average Annual Generation	11,409 MWh[10]
Dependable Capacity[11]	1.4 MW
Maximum Hydraulic Capacity	Unit 1: 470 cfs Unit 2: 470 cfs Unit 3: 470 cfs Total: 1,410 cfs
Minimum Hydraulic Capacity	Unit 1: 85* cfs Unit 2: 85 cfs

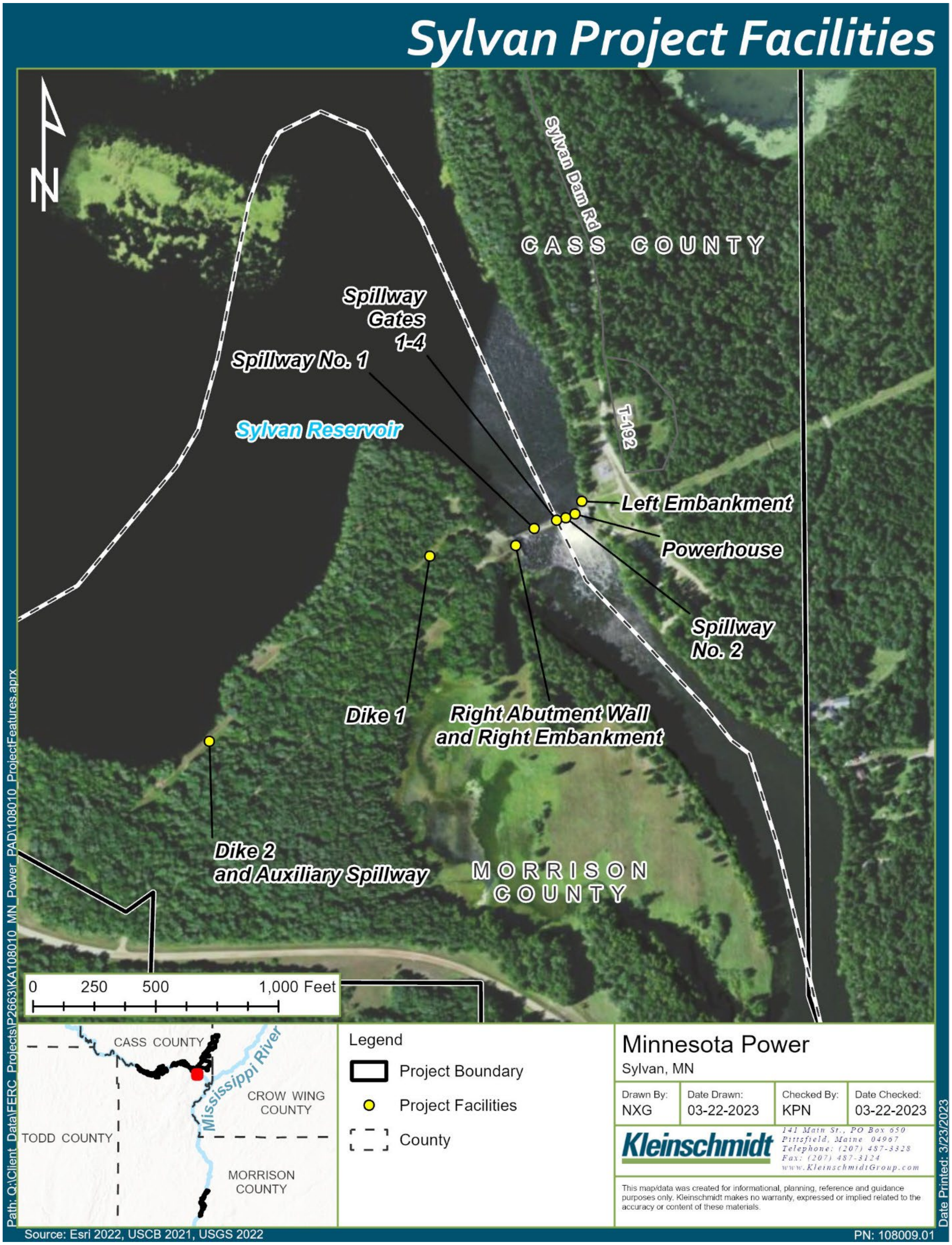
[10] See Section 4.4.2 for additional information on generation.

[11] Dependable capacity is based on MISO median output.

Sylvan Project Description	Specification
	Unit 3: 85 cfs Total: 255 cfs *Minimum hydraulic capacity with one unit running is 85 cfs
Reservoir	
Surface Area of Reservoir	1,275 acres
Storage Volume of Reservoir (normal pool)	8,800 acre-feet
Elevation of Reservoir (normal pool)	1,177.0 feet
Bottom of License Operating Band	1,176.5 feet
Top of the License Operating Band	1,177.5 feet
Powerhouse	
Turbine Generators	Three (3) turbine/generator units
Unit 1	Installed Capacity: 600 kW RPM: 150 Type: Horizontal Francis Manufacturer: Morgan-Smith / A.C. Year in Service: 1913
Unit 2	Installed Capacity: 600 kW RPM: 150 Type: Horizontal Francis Manufacturer: Morgan-Smith / A.C. Year in Service: 1913
Unit 3	Installed Capacity: 600 kW RPM: 150 Type: Horizontal Francis Manufacturer: Morgan-Smith / A.C. Year in Service: 1915
Powerhouse Configuration	Reinforced concrete; approximately 83 by 90 feet.
Dam / Spillways	
Left Embankment	78-foot-long earth fill section with a concrete corewall
Spillway 2 (a.k.a. the Small Rubber Dam)	20-foot-long mass concrete rollway with 4-foot diameter inflatable rubber dams
Gated Spillway	48-foot-long reinforced concrete section with four steel vertical lift gates
Spillway 1 (a.k.a. the Large Rubber Dam)	169-foot-long mass concrete rollway with 4-foot diameter inflatable rubber dams
Right Abutment Wall and Right Embankment	41-foot-long earth fill section with a concrete corewall
Dike 1	730-foot-long earth embankment, approximately 4 to 6 feet tall

Sylvan Project Description	Specification
Dike 2 and Auxiliary Spillway	830-foot-long earth embankment, typically about 4 to 6 feet tall with some sections up to 9 feet tall
Interconnection Lines	
Number of Interconnection Lines	1
Length of Interconnection Lines	Approximately 200 feet
Interconnection Line Voltage	2.3 kV

Figure 4-5: Sylvan Project Facilities



4.2.1.3 Pillager Project

Table 4-6 summarizes existing specifications at the Pillager Project. The primary Pillager Project facilities are depicted on Figure 4-6.

The Pillager Project works consist of: (a) a 357-foot-long concrete gravity dam; (b) a 15-foot-high south earth embankment, extending 223 feet from the south side of the spillway to the natural earth embankment of the river; (c) a 25-foot-high earth embankment, with a 2-foot-wide concrete core wall, extending 225 feet from the north side of the powerhouse to the natural earth embankment of the river; (d) a low 1,330-foot-long earth dike along the north boundary of the reservoir which closes a low spot on the reservoir rim; (e) a reinforced concrete powerhouse with two generating units with a total installed capacity of 1,520 kW; (f) a reservoir (commonly known as Lake Placid) with a surface area of 768 acres; (g) a 85-foot-long earthfill dike; and (h) appurtenant facilities. The primary structures are concrete on a soil foundation flanked by earth embankments, with a maximum height of approximately 47 feet (top of concrete piers to bottom of concrete on the spillway).

The single-line diagram for the Pillager Project contains CEII and is included in Volume II of this PAD.

Table 4-6: Pillager Project Specifications

Pillager Project Description	Specification
General Information	
FERC Number	FERC P-2663
License Issuance Date	4/27/1993
License Expiration Date	3/31/2028
Licensed Capacity	1.52 MW
Project Location	Cass and Morrison counties, Minnesota
Drainage Area	3,230 square miles
Operation Type	Run-of-river
Generation	
Average Annual Generation	8,929 MWh[12]
Dependable Capacity[13]	1.4 MW
Maximum Hydraulic Capacity	Unit 1: 620 cfs Unit 2: 620 cfs Total: 1,240 cfs

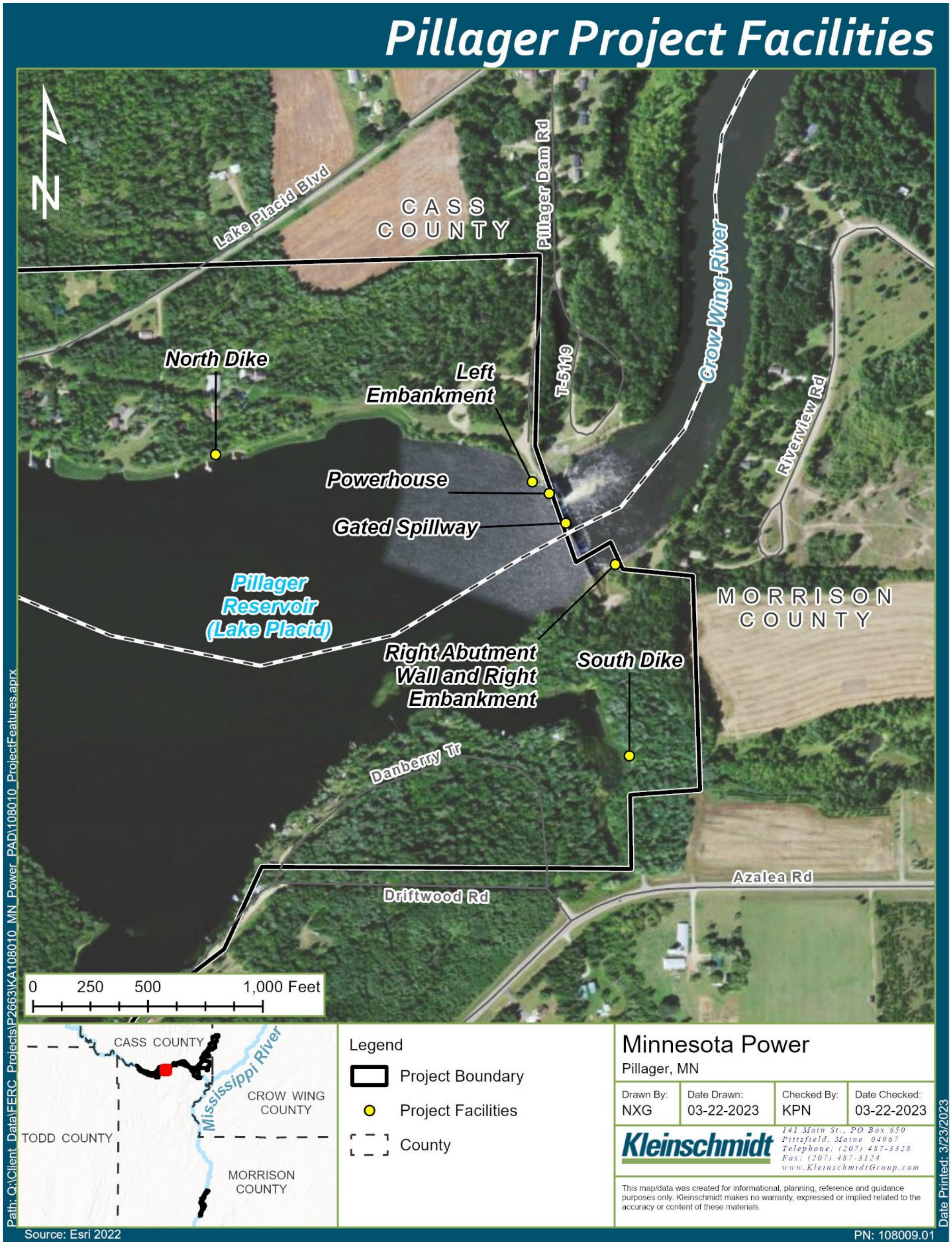
[12] See Section 4.4.2 for additional information on generation.

[13] Dependable capacity is based on MISO median output.

Pillager Project Description	Specification
Minimum Hydraulic Capacity	Unit 1: 250* cfs Unit 2: 250 cfs Total: 500 cfs *Minimum hydraulic capacity with one unit running is 250 cfs
Reservoir (also known as Lake Placid)	
Surface Area of Reservoir (normal pool)	768 acres
Storage Volume of Reservoir (normal pool)	4,600 acre-feet
Elevation of Reservoir (normal pool)	1,199.25 feet
Bottom of License Operating Band	1,198.75 feet
Top of the License Operating Band	1,199.75 feet
Powerhouse	
Turbine Generators	Two (2) turbine generator units
Unit 1	Installed Capacity: 760 kW RPM: 120 Type: Vertical Francis Manufacturer: Morgan-Smith/G.E. Year in Service: 1917
Unit 2	Installed Capacity: 760 kW RPM: 120 Type: Vertical Francis Manufacturer: Morgan-Smith/G.E. Year in Service: 1917
Powerhouse Configuration	Reinforced concrete supported on timber piles. Approximately 98 by 37 feet.
Dam / Spillways	
North Dike	1,330-foot-long earth dike with a maximum height approximately 3 feet
Left Embankment	225-foot-long, 25-foot-high earth embankment with a 2-foot-wide concrete core wall
Gated Spillway	357-foot-long concrete gravity rollway (ogee crest shape) with a maximum height of 35 feet. Includes 18 vertical lift gates (Gates Nos. 1 through 16 vary in length from 18.5 feet to 20.7 feet and Gates Nos. 17 and 18 are 6.0 feet and 4.0 feet wide, respectively)
Right Abutment Wall and Right Embankment	223-foot-long, 15-foot-high south earth embankment

Pillager Project Description	Specification
South Dike	85-foot-long earthfill dike with a maximum height of about 3 feet
Interconnection Lines	
Number of Interconnection Lines	1
Length of Interconnection Line	Approximately 125 feet
Interconnection Line Voltage	2.3 kV

Figure 4-6: Pillager Project Facilities



4.2.2 Proposed Facilities

The Licensee proposes no changes to the facilities at the Projects.

4.3 Projects Operations (18 CFR § 5.6(d)(2)(iv))

4.3.1 Current Operations

4.3.1.1 Little Falls Project

General Operation

The Little Falls Project is remotely operated in ROR mode by the hydro operator located at MP's Thomson Station located in Carlton, Minnesota. Numerous parameters are continuously monitored by the hydro operator including reservoir and tailwater elevations, unit and waste gate flows, and generating unit status. The need for flow changes to maintain ROR is determined by the hydro operator. If local gate operation is required, maintenance personnel are dispatched as needed from the Little Falls Project. The control room at the Little Falls Project is also fully functional and serves as a backup control room if communication with the hydro control room at Thomson Station is disrupted.

The Little Falls Project is operated in a ROR mode whereby inflows at the dam match outflows to the greatest extent possible with a target pool elevation of 1,107.0 feet ± 0.25 feet during flows less than 4,800 cubic feet per second (cfs) and an elevation of 1,107.0 feet ± 0.50 feet during higher flows.

The Little Falls Project has a minimum flow requirement when there is a reservoir drawdown to replace flashboards during walleye spawning season in the spring. In that event, a minimum flow of 350 cfs must be maintained in the east channel.

In accordance with the Ramping Rate Plan, as required by Article 405 of the Little Falls Project FERC license, Project-related flow changes are limited to 10 percent per hour during low and normal flow scenarios, unless inflow is changing at a greater rate.

Normal pool is generally maintained by discharging flow through the turbines. Flow exceeding the turbine capacity is passed through the spillway gates and Spillway 4 (inflatable rubber dam). The gate operating sequence is at the discretion of the hydro operator.

For higher flows, the Tainter gates, slide gates, and rubber dam are operated to maintain normal pool. If the flood magnitude increases sufficiently, the flashboards on Spillways 1, 2, and 3 are overtopped and designed to fail, providing additional spill capacity. Maintenance of the flashboards is completed as needed.

The hydro operators can remotely operate the six generating units and Tainter Gates 1, 2, 4, and 5. Tainter Gates 1, 2, and 5 are operated by hoists dedicated to each gate. A common hoist system operates Tainter Gates 3 and 4, but only one at a time and the hoist shaft is manually disengaged/engaged from one gate to the next. A backup generator is available to operate one Tainter gate at a time; the generator is checked and operated monthly. Hand cranks are also available for manual operation of the Tainter gate hoists with adaptors; multiple adaptors are available.

Slide Gates 6-10 and the Log Sluice are manually operated with overhead electric hoists. Slide Gate 11 has a dedicated hoist. These gate hoists can be operated with a generator. If power is lost or a chain breaks, the slide gates can be manually operated by chain falls; multiple chain falls are available.

Inflation of the rubber dam at Spillway 4 is maintained with an air compressor. Valves allow the dam to be deflated manually. It is operated in a fully inflated or fully deflated position. The rubber dam should not be held in a partially inflated position. For winter operation, Tainter Gate 5 has a glycol heating system in the sides and sill to prevent ice buildup and maintain reliable winter operation. Agitators are used on Gates 4 and 5 to keep the chains ice-free. Portable steamers are also available to aid in removal of ice buildup, if required. Agitators also are used along the left abutment wall to prevent ice loading on the wall.

The reservoir and tailwater levels at the powerhouse are electronically measured to the nearest one-hundredth foot using submersible, differential transducers with 11-foot spans. The water level is displayed in real time on the control room monitor at Thomson Station, manually recorded on a log sheet, and electronically stored as an hourly average for data collection purposes. A staff gage is used frequently to verify the transducer reading. Alarms are set to warn the hydro operator if the reservoir level is nearing the upper or lower end of the license operating band.

Flood Operations

Flood events require increased vigilance by the hydro operator, maintenance personnel, and dam safety engineers. The hydro operator closely monitors river conditions and weather forecasts; an additional operator may be called on-duty to assist during flood operations if needed. Maintenance completes additional debris control as needed to keep water flowing freely through the gates. Pike poles and pole saws are available to help flush woody debris through the gates. Additional engineering inspections are completed at the discretion of the Dam Safety Engineer.

The trigger level for activating the Emergency Action Plan under a High Flow Condition is 25,000 cfs. Most gates are fully open at this point, and maintenance personnel are dispatched to complete inspections more frequently. When the flow reaches 32,000 cfs, all gates (including the rubber dam) must be fully open to maintain the pond level within the license operating band. If the flood continues to increase, the pond will surcharge, eventually overtopping and tipping the flashboards.

If the flow increases beyond 36,000 cfs, sandbagging around the powerhouse doors is needed to prevent water from entering the buildings.

If the flow increases beyond 41,000 cfs, sandbagging along the left embankment is needed to prevent overtopping.

4.3.1.2 Sylvan Project

General Operation

The Sylvan Project is remotely operated in ROR mode by the hydro operator located at MP's Thomson Station located in Carlton, Minnesota. Numerous parameters are continuously monitored by the hydro operator including reservoir and tailwater elevations, unit and waste gate flows, and generating unit status. The need for flow changes to maintain ROR is determined by the hydro operator. If local gate operation is required, maintenance personnel are dispatched as needed from the Little Falls Project.

The facility is operated in a ROR mode whereby inflows at the dam match outflows, to the greatest extent possible. The pond level at the dam is maintained at elevation 1,177.00 +/- 0.25 ft. (NGVD29) for flows less than 1,400 cfs and at elevation 1,177.00 +/- 0.50 ft. (NGVD29) for higher flows. The water flow to the turbines and waste gates is adjusted to match available river flow. The turbines are generally capable of handling the river flow to maintain the proper pond elevation.

The rate of change (ramping rate) in Sylvan Project outflow (the total of both turbine and spillway discharges) is not to exceed 10 percent per hour unless the inflow changes at a greater rate. In the case of the inflow changing at a rate greater than 10 percent per hour, the actual rate of change in inflow or the 10 percent outflow change limit, whichever is greater, is considered the maximum outflow change limit. The need to exceed a 10 percent per hour outflow change limit shall be determined by whether or not the pond level change trend can be arrested with a 10 percent per hour change in outflow.

In the case of increasing flow, the hydro operator will bring the turbines online or increase generation as needed, utilizing available flow until all three units are generating at their maximum capacity. A further increase in flow requires the operation of one or more of the spillway gates to discharge flow in excess of the turbine capacity. Maintenance personnel are dispatched to the site if local operations are needed. In a similar manner, the gates and generating units are cut back (or closed) in response to decreasing flows.

There are no seasonal minimum flow requirements or seasonal reservoir elevation restrictions for the Sylvan Project.

Under normal conditions flow is discharged through the powerhouse. When the discharge capacity of the powerhouse (approximately 1,400 cfs) is exceeded, flow is discharged through Slide Gates Nos. 2-7 and then through Spillway No. 2. Under increasing discharge, the rubber dam is lowered for Spillway No. 1 and flow is discharged over this concrete gravity structure. Under extreme flow events when the normal reservoir rises to el. 1,183 ft discharge occurs over the fuse plug spillway in the right abutment. This triggers the erosion of this section and the flow through the fuse plug spillway which has a concrete crest at elevation 1,178 ft.

Flood Operations

Flood events require increased vigilance by the hydro operator, maintenance personnel, and dam safety engineers. The hydro operator closely monitors river conditions and weather forecasts; an additional hydro operator may be called on-duty to assist during flood operations if needed. Maintenance completes additional debris control as needed to keep water flowing freely through the gates. Pike poles and pole saws are available to help flush woody debris through the gates. Additional engineering inspections are completed at the discretion of the Dam Safety Engineer.

The trigger level for activating the Emergency Action Plan under a High Flow Condition is 9,000 cfs. Most gates are fully open at this point, and maintenance personnel are dispatched to complete inspections more frequently. When the flow reaches 9,500 cfs, all gates (including the rubber dams) must be fully open to maintain the pond level within the license operating band. If the flood continues to increase, the pond will surcharge, eventually passing through the auxiliary spillway and opening the fuse plug.

4.3.1.3 Pillager Project

General Operations

The Pillager Project is remotely operated in ROR mode by the hydro operator located at MP's Thomson Station located in Carlton, Minnesota. Numerous parameters are continuously monitored by the hydro operator including reservoir and tailwater elevations, unit and waste gate flows, and generating unit status. The need for flow changes to maintain ROR is determined by the hydro operator. If local gate operation is required, maintenance personnel are dispatched as needed from the Little Falls Project. The Pillager Project is operated in a ROR mode whereby inflows at the dam match outflows, to the greatest extent possible. The pond level at the Pillager dam is maintained at elevation 1,199.25 +/- 0.25 ft. (NGVD29) for flows less than 1,040 cfs and at elevation 1,199.25 +/- 0.50 ft. (NGVD29) for higher flows. The water flow to the turbines is adjusted to match available river flow.

The rate of change (ramping rate) in Pillager Project outflow (the total of both turbine and spillway discharges) is not to exceed 10 percent per hour unless the inflow changes at a greater rate. In the case of the inflow changing at a rate greater than 10 percent per hour, the actual rate of change in inflow or the 10 percent outflow change limit, whichever is greater, is considered the maximum outflow change limit. The need to exceed a 10 percent per hour outflow change limit shall be determined by whether or not the pond level change trend can be arrested with a 10 percent per hour change in outflow.

Flood Operations

Flood events require increased vigilance by the Operator, maintenance personnel, and dam safety engineers. The Operator closely monitors river conditions and weather forecasts; an additional Operator may be called on-duty to assist during flood operations if needed. Maintenance completes additional debris control as needed to keep water flowing freely through the gates. Pike poles and pole saws are available to help flush woody debris through the gates. Additional engineering inspections are completed at the discretion of the Dam Safety Engineer.

The trigger level for activating the Emergency Action Plan under a High Flow Condition is 12,000 cfs. Most gates are fully open at this point, and maintenance personnel are dispatched to complete inspections more frequently. When the flow reaches 13,000 cfs, all gates must be fully open to maintain the pond level within the license operating band. If the flood continues to increase, the pond will surcharge.

If the flow increases beyond 22,000 cfs, sandbagging around the powerhouse doors is needed to prevent water from entering the buildings.

4.3.2 Proposed Operations

The Licensee proposes to continue to operate the Little Falls Project, Sylvan Project, and Pillager Project in ROR mode and proposes no changes to the operations of the Projects.

4.4 Other Information (18 CFR § 5.6(d)(2)(v))

4.4.1 Current License Requirements (18 CFR § 5.6(d)(2)(v)(A))

4.4.1.1 Little Falls Project

The Little Falls Project FERC license was issued on October 27, 1993.[14] On November 21, 2016, MP filed a request to extend the license terms for the Sylvan, Grand Rapids (P-2362), and the Little Falls Projects to align the expiration dates of these projects with other MP projects in similar locations. FERC issued an Order Extending License Terms on February 24, 2017, and the current license for Little Falls expires on March 31, 2028. The Little Falls Project FERC license includes the following requirements as outlined in Table 4-7. Please note that some requirements have been summarized or condensed for the purpose of brevity.

The Little Falls Project FERC license has been amended throughout the license term. On October 27, 1995, License Article 411 was amended, as described in detail in Table 4-7 below.[15] On August 25, 1998, the Licensee name was changed from Minnesota Power and Light Company to Minnesota Power, Inc.[16] On September 24, 2001, the Licensee name was changed from Minnesota Power, Inc. to ALLETE, Inc.[17] On April 14, 2004 the license was amended to change the Little Falls Project Boundary.[18]

Table 4-7: Little Falls Project FERC License Requirements

License Article	Description
L-3	This license is subject to the articles set forth in Form L-3, (October 1975), entitled "Terms and Conditions of License for Constructed Major Project Affecting Navigable Waters of the United States," and the following additional articles:
201	The licensee shall pay the United States an annual charge, effective January 1, 1994, for the purpose of reimbursing the United States for the cost of administration of Part I of the FPA, as determined by the Commission. The authorized installed capacity for that purpose is 6,290 horsepower.
202	Use and occupancy article
203	Pursuant to Section 10(d) of the FPA, a specified reasonable rate of return upon the net investment in the project shall be used for determining surplus earnings of the project for the establishment and maintenance of amortization reserves. The licensee shall set aside in a project amortization reserve account at the end of each

[14] 65 FERC ¶ 62,084 (1993).

[15] 73 FERC ¶ 62,065 (1995).

[16] 84 FERC ¶ 62,178 (1998).

[17] 95 FERC ¶ 62,295 (2001).

[18] 107 FERC ¶ 62,025 (2004).

License Article	Description
	fiscal year one half of the project surplus earnings, if any, in excess of the specified rate of return per annum on the net investment. To the extent that there is a deficiency of project earnings below the specified rate of return per annum for any fiscal year, the licensee shall deduct the amount of that deficiency from the amount of any surplus earnings subsequently accumulated, until absorbed. The licensee shall set aside one-half of the remaining surplus earnings, if any, cumulatively computed, in the project amortization reserve account. The licensee shall maintain the amounts established in the project amortization reserved account until further order of the Commission.
401	The licensee shall operate the project run-of-river (ROR) for the protection of fish and wildlife resources in the Mississippi River. The licensee shall at all times act to minimize the fluctuation of the reservoir surface elevation by maintaining a discharge from the project so that, at any point in time, flows, as measured immediately downstream from the project tailrace, approximate the sum of inflows to the project reservoir. Under normal operating conditions, the licensee shall maintain the reservoir surface elevation at 1107.0 feet National Geodetic Vertical Datum with interim reservoir level fluctuations limited to ± 0.25 foot. During high flows, such as storm events, this fluctuation must be less than ± 0.5 foot. ROR operation may be temporarily modified if required by operating emergencies beyond the control of the licensee, and for short periods upon mutual agreement between the licensee, the Minnesota Department of Natural Resources and the U.S. Department of the Interior. If the flow is so modified, the licensee shall notify the Commission as soon as possible, but no later than 10 days after each such incident.
402	Within one year from the effective date of this license, the licensee shall complete the upgrading of flow monitoring equipment. Improving the ability to read the headwater gage with a monitoring computer system shall improve the licensee's ability to maintain the reservoir surface elevation. The upgrade of the equipment shall be done to the satisfaction of the United States Geological Survey. After the upgrade is completed, the licensee shall provide flow records and water level data (headwater and tailwater elevations) on a monthly basis to the U.S. Department of the Interior and the Minnesota Department of Natural Resources.
403	Within one year from the effective date of this license, the licensee shall file, for Commission approval, an operation plan for the Little Falls Project. This plan should establish a reservoir operating range to minimize potential fluctuations, address reasons for any deviations from this operating range, and specify how the licensee would make releases through the project's turbines and gates during all flow conditions found in the Mississippi River in the project area.
404	Within 6 months from the effective date of this license, the licensee shall file, for Commission approval, a plan to coordinate seasonal flashboard operation to

License Article	Description
	protect fisheries reproduction, including a provision for a minimum flow to the east channel to protect walleye spawning.
405	Within 6 months from the effective date of this license, the licensee shall file, for Commission approval, a plan to establish limits on the maximum rate of change in river flow (ramping rate) for the protection of fish resources in the Mississippi River in the project area. The plan shall establish measures to avoid stranding and allow time for redistribution of aquatic life due to project flow fluctuations.
406	Within 6 months from the effective date of this license, the licensee shall file a request with the Mid-Continent Area Power Pool (MAPP) for approval to accredit each generating unit individually. Concurrently, the licensee shall provide a copy of the request to the Commission, and a copy of any subsequent MAPP correspondence related to the accreditation request. MAPP accreditation testing and emergencies could cause the Little Falls Project to modify ROR operations. To limit impacts to aquatic populations in the reservoir and downstream reaches of Mississippi River, every effort shall be made to maintain ROR operations. Testing of individual units would allow the licensee to use additional gates or units during the test period to maintain ROR. If the licensee cannot get MAPP approval, then periodic testing of the plants' maximum generating capacity shall be performed when flows are close to the station capacity (3,695 cubic feet per second) to lessen reservoir drawdown and downstream effects on fish and wildlife. The licensee shall schedule normal preventive maintenance so that it will occur at a time when it does not affect the ROR operation of the project. ROR operation may be temporarily modified if required by MAPP operating emergencies beyond the control of the licensee, and for short periods upon mutual agreement between the licensee, the Minnesota Department of Natural Resources (Minnesota DNR), and the U.S. Department of the Interior (Interior). The licensee shall notify the Minnesota DNR and Interior in advance of any proposed water level drawdowns and immediately if any interruption of flow occurs. If the flow is so modified, the licensee shall notify the Minnesota DNR, Interior, and the Commission as soon as possible, but no later than 10 days after each such incident. An explanation of the nature and extent of the MAPP emergency should be included in the filing.
407	Within 6 months after a MAPP emergency that occurs less than 1 year from the last such occurrence, the licensee shall file, for Commission approval, a plan and schedule for preparing a fishery impact study for the project. The fishery study shall describe impacts to fisheries resources from MAPP emergencies. The study shall analyze and provide reasonable alternatives that would decrease environmental impacts caused by an increase in the frequency of power pool emergencies.

License Article	Description
408	Within 6 months from the effective date of this license, the licensee shall file, for Commission approval, a plan for developing a system-wide, low flow management plan in cooperation with the U.S. Army Corps of Engineers (Corps) and the Minnesota Department of Natural Resources (Minnesota DNR) for the Mississippi River in the project area. The low-flow management plan shall determine measures needed to attain an even rate of river discharge during low-flow conditions, and achieve gradual changes in discharge as river discharge recedes.
409	Authority is reserved to the Commission to require the licensee to construct, operate, and maintain, or provide for the construction, operation, and maintenance of, such fishways as may be prescribed by the Secretary of the Interior or the Secretary of Commerce.
410	The licensee shall implement the Programmatic Agreement (PA) executed on June 25, 1993, to avoid and mitigate impacts to the historic project facilities and archeological sites at the Little Falls Project that are eligible for inclusion in the National Register of Historic Places. Within 15 months from the effective date of this license, the licensee shall file, for Commission approval, the cultural resources management plan identified in the PA, along with a letter from the Minnesota State Historic Preservation Officer commenting on the plan. The Commission may require additional work and changes to the plan based on that filing.
411	The licensee shall file, for Commission approval, an annual recreation improvement report for each of the first 10 years of this license. This report shall describe the improvements the licensee has contributed to recreation at the project during the past year. The annual reports shall be due on the license anniversary date.[19]
501	The licensee, within 6 months of the effective date of this license, shall file a Hydropower Compliance Management Program for Commission approval.
502	If the licensee's project was directly benefitted by the construction work of another licensee, a permittee, or the United States on a storage reservoir or other headwater improvement during the term of the original license (including extensions of that term by annual licenses), and if those headwater benefits were not previously assessed and reimbursed to the owner of the headwater improvement, the licensee shall reimburse the owner of the headwater improvement for those benefits, at such time as they are assessed, in the same manner as for benefits received during the term of this new license.

[19] On October 27, 1995, license article 411 was amended as follows: The licensee shall file, for Commission approval, a recreation improvement report by October 31, 1996. The report shall include, at a minimum, the following: (1) supporting documents showing the transfer of money from the licensee to the City of Little Falls (CLF) and a description of how the licensee's funds were specifically used to design and construct the facilities and improvements described in the CLF's Recreation Enhancement Plan; and (2) a map that shows the improvements' location in relation to project features. 73 FERC ¶ 62,065 (1995).

4.4.1.2 Sylvan Project

The Sylvan Project FERC license was issued October 29, 1993.[20] On November 21, 2016, MP filed a request to extend the license terms for the Sylvan, Grand Rapids, and the Little Falls Projects to align the expiration dates these projects with other MP projects in similar locations. FERC issued an Order Extending License Terms on February 24, 2017, and the current license for Sylvan expires March 31, 2028. The Sylvan Project FERC license includes the following requirements as outlined in Table 4-8. Please note that some requirements have been summarized or condensed for the purpose of brevity.

The Sylvan Project FERC license has been amended throughout the license term. On August 25, 1998, the Licensee name was changed from Minnesota Power and Light Company to Minnesota Power, Inc.[21] On March 21, 2000 the license was amended to change the Sylvan Project Boundary.[22] On September 24, 2001, the Licensee name was changed from Minnesota Power, Inc. to ALLETE, Inc.[23]

Table 4-8: Sylvan Project FERC License Requirements

License Article	Description
L-3	This license is subject to the articles set forth in Form L-3, (October 1975), entitled "Terms and Conditions of License for Constructed Major Project Affecting Navigable Waters of the United States," and the following additional articles:
201	The licensee shall pay the United States an annual charge, effective January 1, 1994, for the purpose of reimbursing the United States for the cost of administration of Part I of the FPA, as determined by the Commission. The authorized installed capacity for that purpose is 2,400 horsepower.
202	Use and occupancy article
203	Pursuant to Section 10(d) of the FPA, a specified reasonable rate of return upon the net investment in the project shall be used for determining surplus earnings of the project for the establishment and maintenance of amortization reserves. The licensee shall set aside in a project amortization reserve account at the end of each fiscal year one half of the project surplus earnings, if any, in excess of the specified rate of return per annum on the net investment. To the extent that there is a deficiency of project earnings below the specified rate of return per annum for any fiscal year, the licensee shall deduct the amount of that deficiency from the amount of any surplus earnings subsequently accumulated, until absorbed. The licensee shall set aside one-half of the remaining surplus earnings, if any, cumulatively computed, in the project amortization reserve account. The licensee

[20] 65 FERC ¶ 62,094 (1993).
[21] 84 FERC ¶ 62,178 (1998).
[22] 90 FERC ¶ 62,200 (2000).
[23] 95 FERC ¶ 62,295 (2001).

License Article	Description
	shall maintain the amounts established in the project amortization reserve account until further order of the Commission. The specified reasonable rate of return used in computing amortization reserves shall be calculated annually based on current capital ratios developed from an average of 13 monthly balances of amounts properly includible in the licensee's long-term debt and proprietary capital accounts as listed in the Commission's Uniform System of Accounts. The cost rate for such ratios shall be the weighted average cost of long-term debt and preferred stock for the year, and the cost of common equity shall be the interest rate on 10-year government bonds (reported as the Treasury Department's 10-year constant maturity series) computed on the monthly average for the year in question plus four percentage points (400 basis points).
401	The licensee shall operate the project ROR for the protection of fish and wildlife resources in the Crow Wing River. The licensee shall at all times act to minimize the fluctuation of the reservoir surface elevation by maintaining a discharge from the project so that, at any point in time, flows, as measured immediately downstream from the project tailrace, approximate the sum of inflows to the project reservoir. Under normal operating conditions, the licensee shall maintain the elevation of the Sylvan Reservoir at 1177.0 feet National Geodetic Vertical Datum with fluctuations limited to ± 0.25 foot. During high flow conditions, such as storm events, the licensee may operate the project with fluctuations limited to ± 0.5 foot.
402	Within one year from the effective date of this license, the licensee shall file, for Commission approval, an operation plan for the Sylvan Project. This plan should establish a reservoir operating range to minimize potential fluctuations, address reasons for any deviations from this operating range, and specify how the licensee would make releases through the project's turbines, gates, and inflatable rubber dam during all flow conditions found in the Crow Wing River.
403	Within one year from the effective date of this license, the licensee shall complete the upgrading of the equipment used to monitor ROR operations. Improving the ability to read the headwater gage with a monitoring computer system shall improve the licensee's ability to maintain the reservoir surface elevation. The upgrade of the equipment shall be done to the satisfaction of the United States Geological Survey.
404	Within 6 months from the effective date of this license, the licensee shall file, for Commission approval, a plan to establish limits on the maximum rate of change in river flow (ramping rate) for the protection of fish resources in the Crow Wing River in the project area. The plan should establish measures to avoid stranding or flushing of fish and invertebrates due to project flow fluctuations caused by the removal and installation of flashboards and MAPP testing and emergencies.
405	Within 6 months from the effective date of this license, the licensee shall file, for Commission approval, a monitoring plan for the Sylvan Project. This plan should

License Article	Description
	address how the licensee plans to monitor: (1) instream flow releases below the dam; (2) the reservoir level elevation fluctuations addressed in article 401; and (3) the ramping rates addressed in article 404. The plan shall include methods to incorporate use of the existing tailrace gage, methods to provide headwater level accuracy to the nearest hundredths of a foot, methods for collecting flow data, and details of how this flow data will be provided to the consulted agencies. The plan should also include a schedule for implementing these monitoring measures.
406	Within 6 months from the effective date of this license, the licensee shall file a request with the MAPP for approval to accredit each generating unit individually. Concurrently, the licensee shall provide a copy of the request to the Commission, and a copy of any subsequent MAPP correspondence related to the accreditation request. MAPP accreditation testing and emergencies can cause the Sylvan Project to modify ROR operations. To limit impacts to aquatic populations in the reservoir and downstream reaches of the Crow Wing River, every effort shall be made to maintain ROR operations. Testing of individual units would allow the licensee to use additional gates or units during the test period to maintain ROR operation.
407	Within 6 months after a MAPP emergency that occurs less than 1 year from the last such occurrence, the licensee shall file, for Commission approval, a plan and schedule for preparing a fishery impact study for the project. The fishery study shall describe impacts to fisheries resources from MAPP emergencies. The study shall analyze reasonable alternatives that would decrease environmental impacts caused by an increase in the frequency of power pool emergencies.
408	Authority is reserved to the Commission to require the licensee to construct, operate, and maintain, or provide for the construction, operation, and maintenance of, such fishways as may be prescribed by the Secretary of the Interior.
409	The licensee shall implement the Programmatic Agreement (PA) executed on June 25, 1993, to avoid and mitigate impacts to the historic project facilities and archeological sites at the Sylvan Project eligible for inclusion in the National Register of Historic Places.
410	Within 6 months from the effective date of this license, the licensee shall file, for Commission approval, a plan to enhance the portage facility around the dam and the Fisherman's Bridge access site. Enhancements at the Fisherman's Bridge access site shall include a fishing pier or platform accessible to the disabled and measures to stabilize bank erosion. The plan, at a minimum, shall include the following: (1) a description of the modifications or enhancements for each site; (2) a map of each facility showing the modifications or enhancements; (3) a description of how the plan accommodates disabled users; (4) construction and maintenance costs, showing the entity responsible for each; and (5) an implementation schedule.
411	Within one year from the effective date of this license, the licensee shall file, for Commission approval, a revised land management plan that includes land lease

License Article	Description
	and management agreements for the following recreational facilities at the Sylvan Project: (1) Wilders Landing; (2) Fisherman's Bridge Boat Launch and Fishing Area; (3) Sylvan Dam Boat Access and Fishing Area; (4) Camp Ripley Canoe Portage; and (5) Crow Wing River Canoe Campsite. The revised land management plan, at a minimum, shall describe each facility, including any improvements, and identify the entity responsible for operating and maintaining the facility throughout the term of a new license. If an agreement cannot be reached, the licensee shall be responsible for the continued operation and maintenance of the facility.
501	Within 6 months from the effective date of this license, the licensee shall file, for Commission approval, a Hydropower Compliance Management Program.
502	If the licensee's project was directly benefitted by the construction work of another licensee, a permittee, or the United States on a storage reservoir or other headwater improvement during the term of the original license (including extensions of that term by annual licenses), and if those headwater benefits were not previously assessed and reimbursed to the owner of the headwater improvement, the licensee shall reimburse the owner of the headwater improvement for those benefits, at such time as they are assessed, in the same manner as for benefits received during the term of this new license.

4.4.1.3 Pillager Project

The Pillager Project FERC license was issued April 27, 1998. [24] The Pillager Project FERC license includes the following requirements as outlined in Table 4-9. Please note that some requirements have been summarized or condensed for the purpose of brevity.

The Pillager Project FERC license has been amended throughout the license term. On August 25, 1998, the Licensee name was changed from Minnesota Power and Light Company to Minnesota Power, Inc.[25] On November 17, 2000, License Article 404 was amended to delete the requirement to monitor dissolve oxygen from November through March.[26] On September 24, 2001, the Licensee name was changed from Minnesota Power, Inc. to ALLETE, Inc.[27] On April 23, 2004 the license was amended to change the project boundary.[28] On July 5, 2022 the license was amended to correct the target reservoir elevation in Article 402 from 1,195.25 feet (which was the result of an administrative error) to 1,199.25 feet.[29]

Table 4-9: Pillager Project FERC License Requirements

License Article	Description
L-3	This license is subject to the articles set forth in Form L-3, (October 1975), entitled "Terms and Conditions of License for Constructed Major Project Affecting Navigable Waters of the United States," and the following additional articles:
201	The licensee shall pay the United States an annual charge, effective as of the first day of the month in which this license is issued, for the purposes of reimbursing the United States for the cost of administering Part I of the Federal Power Act, a reasonable amount, as determined in accordance with the provisions of the Commission's regulations in effect from time to time. The authorized installed capacity for that purpose is 1,520 kilowatts.
202	Within 45 days of the date of issuance of the license, the licensee shall file an original set and two duplicate sets of aperture cards of the approved exhibit drawings.
203	If the Pillager Project was directly benefitted by the construction work of another licensee, a permittee, or the United States on a storage reservoir or other headwater improvement during the term of the original license (including extensions of that term by annual licenses), and if those headwater benefits were not previously assessed and reimbursed to the owner of the headwater improvement, the licensee shall reimburse the owner of the headwater

[24] 83 FERC ¶ 62,073 (1998).
[25] 84 FERC ¶ 62,178 (1998).
[26] 93 FERC ¶ 62,123 (2000).
[27] 95 FERC ¶ 62,295 (2001).
[28] 107 FERC ¶ 62,075 (2004).
[29] 180 FERC ¶ 62,005 (2022).

License Article	Description
	improvement for those benefits, at such time as they are assessed, in the same manner as for benefits received during the term of this new license.
204	Pursuant to Section 10(d) of the FPA, a specified reasonable rate of return upon the net investment in the project shall be used for determining surplus earnings of the project for the establishment and maintenance of amortization reserves. The licensee shall set aside in a project amortization reserve account at the end of each fiscal year one half of the project surplus earnings, if any, in excess of the specified rate of return per annum on the net investment. To the extent that there is a deficiency of project earnings below the specified rate of return per annum for any fiscal year, the licensee shall deduct the amount of that deficiency from the amount of any surplus earnings subsequently accumulated, until absorbed. The licensee shall set aside one-half of the remaining surplus earnings, if any, cumulatively computed, in the project amortization reserve account. The licensee shall maintain the amounts established in the project amortization reserve account until further order of the Commission.
401	At least 90 days before the start of any land-disturbing activities relating to recreational facilities, the licensee shall file with the Commission, for approval, a plan to control erosion, to control slope stability, and to minimize the quantity of sediment resulting from construction and operation of the recreational improvements in accordance with Article 409.
402	The licensee shall operate the Pillager Project in a ROR mode for the protection of aquatic resources in the Crow Wing River. The licensee shall at all times act to minimize the fluctuation of the reservoir surface elevation by maintaining a discharge from the project so that, at any point in time, flows, as measured immediately downstream from the project powerhouse, approximate the sum of inflows to the project reservoir. The licensee shall act at all times to maintain the impoundment water surface elevation, as measured immediately upstream of the project dam, to within ± 0.25-foot band width around the target elevation of 1195.25 feet[30] during low and average inflows and within ± 0.50 feet during high flow events.
403	Within 180 days of license issuance, to provide for and monitor the ROR operating mode required in Article 402 and ramping rates in Article 405, the licensee shall develop, after consultation with the Minnesota Department of Natural Resources (Minnesota DNR), Minnesota Pollution Control Agency (MPCA), U.S. Fish and Wildlife Service (USFWS), and U.S. Geological Survey (USGS) a plan and schedule, for Commission approval, to: (1) maintain automatic water level sensors to continuously record the elevation of the Pillager Project's impoundment and tailwater; (2) maintain a log of elevations of the Pillager Project's impoundment, tailwater and turbine operation; (3) develop a generating capacity rating curve to correlate gate settings to gage outflow; (4) develop discharge curves through

[30] On July 5, 2022 the license was amended to correct the target reservoir elevation in Article 402 from 1,195.25 feet (which was an administrative error) to 1,199.25 feet. 180 FERC ¶ 62,005 (2022).

License Article	Description
	spillway gates; (5) identify the exact equipment that shall be utilized to comply with Article 402 and 405; and (6) any other measures that will ensure that the monitoring system will operate under all conditions. The licensee shall provide impoundment and tailwater elevation and turbine operation data to the Minnesota DNR, MPCA, USFWS, and USGS within 30 days from the date of receiving a written request for such information.
404	Within 180 days from the date of issuance of the license, the licensee shall, after consultation with the MPCA, Minnesota DNR, USGS, and the USFWS, file with the Commission for approval, a plan to monitor dissolved oxygen (DO) in the impoundment and in the river immediately below the powerhouse.
405	Within 180 days from the date of issuance of the license, the licensee shall, after consultation with the Minnesota DNR, MPCA, USFWS, and USGS, file with the Commission for approval, a plan to ramp the project discharges for the protection of fish resources downstream of the project area in the Crow Wing River. The change in project discharge shall not exceed 10 percent per hour so long as the change in the inflow to the reservoir does not exceed 10 percent per hour. Therefore, the specified ramping limit shall be equal to either a 10-percent-per-hour change in project outflow or the actual hourly change in the rate of inflow to the reservoir, whichever is greater. The licensee shall take all reasonable measures to implement the aforementioned ramping rate without compromising headwater elevation restrictions.
406	Within 180 days from the date of issuance of the license, the licensee shall file a request with the MAPP for approval to accredit each generating unit individually. Concurrently, the licensee shall provide a copy of the request to the Commission, and a copy of any subsequent MAPP correspondence related to the accreditation request. The licensee shall operate the project in a ROR mode in accordance with Article 402 and within the ramping rate restrictions of Article 405 during the MAPP accreditation to protect fish and wildlife resources upstream and downstream of the project facilities.
407	Within 90 days after a MAPP emergency that occurs less than 1 year from the last such occurrence, the licensee shall file, for Commission approval, a plan and schedule for preparing a fishery impact study. The fishery study shall describe impacts to fisheries resources from changes in operation to address MAPP emergencies. The study shall analyze reasonable alternatives that would decrease environmental impacts caused by more than one power pool emergency per year.
408	Authority is reserved to the Commission to require the licensee to construct, operate, and maintain, or to provide for the construction, operation, and maintenance of such fishways as may be prescribed by the Secretary of the Interior.

License Article	Description
409	Within one year from the date of issuance of the license, the licensee shall file with the Commission for approval, a recreation plan for lands within the project boundary.
410	The licensee, after consultation with the Minnesota Department of Natural Resources and U.S. Fish and Wildlife Service, shall monitor recreational use of the project area to determine whether existing and proposed recreational facilities are meeting recreational needs. Monitoring studies shall begin within six years of the issuance of this license and reported to the Commission in accordance with Section 8 of the Commission's regulations (18 CFR 8.11), which requires the filing of FERC Form No. 80.
411	Within one year of the issuance date of this license, the licensee shall file with the Commission, for approval, a revised land management plan for the lands within the project boundary. The intent of the plan is to provide conceptual methods for sound stewardship for managing these lands in a manner that protects environmentally sensitive habitat and ensures that land use is compatible with wildlife management.
412	The licensee shall implement the "Programmatic Agreement Among the Federal Energy Regulatory Commission, the Advisory Council on Historic Preservation, and the State of Minnesota, State Historic Preservation Officer, for Managing Historic Properties That May Be Affected By a License Issuing to Minnesota Power and Light Company for the Continued Operation of the Pillager Hydropower Project in Minnesota," executed on September 26, 1997, including but not limited to the Cultural Resources Management Plan for the project. In the event that the PA is terminated, the licensee shall implement the provisions of its approved Cultural Resources Management Plan. The Commission reserves the authority to require changes to the Cultural Resources Management Plan at any time during the term of the license. If the PA is terminated prior to Commission approval of the Cultural Resources Management Plan, the licensee shall obtain Commission approval before engaging in any ground disturbing activities or taking any other action that may affect any historic properties within the Project's area of potential effect.
413	Within one year of the issuance date of this license, the licensee shall file with the Commission, for approval, a revised Exhibit G, containing a proposed project boundary that provides sufficient lands to operate and maintain the project, including, at a minimum: (1) lands associated with recreational facilities provided per Article 409; (2) lands necessary to protect wildlife and its habitat per Article 411; and (3) any lands necessary to secure land rights sufficient to operate and maintain the project. The revised proposed project boundary shall apply to, but not be limited to, the existing 470 acres of flowage rights property, the project boundary currently at elevation 1199 feet National Geodetic Vertical Datum (NGVD), and any fee-owned property necessary for the proper operation (i.e., a minimum elevation of 1199.75 feet NGVD during high flow events), maintenance, and preservation of the project's environmental integrity.

License Article	Description
414	Use and occupancy article

4.4.2 Summary of Projects Generation and Outflow Records (18 CFR § 5.6(d)(2)(v)(B))

The Projects operate in a ROR mode and inflows to the Projects are controlled by upstream flows. Table 4-10, Table 4-11, and Table 4-12 provide a summary of monthly and annual Project generation for the most recent five-year period in MWh for the Little Falls Project, Sylvan Project, and Pillager Project, respectively. Average annual generation at the Projects from 2018 through 2022 is 32,615 MWh at the Little Falls Project, 11,409 MWh at the Sylvan Project, and 8,929 MWh at the Pillager Project. Monthly and annual average outflows at the Little Falls Project, Sylvan Project, and Pillager Project for 2018 through 2022 are shown in Table 4-13, Table 4-14, and Table 4-15, respectively.

Table 4-10: Generation (MWh) for the Little Falls Project from January 1, 2018 to December 31, 2022

Period	2018	2019	2020	2021	2022	Average
January	2,724	3,562	3,057	3,484	3,091	3,184
February	2,136	2,863	3,161	2,394	2,535	2,618
March	2,912	3,058	3,325	3,160	2,898	3,071
April	3,119	2,515	2,443	2,749	2,447	2,655
May	3,454	3,062	3,396	3,168	2,324	3,081
June	3,156	2,044	2,837	2,279	2,545	2,572
July	2,874	2,741	2,852	1,107	2,982	2,511
August	2,959	3,513	2,767	865	3,034	2,628
September	2,265	2,539	2,632	981	3,016	2,287
October	2,345	2,036	2,886	2,132	2,891	2,458
November	2,814	2,004	2,861	2,948	2,377	2,601
December	3,551	2,870	2,827	2,858	2,651	2,951
Gross Annual Generated	**34,309**	**32,806**	**35,043**	**28,125**	**32,791**	**32,615**

Table 4-11: Generation (MWh) for the Sylvan Project from January 1, 2018 to December 31, 2022

Period	2018	2019	2020	2021	2022	Average
January	840	839	942	1,009	894	905
February	629	690	1,003	576	637	707
March	955	1,038	1,235	1,139	917	1,057
April	1,101	903	961	1,134	1,036	1,027
May	1,116	1,173	1,242	1,315	1,019	1,173
June	1,142	1,174	1,022	555	1,113	1,001
July	1,242	1,293	1,185	352	1,226	1,060
August	1,036	840	1,130	242	879	825
September	970	1,115	881	443	621	806
October	869	983	1,057	834	607	870
November	1,102	1,148	1,117	1,074	725	1,033
December	939	1,075	1,056	909	739	944
Gross Annual Generated	**11,943**	**12,271**	**12,832**	**9,581**	**10,416**	**11,409**

Table 4-12: Generation (MWh) for the Pillager Project from January 1, 2018 to December 31, 2022

Period	2018	2019	2020	2021	2022	Average
January	552	565	868	883	581	690
February	379	429	868	527	428	526
March	741	735	1,064	1,027	525	818
April	1,001	748	1,012	1,011	527	860
May	1,139	1,100	1,229	240	552	852
June	1,059	1,090	932	-	547	726
July	1,156	755	1,054	5	610	716
August	877	633	1,107	127	634	676
September	944	565	1,103	515	613	748
October	1,120	472	1,131	623	620	1,120
November	919	709	1,101	614	557	780
December	785	942	919	546	529	744
Gross Annual Generated	**10,672**	**8,743**	**12,389**	**6,119**	**6,723**	**8,929**

Table 4-13: Monthly and Annual Average Project Flows (cfs) for the Little Falls Project from January 1, 2018 to December 31, 2022

Period	2018	2019	2020	2021	2022	Average
January	2,659	3,548	6,108	3,325	2,547	3,637
February	2,171	2,878	5,246	2,267	2,322	2,977
March	2,601	6,401	6,601	4,438	4,365	4,881
April	6,790	17,167	15,282	11,800	11,805	12,569
May	7,451	14,642	5,393	5,636	16,547	9,934
June	9,521	8,054	2,780	2,110	12,147	6,922
July	9,188	6,719	3,686	946	7,049	5,518
August	3,320	3,748	5,459	776	3,859	3,432
September	3,785	5,669	3,980	1,008	2,913	3,471
October	7,589	12,700	4,433	1,894	2,557	5,835
November	6,340	9,077	5,599	2,873	3,629	5,504
December	3,957	5,643	3,513	2,355	2,648	3,623
Annual	**5,448**	**8,021**	**5,673**	**3,286**	**6,032**	**5,692**

Table 4-14: Monthly and Annual Average Project Flows (cfs) for the Sylvan Project from January 1, 2018 to December 31, 2022

Period	2018	2019	2020	2021	2022	Average
January	814	825	1,582	970	871	1,012
February	697	698	1,396	656	680	825
March	954	2,860	2,166	1,801	1,944	1,945
April	3,430	5,937	4,626	3,704	4,976	4,535
May	2,619	3,970	1,804	1,619	4,809	2,964
June	3,201	2,477	1,064	620	3,062	2,085
July	2,624	1,460	1,668	369	1,498	1,524
August	1,091	1,071	1,871	329	865	1,045
September	1,147	2,271	1,243	501	695	1,231
October	1,940	4,566	1,243	855	641	1,849
November	1,526	2,400	1,585	1,057	847	1,483
December	917	1,610	1,032	874	705	1,028
Annual	**1,747**	**2,512**	**1,773**	**1,113**	**1,799**	**1,789**

Table 4-15: Monthly and Annual Average Project Flows (cfs) for the Pillager Project from January 1, 2018 to December 31, 2022

Period	2018	2019	2020	2021	2022	Average
January	716	763	1,452	885	723	908
February	637	610	1,282	581	559	734
March	893	2,697	2,140	1,793	1,959	1,896
April	3,386	6,143	4,707	3,646	5,394	4,655
May	2,669	3,966	1,760	1,655	5,231	3,056
June	3,244	2,441	1,046	639	3,103	2,095
July	2,526	1,410	1,460	353	1,500	1,450
August	1,052	1,012	1,885	307	812	1,014
September	1,069	2,217	1,244	502	645	911
October	1,734	4,868	1,145	801	596	1,829
November	1,442	2,451	1,494	934	753	1,415
December	884	1,467	927	819	629	945
Annual	**1,688**	**2,504**	**1,712**	**1,076**	**1,825**	**1,761**

4.4.3 Current Net Investment (18 CFR § 5.6(d)(2)(v)(C))

The net investment for the Little Falls Project, based on the book value as of December 31, 2022, is $9,022,259.01. The net investment for the Sylvan Project, based on the book value as of December 31, 2022, is $777,234.20. The net investment for the Pillager Project, based on the book value as of December 31, 2022, is $1,407,340.85.

4.4.4 Projects Compliance History (18 CFR § 5.6(d)(2)(v)(D))

The Licensee received a non-compliance notice for the Pillager Project on October 8, 2008. The Licensee was notified on January 31, 2013 by FERC that a temporary drawdown at the Sylvan Project on December 17, 2012 required a temporary amendment of Article 401, and a violation was received. The Licensee received a non-compliance notice for the Projects on December 9, 2014. A ramping rate deviation at the Pillager Project that occurred on December 10, 2016 was considered a violation; FERC issued a letter regarding this matter on January 11, 2017. The matters noted in these notices have been addressed by the Licensee.

4.4.5 Public Utility Regulatory Policies Act Benefits (18 CFR § 5.6(e))

The Licensee 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.

4.5 References

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5.0 DESCRIPTION OF EXISTING ENVIRONMENT (18 CFR § 5.6(D)(3))

5.1 Geology and Soils

18 CFR 5.6(d)(3)(ii) requires "Descriptions and maps showing the existing geology, topography, and soils of the proposed project and surrounding area. Components of the description must include: (A) A description of geological features, including bedrock lithology, stratigraphy, structural features, glacial features, unconsolidated deposits, and mineral resources at the project site; (B) A description of the soils, including the types, occurrence, physical and chemical characteristics, erodability and potential for mass soil movement; (C) A description of reservoir shorelines and streambanks, including: (1) Steepness, composition (bedrock and unconsolidated deposits), and vegetative cover; and (2) Existing erosion, mass soil movement, slumping, or other forms of instability, including identification of project facilities or operations that are known to or may cause these conditions."

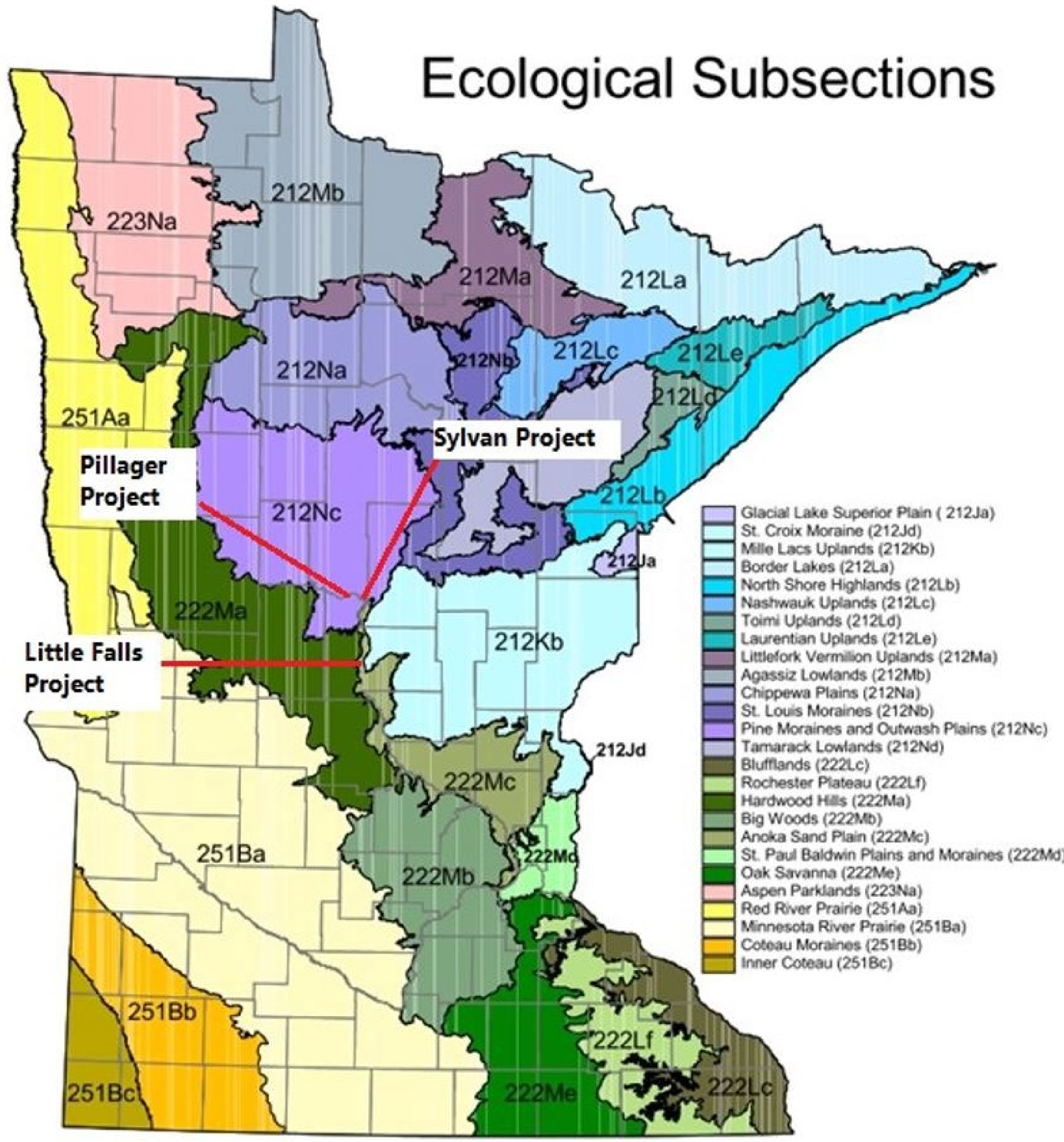
5.1.1 Overview

The National Park Service (NPS) divided the contiguous United States into physiographic provinces according to their geomorphology[31] (NPS 2017). Minnesota is comprised of two main physiographic provinces: the Superior Upland Province and the Central Lowland Province. The Projects are located within the Central Lowland Province, which is the largest physiographic province extending from western New York to North Dakota and south to Texas. (NPS 2018).

The Minnesota Department of Natural Resources (Minnesota DNR) and the U.S. Forest Service (USFS) developed a hierarchical Ecological Classification System (ECS) for ecological mapping and landscape classification in Minnesota (Minnesota DNR 2022a). The ECS divides the state of Minnesota into six levels: provinces, sections, subsections, land type associations, land types, and land type phases. (Minnesota DNR 2022). The data associated with the first three levels (provinces, sections, and subsections[32]) were readily available. The Little Falls Project lies within the Eastern Broadleaf Forest Province (222), the Minnesota and Northeast Iowa Morainal (222M) Section, and the Anoka Band Plain Subsection (222Mc). The Sylvan and Pillager Projects are located within the Laurentian Mixed Forest Province (212), the North Minnesota Drift and Lake Plains Section (212N), and the Pine Moraines and Outwash Plains Subsection (212Nc). Minnesota DNR's ECS subsections are shown in Figure 5-1.

[31] Geomorphology refers to the physical features and processes of landforms, and their relation to geologic structures.

[32] Provinces are units of land defined using major climate zones, native vegetation, and biomes such as prairies, deciduous forests, or boreal forests. Sections are units within Provinces that are defined by origin of glacial deposits, regional elevation, distribution of plants, and regional climate. Subsections are units within Sections that are defined using glacial deposition processes, surface bedrock formations, local climate, topographic relief, and the distribution of plants, especially trees. (Minnesota DNR 2022a).



Source: Minnesota DNR 1999

Figure 5-1: Minnesota DNR's Ecological Subsections for the State of Minnesota

5.1.2 Topography

The majority of the Central Lowland Province is surrounded by higher relief with elevations ranging from 1,000 feet above sea level in the east to less than 2,000 feet to the west (NPS 2022). Topography in the Projects Vicinities is relatively flat with elevations ranging from approximately 1,110 feet to 1,150 feet at the Little Falls Project, approximately 1,170 feet to 1,250 feet at the Sylvan Project, and approximately 1,210 feet to 1,270 feet at the Pillager Project. Figure 5-2 and Figure 5-3 depict the general topography at the Little Falls Project, and Sylvan and Pillager Projects, respectively.

Figure 5-2: Topography at the Little Falls Project

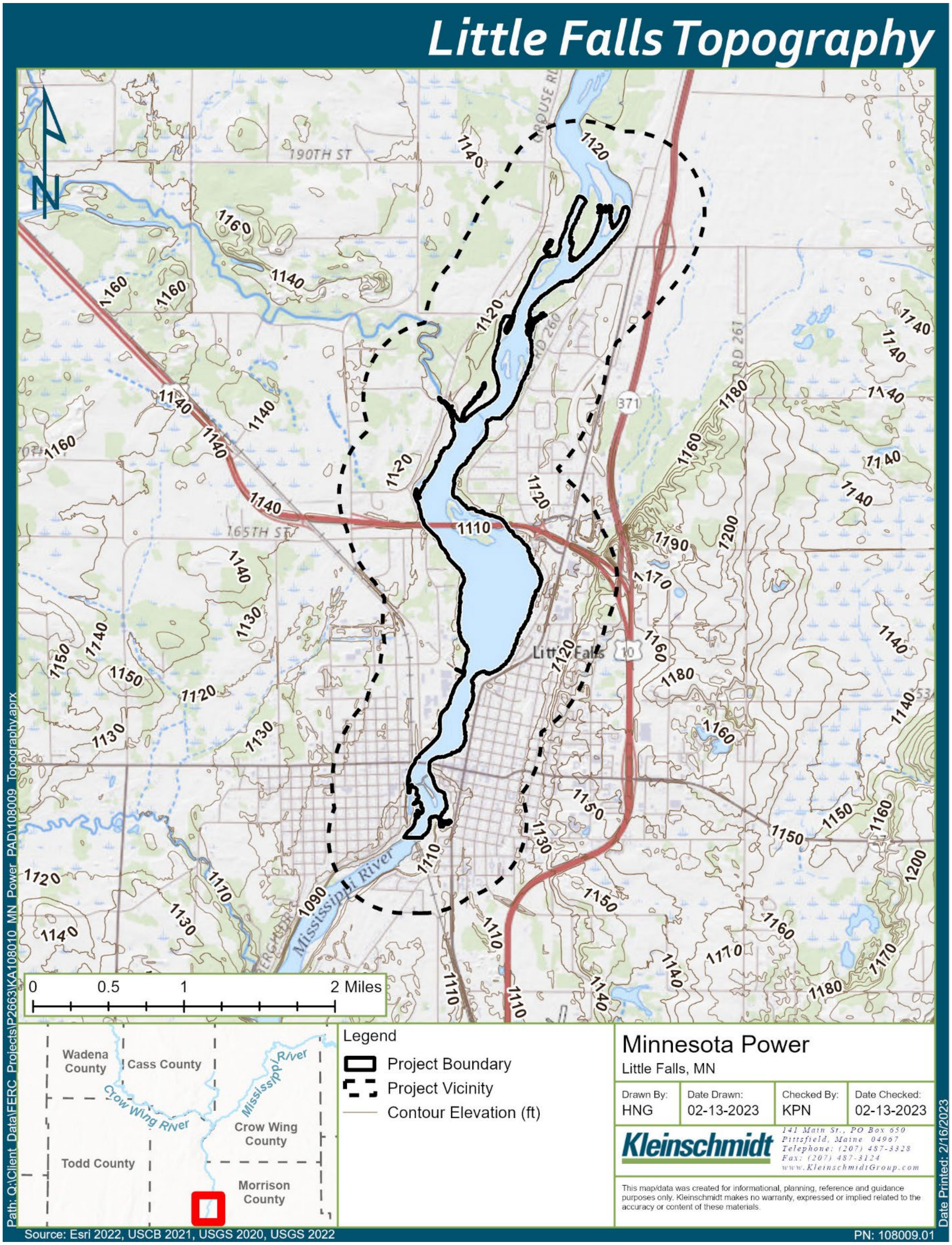
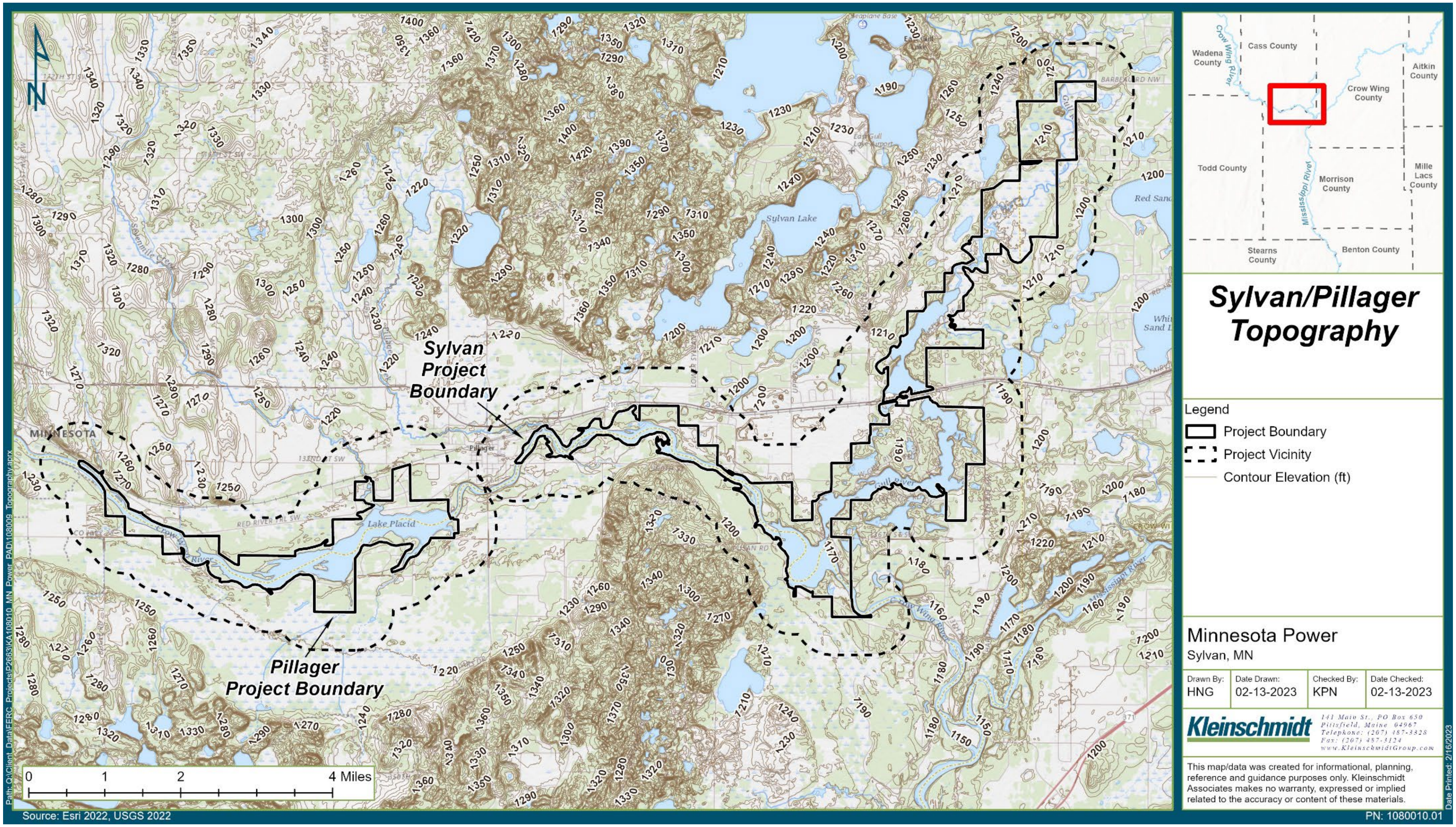


Figure 5-3: Topography at the Sylvan and Pillager Projects



5.1.3 Geology

The Central Lowland Province is characterized by flat lands with geomorphic remnants of glaciation. The Central Lowlands were subject to repeated Pleistocene glaciations and can be divided into regions based on glacial features, including the Great Lakes, Small Lakes, Driftless Area, Till Plains, Dissected Till Plains, and Osage Plains. Underlying glacial deposits are largely horizontal Paleozoic sandstones, shales, limestones, conglomerates, and coals. (NPS 2022).

The Little Falls Project is located within the Eastern Broadleaf Forest Province, the Minnesota and Northeast Iowa Morainal Section, and the Anoka Band Plain Subsection. The Eastern Broadleaf Forest Province is the product of Pleistocene glacial processes and characterized by thick (100 to 300 feet) deposits of glacial drift (Minnesota DNR 2022b). Over half of the Minnesota and Northeast Iowa Morainal Section consists of rugged moraines along the eastern margin of the Des Moines ice lobe from the last glaciation, with another quarter of the area consisting of rolling till or basal till. Small sand plains occur within the moraines, and the Little Falls Project exists in the Anoka Sand Plain (Minnesota DNR 2022c). The Anoka Sand Plain Subsection consists of a flat, sandy lake plain and terraces along the Mississippi River. Surface glacial deposits are typically less than 200 feet thick and underlain by Cambrian and Ordovician dolomite, sandstone, and shale. (Minnesota DNR 2022d). The major rock type at the Little Falls Project is schist as shown in Figure 5-4.

The Sylvan and Pillager Projects are located within the Laurentian Mixed Forest Province, the North Minnesota Drift and Lake Plains Section, and the Pine Moraines and Outwash Plains Subsection. The Laurentian Mixed Forest Province ranges from rugged terrain covered with lakes and thin glacial deposits on top of bedrock, to undulating plains with deep glacial drift, to large, flat poorly drained peatlands (Minnesota DNR 2022e). The Minnesota Drift and Lake Plains Section has complex surface geology and is characterized by deep (200 to 600 feet) glacial deposits in outwash plains, lake plains, till plains, outwash channels, moraines, and drumlin fields (Minnesota DNR 2022f). The Pine Moraines and Outwash Plains Subsection is a mix of end moraines, outwash plains, till plains, and drumlin fields. The moraines are relatively large and formed from portions of multiple glacial lobes. Thick glacial drift covers the bedrock in the majority of this Subsection. A diversity of Precambrian rock underlies the glacial drift, with iron formations along with argillite, siltstone, quartzite, and graywacke at the southeastern edge of the Subsection. Cretaceous marine shale, sandstone, and variegated shale are present in the southwest area of the Subsection. (Minnesota DNR 2022g). The major rock types at the Sylvan Project are siltstone and quartzite and the major rock types at the Pillager Project are schist and felsic-volcanic, as shown in Figure 5-4.

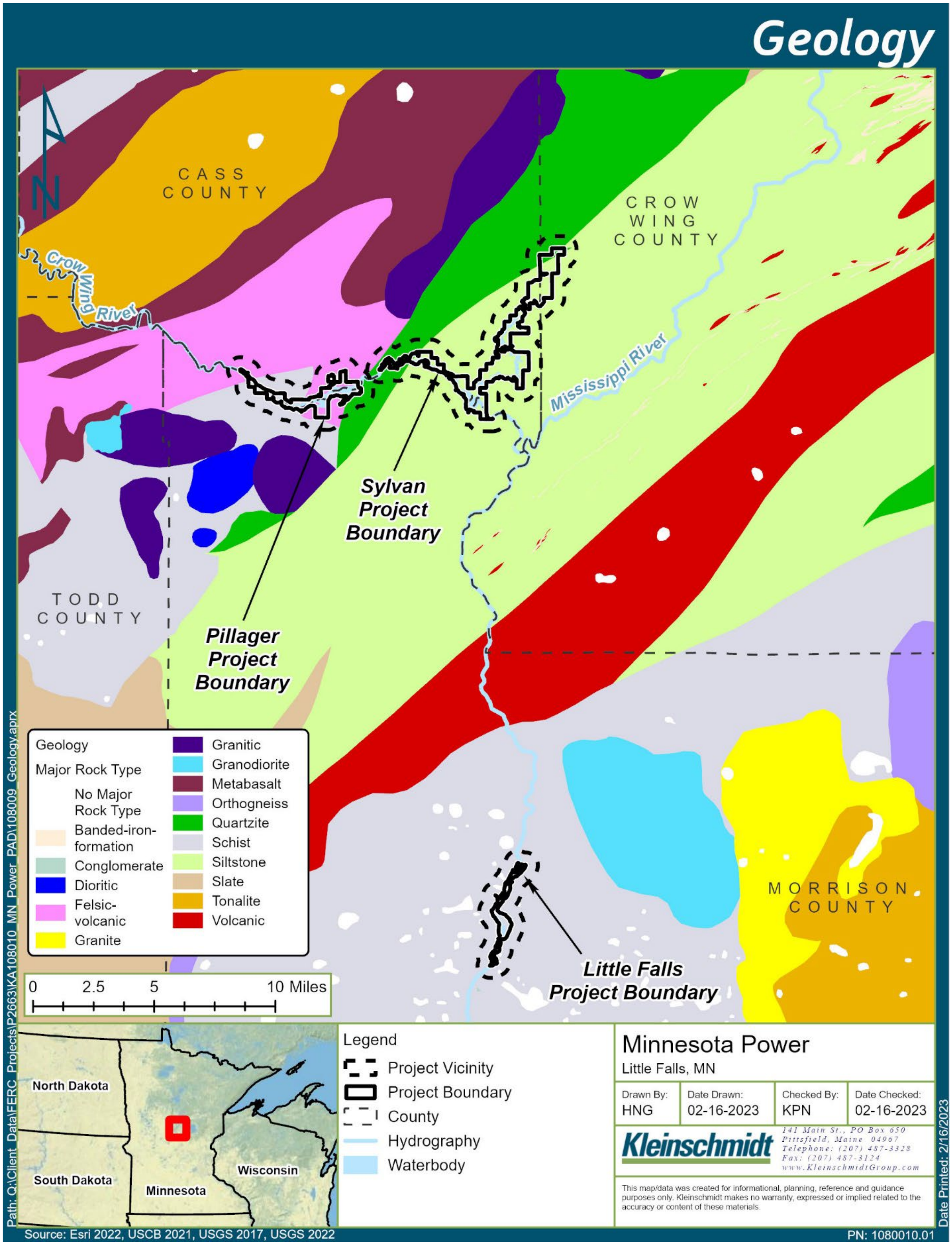


Figure 5-4: Geology at the Little Falls, Sylvan, and Pillager Projects

5.1.4 Soils

The Soil Survey Geographic Database (SSURGO) was reviewed to characterize the soil types in the Projects Boundaries and Projects Vicinities. Soils are organized into twelve major groups (orders) that are determined by major climate factors, dominant materials, or degree of weathering (USDA NRCS 2023a). Soil erosion factors are used to quantify erosion and include k-factor[33] (rock free), t-factor[34], and wind erodibility index and group.[35] Table 5-1, Table 5-2, and Table 5-3 provide the soil types, soil orders, accompanying acreage, and associated erosion factors at the Projects. Soil orders are depicted in Figures 5-4 and 5-5.

[33] K factor is a soil erodibility factor representing both susceptibility of soil to erosion and the rate of runoff. Soils high in clay have low K values because they are resistant to detachment. Sandy soils also have low K values due to low rate of runoff, although they are easily detached. Medium textured soils (such as silt loam soils) have moderate K values (MSU 2002).

[34] T factor is the soil loss tolerance in tons per acres. The factor of 1 ton per acre per year is for shallow or fragile soils and 5 tons per acre per year designate deep soils that are least susceptible to damage by erosion (USDA NRCS 2023b).

[35] Soil erodibility by wind is directly related to the percentage of dry non-erodible surface soil aggregates larger than 0.84 mm in diameter. From this percentage, the wind erodibility index is determined. The index is an expression of the stability of these soil aggregates against breakdown by tillage and abrasion from wind erosion. Soils are placed in Wind Erodibility Groups having similar percentages of dry soil aggregates larger than 0.84 mm (SD Tech Guide 2002).

Table 5-1: Soil Types at the Little Falls Project

Soil Type	Soil Order	k-factor Rock Free	t-factor	Wind Erodibility Group	Wind Erodibility Index	Area (Acres)
Water	Bodies of Water	-	-	-	-	585.5
Fordum-Winterfield complex	Entisols	0.12	4	5	56	69.4
Udorthents, loamy	Entisols	0.43	5	5	56	9.4
Becker fine sandy loam	Mollisols	0.22	3	3	86	8.3
Hubbard loamy sand, 1 to 6 percent slopes	Mollisols	0.04	5	2	134	7.6
Menahga loamy sand, 8 to 15 percent slopes	Entisols	0.02	5	2	134	3.7
Menahga loamy sand, 1 to 8 percent slopes	Entisols	0.02	5	2	134	1.6
Menahga loamy sand, 15 to 30 percent slopes	Entisols	0.02	5	2	134	1.5
Isan-Isan, frequently ponded, complex, 0 to 2 percent slopes	Mollisols	0.11	2	3	86	0.9
Menahga loamy sand, 0 to 2 percent slopes	Entisols	0.02	5	2	134	0.5
Meehan loamy sand, 0 to 3 percent slopes	Entisols	0.04	5	2	134	0.4
Watab loamy fine sand	Alfisols	0.33	4	2	134	0.2
Duelm loamy sand, 0 to 2 percent slopes	Mollisols	0.05	5	2	134	0.1
Hubbard loamy sand, 0 to 2 percent slopes	Mollisols	0.04	5	2	134	0.0

Source: USDA NRCS 2023c

Table 5-2: Soil Types at the Sylvan Project

Soil Types	Soil Order	k-factor Rock Free	t-factor	Wind Erodibility Group	Wind Erodibility Index	Area (Acres)
Water	Bodies of Water	-	-	-	-	1,206.4
Menahga loamy sand, 1 to 8 percent slopes	Entisols	0.02	5	2	134	521.5
Hubbard loamy sand, 0 to 2 percent slopes	Mollisols	0.04	5	2	134	508.0
Rifle-Rifle, ponded, complex, 0 to 1 percent slopes	Histosols		2	7	38	333.0
Hubbard loamy sand, 1 to 6 percent slopes	Mollisols	0.04	5	2	134	290.9
Markey muck, occasionally ponded, 0 to 1 percent slopes	Histosols	0.02	1	8	0	262.5
Menahga loamy sand, 8 to 15 percent slopes	Entisols	0.02	5	2	134	243.4
Seelyeville-Seelyeville, ponded, complex, 0 to 1 percent slopes	Histosols		2	2	134	186.3
Lougee-Totagatic-Bowstring complex, 0 to 1 percent slopes, frequently flooded	Histosols	0.07	1	7	38	182.9
Menahga loamy sand, 15 to 30 percent slopes	Entisols	0.02	5	2	134	141.7
Graycalm loamy sand, 12 to 25 percent slopes	Entisols	0.06	5	2	134	110.4
Menahga loamy sand, 0 to 2 percent slopes	Entisols	0.02	5	2	134	108.0
Friendship loamy sand	Entisols	0.05	5	2	134	52.8
Roscommon loamy sand	Entisols	0.05	5	2	134	42.5
Zimmerman loamy fine sand, 0 to 2 percent slopes	Entisols	0.16	5	2	134	39.7
Zimmerman loamy fine sand, 6 to 15 percent slopes	Entisols	0.16	5	2	134	39.3
Meehan loamy sand, 0 to 3 percent slopes	Entisols	0.04	5	2	134	35.6
Graycalm-Wurtsmith complex, 2 to 8 percent slopes	Entisols	0.07	5	2	134	33.1
Cathro-Seelyeville complex	Histosols	0.32	1	2	134	32.2
Zimmerman loamy fine sand, 1 to 6 percent slopes	Entisols	0.16	5	2	134	22.4
Gerrish-Mahtomedi complex, 12 to 25 percent slopes	Entisols	0.07	5	2	134	18.3
Isan-Isan, frequently ponded, complex, 0 to 2 percent slopes	Mollisols	0.11	2	3	86	16.1

Soil Types	Soil Order	k-factor Rock Free	t-factor	Wind Erodibility Group	Wind Erodibility Index	Area (Acres)
Fordum-Winterfield complex	Entisols	0.12	4	5	56	14.0
Mahtomedi loamy sand, 8 to 15 percent slopes	Entisols	0.07	5	2	134	13.1
DeMontreville loamy sand, 2 to 8 percent slopes	Alfisols	0.27	5	2	134	9.4
Mahtomedi loamy sand, 1 to 8 percent slopes	Entisols	0.07	5	2	134	7.1
Graycalm loamy sand, 2 to 8 percent slopes	Entisols	0.07	5	2	134	4.7
Fluvaquents, frequently flooded	Entisols	0.11	2	4L	86	1.9
Lougee-Barber-Guida complex, 0 to 6 percent slopes	Entisols	0.11	1	7	38	0.9
Mooselake and Lupton soils, 0 to 1 percent slopes	Histosols		2	2	134	0.5
Warba-Cromwell complex, 1 to 8 percent slopes	Alfisols	0.24	5	3	86	0.4
Graycalm-Grayling complex, 12 to 25 percent slopes	Entisols	0.06	5	2	134	0.2
Uskabwanka-Rifle-Lougee complex, 0 to 1 percent slopes	Histosols	0.03	1	7	38	0.1

Source: USDA NRCS 2023c

Table 5-3: Soil Types at the Pillager Project

Soil Types	Soil Order	k-factor Rock Free	t-factor	Wind Erodibility Group	Wind Erodibility Index	Area (Acres)
Water	Bodies of Water					696.4
Meehan loamy sand, 0 to 3 percent slopes	Entisols	0.04	5	2	134	320.3
Menahga loamy sand, 1 to 8 percent slopes	Entisols	0.02	5	2	134	195.7
Friendship loamy sand	Entisols	0.05	5	2	134	93.8
Roscommon loamy sand	Entisols	0.05	5	2	134	85.6
Menahga loamy sand, 0 to 2 percent slopes	Entisols	0.02	5	2	134	46.8
Meehan-Isan complex	Entisols	0.09	5	2	134	36.6
Menahga loamy sand, 8 to 15 percent slopes	Entisols	0.02	5	2	134	32.4
Fordum-Winterfield complex	Entisols	0.12	4	5	56	21.1
Cathro-Seelyeville complex	Histosols	0.32	1	2	134	20.1
Isan-Isan, frequently ponded, complex, 0 to 2 percent slopes	Mollisols	0.11	2	3	86	19.3
Menahga loamy sand, 15 to 30 percent slopes	Entisols	0.02	5	2	134	14.0
Markey muck, occasionally ponded, 0 to 1 percent slopes	Histosols	0.02	1	8	0	7.7
Hubbard loamy sand, 0 to 2 percent slopes	Mollisols	0.04	5	2	134	3.7
Staples loamy sand, acid substratum	Alfisols	0.29	4	2	134	0.2

Source: USDA NRCS 2023c

Figure 5-5: Soils at the Little Falls Project

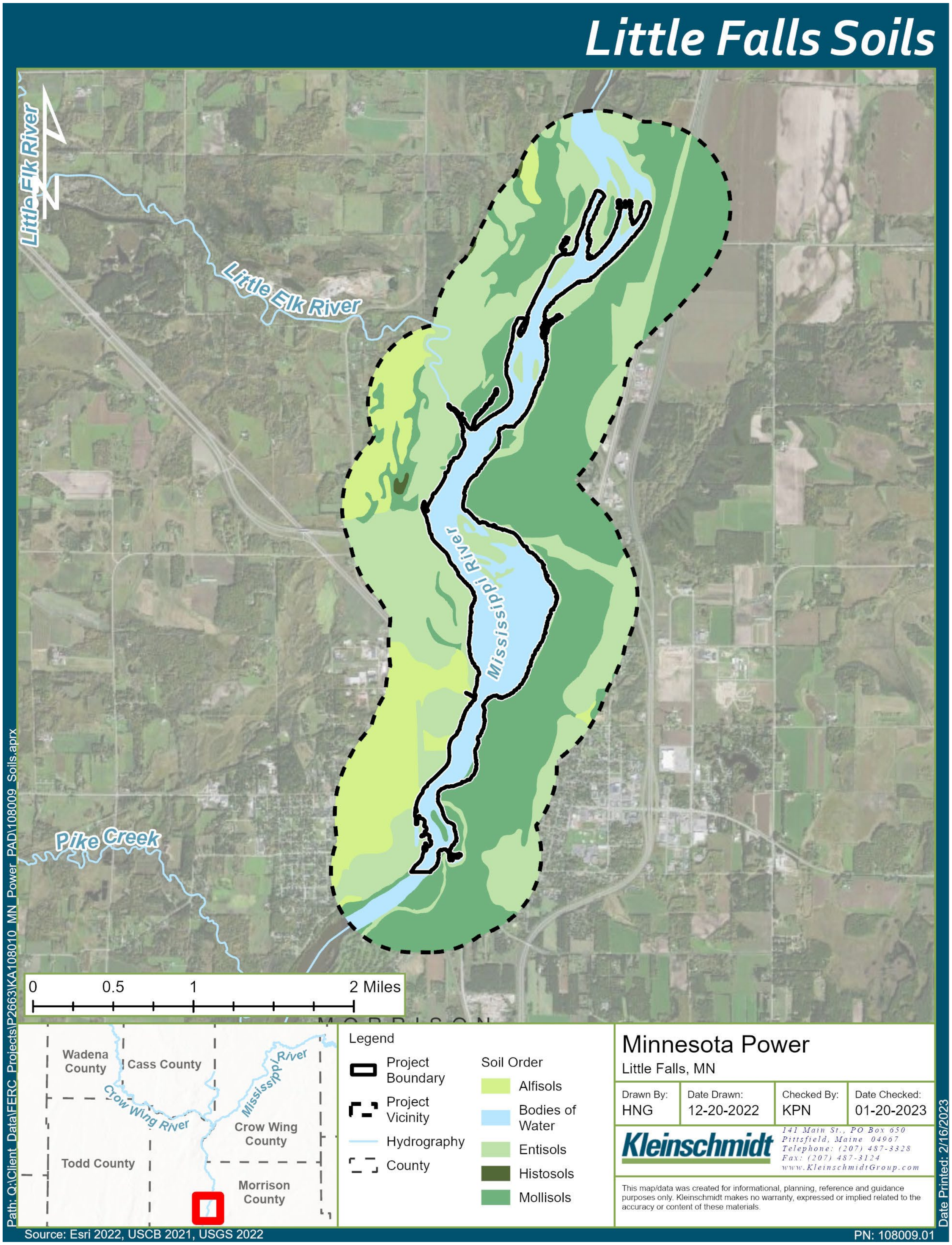
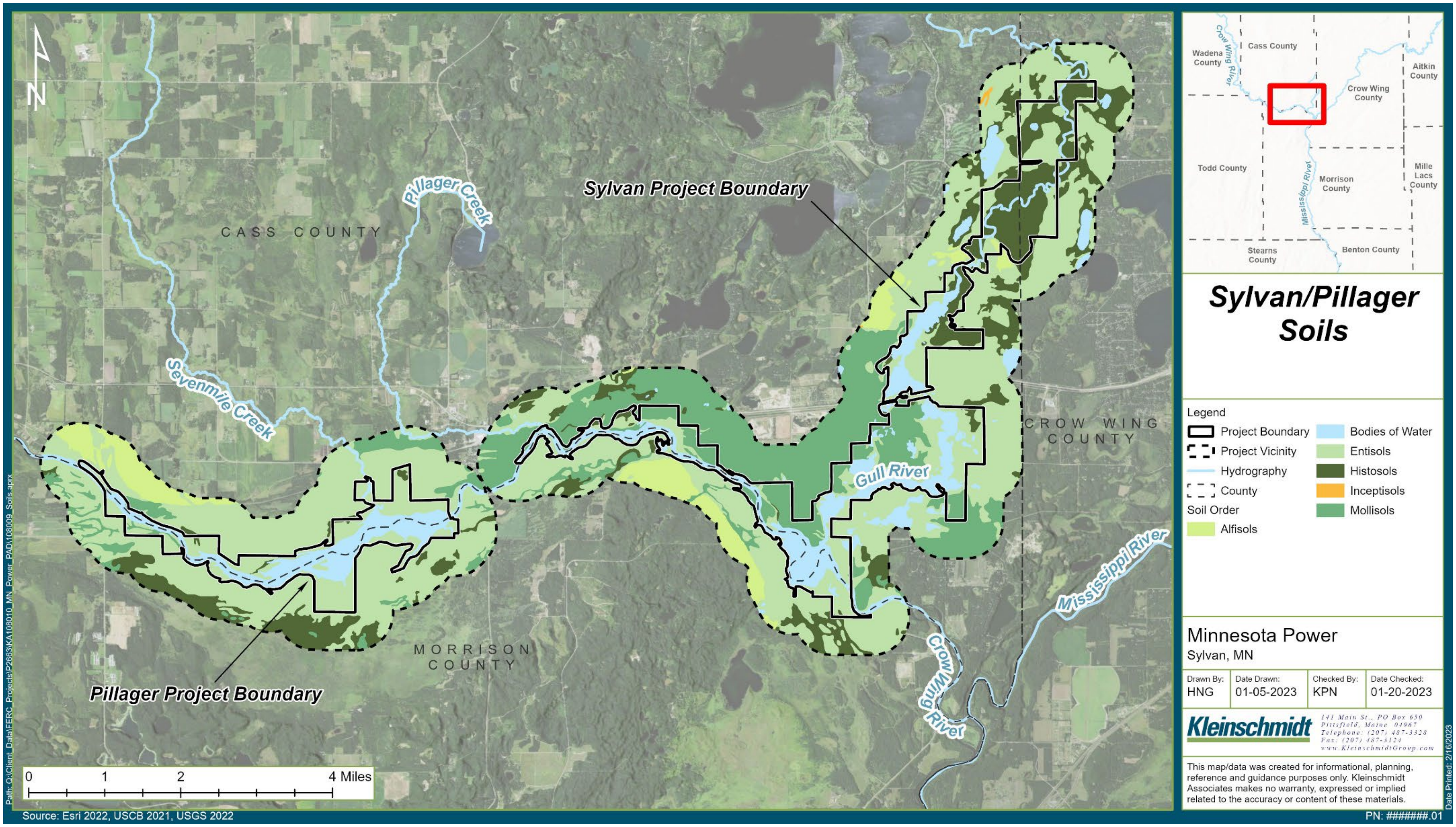


Figure 5-6: Soils at the Sylvan and Pillager Projects



5.1.5 Reservoir Shoreline and Streambanks

The Little Falls, Sylvan, and Pillager reservoir shorelines are relatively flat as depicted in Figure 5-2 and Figure 5-3 above. The shorelines are vegetated with forests, grasslands, and wetlands as described in more detail in Sections 5.4 and 5.5.

The Projects' reservoirs are not subject to annual drawdowns and do not widely fluctuate during the year. However, potential for erosion along the shorelines does occur. The Cultural Resources Management Plans (CRMP) for the Projects identified river currents, wind and ice action, water access, bank grooming, and cattle crazing as the main sources of erosion on the Projects' shorelines (IMA 1996a, 1996b, 1999[36]). As a requirement of the Projects' existing CRMPs, MP is required to submit annual reports that includes general shoreline monitoring. Review of the most recent annual reports (In Situ 2021 and 2022[37]) stated that the annual site monitoring found no visible impacts (i.e., active erosion) from the operation and maintenance of the Projects (In Situ 2022a, 2021a, 2022b, 2021b, 2022c, and 2021c). There is no current evidence of active erosion, slumping, or slope instability along the Projects' shorelines.

5.1.6 References

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Institute for Minnesota Archaeology (IMA) Consulting. 1996b. Cultural Resource Management Plan for the Sylvan Hydroelectric Project on the Crow Wing River in Cass, Crow Wing, and Morrison County, Minnesota.

Institute for Minnesota Archaeology (IMA). 1999. Cultural Resources Management Plan for the Pillager Hydroelectric Project on the Crow Wing River in Cass and Morrison Counties, Minnesota.

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[36] Cattle grazing was not identified as a source of erosion at the Pillager Project.

[37] The 2021 and 2022 Little Falls Project Annual Reports were filed under Accession Numbers 20211004-5226 and 20221012-5010. The 2021 and 2022 Sylvan Project Annual Reports were filed under Accession Numbers 20211004-5226 and 20221011-5377. The 2021 and 2022 Pillager Project Annual Reports were filed under Accession Numbers 20210121-5024 and 20220124-5087.

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5.2 Water Resources

18 CFR 5.6(d)(3)(iii) requires "A description of the water resources of the proposed project and surrounding area. This must address the quantity and quality (chemical/physical parameters) of all waters affected by the project, including but not limited to the project reservoir(s) and tributaries thereto, bypassed reach, and tailrace. Components of the description must include: A) Drainage area; (B) The monthly minimum, mean, and maximum recorded flows in cubic feet per second of the stream or other body of water at the powerplant intake or point of diversion, specifying any adjustments made for evaporation, leakage, minimum flow releases, or other reductions in available flow; (C) A monthly flow duration curve indicating the period of record and the location of gauging station(s), including identification number(s), used in deriving the curve; and a specification of the critical streamflow used to determine the project's dependable capacity; (D) Existing and proposed uses of project waters for irrigation, domestic water supply, industrial and other purposes, including any upstream or downstream requirements or constraints to accommodate those purposes; (E) Existing instream flow uses of streams in the project area that would be affected by project construction and operation; information on existing water rights and water rights applications potentially affecting or affected by the project; (F) Any federally-approved water quality standards applicable to project waters; (G) Seasonal variation of existing water quality data for any stream, lake, or reservoir that would be affected by the proposed project, including information on: (1) Water temperature and dissolved oxygen, including seasonal vertical profiles in the reservoir; (2) Other physical and chemical parameters to include, as appropriate for the project; total dissolved gas, pH, total hardness, specific conductance, chlorophyll-a, suspended sediment concentrations, total nitrogen (mg/L as N), total phosphorus (mg/L as P), and fecal coliform (E. Coli) concentrations; (H) The following data with respect to any existing or proposed lake or reservoir associated with the proposed project; surface area, volume, maximum depth, mean depth, flushing rate, shoreline length, substrate composition; and (I) Gradient for downstream reaches directly affected by the proposed project."

5.2.1 Overview

The Little Falls Project is located approximately 350 RMs downstream of the origin of the Mississippi River at Lake Itasca in Itasca State Park, Park Rapids, MN. The Mississippi River upstream of the Little Falls Project has a riverine character, while the river becomes more lake-like and straighter downstream of the Little Falls Project (MPLC 1991a). The Little Falls Project influences river flow upstream approximately 4 RMs to the Belle Prairie Rapids and in the Little Elk River, which joins the Little Falls Project reservoir approximately 2.5 RMs upstream of the Little Falls dam. The width of the Mississippi River near Brainerd, MN, is approximately 150 yards; the average width of the river upstream of the Little Falls Project is approximately 350 yards. The width of the Mississippi River downstream of the Little Falls Project increases from approximately 250 yards near the Little Falls Project to 400 yards near Royalton, MN (MPLC 1991a).

The Sylvan dam is approximately 4 RMs upstream from confluence with the Mississippi River; the Pillager dam is approximately 7 RMs upstream from the Sylvan Project dam. The 35-mile Gull River is a tributary of the Crow Wing River and enters the Sylvan Project reservoir approximately 2,100 feet upstream of the Sylvan dam. The Sylvan dam influences flow to approximately 8 RMs upstream in the Gull River (MP 2013). The Gull Lake dam is approximately 10 RMs upstream of the confluence with the Sylvan reservoir.

5.2.2 Drainage Area

The drainage areas at the Projects are listed in Section 4.2.

5.2.3 Streamflow, Gage Data, and Flow Statistics

Little Falls Project

Daily average flow data at the Little Falls Project was prorated from USGS Gage #05267000 Mississippi River near Royalton, MN, which is approximately 12 RMs downstream of the Little Falls Project with a drainage area of 11,600 square miles (USGS 2022a). The prorate factor was determined from the ratio of the drainage area at Little Falls dam to the drainage area at USGS Gage #05267000 (=11,145 square miles/11,600 square miles = 0.961). The ROR Blanchard Hydroelectric Project (FERC No. 346) is approximately 8.5 RMs downstream of the Little Falls Project dam and is between the Little Falls Project and the USGS gage. The annual average, minimum, and maximum flows at the Little Falls Project were 5,899 cfs, 503 cfs, and 36,710 cfs, respectively (Table 5-4). The monthly average flow ranged from 3,387 cfs in February to 10,789 cfs in April. The highest flows are typically observed in the spring (March to June). The minimum daily average flow (503 cfs) was observed August 14, 2021, and the maximum daily average flow (36,710 cfs) occurred on April 8, 1997. Annual and monthly flow duration curves are provided in Appendix B. Flows above the minimum (95 cfs)[38] and maximum (3,780 cfs) hydraulic capacity of the Little Falls Project occur approximately 100 percent and 63 percent of the time, respectively.

[38] Minimum hydraulic capacity is based on operation of one unit only.

Table 5-4: Annual and monthly average, minimum, and maximum (cfs) Mississippi River flow at the Little Falls Project, January 1, 1992 to November 30, 2022

Month	Average (cfs)	Minimum (cfs)	Maximum (cfs)
January	3,597	1,297	7,621
February	3,387	999	12,493
March	5,165	1,288	23,929
April	10,789	2,451	36,710
May	10,110	2,700	25,947
June	7,938	1,461	24,121
July	6,847	752	20,854
August	4,202	503	11,340
September	3,743	763	12,397
October	5,140	1,009	18,067
November	5,381	1,057	15,568
December	4,179	940	12,781
Annual	**5,899**	**503**	**36,710**

Source: USGS 2022a

Notes: cfs = cubic feet per second

Sylvan Project

Daily average Crow Wing River flow at the Sylvan Project was obtained from USGS Gage No. 05247500 Crow Wing River near Pillager, MN, for the period January 1, 1992 to November 30, 2022; the gage is located directly downstream of the Sylvan Project dam with a drainage area of 3,760 square miles (USGS 2022b). The annual average, minimum, and maximum flows were 1,813 cfs, 167 cfs, and 16,900 cfs, respectively (Table 5-5).[39] The monthly average flow ranged from 909 cfs in February to 3,715 cfs in April. The highest flows are typically observed in March to June. The minimum daily average flow (167 cfs) was observed August 18, 2021, and the maximum daily average flow (16,900 cfs) occurred on April 12, 2001. Annual and monthly flow duration curves are provided in Appendix B. Flows above the minimum (85 cfs)[40] and maximum (1,410 cfs) hydraulic capacity of the Sylvan Project occur approximately 100 percent and 45 percent of the time, respectively.

[39] Annual peak streamflow data from USGS Gage No. 05247000 Gull River at Gull Lake Dam near Brainerd, MN, is available from 1982 to 1994; the gage is no longer active (USGS 2023). The annual peak streamflow ranged from 150 cfs to 672 cfs. This range provides an estimate of the minimum and maximum amount of inflow at the Sylvan Project provided by the Gull River.

[40] Minimum hydraulic capacity is based on operation of one unit only.

Table 5-5: Annual and monthly average, minimum, and maximum (cfs) Crow Wing River flow at the Sylvan Project, January 1, 1992 to November 30, 2022

Month	Average (cfs)	Minimum (cfs)	Maximum (cfs)
January	945	410	2,150
February	909	399	3,940
March	1,778	445	13,200
April	3,751	971	16,900
May	3,125	743	9,760
June	2,523	483	10,300
July	1,872	307	6,960
August	1,311	167	4,090
September	1,253	233	4,280
October	1,581	358	6,770
November	1,499	191	4,420
December	1,166	300	4,080
Annual	**1,813**	**167**	**16,900**

Source: USGS 2022b

Notes: cfs = cubic feet per second

Pillager Project

Daily average Crow Wing River flow at the Pillager Project was obtained from USGS Gage No. 05247500 Crow Wing River near Pillager, MN, for the period January 1, 1992 to November 30, 2022 (USGS 2022a). The gage is approximately 7 RMs downstream of the Pillager Project and directly downstream of the Sylvan Project dam. The flow data were prorated to the Pillager Project dam based on the ratio of the drainage area at the Pillager dam to the drainage area at USGS Gage #05247500 (3,230 square miles/3,760 square miles = 0.859). The annual average, minimum, and maximum flows were 1,557 cfs, 143 cfs, and 14,517 cfs, respectively (Table 5-6). The monthly average flow ranged from 781 cfs in February to 3,222 cfs in April. Annual and monthly flow duration curves are provided in Appendix B. Flows above the minimum (250 cfs)[41] and maximum (1,240 cfs) hydraulic capacity of the Pillager Project occur approximately 99 percent and 44 percent of the time, respectively.

[41] Minimum hydraulic capacity is based on operation of one unit only.

Table 5-6: Annual and monthly average, minimum, and maximum (cfs) Crow Wing River flow at the Pillager Project, January 1, 1992, to November 30, 2022

Month	Average (cfs)	Minimum (cfs)	Maximum (cfs)
January	812	352	1,847
February	781	343	3,384
March	1,527	382	11,339
April	3,222	834	14,517
May	2,684	638	8,384
June	2,167	415	8,848
July	1,608	264	5,979
August	1,126	143	3,513
September	1,076	200	3,677
October	1,358	308	5,815
November	1,288	164	3,797
December	1,002	258	3,505
Annual	**1,557**	**143**	**14,517**

Source: USGS 2022b

Notes: cfs = cubic feet per second

5.2.4 Existing and Proposed Uses of Waters

Use of the Mississippi River at the Little Falls Project and the Crow Wing River at the Sylvan and Pillager Projects is for hydroelectric power generation. Uses of the Mississippi River in the Little Falls Project Vicinity and surrounding area include recreation, wastewater assimilation, irrigation, industry, and aquatic habitat. Uses of the Gull River and Crow Wing River in the Sylvan Project and the Pillager Project Vicinities and surrounding areas include recreation, wastewater assimilation, irrigation, and aquatic habitat. Several active permitted wastewater discharges occur in the surrounding area of the Little Falls, Sylvan, and Pillager Projects (Table 5-7). MP is not proposing any new uses of water at the Projects.

Table 5-7: Active Wastewater Discharges in Projects Vicinities and Surrounding Areas

Facility	Location	Permit Number	Type	Discharge Site
Camp Ripley Military Reservation Wastewater Treatment Plant (WWTP)	Little Falls, MN	MN0025721	Municipal wastewater	Mississippi River, approximately 8 RMs upstream of the Little Falls Dam
Anderson Custom Processing	Little Falls, MN	MNG255005	Industrial	Mississippi River, approximately 2,000 feet downstream of the Little Falls Project dam
Little Falls WWTP	Little Falls, MN	MN0020761	Municipal wastewater	Mississippi River, 0.5 RM downstream of the Little Falls Project dam
East Gull Lake WWTP	Sylvan Township, MN	MN0059871	Municipal wastewater	North Plant-Gull River, approximately 6 RMs upstream of the confluence with the Sylvan reservoir
		MN0059871	Municipal wastewater	South Plan-Gull River, approximately 14 RMs upstream of the confluence with the Sylvan reservoir
Pillager WWTP	Pillager, MN	MNG585209	Municipal wastewater	Crow Wing River, approximately 600 ft downstream Pillager Project dam
Motley WWTP	Motley, MN	MN0024244	Municipal wastewater	Crow Wing River approximately 9 RMs upstream of Pillager Project dam

Sources: NRRI-UMD 2022; Minnesota PCA 2015, 2020

5.2.5 Existing Instream Flow Uses

The Projects are operated in ROR mode where outflow from the powerhouse is approximately equal to inflow. ROR operations minimize water level fluctuations in the reservoirs; protect water quality, aquatic resources, and visual resources; and provide natural river flows downstream.

There is a minimum flow requirement for the Little Falls Project if the reservoir needs to be drawn down to replace flashboards during the spring walleye spawning season. In that event, a minimum flow of 350 cfs must be provided to the east channel (STID 2022). There are no other minimum flow requirements at the Projects.

5.2.6 Federally Approved Water Quality Standards

Water quality standards for the state of Minnesota are provided in Minnesota Rules chapter 7050 (Minnesota Legislature 2021a). Surface waters are classified into seven beneficial use classes: Class 1 domestic consumption, Class 2 aquatic life and recreation, Class 3 industrial consumption, Class 4 agricultural and wildlife, Class 5 aesthetics and navigation, Class 6 other uses, and Class 7 limited resource value water (Minnesota PCA 2022c). All surface waters are protected for Class 2 aquatic life and recreation unless that water body has been re-classified as a Class 7. All surface waters are also protected for at least one subclass within use Classes 3, 4, 5, or 6 (Table 5-8) (Minnesota PCA 2022c).

The Mississippi River from the southerly border of Morrison County to Sauk River, including the Little Falls Project, is classified as 1C, 2Bdg, 3, 4A, 4B, 5, 6 (Minnesota PCA 2017). The Crow Wing River from Long Prairie River to the Mississippi River, including the Sylvan Project and Pillager Project, is classified as 2Bg, 3C, 4A, 4B, 5, 6 (Minnesota PCA 2020b). The Gull River, from Gull Lake to the confluence with the Crow Wing River, is classified as 2Bg, 3C, 4A, 4B, 5, 6 (Minnesota PCA 2020b).

The state of Minnesota separated the state into three different river nutrient regions based on U.S. Environmental Protection Agency (EPA) level III ecoregions (Minnesota PCA 2019). The three regions (i.e., north, central, and south) each have their own nutrient standards. The Little Falls Project is in the central nutrient region. The Sylvan Project and Pillager Project are in the north nutrient region.

The reach of the Mississippi River containing the Little Falls Project, the reach of the Crow Wing River containing the Sylvan Project and Pillager Project, and the North Basin of the Sylvan reservoir are listed as impaired for the use of aquatic consumption because of mercury in fish tissue (Minnesota PCA 2022d). A statewide mercury Total Maximum Daily Load (TMDL) was approved by EPA in 2007 and most recently updated in 2022 (Minnesota PCA 2022e).

Table 5-8: Surface water use classifications and water quality standards for the Mississippi River at the Little Falls Project, the Crow Wing River at the Sylvan Project and Pillager Project, and the Gull River

Project and Beneficial Use Classification	Beneficial Use Subclass Description	Applicable Numeric Water Quality Standards
Mississippi River at Little Falls Project: 1C, 2Bdg, 3, 4A, 4B, 5, 6	1C: domestic consumption (requires heavy treatment) 2Bdg: aquatic life and recreation also protected as a source of drinking water – general warm water habitat 3: industrial consumption 4A: agriculture and wildlife (irrigation) 4B: agriculture and wildlife (livestock and wildlife) 5: aesthetics and navigation 6: other uses	For 1C: Color 15 PCU For 1C: Nitrate 10 mg/L pH: 6.5-8.5 for 1C classification pH: 6.0 to 9.0 for 4B and 5 classifications DO: daily minimum 5 mg/L Temperature: must not exceed 5°F above natural in streams and 3°F above natural in lakes, based on monthly average of maximum daily temperature, except in no case shall it exceed the daily average temperature of 86°F. Eutrophication standards for Class 2Bd rivers and streams: Central River Nutrient Region Total Phosphorus (µg/L) – less than or equal to 100 (0.1 mg/L) Chlorophyll-a (µg/L) – less than or equal to 18
Crow Wing River at Sylvan Project and Pillager Project, and the Gull River (Gull Lake to Crow Wing River): 2Bg, 3C, 4A, 4B, 5, 6	2Bg: aquatic life and recreation – general warm water habitat 3C: industrial consumption (heavy treatment) 4A: agriculture and wildlife (irrigation) 4B: agriculture and wildlife (livestock and wildlife) 5: aesthetics and navigation 6: other uses	pH: 6.5-9.0 for 2B classification pH: 6.0 to 9.0 for 4B and 5 classifications DO: daily minimum 5 mg/L Temperature - Class 2B standard: must not exceed 5°F above natural in streams and 3°F above natural in lakes, based on monthly average of maximum daily temperature, except in no case shall it exceed the daily average temperature of 86°F Eutrophication standards for Class 2B rivers and streams: Crow Wing River from confluence of Long Prairie River to mouth at the Mississippi River Total phosphorus (µg/L) – less than or equal to 75 Chlorophyll-a (µg/L) – less than or equal to 13

Sources: Minnesota Legislature 2021a, b

PCU = Platinum Cobalt Units; mg/L = milligram per liter; µg/L = microgram per liter

°F = degrees Fahrenheit = (°C*1.8) + 32

5.2.7 Water Quality Data

Little Falls Project

1989-1990 Water Quality Data

The Licensee performed water quality monitoring during the previous relicensing from June to August 1989 and March to July 1990 (MPLC 1991a). DO and water temperature were measured at two sites upstream of the dam and at three sites downstream; two of the three downstream sites were in the powerhouse discharge. The data are presented in Table 5-9. At all sites the DO concentration was above 5 mg/L. DO and water temperature were similar at the upstream and downstream sites on each sampling day.

Minnesota PCA Water Quality Data

The Minnesota Pollution Control Agency (Minnesota PCA) collects and compiles water quality data for multiple parameters throughout the Mississippi River including sites in, upstream, and downstream of the Little Falls Project Vicinity (Minnesota PCA 2022f). Results for DO, water temperature, pH, chlorophyll-a (chl-a), inorganic nitrogen (nitrate and nitrite as N) (NO2NO3), total phosphorus (Total P), Total Kjeldahl Nitrogen (TKN), specific conductivity, and turbidity collected upstream and downstream of the Little Falls Project and from the Little Elk River are shown in Table 5-9, Table 5-10, Table 5-11, Table 5-12, Table 5-13, Table 5-14, and Table 5-15. The monitoring sites are shown in Figure 5-7.

Site S000-151 is approximately 7.8 RMs upstream of the Little Falls Project on the Mississippi River near Camp Ripley. Water quality data collected between 2010 and 2018 is shown in Table 5-10. The DO concentration was above the 5 mg/L daily minimum and ranged from 6.6 mg/L to 11.3 mg/L. pH was within the range of the 6.5 to 8.5 standard. Chlorophyll-a and total phosphorus were below the nutrient standards for the central nutrient region. Maximum water temperatures between 25°C and 26°C (77°F to 78.8°F) were observed in July.

Site S002-641 is approximately 2.1 RM upstream of the Little Falls dam and within the upper reach of the Project Boundary. Site S002-642 is approximately 2,200 feet downstream of the Little Falls dam at the railroad bridge and at the lower end of the Project Boundary. Data collected at these sites in 1992 to 1996 are presented in Table 5-11 and Table 5-12. DO, pH, and total phosphorus were in attainment with standards at both sites with the exception of total phosphorus collected on Sept 27, 1995, at S002-642. Results for all parameters were similar at the two sites.

Site S007-331 is approximately 1.3 RM downstream of the Little Falls dam; data collected at this site from 2013 to 2018 are shown in Table 5-13. The DO concentration was well above the daily minimum and ranged from 7.5 mg/L to 9.8 mg/L, and the DO percent saturation ranged from 87.2

percent to 99 percent. pH was in attainment with the standard and ranged from 7.5 to 8.6. Chlorophyll-a and total phosphorus were below the applicable standards.

Site S002-643 is approximately 2.4 RM downstream of the Little Falls dam; data from 2011 and 2012 are included in Table 5-14. The DO concentration was above the 5 mg/L standard. Several pH measurements were above the upper limit of the pH standard (8.5) for the 1C use classification but were below the 9.5 standard upper limit for the 4B and 5 use classifications.

The Little Elk River enters the Little Falls Project reservoir approximately 2.5 RM upstream of the dam and within the Project Boundary. Data collected in the Little Elk River from 2011-2017 approximately 1.7 RM upstream of the confluence with the Mississippi River are in Table 5-15. The DO concentration and chlorophyll-a were in attainment with the standards. A few pH measurements were above the upper limit of the pH standard (8.5) for the 1C use classification but were below the 9.5 standard upper limit for the 4B and 5 use classifications. Several total phosphorus measurements were slightly above the 100 µg/L (0.1 mg/L) standard.

Figure 5-7: Water Quality Monitoring Sites near Little Falls Project

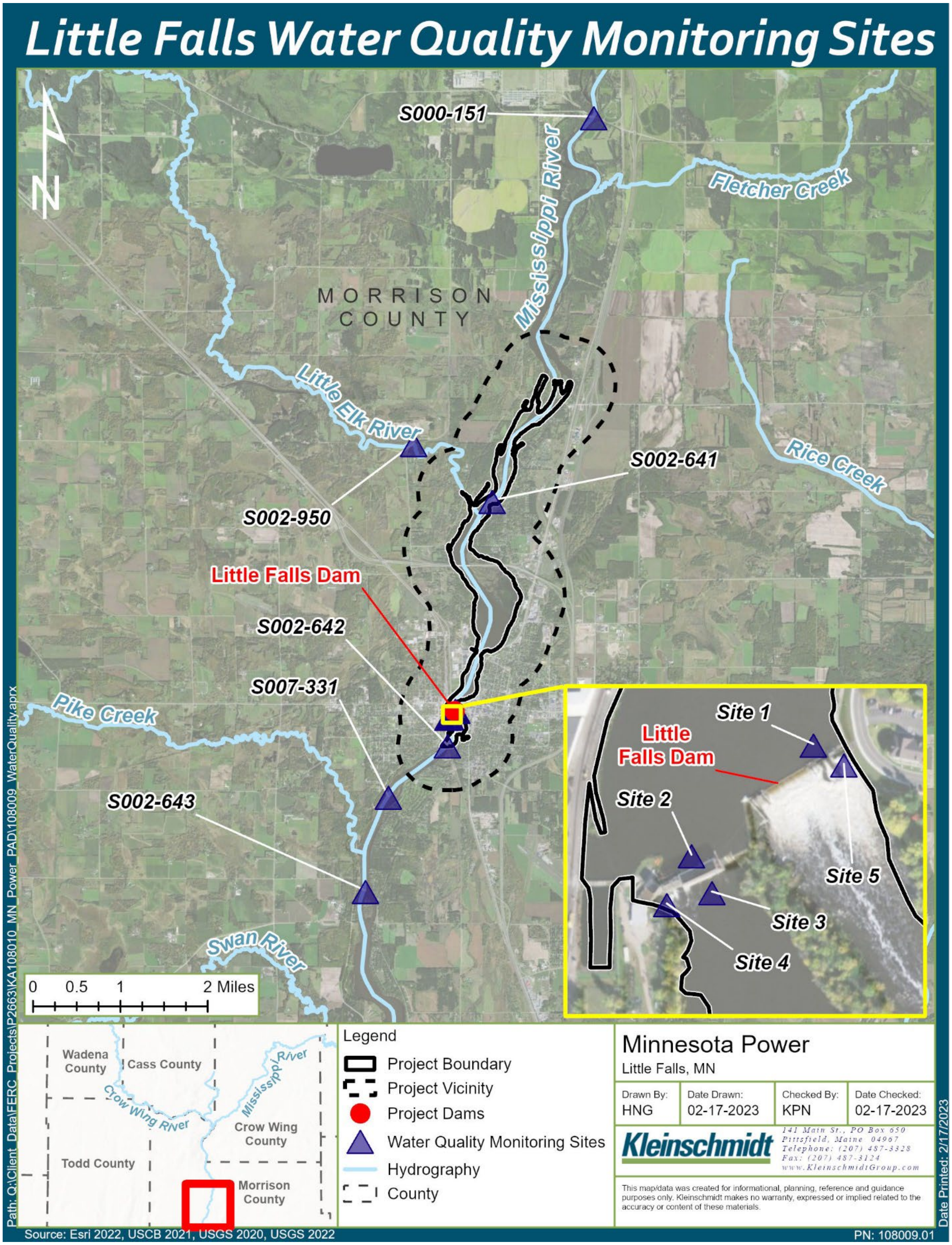

Table 5-9: Water Temperature (°C) and DO Concentration (mg/L) Data Collected Upstream and Downstream of the Little Falls Dam in 1989 and 1990

Depth (m)	June 11, 1989		July 16, 1989		August 8, 1989		March 22, 1990		April 27, 1990		May 27, 1990		June 18, 1990		July 17, 1990	
	Temp	DO	Temp	DO	Temp	DO	Temp	DO	Temp	DO	Temp	DO	Temp	DO	Temp	DO
Site 1 Upstream Dam																
0	18.4	8.5	24.4	6.3	23.4	8.5	NA	NA	14.8	7.1	14.5	5.9	NA	NA	NA	NA
1	18.4	8.5	24.3	6.4	23.0	8.5			14.8	7.1	14.5	6.0				
2	18.4	8.5	24.2	6.3	23.0	8.5			14.8	7.1	14.5	6.0				
3	18.4	8.5	24.2	6.4	22.9	8.4			14.8	7.1	14.5	6.0				
4	18.4	8.4	24.2	6.1	22.8	8.4			14.8	7.1						
5	18.5	8.6			22.8	8.4			14.8	7.1						
6	18.5	8.6			22.7	8.4										
Site 2 Upstream Powerhouse																
0	18.4	9.1	24.6	6.6	23.1	8.6	0.1	12.9	14.7	7.4	14.4	6.0	NA	NA	NA	NA
1	18.4	9.0	24.3	6.5	23.2	8.7	0	13.9	14.8	7.1	14.4	6.0				
2	18.4	8.8	24.2	6.4	23.0	8.8	0	13.3	14.8	7.1	14.4	6.0				
3			24.2	6.3	22.8	8.8	0	13.5	14.8	7.1	14.4	6.0				
4			24.2	6.3	22.8	8.8			14.8	7.1	14.4	6.0				
5			24.2	6.4	22.8	8.7			14.8		14.4	6.0				
6					22.8	8.7			14.8		14.4	6.0				
7					22.8	8.6			14.8		14.4	6.0				
Site 3 Powerhouse Discharge																
0	18.5	9.2	24.6	6.6	22.7	8.4	0.1	12.9	14.7	7.2	14.5	6.1	21.7	6.5	24.7	6.2
1	18.5	9.4	24.6	6.6	22.9	8.3			14.7	7.2	14.5	6.1			24.7	6.2
2	18.5	9.2	24.6	6.7	22.9	8.6										
3	18.5	9.4	24.6	6.7	22.9	8.7										
4	18.5	9.2														
5	18.5	9.2														

Depth (m)	June 11, 1989		July 16, 1989		August 8, 1989		March 22, 1990		April 27, 1990		May 27, 1990		June 18, 1990		July 17, 1990	
	Temp	DO	Temp	DO	Temp	DO	Temp	DO	Temp	DO	Temp	DO	Temp	DO	Temp	DO
Site 4 Powerhouse Discharge																
0	18.6	9.5	24.5	6.9	22.8	8.6	0.1	3.2	14.7	7.1	14.4	6.1	21.7	6.5	24.7	6.1
1	18.6	9.2	24.5	6.8	22.8				14.7	7.1	14.4	6.1			24.7	6.1
2	18.6	9.2	24.5	6.8	22.8											
3	18.6	9.3	24.5	6.8												
4	18.6	9.3	24.5	6.8												
5	18.6	9.2														
Site 5 Downstream Dam																
0	18.9	8.4	24.6	7.8	24.4	9.7	NA	NA	14.8	7.9	14.6	7.0	NA	NA	NA	NA
1	18.8	8.7	24.4	7.6	22.4	7			14.9	7.8	14.6	7.0				

Source: MPLC 1991a

Notes: temp = temperature; DO = dissolved oxygen; ºC = degrees Celsius; m = meter; mg/L = milligrams per liter

Table 5-10: Water Quality Data from Site S000-151 on the Mississippi River Upstream of the Little Falls Project

Date	DO (mg/L)	DO (percent saturation)	Water Temperature (ºC)	pH	Specific Conductance (µS/cm)	Chl-a (µg/L)	NO2NO3 (mg/L)	TKN (mg/L)	Turbidity (NTU)	Total P (mg/L)
2/10/2010	6.6		0.0	8.7	361		0.15		15.4	0.03
3/25/2010	10.2		3.9	8.8	256		0.13		8.1	0.06
4/13/2010	11.3		12.8	8.6	314		0.6		8.1	0.04
5/4/2010	10.3		12.8	8.7	329		0.39	0.6	7.2	0.03
6/2/2010	7.9		14.7	8.1	313	5.5	0.44	0.7	8.3	0.05
7/8/2010	9.0		25.9	8.4	290	3.3	0.18	1.3	6.9	0.05
8/30/2010	7.8		23.5	8.3	326	3.4	0.16	1.0	22.3	0.05
9/13/2010	8.9		16.7	8.3	333	2.6	0.23	0.8	8.2	0.05
5/21/2013	9.1		14.2	7.6	226		0.16	0.9		
6/3/2013	8.9		16.8	7.7	234	4.4	0.1	0.9		
6/10/2013	9.2		16.4	7.8	247	2.1	0.11	0.8		
6/26/2013	7.1		23.4	7.6	239					
7/9/2013	6.9		24.5	7.7	261	2.9	0.99	1.1		
7/16/2013	7.6		25.8	8.0	291	4.6	0.22	0.8		
8/6/2013	8.8		20.9	8.4	304	7.3	0.05	0.7		
8/12/2013	9.6		22.1	8.5	309	4.9	0.05	0.6		
9/11/2013	9.3		21.4	8.3	332	3.1	0.12	0.5		
5/27/2014	8.1	92.1	20.5	8.0	230		0.07	0.8		0.03
6/4/2014	7.4	87.7	21.6	7.5	192	3.0	0.16	1.0		0.05
6/18/2014	8.1		20.1	7.8	235	1.7	0.11	1.1		0.06
7/7/2014	7.3	87.7	22.7	7.7	283	4.4	0.13	0.8		0.06
7/23/2014	7.6		23.8	7.9	312	4.3	0.18	0.8		0.05
8/11/2014	7.9	95.7	22.9	8.2	332	3.2	0.12	0.6		0.03
8/18/2014	7.6	90.7	22.6	8.2	323	2.7	0.13	0.6		0.02
9/2/2014	8.5	98.6	20.7	8.2	304	1.7	0.17	0.8		0.03

Date	DO (mg/L)	DO (percent saturation)	Water Temperature (ºC)	pH	Specific Conductance (µS/cm)	Chl-a (µg/L)	NO2NO3 (mg/L)	TKN (mg/L)	Turbidity (NTU)	Total P (mg/L)
5/8/2018	9.3	92.8	15.4	8.2	236		0.05			0.05
6/6/2018	8.5	92.4	19.6	8.0	246	3.3	0.2			0.06
6/12/2018	7.6	83.6	19.9	7.8	232	3.3	0.16			0.07
6/18/2018	7.5	84.9	21.7	7.9	271					
7/9/2018	7.4	89.9	25.5	7.9	243	2.7	0.14			0.08
7/16/2018	7.0	83.9	24.6	7.6	230	5.2	0.13			0.09
7/23/2018	7.0	81.7	23.2	7.6	237					
8/6/2018	7.8	89.5	22.1	8.0	288	2.7	0.21			0.05
8/13/2018	8.0	9.8	24.6	8.0	289	4.4	0.14			0.04
8/20/2018	8.2	95.9	23.1	8.1	300					
9/18/2018	7.6	82.3	19.3	8.1	288	5.1	0.15			0.05

Source: Minnesota PCA 2022f.

Notes: DO = dissolved oxygen; ºC = degrees Celsius; pH = power of hydrogen; NTU = nephelometric turbidity unit; Chl-a = chlorophyll-a; NO2NO3 = inorganic nitrogen (nitrate and nitrite as N); TKN = Total Kjeldahl Nitrogen; P = phosphorus; µS/cm = microSiemens per centimeter; µg/L = micrograms per liter; mg/L = milligrams per liter

Table 5-11: Water Quality Data from Site S002-641 on the Mississippi River Upstream of the Little Falls Project Dam

Date	DO (mg/L)	DO (percent saturation)	Water Temperature (°C)	pH	Specific Conductance (µS/cm)	NO2NO3 (mg/L)	Turbidity (NTU)	Total P (mg/L)
4/9/1992	11.2	91.4	7.2	7.1	252	0.4	6.1	0.05
5/20/1992	6.6	71.7	20.0	7.7	262	0.5	4.5	0.07
6/20/1992	7.8	80.8	17.5	8.3	308	0.2	2.6	
7/10/1992	7.5	83.3	21.1	8.3	213		6	
8/21/1992	7.6	86.8	22.8	8.3	301	0.1	1.8	0.03
9/23/1992	7.8	75.4	13.6	7.6		0.3	5.1	0.05
4/21/1993	10.6	91.4	9.0	7.5	243	0.3	6.1	0.02
5/20/1993	8.5			7.7	263	0.4	7.6	0.03
8/31/1993	7.5			8.2	320	0.7	4.1	0.02
9/29/1993	7.8			8.6	325	0.2	4.6	0.02
10/27/1993	12.5			8.6	317	0.2	5.4	
4/18/1994	10.6	100.0	13.0	7.8	180	0.3	6.9	0.04
5/17/1994	8.7	85.1	15.0	8.2	220	0.3		0.04
6/29/1994	6.3	70.4	21.0	7.1	222	0.5	5.8	0.02
7/7/1994	6.5	74.7	23.0	7.1	265	0.4	8.3	0.02
7/19/1994	7.9	87.8	21.0	7.3	299	0.3	10	0.03
4/17/1995	10.2	79.7	4.6	7.0	286	0.2	4.2	0.03
5/4/1995	9.7	87.2	10.6	7.8	281	0.3	3	0.02
5/24/1995	9.8	94.2	14.3	7.9	301	0.2	6.2	0.03
7/11/1995	8.4	95.5	22.0	8.1	307	0.05	6.8	0.04
8/22/1995	7.0	82.8	24.0	8.1	332	0.2	3.8	0.05
9/27/1995	9.1	87.3	13.6	8.3	351	0.2	3.5	0.02
10/31/1995	8.2			7.8	232		5.2	0.03
4/29/1996	9.0	75.5	8.4	8.0	210	0.6	11	0.03
5/28/1996	7.9	81.4	17.0	7.9	280	0.3	3.9	0.03

Date	DO (mg/L)	DO (percent saturation)	Water Temperature (ºC)	pH	Specific Conductance (µS/cm)	NO2NO3 (mg/L)	Turbidity (NTU)	Total P (mg/L)
6/6/1996	7.2	74.2	17.0	7.6	338	0.4	6.8	0.02
7/1/1996	6.0	69.0	23.0	7.6	338	0.6	6.8	0.02
7/18/1996	7.6	90.5	25.0	7.7	259	0.5	6	0.01
8/22/1996	7.4	87.1	24.0	8.0	299		7.2	0.04
9/24/1996	8.6	82.7	14.4	8.1	375	0.2	3.1	0.02
10/30/1996	10.9	80.7	3.0	7.8	302	0.4	7	0.03

Source: Minnesota PCA 2022f

Notes: DO = dissolved oxygen; ºC = degrees Celsius; pH = power of hydrogen; NTU = nephelometric turbidity unit; NO2NO3 = inorganic nitrogen (nitrate and nitrite as N); P = phosphorus; µS/cm = microSiemens per centimeter; mg/L = milligrams per liter

Table 5-12: Water Quality Data from Site S002-642 on the Mississippi River Downstream of the Little Falls Project Dam

Date	DO (mg/L)	DO (percent saturation)	Water Temperature (°C)	pH	Specific Conductance (µS/cm)	NO2NO3 (mg/L)	Turbidity (NTU)	Total P (mg/L)
12/16/1991	10.0			7.4	318	0.1	2.3	0.004
1/6/1992	9.7			7.0		0.3	3.6	0.03
4/9/1992	12.7	106.6	8.1	7.3	275	0.5	5.9	0.04
5/21/1992	7.3	78.8	20.0	7.9	266	0.4	5.8	0.09
6/20/1992	7.8	80.2	16.9	7.7	308	0.3	4.1	
7/10/1992	8.7	96.4	20.6	7.5	220		6.7	
8/21/1992	9.7	110.2	22.0	8.5	309	0.2	2.5	0.02
9/23/1992	9.3	89.2	13.7	8.2		0.4	3.9	0.03
4/21/1993	10.7			7.7	252	0.3	5.4	0.02
5/20/1993	8.2	80.8	15.0	7.7	260	0.4	7.3	0.02
7/25/1993	7.2	86.2	25.0	7.8	229	0.6	4.8	0.05
8/31/1993	7.4			8.1	280	0.4	3.9	0.02
9/29/1993	8.2			8.1	343	0.2	4.1	0.08
10/27/1993	9.1			8.6	328	0.3	4	
4/18/1994	10.0	94.3	13.0	7.8	180	0.5	10	0.05
5/17/1994	8.8	86.3	15.0	7.6	235	0.3		0.05
6/29/1994	7.2	82.0	22.0	7.3	248	0.5	7.1	0.02
7/7/1994	7.0	82.4	24.0	7.3	275	0.5	8.9	0.02
7/19/1994	8.1	88.0	20.0	7.6	298	0.4	10	0.04
4/17/1995	9.9	78.9	5.7	7.1	293	0.3	4	0.03
5/4/1995	8.9	78.6	10.5	7.8	275	0.2	3.4	0.02
5/24/1995	9.4	92.2	15.2	7.9	290	0.2	7.6	0.03
8/22/1995	6.0	70.1	24.0	8.1	370	0.5	3.5	
9/27/1995	7.7	72.6	13.4	8.0	405	1.2	5.6	0.13
10/31/1995	8.2			7.6	276	0.5	7.5	0.02

Date	DO (mg/L)	DO (percent saturation)	Water Temperature (ºC)	pH	Specific Conductance (µS/cm)	NO2NO3 (mg/L)	Turbidity (NTU)	Total P (mg/L)
4/29/1996	8.5	71.3	8.3	8.1	221	0.7	6.2	0.04
5/28/1996	6.8			7.8		0.4	3.8	0.03
6/6/1996	6.5	68.4	18.0	7.7	329	0.4	8	0.04
7/1/1996	6.3	72.4	23.0	7.5	359	0.7	6.6	0.03
7/18/1996	7.4	85.1	23.0	7.6	290	0.9	6.8	0.04
8/22/1996	7.1	78.9	21.0	7.7	385	1.2	4.9	0.39

Source: Minnesota PCA 2022f

Notes: DO = dissolved oxygen; ºC = degrees Celsius; pH = power of hydrogen; NTU = nephelometric turbidity unit; NO2NO3 = inorganic nitrogen (nitrate and nitrite as N); P = phosphorus; µS/cm = microSiemens per centimeter; mg/L = milligrams per liter

Table 5-13: Water Quality Data from Site S007-331 on the Mississippi River Downstream of the Little Falls Project

Date	DO (mg/L)	DO (% saturation)	Water Temperature (°C)	pH	Chl-a (µg/L)	NO2NO3 (mg/L)	TKN (mg/L)	Total P (mg/L)
5/21/2013	9.8		14.3	7.6		0.16	0.8	
6/3/2013	9.5		16.3	7.8	5.6	0.12	0.9	
6/11/2013	9.8		16.8	7.8	2.5	0.13	0.8	
6/26/2013	7.9		23.1	7.7				
7/9/2013	7.4		25.1	7.7	4.3	0.2	0.8	
7/17/2013	7.9		25.5	8.1	5.2	0.26	0.9	
7/30/2013	8.0		20.5	8.1				
8/6/2013	9.1		21.8	8.5	4.7	0.06	0.6	
8/12/2013	9.5		22.4	8.6	4.5	0.05	0.6	
8/26/2013	7.7		26.7	8.3				
9/11/2013	8.9		22.0	8.1	3.9	0.11	0.4	
5/27/2014	8.7	98.1	19.5	7.9		0.1	0.9	0.03
6/4/2014	8.2	95.5	21.2	7.8	3.4	0.19	1.0	0.05
6/17/2014	9.0		17.9	7.8	1.7	0.14	1.0	0.06
7/7/2014	7.9	95.1	22.6	7.5	3.7	0.17	1.0	0.06
7/23/2014	7.8		23.5	7.8	4.3	0.17	0.8	0.04
8/11/2014	7.5	89.3	22.0	8.1	3.5	0.16	0.8	0.03
8/18/2014	7.4	87.2	22.0	8.2	2.4	0.16	0.8	0.03
9/2/2014	8.1	93.3	20.4	8.1	1.7	0.21	0.8	0.03
5/8/2018	9.5	95.4	15.7	8.2		0.05		0.04
6/6/2018	8.6	93.6	19.6	8.0	3.1	0.23		0.07
6/12/2018	8.3	91.0	19.6	7.8	2.6	0.17		0.06
6/18/2018	7.9	88.7	21.4	7.9				
7/9/2018	7.8	95.4	25.5	7.9	2.7	0.17		0.08

Date	DO (mg/L)	DO (% saturation)	Water Temperature (°C)	pH	Chl-a (µg/L)	NO2NO3 (mg/L)	TKN (mg/L)	Total P (mg/L)
7/16/2018	7.9	94.1	24.4	7.7	1.5	0.14		0.09
7/23/2018	8.1	94.6	23.2	7.7				
8/6/2018	8.0	91.7	22.4	8.0	3.9	0.2		0.05
8/13/2018	8.2	99.0	25.1	8.3	4.4	0.1		0.04
8/20/2018	8.0	94.3	24.5	8.2				
9/18/2018	8.7	93.4	18.9	8.1	3.2	0.17		0.05

Source: Minnesota PCA 2022f

Notes: DO = dissolved oxygen; °C = degrees Celsius; pH = power of hydrogen; NTU = nephelometric turbidity unit; Chl-a = chlorophyll-a; NO2NO3 = inorganic nitrogen (nitrate and nitrite as N); TKN = Total Kjeldahl Nitrogen; P = phosphorus; µS/cm = microSiemens per centimeter; µg/L = micrograms per liter; mg/L = milligrams per liter

Table 5-14: Water Quality Data from Site S002-643 on the Mississippi River Downstream of the Little Falls Project

Date	DO (mg/L)	Water Temperature (°C)	pH	Specific Conductance (µS/cm)
5/10/2011	7.8	14.1	8.0	383
5/23/2011	6.6	16.5	8.0	287
6/6/2011	8.1	21.2	7.8	372
6/29/2011	8.3	20.8	8.2	318
7/13/2011	7.1	24.6	8.7	296
7/27/2011	7.1	24.7	8.4	319
8/5/2011	8.1	25.0	8.5	357
8/18/2011	7.2	19.8	8.0	353
9/1/2011	8.6	22.7	8.2	355
9/26/2011	10.2	14.4	8.3	372
6/7/2012	8.3	21.2	9.4	224
6/18/2012	7.8	20.1	8.6	311
6/28/2012	7.0	23.9	7.4	301
7/5/2012	6.0	26.3	7.6	224
7/18/2012	4.7	24.6	9.5	223
7/25/2012	6.2	25.9	8.9	231
8/6/2012	7.6	13.9	7.7	264
8/15/2012	8.3	22.5	8.7	279
8/21/2012	10.8	23.2	8.5	286

Source: Minnesota PCA 2022f

Notes: DO = dissolved oxygen; °C = degrees Celsius; pH = power of hydrogen; µS/cm = microSiemens per centimeter; mg/L = milligrams per liter

Table 5-15: Water Quality Data Collected at Site S002-950 in the Little Elk River

Date	DO (mg/L)	DO (% saturation)	Water Temperature (°C)	pH	Specific Conductance (µS/cm)	Chl-a (µg/L)	NO2NO3 (mg/L)	TKN (mg/L)	Total P (mg/L)
5/10/2011	7.7		13.1	8.3	230				
5/23/2011	6.1		15.2	8.4	230				
6/6/2011	6.2		21.1	7.7	296				
6/29/2011	8.1		19.7	8.1	328				
7/13/2011	7.6		20.7	8.6	378				
7/27/2011	6.9		22.0	8.3	381				
8/5/2011	6.5		22.5	8.3	343				
8/18/2011	5.7		19.8	8.0	332				
9/1/2011	8.2		20.5	8.2	383				
9/26/2011	11.3		11.8	8.1	397				
6/7/2012	7.9		21.6	9.4	298				
6/18/2012	8.1		18.9	8.7	303				
6/28/2012	7.1		22.7	7.4	289				
7/5/2012	6.8		26.2	7.8	142				
7/18/2012	5.8		22.3	9.4	366				
7/25/2012	6.8		22.8	8.9	378				
8/6/2012	10.6		23.9	8.1	522				
8/15/2012	10.6		19.4	8.9	397				
8/21/2012	12.7		20.7	8.3	394				
5/10/2016	9.1	87.0	13.4	7.9	292	3.0	0.1	0.9	0.04
5/18/2016	11.8	114.0	14.0	8.2	290	2.2	0.1	0.7	0.03
6/13/2016	8.6	96.4	20.7	7.9	336	2.5	0.3	1.4	0.10
6/23/2016	9.3	105.7	21.7	8.1	359	2.2	0.2	0.9	0.07
6/28/2016	8.8	95.3	19.1		349				
6/29/2016	9.4	102.5	19.7		370				
7/12/2016	5.3	57.0	18.8	7.5	180	4.1	0.4	1.2	0.15

Date	DO (mg/L)	DO (% saturation)	Water Temperature (ºC)	pH	Specific Conductance (µS/cm)	Chl-a (µg/L)	NO2NO3 (mg/L)	TKN (mg/L)	Total P (mg/L)
7/20/2016	4.5	51.6	22.3	7.5	289	1.8	0.1	1.2	0.14
7/27/2016	5.1	58.6	22.1		339				
8/3/2016	6.6	76.5	22.8	7.8	359	1.6	0.3	1.4	0.18
8/9/2016	8.0	93.1	23.1		380				
8/22/2016	7.6	82.2	19.0	8.2	327	1.3	0.2	1.2	0.10
8/29/2016	7.0	76.3	19.2		344				
9/14/2016	9.1	86.7	13.2	8.2	355	1.3	0.3	0.9	0.08
9/28/2016	9.1	84.2	11.8	7.8	341	2.1	0.2	1.0	0.07
6/1/2017	9.5	97.6	16.0	7.9	286	1.7	0.1	0.9	0.06
6/19/2017	9.1	96.2	19.0	8.0	311	3.5	0.3	1.0	0.08
7/13/2017	8.9		19.4	7.5	368	2.9	0.4	1.0	0.08
7/17/2017	6.6		20.0		245	5.8			
8/2/2017	7.1		21.2	8.3	367	0.9	0.2	1.3	0.13
8/21/2017	5.6		18.3	7.6	228	0.7	0.1	1.2	0.07

Source: Minnesota PCA 2022f

Notes: DO = dissolved oxygen; ºC = degrees Celsius; pH = power of hydrogen; NTU = nephelometric turbidity unit; Chl-a = chlorophyll-a; NO2NO3 = inorganic nitrogen (nitrate and nitrite as N); TKN = Total Kjeldahl Nitrogen; P = phosphorus; µS/cm = microSiemens per centimeter; µg/L = micrograms per liter; mg/L = milligrams per liter

Sylvan Project

1989-1990 Water Quality Data

The Licensee completed a water quality monitoring study during the previous relicensing (MPLC 1991b). Water temperature and DO were monitored upstream and downstream of the Sylvan Project dam and powerhouse from June to August 1989 and March-July 1990; the results are shown in Table 5-16. The DO concentration decreased with depth during summer 1989 in the reservoir; DO values less than 5 mg/L were measured at depths of 5 m to 7 m on July 16 and August 10, 1989. DO was above 5 mg/L in all measurements made downstream of the powerhouse and dam.

Table 5-16: Water Temperature (°C) and DO Concentration (mg/L) Data Collected Upstream and Downstream of the Sylvan Dam in 1989 and 1990

Depth (m)	June 11, 1989		July 16, 1989		August 10, 1989		March 22, 1990		April 27, 1990		May 27, 1990		June 28, 1990		July 17, 1990	
	Temp	DO	Temp	DO	Temp	DO	Temp	DO	Temp	DO	Temp	DO	Temp	DO	Temp	DO
Site 1 Upstream Dam																
0	18.9	10.3	25.1	8.3	22.3	12.3			17.0	7.5	15.6	6.7				
1	19.0	10.1	25.2	8.5	22.3	12.3			17.0	7.5	15.7	6.7				
2	18.9	10.1	25.1	6.8	22.1	7.3			17.0	7.4	15.7	6.7				
3	18.3	9.0	24.8	6.1	21.8	6.5			17.0	7.4	15.7	6.7				
4	18.0	8.2	24.6	6.0	21.7	6.2			16.9	7.4	15.7	6.7				
5	17.9	7.4	24.4	4.6	21.7	6.1			16.9	7.4	15.7	6.7				
6	17.7	6.9	23.9	1.7	21.7	5.6			14.1	7.4	15.7	6.7				
7	17.5	6.9	20.8	0.5	20.9	0.5			13.5	7.6	15.7	6.7				
Site 2 Upstream Powerhouse																
0	18.9	9.8	24.9	8.7	22.2	10.3			17.0	7.8	15.6	6.8				
1	18.9	10.3	25.0	8.6	22.2	10.1			17.0	7.6	15.6	6.8				
2	18.7	9.7	24.9	8.6	22.1	7.1			17.1	7.6	15.6	6.8				
3	18.4	9.2	24.8	6.5	21.9	6.7			17.1	7.6	15.6	6.8				
4	17.9	8.0	24.6	5.8	21.8	6.5			17.1	7.5	15.6	6.8				
5	17.7	7.8	24.1	4.5	21.7	5.8			17.0	7.4	15.6	6.8				
6	17.6	7.2	23.4	3.3	20.7	4.8			17.0	7.4						
7	17.5	6.9				0.6			10.9	8.4						
Site 3 Powerhouse Discharge																
0	18.2	9.1	24.7	6.5	22	7.6	0	7.8	16.8	7.5	15.6	6.8	21.0	7.4	23.5	6.2
1	18.2	8.9	24.8	6.6	22	7.7			16.8	7.5	15.6	6.8			23.5	6.2
2	18.3	8.9	24.8	6.5	22	7.8			16.8	7.5						
3	18.3	8.8	24.8	6.5	22	7.6										
4	18.3	8.8														
5	18.3	8.7														

Depth (m)	June 11, 1989		July 16, 1989		August 10, 1989		March 22, 1990		April 27, 1990		May 27, 1990		June 28, 1990		July 17, 1990	
	Temp	**DO**	**Temp**	**DO**	**Temp**	**DO**	**Temp**	**DO**	**Temp**	**DO**	**Temp**	**DO**	**Temp**	**DO**	**Temp**	**DO**
6	18.3	8.7														
7	18.3	8.6														
Site 4 Downstream Dam																
0	0	18.4	8.0	24.6	8.1	21.7	10.6			16.2	7.5	15.6	6.8			
Site 5 Downstream Dam																
0	0	18.2	8.4	24.6	7.1	21.9	8.2			16.3	7.7	15.5	6.6			
1	1	18.1	7.0	24.6	5.7	21.5	6.1									

Source: MPLC 1991b

Notes: temp = temperature; DO = dissolved oxygen; ºC = degrees Celsius; m = meter; mg/L = milligrams per liter

Minnesota PCA Water Quality Data

The Minnesota PCA has collected water quality data at multiple sites throughout the Crow Wing River and its tributaries (Minnesota PCA 2022f). Results for DO, water temperature, pH, chlorophyll-a (chl-a), inorganic nitrogen (nitrate and nitrite as N) (NO2NO3), total phosphorus (Total P), TKN, specific conductivity, and turbidity collected upstream and downstream of the Sylvan Project and from Pillager Creek are shown in Table 5-17, Table 5-18, Table 5-19, Table 5-20, and Table 5-21. The locations of these sites are shown in Figure 5-8.

Data collected in 2020 and 2021 at Site S016-349 are shown in Table 5-17; this site is approximately 600 feet downstream of the Sylvan powerhouse and within the Project Boundary. The DO concentration ranged from 7.5 mg/L to 12.9 mg/L and was above the standard. pH was within the range of the standard. The maximum water temperature was 24.9°C (76.8°F) in July 2020. Chlorophyll-a and total phosphorus were below the Class 2B nutrient standards for the north nutrient region.

Site S001-926 is just downstream of the Sylvan dam and within the Project Boundary (Figure 5-8); data from 2017 to 2020 are provided in Table 5-18. DO exceeded the 5 mg/L standard and was generally higher in the spring and fall with lower values in the summer when water temperatures were highest. Water temperatures reached 22°C to 25°C (71.6°F to 77.0°F) in the summer. pH ranged from 6.8 to 8.4 and was within the range of the standard. Total phosphorus was below the 75 µg/L (0.075 mg/L) standard.

Site 49-036-01-202 was in the Sylvan Project reservoir approximately 1,400 feet upstream of the dam and within the Project Boundary (Figure 5-8). Chlorophyll-a and total phosphorus were above the standards in August and early September 2008; they were both below the standards in the other samples (Table 5-19).

Site 49-036-02-202 was in the Gull River approximately 0.9 RM upstream of the Sylvan Project dam and within the Project Boundary (Figure 5-8). Chlorophyll-a exceeded the 13 µg/L standard in late August 2008 and early September 2008. Total phosphorus was below the standard (Table 5-19).

Site S001-927 was approximately 0.5 RM upstream of the Sylvan dam near the mouth of the Gull River and within the Project Boundary (Figure 5-8); data collected in spring, summer, and fall 2002 and 2003 are shown in Table 5-20. DO was above the 5 mg/L standard except for one measurement on August 22, 2002. Maximum water temperatures of 27°C to 28°C (80.6°F to 82.4°F) were observed in July and August 2002 and August 2003. Several pH measurements were above the upper limit of the pH standard (8.5) for the 1C use classification but were below the 9.5

standard upper limit for the 4B and 5 use classifications. Total phosphorus was below the standard except for one sample on April 23, 2002.

Pillager Creek joins the Crow Wing River approximately 5 RM upstream of the Sylvan dam within the Sylvan Project Boundary. Site S006-249 was approximately 0.9 RM upstream of the confluence of Pillager Creek with the Crow Wing River (Figure 5-8). Data collected in 2010, 2011, 2020, and 2021 are shown in Table 5-21. In 2010 and 2011, DO was above the 5 mg/L standard; DO was 4.7 mg/L on June 8, 2021. Water temperatures of 27°C to 29°C (80.6°F to 84.2°F) were observed in July 2011 and June 2021. pH was within the range of the standard for Class 1C except for two measurements; all pH data were below the 9.5 standard upper limit for the 4B and 5 use classifications. Chlorophyll-a was above the 13 µg/L standard in one sample on July 12, 2011. Total phosphorus exceeded the 75 ug/L (0.075 mg/L) standard in several samples.

The Minnesota PCA has estimated the Trophic State Index (TSI) of the Sylvan reservoir. The TSI summarizes the nutrient richness of a water body based on trophic state indicators (e.g., chlorophyll-a, total phosphorus, Secchi Disk depth). Based on data collected between June and September 2008 to 2017, the Sylvan reservoir had a trophic state index of 56, which is between mesotrophic (moderately productive) and eutrophic (highly productive) and is slightly above the TSI of lakes in the same ecoregion (Minnesota PCA 2022f).

Figure 5-8: Water Quality Monitoring Sites near the Sylvan and Pillager Projects

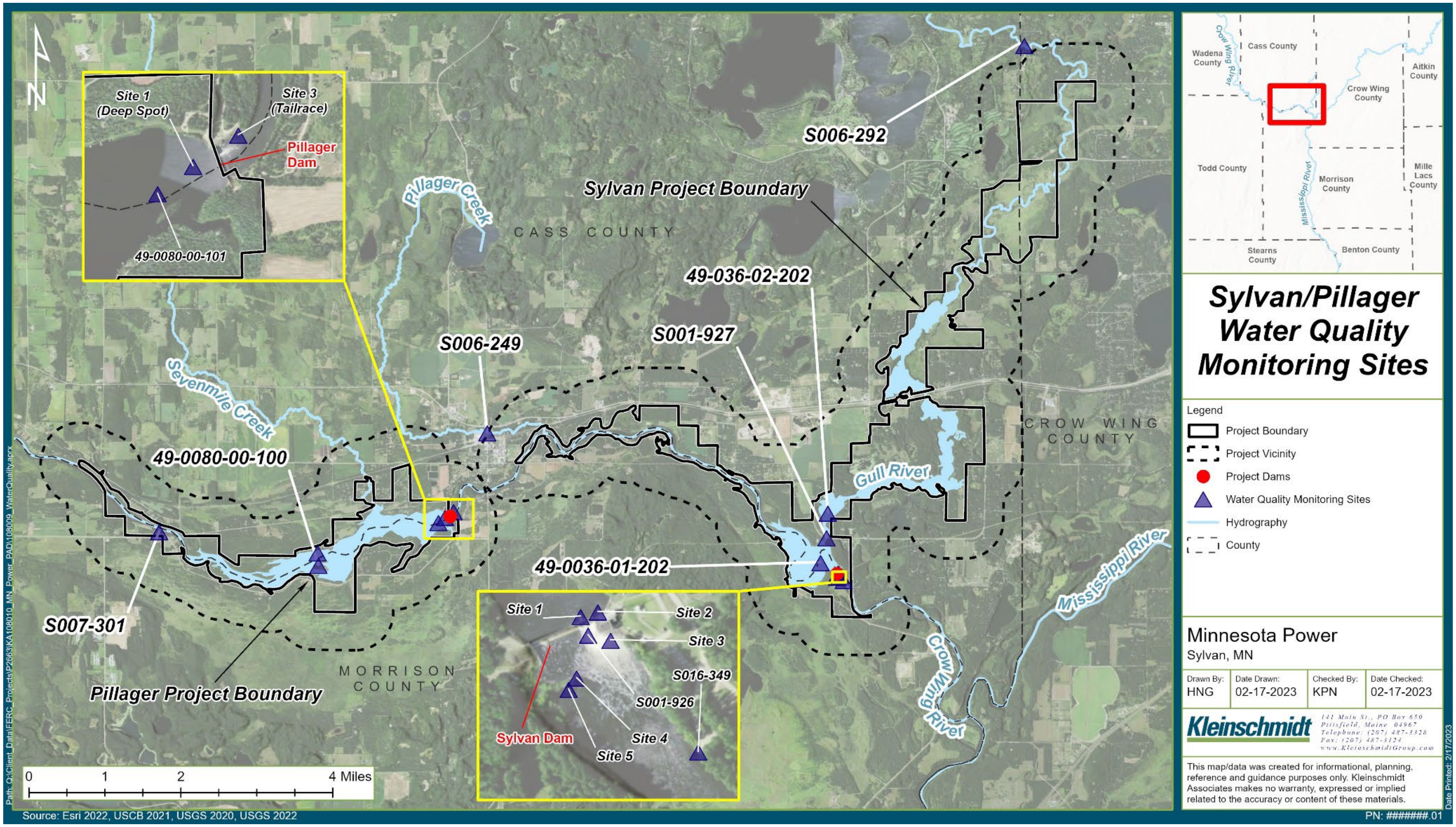

Table 5-17: Water Quality Data from Site S016-349 Downstream of the Sylvan Project Dam

Date	DO (mg/L)	Water Temperature (°C)	pH	Specific Conductance (µS/cm)	Chl-a (µg/L)	Total P (mg/L)
6/8/2020	10.2	23.8	8.4	426		
6/24/2020	8.3	22.8	8.4	388	7.5	0.06
7/6/2020	8.8	28.2	8.4	370	21	0.06
7/31/2020	8.3	24.9	8.1	373	8	0.08
8/7/2020	8.8	22.7	8.3	422	9.6	0.06
8/28/2020	7.5	24.5	8.2	392	6.9	0.08
9/9/2020	9.6	15.9	8.3	430	5.9	0.06
9/21/2020	12.9	16.5	8.6	431	13	0.03
6/3/2021					27	0.06

Source: Minnesota PCA 2022f

Notes: DO = dissolved oxygen; °C = degrees Celsius; pH = power of hydrogen; µS/cm = microSiemens per centimeter; mg/L = milligrams per liter

Table 5-18: Water Quality Data from Site S001-926 Downstream of the Sylvan Project Dam

Date	DO (mg/L)	DO (% Saturation)	Water Temperature (°C)	pH	Specific conductance (µS/cm)	NO2NO3 (mg/L)	TKN (mg/L)	Total P (mg/L)
1/20/2017	8.7		0.0	7.8	426	0.84		
2/23/2017	9.6		0.0	8.1	325	0.56		
3/21/2017	13.0		2.2		254	0.68		
4/6/2017	10.5		7.6	8.1	389	0.32		
4/19/2017	11.0		11.7	8.1	399	0.29		
4/25/2017	10.4		8.8	8.1	344	0.10		
4/27/2017	11.7		7.1	8.2	204			
5/2/2017	12.2		7.7	8.0	364	0.16		
5/8/2017	10.3		16.6	8.4	359	0.10		
5/22/2017	10.5		11.3	8.2	402			
6/13/2017	7.1		22.3	8.2	417	0.12		
7/10/2017	8.7		22.6	8.1	476	0.09		
7/13/2017	6.6		23.9	8.3	423			
8/22/2017	8.2		20.1	7.6	331	0.10		
10/16/2017	10.9		9.3	8.0	391.5			
10/26/2017	10.5		8.4	7.8	414	0.31		
11/14/2017	13.5		0.5	7.7	480	0.70		
1/23/2018	7.4		0.1	7.5	462	1.3		
2/28/2018	7.0		0.1	7.5	467			
4/2/2018	10.1		0.0	7.3	388	0.76		

Date	DO (mg/L)	DO (% Saturation)	Water Temperature (ºC)	pH	Specific conductance (µS/cm)	NO2NO3 (mg/L)	TKN (mg/L)	Total P (mg/L)
4/23/2018	11.7		3.0	7.6	199	0.25		
4/26/2018	10.9		6.8	7.6	229	0.17		
5/10/2018	9.7		14.6	8.2	377	0.21		
5/31/2018	7.1		23.3	8.1	412	0.31		
6/18/2018	7.5		22.3	8.0	366	0.19		
7/23/2018	7.7		23.3	7.9	385	0.15		
8/14/2018	8.4		25.2	8.4	421	0.05		
9/5/2018	8.7		21.2	8.1	410	0.34		
9/24/2018	9.3		15.2	7.9	430	0.40		
10/8/2018	10.5		8.5	8.2	415	0.60		
11/26/2018	11.8		0.1	7.2	435	0.93		
1/10/2019	8.0		0.0	7.2	453	0.97		
2/11/2019	6.2		0.0	7.4	458		0.6	0.02
3/7/2019	7.6		0.0	7.2	426		0.6	0.03
3/21/2019	9.6		0.1	7.3	359		0.9	0.07
3/27/2019	11.6		0.0	6.8	238		1.4	0.17
4/1/2019	13.4		0.2	7.2	222		1.0	0.13
4/9/2019	11.6		4.6	7.7	262		0.7	0.06
4/30/2019	11.0		8.5	7.9	341		0.6	0.03
5/20/2019	11.0		10.8	8.0	371		0.6	0.03
5/28/2019	9.6		14.7	7.5	311		0.7	0.04
5/30/2019	9.4		16.6	7.8	322		0.6	0.04
6/13/2019	9.1		19.6	8.0	366		0.9	0.07
7/9/2019	8.7		24.7	8.2	413		0.8	0.07
8/6/2019	9.4		25.7	8.3	413		0.7	0.05
10/23/2019	11.9		6.3	7.9	368		0.6	0.05
11/4/2019	12.7		1.8	7.7	389		0.5	0.03
12/3/2019	13.6		-0.1	7.7	386		0.6	0.02
1/7/2020	10.3		-0.2	7.1	435		0.5	0.03
2/26/2020	9.9		-0.2	7.2	446		0.4	0.03
6/30/2020	7.5		25.3	8.2	395		0.7	0.06
7/5/2020	6.7	80.9	24.6	7.9	354			
7/29/2020	7.8	94.0	24.8	8.0	362			
8/7/2020	8.5	98.2	22.6	8.2	402			
8/21/2020	8.1	92.5						
9/4/2020	8.8	93.1	17.8	8.0	276			

Source: Minnesota PCA 2022f

Notes: DO = dissolved oxygen; ºC = degrees Celsius; pH = power of hydrogen; NTU = nephelometric turbidity unit; Chl-a = chlorophyll-a; NO2NO3 = inorganic nitrogen (nitrate and nitrite as N); TKN = Total Kjeldahl Nitrogen; P = phosphorus; µS/cm = microSiemens per centimeter; µg/L = micrograms per liter; mg/L = milligrams per liter

Table 5-19: Water Quality Data from Site 49-0036-01-202 and Site 49-0036-02-202 Upstream of the Sylvan Project Dam

Date	Site 49-0036-01-202			Site 49-0036-02-202		
	Chl-a (µg/L)	Total P (mg/L)	Secchi Disk Depth (m)	Chl-a (µg/L)	Total P (mg/L)	Secchi Disk Depth (m)
6/9/2008	4	0.07		11	0.04	2.4
6/25/2008	8	0.07		1	0.02	
7/14/2008	5	0.04		4	0.03	
8/5/2008	39	0.08	1.7	8	0.03	4
8/25/2008	21	0.09	1.8	22	0.04	3.1
9/9/2008	20	0.06	2.1	16	0.05	1.4
8/6/2009	4	0.03		4	0.03	3.4
8/19/2009	4	0.05	2.1	3	0.03	3.1
9/9/2009	4	0.05	2.3	7	0.02	2.4

Source: Minnesota PCA 2022f

Notes: Chl-a = chlorophyll-a; P = phosphorus; m = meter; mg/L = milligrams per liter

Table 5-20: Water Quality Data from Site S001-927 Upstream of the Sylvan Project Dam

Date	DO (mg/L)	Water Temperature (ºC)	pH	Specific Conductance (µS/cm)	NO2NO3 (mg/L)	TKN (mg/L)	Turbidity (NTU)	Total P (mg/L)
4/23/2002	10.8	10.6	8.3	204	< 0.05	0.89	10	0.08
5/7/2002	11.2	10.5	8.4	228	< 0.05	0.75	2	0.02
5/21/2002	11.7	14.4	8.3	237	< 0.05	0.86	2.3	0.04
6/5/2002	9.3	20.0	8.8	235	< 0.05	0.63	3	0.04
6/18/2002	8.9	22.3	8.8		< 0.05	0.69	2	
7/2/2002	7.2	28.0	8.7	226	< 0.05	0.53	1.3	0.02
7/16/2002	6.6	26.7	8.1	220	< 0.05	0.61	1.1	0.03
7/30/2002	8.9	26.2	8.2	226	< 0.05	0.48	1.0	0.03
8/13/2002			8.4		< 0.05	0.77	1.0	0.04
8/22/2002	3.1	27.6	7.4	264	0.1	0.61	2.1	0.05
9/10/2002	9.0	23.3	7.6	245	0.09	0.74	3	0.05
9/23/2002	7.3	16.1	7.9	253	< 0.05	0.5	1.7	0.03
10/8/2002	15.8	10.2	8.3	351	0.33	0.64	1.7	0.07
10/22/2002			7.7		< 0.05	0.49	1	0.03
11/19/2002	13.5	3.8	8.2	238	< 0.05	0.59	1	0.02
3/31/2003	14.9	3.6	8.3	220	0.17	0.66	2.2	0.04
4/14/2003	16.2	5.3	9.2	168	< 0.05	0.52	2	0.03
4/28/2003	17.7	0.4	9.2	193	< 0.05	0.53	2.3	0.03

Date	DO (mg/L)	Water Temperature (ºC)	pH	Specific Conductance (µS/cm)	NO2NO3 (mg/L)	TKN (mg/L)	Turbidity (NTU)	Total P (mg/L)
5/12/2003	10.6	10.7	7.8	216		0.53	1.6	0.03
5/19/2003			7.9		< 0.05	0.59	2	0.03
6/2/2003	10.5	18.8	8.5	227	< 0.05	0.6	1.7	0.02
6/16/2003	11.0	24.0	8.4	224	< 0.05	0.58	4.1	0.03
6/23/2003	8.7	24.2	8.3	226	< 0.05	0.52	1.1	0.03
6/30/2003	9.9	22.1	8.0	234	< 0.05	0.59	1.4	0.04
7/14/2003	8.1	22.8	7.9	238	< 0.05	0.53	1.2	0.04
8/18/2003	11.5	27.3	8.8	377	< 0.05	0.73	1.9	0.05
9/8/2003	13.6	23.3	8.8	264	< 0.05	0.83	2.3	0.05
9/22/2003	9.3	17.2	8.4	316	< 0.05	0.64	1.7	0.04
10/6/2003	14.2	12.0	8.7	294	< 0.05	0.72	1.5	0.04
10/27/2003	11.8	9.1	8.4	330	< 0.05	0.6	2.5	0.05

Source: Minnesota PCA 2022f

Notes: DO = dissolved oxygen; ºC = degrees Celsius; pH = power of hydrogen; NTU = nephelometric turbidity unit; Chl-a = chlorophyll-a; NO2NO3 = inorganic nitrogen (nitrate and nitrite as N); TKN = Total Kjeldahl Nitrogen; P = phosphorus; µS/cm = microSiemens per centimeter; µg/L = micrograms per liter; mg/L = milligrams per liter

Table 5-21: Water Quality Data from Site S006-249 in Pillager Creek

Date	DO (mg/L)	DO (% saturation)	Water Temperature (°C)	pH	Specific Conductance (µS/cm)	Chl-a (µg/L)	NO2NO3 (mg/L)	TKN (mg/L)	Total P (mg/L)
4/8/2010	10.4		5.5	7.7	180				
4/21/2010	11.3		10.5	6.8	118				
5/4/2010	10.7		10.0	7.7	205	5	0.03	0.54	0.04
5/18/2010	7.9		14.9	8.1	189	3	0.03	0.69	0.06
6/2/2010	7.9		16.8	7.8	227	2	0.03	0.85	0.16
6/14/2010	7.8		16.5	7.6	255	2	0.03	0.57	0.07
7/5/2010	10.2		25.9	8.0	221	4	0.03	0.80	0.07
7/20/2010	6.6		22.4	7.4	190	7	0.03	0.90	0.08
8/4/2010	6.0		22.0	7.5	208	2	0.03	0.97	0.09
8/17/2010	8.6		19.9	7.7	220	1	0.03	0.62	0.06
9/7/2010	7.7		14.1	7.4	206	2	0.03	0.77	0.06
9/20/2010	9.2		11.8	7.7	213	2	0.03	0.44	0.03
10/13/2010	10.1		12.7	7.8	237				
10/26/2010	8.3		9.4	7.6	200				
4/5/2011	10.8		2.6	7.9	184				
4/19/2011	11.1		8.7	8.1	209				
5/4/2011	11.8		13.1	8.2	200	12	0.03	0.58	0.04
5/17/2011	8.4		20.4	8.9	191	3	0.03	0.70	0.09
6/1/2011	8.3		18.8	8.4	172	1	0.03	0.82	0.08
6/20/2011	8.3		20.4	8.1	249	2	0.03	0.85	0.11
6/27/2011	8.3		22.1	8.1	228				
7/12/2011	10.7		23.0	8.5	264	19	0.09	0.58	0.12
7/18/2011	8.4		28.6	7.9	264				
7/25/2011	7.7		27.4	8.5	252	3	0.11	0.98	0.13
8/8/2011	7.2		23.1	8.4	231	2	0.03	0.67	0.09
8/26/2011	6.4		19.9	8.0	263	1	0.03	0.65	0.06

Date	DO (mg/L)	DO (% saturation)	Water Temperature (ºC)	pH	Specific Conductance (µS/cm)	Chl-a (µg/L)	NO2NO3 (mg/L)	TKN (mg/L)	Total P (mg/L)
8/31/2011	6.9		17.7	8.5	274				
9/12/2011	9.4		22.5	8.8	295	2	0.03	0.49	0.06
9/27/2011	9.6		12.2	7.5	272	7	0.03	0.52	0.05
10/14/2011	8.7		9.7	6.8	276				
10/26/2011	10.9		5.6	7.4	278				
8/12/2020	6.9	76.1	20.1	7.7	267		0.02		0.04
6/8/2021	4.7	61.2	28.5	7.5	326				

Source: Minnesota PCA 2022f

Notes: DO = dissolved oxygen; ºC = degrees Celsius; pH = power of hydrogen; NTU = nephelometric turbidity unit; Chl-a = chlorophyll-a; NO2NO3 = inorganic nitrogen (nitrate and nitrite as N); TKN = Total Kjeldahl Nitrogen; P = phosphorus; µS/cm = microSiemens per centimeter; µg/L = micrograms per liter; mg/L = milligrams per liter

Pillager Project

1993-1994 Water Quality Data

The Licensee conducted water quality monitoring between March 1 and July 31, 1993, and February to September 1994 at one site upstream of the Pillager Project dam and one site downstream of the powerhouse (MPLC 1995). Vertical DO and water temperature profiles were collected upstream of the dam, and a single measurement was collected downstream of the dam 2 to 4 times per month. At the upstream site, DO was less than 5 mg/L in March 1993, in a single measurement at a depth of 6 m on May 7, 1993, and in February 1994; DO was above the 5 mg/L standard in all the other measurements performed upstream and downstream of the dam in 1993 and 1994. There was no evidence that the reservoir thermally stratified over the summer. Overall, DO values downstream of the powerhouse were similar to the concentrations in the reservoir; when there was spill over the dam, DO was 1 mg/L to 2 mg/L higher at the downstream site. The water temperature reached 20°C to 23°C (68°F to 73.4°F) in summer 1993 and 20°C to 24°C (68°F to 75.2°F) in summer 1994.

On June 20 and August 23, 1994, water chemistry samples and Secchi Disk transparency depths were collected at two sites in the Pillager Project reservoir; Site 1 was at the deepest site in the reservoir and Site 2 was at the upstream end of the reservoir (MPLC 1995). At the deep spot in the reservoir, there was evidence of thermal stratification during the June sampling. The TSI was estimated for the Pillager Project reservoir based on chlorophyll-a, total phosphorus, and Secchi Disk measurements. The TSI based on total phosphorus and Secchi Disk was in the range for eutrophic (highly productive) waters, and the TSI based on chlorophyll-a was characteristic of mesotrophic (medium productivity) and eutrophic waters.

1999-2001 Water Quality Data

Article 404 of the 1998 Pillager Project license required MP to develop a plan to monitor DO upstream and downstream of the Pillager dam for three years (FERC 1998). The objective of the monitoring was to further evaluate the low DO concentrations that were documented in late winter and that could occur if the reservoir stratified during the summer. If DO concentrations less than 5 mg/L were observed, the Licensee was to evaluate reasonable measures to modify or enhance Pillager Project operations to increase DO levels. MP developed a plan to monitor DO and water temperature once per month at three sites upstream of the Pillager dam, including at the deep spot upstream of the dam, and one site downstream of the powerhouse (MP 1998); FERC approved the plan on April 7, 1999 (FERC 1999).

The DO and water temperature results from the deep spot in the Pillager reservoir and from the tailrace are shown in Table 5-22 and Table 5-23. At the deep spot in the Pillager reservoir, there was evidence of DO stratification with decreasing DO with increasing depth during each year of monitoring. One measurement in 1999 was below the 5 mg/L standard (4.7 mg/L on June 8, 1999, at 5 m), and four measurements in 2000 were less than 5 mg/L (1.8 mg/L on August 10, 2000, at 7 m and 3.5 mg/L to 4.4 mg/L below 5 m depth on September 8, 2000) (Table 5-22). In 2001, DO concentrations less than 5 mg/L were observed on May 23, July 24, and August 14. All DO data collected in the Pillager tailrace was above the standard suggesting that DO stratification in the reservoir did not influence DO downstream of the Pillager Project in the Crow Wing River (MP 2002).

Table 5-22: Water Temperature (°C) and DO Concentration (mg/L) Vertical Profiles Collected at the Deep Spot in the Pillager Reservoir, 1999-2001

Depth (m)	6/8/1999		7/14/1999		8/10/1999		9/15/1999	
	Temp	DO	Temp	DO	Temp	DO	Temp	DO
0	23.2	8.9	24.6	9.4	22.4	9.5	13.7	9.3
1	23.2	8.9	24.5	9.3	22.4	9.6	13.5	9.3
2	23.2	9.3	24.4	8.7	22.3	9.4	13.4	9.2
3	23.2	6.7	24.3	8.3	22.3	9.2	13.4	9.2
4	22.8	5.2	24.1	7.9	22.2	9.0	13.4	9.1
5	22.8	4.7	23.4	7.0	22.2	8.9	13.3	8.5
6	22.6	5.1	22.9	6.7	22.2	8.8	13.3	8.8
7	21.7	6.1			22.1	8.3	13.4	8.6

Depth (m)	4/30/2000		5/25/2000		6/28/2000		7/3/2000		8/10/2000		9/8/2000		10/12/2000	
	Temp	DO	Temp	DO	Temp	DO	Temp	DO	Temp	DO	Temp	DO	Temp	DO
0	15.7	17.7	17.8	12.5	19.7	9.5	24.7	8.1	24.5	8.1	17.8	9.2	7.3	13.1
1	14.7	14.9	17.8	13.4	19.6	9.9	24.7	9.4	25.1	8.3	18.0	7.8	7.3	13.1
2	13.1	14.8	17.7	15.5	19.5	9.8	24.6	9.2	25.1	8.2	18.0	11.3	7.0	13.1
3	12.2	14.2	17.7	14.5	19.4	11.4	24.6	9.1	25.1	8.8	18.1	8.0	7.0	13.1
4	11.5	12.6	17.6	14.9	19.4	10.9	24.4	8.4	25.1	8.6	18.0	6.1	7.0	12.9
5	10.8	10.8	17.6	12.5	19.4	11.3	24.3	7.8	25.1	7.8	18.0	4.4	7.0	13.1
6	10.9	5.2	17.5	12.1	19.4	10.5	24.1	6.3	25.1	7.7	18.0	3.7	7.0	13.1
7			17.4	10.4	19.1	6.4	23.2	6.3	24.5	1.8	18.0	3.5	7.0	13.1

Depth (m)	5/23/2001		6/19/2001		7/24/2001		8/14/2001		9/18/2001		10/16/2001	
	Temp	DO	Temp	DO	Temp	DO	Temp	DO	Temp	DO	Temp	DO
0	11.8	10.6	18.8	11.8	26.8	5.6	23.4	5.6	16.1	11.6	9.5	9.8
1	11.9	10.9	18.8	11.9	27.2	8.5	23.9	3.0	15.9	9.1	9.5	9.8
2	11.8	7.6	18.8	11.5	27.2	9.7	24.0	4.2	15.6	6.9	9.4	8.9
3	11.7	5.6	18.8	10.2	27.2	4.4	24.0	4.6	15.5	6.6	9.4	8.8
4	11.7	4.5	18.8	9.3	27.3	9.4	23.6	4.4	15.4	6.5	9.3	7.9
5	11.6	3.8	18.7	9.6	27.2	7.2	23.4	4.2	15.4		9.3	7.5
6	11.6	3.3	18.7	8.1	27.2	6.6	23.3	3.7	15.4	6.2	9.3	6.4
7	11.6	3.2	18.7	7.9	26.8	5.8	23.2	3.2	15.3	6.2	9.3	6.4

Source: MP 2002
Notes: temp = temperature; DO = dissolved oxygen; °C = degrees Celsius; m = meter; mg/L = milligrams per liter

Table 5-23: Water Temperature (°C) and DO Concentration (mg/L) Collected in the Pillager Tailrace, 1999-2001

Date	Temp (°C)	DO (mg/L)
6/8/1999	23.0	7.1
7/14/1999	24.0	8.1
8/10/1999	22.4	8.8
9/14/1999	14.0	10.0
10/28/1999	6.2	13.1
11/23/1999	2.6	13.5
12/8/1999	0.7	15.2
1/5/2000	0.0	6.7
2/18/2000	0.1	7.2
3/1/2000	0.4	11.8
4/28/2000	15.2	13.5
5/25/2000	17.7	15.5
6/28/2000	19.4	15.2
7/12/2000	24.4	11.1
8/1/2000	25.9	7.5
9/6/2000	17.3	10.5
10/3/2000	14.6	11.6
5/23/2001	11.7	13.1
6/19/2001	18.6	10.5
7/24/2001	27.1	7.9
8/14/2001	23.7	6.2
9/18/2001	15.8	12.2
10/11/2001	9.8	9.8

Source: Allete 2002

Notes: temp = temperature; DO = dissolved oxygen; °C = degrees Celsius; m = meter; mg/L = milligrams per liter

Minnesota PCA Water Quality Data

The Minnesota PCA has collected water quality data in the Pillager reservoir (Minnesota PCA 2022f). Results for DO, water temperature, pH, chlorophyll-a (chl-a), inorganic nitrogen (nitrate and nitrite as N) (NO2NO3), total phosphorus (Total P), TKN, and specific conductivity are shown in Table 5-24, Table 5-25, and Table 5-26. The locations of these sites are shown in Figure 5-8.

The DO concentration in vertical profiles collected at two sites in the Pillager reservoir in 1999 was above the 5 mg/L standard; the DO concentration ranged from 6.2 mg/L to 10.4 mg/L (Table 5-24). pH levels were within the range of the standard, and total phosphorus was below the standard (Table 5-25). On July 20, 1999, chlorophyll-a was above the 13 µg/L standard at 14.9 µg/L; chlorophyll-a was below the standard in the other samples.

Site S007-301 was approximately 4.4 RM upstream of the Pillager dam and at the upper end of the Project Boundary. The DO concentration and pH data at this site were in attainment with the water quality standards (Table 5-26). The total phosphorus results from June 30, 2010, was above the 75 µg/L standard (0.075 mg/L).

The Pillager reservoir has a TSI of 53, which is between mesotrophic (moderately productive) and eutrophic (highly productive), based on Secchi Disk transparency, chlorophyll-a, and total phosphorus data collected between June and September 2000 to 2009 (Minnesota PCA 2022f). This value is at the upper end of TSI values for lakes in the same ecoregion.

Table 5-24: Vertical Profile Data Collected at Site 49-0080-00-101 and Site 49-0080-00-100 in the Pillager Reservoir

Depth (m)	Site 49-0080-00-101					Site 49-0080-00-100		
	DO (mg/L)					DO (mg/L)		
	6/22/1999	**7/20/1999**	**8/17/1999**	**9/21/1999**		**6/22/1999**	**7/20/1999**	**9/21/1999**
0	10.4	7.7	8.8	9.3		8.7	7.2	8.9
1	10.2	7.9	8.8	9.2		8.5	6.8	9.1
2	9.9	7.8	8.4	9.2		8.3	6.6	9.0
3	9.7	7.6	8.2	9.0		8.3	6.4	9.0
4	9.7	6.2	8.1	8.9				9.0
5	9.1		7.9	8.8				
6	8.3		7.9					
Depth (m)	**DO (% Saturation)**					**DO (% Saturation)**		
	6/22/1999	**7/20/1999**	**8/17/1999**	**9/21/1999**		**6/22/1999**	**7/20/1999**	**9/21/1999**
0	119.6	96.3	104.4	93.5		98.8	90.1	88.6
1	117.1	97.5	103.2	93.6		96.4	82.7	90.5
2	112.0	96.5	97.8	93.0		92.8	79.6	89.8
3	109.0	93.9	95.2	91.4		92.3	77.3	89.0
4	107.6	74.5		90.1				88.9
5	100.6		89.8	88.0				
6	89.4							

Depth (m)	Water Temperature (°C)					Water Temperature (°C)		
	6/22/1999	7/20/1999	8/17/1999	9/21/1999		6/22/1999	7/20/1999	9/21/1999
0	21.7	24.6	22.2	14.4		21.2	24.6	13.5
1	21.5	24.3	21.9	14.4		21.0	23.2	13.6
2	21.3	24.0	21.3	14.4		20.6	22.9	13.5
3	20.7	23.8	21.0	14.3		20.3	22.6	13.4
4	20.3	22.8	20.6	14.2				13.4
5	19.9		20.5	14.1				
6	19.5		20.4					
Depth (m)	pH					pH		
	6/22/1999	7/20/1999	8/17/1999	9/21/1999		6/22/1999	7/20/1999	9/21/1999
0	8.5	8.1	8.2	8.2		8.3	8.0	8.2
1	8.4	8.1	8.2	8.2		8.2	7.9	8.2
2	8.4	8.1	8.2	8.2		8.2	7.9	8.2
3	8.4	8.1	8.3	8.3		8.3	7.9	8.2
4	8.4	8.0		8.2				8.2
5	8.4		8.1	8.2				
6	8.3							
Depth (m)	Specific Conductance (µS/cm)					Specific Conductance (µS/cm)		
	6/22/1999	7/20/1999	8/17/1999	9/21/1999		6/22/1999	7/20/1999	9/21/1999
0	411	341	356	403		409	342	405
1	411	341	356	403		408	344	405
2	410	341	357	404		408	345	405
3	415	342	356	404		410	348	405
4	416	344		403				404
5	417		356	403				
6	419							

Source: Minnesota PCA 2022f

Notes: DO = dissolved oxygen; °C = degrees Celsius; pH = power of hydrogen; m = meter; mg/L = milligrams per liter; µS/cm = microSiemens per centimeter

Table 5-25: Water Quality Data Collected at Site 49-0080-00-101 and Site 49-0080-00-100 in the Pillager Reservoir

Date	Site 49-0080-00-101			
	Chl-a (µg/L)	TKN (mg/L)	Total P (mg/L)	Secchi Disk (m)
6/22/1999	10.6	0.74	0.04	1.5
7/20/1999	14.9		0.07	
8/17/1999	4.0	1.48	0.06	2
9/21/1999	8.8	0.65	0.04	2.9
Date	Site 49-0080-00-100			
	Chl-a (µg/L)	TKN (mg/L)	Total P (mg/L)	Secchi Disk (m)
5/18/1999		0.77	0.05	
6/22/1999	2.3	0.69	0.04	1.5
7/20/1999	7.0	0.80	0.06	1.6
8/17/1999	4.1	0.79	0.05	2.2
9/21/1999	2.9	0.65	0.04	2.7

Source: Minnesota PCA 2022f

Notes: Chl-a = chlorophyll-a; TKN = Total Kjeldahl Nitrogen; P = phosphorus; m = meter; mg/L = milligrams per liter

Table 5-26: Water Quality Data from Site S007-301 Upstream of the Pillager Dam

Date	DO (mg/L)	DO (% saturation)	Water Temperature (ºC)	pH	Specific Conductance (µS/cm)	NO2NO3 (mg/L)	Total P (mg/L)
6/30/2010	9.7		22.7	8.4	471	0.24	0.13
8/25/2011	11.7		23.4	8.5	406		
10/1/2020	11.1	104.4	12.5	8.4	419		
7/21/2021	6.4	74.3	23.0	8.0	419	0.02	0.02

Source: Minnesota PCA 2022f

Notes: DO = dissolved oxygen; ºC = degrees Celsius; pH = power of hydrogen; m = meter; mg/L = milligrams per liter; µS/cm = microSiemens per centimeter

5.2.8 Projects Reservoirs

Little Falls Project

The Little Falls Project reservoir specifications are described in Section 4.2. The maximum depth of the reach of the Mississippi River between Brainerd, MN, and Royalton, MN, is 25 feet (MPLC 1991a). The average depth upstream of the Little Falls dam is approximately 6 feet, and the average depth downstream is about 12 feet. The average width of the Mississippi River upstream of the Little Falls dam is approximately 350 feet (MPLC 1991a). The approximate shoreline length within the Little Falls Project Boundary based on the National Hydrography Dataset (NHD) waterbody boundaries and buffered NHD flowlines is 16 miles. The Little Falls reservoir is dominated by sandy substrates, with rocky substrates also present (MPLC 1991a).

Sylvan Project

The Sylvan Project reservoir specifications are described in Section 4.2. In addition to the Crow Wing River, other inflow sources to the Sylvan reservoir include the Gull River from the northeast and a bog seepage area along southwest shoreline (MPLC 1991b). The reservoir is generally shallow with a maximum depth of approximately 31 feet, and a mean depth of approximately 10 feet (MPLC 1991b). The reservoir shoreline is gradual with gravel-rubble, sand, and organic soils. The approximate shoreline length within the Sylvan Project Boundary based on the NHD waterbody boundaries and buffered NHD flowlines is 41 miles. The Sylvan reservoir is dominated by sandy substrates (MPLC 1991b).

Pillager Project

The Pillager reservoir specifications are described in Section 4.2. In addition to the Crow Wing River, other sources of inflow to the reservoir include Sevenmile Creek, which enters from the north, and unnamed creeks that enter from the south. The reservoir is generally shallow with a maximum water depth of approximately 25 feet (MPLC 1995). The reservoir shoreline is gradual with gravel-rubble, sand, and organic soils. The approximate shoreline length within the Pillager Project Boundary based on the NHD waterbody boundaries and buffered NHD flowlines is 15 miles. The Pillager reservoir is dominated by fine substrates including silt and sand (MPLC 1995).

5.2.9 Gradient of Downstream Reaches

Little Falls Project

The Mississippi River drops 15 feet in elevation within a mile downstream of the Little Falls dam (Google Earth Elevation Model 2022). Overall, the gradient of the Mississippi River from the Little Falls dam to Royalton, MN, is about 1.7 feet per mile (MPLC 1991a).

Sylvan Project and Pillager Project

Overall, the Crow Wing River has a low gradient and drops 200 feet in elevation from the headwaters to the confluence with the Mississippi River or a decrease of approximately 0.5 feet per mile (MP 2013). The Crow Wing River drops approximately 2 feet in elevation downstream of the Pillager tailrace to the top of the Sylvan reservoir. Based on the Google Earth elevation model, the Crow Wing River decreases approximately 7 feet in elevation from the Sylvan tailrace to the confluence with the Mississippi River (approximately 2.2 feet per mile).

5.2.10 References

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5.3 Fish and Aquatic Resources

18 CFR 5.6(d)(3)(iv) requires "A description of the fish and other aquatic resources, including invasive species, in the project vicinity. This section must discuss the existing fish and macroinvertebrate communities, including the presence or absence of anadromous, catadromous, or migratory fish, and any known or potential upstream or downstream impacts of the project on the aquatic community. Components of the description must include: (A) Identification of existing fish and aquatic communities; (B) Identification of any essential fish habitat as defined under the Magnuson-Stevens Fishery Conservation and Management Act and established by the National Marine Fisheries Service; and (C) Temporal and spatial distribution of fish and aquatic communities and any associated trends with respect to: (1) Species and life stage composition; (2) Standing crop; (3) Age and growth data; (4) Spawning run timing; and (5) The extent and location of spawning, rearing, feeding, and wintering habitat."

5.3.1 Existing Fish and Aquatic Communities

5.3.1.1 Aquatic Habitat

Little Falls Project

The Little Falls Project creates a reservoir on the Mississippi River. The riverine reaches upstream and downstream of the Little Falls Project include riffle, run, and pool complexes. Much of the riverine reach is dominated by coarse substrate, while the Little Falls reservoir is dominated by sandy substrates. Smallmouth bass (*Micropterus dolomieu*) habitat is present throughout much of the Mississippi River upstream and downstream of the Little Falls reservoir in tailwater, island, and backwater areas (Minnesota DNR 2022a). Specifically, smallmouth bass spawning habitat has been documented throughout the upstream and downstream reach, with spawning conditions and habitat suitability tied to annual flow rates (Minnesota DNR 2009a, Minnesota DNR 2009b, Minnesota DNR 2022a). Past fish assemblage surveys in the reach of the Mississippi River near the Little Falls Project have documented fish species compositions that are indicative of fair to good habitat quality (Minnesota DNR 2009a, Minnesota DNR 2009b).

Sylvan Project

The Sylvan Project creates a reservoir on the Crow Wing River and Gull River, with a maximum depth of approximately 31 feet (MPLC 1991b). Waters are characterized as eutrophic, with chlorophyll and total phosphorous levels above or equal to the expected range for similar lakes (Minnesota PCA 2014). Gravel and cobble-based substrates that are suitable spawning habitat for walleye (*Sander vitreus*) are found in the riverine portions of the Crow Wing and Gull Rivers, with past stocking efforts utilized to supplement the population. Sandy and vegetated littoral habitats that provide suitable spawning habitat for largemouth bass (*Micropterus salmoides*) and panfish species occur throughout the Sylvan reservoir. Aquatic vegetation has historically been abundant in the middle of Sylvan reservoir, at the confluence of the Gull and Crow Wing Rivers, and in surrounding shoreline and wetland habitats (MPLC 1991b). Vegetated littoral reaches in the Sylvan reservoir provide adequate spawning habitat for species including northern pike (*Esox Lucius)*, bluegill (*Lepomis macrochirus*), black crappie (*Pomoxis nigromaculatus*), and largemouth bass (Minnesota DNR 2021a).

Habitat assessments conducted in the Gull River and Crow Wing River by the Minnesota DNR and the Minnesota PCA noted that the reaches of those rivers that include the Sylvan Project have stream habitat assessment ratings of fair. The reaches of the Crow Wing River near the Sylvan Project meet state standards for fish IBI ratings, based on habitat and fish assemblage surveys conducted by the Minnesota DNR and Minnesota PCA during 2010 (Minnesota PCA 2014).

Pillager Project

The Pillager Project creates a reservoir on the Crow Wing River. The reservoir is relatively shallow, and the deepest point is approximately 25 feet (MPLC 1995). It is characterized as eutrophic, with chlorophyll and total phosphorous levels above or equal to the expected range for similar lakes (Minnesota PCA 2014). The reservoir above the dam and the Pillager tailrace create aquatic habitat that supports both warmwater and coolwater fish species (MPLC 1995). Marshy areas with emergent aquatic vegetation are present in the upstream reaches of the reservoir. Submerged aquatic vegetation has been historically abundant in the shallow portions of the reservoir, and in littoral areas. Aquatic plant species documented in the Pillager reservoir that provide refuge to multiple lifestages of fish species include coontail (*Ceratophyllum demersum*) and northern watermilfoil (*Myriophyllum sibiricum*). Specifically, habitat for bluegill, black crappie, and largemouth bass is present in the Pillager reservoir, with more suitable habitat for walleye and smallmouth bass in the riverine reaches upstream and downstream of the Pillager Project. Although walleye likely use the riverine portions of the Crow Wing River during most of the year, they may utilize the deeper water habitats in the reservoir during the winter months (Minnesota DNR 2021b). The predominant substrate types present in the reservoir are silt and sand, with some gravel present (MPLC 1995).

Habitat assessments conducted in the Crow Wing River by the Minnesota DNR and the Minnesota PCA noted that the reach that encompasses the Pillager Project has a stream habitat assessment rating of fair. These reaches of the of the Crow Wing River also meet state standards for fish IBI ratings, based on habitat and fish assemblage surveys conducted by the Minnesota DNR and Minnesota PCA during 2010 (Minnesota PCA 2014).

5.3.2 Fish Assemblage and Management

Little Falls Project

Common non-game fish species in the reach of the Mississippi River that encompasses the Little Falls Project include common carp (*Cyprinus carpio*), silver redhorse (*Moxostoma anisurum*), and shorthead redhorse (*Moxostoma macrolepidotum*). Smallmouth bass are the most abundant gamefish species in the reach (Minnesota DNR 2009a, Minnesota DNR 2022a). Other non-game species that are common near the Little Falls Project include common shiner (*Luxilus cornutus*), spotfin shiner (*Cyprinella spiloptera*), hornyhead chub (*Nocomis biguttatus*), white sucker (*Catostomus commersonii*), rock bass (*Ambloplites rupestris*), yellow perch (*Perca flavescens*), and common logperch (*Percina caprodes*) (Minnesota DNR 2009a, Minnesota DNR 2009b). Other gamefish species documented in the reach of the Mississippi River that encompasses the Little Falls Project during recent years include bluegill, channel catfish (*Ictalurus punctatus*), largemouth bass, muskellunge (*Esox masquinongy*), northern pike, smallmouth bass, and walleye. Bluegill and largemouth bass are less abundant upstream and downstream of the Little Falls Project, and largemouth bass are likely move into the Little Falls Project Vicinity from upstream reservoirs. (Minnesota DNR 2022a). Bluegill are not abundant at the Little Falls Project, but do reach catchable size and have increased in abundance during recent years. Bluegill are targeted by anglers in the Little Falls Project reservoir, although the primary sport fisheries at the Little Falls Project are for muskellunge, smallmouth bass, and walleye (Minnesota DNR 2009a, Minnesota DNR 2009b). Channel catfish abundance has increased throughout the Mississippi River upstream and downstream of the Little Falls Project during recent years (Minnesota DNR 2022a).

Invasive carp species have been documented approximately 125 miles downstream of the Little Falls Project. Specifically, silver carp (*Hypophthalmichthys molitrix*) and bighead carp (*Hypophthalmichthys nobilis*) have been collected in the Mississippi River immediately south of St. Paul, Minnesota (Minnesota DNR 2022b). Additionally, eDNA samples have indicated the presence of invasive carp upstream of the Coon Rapids dam (P-4369), in a reach of the Mississippi River north of Minneapolis/St. Paul, Minnesota. The Coon Rapids dam is located approximately 95 miles downstream of the Little Falls Project.

The Minnesota DNR has conducted daytime electrofishing surveys in known smallmouth bass spawning reaches upstream of the Little Falls Project and in the Little Falls reservoir since 1994. The most recent surveys of these reaches were conducted during 2021. Smallmouth bass are the target species for the surveys, but attempts are made to capture all gamefish species that are encountered. Smallmouth bass have been the most abundant species collected across transects and years. Young-of-year smallmouth bass have been documented across years, with high recruitment associated with drought conditions and associated low, stable river flows during the summer months (Minnesota DNR 2022a). Substantial recruitment of smallmouth bass has been documented both upstream and downstream of the Little Falls dam during recent years (Minnesota DNR 2009a, Minnesota DNR 2009b, Minnesota DNR 2022a).

Smallmouth bass are managed in the reach of the Mississippi River that encompasses the Little Falls Project. Trophy-sized smallmouth bass are present both upstream and downstream of the Little Falls Project, and documented growth rates are considered normal to fast as compared to similar populations. In addition to smallmouth bass management, abundance thresholds for walleye and muskellunge are also maintained (Minnesota DNR 2009a, Minnesota DNR 2009b). Muskellunge stocking efforts were conducted in the reach of the Mississippi River immediately downstream of the Little Falls Project during 1976-1980. Muskellunge were also stocked during 1988, 1990, and 1991. Over 1,000,000 walleye were stocked in the same reach of the Mississippi River during 1984 (Minnesota DNR 2009a). Additionally, muskellunge stocking was conducted in the reach of the Mississippi River upstream from the Little Falls Project during 1970-1975, 1977, 1988, 1990, and 1991. Walleye stocking also occurred in this reach in 1984 (Minnesota DNR 2009b). Gamefish populations in the reaches of the Mississippi River upstream and downstream of the Little Falls Project are currently self-sustaining and stocking efforts have not been implemented during more recent years (Minnesota DNR 2009a, Minnesota DNR 2009b).

Sylvan Project

The fish assemblage in the Sylvan reservoir and the downstream reach includes gamefish species (walleye, northern pike, largemouth bass, smallmouth bass, black crappie, bluegill) and non-game species (shorthead redhorse, silver redhorse, white sucker) (MPLC 1991b, Minnesota DNR 2021a). Panfish are generally more abundant in the reservoir, with walleye more abundant in the lotic reaches of the Crow Wing River (including the Sylvan and Pillager Project tailraces) during much of the year (MPLC 1991b). Specifically, walleye are likely spend much of the warmer months in the riverine reaches and may utilize the Sylvan reservoir during the winter months (Minnesota DNR 2014a, Minnesota DNR 2021a).

Surveys conducted by the Minnesota DNR and Minnesota PCA in 2010 documented 55 fish species in the Crow Wing River Watershed. These surveys encompassed the entire watershed, including the reaches of the Gull River and Crow Wing River at the Sylvan Project (Table 5-27). Fish assemblage surveys in the Sylvan reservoir have occurred during 1958, 1985, 1986, 1987, 1990, 1996, 2000, 2002, 2008, and 2014. Sampling methods across one or multiple years included the use of gill nets, trap nets, and electrofishing techniques. Sampling during the most recent sampling year (2014) included the use of trap nets and electrofishing techniques. A total of 17 fish species were collected at the Sylvan Project (Table 5-27). Bluegill was the most abundant species collected during trap netting, and largemouth bass was the most abundant species collected during electrofishing (Minnesota DNR 2014a). Bluegill abundance and size structure at the Sylvan Project is generally consistent with the expected values for similar lakes in Minnesota (Minnesota

DNR 2014a, Minnesota DNR 2021a). Bluegill total lengths during trap netting ranged from 3.2 – 8.4 inches, and largemouth bass total lengths during electrofishing ranged from 3.7 – 19.1 inches. Mean growth increment was 1.5 inches for bluegill in their first year of life, and 1.1 inches in year 2 (Minnesota DNR 2014a).

Invasive silver carp and bighead carp have been collected further downstream in the drainage from the Mississippi River below St. Paul, Minnesota (Minnesota DNR 2022b). Additionally, eDNA samples have indicated the presence of invasive carp upstream of the Coon Rapids dam (P-4369), in a reach of the Mississippi River north of Minneapolis/St. Paul, Minnesota.

Stocking of walleye fry occurred annually at the Sylvan Project from 1986-1991, and walleye fingerlings were stocked in 1992 and 1994. Additional stocking of walleye fry occurred during 2006-2009 and has occurred during odd numbered years since 2013 (Minnesota DNR 2021a). Some walleye recruitment during 1994-2006 was maintained by natural reproduction (Minnesota DNR 2014a). Current Minnesota DNR fisheries management goals for the Sylvan Project include maintaining northern pike and walleye populations, maintaining size structure and density targets for bluegill and black crappie, maintaining largemouth bass abundance, and encouraging removal of the Sylvan dam (Minnesota DNR 2021a). Planned Minnesota DNR management activities in future years include trap net assessments to target panfish, electrofishing assessments to target walleye and largemouth bass, biennial walleye stocking efforts, review of flow data and vegetation abundance, and possible roughfish removal allowances (Minnesota DNR 2021a).

Pillager Project

The Pillager reservoir fish assemblage is largely comprised of catostomids (e.g., white sucker and redhorse species) (MPLC 1995, Minnesota DNR 2014b). Managed fish species include warmwater gamefish species, as well as walleye. Previous fish assemblage surveys have documented centrarchid and sucker species upstream of the dam, with walleye more abundant downstream of the dam (MPLC 1995). Documented non-game fish species include catostomids (sucker and redhorse species) and minnow species; documented sportfish species include rock bass, bluegill, largemouth bass, black crappie, northern pike, walleye, and muskellunge. Commercial roughfish (e.g., common carp, bullhead species) removals were conducted in 1977, 1984, and 1990 (MPLC 1995).

Surveys conducted by the Minnesota DNR and Minnesota PCA in 2010 documented 55 fish species in the Crow Wing River Watershed. These surveys encompassed the entire Crow Wing River Watershed, including the reach of the Crow Wing River at the Pillager Project, more upstream and downstream reaches of the Crow Wing River outside of the Pillager Project Vicinity, and tributaries within the watershed (Table 5-27a). The Minnesota DNR has conducted recent fish assemblage surveys in the Pillager reservoir during 2008, 2009, 2014. Collection methodologies during 2014 included trap netting and electrofishing techniques. Sixteen fish species were documented (Table 5-27b). The most common species collected via trap netting were rock bass, brown bullhead, and bluegill. The most common species collected via electrofishing techniques was smallmouth bass (Minnesota DNR 2014b). Bluegill total lengths during trap netting ranged from 3.5 – 9.1 inches, and smallmouth bass total lengths during electrofishing ranged from 8.5 – 19.4 inches. Mean growth increment was 1.6 inches for bluegill in their first year of life, and 1.2 inches in year 2 (Minnesota DNR 2014b).

Invasive silver carp and bighead carp have been collected further downstream in the drainage from the Mississippi River below St. Paul, Minnesota (Minnesota DNR 2022b). Additionally, eDNA samples have indicated the presence of invasive carp upstream of the Coon Rapids dam, in a reach of the Mississippi River north of Minneapolis/St. Paul, Minnesota.

The Minnesota DNR has previously stocked walleye in the Pillager reservoir, and long-term management goals have included increasing walleye abundance (MPLC 1995). Past walleye management included stocking fry at a rate of 350,000 fry per year during 1986-1991. Stocking of fingerlings occurred in 1992 and 1994, as it was determined that the larger fingerlings may experience less predation and have better survival than fry (MPLC 1995). It does not appear that substantial walleye recruitment occurred directly from the stocking efforts, although natural walleye recruitment has been documented during more recent surveys. The Minnesota DNR does not currently have plans for additional fish stocking at the Pillager Project, as natural reproduction at levels that can sustain sport fisheries have been documented for species including walleye, smallmouth bass, bluegill, and black crappie, while walleye stocking did not appear to provide a long-term benefit for that species. Current Minnesota DNR fisheries management goals for the Pillager Project include maintaining a naturally reproducing walleye population, with specific goals informed by trap netting and electrofishing survey results. Additional goals include maintaining abundance thresholds for largemouth bass, smallmouth bass, and bluegill (Minnesota DNR 2021b).

Table 5-27a: Fish Species Documented in the Crow Wing River Watershed

Common Name	Scientific Name
banded killifish	*Fundulus diaphanus*
bigmouth shiner	*Notropis dorsalis*
black bullhead	*Ameiurus melas*
black crappie	*Pomoxis nigromaculatus*
blackchin shiner	*Notropis heterodon*
blacknose dace	*Rhinichthys atratulus*
blacknose shiner	*Notropis heterolepis*
bluegill	*Lepomis macrochirus*
bluntnose minnow	*Pimephales notatus*

Common Name	Scientific Name
bowfin	*Amia calva*
brassy minnow	*Hybognathus hankinsoni*
brook stickleback	*Culaea inconstans*
brook trout	*Salvelinus fontinalis*
brown bullhead	*Ameiurus nebulosus*
brown trout	*Salmo trutta*
burbot	*Lota lota*
central mudminnow	*Umbra limi*
central stoneroller	*Campostoma anomalum*
common carp	*Cyprinus carpio*
common shiner	*Luxilus cornutus*
creek chub	*Semotilus atromaculatus*
fathead minnow	*Pimephales promelas*
finescale dace	*Chrosomus neogaeus*
redhorse (general)	*Moxostoma sp.*
greater redhorse	*Moxostoma valenciennesi*
green sunfish	*Lepomis cyanellus*
hornyhead chub	*Nocomis biguttatus*
hybrid dace	-
hybrid sunfish	*Lepomis sp.*
Iowa darter	*Etheostoma exile*
Johnny darter	*Etheostoma nigrum*
largemouth bass	*Micropterus salmoides*
least darter	*Etheostoma microperca*
logperch	*Percina caprodes*
longnose dace	*Rhinichthys cataractae*
mimic shiner	*Notropis volucellus*
mottled sculpin	*Cottus bairdii*
northern pike	*Esox lucius*
northern redbelly dace	*Chrosomus eos*
pearl dace	*Margariscus nachtriebi*
pugnose shiner	*Notropis anogenus*
pumpkinseed	*Lepomis gibbosus*
rock bass	*Ambloplites rupestris*
shorthead redhorse	*Moxostoma macrolepidotum*
silver redhorse	*Moxostoma anisurum*
smallmouth bass	*Micropterus dolomieu*
spotfin shiner	*Cyprinella spiloptera*
spottail shiner	*Notropis hudsonius*
tadpole madtom	*Noturus gyrinus*
trout-perch	*Percopsis omiscomaycus*
walleye	*Sander vitreus*

Common Name	Scientific Name
weed shiner	*Notropis texanus*
white sucker	*Catostomus commersonii*
yellow bullhead	*Ameiurus natalis*
yellow perch	*Perca flavescens*

Source: Minnesota PCA 2014

Table 5-27b: Fish Species Documented in the Sylvan and Pillager Reservoirs During 2014

Common Name	Scientific Name	Documented at Sylvan	Documented at Pillager
black crappie	*Pomoxis nigromaculatus*	X	X
bluegill	*Lepomis macrochirus*	X	X
bowfin	*Amia calva*	X	
brown bullhead	*Ameiurus nebulosus*	X	X
common carp	*Cyprinus carpio*	X	X
greater redhorse	*Moxostoma valenciennesi*		X
hybrid sunfish	*Lepomis sp.*	X	X
largemouth bass	*Micropterus salmoides*	X	
northern pike	*Esox lucius*	X	X
pumpkinseed	*Lepomis gibbosus*	X	X
rock bass	*Ambloplites rupestris*	X	X
shorthead redhorse	*Moxostoma macrolepidotum*	X	X
silver redhorse	*Moxostoma anisurum*	X	X
smallmouth bass	*Micropterus dolomieu*	X	X
walleye	*Sander vitreus*	X	X
white sucker	*Catostomus commersonii*	X	X
yellow bullhead	*Ameiurus natalis*	X	X
yellow perch	*Perca flavescens*	X	X

Sources: Minnesota DNR 2014a, Minnesota DNR 2014b

5.3.3 Benthic Macroinvertebrates and Freshwater Mussels

The Minnesota DNR conducted mussel surveys in the Crow Wing River and Mississippi River during 2003 and 2007. Survey reaches included the reach of the Crow Wing River upstream of the Pillager Project, the reach of the Mississippi River near the confluence with the Crow Wing River (e.g., downstream of the Sylvan Project/upstream of the Little Falls Project), and the reach of the Mississippi River downstream of the Little Falls Project (Minnesota DNR 2003, Minnesota DNR 2007). Eight mussel species were documented upstream of the Pillager Project, eight mussel species were documented between the Sylvan Project and Little Falls Project, and six mussel species were documented downstream of the Little Falls Project (Table 5-28). The most abundant species documented across all three reaches was the fatmucket (*Lampsilis siliquoidea)*. The second most abundant species at all three reaches was the plain pocketbook (*Lampsilis cardium)*. Two Minnesota state-listed species, black sandshell (*Ligumia recta)* and creek heelsplitter (*Lasmigona compressa)*, were collected at all three reaches. No federally-listed species were documented. Statewide mussel collections by the Minnesota DNR have documented extirpation rates of 0-3 percent throughout the region of Minnesota that includes the Sylvan Project, Pillager Project, and Little Falls Project, with higher mussel extirpation rates (> 50 percent) occurring in drainages located in more southern portions of Minnesota (Minnesota DNR 2023a). The invasive zebra mussel (*Dreissena polymorpha)* was documented in the reach of the Mississippi River upstream of the Little Falls Project (Minnesota DNR 2003, Minnesota DNR 2007). Additional observations of zebra mussel have been documented in the Crow Wing River upstream of the Pillager Project and in the Gull River upstream of the Sylvan Project (USGS 2023). Faucet snail have also been documented in the Mississippi River, Gull River, and Crow Wing River (Minnesota DNR 2023b).

Sampling conducted by the Minnesota DNR and Minnesota PCA in 2010 and 2011 documented 272 unique macroinvertebrate taxa in the Crow Wing River Watershed. The most commonly observed macroinvertebrate genera were *Simulium* (Diptera), *Hyalella* (Amphipoda), *Polypedilum* (Diptera), *Physa* (Gastropoda), and *Cheumatopsyche* (Trichoptera) (Minnesota PCA 2014).

Table 5-28 Mussel Species Documented in the Crow Wing River and Mississippi River

Common Name	Scientific Name	Crow Wing River- Upstream of Pillager	Mississippi River- Crow Wing River to Little Falls	Mississippi River- Downstream of Little Falls
cylindrical papershell	*Anodontoides ferussacianus*	8	-	-
plain pocketbook	*Lampsilis cardium*	71	98	9
fatmucket	*Lampsilis siliquoidea*	238	371	86
white heelsplitter	*Lasmigona complanata*	1	53	1
creek heelsplitter	*Lasmigona compressa*	9	2	1
black sandshell	*Ligumia recta*	17	98	5
giant floater	*Pyganodon grandis*	4	7	1
paper pondshell	*Utterbackia imbecillis*	1	-	-
zebra mussel	*Dreissena polymorpha*	-	2	-
creeper	*Strophitus undulatus*	-	1	-

Sources: Minnesota DNR 2003, Minnesota DNR 2007

5.3.4 Aquatic Invasive Species

Aquatic invasive species have been documented in the Crow Wing River, Gull River, and Mississippi River. Occurrences of zebra mussel have been documented in the reach of the Mississippi River upstream of the Little Falls Project (Minnesota DNR 2003, Minnesota DNR 2007). Additional observations of zebra mussel have been documented in the Crow Wing River upstream of the Pillager Project and in the Gull River upstream of the Sylvan Project (USGS 2023). Faucet snail have also been documented in the Mississippi River, Gull River, and Crow Wing River (Minnesota DNR 2023b). Silver carp and bighead carp have been collected from the reach of the Mississippi River below St. Paul, Minnesota (Minnesota DNR 2022b). Additionally, eDNA samples have indicated the presence of invasive carp upstream of the Coon Rapids dam (P-4369), in a reach of the Mississippi River north of Minneapolis/St. Paul, Minnesota.

MP has developed and implemented guidance procedures for preventing the spread of aquatic species (MP 2023). The guidance document outlines procedures for preventing the spread of aquatic invasive species on watercraft, in compliance with Minnesota Statute's chapter 84D and Minnesota Rule chapter 6216.

5.3.5 Essential Fish Habitat

The National Marine Fisheries Service identifies essential fish habitat (EFH) for fish species that are commercially managed under the Magnuson-Stevens Fishery Conservation and Management Act. EFH is defined as "the habitat necessary for managed fish species to complete their life cycle such that the fishery can be harvested sustainably (NOAA 2023)." There are no federally managed commercial fish species near the Projects; therefore, there is no EFH in the Projects Vicinities.

5.3.6 References

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5.4 Terrestrial Wildlife and Botanical Resources

18 CFR 5.6(d)(3)(v) requires "A description of the wildlife and botanical resources, including invasive species, in the project vicinity. Components of this description must include: (A) Upland habitat(s) in the project vicinity, including the project's transmission line corridor or right-of-way and a listing of plant and animal species that use the habitat(s); and (B) Temporal or spatial distribution of species considered important because of their commercial, recreational, or cultural value."

5.4.1 Upland Botanical Resources

The Little Falls Project lies within the western portion of the Mississippi River-Brainerd Watershed (HUC 07010104). This region is characterized by rangeland, agriculture, development, wetlands, and forests (Minnesota PCA 2019). The Sylvan and Pillager Projects are located within the Crow Wing River Watershed (HUC 8-07010106), which is made up of moderately rolling terrain covered by mixed deciduous and coniferous forests (MP 1995).

Little Falls

The Little Falls Project is located in an urban area near the city of Little Falls and includes a limited amount of land beyond the banks of the Mississippi River. The area within the Little Falls Project Boundary includes forested areas and wetlands along the shorelines and on islands within the Mississippi River. The Little Falls Project Vicinity is mostly urban and suburban, with a mix of forested, residential, and agricultural lands outside the city limits. Despite the high levels of human development, the Little Falls Project sits in a unique ecological position in which a prairie-forest transition zone intersects the Mississippi Valley. The mouth of the Little Elk River, which is within the Little Falls Project Boundary approximately 2.5 miles upstream of the Little Falls dam on the west bank of the Mississippi River, is considered the historic southern edge of Minnesota's extensive pine forest in this region. The upland forested areas within and around the Little Falls Project include forests dominated by oak (*Quercus* spp.), aspen (*Populus* spp.), and jack pine (*Pinus banksiana*), with mixed deciduous floodplains, described in more detail below. Forested areas are generally dominated by hardwoods with coniferous species scattered throughout; however, pine-dominant areas are also present. (MP 1991).

Sylvan Project

The area surrounding the Sylvan Project is primarily forested, but also includes farmland. Areas along the Gull River, south of Highway 210 are developed as seasonal and permanent residences. The rest of the lands bordering the reservoir are primarily undeveloped with rolling topography. The Sylvan Project contains approximately 1,510 acres of forest. The major forest types found at the Sylvan Project and associated timber harvest practices are described below (MP 2016a). Forest composition (based on 2016 inventory) for the Sylvan Project is provided in Table 5-29.

Table 5-29: Sylvan Project Forest Cover Type Acreage Based on 2016 Inventory

Cover Type	Acreage	Percent Cover
Oak	967	64%
Jack pine	195	13%
Aspen	188	12%
Aspen/birch	76	5%
Red/white pine	61	4%
Birch	15	1%
Swamp conifer	8	1%
Total	**1,510**	**100%**

Source: MP 2016b

Oak

Oak species are the dominant tree species at the Sylvan Project, covering approximately 967 acres. The oak type is composed of northern pin oak (*Quercus ellipsoidalis*), northern red oak (*Quercus rubra*), and bur oak (*Quercus macrocarpa*), often growing in association with minor quantities of trembling aspen (*Populus tremuloides*), jack pine, American basswood (*Tilia americana*), and ironwood (*Ostrya virginiana*). (MP 2016b).

In general, the oak forests have an overstory comprised mostly of 70 to 90 year-old red and pin oak. Bur oak of approximately the same age also occupy the overstory but in lesser quantities. Bur oak, considered more shade tolerant than red and pin oak, is the dominant tree in the sub-canopy and represents the majority of the advanced oak regeneration. Other species occur as single trees or in small groups. (MP 2016b).

The soils at the Sylvan Project do not provide favorable growing conditions for harvest-quality oak. As a result, most (approximately 90 percent) harvested oak timber at the Sylvan Project is useful only as firewood. The remaining volume is lower quality sawtimber generally found in the butt logs of larger diameter oak trees. (MP 2016b).

The Licensee’s forest management goal at the Sylvan Project is to maintain the oak type and its associated plant and animal species. Management practices include silvicultural techniques designed to produce timber products and enhance wildlife habitat. (MP 2016b).

Jack Pine

The jack pine cover type covers roughly 195 acres, or 13 percent of the forested acreage at the Sylvan Project. Jack pine occurs in relatively even-aged stands that either originate from fires or have naturally seeded into sandy soils. The jack pine stands range from 0 to 70 years in age and have an average site index of 50 to 55. This is considered a medium site index for jack pine. Monocultures of jack pine stands growing on medium quality sites will grow an average of 0.4 cords per acre per year over a recommended rotation period of 50 to 60 years, yielding about 20 to 24 cords of timber per acre at the time of harvest. (MP 2016b).

The Licensee harvested 102 acres of the total 195 acres in 2015. The harvesting was implemented due to a storm event in July 2015, which blew down much of the over-mature jack pine. Clearcutting is the primary silvicultural technique that is employed in areas dominated by jack pine. These stands will be regenerated to a mixture of red pine (*Pinus resinosa*) and jack pine through tree planting. Stands typed as jack pine that have a substantial component of oak or aspen are managed with a combination of silvicultural techniques that support regeneration of all species in the stand. (MP 2016b).

Aspen and Aspen/Birch

The aspen/birch cover type and aspen cover type are considered together because of similar management strategies. These two cover types occupy 264 acres or approximately 17 percent of the forest land at the Sylvan Project. The aspen and aspen/birch cover types occur in even-aged stands from about 1 to 20 acres in size generally scattered throughout the Sylvan Project. Growing conditions are considered poor to medium for aspen on the sandy soils at the Sylvan Project, with an average site index of about 55 to 60. For comparison, a site index of 70 and above is considered a good site index for aspen. (MP 2016b).

The Licensee harvested 67 acres of the total 264 acres in 2015. The harvesting was implemented due to a storm event in July 2015, which blew down much of the mature aspen. Clearcutting is the primary silvicultural technique that was and continues to be employed. Once a stand of aspen is harvested, it regenerates naturally from root suckers. Birch (*Betula sp.*) regenerates from stump sprouts or seed if mineral soil is exposed during the harvest. (MP 2016b).

Red/White Pine

Most of the acreage classified as red/white pine at the Sylvan Project is located in a stand next to the Sylvan dam on the north bank of the Crow Wing River. This is an area of high visibility because of hydropower operations and recreational use related with the public boat launch. This stand is actively managed for timber; however, an additional high priority is to protect the scenic quality of the area and to maintain an adequate screen of vegetation for the Sylvan Project facilities. Any timber harvesting in this stand is conducted using silvicultural techniques designed to perpetuate the stand and preserve its aesthetic value. (MP 2016b).

Pillager Project

The forest conditions of the Pillager Project are similar to those of the Sylvan Project. The Pillager Project Vicinity is characterized by sandy soils, a mixture of jack pine and oak forests, agricultural land, and plants typically found in prairie and open areas. The Pillager Project Vicinity includes a mixture of uplands and lowlands under various land uses, including seasonal and permanent residences. Both the north and south shores of the Pillager Project reservoir contain residential development. Tree cover around the reservoir area consists of oak, jack pine, red pine, white pine (*Pinus strobus*), and lowland hardwoods in the low-lying shoreline areas. There are two islands located in the Pillager reservoir. The islands contain a mixture of emergent aquatic vegetation and forested areas. Based on 2016 inventory, the Pillager Project contains approximately 357 acres of productive forest. The four forest types found at the Pillager Project are described below and accompanying acreage is provided in Table 5-30 (MP 2016b).

Table 5-30: Pillager Project Forest Cover Type Acreage Based on 2016 Inventory

Cover Type	Acreage	Percentage Cover
Aspen/birch	119	33%
Mixed pine	110	31%
Northern hardwoods	108	30%
Lowland hardwoods	20	6%
Total	**357**	**100%**

Source: MP 2016b

Aspen/Birch

The aspen/birch cover type constitutes roughly 119 acres, or 33 percent of the forested acreage at the Pillager Project. Growing conditions are considered poor to medium for aspen on the area's sandy soils, with an average site index of about 55 to 60. For comparison, a site index of 70 and above is considered a good site index for aspen. (MP 2016a).

MP harvested 31 acres of the total 119 acres in 2015. The harvesting was implemented as a result of the aspen and birch reaching maturity. Clearcutting is the primary silvicultural technique for this cover type. The aspen regenerate from root suckering and the birch regenerate from stump sprouts or seed if mineral soil is exposed during the harvest. (MP 2016a).

Aspen stands provide many benefits to wildlife, particularly white-tailed deer (*Odocoileus virginianus*), ruffed grouse (*Bonasa umbellus*), and woodcock (*Scolopax minor*). These game species thrive in areas that contain a mix of young, old, and medium age aspen stands in close proximity to one another. This varied age structure provides both food and cover during various seasons of the year. MP manages the aspen at the Pillager Project through silvicultural practices that will produce forest products, assure renewal of the aspen stands, and create habitat for ruffed grouse, woodcock, deer, and other wildlife. (MP 2016a).

Mixed Pine

The mixed pine cover type constitutes roughly 110 acres, or 31 percent of the forested acreage at the Pillager Project. This cover type is made up of various ages of red pine, white pine, and jack pine. Roughly 40 acres of jack pine was harvested in 2015 to control a jack pine budworm (*Choristoneura pinus*) infestation. This area was treated in 2016 and was planted to a mixture of red pine, white pine, and jack pine in 2017. The remaining 70 acres of mixed pine is either a management area or is more mature mixed pine. Young jack pine and associated plant species are utilized as browse for deer and other wildlife, and medium aged stands are important cover for a variety of animals. MP will maintain the mixed pine cover type at the Pillager Project to produce timber products and maintain wildlife habitat. (MP 2016b).

Clearcutting is the primary silvicultural technique that is employed when harvesting jack pine. These stands will be regenerated to a mixture of red pine and jack pine through natural seeding and tree planting. Other mixed stands of pine may be harvested in a more selective manner to encourage a more diverse forest stand in the future. (MP 2016b).

Northern Hardwoods

Oaks are the dominant tree species in the northern hardwoods cover type, which constitutes approximately 108 acres, or 30 percent of the forested acreage at the Pillager Project. This cover type is composed of northern pin oak, red oak, and bur oak often growing in association with trembling aspen, jack pine, American basswood, and ironwood. (MP 2016a).

In general, the northern hardwood cover type has an overstory comprised mostly of 70 to 90 year-old red and pin oak. Bur oak of approximately the same age also occupies the overstory but in lesser quantities. Bur oak, considered more shade tolerant than red and pin oak, is the dominant tree in the subcanopy and represents the majority of the advanced oak regeneration. Other species occur as single trees or in small groups. (MP 2016a).

The sandy soils at the Pillager Project do not provide favorable growing conditions for harvest-quality oak. As a result of the growing conditions, most oaks are relatively small, poorly-formed trees. Approximately 90 percent of the oak timber volume is useful only as firewood. The remaining volume is low quality sawtimber generally found in the butt logs of larger diameter oak trees. (MP 2016a).

Lowland Hardwoods

Lowland hardwood forests in Minnesota, such as those which occur within the Pillager Project Boundary occur in floodplains or hardwood swamp communities. Both types of communities exist along the margins of major rivers. Common tree canopy species in floodplains are black ash[42] (*Fraxinus nigra*) and silver maple (*Acer saccharinum*), with lesser amounts of green ash (*Fraxinus pennsylvanica*), American elm (*Ulmus americana*), bur oak (*Quercus macrocarpa*), and basswood. The understory of the floodplains is typically open, with few shrubs or saplings. The most common tree canopy species of hardwood swamp forests is the black ash; other less common trees may include yellow birch (*Betula alleghaniensis*), red maple (*Acer rubrum*), aspens, and balsam poplar (*Populus balsamifera*), basswood, elms, and paper birch (*Betula papyrifera*). Conifer species, especially white cedar (*Thuja occidentalis*) and balsam fir (*Abies balsamea*), are sometimes present in the canopy and understory. The understory of hardwood swamps is characterized by patches of shrubs, including speckled alder (*Alnus incana*), mountain maple (*Acer spicatum*), dogwoods (*Cornus* spp.), gooseberries or currants (*Ribes* spp.), and winterberry (*Ilex verticillata*). (Minnesota DNR 2023a).

5.4.2 Terrestrial Wildlife Resources

The grasslands, hardwood, pine, and aspen forests, wetlands, and agricultural lands at the Projects offer suitable habitats for a variety of common wildlife. The Mississippi, Crow Wing, and Gull rivers, tributaries, and adjacent woodlands provide habitat for animals adapted to both aquatic and terrestrial life. Wildlife species occupy habitats in the surrounding forests, agricultural lands, and grasslands, including popular game species (MP 1991, 2016a, 2016b). Popular game species include the white-tailed deer, ruffed grouse, wild turkey (*Meleagris gallopavo*), woodcock, rabbits, and squirrels (MP 2016a, 2016b).

The abundance and diversity of birds varies with the seasons and the particular habitat at each of the Projects. Many species are observed only during spring and fall migrations. During the fall and winter months trumpeter swans (*Cygnus buccinator*) utilize areas of open water below the Sylvan and Pillager dams (MP 2016a, 2016b). A variety of songbirds utilize the grasslands, hardwood, pine, and aspen forests, wetlands, and agricultural lands in the Projects Vicinities. Common songbirds and raptors are listed in Table 5-31. MP's existing raptor protection policy ensures that measures are taken to protect nesting raptors, including the installation of an alternate pole and nest platform, and/or restrictions of maintenance activities to non-nesting periods of the year

[42] The emerald ash borer (*Agrilus planipennis*), an invasive insect first detected in Minnesota in 2009, may pose a threat to populations of black and green ash within the Pillager Project Boundary. Considered a "serious invasive tree pest" by the Minnesota Department of Agriculture, the Minnesota Department of Agriculture's Plant Protection Division tracks the spread of the emerald ash borer throughout the state.

(MP 1991, MP 2016a, 2016b). Waterfowl and wetland birds at the Projects are discussed in Section 5.5.4. Rare, threatened, and endangered raptors are discussed further in Section 5.6.

A list of common wildlife species known or likely to occur within the Projects Vicinities is found in Table 5-31. Rare, threatened, and endangered wildlife are discussed in Section 5.6.

Table 5-31: Common Wildlife Known or Likely to Occur within the Little Falls, Sylvan, and Pillager Projects Vicinities

Scientific Name	Common Name
Birds	
Acanthis flammea	common redpoll
Actitis macularius	spotted sandpiper
Agelaius phoeniceus	red-winged black bird
Aix sponsa	wood duck
Anas discors	blue-winged teal
Anas platyrhynchos	mallard
Antrostomus vociferus	eastern whip-poor-will
Archilochus colubris	ruby-throated hummingbird
Ardea alba	great egret
Ardea herodias	great blue heron
Aythya affinis	lesser scaup
Aythya americana	redhead
Aythya collaris	ring-necked duck
Aythya marila	greater scaup
Bombycilla cedrorum	cedar waxwing
*Bonasa umbellus**	ruffed grouse
Branta canadensis	Canada goose
Bubo virginianus	great horned owl
Bucephala albeola	bufflehead
Bucephala clangula	common goldeneye
Buteo jamaicensis	red-tailed hawk
Buteo lagopus	rough-legged hawk
Buteo lineatus[1]	red-shouldered hawk
Buteo platypterus	broad-winged hawk
Butorides virescens	green heron
Cardellina canadensis	Canada warbler
Cardinalis cardinalis	northern cardinal
Cathartes aura	turkey vulture
Catharus fuscescens	veery
Catharus guttatus	hermit thrush
Certhia americana	brown creeper
Chaetura pelagica	chimney swift

Scientific Name	Common Name
Charadrius vociferus	killdeer
Chlidonias niger	black tern
Chordeiles minor	common nighthawk
Chroicocephalus philadelphia	Bonaparte's gull
Cistothorus palustris	marsh wren
Coccyzus erythropthalmus	black billed cuckoo
Colaptes auratus	northern flicker
Columba livia	rock pigeon
Contopus cooperi	olive-sided flycatcher
Contopus virens	eastern wood pewee
Corvus brachyrhynchos	American crow
Corvus corax	common raven
Cyanocitta cristata	blue jay
Cygnus buccinator	trumpeter swan
Dolichonyx oryzivorus	bobolink
Dryocopus pileatus	pileated woodpecker
Dumetella carolinensis	gray catbird
Euphagus carolinus	rusty blackbird
Falco columbarius	merlin
Falco sparverius	American kestrel
Fulica americana	American coot
Gavia immer	common loon
Geothlypis trichas	common yellowthroat
Grus canadensis	sandhill crane
Haemorhous mexicanus	house finch
Haemorhous purpureus	purple finch
Haliaeetus leucocephalus	bald eagle
Hirundo rustica	barn swallow
Hylocichla mustelina	wood thrush
Icterus bullockii	Baltimore oriole
Icterus spurius	orchard oriole
Junco hyemalis	dark-eyed junco
Larus delawarensis	ring-billed gull
Larus smithsonianus	herring gull
Leuconotopicus villosus	hairy woodpecker
Lophodytes cucullatus	hooded merganser
Megaceryle alcyon	belted kingfisher
Melanerpes carolinus	red-bellied woodpecker
Melanerpes erythrocephalus	red-headed woodpecker
*Meleagris gallopavo**	wild turkey
Melospiza georgiana	swamp sparrow
Melospiza melodia	song sparrow

Scientific Name	Common Name
Mergus merganser	common merganser
Mergus serrator	red-breasted merganser
Molothrus ater	brown-headed cowbird
Myiarchus crinitus	great crested flycatcher
Oporornis agilis	Connecticut warbler
Oxyura jamaicensis	ruddy duck
Pandion haliaetus	osprey
Passer domesticus	house sparrow
Passerina cyanea	indigo bunting
Pelecanus erythrorhynchos	American white pelican
Petrochelidon pyrrhonota	cliff swallow
Phalacrocorax auritus	double-crested cormorant
Phasianus colchicus	ring-necked pheasant
Pheucticus ludovicianus	rose-breasted grosbeak
Picoides pubescens	downy woodpecker
Piranga olivacea	scarlet tanager
Podiceps auritus	horned grebe
Podiceps grisegena	red-necked grebe
Podiceps nigricollis	eared grebe
Podilymbus podiceps	pied-billed grebe
Poecile atricapillus	black-capped chickadee
Progne subis	purple martin
Quiscalus quiscula	common grackle
Regulus calendula	ruby-crowned kinglet
Regulus satrapa	golden-crowned kinglet
Sayornis phoebe	eastern phoebe
*Scolopax minor**	woodcock
Seiurus aurocapilla	ovenbird
Setophaga coronata	yellow-rumped warbler
Setophaga palmarum	palm warbler
Setophaga petechia	yellow warbler
Setophaga pinus	pine warbler
Setophaga ruticilla	American redstart
Sialia sialis	eastern bluebird
Sitta canadensis	red-breasted nuthatch
Sitta carolinensis	white-breasted nuthatch
Spatula clypeata	northern shoveler
Sphyrapicus varius	yellow-bellied sapsucker
Spinus tristis	American goldfinch
Spizella passerina	chipping sparrow
Spizelloides arborea	American tree sparrow
Stelgidopteryx serripennis	northern rough-winged swallow

Scientific Name	Common Name
Sterna hirundo	common tern
Strix varia	barred owl
Sturnus vulgaris	European starling
Tachycineta bicolor	tree swallow
Toxostoma rufum	brown thrasher
Tringa flavipes	lesser yellowlegs
Tringa solitaria	solitary sandpiper
Troglodytes aedon	house wren
Turdus migratorius	American robin
Tyrannus tyrannus	eastern kingbird
Vermivora chrysoptera	golden-winged warbler
Vireo flavifrons	yellow-throated vireo
Vireo gilvus	warbling vireo
Vireo olivaceus	red-eyed vireo
Zenaida macroura	mourning dove
Mammals	
Canis latrans	coyote
Castor canadensis	beaver
Eptesicus fuscus	big brown bat
Erethizon dorsatum	porcupine
Geomyidae spp.	pocket gopher
Glaucomys spp.	flying squirrel
Lontra canadensis	otter
Lynx rufus	bobcat
Marmota monax	woodchuck
Mephitis mephitis or *Spilogale putorius*	skunk
Microtus spp.	vole
Mus spp.	mouse
Mustela spp.	weasel
Myotis lucifugus	little brown bat
Neogale vison	mink
*Odocoileus virginianus**	white-tailed deer
Ondatra zibethicus	muskrat
Procyon lotor	racoon
*Sciuridae spp.**	ground squirrel
Sciurus carolinensis	gray squirrel
Sciurus vulgaris	red squirrel
*Sylvilagus floridanus**	cottontail rabbit
Synaptomys cooperi	bog lemming
Tamias striatus or *Neotamias minimus*	chipmunk
Taxidea taxus	badger
Ursus americanus	black bear

Scientific Name	Common Name
Amphibians	
Ambystoma laterale	blue-spotted salamander
Ambystoma tigrinum	tiger salamander
Anaxyrus americanus	American toad
Hyla chrysoscelis	Cope's gray treefrog
Lithobates clamitans	green frog
Lithobates pipiens	northern leopard frog
Lithobates septentrionalis	mink frog
Lithobates sylvaticus	wood frog
Notophthalmus viridescens	eastern newt
Plethodon cinereus[2]	red-backed salamander
Pseudacris crucifer	spring peeper
Pseudacris maculata	boreal chorus frog
Reptiles	
Apalone spinifera	spiny softshell
Chelydra serpentina	snapping turtle
Chrysemys picta	painted turtle
Emydoidea blandingii	Blanding's turtle
Graptemys geographica	northern map turtle
Heterodon nasicus[2]	plains hognose snake
Heterodon platirhinos[1]	eastern hognose snake
Opheodrys vernalis[1]	smooth green snake
Pituophis catenifer[2]	gopher snake
Plestiodon septentrionalis	prairie skink
Storeria occipitomaculata	red-bellied snake
Thamnophis radix	plains garter snake
Thamnophis sirtalis	common garter snake

Sources: MP 1999, MP 2016a, MP 2016b, Amphibian and Reptile Survey of Minnesota 2023, eBird 2023a, eBird 2023b, eBird 2023c, USFWS 2023

* game species

[1]Species of greatest conservation need

[2]Special concern

5.4.3 Terrestrial Invasive Species

Invasive species are non-indigenous plant or animal species that aggressively compete with native species. These species often out-compete native species, impacting biodiversity, recreation, and human health. Invasive plants tend to appear in disturbed areas, and the most aggressive have the ability to invade existing ecosystems.

Minnesota defines invasive plants as a nonnative species that cause or may cause economic or environmental harm or harm to human health or threatens or may threaten natural resources or the use of natural resources in the state (Minn. Stat. 84D. 2018). Invasive plants are regulated under both Minnesota State Statute Chapter 84D and Minnesota Rule part 6216. The Minnesota Department of Agriculture classifies state prohibited noxious weeds into three categories: (1) "Prohibited-eradicate noxious weeds" include noxious weeds that must be eradicated on all lands within the state, (2) "Prohibited control noxious weeds" include noxious weeds that must be controlled on all lands within the state, and (3) "Restricted noxious weeds" include noxious weeds and their propagating parts that may not be imported, sold, or transported in the state, except as allowed by permit under Section 18.82 (Minnesota Department of Agriculture 2023a).

An analysis using the Early Detection and Distribution Mapping System (EDDMaps) revealed that seven invasive terrestrial plants are known to occur within the Projects Vicinities (Table 5-32).

Table 5-32: Invasive Terrestrial Plants Observed within the Projects Vicinities

Scientific Name	Common Name	Classification Category
Centaurea stoebe	spotted knapweed	Prohibited control
Cirsium arvense	Canada thistle	Prohibited control
Lonicera tatarica	tatarian honeysuckle	Restricted
Pastinaca sativa	wild parsnip	Prohibited control
Rhamnus cathartica	common or European buckthorn	Restricted
Securigera varia	crown vetch	Restricted
Tanacetum vulgare	common tansy	Prohibited control

Source: EDDMaps 2023, Minnesota Department of Agriculture 2023a

MP implements best management practices to prevent the spread of invasive plant species in accordance with Minnesota DNR's Operational Order 113 – Invasive Species Prevention and Management.

The Minnesota DNR has also established a list of terrestrial invasive wildlife species that may pose a threat to ecological communities in Minnesota (Minnesota DNR 2023b). The European starling (*Sturnus vulgaris*) has been observed at the Little Falls dam and the Sylvan dam (eBird 2023a, 2023c). The Japanese beetle (*Popillia japonica*) has been observed within Cass and Crow Wing counties; however, these observations were outside of all Projects Vicinities (EDDMaps 2023).

Although not reported within the Projects Vicinities, the emerald ash borer (*Agrilus planipennis*) and spongy moth (*Lymantria dispar*) are invasive insects which are present in the state of Minnesota as of 2023 and may threaten forest species at the Projects. The emerald ash borer causes damage to ash trees by tunneling under the bark of ash trees. Infections can quickly spread and lead to the deaths of entire ash tree populations. Since ash trees are present at the Projects, this insect poses a serious threat (Minnesota Department of Agriculture 2023b). Similarly, the spongy moth can infest and kill up to 300 species of deciduous trees, including birches, aspens, and oaks (all of which can be found at the Projects). A spongy moth infestation leads to tree defoliation, which can stress trees and make them more vulnerable to other infections, eventually killing them (Minnesota DNR 2023c).

Although native to North America, the jack pine budworm is a pest insect which caused damage to the jack pine population at the Pillager Project in 2015. This infestation was controlled by clearcutting the infected timber (MP 2016b).

5.4.4 References

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5.5 Wetlands, Riparian, and Littoral Habitat

18 CFR 5.6(d)(3)(vi) requires "Description of floodplains, wetlands, riparian, and littoral habitat (1) List of plant and animal species using the habitat (2) Map of wetlands, riparian and littoral habitat (3) Acreage estimate for each type of land including variability connected to project operations."

5.5.1 Overview

The U.S. Fish and Wildlife Service (USFWS) classification scheme for wetlands serves as the national standard for wetland classification and has been used to classify wetlands appearing in the National Wetlands Inventory (USFWS 2023). The National Wetland Inventory (NWI) coverage is developed from aerial photography. USFWS 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 the purpose of the classification, wetlands must have one or more of these three attributes: (1) at least periodically, the land must support predominantly wetland plants; (2) the substrate is predominantly undrained hydric soil; and (3) rocky, gravelly, or sandy areas that are saturated with or covered by shallow water at some time during the growing season.*" (USFWS 1993).

Information regarding the location and spatial extent of wetland resources in the Projects Vicinities were obtained from the NWI. The mapped NWI features within the Projects are detailed in Table 5-33, Table 5-34, and Table 5-35. The mapped NWI features in the Little Falls Project Vicinity are presented in Figure 5-9 and the mapped NWI features in the Sylvan Project Vicinity and Pillager Project Vicinity are presented in Figure 5-10.

As depicted on Figure 5-9, the NWI features in the Little Falls Project Vicinity primarily includes a riverine area of the Mississippi River. As depicted on Figure 5-10, in the Sylvan Project Vicinity there are riverine and lacustrine mapped areas at the Crow Wing River and Gull River, and additional freshwater wetland areas are located throughout the Project Vicinity, including NWI mapped wetland areas located just south of the Sylvan reservoir and at the northern end of the Gull River within the Project Vicinity. As depicted on Figure 5-10, in the Pillager Project Vicinity the Pillager reservoir is mapped as lacustrine and the Crow Wing River on the western end of the Project Boundary is mapped as riverine. There are mapped wetland areas in the Pillager Project Vicinity, including a relatively large area mapped as wetland on the southern side of the Project Vicinity.

Table 5-33: USFWS National Wetland Inventory Mapped Wetlands in the Little Falls Project Boundary

NWI Wetland Type	Acres in the Project Boundary
Freshwater Emergent Wetland	15.7
Freshwater Forested/Shrub Wetland	50.1
Freshwater Pond	0.9
Riverine	606.5

Source: USFWS 2023

Table 5-34: USFWS National Wetland Inventory Mapped Wetlands in the Sylvan Project Boundary

NWI Wetland Type	Acres in the Project Boundary
Freshwater Emergent Wetland	564.3
Freshwater Forested/Shrub Wetland	473.6
Freshwater Pond	60.0
Lake	828.5
Riverine	365.3

Source: USFWS 2023

Table 5-35: USFWS National Wetland Inventory Mapped Wetlands in the Pillager Project Boundary

NWI Wetland Type	Acres in the Project Boundary
Freshwater Emergent Wetland	60.9
Freshwater Forested/Shrub Wetland	78.3
Freshwater Pond	6.5
Lake	514.6
Riverine	166.2

Source: USFWS 2023

Figure 5-9: NWI Mapped Wetlands in the Little Falls Project Vicinity

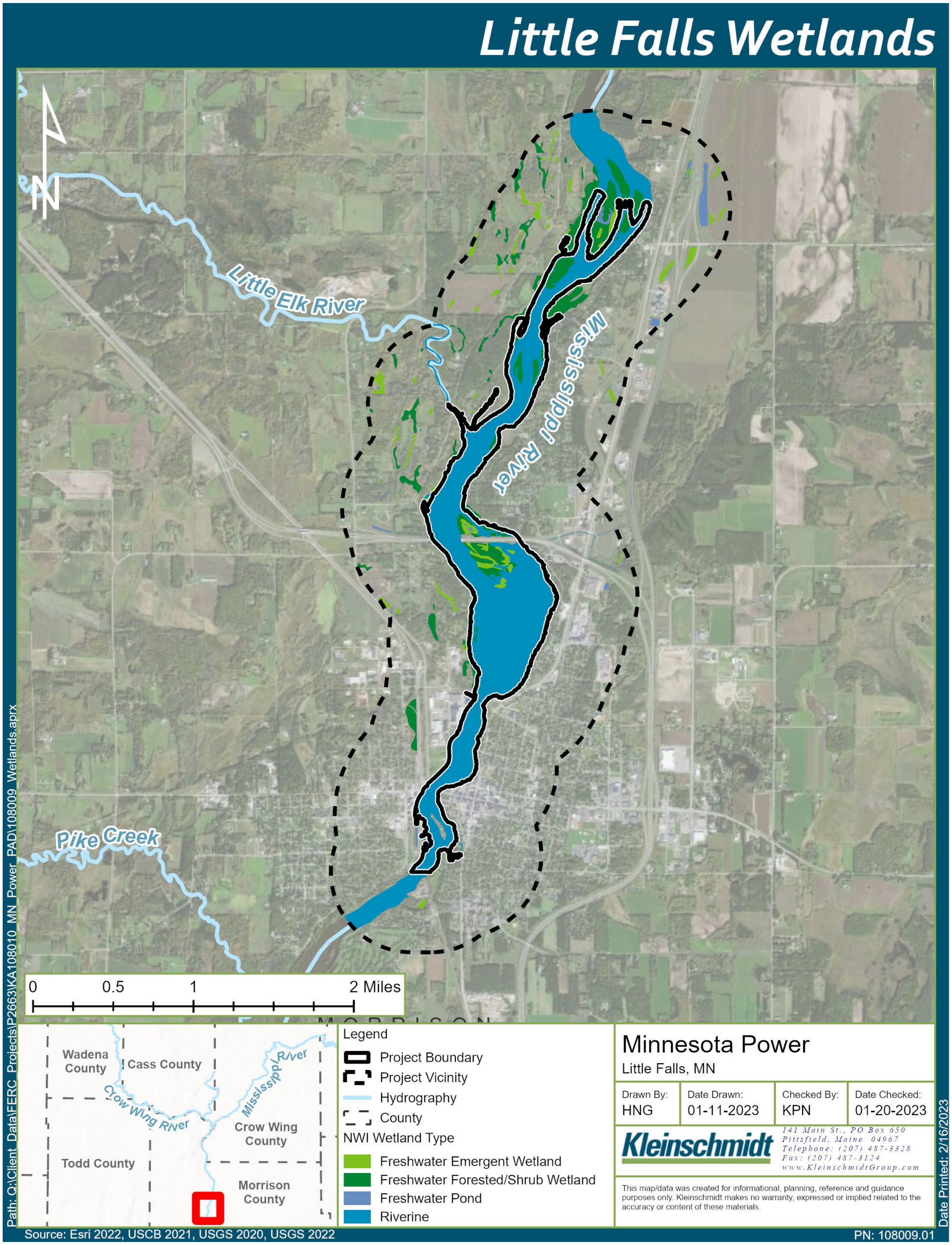
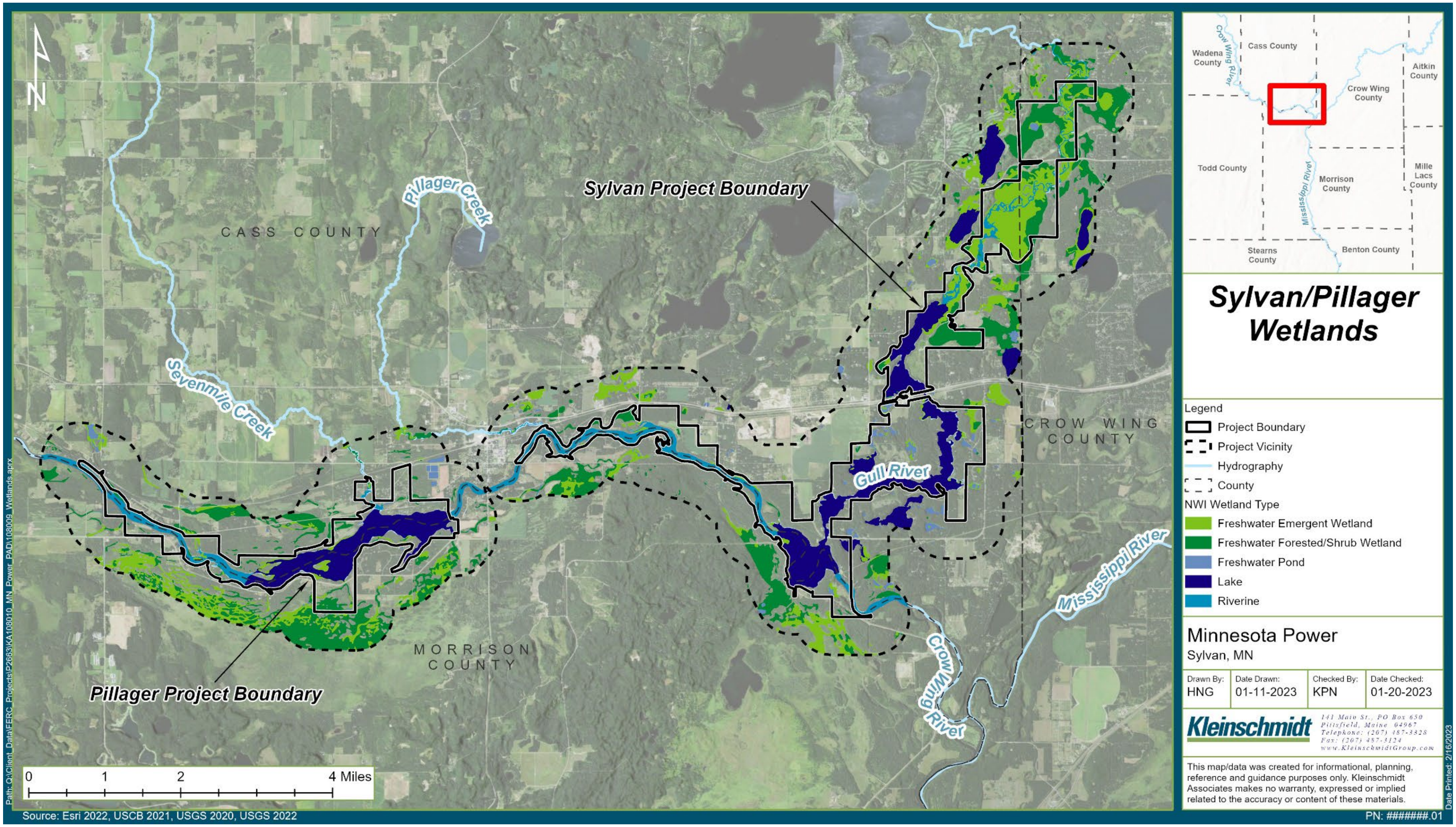


Figure 5-10: NWI Mapped Wetlands in the Sylvan and Pillager Projects Vicinity



5.5.2 Riparian and Littoral Habitat

Riparian habitat is located along streams, rivers, and lakes, and provides important ecosystem functions related to hydrology and flooding, nutrient cycling, and plant and wildlife habitat (Mitsch and Gosselink 2000). Riparian habitat within the Projects Vicinities includes land adjacent to the Mississippi River (Little Falls Project) the Crow Wing River (Sylvan Project and Pillager Project), and the Gull River (Sylvan Project) as well as associated tributaries. These riparian habitats are found in the floodplains of the river and associated tributaries. Tributaries are described in more detail in Section 3.2.

The Minnesota DNR defines the littoral zone within a lake or pond as "the shallow transition zone between dry land and the open water area of the lake" (Minnesota DNR 2023d). The littoral zone acts as an interface between the open water aquatic environment and the terrestrial environment (Wetzel 2001). The size and extent of the littoral zone within a waterbody varies depending upon geomorphology and sedimentation within the aquatic system (Wetzel 2001). According to the Minnesota DNR, "the littoral zone extends from the shore to a depth of about 15 feet, depending on water clarity," and provides conditions of shallow water, abundant light, and nutrient rich sediment that are ideal for plant growth (Minnesota DNR 2023d). The littoral habitat at the Projects includes the area just below the ordinary high water mark of the Crow Wing, Gull, and Mississippi rivers. The greatest amount of littoral habitat among the Projects is present along the Gull River shoreline of the Sylvan Project, given that the reservoir in this area is shallow and contains a substantial amount of aquatic vegetation (MP 2016a).

5.5.3 Wetland Habitat

Wetlands have the potential to provide a variety of ecological functions including groundwater discharge and recharge, flood-flow alteration, fish and shellfish habitat, sediment, toxicant, and pathogen retention, nutrient removal, retention, and transformation, production export, sediment and shoreline stabilization, and wildlife habitat. Wetlands also support human-defined values such as recreation, educational and scientific use, uniqueness and heritage, visual quality, and threatened and endangered species habitat (USACE 1999). Understanding the distribution and characteristics of wetlands on the landscape is useful for land use planning and management.

Wetland habitat within the Projects Vicinities include freshwater emergent, forested/shrub wetland, and ponds. Emergent wetlands are dominated by grasses, sedges, rushes, and flowering herbaceous plants. Forested/shrub wetlands are characterized by woody vegetation, including an overstory of trees and understory of young trees and/or shrubs, and herbaceous plants. Ponds include areas of open water with vegetative cover less than 30 percent. (Cowardin et al. 1979).

5.5.4 Wetland, Riparian, and Littoral Plant and Animal Species

The Mississippi, Crow Wing, and Gull Rivers in the Projects Vicinities contain littoral habitat, emergent wetlands, forested/shrub wetlands, and ponds, which offer suitable habitat for wildlife. Littoral zones and wetlands in Minnesota support aquatic plants, which provide habitat to animals such as fishes, frogs, birds, muskrats, turtles, insects, and snails (Minnesota DNR 2023d). Many of the species that utilize terrestrial habitats outlined in Section 5.4 also utilize wetlands.

Waterfowl and Shore Birds

The Projects provide wetland and littoral habitat for waterfowl and shorebirds. Birds that have been observed in the Projects Vicinities are listed in Table 5-31 in Section 5.4.2. Bird species diversity increases along the rivers during migration periods. Waterfowl and shore birds which have been observed on the rivers and utilize wetland habitat include mallards (*Anas platyrhynchos*), blue-winged teal (*Anus discors*), wood ducks (*Aix sponsa*), Canada geese (*Branta canadensis*), great blue herons (*Ardea herodias*), and green herons (*Butorides virescens*). During the winter months trumpeter swans have been observed at the Sylvan Project utilizing areas of open water below the Sylvan dam. (MP 2016a, 2016b).

The Gull River in the Sylvan Project contains an abundance of backwater areas and aquatic vegetation, which provide ideal habitat for nesting opportunities for many species of waterfowl. A Wildlife Lake Habitat Survey Report was prepared by the Minnesota DNR in March 2006 for the Gull River. The survey describes that the Gull River has vegetation that supports waterfowl habitat including several varieties of duck weeds, and abundant wild rice (*Zizania* spp). MP completed aquatic vegetation surveys in 2013, 2014, and 2015 and those surveys also documented abundant wild rice beds and varieties of duck weeds. The 2006 Minnesota DNR report describes observations of wood ducks and great blue herons during the survey, along with a variety of additional wildlife and fish species. (MP 2016b).

MP has placed wood duck nesting boxes in the Sylvan and Pillager Projects Vicinities, including along the Gull River in the Sylvan Project Boundary. The purposes of these boxes are to enhance waterfowl nesting conditions for cavity nesting waterfowl. During monthly monitoring on the Crow Wing River in 2013, 2014, and 2015, numerous varieties of waterfowl, including broods of Canada geese gooselings, and various species of ducklings, were observed. Several other wetland birds were observed in abundance along the rivers with sittings of great blue herons, king fishers (*Megaceryle alcyon*), and variety of songbirds. (MP 2016b).

Vegetation

Common wetland vegetation observed by MP staff to be present within the emergent, forested, and shrub wetlands in the Projects Vicinities include sedges (*Carex* spp.), cattails (*Typha* spp.), rushes (*Scirpus* and *Juncus* spp.), ash (*Fraxinus* spp.), maples (*Acer* spp.), birches (*Betula* spp.), poplars (*Populus* spp.), and shrubs (*Viburnum* spp., *Cornus* spp., *Alnus* spp.) (USACE 2015, Minnesota DNR 2023c). A list of wetland plants known or likely to occur within the Projects Vicinities is included in Table 5-36 below.

Table 5-36: Wetland Plants Known or Likely to Occur within the Little Falls, Sylvan, and Pillager Projects Vicinities

Scientific Name	Common Name
Abies balsamea	balsam fir
Acer negundo	boxelder
Acer saccharinum	silver maple
Acer spicatum	mountain maple
Alnus incana	speckled alder
Asclepias incarnata	swamp milkweed
Betula alleghaniensis	yellow birch
Betula pumila	bog birch
Bidens cernua	nodding burr marigold
Calamagrostis canadensis	bluejoint grass
Carex spp.	sedges
Cicuta bulbifera	bulblet water hemlock
Cicuta maculata	spotted water hemlock
Cornus amomum	silky dogwood
Cornus racemosa	gray dogwood
Cornus sericea	red-osier dogwood
Eleocharis spp.	spike rushes
Eupatoriadelphus maculatus	spotted Joe-pye weed
Fraxinus nigra	black ash
Fraxinus pennsylvanica	green ash
Glyceria canadensis	rattlesnake manna grass
Glyceria striata	fowl manna grass
Ilex verticillata	winterberry
Juncus spp.	rushes

Scientific Name	**Common Name**
Larix laricina	tamarack
Leersia oryzoides	rice cut grass
Persicaria pennsylvanica	pinkweed
Picea mariana	black spruce
Pontederia cordata	pickerelweed
Populus balsamifera	balsam poplar
Populus deltoides	cottonwood
Populus tremuloides	quaking aspen
Sagittaria latifolia	broad-leaved arrowhead
Salix amygdaloides	peach-leaved willow
Salix bebbiana	Bebb's willow
Salix discolor	pussy willow
Salix exigua	sandbar willow
Salix nigra	black willow
Sambucus canadensis	American elderberry
Scirpus spp.	bulrushes
Schoenoplectus acutus	hardstem bulrush
Schoenoplectus tabernaemontani	softstem bulrush
Scutellaria galericulata	marsh skullcap
Sium suave	water parsnip
Spirea alba	meadowsweet
Spirea tomentosa	hardhack
Symphyotrichum spp.	asters
Thelypteris palustris	northern marsh fern
Thuja occidentalis	white cedar
Tilia americana	basswood
Typha angustifolia	narrowleaf cattail
Typha latifolia	broadleaf cattail
Ulmus americana	American elm
Verbena hastata	blue vervain
Zizania aquatica	annual wild rice
Zizania palustris	northern wild rice

Sources: Minnesota DNR 2023c, Smith 2008, USACE 2015, USACE 2020

Aquatic vegetation is abundant in the Pillager and Sylvan reservoirs, at the confluence with the Crow Wing River, and in surrounding shoreline and wetland habitats. Plant species with value to wildlife observed at the Sylvan Project and the Pillager Project include wild rice, flat-stem pondweed (*Potamogeton zosteriformis*), coontail, northern watermilfoil, common duckweed (*Lemna minor*), and giant duckweed (*Spirodela polyrhiza*) (MPLC 1991 and MPLC 1995).

Invasive Species

As outlined in more detail in Section 5.3, invasive carp species are known to occur downstream of the Blanchard Project in the Mississippi River, and faucet snail and zebra mussels are present in the Mississippi River, Gull River, and Crow Wing Rivers (Minnesota DNR 2023a, USGS 2023a).

Invasive aquatic and wetland plant species that have been documented in the Crow Wing watershed include curly-leaf pondweed (*Potamogeton crispus*), Eurasian watermilfoil (*Myriophyllum spicatum*), purple loosestrife (*Lythrum salicaria*), common reed (*Phragmites australis*), and plumeless thistle (*Carduus acanthoides*) (EDDMaps 2023, Minnesota DNR 2023b, Minnesota PCA 2014, USGS 2023b).

5.5.5 References

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5.6 Rare, Threatened, and Endangered Species

18 CFR 5.6(d)(3)(vii) requires "A description of any listed rare, threatened and endangered, candidate, or special status species that may be present in the project vicinity. Components of this description must include: (A) A list of Federal- and state-listed, or proposed to be listed, threatened and endangered species known to be present in the project vicinity; (B) Identification of habitat requirements; (C) References to any known biological opinion, status reports, or recovery plan pertaining to a listed species; (D) Extent and location of any federally- designated critical habitat, or other habitat for listed species in the project area; and (E) Temporal and spatial distribution of the listed species within the project vicinity."

5.6.1 Overview

Information on rare, threatened, and endangered (RTE) species potentially occurring within the Projects Vicinities was obtained from rare species databases maintained by the USFWS Information for Planning and Consultation (IPaC) and the Natural Heritage Information System (NHIS) maintained by the Minnesota DNR.

5.6.2 Rare, Threatened, and Endangered Wildlife Resources

According to the USFWS IPaC list and letter from USFWS dated January 11, 2023 (Appendix C), three federally-listed species potentially occur in the Projects Vicinities: the threatened gray wolf (*Canis lupus*), endangered northern long-eared bat (*Myotis septentrionalis*)[43], and the proposed endangered tricolored bat (*Perimyotis subflavus*) (USFWS 2023a). In addition, the monarch butterfly (*Danaus plexippus*), a candidate federally-listed species, may occur at the Projects. There are no critical habitats at the Projects (USFWS 2023a). There are currently no recovery plans in place for any of the federally-listed or proposed species that have the potential to occur within the Projects Vicinities.

According to the Minnesota NHIS database, eight state-listed wildlife species have been identified within the Projects Vicinities as specified in Table 5-37. The NHIS information described herein is based on a query submitted within the Projects Vicinities (a buffer of ½ mile around the Projects boundaries). Formal Natural Heritage Reviews of the Projects were requested from Minnesota DNR NHIS via the Minnesota Conservation Explorer tool on February 2, 2023. The results were received on March 24, 2023 and are provided in Appendix C.

Bald eagle (*Haliaeetus leucocephalus*) nests have been identified within the Sylvan Project Vicinity and Pillager Project Vicinity (MP 2016a, 2016b). The exact locations of these nests are being

[43] The effective date of reclassifying the northern long-eared bat as an endangered species is March 31, 2023, as posted on the Federal Register on January 26, 2023: https://www.federalregister.gov/documents/2023/01/26/2023-01656/endangered-and-threatened-wildlife-and-plants-endangered-species-status-for-northern-long-eared-bat.

withheld to protect the nesting eagles. Bald eagles are protected under the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act. (MP 2016a, 2016).

Gray Wolf

The gray wolf lives near lakes and sub-boreal forests in Minnesota. The gray wolf range in Minnesota has grown from the northeast corner of the state in the 1970s toward the center of the state (2000s). Wolf packs live within territories ranging in size from 50 square miles to more than 1,000 square miles, depending on available prey and their seasonal movements. Their adaptability is reflected in the wide range of habitats which they can occupy, including temperate forests, mountains, tundra, taiga, grasslands, and deserts. The gray wolf does not migrate extensive distances and, therefore, does not have a significant temporal distribution. (USFWS 2023b). Wolves require large amounts of space, therefore are sensitive to habitat loss, degradation, and fragmentation caused by the development of urban and agricultural landscapes. Other indirect factors which may impact wolf populations in Minnesota include parasites, disease, or a loss/changing density of prey resources (moose and deer) (Minnesota DNR 2022).

Northern Long-eared Bat

The northern long-eared bat, distinguished from other species of *Myotis* by its long ears, is a wide-ranging species found in a variety of forested habitats in summer and hibernates in caves in winter (USFWS 2023c). The species is found across eastern and north central U.S. and southern Canada and is generally associated with old-growth forests (NatureServe 2023). Northern long-eared bats overwinter in hibernacula that include caves and abandoned mines (USFWS 2023c). Rarely are there more than 100 individuals per hibernation colony (NatureServe 2023). Mating occurs in late summer or fall prior to hibernation, and each female delivers a single pup in June or early July. In summer, the bats generally are colonial but tend to be more solitary than other *Myotis* species, often roosting alone in deep cracks and crevices, under bark, or in hollows of live and dead trees. Foraging occurs within forests, along forest edges and clearings, and occasionally over ponds. Principal threats to the species include human disturbance of hibernating bats and mortality due to white-nose syndrome. (USFWS 2023c).

Tricolored Bat

The tricolored bat is found in most of the eastern United States and southeastern Canada. In the winter, tricolored bats hibernate in caves, mines, and tunnels. The bats tend to occupy the deeper portions of the hibernaculum where temperatures and humidity are higher. In the summer, tricolored bats generally roost singly, often in trees, but some males and non-reproductive females also roost in their winter hibernaculum. Tricolored bats forage early in the evening, mainly over water, and tend to avoid deep woods or open fields. Tricolored bats eat moths, flies, beetles, and ants. In Minnesota, tricolored bats have never been found in large numbers, and no maternity colony has yet been found in the state. Human activity in caves where bats are hibernating can be detrimental, causing disturbed bats to awaken frequently during the winter. Disturbance may result in bats emerging from the hibernaculum early, before there is an adequate supply of insects for them to feed on. In addition, disturbance may cause them to fail to awaken altogether (Minnesota DNR 2023a). A major threat to tricolored bat populations is white-nose syndrome. In areas impacted by the disease, the fungal pathogen has led to declines of more than 90 percent of tricolored bat winter colony abundance (USFWS 2023d). In addition, tricolored bats face susceptibility during hibernation. Human disturbance of tricolored bat hibernation sites may result in the bats emerging from hibernation too early, before there are adequate food resources to support them. The small population size of tricolored bats within the state of Minnesota also makes the populations more susceptible to disturbances in general (Minnesota DNR 2023a).

Monarch Butterfly

Monarch butterfly is a candidate species not yet proposed for listing under the Endangered Species Act of 1973 (USFWS 2020). In the summer, monarch butterflies are found throughout Minnesota in backyards, parks, and rural areas (Minnesota DNR 2023b). The species is a large and conspicuous butterfly that exhibits long-distance migration and overwinters as adults at forested locations in Mexico and California. Adult monarch butterflies feed on nectar from a wide variety of flowers. Reproduction is dependent on the presence of milkweed (*Asclepias* spp.), the sole food source for larvae. Larvae develop and feed on the milkweed plant, sequestering chemicals as a defense against predators. Adults live up to six to nine months, and multiple generations are produced over the course of the breeding season. Monarch butterflies occur across the continental U.S., but populations have been declining over the past 20 years. Primary threats to the species include the loss and degradation of habitat from conversion of grasslands to agriculture, widespread use of herbicides, exposure to insecticides, land-clearing activities in overwintering sites, urban development, and general loss of milkweed and nectar sources across the species' range from various land development activities. (USFWS 2020).

Bald Eagle

The bald eagle was removed from the Endangered Species Act listing on August 8, 2007 but is still protected by the Bald and Golden Eagle Protection Act, which prohibits the take, possession, transport, or sale (among other actions) of live or dead eagle and their parts, nests, or eggs, unless authorized by a permit (USFWS 1940). In Minnesota, bald eagles commonly breed on northern lakes and along the St. Croix and Mississippi Rivers. Bald eagles move south for the winter to open water areas that attract large numbers of waterfowl or fish. In Minnesota, this includes the Minnesota and Mississippi Rivers and sometimes lakes in the southern part of the state (University of Minnesota 2023).

Table 5-37: State-Listed Wildlife Species with the Potential to Occur in the Projects Vicinities

Scientific Name	Common Name	State Status	Project			Habitat
			Little Falls	Pillager	Sylvan	
Buteo lineatus	red-shouldered hawk	SC			X	Wet Forest, Floodplain Forest, Mesic Hardwood Forest, Fire Dependent Forest
Chondestes grammacus	lark sparrow	SC			X	Rock Outcrop, Fire Dependent Forest, Savanna, Upland Prairie
Emydoidea blandingii	Blanding's turtle	T	X	X	X	Savanna, Large Rivers, Medium Rivers and Streams, Small Rivers and Streams, Marsh, Wet Meadow/Carr, Forested Rich Peatland, Wet Forest, Floodplain Forest, Lowland Prairie, Upland Prairie
Myotis lucifugus	little brown bat	SC			X	Floodplain Forest, Mesic Hardwood Forest, Floodplain Forest
*Myotis septentrionalis**	northern long-eared bat	SC			X	Floodplain Forest, Subterranean, Mesic Hardwood Forest, Fire Dependent Forest
Lasmigona compressa	creek heelsplitter	SC	X		X	Small Rivers and Streams
Ligumia recta	black sandshell	SC	X		X	Large Rivers, Medium Rivers and Streams

Source: NHIS 2023

Notes: E=Endangered, T=Threatened, SC=Special Concern

*= also federally endangered, as of March 31, 2023

5.6.3 Rare, Threatened, and Endangered Botanical Resources

There are no federally-listed plant species that potentially occur within the Projects Vicinities according to the USFWS IPaC list and letter from USFWS dated January 11, 2023 (Appendix C) (USFWS 2023). According to the Minnesota NHIS database, five state-listed botanical species have been identified within the Projects Vicinities as specified in Table 5-38.

Table 5-38: State-Listed Botanical Species with the Potential to Occur in the Projects Vicinities

Scientific Name	Common Name	State Status	Project			Habitat
			Little Falls	Pillager	Sylvan	
Besseya bullii	kitten-tails	T	X			Savanna, Upland Prairie, Fire Dependent Forest
Carex obtusata	blunt sedge	SC	X			Savanna, Upland Prairie
Cirsium pumilum var. *hillii*	Hill's thistle	SC	X			Savanna, Upland Prairie
Juglans cinerea	butternut	E	X			Mesic Hardwood Forest

Source: NHIS 2023

Notes: E=State Endangered, T=State Threatened, SC=State Species of Special Concern

5.6.4 References

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5.7 Recreation and Land Use

18 CFR 5.6(d)(3)(viii) requires "A description of the existing recreational and land uses and opportunities within the project boundary. The components of this description include: (A) Text description illustrated by maps of existing recreational facilities, type of activity supported, location, capacity, ownership and management; (B) Current recreational use of project lands and waters compared to facility or resource capacity; (C) Existing shoreline buffer zones within the project boundary; (D) Current and future recreation needs identified in current State Comprehensive Outdoor Recreation Plans, other applicable plans on file with the Commission, or other relevant local, state, or regional conservation and recreation plans; (E) If the potential applicant is an existing licensee, its current shoreline management plan or policy, if any, with regard to permitting development of piers, boat docks and landings, bulkheads, and other shoreline facilities on project lands and waters; (F) A discussion of whether the project is located within or adjacent to a: (1) River segment that is designated as part of, or under study for inclusion in, the National Wild and Scenic River System; or (2) State-protected river segment; (G) Whether any project lands are under study for inclusion in the National Trails System or designated as, or under study for inclusion as, a Wilderness Area. (H) Any regionally or nationally important recreation areas in the project vicinity; (I) Non-recreational land use and management within the project boundary; and (J) Recreational and non-recreational land use and management adjacent to the project boundary."

5.7.1 Recreation

Lands and waters at the Projects provide a variety of public recreational opportunities through formal and informal public recreation sites, as described in the following sections.

5.7.1.1 Existing Recreation Sites and Opportunities

Recreation at the Little Falls Project

The Licensee does not directly provide recreational facilities at the Little Falls Project, although there are several sites that provide public access to the Little Falls Project reservoir. Recreation sites in the Little Falls Project Vicinity are listed on Table 5-39 and depicted on Figure 5-11. The Licensee has cooperated with the city of Little Falls in establishing shoreline fishing areas at two city of Little Falls-owned parks near the dam. In addition, the Licensee helps the city of Little Falls maintain a canoe portage around the Little Falls dam. The portage is about 1,000 feet long and parallels the river on the east bank through a city of Little Falls park.

Table 5-39: Public Recreation Sites in the Little Falls Project Vicinity

Site Name	Description
Mill Park	615 Lindbergh Drive South. Mill Park is located at the former site of Hennepin Paper Company. Amenities/activities include: walking, fishing, artifacts from the Hennepin Paper Mill, park area, and views of the Mississippi River. Shown on Photo 5-1. (City of Little Falls 2023a).
Maple Island Park	59 3rd Avenue SE. Paved walking trails, pavilion, restrooms, and views of the Mississippi River. Shown on Photo 5-2. (City of Little Falls 2023a).
James Green Park	38 1st Avenue SE. Paved walking paths and views of the Little Falls Dam on the Mississippi River. Shown on Photo 5-3. (City of Little Falls 2023a).
Columbia Park	505 3rd Avenue SE. Playground, picnic area, baseball field, and basketball court. Shown on Photo 5-4. (City of Little Falls 2023a).
Veterans Memorial Park	25 Broadway Avenue East. Memorial wall, memorial bricks, picnic area, and views of the Mississippi River. Shown on Photo 5-5. (City of Little Falls 2023a).
Memorial Park	26 Broadway Avenue East. Memorials, fountains, and flower beds. Shown on Photo 5-6. (City of Little Falls 2023a).
Kiwanis Park	59 1st Avenue NE. Picnic area and fishing pier on the Mississippi River. Shown on Photo 5-7. (City of Little Falls 2023a).
Old City Beach Parking Lot	501 1st Street NE. Boat landing on the Mississippi River. Shown on Photo 5-8. (City of Little Falls 2023a).
Pine Tree Playground	801 4th Street NE. Playground, baseball field, basketball court, and ice skating and hockey rink. Shown on Photo 5-9. (City of Little Falls 2023a).
Canoe Portage	Located at Front Street and Broadway East. Canoe portage around dam. Shown on Photo 5-11. (City of Little Falls 2023a).
LeBourget Park	300 Paul Larson Memorial Drive. Amphitheater, kiosks, picnic area, boat landing, and fishing pier on the Mississippi River. Shown on Photo 5-11. (City of Little Falls 2023a).
Riverside Park	901 1st Street NE. Picnic area and views of the Mississippi River. Shown on Photo 5-12. (City of Little Falls 2023a).
Little Falls Area Recreation Complex	14873 Prairie Drive. Playground and picnic areas. Shown on Photo 5-13. (City of Little Falls 2023a).
Bell Prairie County Park	19169 Haven Road Little Falls, MN 56345. Boat landing, parking, disc golf, hiking trails, picnic shelters, playground, primitive restrooms (April through November), and scenic overlook. (Morrison County 2023a).

Figure 5-11: Recreation Sites in the Little Falls Project Vicinity

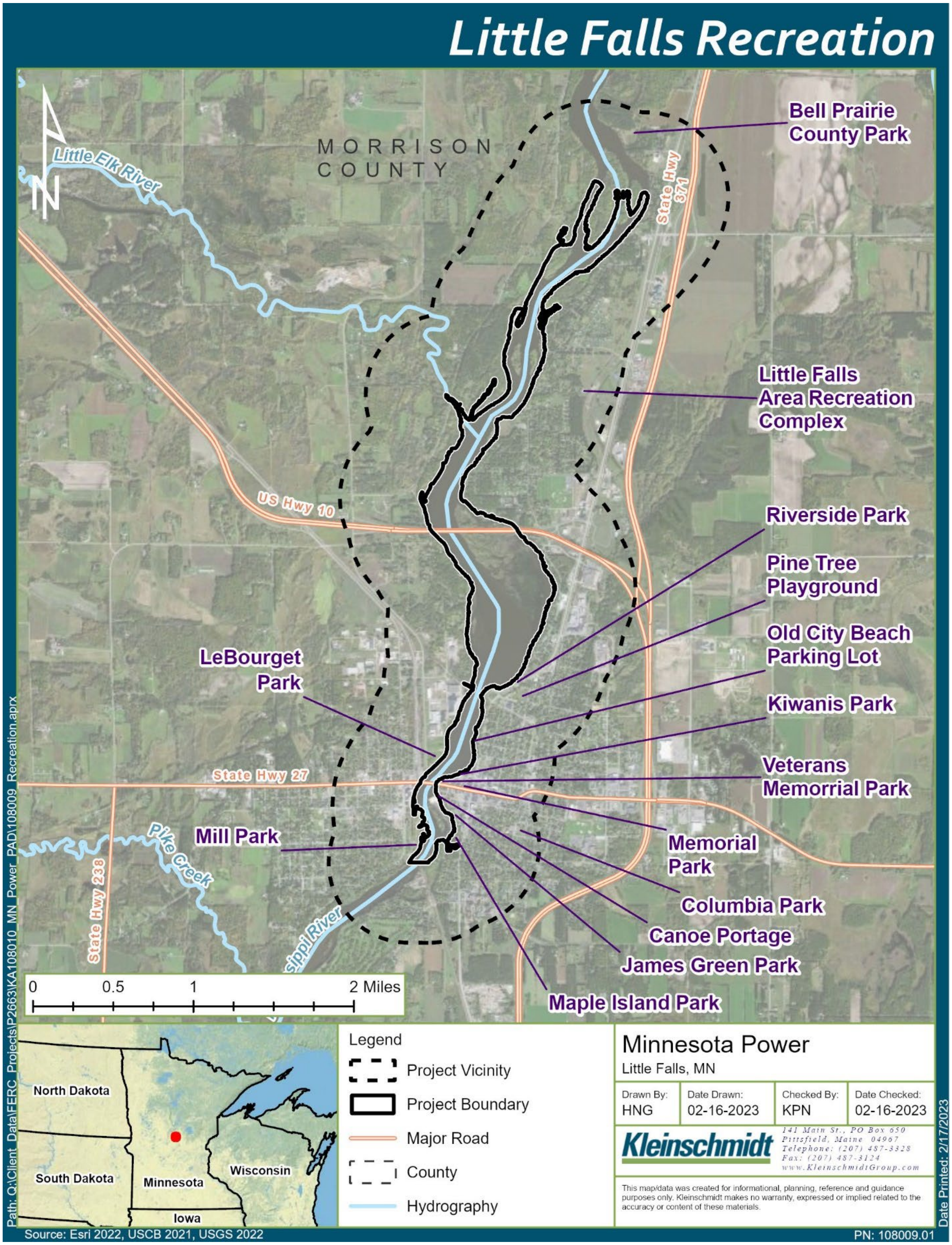


Photo 5-1: Mill Park in Little Falls Project Vicinity

Source: City of Little Falls 2023a

Photo 5-2: Maple Island Park in Little Falls Project Vicinity

Source: City of Little Falls 2023a

Photo 5-3: James Green Park in Little Falls Project Vicinity

Source: City of Little Falls 2023a

Photo 5-4: Columbia Park in Little Falls Project Vicinity

Source: City of Little Falls 2023a

Photo 5-5: Veterans Memorial Park in Little Falls Project Vicinity

Source: City of Little Falls 2023a

Photo 5-6: Memorial Park in Little Falls Project Vicinity

Source: City of Little Falls 2023a

Photo 5-7: Kiwanis Park in Little Falls Project Vicinity

Source: City of Little Falls 2023a

Photo 5-8: Old City Beach Parking Lot in Little Falls Project Vicinity

Source: City of Little Falls 2023a

Photo 5-9: Pine Tree Playground in Little Falls Project Vicinity

Source: City of Little Falls 2023a

Photo 5-10: Canoe Portage at Little Falls Project

Source: City of Little Falls 2023a

Photo 5-11: LeBourget Park in Little Falls Project Vicinity

Source: City of Little Falls 2023a

Photo 5-12: Riverside Park in Little Falls Project Vicinity

Source: City of Little Falls 2023a

Photo 5-13: Little Falls Area Recreation Complex in Little Falls Project Vicinity

Source: City of Little Falls 2023a

Recreation at the Sylvan Project

Recreational opportunities at the Sylvan Project include boating, fishing (ice and open water fishing), snowmobiling, hunting, hiking, and swimming. Shoreline development is limited. Recreation sites at the Sylvan Project are listed in Table 5-40. MP manages the Sylvan Dam Canoe Portage while Minnesota DNR maintains the remaining recreation facilities.

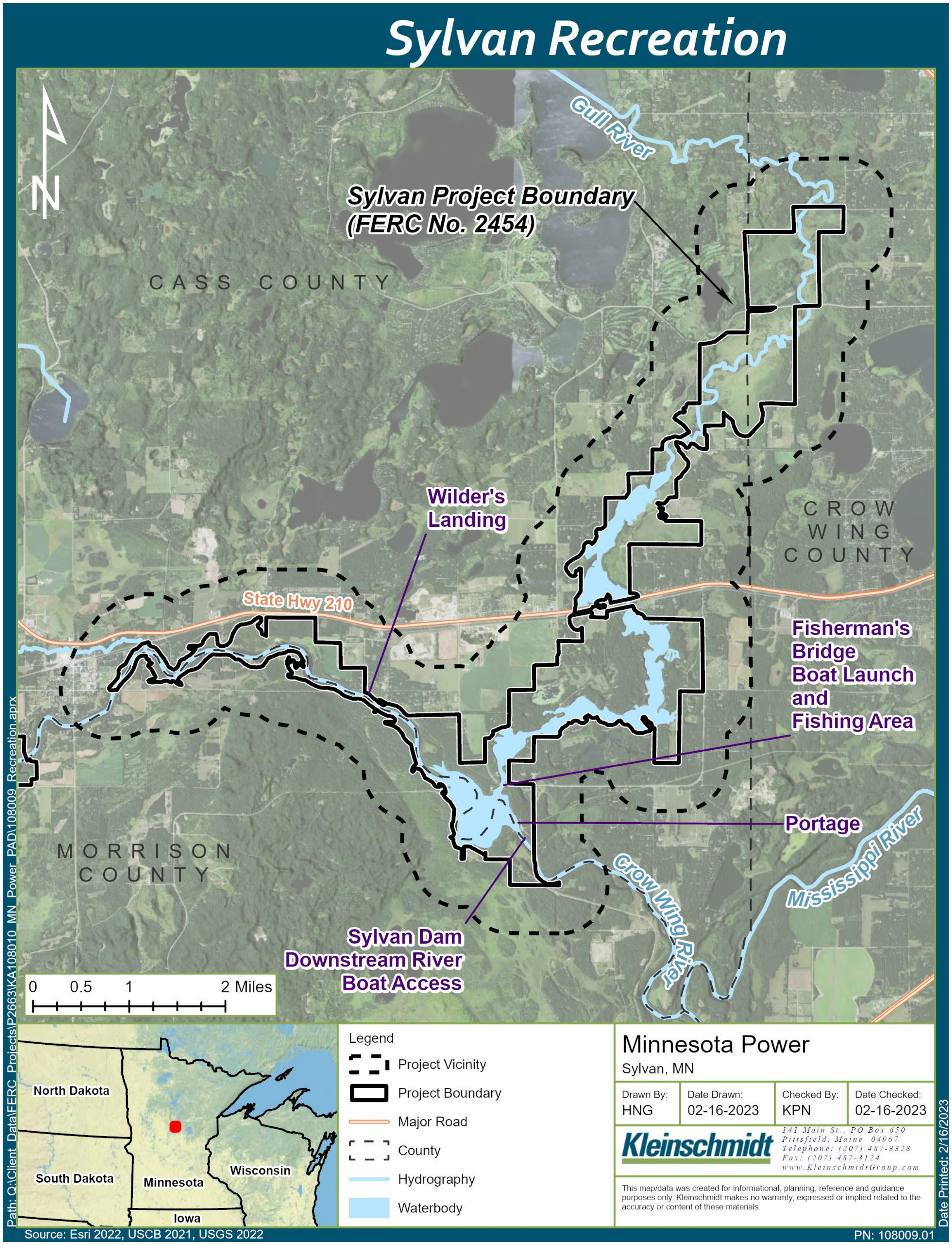
Under License Article 411, the Crow Wing River Canoe Campsite was included as a recreational site at the Sylvan Project. The site was located about one-half mile upstream from the confluence of the Gull River. In 1999, MP and the Minnesota DNR closed this site due to the lack of use by canoeists and that locals had begun to use the site for indiscriminate parties (MP 2016a).

The Licensee also manages recreational leases on Sylvan Project lands. There are 161 recreational leases. These recreational leases are to private residents. Recreational leases are closely managed by MP to protect the Sylvan Project environment. MP communicates with leaseholders through a newsletter, highlighting items of interest and land use policies and activities. Provisions in the lease document require leaseholders to receive approval from MP prior to any construction or earth disturbing activities taking place. This prior approval is required before leaseholders seek signatures by the County and other zoning/permitting agencies for applicable activities, such as building construction and shoreline alterations. The lease document also requires strict adherence to environmental regulations and contains provisions to protect the health, welfare, and safety of the public. The lease also requires leaseholders to maintain their lots and improvements to high aesthetic standards.

Table 5-40: Sylvan Project Recreation Sites

Site Name	Description	Operator
Wilder's Landing	Boat launch at the northwest end of the Crow Wing River. Concrete boat ramp and parking for approximately 15 vehicles.	Minnesota DNR
Fisherman's Bridge Boat Launch and Fishing Area	Located on the north end of Sylvan reservoir. Designated shorefishing area with parking for approximately five vehicles. Concrete boat launch and dock with parking for approximately 15 vehicles.	Minnesota DNR. MP leases the site to the Minnesota DNR.
Sylvan Dam Boat Access and Fishing Area	Concrete boat launch providing access to the Crow Wing River below the dam. The site provides 10 parking spaces for anglers and about 10 additional spaces for boaters.	Minnesota DNR. MP leases the site to the Minnesota DNR.
Canoe Portage	Portage around the dam. Located on the east side of the dam and approximately 200 yards in length (Minnesota DNR 2023b).	MP

Figure 5-12: Sylvan Project Recreation Sites



Recreation at the Pillager Project

Recreational opportunities at the Pillager Project include boating, fishing (ice and open water fishing), snowmobiling, hunting, hiking, camping and swimming. Recreational activities occur on specific sites, (such as shore fishing sites), as well as in dispersed locations (such as hunting). Pillager Project recreation sites are listed in Table 5-41.

Table 5-41: Pillager Project Recreation Sites

Site Name	Description	Operator
Alvah's Landing (Minnesota DNR Boat Launch)	Boat launch located approximately 2.5 miles upstream from the Pillager Project dam, on the south shore of the Crow Wing River. Parking for approximately 15 vehicles and a concrete boat ramp.	Minnesota DNR
Pillager Dam Public Boat Launch	Boat launch located on the north shore of Pillager reservoir, adjacent to the dam. Parking for approximately 15 vehicles and a concrete boat ramp. Photos of the boat launch and parking areas are provided as Photo 5-14 and Photo 5-15, respectively.	Minnesota DNR and MP. (MP owns the land, and leases the land to Minnesota DNR)
Pillager Dam Public Canoe Portage and Shorefishing Access	Portage around the south end of Pillager dam. Approximately 300 feet in length. Parking and shore fishing access (south side of dam) in the same location. An additional Americans with Disabilities Act shore fishing access is located on the north side of the dam.	MP
Crow Wing River Canoe Campsite	Two canoe-up primitive campsites on the north shore of the Crow Wing River, just downstream of Alvah's landing. Photos of the entrance to the site and site are provided as Photo 5-16 and Photo 5-17, respectively.	MP

Recreational Lease Management

MP leases 48 lots on Pillager reservoir. These lots are located on MP lands on the south and north shores of the reservoir. The leasing of company-owned lands to individuals for cabin and home sites is a significant contribution to the public recreation.

Recreational leases are closely managed by MP to protect the Pillager Project environment. MP communicates with all leaseholders, highlighting items of interest and land use policies and activities. Provisions in the lease document require leaseholders to receive approval from MP prior to any construction or earth disturbing activities taking place. This prior approval is required before leaseholders seek signatures by the County and other zoning/permitting agencies for applicable activities, such as building construction and shoreline alterations. The lease document also requires strict adherence to environmental regulations and contains provisions to protect the health, welfare, and safety of the public.

Figure 5-13: Pillager Project Recreation Sites

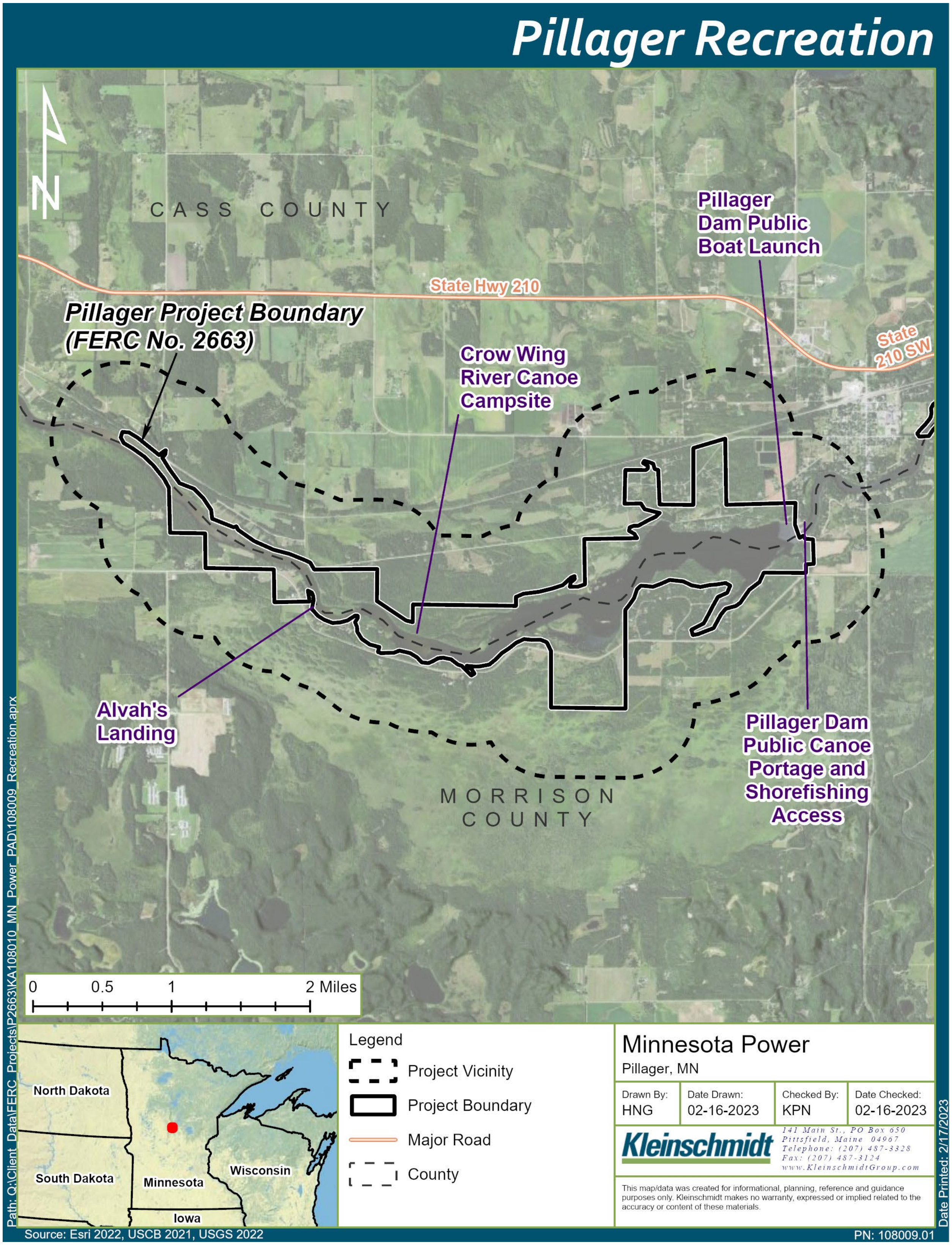


Photo 5-14: Pillager Dam Public Boat Launch

Source: Google Maps 2023

Photo 5-15: Pillager Dam Public Boat Launch Parking Area

Source: Google Maps 2023

Photo 5-16: Crow Wing River Canoe Campsite Entrance

Source: MP 2004

Photo 5-17: Crow Wing River Canoe Campsite

Source: MP 2004

5.7.1.2 Specially Designated Recreation Areas

Protected River Segments

The Projects are not located on a river designated under the National Wild and Scenic Rivers System (National Wild and Scenic Rivers System 2023a). The Projects are not located at a portion of river designated as wild and scenic under the Minnesota's Wild & Scenic Rivers Act (Minnesota DNR 2023a). The Mississippi River is designated as wild and scenic under the Minnesota's Wild & Scenic Rivers Act from St. Cloud to Anoka, MN (Minnesota DNR 2023a). St. Cloud is approximately 30 miles downstream of the Little Falls Project. The Projects are not located at a portion of river listed by the NPS under the Nationwide Rivers Inventory (NRI) (NPS 2023a). The Crow Wing River is listed on the NRI from the city of Motley, Minnesota (less than 5 RM upstream from the Pillager Project Boundary) for 65 miles to the confluence with the Shell River (NPS 2023a). This segment is listed for the recreational and scenic value and was listed on the NRI in 1982 (NPS 2023a).

National Trails System and Wilderness Areas

There are no trails in the Projects Vicinities that are designated on the NPS National Trails System (NPS 2023b). No area in the Projects Vicinities have been designated as wilderness areas, recommended for such designation, or designated as wilderness study areas under the Federal Wilderness Act (USDA 2023a).

5.7.1.3 Recreation Use Levels

Recreation use levels have been previously documented in the FERC Licensed Hydropower Development Recreation Report (FERC Form 80).

At the Little Falls Project, recreation use at two (2) boat launch areas, one (1) portage, three (3) reservoir fishing areas, three (3) picnic areas, and one (1) interpretive display were identified in the Project Boundary and assessed on the 2015 FERC Form 80. As of 2015, the total number of annual visits to the recreational areas identified was estimated to be 10,153 daytime visits and 4,171 nighttime visits. None of the recreation facilities at the Little Falls Project appear to be utilized to the maximum capacity, with the highest utilization indicated at 21 percent at the picnic areas on the 2015 FERC Form 80. The portage was indicated to have a 4 percent capacity utilization. (ALLETE, Inc. 2015a).

At the Sylvan Project, recreation use at three (3) boat launch areas, one (1) portage, one (1) tailwater fishing area, one (1) reservoir fishing area, one (1) interpretive display, one (1) campground (non-Project recreation site), five (5) cottage sites (non-Project recreation site), and three (3) access points (non-Project recreation site) were identified and assessed on the 2015 FERC Form 80. As of 2015, the number of annual visits to the recreational areas identified was estimated to be 12,029 daytime visits and 5,759 nighttime visits. None of the recreation facilities at the Sylvan Project appear to be utilized to the maximum capacity, with the highest utilization estimated at 46 percent at the reservoir fishing area on the 2015 FERC Form 80. The three boat launch areas were estimated to be at 28 percent capacity utilization, the portage was estimated to be at 2 percent capacity utilization, and the tailwater fishing was estimated to be at 31 percent capacity utilization. (ALLETE, Inc. 2015b).

At the Pillager Project, recreation use at two (2) boat launch areas, one (1) portage, one (1) tailwater fishing area, and two (2) dispersed camping areas were identified and assessed on the 2015 FERC Form 80. As of 2015, the number of annual visits to the recreational areas identified was estimated to be 12,029 daytime visits and 5,759 nighttime visits. None of the recreation facilities at the Pillager Project appear to be utilized to the maximum capacity, with the highest utilization estimated at 47 percent at the tailwater fishing area on the 2015 FERC Form 80. The two boat launch areas were estimated to be at 16 percent capacity utilization, the portage was estimated to be at 2 percent capacity utilization, and the dispersed camping areas were estimated to be at 5 percent capacity utilization. (ALLETE, Inc. 2015c).

5.7.1.4 Recreation Needs Identified in Management Plans

Minnesota’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 most recent SCORP covers years 2020 – 2024. The SCORP 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 decision-makers and managers utilize the SCORP as a focused set of priorities and suggested actions to guide them as they make decisions about outdoor recreation. (Minnesota DNR 2019a).

To support the development of the 2020-2024 SCORP, public and stakeholder input was obtained. The Minnesota Outdoor Recreation Household Survey was conducted in 2017. This survey updated a statewide outdoor recreation household survey that had previously been conducted in 2004. The survey invited a random sample of 8,000 Minnesotans to share about their participation in outdoor activities, what motivates them to get outdoors, factors that limit participation, and preferences for communication. A total of 1,987 Minnesotans shared responses online, over the phone, and via paper surveys. (Minnesota DNR 2019a).

Key findings from the survey indicated that outdoor activities are an increasingly important part of most Minnesotan’s lives. The 2017 survey results indicate that from 2004 to 2017, the percentage of Minnesotans who reported that outdoor activities are very important increased from 57 to 70 percent. Most Minnesotans reported that they participate in outdoor activities frequently: nearly two-thirds of Minnesotans reported recreating, on average, more than twice per week over the past year. (Minnesota DNR 2019a).

Findings also revealed that "Minnesotans see the outdoors as a place to rest and relax, connect with family and friends, and improve their health." Favorite activities were broken up into seasonal categories, with activities such as "relaxing in the outdoors," "walking or hiking," "relaxing by the water," and "picnicking outdoors" identified as highly popular year-round and three-season activities. In winter, top activities were "sledding and snow tubing," and "ice fishing." These findings suggest that Minnesotans prefer activities that require less equipment or advanced skills, and/or that they have not had the opportunity to develop interests and skills to participate in other activities. (Minnesota DNR 2019a).

In terms of barriers to getting outdoors, findings were consistent with past data suggesting that pests, time, and convenience were primary reasons people are not spending more time outdoors. (Minnesota DNR 2019a).

5.7.2 Land Use

Little Falls Project

Land cover type in the Little Falls Project Boundary and Little Falls Project Vicinity is provided in Table 5-42 and Table 5-43, respectively, and depicted on Figure 5-14. As shown, land cover in the Little Falls Project Boundary is primarily open water, followed by undeveloped lands including wetlands and forested lands. In the Little Falls Project Vicinity, the majority of the land cover is developed lands, which primarily include the city of Little Falls, Minnesota, which is located on the southern end of the Little Falls Project Boundary.

Table 5-42: Land Cover Type in the Little Falls Project Boundary

National Land Cover Database Class	Acreage
Open Water	570.3
Emergent Herbaceous Wetlands	43.3
Woody Wetlands	31.5
Deciduous Forest	21.6
Developed, High Intensity	6.7
Developed, Medium Intensity	6.1
Developed, Open Space	4.7
Herbaceous	4.7
Unclassified	2.4
Developed, Low Intensity	1.8
Barren Land	0.7
Hay/Pasture	0.7

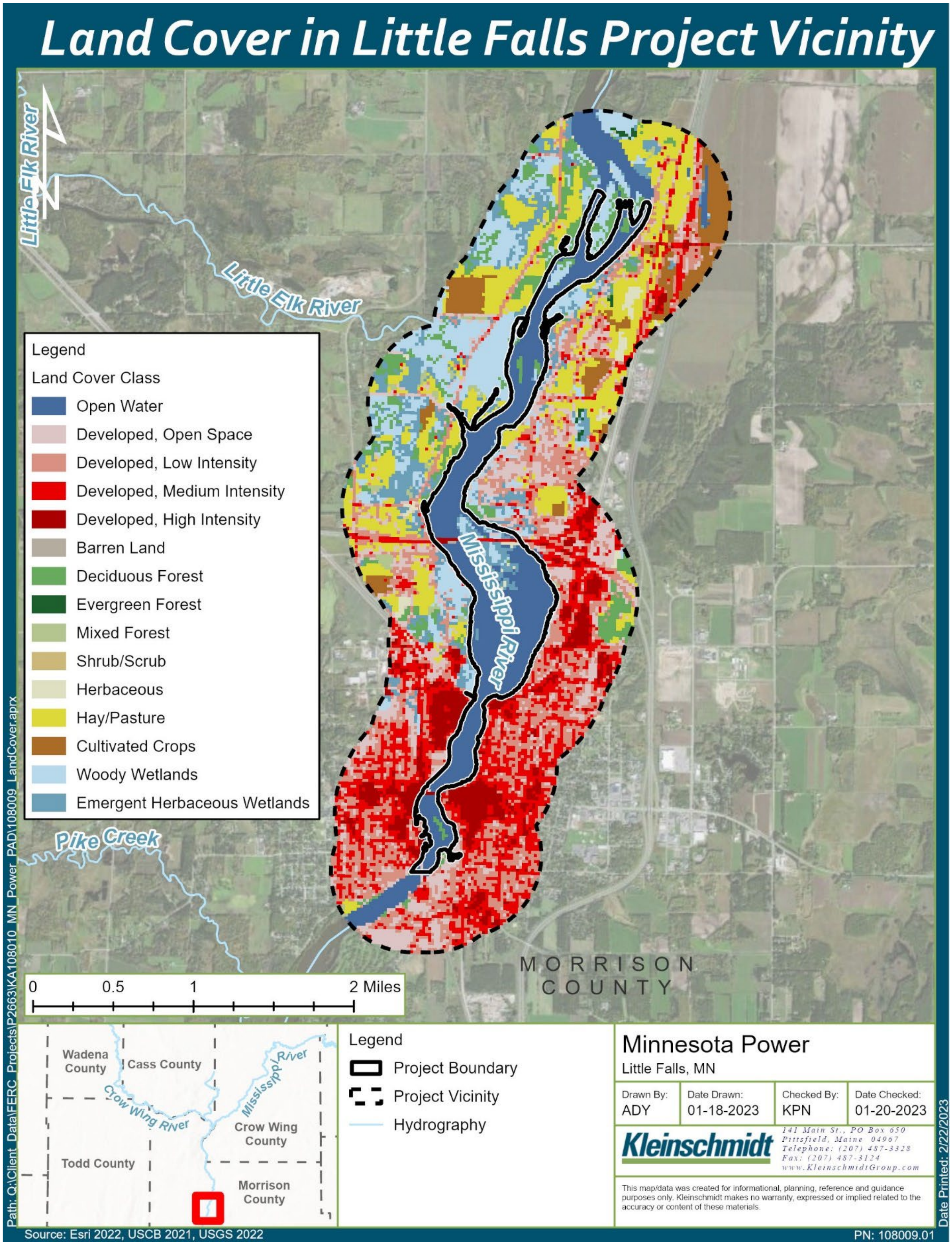
Source: USGS 2019

Table 5-43: Land Cover Type in the Little Falls Project Vicinity

National Land Cover Database Class	Acreage
Developed, Low Intensity	778.8
Open Water	718.1
Developed, Medium Intensity	655.6
Hay/Pasture	556.3
Developed, Open Space	458.3
Woody Wetlands	450.0
Emergent Herbaceous Wetlands	327.0
Developed, High Intensity	260.2
Deciduous Forest	248.3
Cultivated Crops	169.8
Herbaceous	36.7
Mixed Forest	25.7
Evergreen Forest	6.9
Barren Land	0.9
Shrub/Scrub	0.2

Source: USGS 2019

Figure 5-14: Land Cover in Little Falls Project Vicinity



Sylvan Project

Land cover type in the Sylvan Project Boundary and Sylvan Project Vicinity is provided in Table 5-44 and Table 5-45, respectively, and depicted on Figure 5-15. As shown, land cover in the Sylvan Project Boundary is primarily undeveloped land, including deciduous forest and woody wetlands, and open water. In the Sylvan Project Vicinity, much of the land cover is undeveloped, including deciduous forest, woody wetlands, and hay/pasture lands. There is an area of high intensity developed lands by the city of Pillager, Minnesota.

The area surrounding the Sylvan reservoir is primarily forested and includes multiple farms. Areas along the Gull River, south of Highway 210 are developed as seasonal and permanent residences. The rest of the lands bordering the reservoir are primarily undeveloped. The Sylvan Project area is best described into two distinct sections: the Crow Wing River and the Gull River. (MP 2016a). The lands in these sections are described below.

Crow Wing River:

> The south shore of the Crow Wing River, except for the extreme west end in Section 16, lies entirely within the Camp Ripley Military Reservation. Camp Ripley is used for military training and is operated by the Minnesota National Guard. Public access to Camp Ripley is restricted. The private backlands in Section 16 contain both wooded and open field areas. (MP 2016a).
>
> The north shore of the Crow Wing River, except for the 1.25 miles of private shoreline in Section 14, is owned entirely by MP. All of the lands along the north shore are similar in appearance to those on the south shore except for scattered rural residential home development (private) along the westerly three miles of shoreline. (MP 2016a).
>
> MP provides access leases to adjacent landowners where home development and shoreline use encroachments onto MP property occur in Sections 15 and 16. These leases contain provisions to enforce MP’s and the Commission’s rights at the Sylvan Project. The shoreline in this area is generally wooded with a few open fields in Section 14. (MP 2016a).

Gull River:

> The lands in the Sylvan Project Boundary surrounding the Gull River are divided for purposes of this section into lands located south of Minnesota Highway 210 (approximately 3.5 miles of shoreline), and the lands located north of the Highway 210 (approximately three additional miles of shoreline). (MP 2016a).

South of Highway 210:

The Gull River shoreline south of the Highway 210 is almost entirely owned by MP, with the exception of one-half mile of private shoreline. The private land in this area is owned by Little Pine Resort. There are approximately 130 recreational lease lots on the Gull River in the Sylvan Project Boundary. (MP 2016a).

North of Highway 210:

Approximately two-thirds of the Gull River shoreline north of the bridge is owned by MP, the balance is privately-owned land. The reservoir in this area is shallow and contains substantial aquatic vegetation. In the extreme north end of the Sylvan Project, the Sylvan reservoir becomes a narrow river channel bordered in most areas by wetlands. (MP 2016a).

The private lands in this area are forested and also open farmland. Due to private property encroachments, access leases are established from time to time to protect MP's and the Commission's rights. (MP 2016a).

Land is managed at the Sylvan Project through the implementation of a FERC approved Land Management Plan (MP 2016a).

Table 5-44: Land Cover Type in the Sylvan Project Boundary

National Land Cover Database Class	Acreage
Deciduous Forest	1,335.1
Open Water	1,080.3
Woody Wetlands	813.1
Emergent Herbaceous Wetlands	573.8
Hay/Pasture	165.8
Herbaceous	134.4
Developed, Open Space	130.7
Shrub/Scrub	76.5
Cultivated Crops	57.5
Mixed Forest	57.4
Developed, Low Intensity	34.2
Developed, Medium Intensity	8.5
Evergreen Forest	4.7
Barren Land	3.2
Unclassified	1.6
Developed, High Intensity	0.7

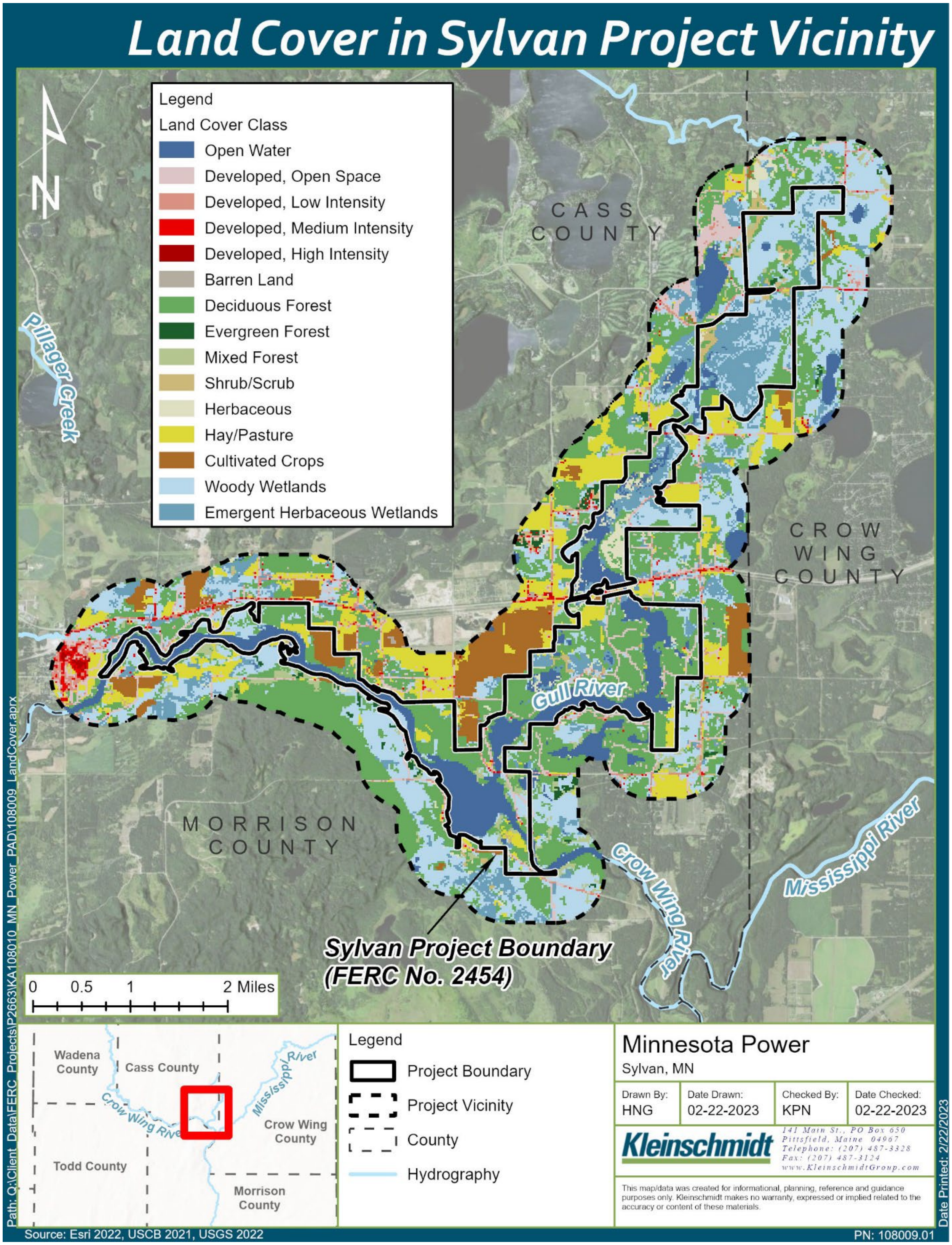
Source: USGS 2019

Table 5-45: Land Cover Type in the Sylvan Project Vicinity

National Land Cover Database Class	Acreage
Deciduous Forest	4,487.1
Woody Wetlands	3,486.1
Hay/Pasture	1,532.4
Open Water	1,489.5
Emergent Herbaceous Wetlands	1,280.6
Developed, Open Space	817.9
Cultivated Crops	814.8
Developed, Low Intensity	341.5
Mixed Forest	297.9
Herbaceous	260.4
Developed, Medium Intensity	143.9
Shrub/Scrub	140.4
Evergreen Forest	92.2
Developed, High Intensity	25.0
Barren Land	11.6

Source: USGS 2019

Figure 5-15: Land Cover in Sylvan Project Vicinity



Pillager Project

Land cover type in the Pillager Project Boundary and Pillager Project Vicinity is provided in Table 5-46 and Table 5-47, respectively, and depicted on Figure 5-13. As shown, land cover in the Pillager Project Boundary is primarily open water, woody wetlands, and deciduous forest. In the Pillager Project Vicinity, much of the land cover is also undeveloped, including woody wetlands and deciduous forest, as well as open water.

MP manages approximately 650 acres of property on the Pillager Project. Approximately 225 acres are flooded; the remaining 425 acres are a mixture of uplands and lowlands under various land uses. Portions of the Pillager Project lands adjacent to the river and reservoir are developed with seasonal and permanent residences. The remainder of the land is undeveloped. (MP 2016b).

The north shore is the least developed shoreline on Pillager reservoir. There are, however, farm fields extending towards the water in Section 19, Township 133 North, Range 30 West (the PLSS locations including the township, range, and sections at which the Pillager Project Boundary is located are shown on Figure 4-3), as well as several homes and the Big Water Property Owners Association located near the shore. Seven Mile Creek enters the reservoir in Section 19, and this area is developed with several homes and the Big Water Property Owners Association. Continuing West in Section 25 and 26, Township 133 North, Range 31 West, the north shoreline is mostly forested and undeveloped. Farther upstream in Section 23 and 22, the north shoreline is intersected by gravel roads, a powerline crossing, open fields, and railroad tracks. (MP 2016b).

The south shore of the Pillager reservoir is mostly developed with homes and cabins. Section 20, 29, and 30 in Township 133 North, Range 30 West, possess shoreline that is mostly developed with MP lots leased for cabin and home sites. MP water access leases at this location provide access to the reservoir for adjacent owners of privately-owned back lots. Section 30 also has County Highway 28 intersecting the shoreline area and a back bay of the reservoir. Westward, the shoreline banks in Section 25 and the eastern 1/3 of Section 26, in Township 133 North, Range 31 West are mostly pine covered. Private home and cabin development also occurs along this shoreline. Farther west agricultural lands abuts the reservoir, and County Highway 28 intersect the shoreline again in Section 27. (MP 2016b).

The Pillager reservoir contains two large islands located in Section 25. The east island, located in the middle of the reservoir, is approximately 25 acres, most of which is covered with emergent aquatic vegetation, with seven to ten acres of high ground. The west island is also approximately 25 acres and is mostly high ground. This island is situated parallel to the north shoreline, which effectively creates a secluded back water area. (MP 2016b).

Natural Character Area Designation. MP has designated portions of company-owned lands on the Pillager Project as Natural Character Areas (NCAs) to retain the shoreline's present natural character and aesthetics. The Pillager Project Land Management Plan restricts permanent development on these lands and no development has occurred to date. Active forest and wildlife management continue to occur. In 2015, a 71-acre timber harvest was conducted in response to a jack pine budworm (*Choristoneura pinus*) infestation. The timber harvest was mainly a clearcut; however, a portion was a selective timber harvest. (MP 2016b). The NCA is shown on Figure 5-17.

Land is managed at the Pillager Project through the implementation of a FERC approved Land Management Plan (MP 2016b).

Table 5-46: Land Cover Type in the Pillager Project Boundary

National Land Cover Database Class	Acreage
Open Water	672.1
Woody Wetlands	315.0
Deciduous Forest	275.8
Emergent Herbaceous Wetlands	94.5
Hay/Pasture	78.9
Developed, Open Space	46.5
Developed, Low Intensity	32.6
Mixed Forest	31.4
Evergreen Forest	13.9
Herbaceous	12.1
Developed, Medium Intensity	10.7
Shrub/Scrub	3.3
Developed, High Intensity	1.6
Cultivated Crops	0.7

Source: USGS 2019

Table 5-47: Land Cover Type in the Pillager Project Vicinity

National Land Cover Database Class	Acreage
Woody Wetlands	1,966.7
Deciduous Forest	1,548.7
Open Water	780.9
Hay/Pasture	753.1
Emergent Herbaceous Wetlands	648.4
Cultivated Crops	343.8
Developed, Open Space	283.3
Developed, Low Intensity	139.7
Mixed Forest	122.6
Evergreen Forest	72.0
Herbaceous	68.7
Developed, Medium Intensity	42.3
Shrub/Scrub	25.5
Developed, High Intensity	6.9
Barren Land	0.9

Source: USGS 2019

Figure 5-16: Land Cover in Pillager Project Vicinity

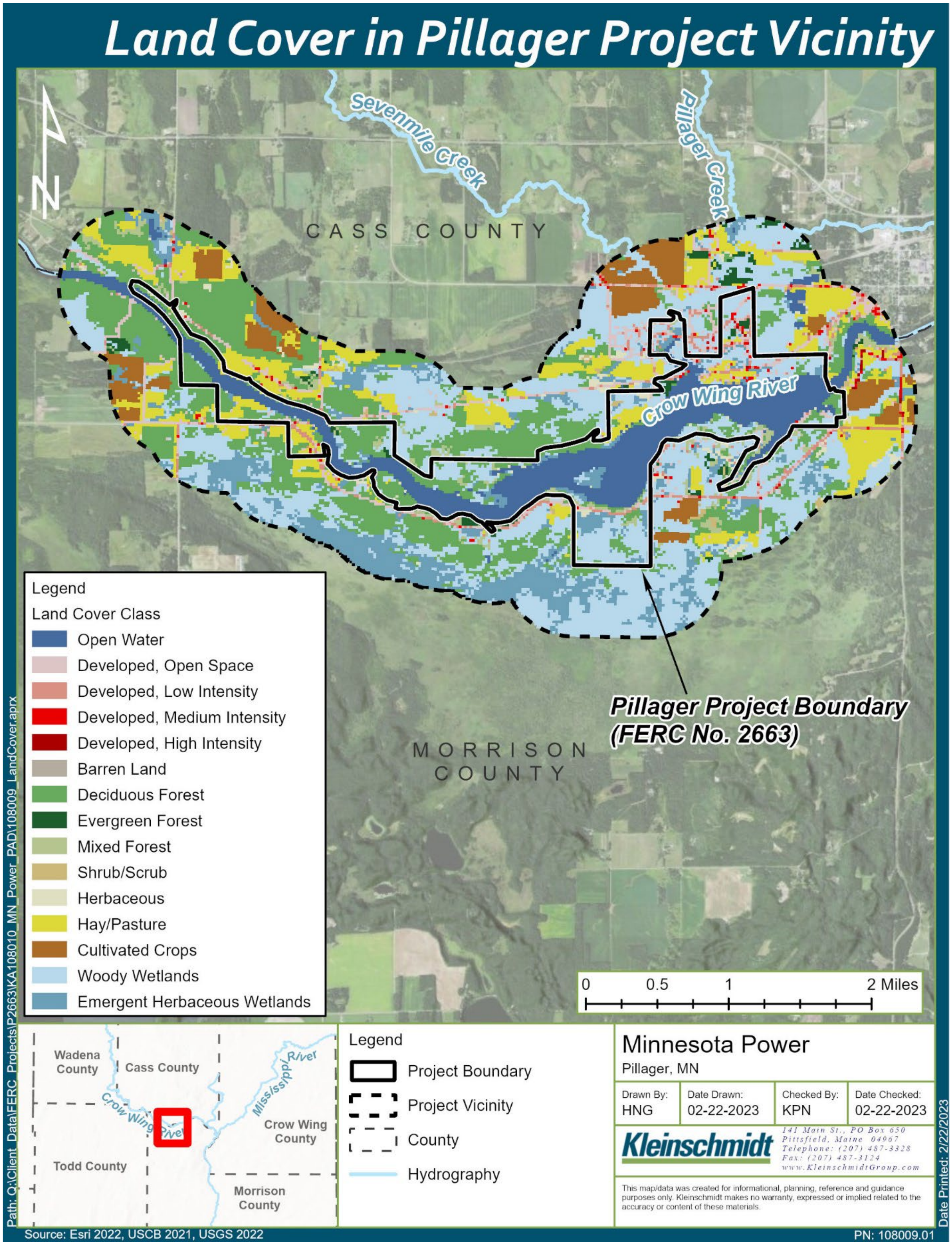
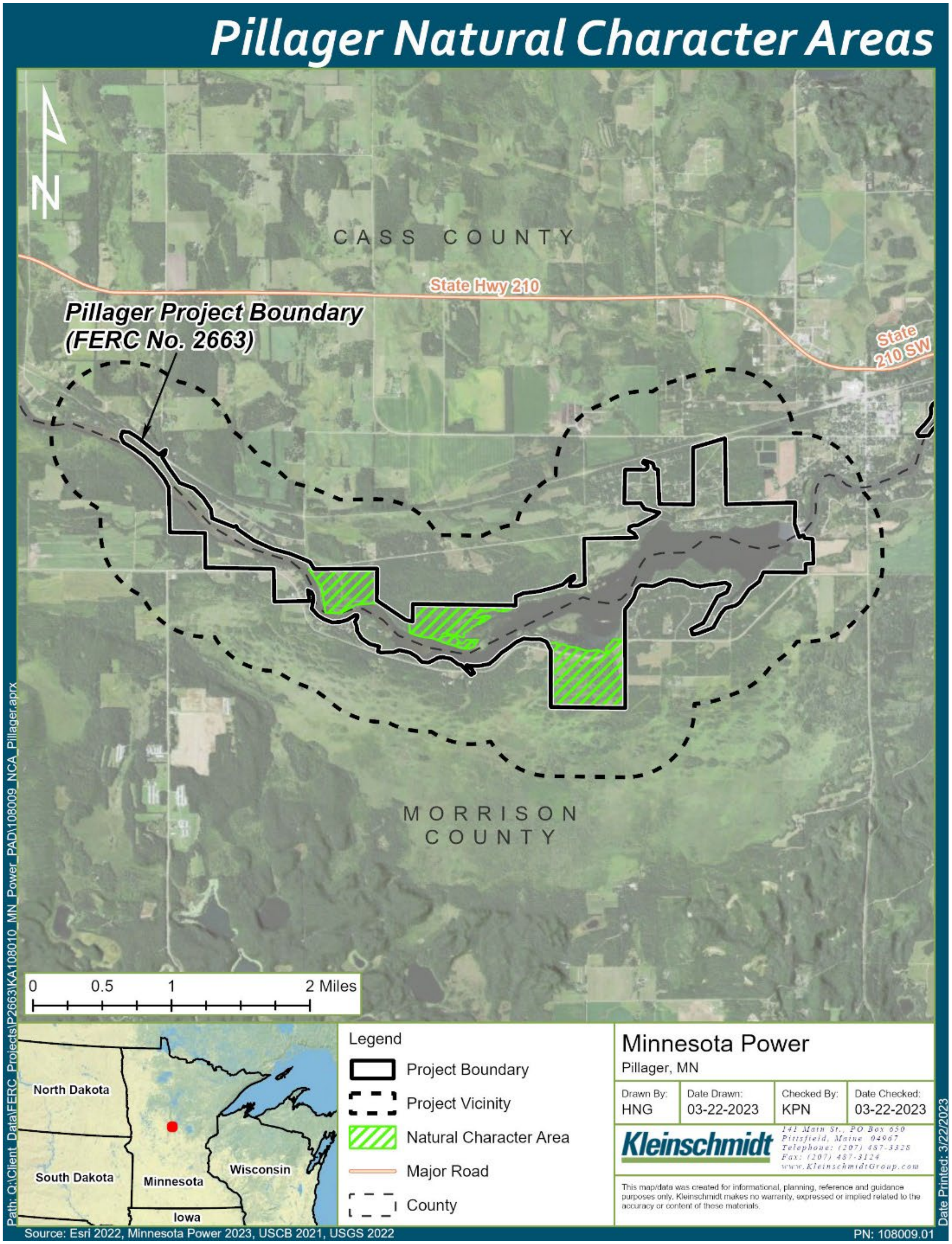


Figure 5-17: Pillager Project Natural Character Area



5.7.3 References

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5.8 Aesthetic Resources

18 CFR 5.6(d)(3)(ix) requires "A description of the visual characteristics of the lands and waters affected by the project. Components of this description include a description of the dam, natural water features, and other scenic attractions of the project and surrounding vicinity. Potential applicants are encouraged to supplement the text description with visual aids."

Little Falls Project

The Little Falls Project is located in both an urban and suburban landscape. The dam and lower portion of the reservoir are located in the city of Little Falls, and the east side of the reservoir is bordered by a residential neighborhood containing several city parks. The upper portion of the reservoir is located north of the city of Little Falls and is surrounded by open and partially wooded lands developed as dispersed home sites and small farms. The lands immediately surrounding the Little Falls Project are typical of central Minnesota scenery. With the exception of the industrial area in the city of Little Falls along the western side of the reservoir, the shoreline meets local recreational and open space needs. (MP 1991a). The Little Falls Project is depicted in Photo 5-18.

Photo 5-18: View of Little Falls Project

Sylvan Project

The Sylvan Project is located in a rural environment offering views of rolling topography and natural vegetation. The lands surrounding the reservoir are primarily forested. The majority of the south shore of the Crow Wing River is within Camp Ripley, and this area remains undeveloped and visually attractive to river recreational users. The lands on the north shore of the Crow Wing River are similar, with the addition of scattered residential home development. Lands along the Gull River shoreline (south of the 210 bridge) contain seasonal and permanent residences. The Sylvan reservoir in the area north of the 210 bridge is shallow with views of wetlands and substantial aquatic vegetation. In the northernmost end, the Sylvan reservoir transitions to a narrow river channel bordered by wetlands. This area is mostly forested or open wetlands, with some open farmland. In general, this area retains its natural, undeveloped character. (MP 2016a, 1991b). The Sylvan Project is depicted in Photo 5-19, Photo 5-20, and Photo 5-21.

Photo 5-19: Sylvan Project Reservoir and Dam

Photo 5-20: View of Sylvan Project Dam

Photo 5-21: View of Sylvan Project from Downstream

Pillager Project

The Pillager Project is located in a rural agricultural and recreational environment, offering views of rolling topography and natural vegetation types. The lands surrounding the reservoir are primarily a mixture of forested and open areas, with some agricultural land and areas developed with seasonal or permanent residences (MP 1995, 2016b). MP currently implements a NCA designation for portions of company-owned lands to retain the shoreline's natural character and aesthetics at the Pillager Project. Forest and wildlife management activities are permitted on NCA designated land; however, permanent development is restricted to preserve the aesthetic qualities within the area. (MP 2016b). The Pillager Project is depicted in Photo 5-22 and Photo 5-23.

Photo 5-22: View of Pillager Project from Downstream

Photo 5-23: Pillager Project Dam

5.8.1 References

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Minnesota Power (MP). 2016b. Land Management Plan Update. Pillager Hydroelectric FERC Project No. 2663.

5.9 Cultural Resources

18 CFR 5.6(d)(3)(x) requires "A description of the known cultural or historical resources of the proposed project and surrounding area. Components of this description include: (A) Identification of any historic or archaeological site in the proposed project vicinity, with particular emphasis on sites or properties either listed in, or recommended by the State Historic Preservation Officer or Tribal Historic Preservation Officer for inclusion in, the National Register of Historic Places; (B) Existing discovery measures, such as surveys, inventories, and limited subsurface testing work, for the purpose of locating, identifying, and assessing the significance of historic and archaeological resources that have been undertaken within or adjacent to the project boundary; and (C) Identification of Indian tribes that may attach religious and cultural significance to historic properties within the project boundary or in the project vicinity; as well as available information on Indian traditional cultural and religious properties, whether on or off of any federally-recognized Indian reservation (A potential applicant must delete from any information made available under this section specific site or property locations, the disclosure of which would create a risk of harm, theft, or destruction of archaeological or Native American cultural resources or to the site at which the resources are located, or would violate any Federal law, including the Archaeological Resources Protection Act of 1979, 16 U.S.C. 470w-3, and the National Historic Preservation Act of 1966, 16 U.S.C. 470hh)."

5.9.1 Prehistoric Context

The archaeological record of Minnesota is long and complex, dating back to approximately 12,000 years ago (Forsberg 2003). Archaeologists have divided the Minnesota record into five main periods known as the Early Paleoindian, Late Paleoindian, Archaic, Initial Woodland, and Terminal Woodland cultural periods (Table 5-48).

Table 5-48: Minnesota's Cultural Periods

Year Range	Cultural Period
12,000 B.P. 10,000 B.P.	Early Paleoindian
10,000 B.P. 8,000 B.P.	Late Paleoindian
8,000 B.P. 2,500 B.P.	Archaic Period
2,500 B.P. 1,500 B.P.	Initial Woodland Period
1,500 B.P. 360 B.P.	Terminal Woodland Period

Source: Forsberg 2003

*B.P. = "Before Present"

Paleoindian Period (12,000 Before Present (B.P.) – 8,000 B.P.). Paleoindian people are the earliest prehistoric inhabitants in the region, and throughout North America. Paleoindian people are likely the first people to migrate into North America in their pursuit of large game. The hallmark of Paleoindian people is the fluted spear point, used to hunt large game species, some of which are now extinct. These spear points possess a long, groove-like scar caused by a flake struck from their base on both faces.

The Early Paleoindian Period is poorly understood in Minnesota, as no archaeologic sites are identified (Forsberg 2003). It is thought that Paleoindian people began occupying Minnesota as the last glaciers retreated. These Paleoindian people likely lived in small, highly mobile bands, with little sense of regional identity, hunting large now extinct animals such as the mammoth, mastodon, or camel (Forsberg 2003).

During the Late Paleoindian Period, cultural changes seemed to coincide with climatic and subsequent environmental shifts in the landscape of Minnesota (Forsberg 2003). What was initially tundra vegetation, turned into boreal forest dominated by spruce as the climate warmed. The Late Paleoindian habits very much resembled those of the Early Paleoindians as these peoples moved frequently and depended primarily upon hunting for sustenance (Forsberg 2003). However, as the communities of plants and animals changed in response to changing climate conditions, so too did food sources. As the mammoth, camel and other megafauna became extinct, the Late Paleoindian people increasingly turned towards bison and other smaller animals as well as plants for food (Forsberg 2003).

Archaic Period (8,000 B.P. – 2,500 B.P.). During Archaic times, Minnesota's occupants continued to adapt to ongoing changes in climate and vegetation, as the trend towards a warmer and drier climate continued, along with the northeasterly expansion of prairie vegetation (Forsberg 2003). In general, changes in subsistence and settlement patterns differentiate the Archaic tradition from the preceding Late Paleoindian period. Archaic people became somewhat sedentary, as they learned to use more diverse plant and animal resources for subsistence, and their tool technology changed and diversified (Forsberg 2003). They used grinding stones to process plant foods and made tools from metamorphic or igneous rocks for cutting and chopping wood. By approximately 7,000-years B.P., Archaic people began to develop a copper tool technology, using pieces of native copper mined from the Lake Superior region or found locally in glacial drift (Forsberg 2003). They fashioned knives, projectile points, gouges, other tools, and decorative items from copper. In the past, archaeologists thought that copper artifacts from the Midwest represented part of an "Old Copper" industry dating to later Archaic times (ca. 5,000-3,000-years B.P.); however, archaeologists now recognize evidence that Native Americans used copper before and after this period (Forsberg 2003).

In parts of the Midwest where greater numbers of Archaic sites are identified and excavated, archaeologists divide the Archaic tradition chronologically into three periods: Early, Middle, and Late (Forsberg 2003). Known Archaic sites are rare in Minnesota, and it has not yet been possible to assign this chronology to the region with any confidence. Moreover, because the environment influenced the lifeways and material culture of Archaic people, their differences in the subsistence, settlement strategies, and toolkits is likely a product of their environment (Forsberg 2003). Excavations of Archaic sites in western Minnesota at the Itasca Bison Kill site, in Itasca County, and the Canning site, in Norman County, indicate a subsistence pattern that focused on hunting bison but also exploited smaller animals and plant foods. Farther to the east, in areas that were continuously forested during Archaic times, a different adaptive pattern is evident. Here, subsistence focused on riverine resources (like fish and freshwater clams), nuts, and deer (Forsberg 2003).

Woodland Period (2,500 B.P. – 360 B.P.). During the Woodland era, the climate continued moving toward current conditions (Forsberg 2003). Prairie vegetation decreased while forest vegetation (pine and oak) increased, the prairie/forest border reached its present location, and lake levels rose across the region. Although the hunter-gatherer way of life continued in the Woodland Period, the introduction of pottery and the construction of earthen mounds for burial of the dead are hallmarks of the time. These innovations were not adopted in all areas of the state at the same time or necessarily together (Gibbon et al. 2002). The result was overlap in time between Late Archaic and early Initial Woodland cultures, just as there had been an earlier period of transition between Paleoindian and Archaic cultures.

Because Initial Woodland sites are not as deeply buried as earlier sites and burial mounds frequently mark their presence, they are more easily found and more frequently excavated by archaeologists. They have also been grouped together into archaeological cultures. This greater degree of attention is reflected in the presence, for the first time, of the names of regional archaeological cultures including the Howard Lake, Fox Lake, Malmo, and Laurel (Gibbon et al. 2002).

Terminal Woodland people were hunters and gatherers (Gibbon et al. 2002). However, their economy in the mixed hardwood forests to the north was increasingly supplemented by the harvesting of wild rice. The number of people in the region rose dramatically, and major abrupt changes occurred in ceramics and other artifact forms and in settlement patterns. Archaeologists have generally relied on the geographic distribution of the distinctive ceramics and burial practices of the period to identify archaeological cultures in this northern region of the state (Gibbon et al. 2002). Three Terminal Woodland complexes have been identified to have existed in what is now northern Minnesota: Kathio, Blackduck, and Psinomani.

In the southern part of the state covered by deciduous forests and prairies, some Terminal Woodland people gradually began growing maize (Gibbon et al. 2002). Some people built distinctive effigy mounds having the shape of birds, bears, and other animals. Most of these southern Terminal Woodland societies abruptly adopted new life ways and artifact assemblages. Archaeologists group these transformed societies together and regard them as a northern expression of a "Mississippian" way of life. Mississippian sites are easily distinguished from Woodland sites by their distinctive ceramics, the larger size and greater artifact density and by the presence of maize fragments. Three Mississippian complexes have been identified in what is now southern Minnesota: Silvernale, Oneota, and Plains Village (Gibbon et al. 2002).

It was Mississippian people to the south and Terminal Woodland people to the north who met the first Europeans to visit the state in the middle of the seventeenth-century (Gibbon et al. 2002).

5.9.2 Historic Context

According to most accounts, the first Europeans to arrive in Minnesota were two Frenchmen, Sieur des Groseilliers and Sieur de Radisson (Gibbon et al. 2002). Although the details are open to dispute, they entered Minnesota between 1659 and 1660. Like other Europeans and Americans who followed them, they came in small numbers in search of natural resources, such as furs. By 1678, merchants in Quebec and Montreal had formed a company to trade with the Dakota, the dominant Native American people in the state of Minnesota at the time. These fur trade-related activities initiated the French period of exploration and occupation in Minnesota, which lasted into the early 1760s. (Gibbon et al. 2002).

Following the Treaty of Paris in 1763, the British began their half-century of activity in Minnesota (Gibbon et al. 2002). Like the French, their primary interest was exploration and the fur trade. During this period, the British built many fur trade posts across the state. It was also during this time that major changes occurred in the distribution of Native American people in the region.

5.9.3 Overview of Previous License Compliance for Cultural Resources

During the previous relicensing, MP executed Programmatic Agreements (PAs) in 1993 for the Projects between MP, FERC, Minnesota State Historic Preservation Office (Minnesota SHPO), and the Advisory Council on Historic Preservation for the management of historic properties affected by the Little Falls Project (FERC 1993a), Sylvan Project (FERC 1993b), and the Pillager Project (FERC 1997). As stipulated by the Projects' PAs, MP was obligated to assess the effects of the Projects' undertakings on cultural resources that are eligible or listed on the National Register of Historic Places (NRHP) within the Projects' Area of Potential Effects (APE). For each Project, the APE was determined to be essentially the same as the FERC Project Boundary. The specific APEs for each Project are provided in Table 5-49.

Table 5-49: Area of Potential Effects Identified during Previous Relicensing

Project	Identified Area of Potential Effects (APE)
Little Falls Project[1]	The APE encompasses the existing reservoir and its marginal fee or flowage lands above and below the Little Falls dam, including the hydroelectric facilities and Mill Island, a rocky escarpment that anchors the dam at mid-channel. • Involves the floor of the reservoir (including submerged tracts), the present shorelines of both the reservoir and discharge pools, and parcels adjoining the electrical generation facilities, including Mill Island.
Sylvan Project[2]	The APE encompasses the existing Sylvan reservoir and its marginal fee and flowage lands and other areas subject to Project flooding or erosion above and below the Sylvan dam. • Involves the floor of the reservoir (including submerged tracts), the present shorelines of both the reservoir and discharge pool, the various wetland, floodplain, and upland areas adjoining the reservoir to which MP has fee or flowage rights, and in same rare instances, areas extending beyond the limits of MP-associated lands to the project "flood line."
Pillager Project[3]	The APE encompasses the existing Pillager reservoir and its marginal fee and flowage lands and other areas subject to Project flooding or erosion above and below the Pillager dam. • Involves the floor of the reservoir (including submerged or partly submerged tracts), the present shorelines of both the reservoir and discharge pool, and the various areas adjoining the reservoir to which MP has fee or flowage rights. Also within the APE are the Pillager Project hydroelectric facilities.

Source: IMA Consulting 1996a[1], 1996b[2], 1999[3]

The PAs also required MP to prepare a CRMP for each Project in consultation with the Minnesota SHPO to manage historic properties within the Projects' APEs. In addition, MP is required to perform annual monitoring of the reservoir shoreline by an archaeologist for the Projects, as well as perform archaeological assessments on the leased lots at Sylvan and Pillager prior to any lot development or improvement.

5.9.4 Architectural Review

Little Falls Project

The Little Falls Hydroelectric Development (hydroelectric facilities) was partially constructed in 1887 and rebuilt or completed between 1912 and 1920. The hydroelectric facilities were inventoried and evaluated in 1991 for listing on the NRHP. The facilities reviewed included the switchyard structure, powerhouse units, gates, spillways, log sluice, piers, and east bank retaining wall. Most of the components, as contributing resources, are part of the dam and electrical generation plant. Within the development area, one shop/garage building erected in 1983 is considered a non-contributing resource. The 1991 application suggests the entire complex might be NRHP-eligible under both Criterion A and Criterion C. The Minnesota SHPO deemed the facilities eligible for listing on the NRHP in 1991. (IMA 1996a).

Sylvan Project

Construction of the Sylvan dam and hydroelectric facilities began in 1912 by the Cuyana Range Power Company and was completed in 1913 (IMA 1996b). The Sylvan Project was acquired by Minnesota Power and Light (now known as Minnesota Power) in 1924. The hydroelectric facilities were inventoried and evaluated in 1991 for listing on the NRHP (IMA 1996b). The facilities reviewed included the powerhouse, gates, spillways, embankments, and dikes. The dam and electrical generation plant (headworks and powerhouse) are considered contributing resources. The 1991 application suggests the entire complex might be NRHP-eligible under Criterion A. The Minnesota SHPO deemed the facilities eligible for listing on the NRHP in 1991. (IMA 1996b).

Pillager Project

Construction of the Pillager dam and hydroelectric facilities began in 1916 and was completed in 1917. The hydroelectric facilities were inventoried and evaluated in 1994 for listing on the NRHP. The facilities reviewed included the powerhouse, gates, spillways, embankments, and dikes. The dam and electrical generation plant (headworks and powerhouse) are considered contributing resources. The 1991 application suggests the entire complex might be NRHP-eligible under Criterion A. The Minnesota SHPO deemed the facilities eligible for listing on the NRHP in 1994. (IMA 1999).

5.9.5 Archaeological Review

Little Falls Project

During previous relicensing efforts, the Institute for Minnesota Archaeology (IMA) (on behalf of MP) conducted a literature review of cultural resources at the Little Falls reservoir in 1990 (IMA 1996a). The initial review identified 42 archaeological sites on and below existing reservoir shorelines and recommended 19 sites for field investigation (IMA 1996a, DAC 2014a). The field survey included 17 sites as two sites were not accessible due to inundation (DAC 2014a). During the field survey, three additional sites were identified, and these 20 total sites were reviewed for eligibility for listing on the NRHP: three sites were recommended as eligible, six unevaluated, and 11 undetermined (DAC 2014a). The three NRHP-eligible properties are the Mill Island site, Ehoff site, and the Roscoe Island Log Drive Control System (IMA 1996a). The Little Elk Heritage Preserve (LEHP) is a 93-acre archaeological preserve owned by the IMA located on the west end of the reservoir. Historic properties were inventoried by the IMA prior to the Little Falls Project previous relicensing efforts (IMA 1996a). The LEHP includes seven sites: one listed on the NRHP and the remaining six are considered likely eligible for listing either individually or as part of a historic district (IMA 1996a).

The 1996 CRMP identified 16 sites that required continued monitoring: the three NRHP-eligible sites, six unevaluated sites (due to being partially or fully inundated), and the seven sites in the LEHP. In 2014, the Duluth Archaeology Center (DAC) developed an updated monitoring plan for archaeological sites on or near existing shorelines at the Little Falls Project. DAC (2014a) recommended 23 sites (the original 20 sites that were reviewed for NRHP-eligibility and three additional sites that had the potential for material remains) for inclusion in the monitoring schedule at the Little Falls Project. Of the 23 sites, 10 are either partially or fully inundated at full pond level (Duluth 2014a).

MP submits annual reports to SHPO and FERC on all cultural resource management activities for the previous field season. The recent 2022 Annual Report for the Little Falls Project was submitted to FERC[44] and SHPO on October 12, 2022 and reported on activities from September 2021 to September 2022:

- No archaeological surveys or site evaluations were conducted in the 2022 field season.
- General shoreline monitoring was conducted and found no visible impacts (i.e., active erosion) from the operation and maintenance of the Little Falls Project.
- No construction or vandalism during this monitoring period. (In Situ 2022a).

Sylvan Project

During previous relicensing efforts, IMA conducted a literature review of cultural resources at the Sylvan Project in 1991. The initial review identified 23 possible archaeological sites on and below existing reservoir shorelines and recommended 16 sites for field investigation. During the field survey, 20 new sites or site components were located or identified for a total of 28 sites. Four of these sites are located within the NRHP-listed Chippewa Agency Historic District. The Chippewa

[44] Accession No. 20221012-5010.

Agency District is approximately 200 acres and located on the north shore of the Sylvan reservoir. The Chippewa Agency Historic District, which is listed on the NRHP, has four separate sites entirely within the district but only three were listed in the field report. (DAC 2014b). The 28 sites were reviewed for eligibility for listing on the NRHP: 15 historic properties (sites, site complexes, or districts) were recommended eligible, and three were already NRHP-listed as part of the Chippewa Agency Historic District. (DAC 2014b, IMA 1993).

The 1996 CRMP identified 15 sites that required continued monitoring, counting the four sites within the Chippewa Agency District as a single site, but leaving out one site (Pillager Creek) from the field report, and combining others (DAC 2014b). In 2014, DAC developed an updated monitoring plan for archaeological sites on or near existing shorelines at the Sylvan Project. DAC (2014b) recommended 24 sites (the 15 sites recommended eligible, the Chippewa Agency District that was previously listed on the NRHP, and eight additional sites) for inclusion in the monitoring schedule and in 2016 reduced it to 22 sites at the Sylvan Project.

In 2017, Merjent, Inc. revised the results of the previous monitoring event and determined only nine of the sites were located within the APE of the Sylvan Project and none of the nine sites were receiving impacts (Merjent, Inc. 2017). Merjent, Inc. (2017) recommended that all monitoring efforts be discontinued unless there was a change in the operation and management of the Sylvan Project. Minnesota SHPO reviewed and concurred with the recommendation and annual monitoring was discontinued. In 2020, MP agreed with the MN SHPO to conduct annual shoreline monitoring to to perform general shoreline inspections for potential project adverse effects on archaeological sites (In Situ 2020a).

In Situ performed a literature review in 2020 of 161 lease lots located on the Crow Wing River and the Gull River within the Sylvan Project Boundary. Of the 161 lease lots, the review identified: 140 lots that contained no previously documented archaeological deposits and were cleared for cultural resource issues; 1 lot with a previously documented archaeological site (but does not meet NRHP-eligibility criteria); and 20 lots with previously documented historic and/or archaeological sites within their defined boundaries. The sites on these 20 lots have either not been formally evaluated or are eligible for listing on the NRHP. In Situ recommended additional evaluation to determine NRHP-eligibility. (In Situ 2020b).

MP submits annual reports to SHPO and FERC on all cultural resource management activities for the previous field season. The recent 2022 Annual Report was submitted to FERC and SHPO on October 11, 2022[45] and reported on activities from September 2021 to September 2022:

- No archaeological surveys or site evaluations were conducted in the 2022 field season.

[45] Accession No. 20221011-5377.

- Eight construction requests from lease holders were to be reviewed during the 2022 field season:
  - All eight requests were cleared for cultural concerns (Phase 1 surveys were performed for six, and two were able to be cleared without a survey).
- General shoreline monitoring was conducted and found no visible impacts (i.e., active erosion) from the operation and maintenance of the Sylvan Project.
- No construction or vandalism during this monitoring period (In Situ 2022b).

<u>Pillager Project</u>

During previous relicensing efforts, IMA conducted a literature review of cultural resources at the Pillager Project in 1993 (IMA 1999). The initial review identified 18 archaeological sites on existing reservoir shorelines (of the Pillager reservoir and Crow Wing River) and recommended 16 sites for field investigation (IMA 1999, DAC 2014c). Some cultural resources identified in the literature review were outside of the APE. Phase 1 surveys were performed in 1993 and 1994 of selected parcels at the Pillager reservoir. During the field surveys, 40 new sites were identified for a total of 51 sites (11 were in the literature review) (IMA 1999, DAC 2014c). Of the 51 sites (31 of which were considered in the APE; 13 sites identified by the 1993 survey and 18 sites identified by the 1994 survey), 4 were recommended ineligible and removed from further consideration, and 15 were recommended for further investigation, such as evaluation to determine NRHP-eligibility.

The 1999 CRMP identified 12 sites that required continued monitoring (DAC 2014c). Further evaluation (Formal Phase II) was performed to determine NRHP-eligibility on 10 of the 12 sites. However, a formal report was not prepared or submitted to Minnesota SHPO; therefore, no evaluated sites were dropped from the review (DAC 2014c). In 2014, DAC developed an updated monitoring plan for archaeological sites on or near existing shorelines at the Pillager Project. DAC (2014c) recommended 21 sites (the 12 sites unevaluated sites, and nine additional sites) for inclusion in the monitoring schedule at the Pillager Project.

In Situ performed a literature review in 2020 of 45 lease lots located on the Crow Wing River and the Pillager reservoir within the Pillager Project Boundary. Of the 45 lease lots, the review identified: 40 lots that contained no previously documented archaeological deposits and were cleared for cultural resource issues; 1 lot with a previously documented archaeological site (but not likely to meet NRHP-eligibility criteria); and four lots with previously documented historic and/or archaeological sites within their defined boundaries. The sites on these 4 lots have either not been formally evaluated or are eligible for listing on the NRHP. In Situ recommended additional evaluation to determine NRHP-eligibility. (In Situ 2020c).

MP submits annual reports to SHPO and FERC on all cultural resource management activities for the previous field season. The recent 2022 Annual Report was submitted to FERC and SHPO on January 27, 2023[46] and reported on activities from January 2022 to December 2022:

- No archaeological surveys or site evaluations were conducted in the 2022 field season.
- No construction requests from lease holders were received or reviewed during the 2022 field season.
- General shoreline monitoring was conducted (on 10 of the 12 archaeological sites; two sites were not inspected due to river conditions) and found no visible impacts (i.e., active erosion) from the operation and maintenance of the Pillager Project.
- No construction or vandalism during this monitoring period (In Situ 2023).

5.9.6 References

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[46] Accession No. 20230127-5171.

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Institute for Minnesota Archaeology (IMA). 1993. Stage II and III Investigations of Archaeological Properties at the Sylvan Hydro Reservoir, Cass, Crow Wing and Morrison Counties, Minnesota.

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5.10 Socioeconomic Resources and Environmental Justice

18 CFR 5.6(d)(3)(xi) requires "A general description of socio-economic conditions in the vicinity of the project. Components of this description include general land use patterns (e.g., urban, agricultural, forested), population patterns, and sources of employment in the project vicinity."

5.10.1 Overview

The Little Falls Project is located on the Mississippi River near the city of Little Falls in Morrison County, Minnesota. The Sylvan Project is located on the Crow Wing River between the cities of Pillager and Baxter, in Cass, Crow Wing and Morrison counties, Minnesota. Located upstream of the Sylvan Project, the Pillager Project is located on the Crow Wing River near the city of Pillager, on the border of Morrison and Cass counties, Minnesota (upstream of the confluence with the Gull River). The following sections describe socioeconomic conditions in the Projects Vicinities (including the cities of Little Falls, Pillager, and Baxter, Morrison, Crow Wing, and Cass counties, and the state of Minnesota).

5.10.2 General Land Use Patterns

Primary land use within Morrison County, Minnesota is agricultural land use and the county ranks high in poultry, milk, and livestock production within the state (Morrison County 2022). Land use within Cass and Crow Wing counties, Minnesota is mostly forested. Land use specific to the Projects is discussed in Section 5.7.2.

5.10.3 Population Patterns

Morrison County is approximately 1,125 square miles, Crow Wing County is approximately 998 square miles, and Cass County is approximately 2,021 square miles (U.S. Census Bureau 2022a). Based on population estimates from 2020, the population densities of Morrison, Crow Wing, and Cass counties were 30.2, 66.2, and 14.9 people per square-mile, respectively. Based on the April 1, 2020 census, the estimated population of Morrison County was 34,010 representing a 2.4 percent increase from the April 1, 2010 census. The city of Little Falls and Baxter experienced an increase in population from the 2010 to 2020 census. (U.S. Census Bureau 2022a). The city of Pillager had a population of 382 in 2020, representing an 8.8 percent decrease in population from 2019 (Data USA 2022a). Table 5-50 summarizes the population estimates for cities of Little Falls, Pillager, and Baxter, Morrison, Crow Wing, and Cass counties, and the state of Minnesota.

Table 5-50: Estimated Population of Applicable Cities, Counties, and the State of Minnesota

Relevant Project	Census Tract/ City/ County/State	2010 Census	2020 Census	Percent Change 2010-2020	2021 Estimates	Percent Change 2020-2021
Little Falls Project	Little Falls, MN[1]	8,343	9,140	9.6%	9,061	-0.9%
Sylvan and Pillager Projects	Pillager, MN[2]	-	382	-	-	-
Sylvan Project	Baxter, MN[1]	7,610	8,612	13.2%	8,830	2.5%
Little Falls and Pillager Projects	Morrison County, MN[1]	33,198	34,010	2.4%	33,992	-0.1%
Sylvan Project	Crow Wing County, MN[1]	62,500	66,123	5.8%	67,270	1.2%
Sylvan and Pillager Projects	Cass County, MN[1]	28,567	30,066	5.2%	30,639	1.9%
Little Falls, Sylvan, and Pillager Projects	Minnesota[1]	5,303,925	5,706,494	7.6%	5,711,471	0.1%

Sources: U.S. Census Bureau 2022a[1]; Data USA 2022a[2]

5.10.4 Economic Indicators and Employment

The 2017-2021 estimated median household incomes was $61,873 for Morrison County, $60,810 for Crow Wing County, $56,487 for Cass County, $43,278 for city of Little Falls, and $64,635 for city of Baxter. The 2021 poverty rate was 10.1 percent in Morrison County, 11.7 percent in Cass County, 16.3 percent in city of Little Falls, and 9.5 percent for city of Baxter. (U.S. Census Bureau 2022a). Table 5-51 provides the household and family distribution for Morrison, Crow Wing, and Cass counties, cities of Little Falls, and Baxter, and the state of Minnesota. The city of Pillager is a smaller community with limited household and family distribution data available. The city of Pillager is summarized as follows and not included in Table 5-51. Between 2019 and 2020, the city of Pillager’s population declined from 419 to 382 and the median household income increased from $44,018 to $44,375, representing a 0.8 percent increase (Data USA 2022a). The city of Pillager had 158 households in 2020 (Data USA 2022a).

The largest employment industries in 2020 in the city of Little Falls, Minnesota were manufacturing, health care and social assistance, and retail trade (Data USA 2022b). The largest industries in 2020 in the city of Pillager, Minnesota were health care and social assistance, construction, and retail trade (Data USA 2022a). The largest industries in 2020 in the city of Baxter, Minnesota were health care and social assistance, educational services, and manufacturing (Data USA 2022c). Table 5-52 provides additional data on employment industry distribution in the cities of Little Falls, Pillager, and Baxter compared to Morrison, Crow Wing, and Cass counties, Minnesota.

Table 5-51: Household and Family Distribution

	Morrison County, MN	Crow Wing County, MN	Cass County, MN	Little Falls, MN	Baxter, MN	Minnesota
2017-2021 Number of Households	13,530	27,539	12,431	3,951	3,452	2,229,100
2017-2021 Approximate Number of Persons per Household	2.47	2.36	2.38	2.20	2.45	2.49
2017-2021 Percentage of Population in Civilian Labor Force	65.3%	60.6%	55.9%	57.9%	62.3%	69.1%
2017-2021 Median Household Income	$61,873	$60,810	$56,487	$43,278	$64,635	$77,706
2021 Population Below Poverty Level	10.1%	10.7%	11.7%	16.3%	9.5%	9.3%

Source: U.S. Census Bureau 2022a

Table 5-52: Top Employment Sectors in 2020 for the Cities of Little Falls, Pillager, and Baxter, and Morrison, Crow Wing, and Cass Counties, Minnesota

Employment Sector	Little Falls, MN[1] (%)	Pillager, MN[2] (%)	Baxter, MN[3] (%)	Morrison County, MN[4] (%)	Crow Wing County, MN[5] (%)	Cass County, MN[6] (%)
Manufacturing	17.1	2.48	8.38	15.3	9.53	9.16
Health Care & Social Assistance	16.8	28.2	22.9	16.6	17	18.3
Retail Trade	12.5	13.9	8.18	10.4	12.6	12.2
Accommodation & Food Services	12.4	4.95	6.13	5.87	8.61	8.63
Public Administration	6.69	3.96	7.32	5.79	4.55	4.82
Administrative & Support & Waste Management Services	5.33	5.94	4.57	4.23	3.86	3.36
Other Services, Except Public Administration	5.1	1.98	4.39	4.91	4.14	4.13
Professional, Scientific, and Technical Services	4.6	3.96	3.08	3.54	4.22	3.28
Educational Services	4.31	8.42	12.6	6.71	7.16	7.59
Wholesale Trade	3.69	3.96	0.858	2.68	1.95	1.86
Construction	3.82	15.8	5.02	8.07	8.82	10.7
Arts, Entertainment, & Recreation	2.14	-	-	1.38	2.45	3.33
Finance & Insurance	1.46	1.98	4.09	2.43	4.63	3.48
Real Estate & Rental & Leasing	1.1	1.98	1.79	0.733	2.16	1.53
Utilities	0.811	-	-	0.703	0.898	0.721
Transportation and Warehousing	0.811	2.48	4.69	3.57	4.33	2.93
Agriculture, Forestry, Fishing & Hunting	0.366	-	0.227	6.09	1.2	2.4

Sources: Data USA 2022a[1], 2022b[2], 2022c[3], 2022d[4], 2022e[5], 2022f[6]

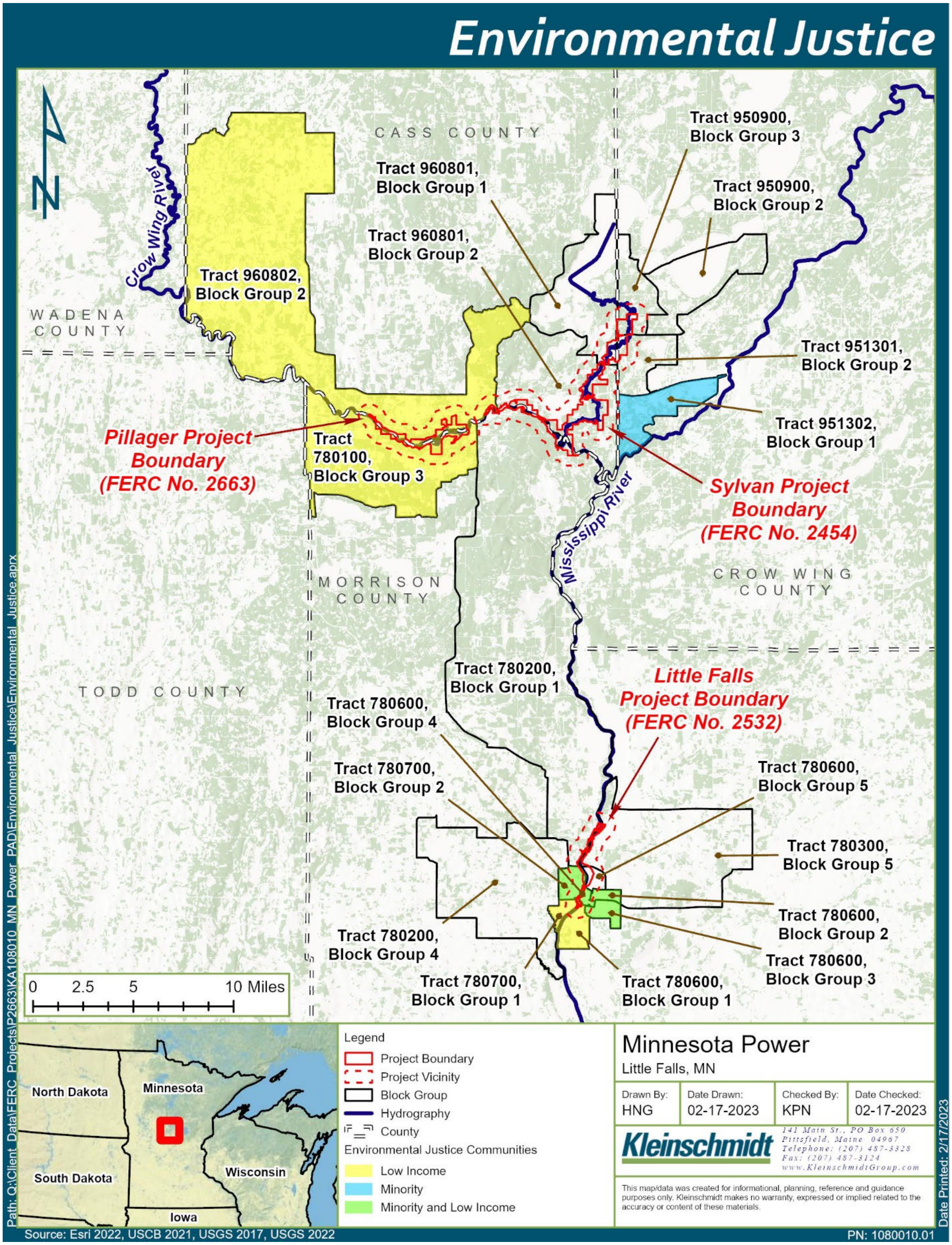
5.10.5 Environmental Justice

Executive Order 14008, Tackling the Climate Crisis at Home and Abroad, and Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, as amended, requires federal agencies to consider if impacts on human health or the environment would be disproportionately high and adverse for minority and low-income populations in the surrounding community resulting from the programs, policies, or activities of federal agencies. The term "environmental justice community" includes disadvantaged communities that have been historically marginalized and overburdened by pollution. Environmental justice (EJ) communities include but may not be limited to minority populations, low-income populations, or indigenous peoples. Census block groups are statistical divisions of census tracts that generally contain between 600 and 3,000 people and the thresholds used for populations meeting EJ status are as follows:

- For minority populations, the meaningfully greater analysis method was used, where the minority population in a block group is at least 10 percent greater than that of the same population for the county (i.e., multiply the percent minority of the county by 1.1). This new percentage is the threshold that a block group's percent minority would need to exceed to qualify as an EJ community under the meaningfully greater analysis method.
- The "low-income threshold criteria" was used to identify EJ communities based on income level, where the percent of low-income population in the identified block group is equal to or greater than that of the county.

The Projects were screened for EJ communities using the methods above. Figure 5-18 depicts the environmental justice screening results and depicts the census blocks groups that intersect the Projects screened for EJ.

Figure 5-18: Environmental Justice Screening for the Little Falls, Sylvan, and Pillager Projects



Little Falls Project

Table 5-53 provides associated race and ethnicity data for the Little Falls Project, as well as data on households in poverty of applicable block groups, counties, and state of Minnesota. Six block groups that intersect the Little Falls Project were identified as EJ communities. Race and ethnicity data identified Block Group 2, 3, and 4 within census tract 780600 and Block Group 2 of census tract 780700 as meeting EJ status since the minority population exceeds the established threshold. In addition, Block Group 1, 2, 3, and 4 of census tract 780600 and Block Group 1 and 2 of census tract 780700 meet EJ status due to poverty levels being equal to or higher than the respective county poverty level. (U.S. Census Bureau 2022b).

Sylvan Project

Table 5-54 provides associated race and ethnicity data for the Sylvan Project, as well as data on households in poverty of applicable block groups, counties, and state of Minnesota. Two block groups that intersect the Sylvan Project were identified as EJ communities. Race and ethnicity data identified Block Group 1 within census tract 951302 as meeting EJ status since the minority population exceeds the established threshold. Block Group 2 of census tract 960802 meets EJ status due to poverty levels being equal to or higher than the respective county poverty level (U.S. Census Bureau 2022b).

Pillager Project

Table 5-55 provides associated race and ethnicity data for the Pillager Project, as well as data on households in poverty of applicable block groups, counties, and state of Minnesota. Two block groups that intersect the Pillager Project were identified as EJ communities. Block Group 2 of census tract 960802 and Block Group 3 of census tract 780100 meet EJ status due to poverty levels being equal to or higher than the respective county poverty level. None of the block groups screened for the Pillager Project met EJ status due to race and ethnicity data. (U.S. Census Bureau 2022b).

Table 5-53: Race and Ethnicity Data and Poverty Data for Applicable Block Groups at the Little Falls Project

Geographic Area	Race and Ethnicity Data										Low-Income Data
	Total Population (count)	White Alone, not Hispanic (count)	African American/ Black (count)	Native American/ Alaska Native (count)	Asian (count)	Native Hawaiian & Other Pacific Islander (count)	Some Other Race (count)	Two or More Races (count)	Hispanic or Latino (count)	Total Minority Population (%)	Below Poverty Data (%)
Minnesota	5,563,378	4,609,049	356,515	58,011	268,181	2194	104,032	165,396	299,556	23%	9%
Morrison County	33,064	31,845	185	75	144	0	345	470	577	5%	10%
Census Tract 780200, Block Group 1	864	851	2	2	0	0	0	9	3	2%	6%
Census Tract 780200, Block Group 4	996	950	0	2	2	0	12	30	7	5%	7%
Census Tract 780300, Block Group 5	1658	1618	3	0	0	0	0	37	2	3%	5%
Census Tract 780600, Block Group 1	868	868	0	0	0	0	0	0	0	0%	10%
Census Tract 780600, Block Group 2	1013	905	0	11	76	0	0	21	55	16%	15%
Census Tract 780600, Block Group 3	1382	1217	126	0	0	0	30	9	0	12%	16%
Census Tract 780600, Block Group 4	1708	1621	24	0	4	0	13	46	52	8%	34%
Census Tract 780600, Block Group 5	699	699	0	0	0	0	0	0	0	0%	3%
Census Tract 780700, Block Group 1	1435	1431	0	0	0	0	0	4	0	0%	10%
Census Tract 780700, Block Group 2	981	926	0	0	7	0	12	36	36	9%	12%

*Gray shaded cells indicate an environmental justice community.

Source: U.S. Census Bureau 2022b

Table 5-54: Race and Ethnicity Data and Poverty Data for Applicable Block Groups at the Sylvan Project

Geographic Area	Race and Ethnicity Data										Low-Income Data
	Total Population (count)	White Alone, not Hispanic (count)	African American/ Black (count)	Native American/ Alaska Native (count)	Asian (count)	Native Hawaiian & Other Pacific Islander (count)	Some Other Race (count)	Two or More Races (count)	Hispanic or Latino (count)	Total Minority Population (%)	Below Poverty Data (%)
Minnesota	5,563,378	4,609,049	356,515	58,011	268,181	2194	104,032	165,396	299,556	23%	9%
Cass County	29,268	24,720	122	3450	187	4	68	717	658	18%	13%
Census Tract 960802, Block Group 2	2131	2085	9	5	0	0	5	27	100	7%	13%
Census Tract 960801, Block Group 1	1013	1005	0	7	1	0	0	0	14	2%	2%
Census Tract 960801, Block Group 2	2418	2381	2	4	0	0	0	31	82	5%	8%
Crow Wing County	64,217	61,499	526	599	272	0	161	1160	958	6%	11%
Census Tract 950900, Block Group 2	827	803	0	24	0	0	0	0	0	3%	8%
Census Tract 951302, Block Group 1	2689	2287	48	125	40	0	30	159	92	18%	7%
Census Tract 950900, Block Group 3	1505	1505	0	0	0	0	0	0	0	0%	4%
Census Tract 951301, Block Group 2	1977	1907	2	9	11	0	0	48	20	5%	5%
Morrison County	33,064	31,845	185	75	144	0	345	470	577	5%	10%
Census Tract 780200, Block Group 1	864	851	2	2	0	0	0	9	3	2%	6%

*Gray shaded cells indicate an environmental justice community.

Source: U.S. Census Bureau 2022b

Table 5-55: Race and Ethnicity Data and Poverty Data for Applicable Block Groups at the Pillager Project

Geographic Area	Race and Ethnicity Data										Low-Income Data
	Total Population (count)	White Alone, not Hispanic (count)	African American/ Black (count)	Native American/ Alaska Native (count)	Asian (count)	Native Hawaiian & Other Pacific Islander (count)	Some Other Race (count)	Two or More Races (count)	Hispanic or Latino (count)	Total Minority Population (%)	Below Poverty Data (%)
Minnesota	5,563,378	4,609,049	356,515	58,011	268,181	2194	104,032	165,396	299,556	23%	9%
Cass County	29,268	24,720	122	3450	187	4	68	717	658	18%	13%
Census Tract 960802, Block Group 2	2131	2085	9	5	0	0	5	27	100	7%	13%
Morrison County	33,064	31,845	185	75	144	0	345	470	577	5%	10%
Census Tract 780200, Block Group 1	864	851	2	2	0	0	0	9	3	2%	6%
Census Tract 780100, Block Group 3	977	953	0	2	0	0	13	9	17	4%	15%

*Gray shaded cells indicate an environmental justice community.

Source: U.S. Census Bureau 2022b

5.10.6 References

Data USA. 2022a. Pillager, MN. Available online at: https://datausa.io/profile/geo/pillager-mn. Accessed January 2023.

Data USA. 2022b. Little Falls, MN. Available online at: https://datausa.io/profile/geo/little-falls-mn. Accessed January 2023.

Data USA. 2022c. Baxter, MN. Available online at: https://datausa.io/profile/geo/baxter-mn. Accessed January 2023.

Data USA. 2022d. Morrison County, MN. Available online at: https://datausa.io/profile/geo/morrison-county-mn. Accessed January 2023.

Data USA. 2022e. Crow Wing County, MN. Available online at: https://datausa.io/profile/geo/crow-wing-county-mn. Accessed January 2023.

Data USA. 2022f. Cass County, MN. Available online at: https://datausa.io/profile/geo/cass-county-mn. Accessed January 2023.

Morrison County. 2022. Morrison County, MN: Feedlots. Available online at: https://www.co.morrison.mn.us/289/Feedlots. Accessed January 2023.

U.S. Census Bureau. 2022a. QuickFacts: Little Falls city, Minnesota; Baxter city, Minnesota; Morisson County, Minnesota; Crow Wing County, Minnesota; Cass County, Minnesota; Minnesota. Available online at https://www.census.gov/quickfacts/fact/table/littlefallscityminnesota,baxtercityminnesota,morrisoncountyminnesota,crowwingcountyminnesota,casscountyminnesota,MN/PST045222. Accessed January 2023.

U.S. Census Bureau. 2022b. American Community survey 5-year data (2009-2021). Census.gov. Retrieved November 29 2022, from https://www.census.gov/data/developers/data-sets/acs-5year.html.

5.11 Tribal Resources

18 CFR 5.6(d)(3)(xii) requires "A description of Indian tribes, tribal lands, and interests that may be affected by the project. Components of this description include: (A) Identification of information on resources specified in paragraphs (d)(2)(ii)–(xi) of this section to the extent that existing project construction and operation affecting those resources may impact tribal cultural or economic interests, e.g., impacts of project-induced soil erosion on tribal cultural sites; and (B) Identification of impacts on Indian tribes of existing project construction and operation that may affect tribal interests not necessarily associated with resources specified in paragraphs (d)(3)(ii)–(xi) of this Section, e.g., tribal fishing practices or agreements between the Indian tribe and other entities other than the potential applicant that have a connection to project construction and operation."

The Projects include no tribal lands. At the time of the filing of this PAD, no correspondence from any tribes have been received by the Licensee pertaining to the relicensings of the Projects and no concerns have been identified. Although no specific tribal interest has been identified by the Licensee at the Projects, the Tribes listed in Table 5-56 are included in Licensee's Distribution List for the Projects relicensing process. This list will be updated to match the list of Tribes that FERC consults with for the relicensings, following FERC's initiation of consultation.

Table 5-56: Tribes included on Projects Distribution List

Tribe
Apache Tribe of Oklahoma
Bad River Band of Lake Superior Chippewa Indians of the Bad River Reservation, Wisconsin
Cheyenne and Arapaho Tribes of Oklahoma
Fort Belknap Indian Community of the Fort Belknap Reservation of Montana
Iowa Tribe of Kansas and Nebraska
Keweenaw Bay Indian Community, Michigan
Lac du Flambeau Band of Lake Superior Chippewa Indians of the Lac du Flambeau Reservation of Wisconsin
Lac Vieux Desert Band of Lake Superior Chippewa Indians of Michigan
Menominee Indian Tribe of Wisconsin
Minnesota Chippewa Tribe - Bois Forte Band (Nett Lake)
Minnesota Chippewa Tribe - Fond du Lac Band
Minnesota Chippewa Tribe - Grand Portage Band
Minnesota Chippewa Tribe - Leech Lake Band
Minnesota Chippewa Tribe - Mille Lacs Band
Minnesota Chippewa Tribe, Minnesota
Minnesota Chippewa Tribe - White Earth Band
Red Lake Band of Chippewa Indians
Red Cliff Band of Lake Superior Chippewa Indians of Wisconsin
Sokaogon Chippewa Community, Wisconsin
Upper Sioux Community of Minnesota

6.0 PRELIMINARY LISTING OF POTENTIAL ISSUES, INFORMATIONAL NEEDS, AND MITIGATION (18 CFR § 5.6(D)(4)(I, II))

18 CFR 5.6(d)(4) requires "Based on the resource description and impacts discussion required by paragraph (d)(3) of this section; the pre-application document must include with respect to each resource area identified above, a list of: (i) Issues pertaining to the identified resources; (ii) Potential studies or information gathering requirements associated with the identified issues; (iii) Relevant qualifying Federal and state or tribal comprehensive waterway plans; and (iv) Relevant resource management plans."

6.1 Geology and Soils

Geology and soils in the Projects Vicinities are well understood and no issues have been identified. The Projects have been operated for several decades in a manner that has not impacted geological and soils resources. Given the Licensee's proposal to continue ROR operation of the Projects, no change to geology and soils should result from continued hydroelectric generation. The Licensee is not proposing any studies specific to geologic or soil resources. No Protection, Mitigation and Enhancement (PME) measures regarding geology or soils are proposed.

6.2 Water Resources

Water resources in the Projects Vicinities and surrounding areas are well understood and no current issues have been identified. There is abundant water quality information available for the river reaches within the Projects Vicinities, as well as the surrounding areas, from studies completed by the Licensee and the Minnesota PCA. River flow information is available from nearby USGS stations, and the Licensee continuously monitors flows and water levels at the Projects. The Projects are operated as ROR, which minimizes water level fluctuations in the reservoirs and provides natural river flows downstream. Due to the proposed continued ROR operations, no changes to water quality conditions at the Projects are anticipated. No studies or additional PME measures are being proposed specific to water resources.

6.3 Fish and Aquatic Resources

Fisheries and aquatic resources in the rivers on which the Projects are located are well understood. Fish assemblage and mussel data collected by the Minnesota DNR documents existing diverse fish and mussel populations and active sport fisheries at the Projects. Fish assemblage diversity extends throughout the Projects reaches, with existing sport fisheries present both upstream and downstream of the Little Falls Project, Sylvan Project, and Pillager Project. Suitable spawning and rearing habitat appears to be present, with annual recruitment of juvenile fish documented for multiple fish species at the Projects. ROR operations aid in the protection of downstream habitat by keeping aquatic habitats wetted and would be expected to maintain a natural flow regime during critical spawning periods. These operations avoid unnatural drawdown or dewatering periods that would expose mussels or fish spawning and rearing habitat during the spring and summer. The Licensee will continue to follow its Preventing the Spread of Aquatic Invasive Species guidance document and comply with Minnesota State Statute Chapter 84D and Minnesota Rule part 6216 to prevent the spread of aquatic invasive species at the Projects. The Licensee proposes to continue ROR operations for the continued protection of fish and aquatic resources. No studies or additional PME measures are being proposed specific to fish and aquatic resources.

6.4 Terrestrial Wildlife and Botanical Resources

Terrestrial wildlife and botanical resources at the Projects are well understood and no issues have been identified. The Projects have been in operation for decades, and the existing terrestrial environment developed in response to the Projects operations. The Projects are operated as ROR which minimizes water level fluctuations in the reservoirs and provides natural river flows downstream and as the Licensee proposes to continue ROR operation, it is anticipated that there will be no change to terrestrial wildlife or botanical habitats or species impacts due to Projects operation. No studies are being proposed specific to terrestrial wildlife and botanical resources. The Licensee proposes to continue to manage the Sylvan Project lands and Pillager Project lands per the respective Land Management Plans, which were recently updated in 2016. The Licensee will also continue to implement best management practices with respect to commercial logging practices and to prevent the spread of terrestrial invasive species in accordance with Minnesota DNR's Operational Order 113 – Invasive Species Prevention and Management.

6.5 Wetlands, Riparian, and Littoral Habitat

Wetlands, riparian, and littoral habitat at the Projects are well understood and no issues have been identified. The Projects are operated in ROR mode, which minimizes unnatural water level fluctuations. The Licensee proposes to continue ROR operations at the Projects; therefore, wetlands, riparian, and littoral habitats are not anticipated to be impacted by the continued operation of the Projects. Further, the Licensee proposes to continue to manage the Sylvan Project lands and Pillager Project lands as described in the respective Land Management Plans, which states that forest management activities in and near wetlands will be conducted in accordance with the Minnesota Forest Resource Council Forest Management Guidelines as published by the Minnesota Forest Resource Council in 2005, and any additions or amendments to such guidelines that may occur in the future. These guidelines include best management practices for timber harvesting around wetlands. The Licensee will continue to follow its Preventing the Spread of Aquatic Invasive Species guidance document and implement best management practices to prevent the spread of aquatic and wetland invasive species in accordance with Minnesota DNR's Operational Order 113 – Invasive Species Prevention and Management. No studies or additional PME measures are being proposed specific to wetlands, riparian, and littoral habitat.

6.6 Rare, Threatened, and Endangered Species

Initial reviews of rare species databases, including USFWS' IPaC and Minnesota DNR's NHIS identified federally listed and state listed species with the potential to occur in the Projects Vicinities, as described in detail in Section 5.6. Gray wolf, northern long-eared bat, tricolored bat, and monarch butterfly were identified as federally listed, proposed, or candidate species with the potential to occur in the Projects Vicinities. Species identified on the NHIS with the potential to occur in the Projects Vicinities included two bird species, one turtle, three bat species, two mussel species, and five plant species as detailed by Project in Section 5.6. Bald eagles, which are protected under the Bald and Golden Eagle Protection Act, are known to occur at the Sylvan Project and Pillager Project. State-listed species, including birds, bats, mussels, a turtle, and plants were listed as potentially occurring within the Projects Vicinities. No changes to Projects facilities are proposed as a part of this relicensing. Given the Licensee's proposal to continue ROR operation of the Projects, no change to aquatic species habitat is anticipated. To avoid potential impacts to tree roosting bats, MP will consult with USFWS and follow the interim consultation and guidance documents[47] for northern-long-eared bats prior to tree clearing activities. No other impacts to RTE species are anticipated from the proposed continued operations and no studies or additional PME measures are proposed.

6.7 Recreation and Land Use

Recreation and land use are well understood and managed at the Projects. No issues related to recreation and land use at the Projects have been identified. At the Little Falls Project, the Licensee does not directly provide recreational facilities, although there are several recreational sites in the Little Falls Project Vicinity, including several public recreational sites that provide access to the Little Falls reservoir. At the Sylvan Project, there are four (4) Commission-approved recreation sites within the Sylvan Project Boundary, including boat launches, fishing areas, and a canoe portage around the dam. At the Pillager Project, there are four (4) Commission-approved recreation sites within the Pillager Project Boundary, including boat launches, a fishing area, a canoe portage around the dam, and a canoe campsite. A wide variety of recreation opportunities currently exist at the Projects, and no issues have been identified. No recreation studies are proposed.

No issues have been identified related to land use or land management at the Projects. Lands at the Sylvan and Pillager Projects are managed through Land Management Plans, pursuant to License Article 411 of their respective FERC licenses. No changes to the FERC Projects Boundaries are proposed at this time. As land use is well understood, no studies related to land use are proposed. The Licensee is required to update the Land Management Plans for the Sylvan Project

[47] USFWS released interim consultation and habitat modification guidance on March 6, 2023 for the recent reclassification of the northern long-eared bat: https://www.fws.gov/library/collections/interim-consultation-framework-northern-long-eared-bat.

and Pillager Project every 10 years. The next update to the Land Management Plans will be in 2026. The Updated Land Management Plans are proposed to be included in the license applications for incorporation into the FERC licenses.

6.8 Aesthetic Resources

Aesthetic resources at the Projects are well understood and no issues have been identified. The Licensee proposes to continue ROR operation of the Projects and is not proposing any changes to facilities. No change to aesthetic resources is anticipated due to the proposed relicensing. No studies or PME measures are proposed for the Projects.

6.9 Cultural Resources

Based on previous surveys in the general area and those specifically performed for the Projects during previous relicensing efforts, existing cultural resources information is well known for the Projects. The Licensee is not proposing changes to Projects operations or facilities, nor to the FERC Project Boundaries. Therefore, the Licensee proposes to use the existing FERC Project Boundary for the Projects as the APE during relicensing. The Licensee will consult with the Minnesota SHPO and applicable tribes and request concurrence on the APEs. The Licensee proposes to conduct a desktop cultural resources evaluation of the APEs for the Projects. This review will result in detailed information on previously recorded archaeological sites, historic properties, and survey areas in the APEs. The cultural resources evaluation is intended to verify known sites in the APEs and provide information that is critical to the review of Projects subject to Section 106 consultation. Following the results of the cultural resources evaluation, the Licensee will consult with the Minnesota SHPO and applicable tribes to determine if field survey is necessary.

6.10 Socioeconomic Resources and Environmental Justice

The region surrounding the Projects support various employment industries including manufacturing, health care and social assistance, and retail trade. EJ communities were identified at the Projects during preliminary review using the low-income threshold and minority population criteria. The Licensee anticipates that the proposed action, which includes continued ROR operation, will not disproportionately adversely affect the identified EJ communities and no studies or mitigation measures related to socioeconomic resources or EJ are proposed.

6.11 Tribal Resources

There are no tribal lands at the Projects and the Licensee is not aware of tribal resources issues at the Projects. No studies or additional PME measures related to tribal resources are proposed.

7.0 RELEVANT RESOURCE MANAGEMENT PLANS (18 CFR § 5.6(D)(4)(III, IV))

7.1 Relevant Qualifying Federal and State or Comprehensive Waterway Plans

Section 10(a)(2)(A) of the FPA, 16 U.S.C § 803(a)(2)(A), requires FERC to consider the extent to which a project is consistent with federal or state comprehensive plans for improving, developing, or conserving a waterway or waterways potentially affected by the proposed project. On April 27, 1988, FERC issued Order No. 481-A revising Order No. 481, issued October 26, 1987, establishing that FERC will accord FPA Section 10(a)(2)(A) comprehensive plan status to any federal or state plan that:

- Is a comprehensive study of one or more of the beneficial uses of a waterway or waterways.
- Specifies the standards, the data, and the methodology used.
- Is filed with the Secretary of the Commission.

FERC currently lists 32 comprehensive plans for the state of Minnesota (FERC 2022). Of these plans, fifteen are potentially relevant to the Projects, as listed below (Table 7-1). These plans may be useful in the relicensing proceeding for characterizing desired conditions.

Table 7-1: List of Qualifying Comprehensive Plans Potentially Relevant to the Projects

Resource	Comprehensive Plan
Water Resources	Minnesota Department of Natural Resources. 1977. A management plan for the Crow Wing River. St. Paul, Minnesota. February 1977.
Water Resources	Minnesota Department of Natural Resources. 1983. Statewide outstanding rivers inventory. St. Paul, Minnesota. March 1983.
Recreation and Land Use	Minnesota Department of Natural Resources. 2015. Minnesota State Parks and Trails System Plan. St. Paul, Minnesota.
Terrestrial Wildlife and Botanical Resources	Minnesota Department of Natural Resources. 2016. Minnesota's Wildlife Action Plan, 2015-2025. St. Paul, Minnesota.
Recreation and Land Use	Minnesota Department of Natural Resources. n.d. Canoe and boating route program. St. Paul, Minnesota. 39 pamphlets.
Recreation and Land Use	Minnesota Department of Natural Resources. n.d. Minnesota's Statewide Comprehensive Outdoor Recreation Plan (SCORP): 2014-2018. St. Paul, Minnesota.

Resource	Comprehensive Plan
Water Resources, Fish and Aquatic Resources, Terrestrial and Botanical Resources	Minnesota Department of Natural Resources. n.d. Strategic Conservation Agenda: The DNR's 10-year Strategic Plan, 2015-2025. St. Paul, Minnesota.
Water Resources	Mississippi Headwaters Board. 1981. A management plan for the Upper Mississippi River. Grand Rapids, Minnesota. January 1981.
Water Resources	National Park Service. The Nationwide Rivers Inventory. Department of the Interior, Washington, D.C. 1993.
Water Resources	Upper Mississippi River Basin Commission. 1981. Comprehensive master plan for the management of the Upper Mississippi River system - environmental report. Minneapolis, Minnesota. September 1981.
Water Resources	Upper Mississippi River Basin Commission. 1982. Comprehensive master plan for the management of the Upper Mississippi River system. Minneapolis, Minnesota. January 1, 1982.
Terrestrial Wildlife and Botanical Resources	U.S. Fish and Wildlife Service. Canadian Wildlife Service. 1986. North American waterfowl management plan. Department of the Interior. Environment Canada. May 1986.
Terrestrial Wildlife and Botanical Resources	U.S. Fish and Wildlife Service. 1993. Upper Mississippi River & Great Lakes Region joint venture implementation plan: A component of the North American waterfowl management plan. March 1993.
Fish and Aquatic Resources	U.S. Fish and Wildlife Service. n.d. Fisheries USA: the recreational fisheries policy of the U.S. Fish and Wildlife Service. Washington, D.C.

Source: FERC 2022

7.2 References

Federal Energy Regulatory Commission (FERC). 2022, August. List of Comprehensive Plans. Office of Energy Projects, 20426. Washington, D.C. Available online: https://cms.ferc.gov/media/list-comprehensive-plans Accessed: January 2023.

APPENDIX A

SUMMARY OF CONTACTS AND CORRESPONDENCE MADE IN PREPARING THE PAD
18 CFR § 5.6 (d)(5)

From: Gregory Prom (MP)
To: "darin_simpkins@fws.gov"; "dave_thomson@nps.gov"; "john.jaschke@state.mn.us"; "shannon.wettstein@morrisonswcd.org"; "Sarah.Beimers@state.mn.us"; "Dan.Wolf@state.mn.us"; "Nanette.m.bischoff@usace.army.mil"; "shannon.geshick@state.mn.u"; 0135; "Jill.Townley@state.mn.us"; "jason.boyle@state.mn.us"; "eric.altena@state.mn.us"; "thorleif@umn.edu"; "Jesse.Anderson@state.mn.us"; "Bonnie.finerty@state.mn.us"; "william.wilde@state.mn.us"; "mattl@co.morrison.mn.us"; "josh.stevenson@casscountymn.gov"; "CoAdmin@crowwing.us"; "joshua.a.pennington4.nfg@army.mil"; "tholman@tnc.org"; "joer@cityoflittlefalls.com"
Cc: nrosemore@mnpower.com; Lesley Brotkowski; Elizabeth Krchnavek; Matthew Radzak (MP)
Date: Thursday, December 22, 2022 4:48:41 PM
Attachments: image001.png
Initial Agency and Stakeholder Relicensing Meeting Agenda Jan 5 2023.pdf

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Good afternoon,

Minnesota Power is initiating the Federal Energy Regulatory Commission (FERC) licensing process for the Little Falls (P-2532), Sylvan (P-2454), Pillager (P-2663) Hydroelectric Projects. The Projects have an upcoming license expiration of March 31, 2028. Minnesota Power will be filing a Notice of Intent (NOI) and Pre-Application Document (PAD) for the Projects by March 31, 2023.

In order to have early involvement in the relicensing process, we would like to invite you to an initial agency meeting, during the development of the PAD. This meeting will provide an overview of the Projects and will be an opportunity to provide resource information or potential known resource concerns or relicensing-related issues. Feedback and available data will be helpful in informing the development of the PAD.

The meeting will be held virtually on **January 5, 2023 at 1:00 PM – 3:00 PM**. We have attached a brief agenda and will send the meeting invitation separately. We appreciate your participation in the upcoming relicensing process. Please contact me at gprom@allete.com or our relicensing consultant Lesley Brotkowski (Kleinschmidt Associates) at Lesley.Brotkowski@kleinschmidtgroup.com with any questions.

Thank you,

Greg Prom

Senior Environmental Compliance Specialist
Minnesota Power/ALLETE
30 West Superior Street
Duluth, Minnesota 55802

Office: 218-355-3191
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Little Falls (P-2532), Sylvan (P-2454), and Pillager (P-2663) Hydroelectric Projects

Initial Agency and Stakeholder Meeting

January 5, 2023, 1:00 CST

Meeting Summary

1) **Introductions – meeting attendees:**
    - Eric Alterna, Minnesota Department of Natural Resources (Minnesota DNR)
    - Mark Anderson, Minnesota DNR
    - Dan O'Shea, Minnesota DNR
    - Darin Simpkins, U.S. Fish and Wildlife Service (USFWS)
    - Bill Wilde, Minnesota Pollution Control Agency (MPCA)
    - Sarah Beimers, Minnesota State Historic Preservation Office (Minnesota SHPO)
    - Destiny Mankowski, Morrison County Soil & Water Conservation District (SWCD)
    - Lew Noska, Morrison County SWCD
    - Matt LaBlanc, Morrison County
    - Greg Kimman, City of Little Falls
    - Todd Holman, The Nature Conservancy (TNC)
    - Dylan, Minnesota Indian Affairs Council (MIAC)
    - Arik Forsman, City of Duluth
    - Kelly Desormey, Little Falls Chamber Board
    - Greg Prom, Minnesota Power (MN Power), Project lead
    - Nora Rosemore, MN Power
    - Mike Chamber, MN Power
    - Jeff Meyer, MN Power
    - Matt Radzak, MN Power
    - Lesley Brotkowski, Kleinschmidt Associates (Kleinschmidt), Project Manager
    - Elizabeth Krchnavek, Kleinschmidt, Assistant Licensing Coordinator
2) **Overview of Little Falls (P-2532), Sylvan (P-2454), and Pillager (P-2663) Hydroelectric Projects (Projects)**
    - Greg Prom kicked off the meeting presentation and described location and basic information on the three Projects.
3) **Overview of Federal Energy Regulatory Commission (FERC) relicensing process**
    - Lesley Brotkowski described the FERC relicensing process, provided an overview of content needed for the Pre-application Document (PAD), and highlighted information needed to compile the PAD.
4) **Resource Discussion**
    - Lesley and Greg requested available studies, data, and comprehensive plans from the resource agencies and stakeholders. Information was requested pertaining to water quality, fisheries, mussels, invasive species, wildlife and rare species, recreation, and cultural resources.

- Potential resource concerns were discussed:
  - Greg Kimman, City of Little Falls
    - Stated that the City of Little Falls is interested in the installation of a fish ladder at the Little Falls Project. Greg noted that a fish ladder may attract people to the park and enhance recreation.
  - Eric Alterna and Dan O'Shea, Minnesota DNR
    - Stated that fishery surveys have been conducted and fish and mussel data are available for the Projects.
    - Minnesota DNR is in favor of natural fish passage at the dams.
    - MN Power requested that data (fish, mussel, and benthic macroinvertebrate) and management plans be provided for review and inclusion in the PAD.
    - Lesley asked if the existing data indicate that fish passage is warranted at these Projects or if the request for passage is a general comment for habitat connectivity.
    - Eric Altena said that below the Sylvan Project there is anecdotal evidence of the need for mussel passage, with fish and mussel species found below, but not above the dams. Dan O'Shea said the request is more for general connectivity needs. The Minnesota DNR is also interested in entrainment mortality at the Projects.
  - Sarah Beimers, Minnesota SHPO
    - The Projects have Historic Properties Management Plans (HPMP). Stated that MN Power does a good job with shoreline monitoring. Minnesota SHPO typically recommends renewed archaeological survey in the Area of Project Effects (APE).
    - For historic structures, the Projects are considered to be Natural Register of Historic Places (NRHP) eligible. Little Falls Project and Sylvan Project have robust evaluations but are dated (greater than 10 years). Pillager Project may not have a very robust NR evaluation. Minnesota SHPO may recommend renewed architectural resource evaluations of the Little Falls, Sylvan, and Pillager Projects. Minnesota SHPO may ask that the impoundments be evaluated as potential contributing resources in the NRHP evaluations.
  - Todd Holman, TNC
    - Minnesota Historical Society did an evaluation in the area. Todd forwarded a copy of the evaluation to Kurt Anderson of MN Power in spring of 2022.
    - Sentinel Landscapes Partnership is currently conducting a climate resilience report, which will be available in May 2023.
  - Bill Wilde, MPCA
    - Bill asked if there will be construction involved or if the Projects are strictly relicensing. Greg stated that there are no major modifications or operations changes proposed.

- Lesley asked if there were any water quality concerns at the Projects; none were noted.
  - Darin Simpkins, USFWS, noted there were no specific rare species concerns at this time.
  - No other comments on resource issues.

5) Timeline and Next Steps

- Lesley reviewed the timeline and next steps in the FERC relicensing process.

6) End of Meeting

- Greg and Lesley thanked everyone for their time and provided contact information.

Little Falls, Sylvan, Pillager Hydroelectric Projects

FERC P-2532, P-2454, P-2663

Initial Agency and Stakeholder Meeting

January 5, 2023

Agenda

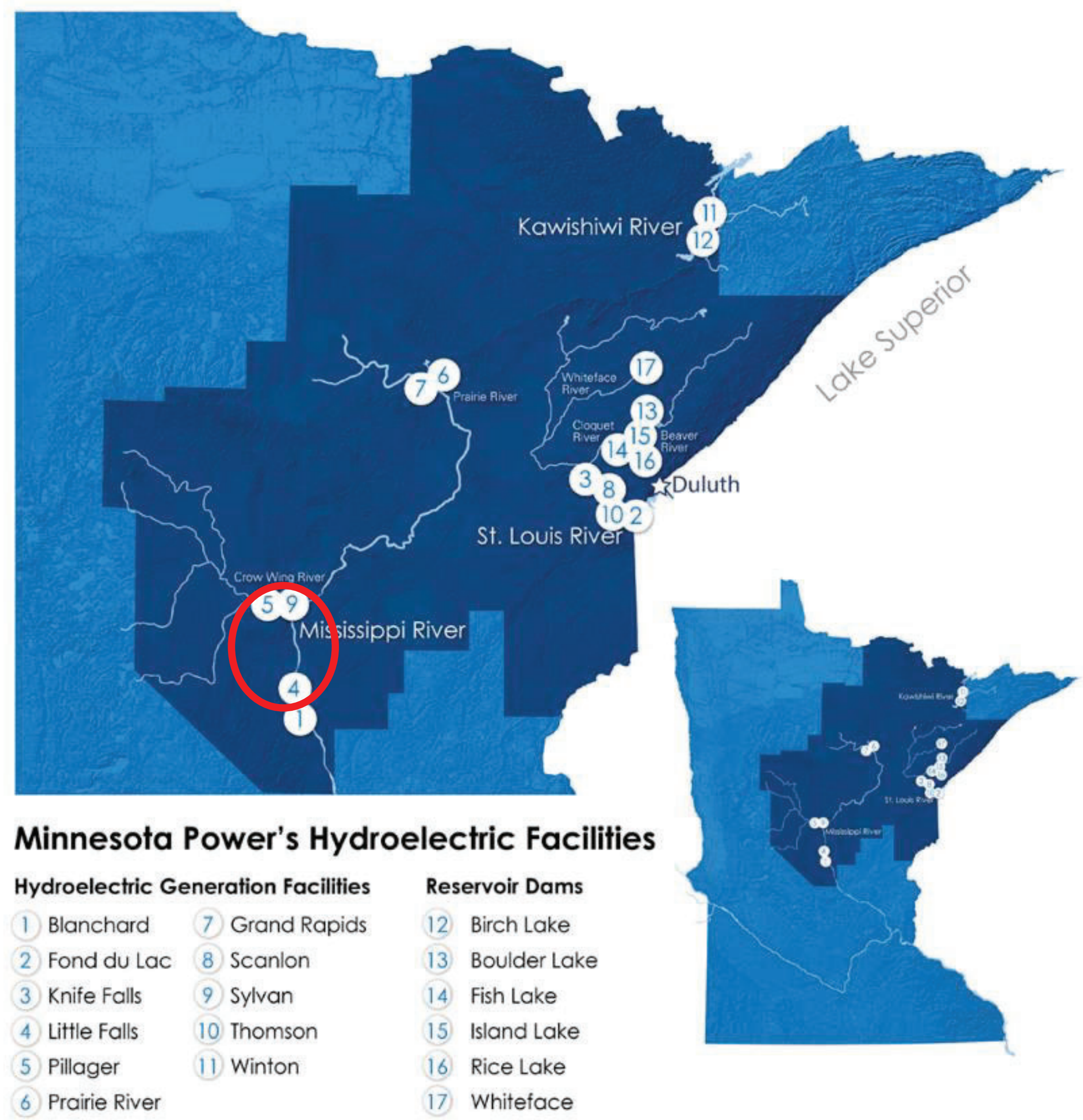
1) Introductions
2) Overview of Little Falls (P-2532), Sylvan (P-2454), Pillager (P-2663) Hydroelectric Projects (Projects)
3) Overview of Federal Energy Regulatory Commission (FERC) relicensing process
4) Resource discussion
5) Timeline and next steps

Introductions

Introduction of Meeting Participants

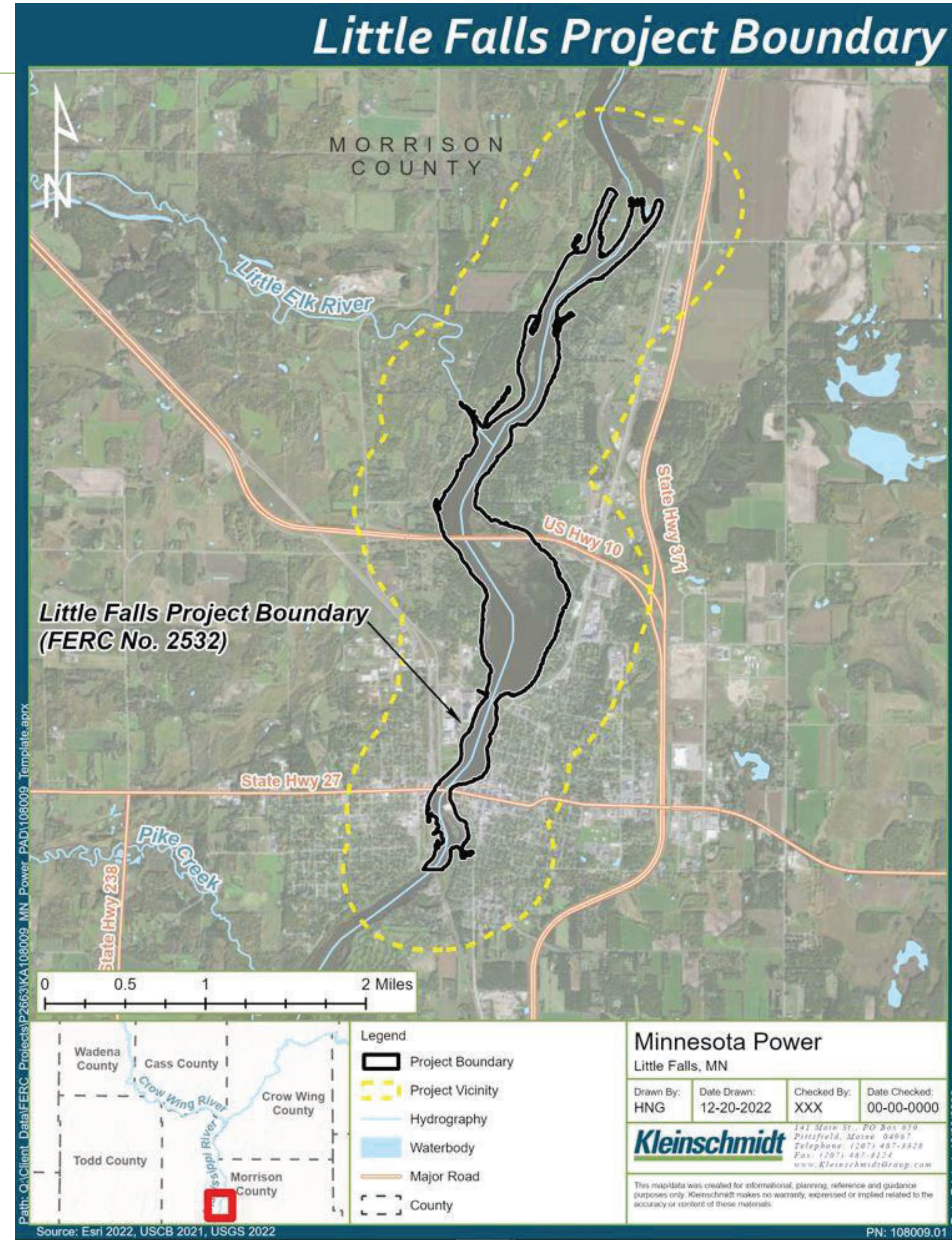
Projects Overview

- Relicensing 3 Hydro Projects:
  - Little Falls (P-2532)
  - Sylvan (P-2454)
  - Pillager (P-2663)
- FERC licenses expiration 3/31/2028
- Initiating FERC relicensing process
- Run-of-river Projects on Mississippi River (Little Falls) and Crow Wing River (Sylvan and Pillager)

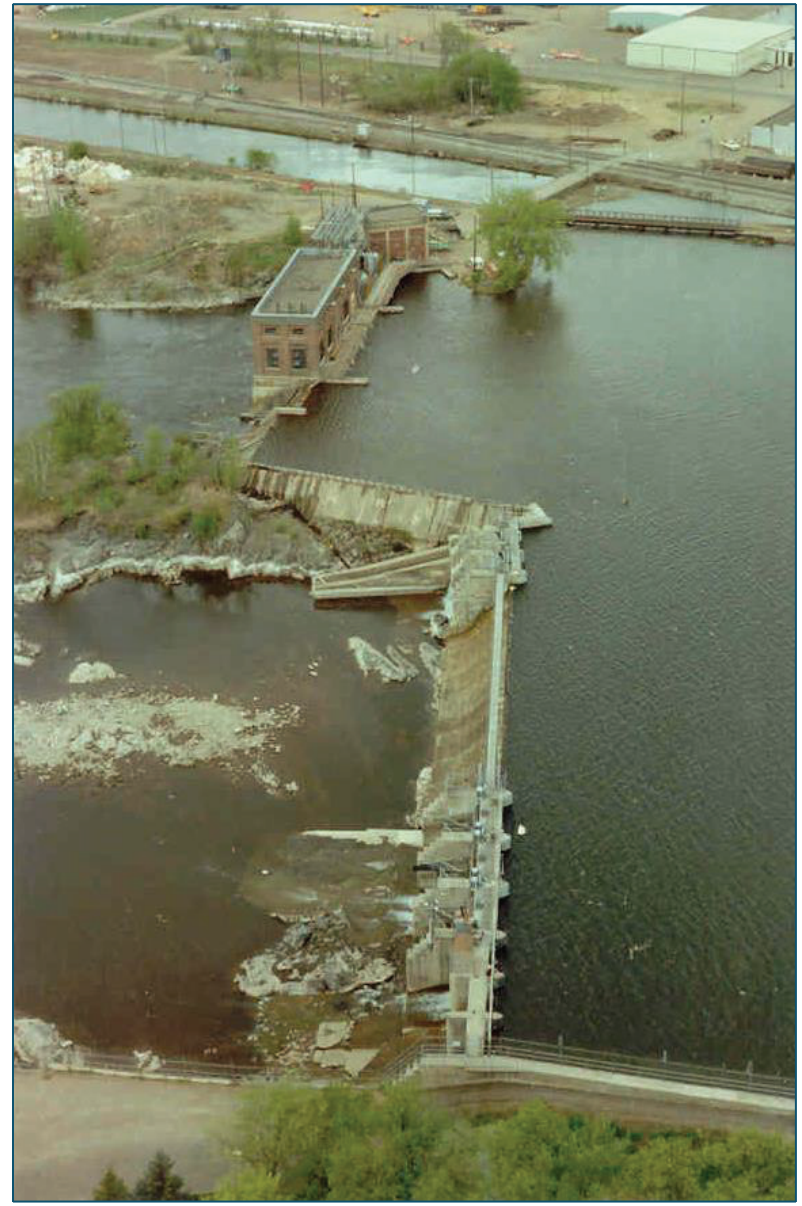


Little Falls Project

- Location: Little Falls, MN (Morrison County)
- Mississippi River
- 4.72 megawatt existing project
- Run-of-river operations
- No federal lands

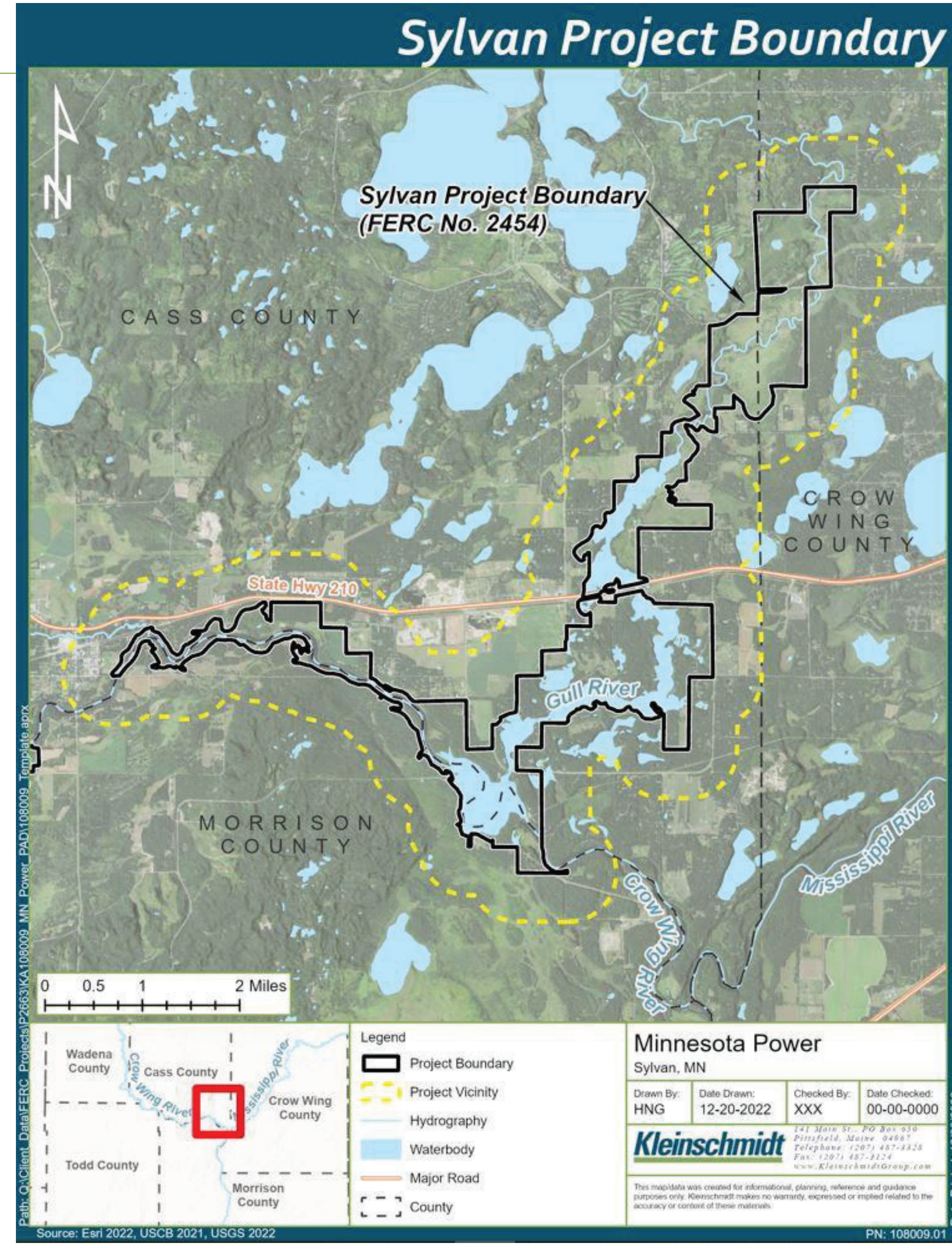


Little Falls Project



Sylvan Project

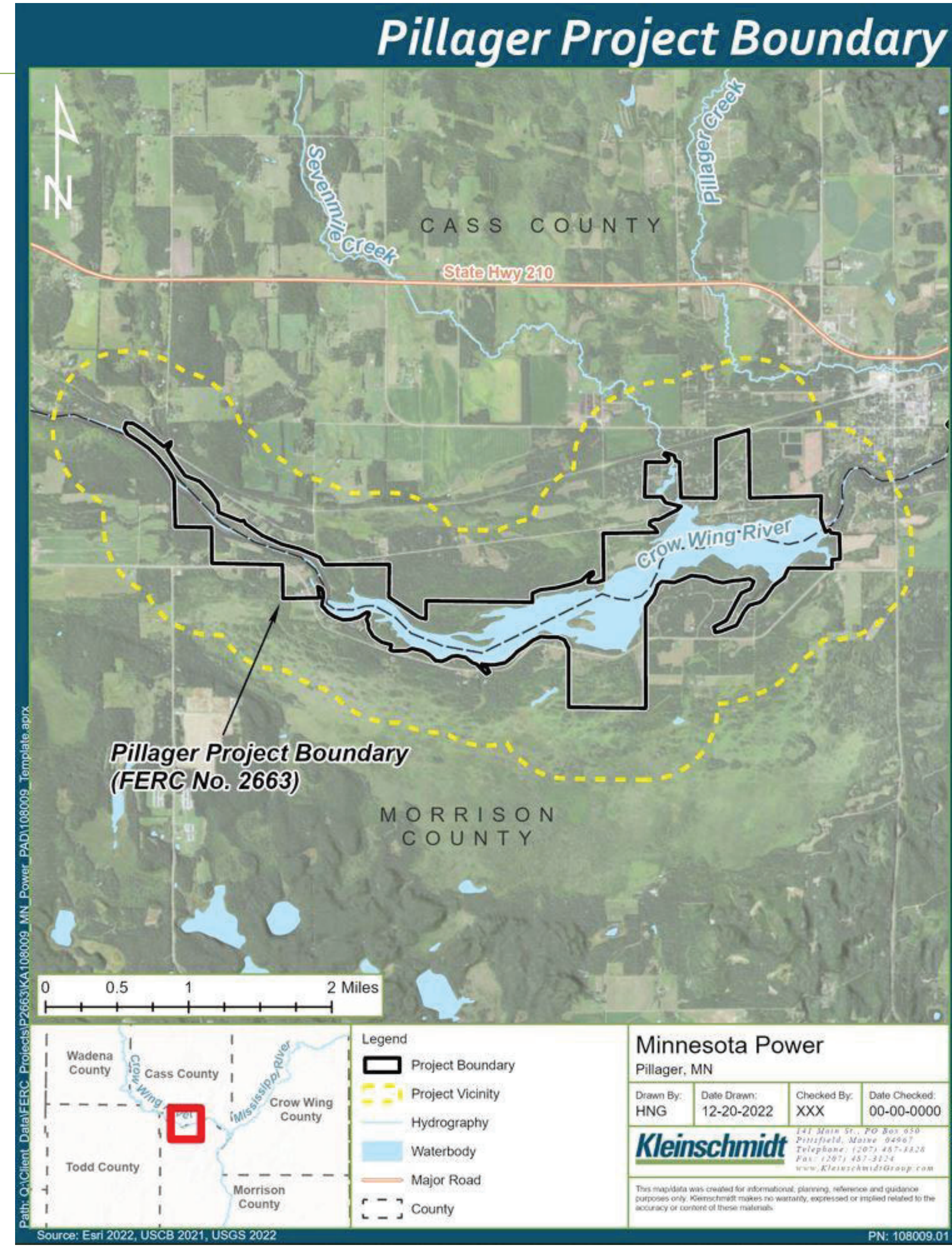
- ❖ Location: Rosing Township, MN (Cass, Crow Wing, and Morrison Counties)
- ❖ Crow Wing River and Gull River
- ❖ 1.8 megawatt existing project
- ❖ Run-of-river operations
- ❖ No federal lands



Sylvan Project

Pillager Project

- ❖ Location: Pillager Township, MN (Cass and Morrison Counties)
- ❖ Crow Wing River
- ❖ 1.52 megawatt existing project
- ❖ Run-of-river operations
- ❖ No federal lands



Pillager Project

FERC Licensing Process Overview

FERC Relicensing is a 5 – 5.5 year long process:

Year 1: Pre-Application Document (PAD) and Notice of Intent (NOI), Public Meeting, Study Requests

Years 2 – 3: Studies

Year 3: Submit Draft and Final License Applications

Years 4 – 5: FERC Application Review and NEPA Process

Year 5: License Issuance

FERC Licenses are for a period of 30 – 50 years. Default term is 40 years.

- Little Falls Project license issued 10/27/1993, expires 3/31/2028
- Sylvan Project license issued 10/29/1993, expires 3/31/2028
- Pillager Project license issued 4/27/1998, expires 3/31/2028

FERC Licensing Process Overview

<u>PAD Content</u>

- Project facilities and operations
- Existing resource information
  - Geology and soils, water resources, fish and aquatic resources, wetlands, wildlife, rare and invasive species, recreation, aesthetics, cultural resources, tribal resources, socioeconomic and environmental justice information
- Proposed actions

<u>Information needed for PAD</u>

- Comprehensive Plans or existing data for the Mississippi, Crow Wing, and Gull Rivers and surrounding areas

Resource Discussion

- Discuss potential resource concerns
  - Little Falls Project
  - Sylvan Project
  - Pillager Project

- Request available studies, data, comprehensive plans

- Water quality	- Invasive species
- Fisheries	- Wildlife and rare species
- Recreation	- Cultural resources

Timeline & Next Steps

Estimated Date	Milestone
Current	Gather relevant and available information to inform Pre-Application Document (PAD) development
March 2023	Submit 3 Notice of Intents (NOI) and 1 single PAD (covering all 3 projects)
Early Summer 2023	Public Meeting
2024 – 2025	Studies
Summer 2025	Submit Draft License Application
NLT 3/31/2026	Submit Final License Application
Prior to 3/31/2028	FERC Issues Licenses

Questions? – Contact Information

Greg Prom
Senior Environmental Compliance Specialist
Minnesota Power / ALLETE, Inc.
218-355-3191
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Lesley Brotkowski
Senior Licensing Coordinator
Kleinschmidt Associates
715-318-3729
Lesley.Brotkowski@kleinschmidtgroup.com

From:	Lesley Brotkowski
To:	william.wilde@state.mn.us
Cc:	Gregory Prom (MP); Elizabeth Krchnavek
Subject:	Little Falls, Sylvan, and Pillager Hydros - Data Request
Date:	Friday, January 13, 2023 11:30:37 AM
Attachments:	image001.gif

Hi Bill,

Thank you for participating in the Initial Meeting for Relicensing of Minnesota Power's Little Falls, Sylvan, and Pillager Hydroelectric Projects on January 5, 2023. During the meeting, it was noted that MPCA has collected aquatic resources information near the project areas. Are you aware of any fisheries, mussel, or water quality data, reports, and/or management plans that are applicable to the project areas? If so, we'd greatly appreciate copies of this information to help us summarize the resources present in the Pre-Application Document.

Thank you!

Lesley Brotkowski
Senior Licensing Coordinator
Office: 715-318-3729
www.KleinschmidtGroup.com

From: Lesley Brotkowski
To: eric.altena@state.mn.us; Daniel.OShea@state.mn.us
Cc: Gregory Prom (MP); Elizabeth Krchnavek
Subject: Little Falls, Sylvan, and Pillager Hydros - Data Request
Date: Friday, January 13, 2023 11:22:55 AM
Attachments: image001.gif

Eric and Dan,

Thank you for participating in the Initial Meeting for Relicensing of Minnesota Power's Little Falls, Sylvan, and Pillager Hydroelectric Projects on January 5, 2023. During the meeting, you indicated that fishery and mussel information are available for the project areas. Can you please provide copies of any data, reports, and/or management plans that would help us summarize the resources present in the Pre-Application Document (PAD)?

While doing some research, our fisheries biologist found a reference to a 1990 fish assemblage survey conducted by MDNR that included 20+ miles of the Crow Wing River, and another reference to 2010 surveys for fish and macroinvertebrates that include study sites by Sylvan and Pillager. Do you have copies of these reports? Any other information, surveys, and reports are much appreciated as well.

Thank you!

Lesley Brotkowski
Senior Licensing Coordinator
Office: 715-318-3729
www.KleinschmidtGroup.com

From: OShea, Daniel T (DNR)
To: Lesley Brotkowski; Altena, Eric (DNR); Holcomb, Kathryn (DNR)
Cc: Gregory Prom (MP); Elizabeth Krchnavek
Subject: RE: Little Falls, Sylvan, and Pillager Hydros - Data Request
Date: Friday, January 13, 2023 12:56:10 PM
Attachments: image001.gif
image004.png
image005.png
image006.png
image007.png
LF_Pillager_Sylvan_mussel_data.xlsx

Lesley,

Attached are the results of the mussel surveys conducted on the Crow Wing River and Mississippi River near the Little Falls, Sylvan, and Pillager dams by the mussel team (CAMP-Center for Aquatic Mollusk Programs) in the EWR River Ecology Unit.

I am including Kathryn "Kate" Holcomb in the email since she is the CAMP Supervisor.

Dan

Dan O'Shea
River Ecology Unit | Ecological and Water Resources Division

Minnesota Department of Natural Resources
500 Lafayette Rd
Saint Paul, MN, 55155
Phone: 651-297-5127
Email: daniel.oshea@state.mn.us

From: Lesley Brotkowski <Lesley.Brotkowski@kleinschmidtgroup.com>
Sent: Friday, January 13, 2023 10:23 AM
To: Altena, Eric (DNR) <eric.altena@state.mn.us>; OShea, Daniel T (DNR) <daniel.oshea@state.mn.us>
Cc: Gregory Prom (MP) <gprom@mnpower.com>; Elizabeth Krchnavek <Elizabeth.Krchnavek@kleinschmidtgroup.com>
Subject: Little Falls, Sylvan, and Pillager Hydros - Data Request

Eric and Dan,

Thank you for participating in the Initial Meeting for Relicensing of Minnesota Power's Little Falls, Sylvan, and Pillager Hydroelectric Projects on January 5, 2023. During the meeting, you indicated that fishery and mussel information are available for the project areas. Can you please provide copies of any data, reports, and/or management plans that would help us summarize the resources present in the Pre-Application Document (PAD)?

While doing some research, our fisheries biologist found a reference to a 1990 fish assemblage survey conducted by MDNR that included 20+ miles of the Crow Wing River, and another reference to 2010 surveys for fish and macroinvertebrates that include study sites by Sylvan and Pillager. Do you have copies of these reports? Any other information, surveys, and reports are much appreciated as well.

Thank you!

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Little Falls Dam Downstream

FID	Shape *	SiteID	Date	River	MajorDrair	MinorDrair	Collector	Collection	SrchTime	Species	Age0_5	Age6_up	TotalLive	MinAge0_!	MaxAge0_	MinAge6_(	MaxAge6_	ShellCondi	LiveDead	MNStatus	FederalSta	Easting	Northing
12570	Point	2007066	6/26/2007	Mississippi	Mississippi	UMRS	B. Sietman	SCUBA	30	Lampsilis cardium	0	3	3			91	115		Live	None	None	393055	5091116
12571	Point	2007066	6/26/2007	Mississippi	Mississippi	UMRS	B. Sietman	SCUBA	30	Lampsilis siliquoidea	5	7	12	53	75	55	79		Live	None	None	393055	5091116
12572	Point	2007066	6/26/2007	Mississippi	Mississippi	UMRS	B. Sietman	SCUBA	30	Ligumia recta	2	2	4	74	89	103	116		Live	Special Coı	None	393055	5091116
12573	Point	2007067	6/26/2007	Mississippi	Mississippi	UMRS	B. Sietman	SCUBA	60	Lampsilis cardium	2	4	6	73	87	80	108		Live	None	None	392348	5088860
12574	Point	2007067	6/26/2007	Mississippi	Mississippi	UMRS	B. Sietman	SCUBA	60	Lampsilis siliquoidea	24	50	74	55	75	60	94		Live	None	None	392348	5088860
12575	Point	2007067	6/26/2007	Mississippi	Mississippi	UMRS	B. Sietman	SCUBA	60	Lasmigona complanata	0	1	1			131	131		Live	None	None	392348	5088860
12576	Point	2007067	6/26/2007	Mississippi	Mississippi	UMRS	B. Sietman	SCUBA	60	Lasmigona compressa	1	0	1	75	75	0	0		Live	Special Coı	None	392348	5088860
12577	Point	2007067	6/26/2007	Mississippi	Mississippi	UMRS	B. Sietman	SCUBA	60	Ligumia recta	0	1	1			117	117		Live	Special Coı	None	392348	5088860
12578	Point	2007067	6/26/2007	Mississippi	Mississippi	UMRS	B. Sietman	SCUBA	60	Pyganodon grandis	1	0	1	79	79	0	0		Live	None	None	392348	5088860
12579	Point	2007068	6/26/2007	Mississippi	Mississippi	UMRS	B. Sietman	SCUBA	15	Lampsilis siliquoidea	0	0	0			0	0	WD	Dead	None	None	392628	5087073

Sylvan Dam Downstream/ Upstream of Little Falls Dam

FID	Shape *	SiteID	Date	River	MajorDrair	MinorDrair	Collector	Collection	SrchTime	Species	Age0_5	Age6_up	TotalLive	MinAge0_!	MaxAge0_	MinAge6_(	MaxAge6_	ShellCondi	LiveDead	MNStatus	FederalSta	Easting	Northing
12551	Point	2007063	6/21/2007	Mississippi	Mississippi	UMRS	B. Sietman	SCUBA	60	Dreissena polymorpha	1	0	1			0	0		Live	None	None	397042	5126471
12552	Point	2007063	6/21/2007	Mississippi	Mississippi	UMRS	B. Sietman	SCUBA	60	Lampsilis cardium	26	29	55	59	93	71	117		Live	None	None	397042	5126471
12553	Point	2007063	6/21/2007	Mississippi	Mississippi	UMRS	B. Sietman	SCUBA	60	Lampsilis siliquoidea	60	104	164	41	71	42	93		Live	None	None	397042	5126471
12554	Point	2007063	6/21/2007	Mississippi	Mississippi	UMRS	B. Sietman	SCUBA	60	Lasmigona complanata	5	12	17	66	85	82	103		Live	None	None	397042	5126471
12555	Point	2007063	6/21/2007	Mississippi	Mississippi	UMRS	B. Sietman	SCUBA	60	Ligumia recta	22	41	63	92	106	91	126		Live	Special Coı	None	397042	5126471
12556	Point	2007063	6/21/2007	Mississippi	Mississippi	UMRS	B. Sietman	SCUBA	60	Pyganodon grandis	3	1	4	65	72	76	76		Live	None	None	397042	5126471
12557	Point	2007063	6/21/2007	Mississippi	Mississippi	UMRS	B. Sietman	SCUBA	60	Strophitus undulatus	1	0	1	48	48	0	0		Live	None	None	397042	5126471
12558	Point	2007064	6/21/2007	Mississippi	Mississippi	UMRS	B. Sietman	SCUBA	60	Lampsilis cardium	7	19	26	80	93	95	119		Live	None	None	395574	5123904
12559	Point	2007064	6/21/2007	Mississippi	Mississippi	UMRS	B. Sietman	SCUBA	60	Lampsilis siliquoidea	62	35	97	45	85	63	89		Live	None	None	395574	5123904
12560	Point	2007064	6/21/2007	Mississippi	Mississippi	UMRS	B. Sietman	SCUBA	60	Lasmigona complanata	3	33	36	77	90	93	130		Live	None	None	395574	5123904
12561	Point	2007064	6/21/2007	Mississippi	Mississippi	UMRS	B. Sietman	SCUBA	60	Lasmigona compressa	0	2	2			59	73		Live	Special Coı	None	395574	5123904
12562	Point	2007064	6/21/2007	Mississippi	Mississippi	UMRS	B. Sietman	SCUBA	60	Ligumia recta	4	11	15	89	91	102	114		Live	Special Coı	None	395574	5123904
12563	Point	2007064	6/21/2007	Mississippi	Mississippi	UMRS	B. Sietman	SCUBA	60	Pyganodon grandis	1	0	1	62	62	0	0		Live	None	None	395574	5123904
12564	Point	2007065	6/21/2007	Mississippi	Mississippi	UMRS	B. Sietman	SCUBA	45	Dreissena polymorpha	1	0	1			0	0		Live	None	None	397252	5125957
12565	Point	2007065	6/21/2007	Mississippi	Mississippi	UMRS	B. Sietman	SCUBA	45	Lampsilis cardium	6	11	17	74	86	90	118		Live	None	None	397252	5125957
12566	Point	2007065	6/21/2007	Mississippi	Mississippi	UMRS	B. Sietman	SCUBA	45	Lampsilis siliquoidea	37	73	110	42	74	50	91		Live	None	None	397252	5125957
12567	Point	2007065	6/21/2007	Mississippi	Mississippi	UMRS	B. Sietman	SCUBA	45	Lasmigona complanata	0	0	0			0	0	WD	Dead	None	None	397252	5125957
12568	Point	2007065	6/21/2007	Mississippi	Mississippi	UMRS	B. Sietman	SCUBA	45	Ligumia recta	9	11	20	74	102	105	127		Live	Special Coı	None	397252	5125957
12569	Point	2007065	6/21/2007	Mississippi	Mississippi	UMRS	B. Sietman	SCUBA	45	Pyganodon grandis	1	1	2	62	62	79	79		Live	None	None	397252	5125957

Upstream of Pillage Dam

FID	Shape *	SiteID	Date	River	MajorDrair	MinorDrair	Collector	Collection	SrchTime	Species	Age0_5	Age6_up	TotalLive	MinAge0_!	MaxAge0_	MinAge6_(	MaxAge6_	ShellCondi	LiveDead	MNStatus	FederalSta	Easting	Northing
7695	Point	2003208	6/17/2003	Crow Wing	Mississippi	UMRS	B. Sietman	Snorkel	150	Anodontoides ferussacian	0	1	1			53	53		Live	None	None	373456	5133396
7696	Point	2003208	6/17/2003	Crow Wing	Mississippi	UMRS	B. Sietman	Snorkel	150	Lampsilis cardium	4	28	32	72	94	76	109		Live	None	None	373456	5133396
7697	Point	2003208	6/17/2003	Crow Wing	Mississippi	UMRS	B. Sietman	Snorkel	150	Lampsilis siliquoidea	20	133	153	44	62	46	82		Live	None	None	373456	5133396
7698	Point	2003208	6/17/2003	Crow Wing	Mississippi	UMRS	B. Sietman	Snorkel	150	Lasmigona complanata	0	1	1			99	99		Live	None	None	373456	5133396
7699	Point	2003208	6/17/2003	Crow Wing	Mississippi	UMRS	B. Sietman	Snorkel	150	Lasmigona compressa	0	5	5			59	71		Live	Special Coı	None	373456	5133396
7700	Point	2003208	6/17/2003	Crow Wing	Mississippi	UMRS	B. Sietman	Snorkel	150	Ligumia recta	2	7	9	69	77	83	101		Live	Special Coı	None	373456	5133396
7701	Point	2003208	6/17/2003	Crow Wing	Mississippi	UMRS	B. Sietman	Snorkel	150	Pyganodon grandis	0	0	0			0	0	WD	Dead	None	None	373456	5133396
7702	Point	2003209	6/17/2003	Crow Wing	Mississippi	UMRS	B. Sietman	Snorkel	120	Anodontoides ferussacian	5	1	6	31	57	56	56		Live	None	None	366850	5136461
7703	Point	2003209	6/17/2003	Crow Wing	Mississippi	UMRS	B. Sietman	Snorkel	120	Lampsilis cardium	6	18	24	73	83	83	94		Live	None	None	366850	5136461
7704	Point	2003209	6/17/2003	Crow Wing	Mississippi	UMRS	B. Sietman	Snorkel	120	Lampsilis siliquoidea	7	44	51	47	59	56	78		Live	None	None	366850	5136461
7705	Point	2003209	6/17/2003	Crow Wing	Mississippi	UMRS	B. Sietman	Snorkel	120	Lasmigona compressa	1	1	2	39	39	66	66		Live	Special Coı	None	366850	5136461
7706	Point	2003209	6/17/2003	Crow Wing	Mississippi	UMRS	B. Sietman	Snorkel	120	Ligumia recta	4	2	6	72	90	73	95		Live	Special Coı	None	366850	5136461
7707	Point	2003209	6/17/2003	Crow Wing	Mississippi	UMRS	B. Sietman	Snorkel	120	Pyganodon grandis	0	4	4			69	80		Live	None	None	366850	5136461
7708	Point	2003209	6/17/2003	Crow Wing	Mississippi	UMRS	B. Sietman	Snorkel	120	Utterbackia imbecillis	1	0	1	51	51	0	0		Live	None	None	366850	5136461
7709	Point	2003210	6/17/2003	Crow Wing	Mississippi	UMRS	B. Sietman	Snorkel	120	Anodontoides ferussacian	1	0	1	52	52	0	0		Live	None	None	361736	5141696
7710	Point	2003210	6/17/2003	Crow Wing	Mississippi	UMRS	B. Sietman	Snorkel	120	Lampsilis cardium	3	12	15	53	92	87	105		Live	None	None	361736	5141696
7711	Point	2003210	6/17/2003	Crow Wing	Mississippi	UMRS	B. Sietman	Snorkel	120	Lampsilis siliquoidea	2	32	34	48	58	52	72		Live	None	None	361736	5141696
7712	Point	2003210	6/17/2003	Crow Wing	Mississippi	UMRS	B. Sietman	Snorkel	120	Lasmigona compressa	0	2	2			61	64		Live	Special Coı	None	361736	5141696
7713	Point	2003210	6/17/2003	Crow Wing	Mississippi	UMRS	B. Sietman	Snorkel	120	Ligumia recta	1	1	2	63	63	100	100		Live	Special Coı	None	361736	5141696

From:	Altena, Eric (DNR)
To:	Lesley Brotkowski; OShea, Daniel T (DNR)
Cc:	Gregory Prom (MP); Elizabeth Krchnavek
Subject:	RE: Little Falls, Sylvan, and Pillager Hydros - Data Request
Date:	Friday, January 13, 2023 3:37:12 PM
Attachments:	image001.gif image004.png image005.png image006.png image003.png Placid Plan-2021 (new format).pdf Sylvan Plan-2021 (new format).pdf Br_LFsmp08.pdf Crow_Wing_R_Report_10.pdf Miss_R_2021_Brd-LF.pdf Miss_R_2020_ZEB.pdf Placid_2015.pdf Sylvan_2014.pdf ZebPikesmp08.pdf

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Thanks for reaching out Leslie.
We did do some surveys along the Crow Wing and I have also included relevant surveys and management plans from the Mississippi River for your reference. As far as the more recent data from MPCA, that is available on their website. https://www.pca.state.mn.us/watershed-information/crow-wing-river Or we can certainly contact the watershed leads.

Please let me know if there are questions, or if there is anything else you may be looking for.

Eric
Eric Altena
Area Fisheries Manager | Fish and Wildlife

Minnesota Department of Natural Resources
16543 Haven Road
Little Falls, MN 56345
Office-320-232-1069
Cell -320-293-2439
Email: eric.altena@state.mn.us
mndnr.gov

Life is truly short! Love as if it is
your last day, sleep to be ready for
the challenges of tomorrow and eat for the
energy to do so. Heck, spend the rest
of your time FISHING, BOWHUNTING
and playing HOCKEY.... For the love of the game!!

From: Lesley Brotkowski <Lesley.Brotkowski@kleinschmidtgroup.com>
Sent: Friday, January 13, 2023 10:23 AM
To: Altena, Eric (DNR) <eric.altena@state.mn.us>; OShea, Daniel T (DNR) <daniel.oshea@state.mn.us>
Cc: Gregory Prom (MP) <gprom@mnpower.com>; Elizabeth Krchnavek <Elizabeth.Krchnavek@kleinschmidtgroup.com>
Subject: Little Falls, Sylvan, and Pillager Hydros - Data Request

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Lesley Brotkowski
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Region	Area	DOW Number	County	Lake Name	Acreage	Littoral Acres	Lake Class
3	Little Falls	49-0036	Morrison-Cass	Sylvan (Reservoir)	321		35

NA-01570-01

LAKE MANAGEMENT PLAN

MINNESOTA
DEPARTMENT OF
NATURAL RESOURCES

Long Range Goal:

- Maintain Northern Pike and Walleye populations with specific goals developed from future electrofishing/and or ice out trap netting.
- Maintain a Bluegill trap net catch with at least 30% exceeding 7 inches.
- Maintain the Black Crappie trap net catch within the lake class interquartile range (0.7-4.3/set) with at least 25% exceeding 9 inches.
- Maintain an electrofishing catch rate for Largemouth Bass above 40/hr. with a PSD over 50.
- Encourage fish and organism passage further up the Crow Wing River. Consider all options available to alleviate fish passage and sediment issues within Sylvan Reservoir.

Operational Plan:

- Conduct ice-out and panfish trap net assessments in 2024 and at least once every eight years thereafter.
- Perform spring electrofishing assessments targeting Walleye and bass in 2024 and at least once every eight years thereafter.
- Review discharge data provided by the Sylvan hydropower facility to evaluate compliance to run-of-the-river operations and other licensing criteria, provide pertinent comments during the re-licensing period.
- Monitor emergent vegetation abundance and riparian land use through videotaping at least once every 10 years.
- Roughfish removal will be permitted under "B" permits as deemed appropriate.
- Provide technical assistance and professional guidance to lakeshore property owners, Camp Ripley, and county officials regarding watershed, water quality, and riparian habitat issues. Encourage increased water quality and water clarity monitoring by MnPCA and Citizen Lake Monitoring Program to better assess trends.
- Stock with 200,000 Walleye fry during odd numbered years. Maintain correspondence with Brainerd DNR Fisheries in assessing the magnitude of Walleye spawning runs in the Gull River and to determine the necessity of stocking in the long term.

Midrange Objective: Complete trap net assessment and electrofishing to monitor fish community trends. Evaluate success of Walleye natural reproduction and fry stocking and determine specific long-range goals for Walleye and Northern Pike using ice-out trap net and spring electrofishing information. Refine indices developed for Largemouth Bass based on electrofishing data. Refine indices developed for Bluegill and Black Crappie from targeted panfish trap netting. Monitor hydropower operations, riparian land use, and vegetation and determine impacts to the reservoir fish community and habitat.

Potential Plan:

- GPS/GIS mapping of emergent vegetation, substrates, and riparian features.
  $ 2,000
- Seasonal temporary drawdown of reservoir to improve water quality and habitat.
  $ 100,000
- Construct a bypass channel or other available options to provide connectivity to upstream and downstream habitats. $ 2,750,000

TOTAL $170,000-3,000,000

Primary Species Management	Secondary Species Management	FOR CENTRAL OFFICE USE ONLY	
WAE, BLC	NOP, LMB, BLG		
Area Supervisors Signature	**Date**	**Entry date**	**Year Resurvey**
Eric R Altena	Digitally signed by Eric R Altena Date: 2023.03.15 14:42:02 -05'00'		

Region	Area	DOW Number	County	Lake Name	Acreage	Littoral Acres	Lake Class
3	Little Falls	49-0036	Morrison-Cass	Sylvan (Reservoir)	321		35

<table>
<tr><td>Regional Supervisors Signature</td><td>Date</td><td colspan="2">Stock species - Size - Number per Acre Pr./Sec</td></tr>
<tr><td colspan="2" rowspan="5"><u>NARRATIVE:</u>
(Historical perspectives - various surveys; past management; social considerations; present limiting factors; survey needs; land acquisition; habitat development and protection;commercial fishery; stocking plans; other management tools; and evaluation plans)</td><td>Schedule</td><td>Year Beginning</td></tr>
<tr><td colspan="2">Population Manipulation
YES/NO; Year:</td></tr>
<tr><td colspan="2">Development
YES/NO; Year:</td></tr>
<tr><td colspan="2">Creel or Use Survey
YES/NO; Year:</td></tr>
<tr><td colspan="2">Other</td></tr>
</table>

Surveys:
The initial fisheries lake survey on Sylvan Lake was completed in 1958 with resurveys occurring in 1985, 1996 and 2008. Population assessments were conducted in 1990, 2002, and 2014 (no gill nets). Daytime electrofishing was performed as part of the 2008 and 2014 surveys, and in 2020. Videotaping of emergent vegetation and shoreline use was conducted in 1996 and 2016. Fall electrofishing assessments were performed in 1996 and 2000 to assess natural reproduction of Walleye. Spring electrofishing assessments were performed in 1986 and 1987 with the 1986 assessment targeting Largemouth Bass and fingerling Walleye evaluated in 1987. Fish were collected by Fisheries staff and analyzed for contaminants in 2014 with results provided to the Minnesota Department of Health. Aerial fish house counts were taken each winter from 1981 to 1993 and in 1997-98 and 2000-01. Water quality data was collected by MPCA in 1999, 2008 and 2009. The lake was mapped in 1958.

Past Management:
Walleye fry stocking was initiated in 1986 and occurred on an annual basis until 1991. Walleye fingerlings were stocked in 1992 and 1994. Neither fry nor fingerling stocking have proven to be successful in enhancing the Walleye gill net catches in the reservoir. However, correspondence with Brainerd Area Fisheries staff suggests that past fry stocking efforts may have been responsible for popular Walleye fisheries that developed below the Federal Dam on the Gull River and in the Placid Dam tailwaters. Walleye fry stocking was re-initiated in 2006 and took place on an annual basis until 2009. Walleye fry have been stocked during odd numbered years since 2013 by the Brainerd Fisheries office staff. Significant natural recruitment of Walleye fingerlings was documented during fall electrofishing in 1996, although no juvenile walleye were observed in similar sampling in 2000. The Sylvan Hydroelectric Project was relicensed in 1993 and the current license expires in 2023. The reservoir was drawn down several feet during late summer in 2002 for dam repair purposes. Limited commercial removal of roughfish has taken place with the most recent effort in 1990 when 600 pounds of bullheads were removed under "B" permit.

Social Considerations:
The shoreline of Sylvan Lake is characterized by light development as approximately 90% remains classified as undeveloped forest. A total of 35 cabins/homes were counted on the lake during the 2008 survey while 29 homes were observed in 1996. All of these residences were located upstream of the Fishermen's Bridge. Minnesota Power and Light Company and the Camp Ripley Military Reservation retain ownership of much of the remaining undeveloped shoreline limiting the potential for future residential development.

Agricultural impacts are minimal in the immediate watershed which is predominantly forest and wetland (51%) however, this reservoir is on the downstream end of a large watershed drained by the Crow Wing and Long Prairie Rivers. Sylvan Lake is classified as eutrophic with nutrient levels above the expected range for the ecoregion. Summer secchi disc readings are generally in the 6-7 foot range. Sedimentation and nutrient loading from this large watershed have considerable impacts on the condition of Sylvan Lake. The impacts of sedimentation and nutrient loading to Sylvan Lake are somewhat mitigated by the presence of the Pillager Hydroelectric Dam several miles upstream. Future management of the reservoir will require that the impacts of hydropower operations, residential development, and land use practices within the watershed are minimized. The Crow Wing River watershed has undergone comprehensive planning as part of MPCA’s Upper Mississippi River Basin Planning program. DNR Fisheries was an active participant in these planning efforts, which included a broad spectrum of public agencies and private groups.

A state owned access is located on the north end of the lake. The public access has a dock, two concrete ramps, and ample parking. The Fishermen's Bridge is a popular shorefishing site and receives significant pressure. This bridge was upgraded in the past to facilitate fishing from the bridge itself (walkway) and along the east shore. Fishing accounts for a large portion of the lake's recreational use. Fishing pressure is light to moderate with most effort directed at Bluegill from late spring through summer. Winter fishing for Bluegill appears to have gained popularity, especially upstream of the Fisherman's Bridge.

Limiting Factors:

Sylvan Lake is a reservoir, therefore it is subject to an aging process hastened by sedimentation and nutrient loading from its extensive watershed. The lake is filling in and the flow of nutrients is increasing vegetation growth. Dense mats of submergent vegetation are found in the middle of the main basin where sediment has been deposited due to the dam. Curly-leaf Pondweed, a non-native species, is a major component of plant community. Sylvan Lake is classified as eutrophic with nutrient concentrations higher than a majority of the lakes in the ecoregion.

Our summer gill netting surveys appear to indicate the lake is not heavily used by adult Walleye. Most use of the lake by adult Walleye likely occurs during the winter as movement occurs out of the rivers and into deep water habitats. Species such as Northern Pike, Bluegill, Black Crappie, and Largemouth Bass find the reservoir as more suitable habitat due to the available vegetation. Walleye and Northern Pike reproduction are good within the system suggesting adequate evaluation of Walleye fry stocking practices is warranted. Due to the river influence and the abundance and diversity of prey species, food availability is not believed to be a critical factor in limiting gamefish populations. Growth rates are in the normal range for most year classes of crappie, Northern Pike, and Walleye. Bluegill growth rates are moderate for fish up to Age 5 which average 6 inches. These growth rates are not sustained as few 7-10 year old Bluegill attain 8 inches.

Carp were captured in lake survey nets for the first time in 1996, although it is suspected they have been present in the system for many years. Trap nets captured carp in 2002 (4 fish) and in 2008 (7 fish). As reservoirs age, carp often tend to assume a more dominant position in the fish community. Carp abundance and their impacts on habitat should be monitored. Zebra Mussels and Faucet Snails are two additional non-native species residing in the Crow Wing River system, their impacts to the reservoir are largely unknown but should be monitored.

Survey Needs:

Gill nets will no longer be used to sample fish in Sylvan Reservoir according to this management plan. Lake survey gill nets have been ineffective in sampling Walleye in the reservoir. Trap net assessments including ice-out and targeted panfish efforts will take place at least once every eight years with the next sampling scheduled for 2024. Spring electrofishing will coincide with the trap netting schedule commencing in 2024. Video documentation of shoreline use and emergent vegetation will be performed within the next ten years. Mapping of the lake's important habitat features including emergent vegetation, substrates, and riparian land use would provide important habitat data. Future "Score the Shore" surveys may also prove useful in monitoring changes to the riparian zone and should be considered. discharge data from the Sylvan Dam will be reviewed on an annual basis to ensure compliance to licensing requirements. Water quality/clarity data is lacking especially for a lake of this size with an extensive watershed. Additional water quality and/or clarity monitoring by the MnPCA, local schools or local citizens would be beneficial in evaluating trends.

Stocking:

Walleye fry will stocked during odd numbered years with the lake receiving 200,000 fry during each stocking. The primary function of this stocking is to restore the fisheries below the Federal Dam on the Gull River and in the Placid Dam tailwaters. These fisheries appeared to be more significant when Sylvan Reservoir was stocked in the past. Evaluation of fry stocking will occur via electrofishing and trap netting as outlined in the Operational Plan. Additional evaluation of the Gull River spawning run should be conducted by Brainerd Fisheries staff.

Land Acquisition:

No acquisition is pending at this time.

Habitat Protection and Development:

Critical review of DOW and APM permits and hydropower operations will be beneficial in ensuring protection of habitat. The Morrison County Water Plan will continue to receive support and technical guidance. Use of best management practices should be encouraged throughout the reservoir's watershed (including river systems) to protect water quality and shoreline habitat and reduce sedimentation. Reservoir drawdowns have the potential to improve water quality and fish and wildlife habitat if performed during the appropriate season. Protection of the terrestrial and aquatic plant communities along shoreline areas should provide many benefits including fish and wildlife habitat, nutrient tie-up, erosion abatement and lake soil stability.

Potential exists to improve fish and wildlife habitat along some of the developed shoreline. Educational efforts and project funding should be directed at improving and protecting riparian areas. Basin planning efforts also have potential to positively impact the habitat of Sylvan Reservoir and its watershed. Video documentation will be utilized to monitor changes in emergent vegetation and shoreline use. GPS/GIS mapping of the lake's habitat features would facilitate habitat protection and improvement. Consideration should be made and comments offered for a fish bypass channel or dam removal of Sylvan Dam as infrastructure ages and safety considerations are involved with FERC Relicensing.

Commercial Fishery:

Sylvan Lake has limited potential to provide an economically viable commercial fishery for roughfish.

Other Management Tools:

Educating lakeshore home owners and land users within the watershed of best management practices would help maintain water quality and healthy fish habitat.

Region	Area	DOW Number	County	Lake Name	Acreage	Littoral Acres	Lake Class
3	Little Falls	49-0036	Morrison-Cass	Sylvan (Reservoir)	321		35

Table 1. Historical net catches of some important species (1st - 3rd quartile values are for lake class 41):

Species	Gear	1996	2002	2008	2014	2020	Avg. Catch	Quartiles
Northern Pike	G	3.80	4.25	3.50	N/A	No GN	3.85	3.6-11.0
Walleye	G	0.10	0.13	0.13	N/A	Or TN	0.12	1.0-3.2
Yellow Perch	G	10.30	13.50	8.25	N/A	Set	10.6	3.8-22.8
Bluegill	T	35.60	69.50	24.58	19.83	Covid	37.38	4.0-28.1
Black Crappie	T	1.75	1.50	2.58	0.67		1.63	1.0-10.5
White Sucker	G	3.50	3.38	0.75	N/A		2.54	0.7-3.5
Largemouth Bass	EF	N/A	N/A	48.40	49.00	22.00	39.80	N/A

* Initial spring electrofishing assessment consisted of daytime shocking in 2008(new boat). Largemouth Bass catch rate=48.4/hr in 2008, 49/hr. in 2014, and 22/hr. in 2020.

Catch rates for fall electrofishing (juvenile Walleye):
1987=(4 fish total), 1996= 36/hr., 2000= none sampled

Region	Area	DOW Number	County	Lake Name	Acreage	Littoral Acres	Lake Class
3	Little Falls	49-0080	Morrison-Cass	Placid (Pillager Reservoir)	537	340	34

NA-01570-01

LAKE MANAGEMENT PLAN

MINNESOTA
DEPARTMENT OF
NATURAL RESOURCES

Long Range Goal:

- Maintain a naturally reproduced Walleye population with specific goals developed from future electrofishing/and or ice out trap netting results.
- Maintain an electrofishing catch rate for Smallmouth Bass at over 50/hr. with at least 5 age classes represented.
- Maintain an electrofishing catch rate for Largemouth Bass at over 25/hr. with a PSD above 30.
- Maintain a Bluegill trap net catch with 30% or more exceeding 7 inches long.

Operational Plan:

- Conduct ice-out and panfish trap net assessments in 2024 and at least once every eight years thereafter.
- Perform spring electrofishing assessments targeting Walleye and bass in 2024 and at least once every eight years thereafter.
- Encourage increased water clarity and water quality monitoring through the MnPCA and Citizen Lake Monitoring Program to better assess trends.
- Review discharge data provided by the Pillager hydropower facility to evaluate compliance to run-of-the-river operations and other licensing criteria, provide pertinent comments during the re-licensing period.
- Monitor emergent vegetation abundance and riparian land use through videotaping within the next 10 years.
- Roughfish removal will be permitted under "B" permits as deemed appropriate.
- Provide technical assistance and professional guidance to lakeshore property owners, other resource agencies, and county officials regarding watershed, water quality, and riparian habitat issues.

Midrange Objective:

- Complete trap net assessment and electrofishing to monitor fish community trends. Evaluate success of Walleye natural reproduction and determine specific long-range goals for Walleye using ice-out trap net and spring electrofishing information. Refine indices developed for Largemouth and Smallmouth Bass based on electrofishing data. Refine indices developed for Bluegill from targeted panfish trap netting. Monitor hydropower operations, vegetation and riparian land use and determine impacts to the reservoir fish community and habitat

Potential Plan:

- GPS/GIS mapping of emergent vegetation, substrates, and riparian features.
  $ 2,000
- Pursue easements along property owned by the Lake Placid Bible Camp if such acquisitions become available. $ 50,000
- Seasonal temporary drawdown of reservoir to improve water quality and habitat.
  $ 75,000
- Construct a bypass channel to provide connectivity to upstream and downstream habitats. A nature like fish bypass channel should be constructed to alleviate concerns over connectivity. ~ $2,000,000

Total = $2,120,000

TOTAL $2,000-2,120,000

Primary Species Management	Secondary Species Management	FOR CENTRAL OFFICE USE ONLY	
WAE, BLG	SMB, LMB		
Area Supervisors Signature	**Date**	**Entry date**	**Year Resurvey**
Eric R Altena	Digitally signed by Eric R Altena Date: 2023.03.17 06:35:12 -05'00'		

Region	Area	DOW Number	County	Lake Name	Acreage	Littoral Acres	Lake Class
3	Little Falls	49-0080	Morrison-Cass	Placid (Pillager Reservoir)	537	340	34

Regional Supervisors Signature	Date	Stock species - Size - Number per Acre Pr./Sec	
NARRATIVE: (Historical perspectives - various surveys; past management; social considerations; present limiting factors; survey needs; land acquisition; habitat development and protection;commercial fishery; stocking plans; other management tools; and evaluation plans)		**Schedule**	**Year Beginning**
		Population Manipulation YES/NO; Year:	
		Development YES/NO; Year:	
		Creel or Use Survey YES/NO; Year:	
		Other	

Region	Area	DOW Number	County	Lake Name	Acreage	Littoral Acres	Lake Class
3	Little Falls	49-0080	Morrison-Cass	Placid (Pillager Reservoir)	537	340	34

Surveys:
The initial fisheries lake survey on Placid Lake was completed in 1958 with resurveys occurring in 1985, 1996 and 2008 and 2014. The 2008 and 2014 lake surveys included daytime electrofishing. Spring daytime electrofishing was attempted in 2020 resulting in very low catches, no report was generated. No gill nets were set in 2014. Population assessments were conducted in 1990 and 2002. Fall electrofishing assessments were performed in 1996, 2000, 2002 and 2009 to assess natural reproduction of Walleye. A spring electrofishing assessment targeting fingerling Walleye was performed in 1987. Video taping of emergent vegetation and shoreline use was conducted in 1996 and 2016. Minnesota Biological Survey completed a plant survey in 2010. Aerial fish house counts were taken each winter from 1981 to 1993 and in 1997-98 and 2000-01. Water quality data was collected by MPCA in 1999.

Past Management:
Walleye fry stocking was initiated in 1986 and occurred on an annual basis until 1991. Walleye fingerlings were stocked in 1992 and 1994. Neither fry nor fingerling stocking have proven to be successful in enhancing the Walleye population in the reservoir. Significant natural recruitment of Walleye fingerlings has been documented by fall electrofishing. Channel catfish fingerlings were stocked in 1971 and 1973 but failed to produce a fishery in the reservoir. Survivors from these catfish introductions may have established the populations now existing in downstream reaches of the Mississippi River. Smallmouth Bass were stocked into the Long Prairie River (part of the Crow Wing River watershed) by Glenwood DNR Fisheries during the late 1990’s. Smallmouth Bass have been sampled in Placid Reservoir by various gear types since that time suggesting that a well-developed and fishable population is present.

Limited commercial removal of roughfish has taken place with the most recent effort in 1990 when 1,000 pounds of bullheads were removed under "B" permit. The Pillager Hydroelectric Project was relicensed in the late 1990’s.

Social Considerations:
The shoreline of Placid Lake is characterized by a moderate level of development. A total of 51 cabins/homes were counted on the reservoir during the 1996 survey as compared to 61 homes counted in 2008. The Lake Placid Bible Camp is located on the north shore. Roughly 60% of the shoreline consists of undeveloped forest land, however large portions of the south shore have been platted for development. Minnesota Power and Light Company retains ownership of much of the remaining undeveloped shoreline.

Agricultural impacts are minimal in the immediate watershed which is predominantly forest and wetland (51%), however this reservoir is on the downstream end of a large watershed drained by the Crow Wing and Long Prairie Rivers. Placid Lake is on the border between mesotrophic and eutrophic classification with total phosphorous levels above the expected range for the ecoregion. Summer secchi disc readings are usually in the 4 to 6 foot range. Sedimentation and nutrient loading from this large watershed have considerable impacts on the condition of Placid Lake. Future management of the reservoir will require that the impacts of hydropower operations, residential development, and land use practices within the watershed are minimized. The Crow Wing River watershed has undergone comprehensive planning as part of MPCA’s Upper Mississippi River Basin Planning process. DNR Fisheries was an active participant in these planning efforts, which included a broad spectrum of private interests and public agencies.

A state owned access is located on the northeast end of the lake and an additional state owned landing (Al Vah's) is located on the Crow Wing River just upstream of the reservoir. Recreational use is moderate. Swimming and canoeing are popular activities for the Placid Bible Camp clients. Fishing pressure is light to moderate with most effort directed at Bluegill and Walleye. Bluegill are a primary target throughout the open water season and usually provide good results. In general, reports have suggested poor Walleye fishing for many years. Local anglers have suggested that DNR Fisheries stock Placid Reservoir and the Crow Wing River upstream of the Placid Dam in an effort to improve Walleye fishing. The reservoir's history of considerable natural reproduction of Walleye indicates stocking is not necessary. Sampling efforts outlined in the Operational Plan should provide additional information to help address the stocking issue.

Fall appears to be the most successful Walleye fishing period, possibly due to downstream migration of riverine gamefish to the deeper wintering areas in the lake. Fish have unobstructed access to lengthy stretches of the Crow Wing and Long Prairie Rivers. The fish community of Placid Lake is strongly influenced by the presence of these rivers in terms of species composition and seasonal movements of fish. Spring electrofishing will be useful in monitoring the prevalence of Smallmouth Bass and Walleye in the system.

No formal lake association has been formed. Frequent written correspondence occurred during the mid-1980's with a few lakeshore property owners who shared our response letters with other property owners. Lakeshore residents expressed concerns regarding poor fishing, submergent weed growth, and cattail expansion. Placid Lake is located adjacent to the City of Pillager.

Limiting Factors:

Placid Lake is a reservoir, therefore it is subject to an aging process hastened by sedimentation and nutrient loading from its extensive watershed. The lake is filling in and the flow of nutrients is increasing vegetation growth. The lake has total phosphorous concentrations as measured in 1999 above the expected range for lakes in the ecoregion. Curley-leaf Pondweed was found to be present in the lake in 1996, however, this non-native species has not yet become a dominant component of the plant community. Habitat conditions are changing, potentially making the upstream riverine environments more attractive to Walleye and Smallmouth Bass than the reservoir. Species such as Bluegill, Black Crappie, and Largemouth Bass find the reservoir as more suitable habitat due to the available vegetation. Spring electrofishing efforts in 2014 and 2020 found few if any Largemouth Bass which was surprising as significant areas of suitable habitat are present. The status of the Largemouth Bass population warrants attention when conducting future sampling efforts. Zebra Mussels and Faucet Snails are two additional non-native species residing in the Crow Wing River system, their impacts to the reservoir are largely unknown but should be monitored.

Our past netting surveys appear to indicate the lake is not heavily used by adult Walleye during the summer. Most use of the lake by adult Walleye likely occurs during the winter as movement occurs out of the river and into deep water habitats. Small scale winterkills of redhorse have been documented upstream of Pillager Dam. Redhorse are highly susceptible to mortality from low oxygen and it is not suspected that winterkill is a significant limiting factor for gamefish. Due to the river influence and the abundance and diversity of prey species, food abundance is not believed to be a critical factor in limiting gamefish populations. All gamefish and panfish species displayed normal to fast growth when compared to other area lakes.

Carp were first sampled in the lake in 1990 and have likely been present in the system for many years. Carp have been sampled in subsequent surveys (1996 and 2002), but not in alarmingly high numbers. No carp were sampled in nets in 2008. As reservoirs age, carp often tend to assume a more dominant position in the fish community. Carp abundance and their impacts on habitat should be monitored.

Survey Needs:

Gill nets will no longer be used to sample fish in Placid Reservoir according to this management plan. Lake survey gill nets have been ineffective in sampling Walleye in the reservoir. During the 2008 survey, the gill nets became heavily laden with filamentous algae reducing their efficiency and requiring considerable additional maintenance. Only four of nine gill net sets were completed in 2008 due to filamentous algae.

Trap net assessments including ice-out and targeted panfish efforts will take place at least once every eight years with the next sampling scheduled for 2024. Spring electrofishing will coincide with the trap netting schedule commencing in 2024. Video documentation of shoreline use and emergent vegetation will be performed within the next ten years. Mapping of the lake's important habitat features including emergent vegetation, substrates, and riparian land use would provide important habitat data. Future "Score the Shore" surveys may also prove useful in monitoring changes to the riparian zone and should be considered. Discharge data from the Pillager Dam will be reviewed on an annual basis to ensure compliance to licensing requirements. Water quality/clarity data is severely lacking especially for a lake of this size with an extensive watershed. Additional water quality and/or clarity monitoring by the MnPCA, local schools or local citizens would be beneficial in evaluating trends.

Stocking:

No stocking is planned as adequate natural reproduction for walleye, smallmouth bass, bluegill and crappie appears to sustain fishable levels.

Land Acquisition:

No acquisition is pending at this time, however DNR Fisheries maintains an interest in obtaining conservation easements along property owned by the Lake Placid Bible Camp.

Habitat Protection and Development:

Critical review of DOW and APM permits and hydropower operations will be beneficial in ensuring protection of habitat. The Morrison County Water Plan will continue to receive support and technical guidance.

Use of best management practices should be encouraged throughout the reservoir's watershed (including river systems) to protect water quality and shoreline habitat and reduce sedimentation. Reservoir drawdowns have the potential to improve water quality and fish and wildlife habitat if performed during the appropriate season. Protection of the terrestrial and aquatic plant communities along shoreline areas should provide many benefits including fish and wildlife habitat, nutrient tie-up, erosion abatement and lake soil stability. Potential exists to improve fish and wildlife habitat along some of the developed shoreline. Educational efforts and project funding should be directed at improving and protecting riparian areas. Basin planning efforts also have potential to positively impact the habitat of Placid Reservoir and its watershed.

Video documentation will be utilized to monitor changes in emergent vegetation and shoreline use. GPS/GIS mapping of the lake's habitat features would facilitate habitat protection and improvement. The acquisition of conservation easements would provide permanent protection to specified areas of the riparian zone. Consideration for a bypass nature like fish way or dam removal should be an option to encourage connectivity and sediment transport. As previously mentioned, aging reservoirs tend to favor invasive species like common carp. One needed element to both invertebrates like mussels and some fish, is mitigation of barriers to migration. Construction of a nature-like fish way around Placid Dam may be a feasible alternative with recent funding opportunities.

Commercial Fishery:

Placid Lake has limited potential to provide an economically viable commercial fishery for roughfish.

Other Management Tools:

Educating lakeshore home owners and land users within the watershed of best management practices would help maintain water quality and healthy fish habitat.

Region 3	Area Little Falls	DOW Number 49-0080	County Morrison-Cass	Lake Name Placid (Pillager Reservoir)	Acreage 537	Littoral Acres 340	Lake Class 34

Table 1. Historical net catches of some important species (1st - 3rd quartile values are for lake class 34):

Species	Gear	1996	2002	2008	2014	2020	Avg. Catch	Quartiles
Northern Pike	G	1.70	3.00	0.00	N/A	No GN	1.56	2.3-9.2
Walleye	G	1.00	0.67	0.25	N/A	Or TN	0.64	1.2-5.3
Yellow Perch	G	2.80	8.22	0.00	N/A	Set	3.67	3.7-28.4
Bluegill	T	N/A	18.67	14.11	1.22	Covid	11.33	5.9-43.3
Black Crappie	T	N/A	0.22	0.44	0.56		0.40	0.8-8.4
White Sucker	G	3.10	6.22	0.50	N/A		3.27	0.5-3.3
Largemouth Bass	EF	N/A	N/A	28.50	0.00		N/A	N/A
Smallmouth Bass	EF	N/A	N/A	58.50	20.90		39.70	N/A

Only 4 gillnets were completed in 2008 vs. 9 gillnets used in other years. No gill nets were used in 2014.

Catch rates from spring electrofishing: Limited results were observed in 2020 bass EF.
Fall electrofishing catch rates for juvenile Walleye:
1996 = 130/hr., 2000 = 93/hr., 2002 = 9/hr. 2009 = 51/hr.

Stream Management Plan

Stream Name: Mississippi River		**Reach:** Brainerd Dam to Little Falls Dam (39.5 miles)	**Tributary Number:** M-1
Region: III	**Area:** 350	**Ecological Classification:** Class II – SMB, MUE, WAE	**County (ies):** Crow Wing, Morrison

Long Range Goal: Protect and improve water quality, stream habitat, and flow regimes within the stream and its watershed to provide adequate conditions for the maintenance of self-sustaining populations of smallmouth bass, muskellunge, walleye and northern pike and to maintain species diversity within the fish community. Maintain spring electrofishing CPUE of 25 to 45 per hour and RSD-15 of 25 or greater for smallmouth bass. Maintain spring muskellunge electrofishing CPUE of 0.2 per hour or 0.02 per hour by angling with 25% being 40 inches or larger. Maintain the presence of muskellunge over 50 inches and protect the genetic integrity of the population. Maintain spring electrofishing CPUE of 3 to 6 per hour or greater for walleye age I and older. Maintain Index or Biotic Integrity (IBI) scores in full surveys and population assessments of 60 or greater.

Operational Plan:

1) Work with riparian landowners, citizen groups, agencies such as the Mississippi Headwaters Board; National Resources Conservation Service (NRCS); Crow Wing and Morrison County SWCDs; MPCA; watershed districts; local water planners; local planning and zoning; U.S. Army Corp of Engineers; USFWS; county and municipal governments; MNDOT; high schools and colleges; Camp Ripley personnel; other DNR sections and planners; and other state agencies to plan and implement proper watershed and riparian land use practices.
2) Support regulatory authority of Mississippi Headwaters Board (MHWB) to maintain uniform protective shoreline development regulations. Encourage the adoption of alternative shoreland standards.
3) Support and provide technical assistance to Crow Wing and Morrison SWCD staff in bank stabilization projects, livestock fencing, and off-river watering sites on the river and its tributaries.
4) Work in coordination with MHWB, MPCA, county SWCDs, local high schools, and colleges and universities to evaluate and monitor water quality using biotic and physical indicators. Work to include water quality monitoring on major tributaries.
5) Investigate D.O.W. and A.P.M. permits to ensure protection of riparian and in-stream habitat within the watershed and maintain ecological integrity of the stream corridor.
6) Document and monitor riparian land use and land use changes using available GIS layers.
7) Provide input to Army COE's Reservoir Operating Plan Evaluation (ROPE) so that resources are protected or enhanced due to changes in upper Mississippi reservoir operations.

Operational Plan (continued):

8) Pursue construction of proposed fish passage around Little Falls Dam.
9) Provide fish samples requested by the Department of Public Health and the USFWS for continued contaminant monitoring.
10) Conduct stream resurvey in cooperation with other DNR Area Offices every 10 years with the next survey scheduled for 2017.
11) Conduct a directed spring smallmouth bass and gamefish electrofishing assessment every four years with the next occurring in 2009.
12) Review hydropower re-licensing documents in coordination with DNR Ecological Resources Division to minimize flow fluctuations by requiring specific guidelines are followed for "run-of-the-river" operation. Monitor compliance of hydropower operations by requesting and analyzing hydrographic data from operators.
13) Area Fisheries staff will actively participate in the development of the Mississippi River Low Flow Water Plan.
14) Protect critical spawning and wintering habitats identified in the muskellunge telemetry study.
15) Educate riparian landowners of river resource ecology and the importance of instituting best management practices (BMPs) on their lands to protect shoreline and near shore habitats.
16) Support WCA and wetland improvement/restoration projects proposed by USFWS, DU, MWA, and county and state conservation agencies within the watershed.
17) Support efforts by other DNR sections, private land trusts, and local government agencies to establish, protect and connect sensitive and outstanding resources by helping to identify potential "greenways" or natural corridors worth protecting for their habitat and wildlife value in the watershed. Actively participate in this process by purchasing AMAs or conservation easements along the river when opportunities arise. Also, support above mentioned groups interested in purchasing lands or conservation easements along the river.
18) Partner with Camp Ripley's ACUB Plan to help purchase lands and conservation easements to protect riparian lands.
19) Provide input to Army COE's Reservoir Operation Plan Evaluation (ROPE) so that resources are protected or enhanced due to changes in upper Mississippi reservoir management/manipulation.

Mid Range Objectives:

1) Monitor shoreline habitat and determine whether protective development standards are being followed in the riparian corridor.
2) Determine if improvements and protection of water quality and habitat have been achieved through the development of partnerships with other agencies and organizations.
3) Collation of pertinent biological, limnological, and physical information relative to the stream and watershed.

Mississippi River –Brainerd Dam to Little Falls Dam - Stream Management Plan

Mid Range Objectives (continued):

4) Adequate inventory of fish populations to assess progress toward management goals.
5) Determine if conservation corridors (greenways) are being established through land purchases and conservation easement purchases.
6) Monitor operation of upstream and downstream dams to determine that compliance to specific "run-of-river" operational guidelines is occurring.
7) Establish plan to protect important smallmouth bass and muskellunge spawning habitat.

Potential Plan:

1. Assist in the design and development of a fish passage around Little Falls Dam through Mill Park at the former Hennepin Paper Company property.	**$750,000.00+**
2. Purchase AMAs or conservation easements when desirable riparian lands become available.	**$250,000.00+**
Total Cost:	**$1,000,000.00+**

Mississippi River –Brainerd Dam to Little Falls Dam - Stream Management Plan

Primary Species Management: Smallmouth bass, Muskellunge	**Secondary Species Management:** Walleye, Northern pike
Area Supervisor Signature:	**Date:** **4/28/2009**
Regional Manager Signature:	**Date:**

Mississippi River –Brainerd Dam to Little Falls Dam
Stream Management Plan – Narrative

<u>Past Surveys:</u> Stream surveys were conducted in 1965, 1985 and 2007-2008. Population assessments were completed in 1987, 1992, 1993 and 1995. Annual aerial fish house counts were taken from 1985 through 1993. DNR Fisheries Research performed a muskellunge telemetry study from 1990 to 1993 and a muskellunge strain study was conducted in 1990. Spring smallmouth bass assessments were completed in 1994 through 1998, and in odd years from 2001 through 2007. Smallmouth bass reproduction checks were completed each fall from 1992 through 2000. A smallmouth bass movement study was completed in 1993 along with a creel survey on the lower nine

Past Surveys (continued):
miles of this stretch of the river. An aerial recreational use survey was conducted in 1995. A creel survey was completed on the entire stretch of the river in 1996. Riverwatch (a.k.a. Aquatech) assessed water quality from 1991 through 2000. DNR Ecological Resources conducted research on mussels in 1993 and purple loosestrife in the vicinity of the Highway 10 Bridge in 1995. St. Anthony Falls Laboratory conducted a flow/hydrology study in the vicinity of the Highway 10 Bridge in 1998. Army COE completed a dredging feasibility study for the east channel at the Highway 10 Bridge site in 1999. DNR and the Army COE completed environmental assessments for dredging at the Highway 10 east channel site in 1999. Dredging and modification of the main and east channels near Highway 10 was completed in 2001. A voluntary angler diary to assess muskellunge population characteristics was done in 1999 and 2000. MPCA has monitored water quality at the Co. 115 bridge since 1967.

Past Management: A total of 3,259 muskellunge fingerlings (unknown strain) were stocked from 1970-1975 and 1977. Stocking of Mississippi River strain muskellunge amounted to 1,000 in 1988, 100 in 1990 and 500 (right pelvic fin clip) in 1991. A total of 240 pounds of fingerling walleye were stocked in 1984. In 1989, 20 brood stock smallmouth bass were removed and sold to a private fish hatchery. A total of 35 adult smallmouth bass were collected in 1992 for introduction into the Otter Tail River (Fergus Falls Area). An erosion control and habitat improvement project occurred along 2000 feet of shoreline at Le Bourget Park in Little Falls. Limited commercial fishing for bullheads has occurred in the reservoir. An Aquatic Management Area was purchased on the west side of the river across from Fletcher Creek in 1996 to protect muskellunge spawning habitat. Morrison SWCD completed a bank stabilization project north of the Little Elk River confluence. Bank stabilization was completed at Crow Wing State Park in 2005. New public access sites were constructed in Little Falls at Le Bourget Park in 1999 and on the east side south of the railroad bridge in 2003. A riparian planting of wild grasses and flowers occurred along the river in 2001 at Le Bourget Park. Wild rice was planted on the southeast side of the Highway 10 Bridge crossing in the fall of 2003. Several conservation easements have been obtained by the U.S. Army at Camp Ripley under the Army's ACUB program. Catch and release regulations for muskellunge were instituted in 2007. Crow Wing State Park has expanded by purchasing additional land north on both sides of the Mississippi River.

Stream and Watershed Alterations:

1) Four hydropower dams affect this stretch of the Mississippi River and its watershed. Brainerd Dam (owned by Wausau Paper Company) and Little Falls Dam (MP&L) in Little Falls are located at opposite ends of this stretch of river. Two other dams owned by MP&L, Pillager and Sylvan are located on the Crow

Wing River. All four dams have associated reservoirs which have altered stream communities and are barriers to fish movement.

Mississippi River – Brainerd Dam to Little Falls Dam - Stream Management Plan

Stream and Watershed Alterations (continued):

2) Agriculture is a major land use in the watershed and has impacts including: nutrient loading, erosion, sedimentation, pesticide runoff, channelization and wetland drainage. The use of center pivot irrigation within the Mississippi Watershed is common. There has been a renewed interest in ditch cleaning by farmers in the watershed.
3) Municipal and residential development continues to increase along the stream corridor especially near Brainerd and Little Falls. The Cities of Brainerd and Little Falls and the town of Fort Ripley are located along the river.
4) Timber harvesting is an important industry in the Mississippi River Watershed and can have impacts including increased runoff, erosion, sedimentation, and loss of riparian cover.
5) Stream channels and banks have been modified at bridge crossings.
6) Camp Ripley Military Reservation has altered riparian lands by constructing roads, picnic areas, a bridge construction training site, and ditches along the river.
7) A channel feeding the Hennepin Paper Mill breeched in 1998 blowing sediment and debris from the mill into the Mississippi River below Little Falls Dam.
8) A dredging project near the Highway 10 Bridge altered stream flows in the east channel. The east shoreline upstream and downstream of the east channel bridge was armored and a rock wall/pier was constructed on the west side of the east channel to direct flows and impeded drift of vegetation from the main channel. A rock weir and a wing dam were built at the upstream end of the east channel to manipulate flow.
9) Highway 371 improvements along this stretch of the river have impacted all tributaries flowing from the east. A new Highway 371 Bridge was constructed over the river south of Brainerd.
10) Riverbanks have been altered in the city of Little Falls to accommodate roads, parks and buildings.
11) Ditching of Fletcher Creek has caused flooding problems in Belle Prairie Township. Fletcher Creek has been altered near the confluence with the Mississippi River to abate flooding.

Social Considerations:

1) The cities of Brainerd and Little Falls and the town of Fort Ripley are located on the banks of this river section. The City of Little Falls has been a cooperative partner on some projects but has shown poor riparian land stewardship at times.
2) The MHWB and county planning and zoning offices have jurisdiction regarding shoreland ordinances within this stretch. Conflicts have occurred with riparian landowners disputing the need for restrictive ordinances.

3) Sedimentation is a major issue in the lower reservoir from Highway 10 to Little Falls Dam. Landowners downstream of the Highway 10 Bridge along the east channel demanded and received a major dredging project that altered the natural course of the Mississippi River in that area.

Mississippi River – Brainerd Dam to Little Falls Dam – Stream Management Plan

<u>Social Considerations (continued):</u>

4) Dam owners/operators such as Wausau Paper Company and Minnesota Power have potential fisheries impacts and should be closely monitored.
5) Agricultural land and water use practices greatly impact the watershed. Working with agencies and landowners is vital to proper watershed management. Urban and rural land use planning will become increasingly important to river management.
6) This portion of the river is a state designated canoe route.
7) The Mille Lacs Band of Ojibwe has an interest in the management of the Mississippi River and its watershed.
8) Camp Ripley Military Reservation is located along the west side of the river. Camp Ripley is currently attempting to purchase an Army Compatible Use Buffer (ACUB) within a 3 mile radius of the reservation. This includes riparian lands along the Mississippi and Crow Wing Rivers. Goals are to purchase or obtain conservation easements within three miles of Camp Ripley to reduce conflicts with training activities and preserve wild lands.
9) Crow Wing State Park is located on the east bank of the river at the confluence of the Crow Wing and Mississippi Rivers. The park has expanded its boundaries north along the east shore of the Mississippi River and west along the north shore of the Crow Wing River.
10) Municipal and residential development continues to increase near the cities of Brainerd and Little Falls and also along all the privately owned riparian land. Enforcement of shoreland ordinances is needed to minimize the impacts of development on the riparian corridor. Proper land use planning will be necessary to adequately protect water quality, habitat quality and watershed health.
11) The city of Brainerd and Camp Ripley have wastewater treatment facilities within this reach of the river.
12) Spill containment sites have been identified along this section of the Mississippi River by the U.S. Army Corp of Engineers.
13) Several public access sites exist along this stretch of the river and include: Brainerd, Crow Wing State Park, Nokasippi River, Fletcher Creek, Belle Prairie Park and Little Falls. Access is also available below Sylvan Dam on the Crow Wing River.
14) A public fishing pier is located at the Kiwanis Park in Brainerd. A fishing structure is also available in Little Falls upstream of the dam on the east bank.
15) Fishing pressure is light but may be increasing with new jetboat technology and increased exposure of this stretch on fishing shows. Muskellunge and smallmouth bass may be vulnerable to any pressure increases.

16) Recreational use is low in most areas due to inaccessibility or remoteness. Moderate recreational use occurs near municipalities.
17) Commercial fishing has taken place on a very limited basis for bullheads. Commercial harvest of turtles has also taken place.
18) The Smallmouth Alliance has been very active in pursuing management activities on the Mississippi River although there has been little recent activities.

Social Considerations (continued):

19) Catch and release regulations for muskellunge were implemented in 2007.
20) Zebra mussels have been present in the river since 2007.

Cultural and Natural Elements:

1) Camp Ripley and the original Fort Ripley are located along the river.
2) Crow Wing State Park is located along the riverbank near the confluence of the Crow Wing and Mississippi Rivers. A small portion of Lindberg State Park is located on the west bank north of Little Falls.
3) Camp Ripley environmental personnel and the County Biological Survey have worked together to complete an inventory of mussels, non-gamefish, reptiles, amphibians and aquatic invertebrates.
4) Much of this stretch is undeveloped and has a higher scenic value compared to other more heavily developed and impacted areas.
5) Rare animals in the vicinity of the river include: bald eagle, red-shouldered hawk, blanding’s turtle, and eastern hognose snake. Two unique mussel sampling sites were also identified.
6) Rare vegetation types in the vicinity include: wet meadow, willow swamp, mixed pine-hardwood forest, oak forest, and dry prairie sand-gravel subtype (include rare plant: Drummond’s campion).

Limiting Factors:

1) Water level fluctuations and seasonal flow regimes created by hydropower operations and natural events can limit fish populations and cause changes to habitat. Climatic factors such as precipitation and temperature have major impacts on populations of certain species. Large year classes of smallmouth bass have been correlated with low water and warm temperatures.
2) Water quality in the Mississippi River and its tributaries is impacted by agricultural activities in the watershed through nutrient loading, pesticide runoff, erosion and sedimentation. Irrigation, ditching, channelization of tributaries, and wetland drainage may also affect stream flows.
3) Industrial impacts to the river include changes in stream characteristics and fish migrations due to dams, and release of contaminants and toxic substances.
4) Tributaries drain primarily agricultural lands and are a major contributor of excess nutrients.
5) Inconsistent recruitment of smallmouth bass results in fluctuating populations and variable fishing success. Growth of smallmouth bass is good up to the 16-18 inch range but slows considerably once the fish reach spawning age. The potential of

bass to reach 20 inches is low as few of the oldest fish (10+ years) ever achieve this size.

6) Increased development, impervious surface, municipal runoff and septic systems drainage creates additional nutrient and chemical input and sedimentation impacts to the river.

Mississippi River –Brainerd Dam to Little Falls Dam – Stream Management Plan

Limiting Factors (continued):

7) Purple loosestrife, an exotic plant, has become established in the vicinity of Highway 10 north of Little Falls. Release of Asian beetles appears to have reduced its abundance to a low level.
8) Zebra mussels were observed on this stretch of the river in 2008 and may threaten to displace native mussels and be a nuisance to property owners and city utilities.

Survey Needs and Evaluation Plans:

1) A comprehensive river survey, in conjunction with other DNR Fisheries Areas, will be conducted every 10 years with the next survey in 2017.
2) Special gamefish assessments will be conducted every four years with the next to be completed in 2009.
3) Past statewide muskie angler diary research has been valuable for monitoring catch rates and population trends on this stretch of the river.
4) Water quality monitoring of the Mississippi and its tributaries by local schools, colleges, and universities; MPCA; or county SWCD offices.
5) Fish contaminant monitoring will be conducted when requested by DNR and USFWS.
6) Evaluate and utilize results of muskellunge telemetry study and spring smallmouth bass assessments to document locations of critical muskie and smallmouth bass spawning habitat and muskie winter habitat.

Land Acquisition Needs: Acquisition of riparian lands (AMAs) critical to fish management will be pursued if such sites become available. Lands valuable to form connections with other significant natural resources will be pursued for outright purchase or purchase of conservation easements. We will also support other agencies and land trusts pursuing conservation easements along the river corridor. Partnering with Camp Ripley on their ACUB program will be a priority.

Habitat Development Needs: The need for erosion and sedimentation control, pollution abatement and habitat development projects will be identified from stream inventories and GIS generated maps in partnership with individuals and agencies listed in the operational plan. Technical advice and professional guidance will be provided to Crow Wing and Morrison County and City of Brainerd and Little Falls officials pertaining to erosion control measures for impacted sites. Protecting forested riparian areas along the river and on tributaries will help reduce erosion and sedimentation. Use of "Best Management Practices" in riparian zones on this section of the Mississippi River and its tributaries will minimize impacts and maintain or improve in-stream habitat. Funding procured by the counties within the Mississippi River watershed has been instrumental in the implementation of proper land use practices. Strong efforts should be made to continue to pursue funding for these practices. A greater emphasis needs to be placed on comprehensive watershed management planning to initiate projects of this type. Shoreline improvement and restoration sites need to be identified and actions taken to repair them. Plans to include a fish passage through the proposed Mill Park at the former

Habitat Development Needs (continued):
Hennepin Paper Mill site would join river sections that have been disconnected for approximately 100 years. This could benefit fish species such as smallmouth bass, redhorse sp., muskellunge, walleye, and white sucker by expanding available habitat. An in-depth river contour map using GIS would be valuable for evaluating and enumerating important fish habitats.

Habitat Protection Needs: Working with the Mississippi Headwaters Board, counties and city of Brainerd and Little Falls planners to ensure maintenance and enforcement of shoreland ordinances that protect riparian areas will be done to protect habitat. Protecting riparian habitat will also be accomplished by providing recommendations to the MHB, cities of Brainerd and Little Falls, Local Water Planners, the NRCS, county SWCDs, and other agencies. Critical review of DNR D.O.W. and A.P.M. permits and other private and public permits will also be done to minimize the impacts of increased development. GIS watershed mapping will be useful in identifying and documenting habitat protection needs. Implementation of proper land use practices is critical to maintaining habitat and water quality in the Mississippi River and should be continued and expanded. Appropriate posting off acquired AMA's will help protect these areas. Analysis of stream discharge data is essential to monitor compliance by hydropower facilities and evaluate affects of flow regimes on fish populations and habitat. Critical review of FERC dam relicensing documents is essential to protect fish and habitat from dam operations. Restoration of Fletcher Creek to abate erosion, flooding and sedimentation issues should be supported. Support of Camp Ripley's ACUB proposal would expand opportunities to institute BMP's in a significant portion of the watershed on the east side of the Mississippi River and provide many resource conservation opportunities. Fisheries may assume management or oversight responsibilities on riparian river sites purchased as AMA's or under permanent easement.

Stocking: None needed.

Regulations: Catch and release regulations for muskellunge have been in effect since 2007. Protective smallmouth bass regulations will be considered if an increase in fishing pressure causes a decline in the quality of the population.

Mississippi River – Brainerd Dam – Little Falls Dam
Fish Population Description

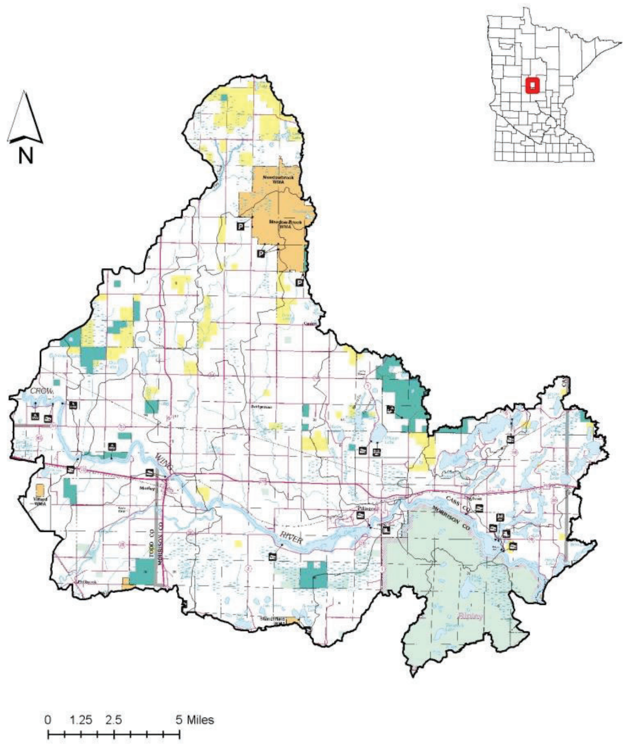
A diverse fish community exists on the Mississippi River from Brainerd Dam to Little Falls Dam with 41 different species sampled in five different surveys/population assessments. A stream survey utilizing boat and barge electrofishing and trapnetting in 2007-2008, sampled 34 different species including eight species defined as intolerant by the MPCA. Non-gamefish species most commonly encountered in electrofishing sampling included spotfin shiner, common shiner, hornyhead chub, white sucker, shorthead redhorse, Johnny darter and logperch. Biomass was dominated by catostomids, primarily white sucker, shorthead redhorse and silver redhorse.

Species richness in this section of the Mississippi River is indicative of "fair" to "good" water and habitat quality. IBI scores were calculated at nine electrofishing stations and ranged from 53 to 79. Seven of nine stations had IBI scores between 60 and 79 indicating "good" biotic integrity. Two stations had scores between 40 and 59 indicating "fair" biotic integrity.

A special smallmouth bass assessment conducted in 2007 effectively sampled gamefish on this stretch of the river. A total of eight different gamefish species were sampled in 4.7 hours of electrofishing effort in four stations combined on May 17-22, 2007. Species captured included: black crappie, bluegill, channel catfish, largemouth bass, smallmouth bass, muskellunge, northern pike and walleye. Smallmouth bass were the targeted species and were the most abundant species in the catch. A total of 205 smallmouth were sampled in 2007 for a CPUE of 43.62/hour. Catch rates in prior assessments from 1994 through 1998, and odd years from 2001 through 2005 ranged from 19.10/hour in 2001 to 58.93/hour in 1995. The mean catch rate for all years was 36.51/hour. Ages 1 through 12 were present in the electrofished sample. The 2000 year class was the largest comprising 18.17% of the aged sample. Though not an impressive year class, this cohort was also most common in 2003 and 2005 comprising over 40% of the catch both years. Low flow and precipitation patterns predominated during the spring and summer months of 2000, creating conditions favorable for smallmouth recruitment. Similar conditions were present in 2006 and 2007 with more yearling smallmouth (18 fish) sampled in 2007 than in any previous spring assessment. Smallmouth bass captured in the 2007 assessment ranged from 3.3 to 20.3 inches in length with 64.7% of the sample exceeding 16.0 inches. PSD values are typically high in this section of the river ranging from 93 in 1996 to 100 in 1994. The calculated PSD value for smallmouth bass captured in 2007 was 95.0. Growth was fast with individuals reaching 16.1 inches at age 5. Trophy individuals in the 19.0 and 20.0-inch ranges comprised 12.7% of the catch.

A total of 13 walleye were captured during this assessment ranging from 6.9 to 20.2 inches. The catch rate (2.77/hour) was in the typical range for this stretch of the Mississippi River. Catch rates in prior assessments ranged from 1.4/hour in 1997 to 8.99/hour in 2001. Low water may have negatively influenced walleye vulnerability to our gear. Walleyes sampled in the 2007 assessment were ages 1 and 3 through 6. Yearling walleye comprised over ½ of the sample. Fifty-two northern pike ranging from 10.3 to 28.8 inches were captured. The 2007 northern pike catch rate was 11.1/hour with past catch rates ranging from 1.1 to 14.5 per hour. Ages 1 through 7 were present and age 1 pike were most common comprising 36.5% of the sample. Twenty-eight bluegills ranging from 2.8 to 8.5 inches were captured during the assessment for a catch rate of 5.96/hour. Catch rates for bluegills have ranged from 0.00/hour in 1994, 1995, 1998 and 2001 to 6.26/hour in 2005. One muskellunge was observed but not captured during the assessment. Channel catfish were sampled for the first time in spring assessments in 2007. A total of six catfish between 21 and 24 inches were electrofished. Thirteen largemouth bass of various sizes were also sampled.

MINNESOTA DEPARTMENT OF NATURAL RESOURCES



Crow Wing River Gamefish and Fish IBI

Assessment Report

Spring Gamefish and Summer Fish IBI Assessment on the Crow Wing River from Staples, MN to the Mississippi River

April 23, 26 and June 29 through July 1, 2010

River Miles 0 to 25

By: Steven M. Marod

Little Falls Area Fisheries

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ABSTRACT

A special spring gamefish assessment of the Crow Wing River (M-096) from Staples, MN to the Mississippi River confluence was conducted April 23 and 26, 2010 in response to constituent's complaints of a lack of gamefish, specifically walleye, and because a spring gamefish assessment had never been completed. Population data was gathered as baseline data and for purposes of monitoring walleye, smallmouth bass and other gamefish populations. Walleye were targeted although an attempt was made to capture all gamefish encountered during sampling. A total of 65 walleye, 48 smallmouth bass and 34 northern pike were sampled in two electrofishing stations with 3.56 hours of effort. Catch per unit of effort (CPUE) for walleye, smallmouth bass and northern pike was 18.3/hour, 13.5/hour and 9.6/hour respectively. Walleye from seven different year classes were sampled.

A summer IBI assessment was completed in cooperation with MPCA from June 29 through July 1, 2010. A total of 32 species were captured in four electrofishing stations using a boat type electrofisher. MPCA calculated IBI scores at all four stations were above the 90^{th} percentile indicating "good" biological integrity exists within the Crow Wing River watershed. Species that were common in the IBI assessment included common shiner, white sucker, bluegill, shorthead redhorse, and hornyhead chub.

STUDY AREA

The Crow Wing River Watershed is a major watershed that covers approximately 1,983 square miles in Becker, Cass, Clearwater, Crow Wing, Hubbard, Morrison, Todd and Wadena Counties in north central Minnesota (Figure 1). The Crow Wing River flows south through the watershed from Akeley, MN in the north to Staples, MN where it bends east to its confluence with the Mississippi River south of Brainerd, MN. The river covers approximately 115 miles from source to mouth and is a state designated canoe route. The source of the river is Eleventh Crow Wing Lake which is included in a chain of eleven interconnected lakes. Major tributaries that enter the Crow Wing River include the Shell, Redeye, Partridge, Long Prairie and Gull Rivers.

Soils in the Crow Wing watershed were predominately sand, sandy loam and loamy sand (Figure 2). Dominant geomorphic sedimentary associations in the watershed were outwash, till plain, supraglacial drift complex and lacustrine (Figure 3).

Land use in the watershed was dominated by forest with deciduous and evergreen forest types and comprised 38.8% and 12.7% of the landscape respectively (Figure 4). Agricultural hay, pasture and crop lands covered 21.9% of lands in the watershed. Developed lands comprised a small percentage of the watershed (Table 1). Topography is nearly level to gently rolling hills with glacial moraines and drumlins common (Figure 5). Aerial photographs of the watershed helped in documenting land use and cover types (Figure 6). The Crow Wing River was classified as a 6th order stream according to the Strahler Stream Order classification system (Figure 7).

According to the Ecological Classification System (ECS) there were two ECS provinces within the Crow Wing River major watershed associated with the study area including, Eastern Broadleaf Forest Province and Laurentian Mixed Forest Province. Two ECS Subsections were within the major watershed including Pine Moraines and Outwash Plains and Hardwood Hills subsections. Pre-settlement vegetation types were primarily jack pine barrens and openings, aspen-birch (tending to conifers), mixed white pine and red pine, and conifer bogs and swamps. The dominant pre-settlement vegetation type in the Partridge River watershed in northern Todd County was big woods hardwoods (oak, maple, basswood, hickory).

The Crow Wing River in the Little Falls Fisheries work area stretches from near Staples, MN to the confluence with the Mississippi River and covers approximately 25.6 miles (Figure 1). Two dams owned by Minnesota Power Company impact connectivity of the lower Crow Wing River; Sylvan Dam located near river mile 4, and Pillager Dam located within river mile 10. In general, this section of the river contained pool, riffle and run type habitat with coarse substrate types from Staples, MN to approximately one mile below the confluence of the Long

Prairie River where Placid Reservoir begins to impact gradient. Sand substrates begin to dominate into the reservoir to Pillager Dam. The Pillager Dam tailwater is again dominated by coarse substrates for less than a mile before Sylvan Reservoir impacts gradient and flow, and sand substrates again dominate. From the Sylvan Dam tailwater to the confluence with the Mississippi River, gradient is significant and boulder, rubble, gravel, and sand substrates dominate.

This section of the Crow Wing River flows through riparian lands dominated by forest. Riparian lands along both banks were lightly developed. Natural scenic quality was high and cover types along the river were primarily upland and bottomland forest. Bottomland forest consisted of ash, silver maple and willow while uplands were primarily oak forest. Land use in the minor watersheds adjacent to this study area was primarily deciduous forest (43.0%). Pasture/hay (16.8%) and cultivated crops (7.7%) were agricultural land uses common in adjacent watersheds and development, in general, was light (Table 2).

Electrofishing during the spring assessment was directed in suspected walleye, smallmouth bass and northern pike habitats. All species were captured in backwater areas, current breaks and deeper runs with woody or boulder cover types. Summer sampling was coordinated with the Minnesota Pollution Control Agency (MPCA) and was part of the agency's comprehensive Crow Wing River Watershed Biological Monitoring Assessment. The entire fish community was targeted at summer stations and all species of fish were netted.

METHODS

Spring Gamefish Assessment

Two long daytime electrofishing runs were conducted in suspected gamefish habitats (Figure 8). In general, as the boom shocker was driven downstream, operators visually assessed habitat and shocking occurred in current breaks, backwaters and deep runs with woody or boulder cover types. Timing of electrofishing was after the walleye and northern pike spawning season but prior to smallmouth bass spawning. A Smith-Root GPP 5.0 boom shocker boat rigged with two spider array dropper type anodes and hull cathode was used to sample fish. An attempt was made to capture all gamefish encountered. Gamefish captured were identified, enumerated and measured. In addition, a scale sample was removed from walleye for age determination prior to release. Electrofishing on-time was recorded to determine catch per unit of effort (CPUE).

Crow Wing River discharge information was obtained for the Pillager, MN USGS Gage Station #05247500 from the USGS Water Resources website.

Summer IBI Assessment

Summer electrofishing occurred at four stations; river mile 25 near Staples, MN (Su_EF1), river mile 15 near Al Vah's Landing upstream of Lake Placid (Su_EF2), river mile 10 near Pillager, MN (Su_EF3), and river mile 3 downstream of Sylvan Dam (Su_EF4) (Figure 8). Electrofishing stations were selected by MPCA as part of their biological monitoring program. Each station was 500 meters in length and consisted of three runs in the downstream direction, one along each bank and one down the center of the station. An attempt was made to capture every fish shocked that was within reach. All fish captured were identified, enumerated by species, measured for maximum and minimum length of each species, bulk weighed by species, and examined for deformities. IBI scores were calculated by MPCA and were based on nine metrics established for moderate to large sized rivers in northern Minnesota (Table 3). IBI methodology was recently updated by MPCA and is unpublished at the time of this writing.

RESULTS AND DISCUSSION

Spring Gamefish Assessment

A total of four different gamefish species were sampled in 3.56 hours of electrofishing effort at two stations combined on April 23 and 26, 2010. Species captured included northern pike, smallmouth bass, bluegill and walleye. Walleye were a targeted species of concern as local anglers had been complaining of a decline of the walleye population in the river. A total of 65 walleye were sampled in 2010 for a CPUE of 18.3/hour (Table 4). Adult walleye were sampled primarily in deeper runs with boulder and woody cover. Juvenile walleye were captured in deeper runs and on sand flats in riffles. Mean total length of walleye captured in the 2010 assessment was 15.0 inches (Table 5) and individuals ranged from 5.9 inches to 27.9 inches (Table 6). Seven different year classes were present indicating fairly consistent natural recruitment is occurring in the river. Ages 1, 4, and 6 were most common in the catch (Table 7). Length at annulus data suggested growth was normal when compared to other area walleye populations. All but one female walleye were spent indicating that spawning season was nearly complete at the time of the assessment. Most males were still ripe.

Smallmouth bass were targeted in backwaters, current breaks and deeper runs. A total of 48 smallmouth were captured for a total CPUE of 13.5/hour (Table 4). Mean length was 14.2 inches (Table 5) and bass ranged from 8.6 inches to 18.9 inches in total length (Table 6). The calculated PSD value for bass on the Crow Wing River was 95.8 and was biased due to sampling near the spawning season when mature fish dominate the catch.

A total of 34 northern pike were captured during the 2010 assessment for a catch rate of 6.6/hour (Table 4). Northern pike averaged 15.5 inches (Table 5) and ranged from 8.3 inches to 29.1 inches (Table 6). Six year classes were present in an aged subsample of northern pike. Ages 2 through 6 and 8 were present in the sample with ages 2 (n=4) and 3 (n=4) most common (Table 7). Only one bluegill was captured during sampling.

Gamefish populations in the Crow Wing River are self-sustaining and natural reproduction appears to be adequate to maintain healthy populations. While there are no prior spring gamefish assessments to compare this survey to, catch rates for walleye were more than four times higher than the highest catch rate observed in spring surveys conducted on the Mississippi River from Brainerd to Little Falls, MN. Northern pike numbers appear to be similar to what is generally sampled on the Mississippi River. Smallmouth bass populations in the Crow Wing River appeared lower than that in the Mississippi River, although, it appears numbers are increasing in the system. Very few bass have been sampled upstream of Pillager Dam in four prior summer fish population assessments.

Summer IBI Assessment

A total of 32 species were sampled in four electrofishing stations during the 2010 assessment on the Crow Wing River between Staples, MN and its confluence with the Mississippi River (Table 8). Five species including brassy minnow, bigmouth shiner, northern redbelly dace, fathead minnow, and trout-perch had never been sampled in the Crow Wing River and were added to the historical species list. A total of 42 different species of fish have been sampled in this and four prior population assessments combined.

IBI scores ranged from 60 at stations Sum_EF1 and Sum_EF3 to 42 at Sum_EF2. All stations had IBI scores that exceeded the upper confidence limit for moderate to large sized rivers in northern Minnesota (Table 3). According to MPCA, IBI scores above the 90% confidence limits reflect "good" biological condition. In general, all stations received high scores for having a low percentage of individuals that were detritivores or exotic species, and moderate to low scores for all other metrics (Table 3).

Nongamefish species dominated the catch by number (Table 9) and by biomass (Table 10) during summer sampling. Common shiner (n=1,039, 36.58% of catch), white sucker (n=269, 9.47%), bluegill (n=236, 8.31%), shorthead redhorse (n=173, 6.09%) and hornyhead chub (n=141, 4.96%) were most abundant in the catch although many species were common in all four stations. Shorthead redhorse (142,534 g, 32.72% of biomass), white sucker (84,305 g, 19.35%), silver redhorse (50,200 g, 11.52%), greater redhorse (43,050 g, 9.88%) and common carp (19,600 g, 4.50%) comprised the greatest proportion of the biomass of the catch. Biomass for bluegill and smallmouth bass were highest amongst gamefish captured comprising 4.40% and 4.09% of the total biomass captured respectively. Total biomass sampled in the four stations was 435,604 grams.

Gamefish species captured during summer IBI sampling included northern pike, rock bass, bluegill, smallmouth bass, largemouth bass, black crappie, yellow perch and walleye (Table 8). All gamefish species were captured in at least three of four electrofishing stations except for black crappie which was identified in only one station (Table 9). Two muskellunge were observed during electrofishing runs at Sum_EF4 downstream of Sylvan Dam, but were not captured. A comprehensive Crow Wing Watershed Biological Monitoring Report describing IBI sampling methodology and data will be available from MPCA in the next two years.

Hydrology

Crow Wing River discharge information was obtained from the USGS Water Resources website. Daily discharge has been monitored at Pillager, MN at Station #05247500 since 1968. Historical low and high flows measured at Pillager, MN were 60 cfs on August 10, 1976 and 18,300 on April 14, 1965 respectively. Discharge in 2010 followed typical patterns with high flows in spring, low flows during summer and increased flows during fall. Peak flows during spring were higher than average and occurred earlier than normal. Discharge was normal during early summer and above normal from late July through fall. Fall flows were much higher than normal in 2010 (Figure 9). Peak discharge was 10,300 cfs and occurred on March 17, 2010. Minimum flow was 714 cfs and was recorded on February 6, 2010. Discharge during the spring gamefish assessment was 1,740 to 1,660 cfs on April 23 and 26, 2010 respectively. Discharge during summer IBI sampling was 1,630 cfs on 6/29/10, 1,580 cfs on 6/30/10, and 1,250 cfs on 7/1/10.

Table 1. 2001 NLCD land use percentages for the Crow Wing River Watershed.

Land Use		Area (acres)	Percentage
Open Water		84,129	6.63
Developed, Open Space		37,909	2.99
Developed, Low Intensity		4,639	0.37
Developed, Medium Intensity		733	0.06
Developed, High Intensity		326	0.03
Barren Land (Rock/Clay/Sand)		467	0.04
Deciduous Forest		492,237	38.80
Evergreen Forest		160,791	12.67
Mixed Forest		2,008	0.16
Shrub/Scrub		45,318	3.57
Grassland/Herbaceous		26,997	2.13
Pasture/Hay		147,988	11.66
Cultivated Crops		129,445	10.20
Woody Wetlands		44,616	3.52
Emergent Herbaceous Wetlands		90,972	7.17
	Total	1,268,575	100.00

Table 2. 2001 NLCD land use percentages for minor watersheds adjacent to the Crow Wing River from Staples, MN to the confluence with the Mississippi River.

Land Use		Area (acres)	Percentage
Open Water		5,384	4.79
Developed, Open Space		3,735	3.32
Developed, Low Intensity		603	0.54
Developed, Medium Intensity		90	0.08
Developed, High Intensity		29	0.03
Barren Land (Rock/Clay/Sand)		13	0.01
Deciduous Forest		45,992	40.96
Evergreen Forest		5,614	5.00
Mixed Forest		44	0.04
Shrub/Scrub		4,897	4.36
Grassland/Herbaceous		3,677	3.27
Pasture/Hay		17,719	15.78
Cultivated Crops		9,921	8.84
Woody Wetlands		7,713	6.86
Emergent Herbaceous Wetlands		6,875	6.12
	Total	112,306	100.00

Table 3. IBI scores for all summer stations on the Crow Wing River from Staples, MN to the confluence with the Mississippi River.

	Sum_EF1	Sum_EF2	Sum_EF3	Sum_EF4
Metric	0 - 100 Score	0 - 100 Score	0 - 100 Score	0 - 100 Score
Percent individuals that are detritivores	9	7	8	8
Percent individuals that are exotic species	11	11	11	11
Percent individuals that are insectivore species	5	5	5	1
Percent individuals that are non-lithophilic nest-guarders	11	5	1	10
Percent of individuals that are sensitive species	5	3	1	2
Percent of taxa that are sensitive	8	7	3	6
Percent of taxa that are simple lithophilic spawners	5	7	3	6
Percent of taxa that are serial spawners	3	8	6	4
Percent of taxa that are very tolerant species	3	6	4	7
Total IBI Score	60	59	42	55

Table 4. Catch per unit of effort (CPUE) for gamefish captured at each site during spring sampling on the Crow Wing River from Staples, MN to Pillager, MN.

	Station		
	Spr_EF1	Spr_EF2	Combined
River Mile	21-25	14-17	14-25
Effort (hrs)	1.70	1.86	3.56
Species	CPUE		
Bluegill	0.0	0.5	0.3
Northern pike	7.1	11.8	9.6
Smallmouth bass	2.4	23.7	13.5
Walleye	24.1	12.9	18.3

Table 5. Number caught and minimum, maximum and mean length of all gamefish captured during spring sampling on the Crow Wing River from Staples, MN to Pillager, MN.

Species	Number Caught	Minimum Length	Maximum Length	Mean Length
Bluegill	1	0.5	0.3	8.0
Northern pike	34	11.8	9.6	15.5
Smallmouth bass	48	23.7	13.5	14.2
Walleye	65	12.9	18.3	15.0

Table 6. Length frequency distribution of gamefish species sampled on the Crow Wing River from Staples, MN to Pillager, MN during spring sampling.

Length Group	Species			
(inches)	NOP	SMB	WAE	BLG
< 5.0				
5.0-5.4				
5.5-5.9			1	
6.0-6.4			1	
6.5-6.9			4	
7.0-7.4			1	
7.5-7.9			4	
8.0-8.4	3		2	1
8.5-8.9		1	1	
9.0-9.4	2			
9.5-9.9	1			
10.0-10.4	1			
10.5-10.9	1	1		
11.0-11.4	2	5		
11.5-11.9	2	4	1	
12.0-12.4	3	6	2	
12.5-12.9		3	1	
13.0-13.4		1	9	
13.5-13.9		3	4	
14.0-14.9	2	6	7	
15.0-15.9	3	5		
16.0-16.9	1	4	2	
17.0-17.9	1	5	2	
18.0-18.9	2	4	3	
19.0-19,9	4		8	
20.0-20.9			4	
21.0-21.9			1	
22.0-22.9	2		2	
23.0-23.9	1		3	
24.0-24.9	2			
25.0-25.9			1	
26.0-26.9				
27.0-27.9			1	
28.0-28.9				
29.0-29.9	1			
Total	34	48	65	1

Table 7. Age and mean length at annulus formation for a subsample of gamefish sampled on the Crow Wing River from Staples, MN to Pillager, MN.

Species		Age/Year Class								
		Age 1/2009	Age 2/2008	Age 3/2007	Age 4/2006	Age 5/2005	Age 6/2004	Age 7/2003	Age 8/2002	Age 9/2001
Northern pike	n=12		4	4	1	1	1		1	
	Mean length at capture		13.2	18	18.1	22.4	23.6		29.1	
Smallmouth bass	n=4				1	1	1	1		
	Mean length at capture				12.1	14.6	16	15.9		
Walleye	n=41	12		3	14	2	6	2		2
	Mean length at capture	7.3		12.4	14.1	17.2	19.1	20.5		21.8

Table 8. Species list of fishes sampled in the Crow Wing River during summer 2010 IBI sampling from Staples, MN to the confluence with the Mississippi River.

Common Name	Scientific Name	Sum_EF1	Sum_EF2	Sum_EF3	Sum_EF4
Bowfin	*Amia calva*			x	
Central mudminnow	*Umbra limi*	x	x	x	
Northern pike	*Esox lucius*	x	x	x	x
Common carp	*Cyprinus carpio*	x		x	
Brassy minnow	*Hybognathus hankinsoni*	x		x	
Hornyhead chub	*Nocomis biguttatus*	x	x	x	x
Common shiner	*Luxilus cornutus*	x	x	x	x
Bigmouth shiner	*Notropis dorsalis*	x			x
Blacknose shiner	*Notropis heterolepis*		x	x	
Spotfin shiner	*Cyprinella spiloptera*	x	x	x	x
Northern redbelly dace	*Phoxinus eos*	x			
Bluntnose minnow	*Pimephales notatus*	x	x	x	x
Fathead minnow	*Pimephales promelas*			x	
Longnose dace	*Rhinichthys cataractae*	x			x
Creek chub	*Semotilus atromaculatus*	x	x	x	
White sucker	*Catostomus commersoni*	x	x	x	x
Silver redhorse	*Moxostoma anisurum*	x	x	x	x
Shorthead redhorse	*Moxostoma macrolepidotum*	x	x	x	x
Greater redhorse	*Moxostoma valenciennesi*	x	x	x	
Trout-perch	*Percopsis omiscomaycus*				x
Burbot	*Lota lota*	x	x		x
Rock bass	*Ambloplites rupestris*	x	x	x	x
Pumpkinseed	*Lepomis gibbosus*			x	x
Bluegill	*Lepomis machrochirus*	x		x	x
Smallmouth bass	*Micropterus dolomieui*	x	x	x	x
Largemouth bass	*Micropterus salmoides*		x	x	x
Black crappie	*Pomoxis nigromaculatus*			x	
Johnny darter	*Etheostoma nigrum*	x	x	x	x
Yellow perch	*Perca flavescens*	x	x	x	x
Logperch	*Percina caprodes*	x	x	x	x
Walleye	*Sander vitreum*	x	x	x	x
Mottled sculpin	*Cottus bairdi*	x			x

Table 9. Total catch by species at each station on the Crow Wing River from Staples, MN to the confluence with the Mississippi River.

Species	Su_EF1	Su_EF2	Su_EF3	Su_EF4	Total	% of Catch
Bowfin			4		4	0.14%
Central mudminnow	18		1	25	44	1.55%
Northern pike	12	22	1	6	41	1.44%
Common carp	1		4		5	0.18%
Brassy minnow	1		1		2	0.07%
Hornyhead chub	108		4	29	141	4.96%
Common shiner	261	531	176	71	1039	36.58%
Bigmouth shiner	11	5			16	0.56%
Blacknose shiner			2	1	3	0.11%
Spotfin shiner	9	13	40	18	80	2.82%
Northern redbelly dace	1				1	0.04%
Bluntnose minnow	5	44	17	31	97	3.42%
Fathead minnow			1		1	0.04%
Longnose dace	1	5			6	0.21%
Creek chub	12		3	1	16	0.56%
White sucker	96	101	40	32	269	9.47%
Silver redhorse	2	4	1	21	28	0.99%
Shorthead redhorse	97	54	16	6	173	6.09%
Greater redhorse	9		4	18	31	1.09%
Redhorse YOY	5	7		10	22	0.77%
Trout-perch		1			1	0.04%
Burbot	7		1	1	9	0.32%
Rock bass	18	14	28	17	77	2.71%
Pumpkinseed		1	4		5	0.18%
Bluegill	3	28	205		236	8.31%
Smallmouth bass	3	9	26	17	55	1.94%
Largemouth bass		2	26	1	29	1.02%
Black crappie			1		1	0.04%
Johnny darter	32		16	74	122	4.30%
Yellow perch	32	9	9	8	58	2.04%
Logperch	70	14	30	14	128	4.51%
Walleye	4	16	3	3	26	0.92%
Mottled sculpin	15	59			74	2.61%

Table 10. Total catch by biomass by species at each station on the Crow Wing River from Staples, MN to the confluence with the Mississippi River.

Species	Su_EF1	Su_EF2	Su_EF3	Su_EF4	Total	% of Biomass
Bowfin			11,400		11,400	2.62%
Central mudminnow	54		6	133	193	0.04%
Northern pike	2,796	11,462	357	774	15,389	3.53%
Common carp	4,100		15,500		19,600	4.50%
Brassy minnow	2		2		4	0.00%
Hornyhead chub	1,133	1,276	15	132	2,556	0.59%
Common shiner	1,138	1,586	885	220	3,829	0.88%
Bigmouth shiner	30	9			39	0.01%
Blacknose shiner			3	1	4	0.00%
Spotfin shiner	60	61	187	105	413	0.09%
Northern redbelly dace	1				1	0.00%
Bluntnose minnow	29	131	50	89	299	0.07%
Fathead minnow			1		1	0.00%
Longnose dace	16	12			28	0.01%
Creek chub	88		15	11	114	0.03%
White sucker	24,804	35,165	9,266	15,070	84,305	19.35%
Silver redhorse	4,200	11,300	2,900	31,800	50,200	11.52%
Shorthead redhorse	67,963	58,650	10,571	5,350	142,534	32.72%
Greater redhorse	13,050		5,100	24,900	43,050	9.88%
Redhorse YOY	21	9		46	76	0.02%
Trout-perch		6			6	0.00%
Burbot	320	110	48	58	536	0.12%
Rock bass	2,733	2,304	2,953	537	8,527	1.96%
Pumpkinseed		18	390		408	0.09%
Bluegill	122	2,212	16,821		19,155	4.40%
Smallmouth bass	1,451	2,653	2,884	10,827	17,815	4.09%
Largemouth bass		1	4,486	1	4,488	1.03%
Black crappie			213		213	0.05%
Johnny darter	47	70	25	103	245	0.06%
Yellow perch	542	180	103	131	956	0.22%
Logperch	376	161	140	132	809	0.19%
Walleye	780	5,556	760	903	7,999	1.84%
Mottled sculpin	154	258			412	0.09%
				Totals	435,604	100.00%

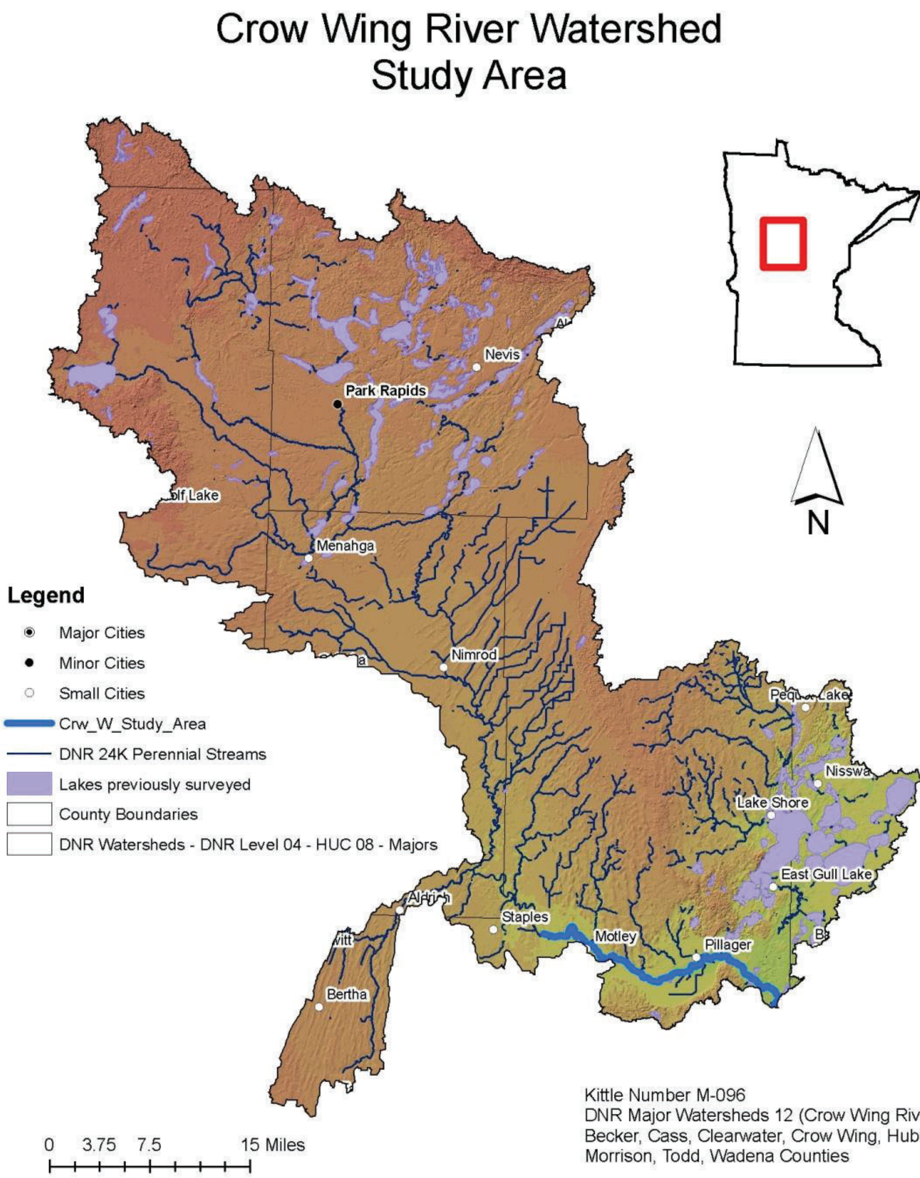

Figure 1. Crow Wing River Major Watershed showing 30 meter digital elevation model, DNR 24K Perennial Streams, surveyed lakes and the Crow Wing River study area in the Little Falls Area.

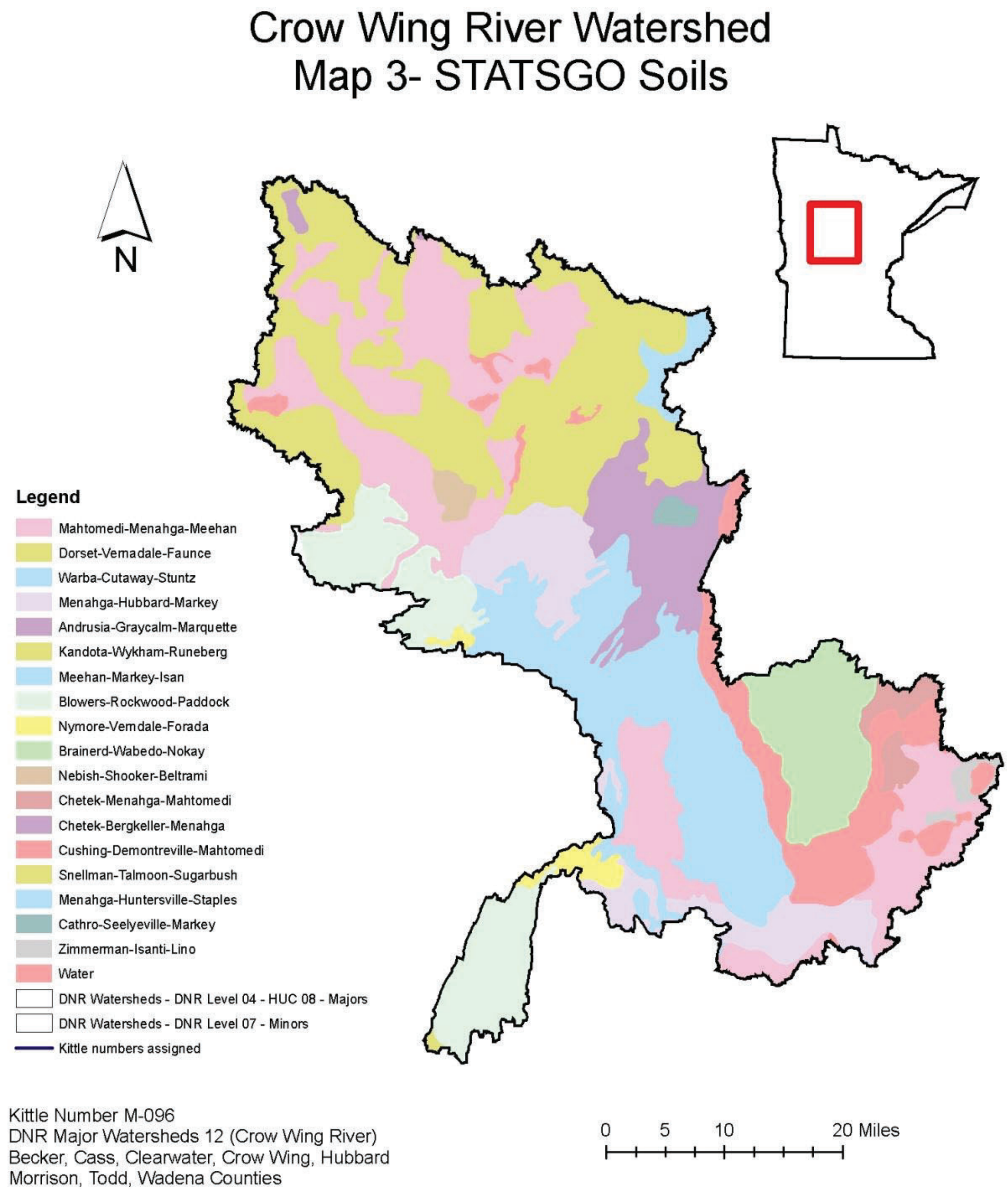

Figure 2. Crow Wing River watershed showing STATSGO Soil types in the watershed.

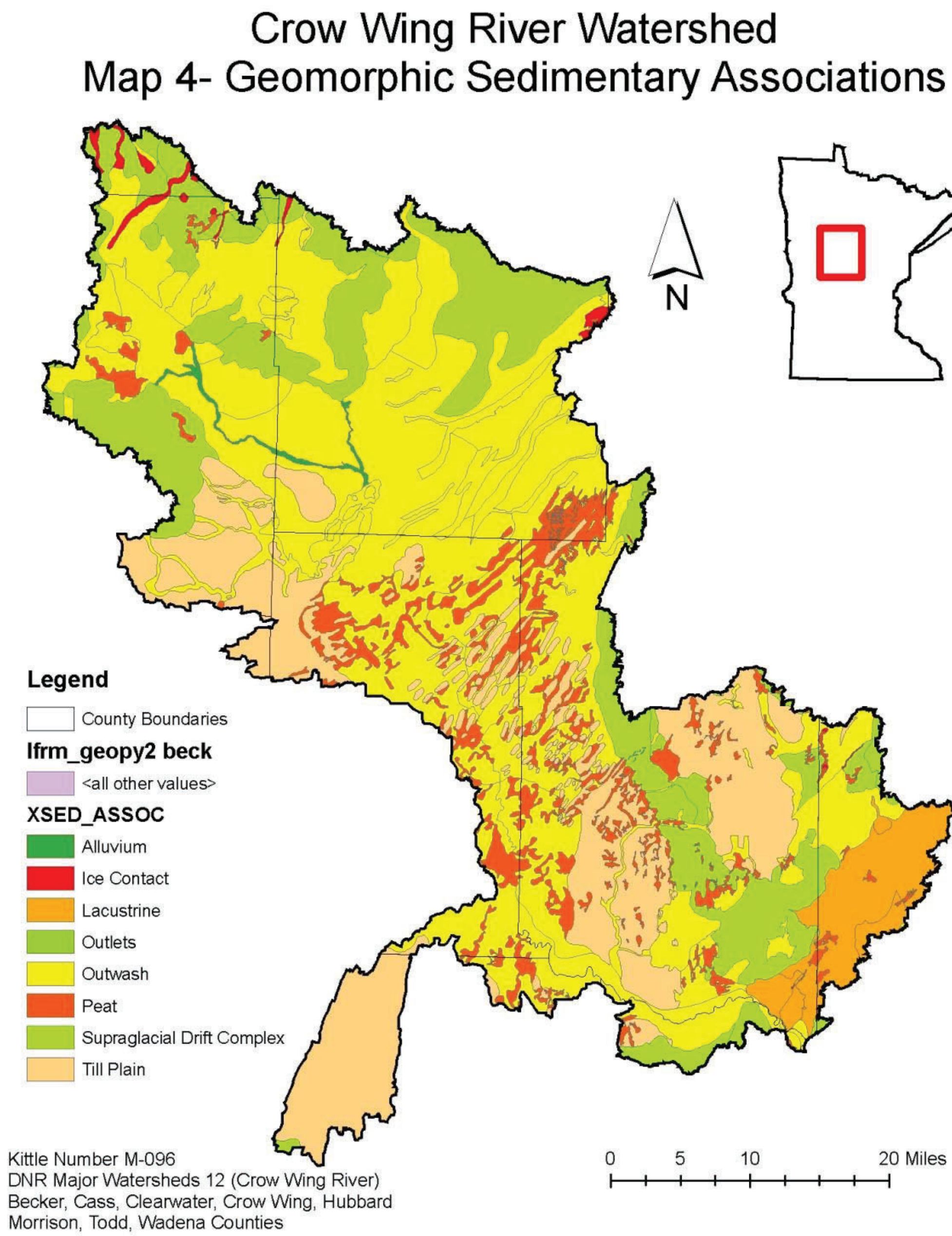

Figure 3. Crow Wing River Watershed showing geomorphic sedimentary associations.

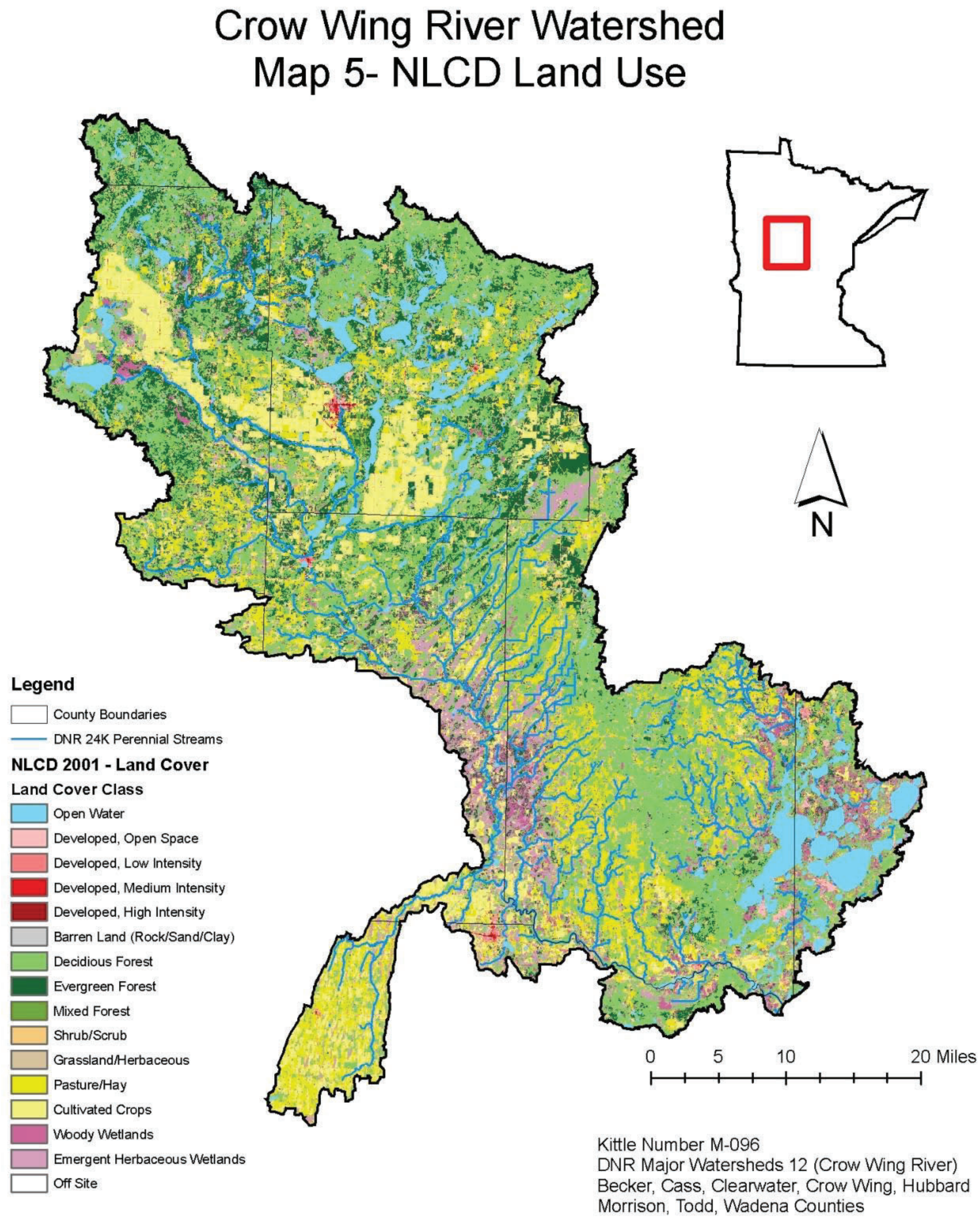

Figure 4. Crow Wing River Watershed showing NLCD 2001 land cover and DNR 24K perennial streams.

Figure 5. Crow Wing River Watershed showing 100 K USGS topographic map coverage.

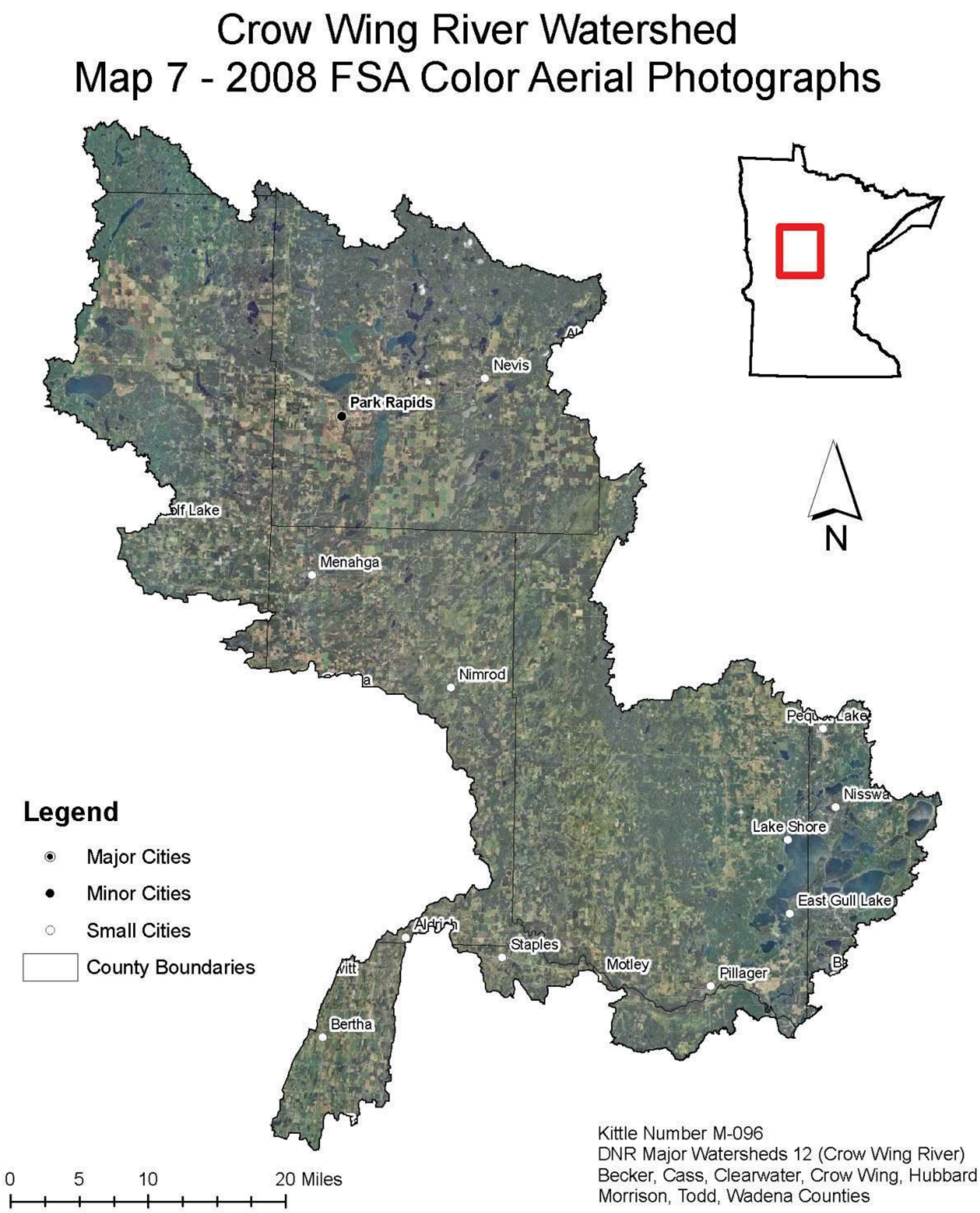

Figure 6. Crow Wing River Watershed showing FSA 2008 color aerial photography.

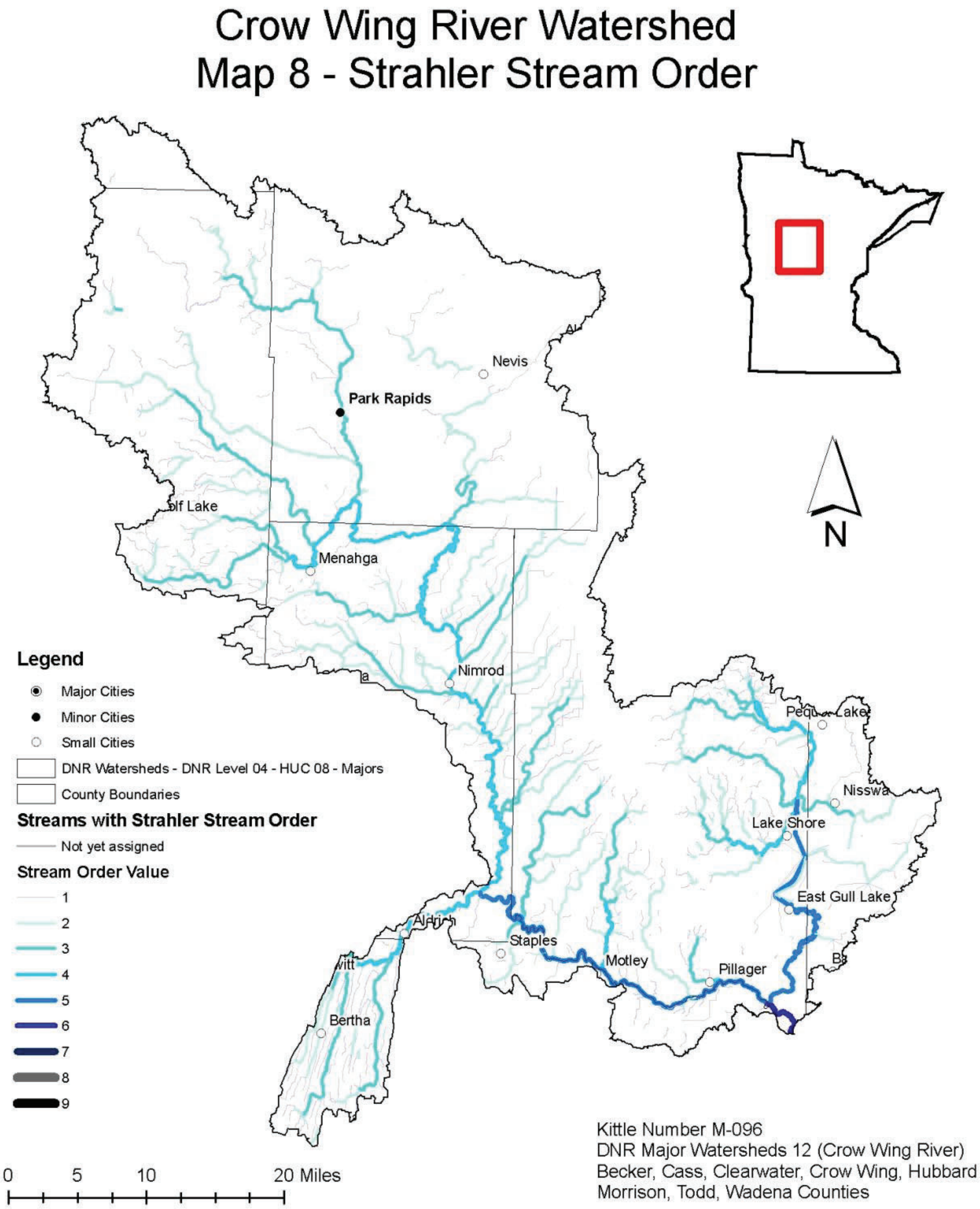

Figure 7. Crow Wing River Watershed showing Strahler Stream Order for the Crow Wing River.

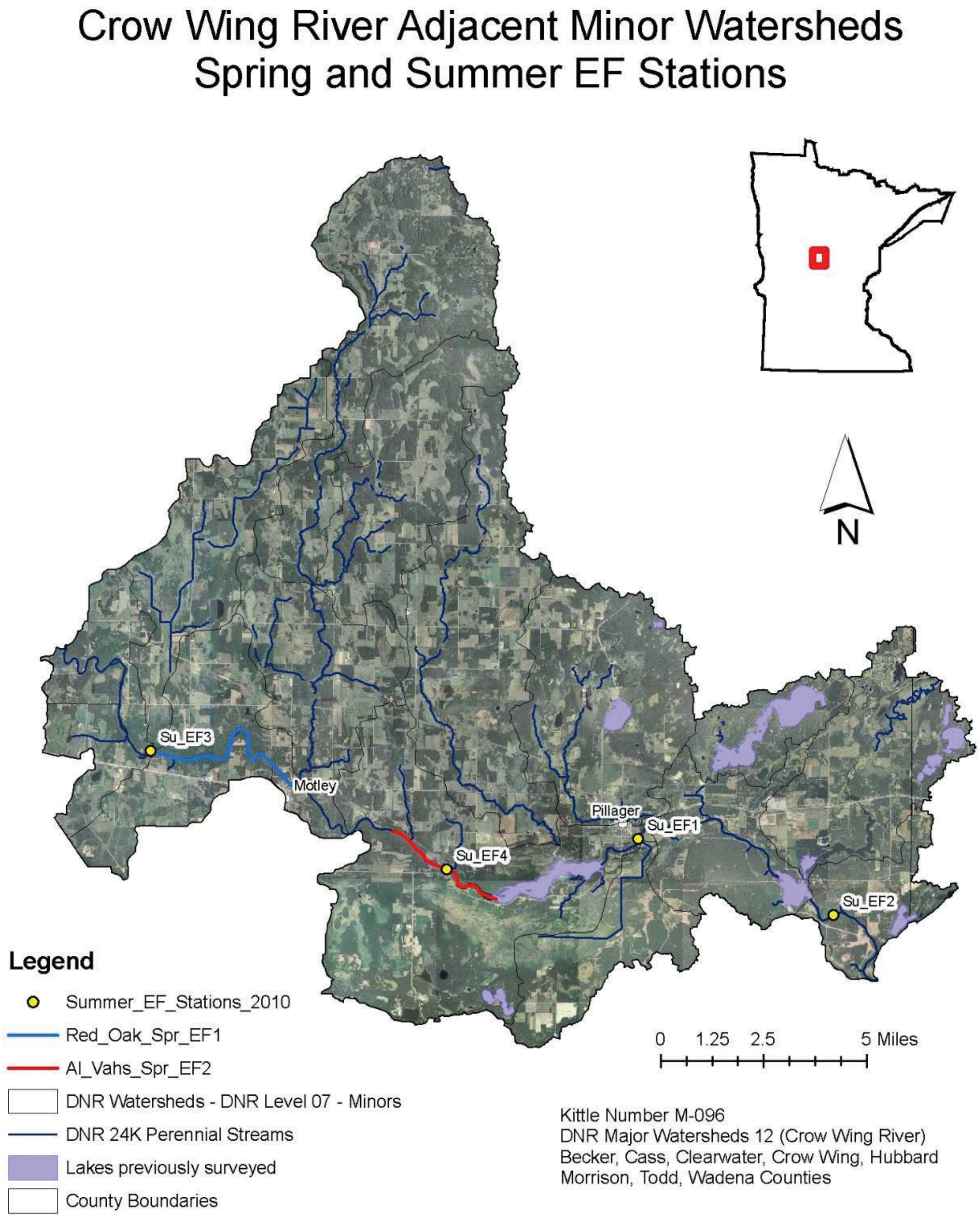

Figure 8. Adjacent minor watersheds to the Crow Wing River in the Little Falls Area showing spring and summer electrofishing stations.

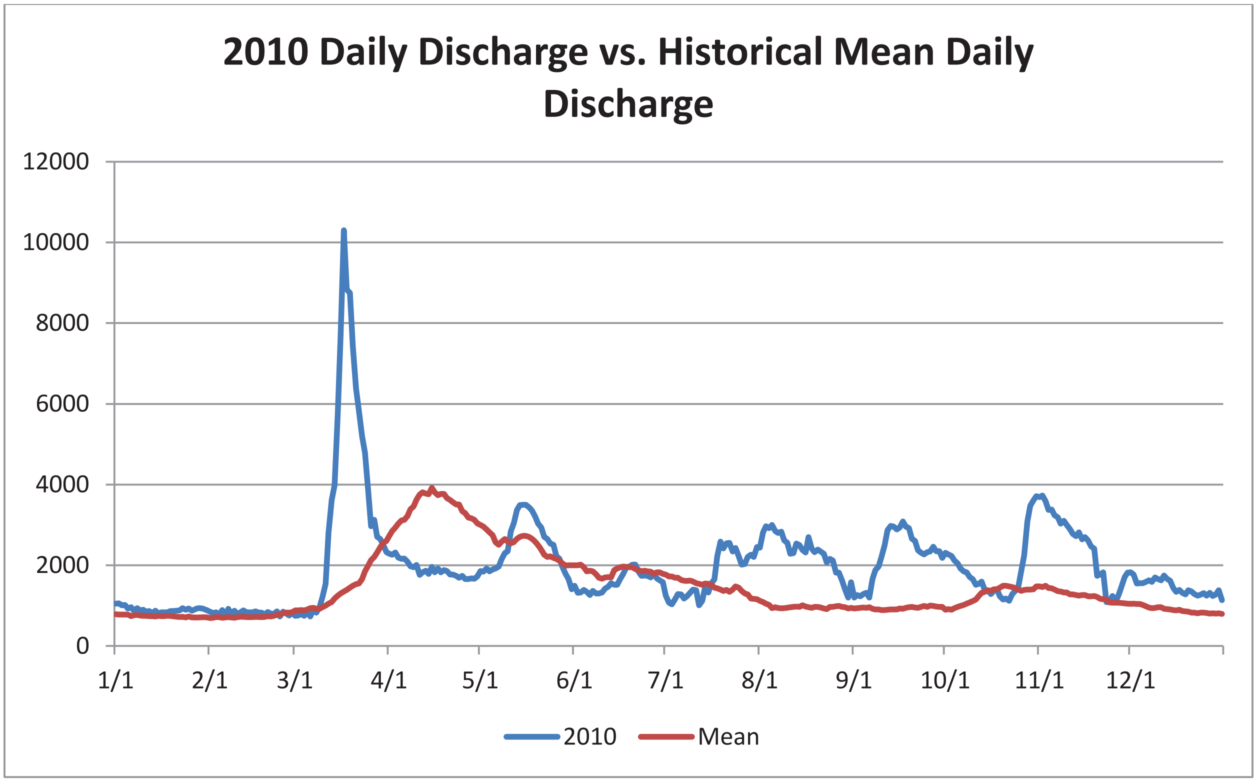

Figure 9. 2010 mean daily discharge versus historical mean daily discharge for the period of record (1968 through 2009) on the Crow Wing River at Pillager, MN USGS Gage Station #05247500.

Crow Wing River Gamefish and Fish IBI Assessment Report

Spring Gamefish and Summer Fish IBI Assessment on the Crow Wing River

from Staples, MN to the Mississippi River

April 23, 26 and June 29 through July 1, 2010

River Miles 0 to 25

By: Steven M. Marod

Little Falls Area Fisheries

Minnesota Dept. of Natural Resources

Division of Fish and Wildlife

Central Region, Little Falls, MN

2011

Approved by: ______________________ Date: 4/5/11
Area Fisheries Supervisor

Approved by: ______________________ Date: ___________
Regional Fisheries Supervisor

FISHERIES MANAGEMENT
STREAM SURVEY REPORT

Revision: 20190402
DNR Reporting Service folder: Fisheries > Survey > Stream

Survey ID: 17692113240558000
Data Date: 06/10/2022 at 7:48 am

STREAM NAME: Mississippi River | **SURVEY TYPE: Targeted Survey**
KITTLE ID NUMBER: M | **SURVEY ID DATE: 05/12/2021**

MANAGED STREAM SEGMENT: Mississippi R - St. Cloud Dam to Brainerd Dam

STREAM SURVEY COMPONENTS

Revision: 20180206

Component Type	Component Class	Sampling Station Code - Type
Fish Community Sampling	Electrofishing	SEF - Special sampling, electrofishing

STREAM LOCATION

Counties: Benton, Cass, Crow Wing, Morrison, Sherburne, Stearns
Primary County (*Mouth*): Morrison
Location of Source: T144, R36W, S35 (UTM 332901.70, 5234171.50)
Sequence of Waterways: Mississippi River (M)

AREA FISHERIES OFFICE

Area Name: Little Falls
ORG Code: F312
Region Name: Central
Region Number: 3

WATERSHED CHARACTERISTICS

Major Watershed	Minor Watershed

Drainage Basin: Upper Mississippi River (M)

Note: Land cover type and acreage data are not on file.

STREAM CHARACTERISTICS (*Entire Stream*)

Stream Length (*miles*): 77.26
Designated Trout Stream? No

PORTION OF STREAM SURVEYED

Downstream River Mile: (*Data not on file*)
Upstream River Mile: (*Data not on file*)
Total Length Surveyed (*miles*): (*Data not on file*)
Number of Sampling Stations: (*Data not on file*)
Total Length of Sampling Stations (*feet*): 48,564

STREAM SURVEY HISTORY*

Revision: 20180212

Survey Type	Survey ID Dates
Targeted Survey	05/31/2022 (*Proposed*), 08/31/2021, **05/12/2021**, 08/31/2020, 08/26/2020, 05/26/2020, 05/23/2019, 05/22/2018, 05/15/2017, 06/15/2016, 05/09/2016, 05/12/2015

*** Note:** Only surveys recorded in the SURVEY@STURGEON database are displayed.

FISH SAMPLING

CATCH SUMMARY

Revision: 20181102

Sampling Station Type: SEF - Special sampling, electrofishing

Station Attributes	(1) SEF-10	(2) SEF-11	(3) SEF-12	(4) SEF-13
	Run 1	Run 1	Run 1	Run 1
Sampling Station	SEF-10	SEF-11	SEF-12	SEF-13
Start Date - Time	05/12/2021 - 10:05 hrs.	05/12/2021 - 12:25 hrs.	05/28/2021 - 09:30 hrs.	05/13/2021 - 11:15 hrs.
End Date - Time	05/12/2021 - 10:32 hrs.	05/12/2021 - 12:55 hrs.	05/28/2021 - 10:47 hrs.	05/13/2021 - 13:27 hrs.
Downstream River Mile	(N/A)	(N/A)	(N/A)	(N/A)
Upstream River Mile	(N/A)	(N/A)	(N/A)	(N/A)
Station Length (ft)	3,560	3,850	9,560	10,000
Surveyed Length (ft)	(N/A)	(N/A)	(N/A)	(N/A)
Targeted Species	(N/A)	(N/A)	(N/A)	(N/A)
Includes Unmeasured Data	No	No	No	No
Daylight Sampling	Yes	Yes	Yes	Yes
Gear Type	Smith-Root GPP 5.0			
Unit Amperage	4.0	4.1	4.0	4.0
Unit Voltage	(N/A)	(N/A)	(N/A)	(N/A)
Unit Pulses (per second)	60	60	(N/A)	60
Water Clarity (ft)	(N/A)	(N/A)	(N/A)	(N/A)
Flow Volume (cfs)	6,230.00	6,230.00	(N/A)	5,170.00
Number of Netters	1	2	2	2
Sampling Effort (seconds)	1,436	1,637	3,705	3,529

Catch Summary	Number	Weight (lbs)	Number	Weight (lbs)	Number	Weight (lbs)	Number	Weight (lbs)
BLG - Bluegill					2	0.44		
CCF - Channel Catfish							4	23.29
MUE - Muskellunge	2	0.77	2	0.56	3	1.22	1	0.20
NOP - Northern Pike	1	0.45	8	11.25	1	0.74	8	15.50
SMB - Smallmouth Bass	44	6.09	29	66.60	57	134.89	65	201.17
WAE - Walleye			1	0.06	10	9.22	25	34.81

CATCH SUMMARY (*Continued*)

Sampling Station Type: SEF - Special sampling, electrofishing

Station Attributes	(5) SEF-14	(6) SEF-15	(7) SEF-16	(8) SEF-17
	Run 1	Run 1	Run 1	Run 1
Sampling Station	SEF-14	SEF-15	SEF-16	SEF-17
Start Date - Time	05/13/2021 - 10:35 hrs.	05/13/2021 - 09:30 hrs.	05/14/2021 - 11:15 hrs.	05/14/2021 - 09:30 hrs.
End Date - Time	05/13/2021 - 11:05 hrs.	05/13/2021 - 10:19 hrs.	05/14/2021 - 12:06 hrs.	05/14/2021 - 10:45 hrs.
Downstream River Mile	(N/A)	(N/A)	(N/A)	(N/A)
Upstream River Mile	(N/A)	(N/A)	(N/A)	(N/A)
Station Length (ft)	5,300	3,404	3,890	9,000
Surveyed Length (ft)	(N/A)	(N/A)	(N/A)	(N/A)
Targeted Species	(N/A)	(N/A)	(N/A)	(N/A)
Includes Unmeasured Data	No	No	No	No
Daylight Sampling	Yes	Yes	Yes	Yes
Unit Amperage	4.0	4.0	4.1	4.1
Unit Voltage	(N/A)	(N/A)	(N/A)	(N/A)
Unit Pulses (per second)	60	60	60	60
Water Clarity (ft)	(N/A)	(N/A)	(N/A)	(N/A)
Flow Volume (cfs)	5,170.00	5,170.00	3,200.00	3,200.00
Number of Netters	2	2	2	2
Sampling Effort (seconds)	607	1,183	1,762	2,843

Catch Summary	Number	Weight (lbs)	Number	Weight (lbs)	Number	Weight (lbs)	Number	Weight (lbs)
BLG - Bluegill					2	0.52	3	0.45
BNT - Brown Trout							1	0.20
CCF - Channel Catfish	1	0.10			6	39.95		
LMB - Largemouth Bass							1	1.96
MUE - Muskellunge			1	0.40	1	0.42	1	22.95
NOP - Northern Pike	1	2.62	7	13.87	4	9.77	12	22.94
SMB - Smallmouth Bass	21	69.84	37	95.47	22	67.39	24	72.30
WAE - Walleye	1	0.08	2	3.20	4	4.01	3	8.12

CATCH PER UNIT EFFORT

Revision: 20190401

Special sampling, electrofishing (SEF)		Summary By Numbers				Summary By Weight (lbs)	
		Total	Number per Hour		Number	Total	Mean
Run Nbr	Species	Number	Run-Time	On-Time	per Mile	Weight	Weight
Sampling Station: (1) SEF-10							
Run 1	MUE - Muskellunge	2	4.44	5.01	-	0.77	0.38
	NOP - Northern Pike	1	2.22	2.51	-	0.45	0.45
	SMB - Smallmouth Bass	44	97.78	110.31	-	6.09	0.14
Sampling Station: (2) SEF-11							
Run 1	MUE - Muskellunge	2	4.00	4.40	-	0.56	0.28
	NOP - Northern Pike	8	16.00	17.59	-	11.25	1.41
	SMB - Smallmouth Bass	29	58.00	63.78	-	66.60	2.30
	WAE - Walleye	1	2.00	2.20	-	0.06	0.06
Sampling Station: (3) SEF-12							
Run 1	BLG - Bluegill	2	1.56	1.94	-	0.44	0.22
	MUE - Muskellunge	3	2.34	2.91	-	1.22	0.41
	NOP - Northern Pike	1	0.78	0.97	-	0.74	0.74
	SMB - Smallmouth Bass	57	44.42	55.38	-	134.89	2.37
	WAE - Walleye	10	7.79	9.72	-	9.22	0.92
Sampling Station: (4) SEF-13							
Run 1	CCF - Channel Catfish	4	1.82	4.08	-	23.29	5.82
	MUE - Muskellunge	1	0.45	1.02	-	0.20	0.20
	NOP - Northern Pike	8	3.64	8.16	-	15.50	1.94
	SMB - Smallmouth Bass	65	29.55	66.31	-	201.17	3.09
	WAE - Walleye	25	11.36	25.50	-	34.81	1.39
Sampling Station: (5) SEF-14							
Run 1	CCF - Channel Catfish	1	2.00	5.93	-	0.10	0.10
	NOP - Northern Pike	1	2.00	5.93	-	2.62	2.62
	SMB - Smallmouth Bass	21	42.00	124.55	-	69.84	3.33
	WAE - Walleye	1	2.00	5.93	-	0.08	0.08
Sampling Station: (6) SEF-15							
Run 1	MUE - Muskellunge	1	1.22	3.04	-	0.40	0.40
	NOP - Northern Pike	7	8.57	21.30	-	13.87	1.98
	SMB - Smallmouth Bass	37	45.31	112.60	-	95.47	2.58
	WAE - Walleye	2	2.45	6.09	-	3.20	1.60
Sampling Station: (7) SEF-16							
Run 1	BLG - Bluegill	2	2.35	4.09	-	0.52	0.26
	CCF - Channel Catfish	6	7.06	12.26	-	39.95	6.66
	MUE - Muskellunge	1	1.18	2.04	-	0.42	0.42
	NOP - Northern Pike	4	4.71	8.17	-	9.77	2.44
	SMB - Smallmouth Bass	22	25.88	44.95	-	67.39	3.06
	WAE - Walleye	4	4.71	8.17	-	4.01	1.00
Sampling Station: (8) SEF-17							

CATCH PER UNIT EFFORT (*Continued*)

Special sampling, electrofishing (*Continued*)		Summary By Numbers				Summary By Weight (lbs)	
		Total	Number per Hour		Number	Total	Mean
Run Nbr	Species	Number	Run-Time	On-Time	per Mile	Weight	Weight
(8) SEF-17 (*Continued*)							
Run 1	BLG - Bluegill	3	2.40	3.80	-	0.45	0.15
	BNT - Brown Trout	1	0.80	1.27	-	0.20	0.20
	LMB - Largemouth Bass	1	0.80	1.27	-	1.96	1.96
	MUE - Muskellunge	1	0.80	1.27	-	22.95	22.95
	NOP - Northern Pike	12	9.60	15.20	-	22.94	1.91
	SMB - Smallmouth Bass	24	19.20	30.39	-	72.30	3.01
	WAE - Walleye	3	2.40	3.80	-	8.12	2.71

LENGTH FREQUENCY DISTRIBUTIONS

Revision: 20181210

Length Frequency Distribution for SEF (for fish < 36.00 inches)

Special sampling, electrofishing (8 stations) - Field work conducted between 05/12/2021 and 05/28/2021

LENGTH (inches)	(1) SEF-10			(2) SEF-11				(3) SEF-12
	MUE	NOP	SMB	MUE	NOP	SMB	WAE	BLG
< 3.00	-	-	-	-	-	-	-	-
3.00 - 3.49	-	-	5	-	-	-	-	-
3.50 - 3.99	-	-	7	-	-	3	-	-
4.00 - 4.49	-	-	6	-	-	3	-	-
4.50 - 4.99	-	-	6	-	-	1	-	-
5.00 - 5.49	-	-	6	-	-	-	-	-
5.50 - 5.99	-	-	-	-	-	-	1	-
6.00 - 6.49	-	-	-	-	-	-	-	-
6.50 - 6.99	-	-	1	-	-	-	-	2
7.00 - 7.49	-	-	-	-	-	-	-	-
7.50 - 7.99	-	-	1	-	-	-	-	-
8.00 - 8.49	-	-	1	-	-	-	-	-
8.50 - 8.99	-	-	2	-	-	-	-	-
9.00 - 9.49	-	-	7	-	-	-	-	-
9.50 - 9.99	-	-	1	-	-	-	-	-
10.00 - 10.49	-	-	1	-	-	-	-	-
10.50 - 10.99	-	-	-	-	-	-	-	-
11.00 - 11.49	-	-	-	-	-	-	-	-
11.50 - 11.99	-	-	-	1	-	-	-	-
12.00 - 12.99	-	-	-	1	-	1	-	-
13.00 - 13.99	2	1	-	-	-	2	-	-
14.00 - 14.99	-	-	-	-	-	-	-	-
15.00 - 15.99	-	-	-	-	2	1	-	-
16.00 - 16.99	-	-	-	-	3	2	-	-
17.00 - 17.99	-	-	-	-	-	3	-	-
18.00 - 18.99	-	-	-	-	-	9	-	-
19.00 - 19.99	-	-	-	-	-	4	-	-
20.00 - 20.99	-	-	-	-	1	-	-	-
21.00 - 21.99	-	-	-	-	-	-	-	-
22.00 - 22.99	-	-	-	-	1	-	-	-
23.00 - 23.99	-	-	-	-	-	-	-	-
24.00 - 24.99	-	-	-	-	1	-	-	-
25.00 - 25.99	-	-	-	-	-	-	-	-
26.00 - 26.99	-	-	-	-	-	-	-	-
27.00 - 27.99	-	-	-	-	-	-	-	-
28.00 - 28.99	-	-	-	-	-	-	-	-
29.00 - 29.99	-	-	-	-	-	-	-	-
30.00 - 30.99	-	-	-	-	-	-	-	-
31.00 - 31.99	-	-	-	-	-	-	-	-
32.00 - 32.99	-	-	-	-	-	-	-	-
33.00 - 33.99	-	-	-	-	-	-	-	-
34.00 - 34.99	-	-	-	-	-	-	-	-
35.00 - 35.99	-	-	-	-	-	-	-	-
= > 36.00	-	-	-	-	-	-	-	-
Total	2	1	44	2	8	29	1	2
Min. Length	13.11	13.03	3.19	11.61	15.63	3.82	5.79	6.50
Max. Length	13.39	13.03	10.35	12.44	24.29	19.29	5.79	6.73
Mean Length	13.25	13.03	5.73	12.03	18.35	14.14	5.79	6.61
Nbr. Measured	2	1	44	2	8	29	1	2
No Lengths for	0	0	0	0	0	0	0	0

LENGTH FREQUENCY DISTRIBUTIONS (*Continued*)

Length Frequency Distribution for SEF (for fish < 36.00 inches) (*Continued*)

Special sampling, electrofishing (8 stations) - Field work conducted between 05/12/2021 and 05/28/2021

LENGTH (inches)	(3) SEF-12				(4) SEF-13			
	MUE	NOP	SMB	WAE	CCF	MUE	NOP	SMB
< 3.00	-	-	-	-	-	-	-	-
3.00 - 3.49	-	-	-	-	-	-	-	-
3.50 - 3.99	-	-	1	-	-	-	-	-
4.00 - 4.49	-	-	-	-	-	-	-	-
4.50 - 4.99	-	-	-	-	-	-	-	-
5.00 - 5.49	-	-	-	-	-	-	-	-
5.50 - 5.99	-	-	-	-	-	-	-	-
6.00 - 6.49	-	-	-	-	-	-	-	-
6.50 - 6.99	-	-	-	-	-	-	-	-
7.00 - 7.49	-	-	-	1	-	-	-	-
7.50 - 7.99	-	-	-	-	-	-	-	-
8.00 - 8.49	-	-	1	2	-	-	-	-
8.50 - 8.99	-	-	4	1	-	-	-	1
9.00 - 9.49	-	-	1	1	-	-	-	-
9.50 - 9.99	-	-	2	-	-	-	-	-
10.00 - 10.49	-	-	2	-	-	-	-	-
10.50 - 10.99	-	-	3	-	-	1	-	-
11.00 - 11.49	-	-	-	-	-	-	-	-
11.50 - 11.99	-	-	1	-	-	-	-	1
12.00 - 12.99	1	-	1	1	-	-	-	2
13.00 - 13.99	1	-	-	1	-	-	-	1
14.00 - 14.99	1	-	2	-	-	-	-	-
15.00 - 15.99	-	1	2	-	-	-	-	2
16.00 - 16.99	-	-	5	-	-	-	1	7
17.00 - 17.99	-	-	13	1	-	-	1	23
18.00 - 18.99	-	-	15	-	-	-	1	16
19.00 - 19.99	-	-	4	1	-	-	1	11
20.00 - 20.99	-	-	-	1	-	-	1	1
21.00 - 21.99	-	-	-	-	1	-	1	-
22.00 - 22.99	-	-	-	-	-	-	-	-
23.00 - 23.99	-	-	-	-	-	-	-	-
24.00 - 24.99	-	-	-	-	-	-	1	-
25.00 - 25.99	-	-	-	-	2	-	1	-
26.00 - 26.99	-	-	-	-	-	-	-	-
27.00 - 27.99	-	-	-	-	1	-	-	-
28.00 - 28.99	-	-	-	-	-	-	-	-
29.00 - 29.99	-	-	-	-	-	-	-	-
30.00 - 30.99	-	-	-	-	-	-	-	-
31.00 - 31.99	-	-	-	-	-	-	-	-
32.00 - 32.99	-	-	-	-	-	-	-	-
33.00 - 33.99	-	-	-	-	-	-	-	-
34.00 - 34.99	-	-	-	-	-	-	-	-
35.00 - 35.99	-	-	-	-	-	-	-	-
= > 36.00	-	-	-	-	-	-	-	-
Total	3	1	57	10	4	1	8	65
Min. Length	12.13	15.39	3.74	7.13	21.10	10.91	16.54	8.98
Max. Length	14.37	15.39	19.72	20.12	27.52	10.91	25.12	20.51
Mean Length	13.43	15.39	15.36	12.41	24.78	10.91	20.62	17.48
Nbr. Measured	3	1	57	10	4	1	8	65
No Lengths for	0	0	0	0	0	0	0	0

LENGTH FREQUENCY DISTRIBUTIONS (*Continued*)

Length Frequency Distribution for SEF (for fish < 36.00 inches) (*Continued*)

Special sampling, electrofishing (8 stations) - Field work conducted between 05/12/2021 and 05/28/2021

LENGTH (inches)	(4) SEF-13	(5) SEF-14				(6) SEF-15		
	WAE	CCF	NOP	SMB	WAE	MUE	NOP	SMB
< 3.00	-	-	-	-	-	-	-	-
3.00 - 3.49	-	-	-	-	-	-	-	2
3.50 - 3.99	-	-	-	-	-	-	-	2
4.00 - 4.49	-	-	-	-	-	-	-	2
4.50 - 4.99	-	-	-	-	-	-	-	1
5.00 - 5.49	1	-	-	-	-	-	-	-
5.50 - 5.99	-	-	-	-	-	-	-	-
6.00 - 6.49	2	-	-	-	-	-	-	-
6.50 - 6.99	1	-	-	-	1	-	-	-
7.00 - 7.49	1	-	-	-	-	-	-	-
7.50 - 7.99	-	1	-	-	-	-	-	-
8.00 - 8.49	-	-	-	-	-	-	-	-
8.50 - 8.99	-	-	-	-	-	-	-	-
9.00 - 9.49	-	-	-	-	-	-	-	-
9.50 - 9.99	2	-	-	-	-	-	-	-
10.00 - 10.49	-	-	-	-	-	-	-	-
10.50 - 10.99	-	-	-	-	-	-	-	-
11.00 - 11.49	-	-	-	-	-	-	-	-
11.50 - 11.99	-	-	-	-	-	-	-	-
12.00 - 12.99	-	-	-	-	-	-	-	-
13.00 - 13.99	4	-	-	1	-	1	1	2
14.00 - 14.99	2	-	-	-	-	-	-	-
15.00 - 15.99	-	-	-	-	-	-	-	1
16.00 - 16.99	2	-	-	2	-	-	-	4
17.00 - 17.99	3	-	-	5	-	-	-	11
18.00 - 18.99	4	-	-	9	-	-	-	4
19.00 - 19.99	-	-	-	4	-	-	2	8
20.00 - 20.99	1	-	-	-	-	-	-	-
21.00 - 21.99	-	-	-	-	-	-	2	-
22.00 - 22.99	2	-	-	-	-	-	-	-
23.00 - 23.99	-	-	1	-	-	-	1	-
24.00 - 24.99	-	-	-	-	-	-	-	-
25.00 - 25.99	-	-	-	-	-	-	1	-
26.00 - 26.99	-	-	-	-	-	-	-	-
27.00 - 27.99	-	-	-	-	-	-	-	-
28.00 - 28.99	-	-	-	-	-	-	-	-
29.00 - 29.99	-	-	-	-	-	-	-	-
30.00 - 30.99	-	-	-	-	-	-	-	-
31.00 - 31.99	-	-	-	-	-	-	-	-
32.00 - 32.99	-	-	-	-	-	-	-	-
33.00 - 33.99	-	-	-	-	-	-	-	-
34.00 - 34.99	-	-	-	-	-	-	-	-
35.00 - 35.99	-	-	-	-	-	-	-	-
= > 36.00	-	-	-	-	-	-	-	-
Total	25	1	1	21	1	1	7	37
Min. Length	5.47	7.52	23.19	13.19	6.61	13.46	13.27	3.35
Max. Length	22.76	7.52	23.19	19.61	6.61	13.46	25.12	19.88
Mean Length	14.48	7.52	23.19	18.01	6.61	13.46	20.60	15.10
Nbr. Measured	25	1	1	21	1	1	7	37
No Lengths for	0	0	0	0	0	0	0	0

LENGTH FREQUENCY DISTRIBUTIONS (*Continued*)

Length Frequency Distribution for SEF (for fish < 36.00 inches) (*Continued*)

Special sampling, electrofishing (8 stations) - Field work conducted between 05/12/2021 and 05/28/2021

LENGTH (inches)	(6) SEF-15	(7) SEF-16						(8) SEF-17
	WAE	BLG	CCF	MUE	NOP	SMB	WAE	BLG
< 3.00	-	-	-	-	-	-	-	-
3.00 - 3.49	-	-	-	-	-	-	-	-
3.50 - 3.99	-	-	-	-	-	1	-	-
4.00 - 4.49	-	-	-	-	-	-	-	-
4.50 - 4.99	-	-	-	-	-	-	-	-
5.00 - 5.49	-	-	-	-	-	-	-	-
5.50 - 5.99	-	-	-	-	-	-	-	2
6.00 - 6.49	-	1	-	-	-	-	-	1
6.50 - 6.99	-	-	-	-	-	-	-	-
7.00 - 7.49	-	-	-	-	-	-	-	-
7.50 - 7.99	-	1	-	-	-	-	-	-
8.00 - 8.49	-	-	-	-	-	-	-	-
8.50 - 8.99	-	-	-	-	-	-	-	-
9.00 - 9.49	-	-	-	-	-	-	-	-
9.50 - 9.99	-	-	-	-	-	-	-	-
10.00 - 10.49	-	-	-	-	-	-	-	-
10.50 - 10.99	-	-	-	-	-	-	-	-
11.00 - 11.49	-	-	-	-	-	-	-	-
11.50 - 11.99	-	-	-	-	-	-	-	-
12.00 - 12.99	-	-	-	-	-	-	3	-
13.00 - 13.99	1	-	-	1	-	-	-	-
14.00 - 14.99	-	-	-	-	-	1	-	-
15.00 - 15.99	-	-	-	-	-	-	-	-
16.00 - 16.99	-	-	-	-	-	5	-	-
17.00 - 17.99	-	-	-	-	-	7	-	-
18.00 - 18.99	-	-	-	-	-	3	1	-
19.00 - 19.99	1	-	-	-	1	4	-	-
20.00 - 20.99	-	-	-	-	1	1	-	-
21.00 - 21.99	-	-	1	-	-	-	-	-
22.00 - 22.99	-	-	-	-	1	-	-	-
23.00 - 23.99	-	-	2	-	-	-	-	-
24.00 - 24.99	-	-	-	-	-	-	-	-
25.00 - 25.99	-	-	-	-	-	-	-	-
26.00 - 26.99	-	-	1	-	1	-	-	-
27.00 - 27.99	-	-	-	-	-	-	-	-
28.00 - 28.99	-	-	1	-	-	-	-	-
29.00 - 29.99	-	-	-	-	-	-	-	-
30.00 - 30.99	-	-	1	-	-	-	-	-
31.00 - 31.99	-	-	-	-	-	-	-	-
32.00 - 32.99	-	-	-	-	-	-	-	-
33.00 - 33.99	-	-	-	-	-	-	-	-
34.00 - 34.99	-	-	-	-	-	-	-	-
35.00 - 35.99	-	-	-	-	-	-	-	-
= > 36.00	-	-	-	-	-	-	-	-
Total	2	2	6	1	4	22	4	3
Min. Length	13.50	6.26	21.54	13.58	19.45	3.86	12.52	5.59
Max. Length	19.21	7.52	30.43	13.58	26.26	20.00	18.27	6.42
Mean Length	16.36	6.89	25.61	13.58	22.37	17.15	14.10	5.89
Nbr. Measured	2	2	6	1	4	22	4	3
No Lengths for	0	0	0	0	0	0	0	0

LENGTH FREQUENCY DISTRIBUTIONS (*Continued*)

Length Frequency Distribution for SEF (for fish < 36.00 inches) (*Continued*)

Special sampling, electrofishing (8 stations) - Field work conducted between 05/12/2021 and 05/28/2021

LENGTH (inches)	(8) SEF-17						SEF TOTAL	
	BNT	LMB	MUE	NOP	SMB	WAE	BLG	BNT
< 3.00	-	-	-	-	-	-	-	-
3.00 - 3.49	-	-	-	-	-	-	-	-
3.50 - 3.99	-	-	-	-	-	-	-	-
4.00 - 4.49	-	-	-	-	1	-	-	-
4.50 - 4.99	-	-	-	-	-	-	-	-
5.00 - 5.49	-	-	-	-	-	-	-	-
5.50 - 5.99	-	-	-	-	-	-	2	-
6.00 - 6.49	-	-	-	-	-	-	2	-
6.50 - 6.99	-	-	-	-	-	-	2	-
7.00 - 7.49	-	-	-	-	1	-	-	-
7.50 - 7.99	-	-	-	-	-	-	1	-
8.00 - 8.49	1	-	-	-	-	-	-	1
8.50 - 8.99	-	-	-	-	-	-	-	-
9.00 - 9.49	-	-	-	-	-	-	-	-
9.50 - 9.99	-	-	-	-	-	-	-	-
10.00 - 10.49	-	-	-	-	-	-	-	-
10.50 - 10.99	-	-	-	-	-	1	-	-
11.00 - 11.49	-	-	-	-	-	-	-	-
11.50 - 11.99	-	-	-	-	1	-	-	-
12.00 - 12.99	-	-	-	-	-	-	-	-
13.00 - 13.99	-	-	-	-	1	-	-	-
14.00 - 14.99	-	-	-	-	1	-	-	-
15.00 - 15.99	-	1	-	-	-	-	-	-
16.00 - 16.99	-	-	-	1	3	-	-	-
17.00 - 17.99	-	-	-	2	2	-	-	-
18.00 - 18.99	-	-	-	-	6	1	-	-
19.00 - 19.99	-	-	-	2	8	-	-	-
20.00 - 20.99	-	-	-	2	-	-	-	-
21.00 - 21.99	-	-	-	1	-	-	-	-
22.00 - 22.99	-	-	-	1	-	-	-	-
23.00 - 23.99	-	-	-	2	-	-	-	-
24.00 - 24.99	-	-	-	1	-	-	-	-
25.00 - 25.99	-	-	-	-	-	1	-	-
26.00 - 26.99	-	-	-	-	-	-	-	-
27.00 - 27.99	-	-	-	-	-	-	-	-
28.00 - 28.99	-	-	-	-	-	-	-	-
29.00 - 29.99	-	-	-	-	-	-	-	-
30.00 - 30.99	-	-	-	-	-	-	-	-
31.00 - 31.99	-	-	-	-	-	-	-	-
32.00 - 32.99	-	-	-	-	-	-	-	-
33.00 - 33.99	-	-	-	-	-	-	-	-
34.00 - 34.99	-	-	-	-	-	-	-	-
35.00 - 35.99	-	-	-	-	-	-	-	-
= > 36.00	-	-	1	-	-	-	-	-
Total	1	1	1	12	24	3	7	1
Min. Length	8.27	15.35	44.88	16.97	4.37	10.75	5.59	8.27
Max. Length	8.27	15.35	44.88	24.80	19.76	25.35	7.52	8.27
Mean Length	8.27	15.35	44.88	20.65	16.79	18.04	6.38	8.27
Nbr. Measured	1	1	1	12	24	3	7	1
No Lengths for	0	0	0	0	0	0	0	0

LENGTH FREQUENCY DISTRIBUTIONS (*Continued*)

Length Frequency Distribution for SEF (for fish < 36.00 inches) (*Continued*)

Special sampling, electrofishing (8 stations) - Field work conducted between 05/12/2021 and 05/28/2021

LENGTH (inches)	SEF TOTAL					
	CCF	LMB	MUE	NOP	SMB	WAE
< 3.00	-	-	-	-	-	-
3.00 - 3.49	-	-	-	-	7	-
3.50 - 3.99	-	-	-	-	14	-
4.00 - 4.49	-	-	-	-	12	-
4.50 - 4.99	-	-	-	-	8	-
5.00 - 5.49	-	-	-	-	6	1
5.50 - 5.99	-	-	-	-	-	1
6.00 - 6.49	-	-	-	-	-	2
6.50 - 6.99	-	-	-	-	1	2
7.00 - 7.49	-	-	-	-	1	2
7.50 - 7.99	1	-	-	-	1	-
8.00 - 8.49	-	-	-	-	2	2
8.50 - 8.99	-	-	-	-	7	1
9.00 - 9.49	-	-	-	-	8	1
9.50 - 9.99	-	-	-	-	3	2
10.00 - 10.49	-	-	-	-	3	-
10.50 - 10.99	-	-	1	-	3	1
11.00 - 11.49	-	-	-	-	-	-
11.50 - 11.99	-	-	1	-	3	-
12.00 - 12.99	-	-	2	-	4	4
13.00 - 13.99	-	-	5	2	7	6
14.00 - 14.99	-	-	1	-	4	2
15.00 - 15.99	-	1	-	3	6	-
16.00 - 16.99	-	-	-	5	28	2
17.00 - 17.99	-	-	-	3	64	4
18.00 - 18.99	-	-	-	1	62	6
19.00 - 19.99	-	-	-	6	43	2
20.00 - 20.99	-	-	-	5	2	2
21.00 - 21.99	2	-	-	4	-	-
22.00 - 22.99	-	-	-	3	-	2
23.00 - 23.99	2	-	-	4	-	-
24.00 - 24.99	-	-	-	3	-	-
25.00 - 25.99	2	-	-	2	-	1
26.00 - 26.99	1	-	-	1	-	-
27.00 - 27.99	1	-	-	-	-	-
28.00 - 28.99	1	-	-	-	-	-
29.00 - 29.99	-	-	-	-	-	-
30.00 - 30.99	1	-	-	-	-	-
31.00 - 31.99	-	-	-	-	-	-
32.00 - 32.99	-	-	-	-	-	-
33.00 - 33.99	-	-	-	-	-	-
34.00 - 34.99	-	-	-	-	-	-
35.00 - 35.99	-	-	-	-	-	-
= > 36.00	-	-	1	-	-	-
Total	11	1	11	42	299	46
Min. Length	7.52	15.35	10.91	13.03	3.19	5.47
Max. Length	30.43	15.35	44.88	26.26	20.51	25.35
Mean Length	23.66	15.35	15.79	20.11	14.69	13.95
Nbr. Measured	11	1	11	42	299	46
No Lengths for	0	0	0	0	0	0

LENGTH FREQUENCY DISTRIBUTIONS (*Continued*)

Length Frequency Distribution for SEF (for fish ≥ 36.00 inches)

Special sampling, electrofishing (8 stations) - Field work conducted between 05/12/2021 and 05/28/2021

LENGTH (inches)	(1) SEF-10			(2) SEF-11				(3) SEF-12
	MUE	NOP	SMB	MUE	NOP	SMB	WAE	BLG
< 36.00	2	1	44	2	8	29	1	2
36.00 - 36.99	-	-	-	-	-	-	-	-
37.00 - 37.99	-	-	-	-	-	-	-	-
38.00 - 38.99	-	-	-	-	-	-	-	-
39.00 - 39.99	-	-	-	-	-	-	-	-
40.00 - 40.99	-	-	-	-	-	-	-	-
41.00 - 41.99	-	-	-	-	-	-	-	-
42.00 - 42.99	-	-	-	-	-	-	-	-
43.00 - 43.99	-	-	-	-	-	-	-	-
44.00 - 44.99	-	-	-	-	-	-	-	-
45.00 - 45.99	-	-	-	-	-	-	-	-
46.00 - 46.99	-	-	-	-	-	-	-	-
47.00 - 47.99	-	-	-	-	-	-	-	-
48.00 - 48.99	-	-	-	-	-	-	-	-
49.00 - 49.99	-	-	-	-	-	-	-	-
50.00 - 50.99	-	-	-	-	-	-	-	-
51.00 - 51.99	-	-	-	-	-	-	-	-
52.00 - 52.99	-	-	-	-	-	-	-	-
53.00 - 53.99	-	-	-	-	-	-	-	-
54.00 - 54.99	-	-	-	-	-	-	-	-
55.00 - 55.99	-	-	-	-	-	-	-	-
56.00 - 56.99	-	-	-	-	-	-	-	-
57.00 - 57.99	-	-	-	-	-	-	-	-
58.00 - 58.99	-	-	-	-	-	-	-	-
59.00 - 59.99	-	-	-	-	-	-	-	-
60.00 - 60.99	-	-	-	-	-	-	-	-
61.00 - 61.99	-	-	-	-	-	-	-	-
62.00 - 62.99	-	-	-	-	-	-	-	-
63.00 - 63.99	-	-	-	-	-	-	-	-
64.00 - 64.99	-	-	-	-	-	-	-	-
65.00 - 65.99	-	-	-	-	-	-	-	-
66.00 - 66.99	-	-	-	-	-	-	-	-
67.00 - 67.99	-	-	-	-	-	-	-	-
68.00 - 68.99	-	-	-	-	-	-	-	-
69.00 - 69.99	-	-	-	-	-	-	-	-
70.00 - 70.99	-	-	-	-	-	-	-	-
71.00 - 71.99	-	-	-	-	-	-	-	-
72.00 - 72.99	-	-	-	-	-	-	-	-
73.00 - 73.99	-	-	-	-	-	-	-	-
74.00 - 74.99	-	-	-	-	-	-	-	-
75.00 - 75.99	-	-	-	-	-	-	-	-
76.00 - 76.99	-	-	-	-	-	-	-	-
77.00 - 77.99	-	-	-	-	-	-	-	-
= > 78.00	-	-	-	-	-	-	-	-
Total	2	1	44	2	8	29	1	2
Min. Length	13.11	13.03	3.19	11.61	15.63	3.82	5.79	6.50
Max. Length	13.39	13.03	10.35	12.44	24.29	19.29	5.79	6.73
Mean Length	13.25	13.03	5.73	12.03	18.35	14.14	5.79	6.61
Nbr. Measured	2	1	44	2	8	29	1	2
No Lengths for	0	0	0	0	0	0	0	0

LENGTH FREQUENCY DISTRIBUTIONS (*Continued*)

Length Frequency Distribution for SEF (for fish ≥ 36.00 inches) (*Continued*)

Special sampling, electrofishing (8 stations) - Field work conducted between 05/12/2021 and 05/28/2021

LENGTH (inches)	(3) SEF-12				(4) SEF-13			
	MUE	NOP	SMB	WAE	CCF	MUE	NOP	SMB
< 36.00	3	1	57	10	4	1	8	65
36.00 - 36.99	-	-	-	-	-	-	-	-
37.00 - 37.99	-	-	-	-	-	-	-	-
38.00 - 38.99	-	-	-	-	-	-	-	-
39.00 - 39.99	-	-	-	-	-	-	-	-
40.00 - 40.99	-	-	-	-	-	-	-	-
41.00 - 41.99	-	-	-	-	-	-	-	-
42.00 - 42.99	-	-	-	-	-	-	-	-
43.00 - 43.99	-	-	-	-	-	-	-	-
44.00 - 44.99	-	-	-	-	-	-	-	-
45.00 - 45.99	-	-	-	-	-	-	-	-
46.00 - 46.99	-	-	-	-	-	-	-	-
47.00 - 47.99	-	-	-	-	-	-	-	-
48.00 - 48.99	-	-	-	-	-	-	-	-
49.00 - 49.99	-	-	-	-	-	-	-	-
50.00 - 50.99	-	-	-	-	-	-	-	-
51.00 - 51.99	-	-	-	-	-	-	-	-
52.00 - 52.99	-	-	-	-	-	-	-	-
53.00 - 53.99	-	-	-	-	-	-	-	-
54.00 - 54.99	-	-	-	-	-	-	-	-
55.00 - 55.99	-	-	-	-	-	-	-	-
56.00 - 56.99	-	-	-	-	-	-	-	-
57.00 - 57.99	-	-	-	-	-	-	-	-
58.00 - 58.99	-	-	-	-	-	-	-	-
59.00 - 59.99	-	-	-	-	-	-	-	-
60.00 - 60.99	-	-	-	-	-	-	-	-
61.00 - 61.99	-	-	-	-	-	-	-	-
62.00 - 62.99	-	-	-	-	-	-	-	-
63.00 - 63.99	-	-	-	-	-	-	-	-
64.00 - 64.99	-	-	-	-	-	-	-	-
65.00 - 65.99	-	-	-	-	-	-	-	-
66.00 - 66.99	-	-	-	-	-	-	-	-
67.00 - 67.99	-	-	-	-	-	-	-	-
68.00 - 68.99	-	-	-	-	-	-	-	-
69.00 - 69.99	-	-	-	-	-	-	-	-
70.00 - 70.99	-	-	-	-	-	-	-	-
71.00 - 71.99	-	-	-	-	-	-	-	-
72.00 - 72.99	-	-	-	-	-	-	-	-
73.00 - 73.99	-	-	-	-	-	-	-	-
74.00 - 74.99	-	-	-	-	-	-	-	-
75.00 - 75.99	-	-	-	-	-	-	-	-
76.00 - 76.99	-	-	-	-	-	-	-	-
77.00 - 77.99	-	-	-	-	-	-	-	-
= > 78.00	-	-	-	-	-	-	-	-
Total	3	1	57	10	4	1	8	65
Min. Length	12.13	15.39	3.74	7.13	21.10	10.91	16.54	8.98
Max. Length	14.37	15.39	19.72	20.12	27.52	10.91	25.12	20.51
Mean Length	13.43	15.39	15.36	12.41	24.78	10.91	20.62	17.48
Nbr. Measured	3	1	57	10	4	1	8	65
No Lengths for	0	0	0	0	0	0	0	0

LENGTH FREQUENCY DISTRIBUTIONS (*Continued*)

Length Frequency Distribution for SEF (for fish > 36.00 inches) (*Continued*)

Special sampling, electrofishing (8 stations) - Field work conducted between 05/12/2021 and 05/28/2021

LENGTH (inches)	(4) SEF-13	(5) SEF-14				(6) SEF-15		
	WAE	CCF	NOP	SMB	WAE	MUE	NOP	SMB
< 36.00	25	1	1	21	1	1	7	37
36.00 - 36.99	-	-	-	-	-	-	-	-
37.00 - 37.99	-	-	-	-	-	-	-	-
38.00 - 38.99	-	-	-	-	-	-	-	-
39.00 - 39.99	-	-	-	-	-	-	-	-
40.00 - 40.99	-	-	-	-	-	-	-	-
41.00 - 41.99	-	-	-	-	-	-	-	-
42.00 - 42.99	-	-	-	-	-	-	-	-
43.00 - 43.99	-	-	-	-	-	-	-	-
44.00 - 44.99	-	-	-	-	-	-	-	-
45.00 - 45.99	-	-	-	-	-	-	-	-
46.00 - 46.99	-	-	-	-	-	-	-	-
47.00 - 47.99	-	-	-	-	-	-	-	-
48.00 - 48.99	-	-	-	-	-	-	-	-
49.00 - 49.99	-	-	-	-	-	-	-	-
50.00 - 50.99	-	-	-	-	-	-	-	-
51.00 - 51.99	-	-	-	-	-	-	-	-
52.00 - 52.99	-	-	-	-	-	-	-	-
53.00 - 53.99	-	-	-	-	-	-	-	-
54.00 - 54.99	-	-	-	-	-	-	-	-
55.00 - 55.99	-	-	-	-	-	-	-	-
56.00 - 56.99	-	-	-	-	-	-	-	-
57.00 - 57.99	-	-	-	-	-	-	-	-
58.00 - 58.99	-	-	-	-	-	-	-	-
59.00 - 59.99	-	-	-	-	-	-	-	-
60.00 - 60.99	-	-	-	-	-	-	-	-
61.00 - 61.99	-	-	-	-	-	-	-	-
62.00 - 62.99	-	-	-	-	-	-	-	-
63.00 - 63.99	-	-	-	-	-	-	-	-
64.00 - 64.99	-	-	-	-	-	-	-	-
65.00 - 65.99	-	-	-	-	-	-	-	-
66.00 - 66.99	-	-	-	-	-	-	-	-
67.00 - 67.99	-	-	-	-	-	-	-	-
68.00 - 68.99	-	-	-	-	-	-	-	-
69.00 - 69.99	-	-	-	-	-	-	-	-
70.00 - 70.99	-	-	-	-	-	-	-	-
71.00 - 71.99	-	-	-	-	-	-	-	-
72.00 - 72.99	-	-	-	-	-	-	-	-
73.00 - 73.99	-	-	-	-	-	-	-	-
74.00 - 74.99	-	-	-	-	-	-	-	-
75.00 - 75.99	-	-	-	-	-	-	-	-
76.00 - 76.99	-	-	-	-	-	-	-	-
77.00 - 77.99	-	-	-	-	-	-	-	-
= > 78.00	-	-	-	-	-	-	-	-
Total	25	1	1	21	1	1	7	37
Min. Length	5.47	7.52	23.19	13.19	6.61	13.46	13.27	3.35
Max. Length	22.76	7.52	23.19	19.61	6.61	13.46	25.12	19.88
Mean Length	14.48	7.52	23.19	18.01	6.61	13.46	20.60	15.10
Nbr. Measured	25	1	1	21	1	1	7	37
No Lengths for	0	0	0	0	0	0	0	0

LENGTH FREQUENCY DISTRIBUTIONS (*Continued*)

Length Frequency Distribution for SEF (for fish > 36.00 inches) (*Continued*)

Special sampling, electrofishing (8 stations) - Field work conducted between 05/12/2021 and 05/28/2021

LENGTH (inches)	(6) SEF-15	(7) SEF-16						(8) SEF-17
	WAE	BLG	CCF	MUE	NOP	SMB	WAE	BLG
< 36.00	2	2	6	1	4	22	4	3
36.00 - 36.99	-	-	-	-	-	-	-	-
37.00 - 37.99	-	-	-	-	-	-	-	-
38.00 - 38.99	-	-	-	-	-	-	-	-
39.00 - 39.99	-	-	-	-	-	-	-	-
40.00 - 40.99	-	-	-	-	-	-	-	-
41.00 - 41.99	-	-	-	-	-	-	-	-
42.00 - 42.99	-	-	-	-	-	-	-	-
43.00 - 43.99	-	-	-	-	-	-	-	-
44.00 - 44.99	-	-	-	-	-	-	-	-
45.00 - 45.99	-	-	-	-	-	-	-	-
46.00 - 46.99	-	-	-	-	-	-	-	-
47.00 - 47.99	-	-	-	-	-	-	-	-
48.00 - 48.99	-	-	-	-	-	-	-	-
49.00 - 49.99	-	-	-	-	-	-	-	-
50.00 - 50.99	-	-	-	-	-	-	-	-
51.00 - 51.99	-	-	-	-	-	-	-	-
52.00 - 52.99	-	-	-	-	-	-	-	-
53.00 - 53.99	-	-	-	-	-	-	-	-
54.00 - 54.99	-	-	-	-	-	-	-	-
55.00 - 55.99	-	-	-	-	-	-	-	-
56.00 - 56.99	-	-	-	-	-	-	-	-
57.00 - 57.99	-	-	-	-	-	-	-	-
58.00 - 58.99	-	-	-	-	-	-	-	-
59.00 - 59.99	-	-	-	-	-	-	-	-
60.00 - 60.99	-	-	-	-	-	-	-	-
61.00 - 61.99	-	-	-	-	-	-	-	-
62.00 - 62.99	-	-	-	-	-	-	-	-
63.00 - 63.99	-	-	-	-	-	-	-	-
64.00 - 64.99	-	-	-	-	-	-	-	-
65.00 - 65.99	-	-	-	-	-	-	-	-
66.00 - 66.99	-	-	-	-	-	-	-	-
67.00 - 67.99	-	-	-	-	-	-	-	-
68.00 - 68.99	-	-	-	-	-	-	-	-
69.00 - 69.99	-	-	-	-	-	-	-	-
70.00 - 70.99	-	-	-	-	-	-	-	-
71.00 - 71.99	-	-	-	-	-	-	-	-
72.00 - 72.99	-	-	-	-	-	-	-	-
73.00 - 73.99	-	-	-	-	-	-	-	-
74.00 - 74.99	-	-	-	-	-	-	-	-
75.00 - 75.99	-	-	-	-	-	-	-	-
76.00 - 76.99	-	-	-	-	-	-	-	-
77.00 - 77.99	-	-	-	-	-	-	-	-
= > 78.00	-	-	-	-	-	-	-	-
Total	2	2	6	1	4	22	4	3
Min. Length	13.50	6.26	21.54	13.58	19.45	3.86	12.52	5.59
Max. Length	19.21	7.52	30.43	13.58	26.26	20.00	18.27	6.42
Mean Length	16.36	6.89	25.61	13.58	22.37	17.15	14.10	5.89
Nbr. Measured	2	2	6	1	4	22	4	3
No Lengths for	0	0	0	0	0	0	0	0

LENGTH FREQUENCY DISTRIBUTIONS (*Continued*)

Length Frequency Distribution for SEF (for fish > 36.00 inches) (*Continued*)

Special sampling, electrofishing (8 stations) - Field work conducted between 05/12/2021 and 05/28/2021

LENGTH (inches)	(8) SEF-17						SEF TOTAL	
	BNT	LMB	MUE	NOP	SMB	WAE	BLG	BNT
< 36.00	1	1	-	12	24	3	7	1
36.00 - 36.99	-	-	-	-	-	-	-	-
37.00 - 37.99	-	-	-	-	-	-	-	-
38.00 - 38.99	-	-	-	-	-	-	-	-
39.00 - 39.99	-	-	-	-	-	-	-	-
40.00 - 40.99	-	-	-	-	-	-	-	-
41.00 - 41.99	-	-	-	-	-	-	-	-
42.00 - 42.99	-	-	-	-	-	-	-	-
43.00 - 43.99	-	-	-	-	-	-	-	-
44.00 - 44.99	-	-	1	-	-	-	-	-
45.00 - 45.99	-	-	-	-	-	-	-	-
46.00 - 46.99	-	-	-	-	-	-	-	-
47.00 - 47.99	-	-	-	-	-	-	-	-
48.00 - 48.99	-	-	-	-	-	-	-	-
49.00 - 49.99	-	-	-	-	-	-	-	-
50.00 - 50.99	-	-	-	-	-	-	-	-
51.00 - 51.99	-	-	-	-	-	-	-	-
52.00 - 52.99	-	-	-	-	-	-	-	-
53.00 - 53.99	-	-	-	-	-	-	-	-
54.00 - 54.99	-	-	-	-	-	-	-	-
55.00 - 55.99	-	-	-	-	-	-	-	-
56.00 - 56.99	-	-	-	-	-	-	-	-
57.00 - 57.99	-	-	-	-	-	-	-	-
58.00 - 58.99	-	-	-	-	-	-	-	-
59.00 - 59.99	-	-	-	-	-	-	-	-
60.00 - 60.99	-	-	-	-	-	-	-	-
61.00 - 61.99	-	-	-	-	-	-	-	-
62.00 - 62.99	-	-	-	-	-	-	-	-
63.00 - 63.99	-	-	-	-	-	-	-	-
64.00 - 64.99	-	-	-	-	-	-	-	-
65.00 - 65.99	-	-	-	-	-	-	-	-
66.00 - 66.99	-	-	-	-	-	-	-	-
67.00 - 67.99	-	-	-	-	-	-	-	-
68.00 - 68.99	-	-	-	-	-	-	-	-
69.00 - 69.99	-	-	-	-	-	-	-	-
70.00 - 70.99	-	-	-	-	-	-	-	-
71.00 - 71.99	-	-	-	-	-	-	-	-
72.00 - 72.99	-	-	-	-	-	-	-	-
73.00 - 73.99	-	-	-	-	-	-	-	-
74.00 - 74.99	-	-	-	-	-	-	-	-
75.00 - 75.99	-	-	-	-	-	-	-	-
76.00 - 76.99	-	-	-	-	-	-	-	-
77.00 - 77.99	-	-	-	-	-	-	-	-
= > 78.00	-	-	-	-	-	-	-	-
Total	1	1	1	12	24	3	7	1
Min. Length	8.27	15.35	44.88	16.97	4.37	10.75	5.59	8.27
Max. Length	8.27	15.35	44.88	24.80	19.76	25.35	7.52	8.27
Mean Length	8.27	15.35	44.88	20.65	16.79	18.04	6.38	8.27
Nbr. Measured	1	1	1	12	24	3	7	1
No Lengths for	0	0	0	0	0	0	0	0

LENGTH FREQUENCY DISTRIBUTIONS (*Continued*)

Length Frequency Distribution for SEF (for fish > 36.00 inches) (*Continued*)

Special sampling, electrofishing (8 stations) - Field work conducted between 05/12/2021 and 05/28/2021

LENGTH (inches)	SEF TOTAL					
	CCF	LMB	MUE	NOP	SMB	WAE
< 36.00	11	1	10	42	299	46
36.00 - 36.99	-	-	-	-	-	-
37.00 - 37.99	-	-	-	-	-	-
38.00 - 38.99	-	-	-	-	-	-
39.00 - 39.99	-	-	-	-	-	-
40.00 - 40.99	-	-	-	-	-	-
41.00 - 41.99	-	-	-	-	-	-
42.00 - 42.99	-	-	-	-	-	-
43.00 - 43.99	-	-	-	-	-	-
44.00 - 44.99	-	-	1	-	-	-
45.00 - 45.99	-	-	-	-	-	-
46.00 - 46.99	-	-	-	-	-	-
47.00 - 47.99	-	-	-	-	-	-
48.00 - 48.99	-	-	-	-	-	-
49.00 - 49.99	-	-	-	-	-	-
50.00 - 50.99	-	-	-	-	-	-
51.00 - 51.99	-	-	-	-	-	-
52.00 - 52.99	-	-	-	-	-	-
53.00 - 53.99	-	-	-	-	-	-
54.00 - 54.99	-	-	-	-	-	-
55.00 - 55.99	-	-	-	-	-	-
56.00 - 56.99	-	-	-	-	-	-
57.00 - 57.99	-	-	-	-	-	-
58.00 - 58.99	-	-	-	-	-	-
59.00 - 59.99	-	-	-	-	-	-
60.00 - 60.99	-	-	-	-	-	-
61.00 - 61.99	-	-	-	-	-	-
62.00 - 62.99	-	-	-	-	-	-
63.00 - 63.99	-	-	-	-	-	-
64.00 - 64.99	-	-	-	-	-	-
65.00 - 65.99	-	-	-	-	-	-
66.00 - 66.99	-	-	-	-	-	-
67.00 - 67.99	-	-	-	-	-	-
68.00 - 68.99	-	-	-	-	-	-
69.00 - 69.99	-	-	-	-	-	-
70.00 - 70.99	-	-	-	-	-	-
71.00 - 71.99	-	-	-	-	-	-
72.00 - 72.99	-	-	-	-	-	-
73.00 - 73.99	-	-	-	-	-	-
74.00 - 74.99	-	-	-	-	-	-
75.00 - 75.99	-	-	-	-	-	-
76.00 - 76.99	-	-	-	-	-	-
77.00 - 77.99	-	-	-	-	-	-
= > 78.00	-	-	-	-	-	-
Total	11	1	11	42	299	46
Min. Length	7.52	15.35	10.91	13.03	3.19	5.47
Max. Length	30.43	15.35	44.88	26.26	20.51	25.35
Mean Length	23.66	15.35	15.79	20.11	14.69	13.95
Nbr. Measured	11	1	11	42	299	46
No Lengths for	0	0	0	0	0	0

Note: Unless all fish were measured in the catch, totals shown for some length frequency distributions may differ from the total number of fish in the catch, due to rounding of fractions used in the estimation of length frequency from a subsample of measured fish.

Fish Species Key: BLG = Bluegill, MUE = Muskellunge, NOP = Northern Pike, SMB = Smallmouth Bass, WAE = Walleye, CCF = Channel Catfish, BNT = Brown Trout, LMB = Largemouth Bass.

NARRATIVES

STATUS OF FISHERY AND FIELD NOTES

Revision: 20181210

Field Notes - Status Narrative

1-1;Proposed;fishcrew;05/12/2021 02:28 PM;(DOWNLOAD SYNCH)
1-1;Proposed;Fishcrew;05/13/2021 03:28 PM;(BACKUP SYNCH)
1-1;Proposed;fishcrew;05/14/2021 02:06 PM;(BACKUP SYNCH)
1-1;Proposed;fishcrew;05/17/2021 02:47 PM;(BACKUP SYNCH)
1-1;Proposed;fishcrew;05/20/2021 03:03 PM;(UPLOAD SYNCH)
1-1;Proposed;Fishcrew;05/28/2021 12:01 PM;(DOWNLOAD SYNCH)
1-1;Proposed;Fishcrew;05/28/2021 12:18 PM;(BACKUP SYNCH)
1-1;Proposed;Fishcrew;05/28/2021 12:19 PM;(UPLOAD SYNCH)
Area Signed by user 'eraltena' on 04/04/2022Region Signed by user 'Nevander' on 05/04/2022

Field Notes - General Field

Boat electrofishing was challenging at most stations due to extremely low water levels. SEF17 below Brainerd Dam was difficult to sample and typical habitats where Smallmouth were targetted in past assessments were not navigable. SEF12 in the islands area along Camp Ripley was also difficult to navigate. Catch rates were below normal at these sites as a result. Muskie catches were higher than normal. Several yearling MUE were captured and PIT Tags were applied. This supported capture of many YMUE during a YSMB assessment in late summer 2020.

Discussion

The Mississippi River from Little Falls, MN to Brainerd, MN covers approximately 40.0 miles and is entirely within the Mississippi River-Brainerd major watershed. The river in this section is also highly influenced by seven other major upstream watersheds. Little Falls Dam is a hydroelectric power generating facility owned by Allete Corporation and is located at the downstream boundary of this river section in downtown Little Falls. Brainerd Dam at the upstream end of the study area is a hydroelectric power generating facility owned by the City of Brainerd, MN. In general, this section of the river contains pool, riffle and run type habitat with coarse substrate types from Brainerd Dam downstream to near the reservoir in Little Falls where sand substrates begin to dominate. Stream banks are fairly steep along this stretch and adjacent lands have predominately sandy-loam soils. This section of the Mississippi River is fairly remote and has limited accessibility due to the presence of many shallow riffle/rapid areas. On the west bank, development is moderate from Little Falls upstream to Camp Ripley Military Reservation. Little development exists for 19 miles along Camp Ripley. From the confluence with the Crow Wing River upstream to Brainerd, residential development increases. On the east bank, residential development is moderate from Little Falls north to near Highway 115. From Hwy 115 upstream to Brainerd, residential development is light. Development is high within Brainerd city limits. Five miles of undeveloped east bank exists within the boundaries of Crow Wing State Park. Scenic quality is very high on this stretch of the river. Cover types along this stretch of the river are primarily upland and bottomland forest types. Bottomland forest consists of ash and silver maple while upland forest is primarily red and bur oak, aspen and white pine.

Major tributaries entering the Mississippi River in this stretch include the Little Elk River from the west immediately upstream of Little Falls, MN and Fletcher Creek from the east near Camp Ripley Junction. The Nokasippi River also enters from the east near Fort Ripley, MN, and the Crow Wing River enters from the west near river mile 992. The Little Elk River drains a mix of forestland, cultivated cropland and pastureland. Fletcher Creek drains mainly irrigated croplands and pasturelands while all other tributaries drain predominately forested lands.

Eight daytime electrofishing stations (SEF10-SEF17) were established in known Smallmouth Bass spawning areas in 1994. These stations have been replicated in assessments completed from 1994 through 1998, and odd years from 2001 through 2009. After 2009 spring assessments were scheduled every four years and were replicated in 2013, 2017 and 2021. Timing of electrofishing corresponded with Smallmouth Bass spawning, specifically when the river approached 60o F. Stations were established in tailwater, island and backwater areas where Smallmouths commonly spawn. A Smith-Root GPP 5.0 boom shocker boat rigged with two spider array anodes was used to sample fish. The Smith-Root electrofishing unit replaced the Coffelt VVP2E unit in the 2013 assessment and appeared to be more efficient. An attempt was made to capture all gamefish encountered. Gamefish captured were identified, enumerated and measured, prior to release. No aging structures were taken on gamefish during the 2021 assessment.

STATUS OF FISHERY AND FIELD NOTES (*Continued*)

Discussion (*Continued*)

Spring boat electrofishing occurred May 12-14, and May 28. Mississippi River discharge was exceptionally low during sampling and had an impact on gamefish catches. Some stations were very difficult to sample while catch rates were very high at other stations. Station SEF17 located in the Brainerd Dam tailwater was very difficult to sample. This station typically has very high catch rates for Smallmouth Bass and other Centrarchids but had comparatively low catch rates in this survey. Smallmouth Bass typically utilize tailwater current breaks and downstream island areas for spawning. Low water made it difficult to navigate the electrofishing boat into these areas. Other sampling stations (SEF11 through SEF15) that still had current breaks had very high catch rates of gamefish as fish seemed to be concentrated and confined in small areas and vulnerable to electrofishing gear. Catch rates were also higher in Station SEF10 above the Little Falls Dam compared to prior assessments. Station SEF12 sampling was delayed due to low water, but then completed on May 28 with even lower flows, in order to complete the survey.

A total of seven different gamefish species were sampled in 4.64 hours of electrofishing effort at eight stations combined during the 2021 assessment. Species captured included Bluegill, Channel Catfish, Largemouth Bass, Muskellunge, Northern Pike, Smallmouth Bass, and Walleye.

Smallmouth Bass were the targeted species and were the most abundant species in the catch. A total of 299 Smallmouth were sampled in 2021 for a CPUE of 64.4/hour which was the second highest catch rate observed for this species. The historical mean catch rate for Smallmouth Bass was 41.3/hour on this stretch of the river. Low discharge during the survey reduced catch rates at some stations as many typical sampling areas were not navigable. Catch rates in prior assessments from 1994 through 2017 ranged from 19.10/hour (n=68) in 2001 to 78.6/hour (n=336) in 2017. Mean total length of Smallmouth Bass captured in the 2021 assessment was 14.7 inches and individuals ranged from 3.2 to 20.5 inches. The PSD-M value calculated in 2021 was 69.3 and was high when compared to previous assessments. Calculated PSD-M values for Smallmouth Bass have ranged from 18.9 in 1994 to 76.3 in 1998 (mean 53.3) on this section of the Mississippi River. PSD-M values may be biased high due to sampling during spawning season where mature fish dominate the catch. Trophy sized Smallmouth greater than 20 inches were present but made up a small proportion of the catch (PSD-T=0.8). PSD-T values have historically been low on this stretch of the river ranging from 0.0 in 1994 through 1997, to 4.4 in 2001. The proportion of fish exceeding 18 and 19 inches can be significant. RSD-18 and RSD-19 values calculated in 2021 were 42.6 and 17.9 respectively. RSD-18 values in previous assessments have ranged from 3.6 in 1994 to 45.6 in 1998 and 2001 (mean=29.0), while RSD-19 values have ranged from 1.0 in 1995 to 26.5 in 2001 (mean=11.6).

Catch of yearling Smallmouth Bass was much higher than normal in the 2021 spring gamefish assessment suggesting a large 2020 year class was produced. In prior spring assessments on this stretch of the Mississippi River, yearling bass made up a relatively small proportion of the catch. A total of 47 yearling Smallmouth were sampled in 2021 which comprised 15.7% of the catch. Large year classes of Smallmouth bass have been associated with drought conditions and corresponding low, stable summer flows on the Mississippi River. These types of conditions were persistent during the spring and summer of 2020. To document year class strength, late summer sampling occurred at ten 10-minute electrofishing stations covering a variety of habitat types in 2020. Electrofishing efforts captured 996 young of year Smallmouth Bass (YSMB). Catch rates were high at all stations sampled and ranged from 408/hour to 804/hour. Total catch rate at all stations combined was 596.4/hour. Similar YSMB sampling was completed in 2021 (see separate survey). While low flow conditions made replicating stations impossible, sampling occurred at or near 2020 stations. Total catch rates were also high in 2021 and exceeded those observed in 2020. Drought conditions persisted throughout the spring and summer in 2021 again creating conditions favorable for Smallmouth Bass spawning success and fry survival.

Aging structures were not taken from Smallmouth Bass during the 2021 assessment as otolith ages were determined in 2017. The 2017 aging data showed that Smallmouth Bass typically exceeded quality and preferred size (11 inches and 14 inches) in their third and fourth years and attained memorable size (17 inches) in their sixth year. Trophy individuals exceeding 20 inches were typically older than age 12. Length at annulus formation was similar to that seen on other sections of the Mississippi River and growth is normal to fast when compared to other Midwest Smallmouth Bass populations. The von Bertalanffy length at infinity (L?) value for Smallmouth Bass on this stretch of the Mississippi River was found to be 502.2 mm.

A total of 42 Walleye were captured during the 2021 assessment for a catch rate of 9.9/hour which was the second highest catch rate recorded on this stretch of the Mississippi River and was well above the long term mean (5.3/hour). CPUE from previous surveys ranged from 1.4/hour in 1997 to 17.9/hour in 2017. Walleye caught during the 2021 assessment ranged from 5.5 to 25.4 inches in total length and averaged 14.0 inches. Aging data analyzed from prior assessments determined growth was normal for all ages when compared to area means.

STATUS OF FISHERY AND FIELD NOTES (*Continued*)

Discussion (*Continued*)

The Northern Pike catch rate (9.1/hour) in 2021 was at the higher end of the range observed in previous assessments. Catch rates have ranged from 1.1/hour in 1994 to 14.5/hour in 1997, and averaged 5.8/hour. Forty-two Northern Pike ranging from 13.0 to 26.3 inches were captured during the 2021 survey. Growth rates for Northern Pike observed in prior assessments appeared to be in the normal range when compared to area means.

The Bluegill catch rate (CPUE=1.5/hour, n=7) in 2021 was low but within the range (0/hour to 6.3/hour, mean=2.1/hour) observed in previous assessments. Bluegill captured ranged from 5.6 to 7.5 inches and averaged 6.4 inches in total length. One Largemouth Bass, 15.4 inches, was sampled during the 2021 assessment. Largemouth Bass are infrequently caught in the Mississippi River and are probably immigrants from connected lakes or upstream reservoirs. Habitat in the river is not well suited to this species. Bluegill and Largemouth Bass are commonly sampled below Brainerd Dam and probably come from Rice Lake Reservoir above the dam.

The catch rate of Muskellunge was 2.4/hour and was the highest ever recorded on this section of the Mississippi River. All Muskellunge sampled were yearlings ranging from 10.5 to 15.0 inches with the exception of one 44.0 inch adult. A strong year class of Muskellunge appeared to be produced in 2020. A late summer young of year Smallmouth Bass assessment conducted at the end of August also captured a high number of young of year Muskellunge. Discharge patterns in 2020 were above normal spring flows which declined steadily in April and May to below normal through summer before returning to normal in fall. This discharge pattern must have been favorable for Muskellunge spawning and subsequent young of year hatching and survival.

Channel Catfish were captured for the first time in a spring gamefish assessment in 2017 on this section of the Mississippi River although they had been seen during other types of sampling. In 2021, eleven Channel Catfish ranging from 7.5 to 30.4 inches were sampled for a catch rate of 2.4 fish/hour. Four fish were captured for a catch rate of 0.9 fish/hour in 2017.

Status Of The Fishery

The Mississippi River from Little Falls, MN to Brainerd, MN covers approximately 40.0 miles and is entirely within the Mississippi River-Brainerd major watershed. The river in this section is also highly influenced by seven other major upstream watersheds. his section of the river contains pool, riffle and run type habitat with coarse substrate types from Brainerd Dam downstream to near the reservoir in Little Falls where sand substrates begin to dominate. Stream banks are fairly steep along this stretch and adjacent lands have predominately sandy-loam soils. This section of the Mississippi River is fairly remote and has limited accessibility due to the presence of many shallow riffle/rapid areas. Scenic quality is very high on this stretch of the river. Cover types along this stretch of the river are primarily upland and bottomland forest types. Bottomland forest consists of ash and silver maple while upland forest is primarily red and bur oak, aspen and white pine.

Major tributaries entering the Mississippi River in this stretch include the Little Elk River from the west immediately upstream of Little Falls, MN and Fletcher Creek from the east near Camp Ripley Junction. The Nokasippi River also enters from the east near Fort Ripley, MN, and the Crow Wing River enters from the west near river mile 992. The Little Elk River drains a mix of forestland, cultivated cropland and pastureland. Fletcher Creek drains mainly irrigated croplands and pasturelands while all other tributaries drain predominately forested lands.

Eight daytime electrofishing stations (SEF10-SEF17) were established in known Smallmouth Bass spawning areas in 1994. These stations have been replicated in 13 previous assessments. This assessment occurred May 12-14, and 28 and timing of electrofishing corresponded with Smallmouth Bass spawning, specifically when the river approached 60o F. Stations were established in tailwater, island and backwater areas where Smallmouths commonly spawn. An attempt was made to capture all gamefish encountered. Gamefish captured were identified, enumerated and measured, prior to release. No aging structures were taken on gamefish during the 2021 assessment.

Mississippi River discharge was exceptionally low during sampling and had an impact on gamefish catches. Some stations were very difficult to sample while catch rates were very high at other stations. Smallmouth Bass typically utilize tailwater current breaks and downstream island areas for spawning. Low water made it difficult to navigate the electrofishing boat into these areas. Other sampling stations that still had current breaks had very high catch rates of gamefish as fish seemed to be concentrated and confined in small areas and vulnerable to electrofishing gear.

STATUS OF FISHERY AND FIELD NOTES (*Continued*)

Status Of The Fishery (*Continued*)

A total of seven different gamefish species were sampled in 4.64 hours of electrofishing effort at eight stations combined during the 2021 assessment. Species captured included Bluegill, Channel Catfish, Largemouth Bass, Muskellunge, Northern Pike, Smallmouth Bass, and Walleye. Smallmouth Bass were the targeted species and were the most abundant species in the catch. A total of 299 Smallmouth were sampled in 2021 for a CPUE of 64.4/hour which was the second highest catch rate observed for this species and was well above the historical mean catch rate (41.3/hour) on this stretch of the river. Mean total length of Smallmouth Bass captured in the 2021 assessment was 14.7 inches and individuals ranged from 3.2 to 20.5 inches. Trophy sized Smallmouth greater than 20 inches were present but made up a small proportion of the catch. Bass 20 inches and larger in the catch have historically been low on this stretch of the river ranging from 0.0 in 1994 through 1997, to 4.4 in 2001. The proportion of fish exceeding 18 and 19 inches can be significant and were quite high in this assessment.

Catch of yearling Smallmouth Bass was much higher than normal in the 2021 spring gamefish assessment suggesting a large 2020 year class was produced. Large year classes of Smallmouth bass have been associated with drought conditions and corresponding low, stable summer flows on the Mississippi River. These types of conditions were persistent during the spring and summer of 2020 and 2021 and late summer sampling documented strong year classes in both years. These two year classes should provide excellent angling for years to come.

Smallmouth Bass grow fast with fish attaining 17 inches in their sixth year. Trophy individuals exceeding 20 inches were typically older than age 12. Although Smallmouth Bass will exceed 20 inches on this stretch of the Mississippi River, most bass will max out in the 19.0 to 20.0 inch range. When compared to Smallmouth on other sections of the river, bass on this stretch are heavier at a given length.

A total of 42 Walleye were captured during the 2021 assessment for a catch rate of 9.9/hour which was the second highest catch rate recorded on this stretch of the Mississippi River and was well above the long term mean (5.3/hour). CPUE from previous surveys ranged from 1.4/hour in 1997 to 17.9/hour in 2017. Walleye caught during the 2021 assessment ranged from 5.5 to 25.4 inches in total length and averaged 14.0 inches. Aging data analyzed from prior assessments determined growth was normal for all ages when compared to area means.

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ATTACHMENTS

SURVEY ATTACHMENTS

Revision: 20180411

Note: The following attachment was excluded from this report:

(1) Miss_R_LF_Brd_Report_2021.pdf

APPROVAL DATES AND NOTICES

Approval Dates:

Date Approved by Little Falls Area Fisheries Supervisor:	April 4, 2022
Date Approved by Central Region Fisheries Manager:	May 4, 2022

Approval Notices:

Survey Life Status:	Region Signed

(Stream Survey Report revision 20190402, Waterbody ID 6000040, Survey ID 17692113240558000)

INDEX

(End of report. Report sections are listed in all capital letters. Sub-component reports are listed in blue font with an asterisk, and can be viewed separately.)

DEPARTMENT OF NATURAL RESOURCES

FISHERIES MANAGEMENT
STREAM SURVEY REPORT

Revision: 20190402
DNR Reporting Service folder: Fisheries > Survey > Stream

Survey ID: 16132016933262000
Data Date: 06/10/2022 at 7:34 am

STREAM NAME: Mississippi River | **SURVEY TYPE: Targeted Survey**
KITTLE ID NUMBER: M | **SURVEY ID DATE: 05/26/2020**

MANAGED STREAM SEGMENT: Mississippi R - St. Cloud Dam to Brainerd Dam

STREAM SURVEY COMPONENTS

Revision: 20180206

Component Type	Component Class	Sampling Station Code - Type
Fish Community Sampling	Electrofishing	SEF - Special sampling, electrofishing

STREAM LOCATION

Counties: Benton, Cass, Crow Wing, Morrison, Sherburne, Stearns
Primary County (*Mouth*): Morrison
Location of Source: T144, R36W, S35 (UTM 332901.70, 5234171.50)
Sequence of Waterways: Mississippi River (M)

AREA FISHERIES OFFICE

Area Name: Little Falls
ORG Code: F312
Region Name: Central
Region Number: 3

WATERSHED CHARACTERISTICS

Major Watershed	Minor Watershed

Drainage Basin: Upper Mississippi River (M)

Note: Land cover type and acreage data are not on file.

STREAM CHARACTERISTICS (*Entire Stream*)

Stream Length (*miles*): 77.26
Designated Trout Stream? No

PORTION OF STREAM SURVEYED

Downstream River Mile: (*Data not on file*)
Upstream River Mile: (*Data not on file*)
Total Length Surveyed (*miles*): (*Data not on file*)
Number of Sampling Stations: (*Data not on file*)
Total Length of Sampling Stations (*feet*): 16,950

STREAM SURVEY HISTORY*

Revision: 20180212

Survey Type	Survey ID Dates
Targeted Survey	05/31/2022 (*Proposed*), 08/31/2021, 05/12/2021, 08/31/2020, 08/26/2020, **05/26/2020**, 05/23/2019, 05/22/2018, 05/15/2017, 06/15/2016, 05/09/2016, 05/12/2015

*** Note:** Only surveys recorded in the SURVEY@STURGEON database are displayed.

FISH SAMPLING

CATCH SUMMARY

Revision: 20181102

Sampling Station Type: SEF - Special sampling, electrofishing

Station Attributes	(1) SEF-8	(2) SEF-9
	Run 1	Run 1
Sampling Station	SEF-8	SEF-9
Start Date - Time	05/26/2020 - 11:55 hrs.	05/26/2020 - 09:40 hrs.
End Date - Time	05/26/2020 - 13:20 hrs.	05/26/2020 - 10:20 hrs.
Downstream River Mile	(N/A)	(N/A)
Upstream River Mile	(N/A)	(N/A)
Station Length (ft)	9,300	7,650
Surveyed Length (ft)	(N/A)	(N/A)
Targeted Species	(N/A)	(N/A)
Includes Unmeasured Data	No	No
Daylight Sampling	Yes	Yes
Gear Type	Smith-Root GPP 5.0	Smith-Root GPP 5.0
Unit Amperage	(N/A)	(N/A)
Unit Voltage	(N/A)	(N/A)
Unit Pulses (per second)	60	60
Water Clarity (ft)	(N/A)	(N/A)
Flow Volume (cfs)	4,640.00	4,640.00
Number of Netters	1	1
Sampling Effort (seconds)	2,409	2,173

Catch Summary	Number	Weight (lbs)	Number	Weight (lbs)
BLC - Black Crappie	1	0.15		
BLG - Bluegill	1	0.19		
CCF - Channel Catfish	16	74.38	13	41.56
NOP - Northern Pike	2	3.67	8	12.81
SMB - Smallmouth Bass	94	150.56	50	85.29
WAE - Walleye	3	1.85	9	7.78
YEP - Yellow Perch	1	0.13		

CATCH PER UNIT EFFORT

Revision: 20190401

Special sampling, electrofishing (SEF)		Summary By Numbers				Summary By Weight (lbs)	
		Total	Number per Hour		Number	Total	Mean
Run Nbr	Species	Number	Run-Time	On-Time	per Mile	Weight	Weight
Sampling Station: (1) SEF-8							
Run 1	BLC - Black Crappie	1	0.71	1.49	-	0.15	0.15
	BLG - Bluegill	1	0.71	1.49	-	0.19	0.19
	CCF - Channel Catfish	16	11.29	23.91	-	74.38	4.65
	NOP - Northern Pike	2	1.41	2.99	-	3.67	1.83
	SMB - Smallmouth Bass	94	66.35	140.47	-	150.56	1.60
	WAE - Walleye	3	2.12	4.48	-	1.85	0.62
	YEP - Yellow Perch	1	0.71	1.49	-	0.13	0.13
Sampling Station: (2) SEF-9							
Run 1	CCF - Channel Catfish	13	19.50	21.54	-	41.56	3.20
	NOP - Northern Pike	8	12.00	13.25	-	12.81	1.60
	SMB - Smallmouth Bass	50	75.00	82.83	-	85.29	1.71
	WAE - Walleye	9	13.50	14.91	-	7.78	0.86

LENGTH FREQUENCY DISTRIBUTIONS

Revision: 20181210

Length Frequency Distribution for SEF

Special sampling, electrofishing (2 stations) - Field work conducted on 05/26/2020

LENGTH (inches)	(1) SEF-8							(2) SEF-9
	BLC	BLG	CCF	NOP	SMB	WAE	YEP	CCF
< 3.00	-	-	-	-	-	-	-	-
3.00 - 3.49	-	-	-	-	-	-	-	-
3.50 - 3.99	-	-	-	-	1	-	-	-
4.00 - 4.49	-	-	-	-	4	-	-	-
4.50 - 4.99	-	-	-	-	-	-	-	-
5.00 - 5.49	-	-	-	-	-	-	-	-
5.50 - 5.99	-	-	-	-	-	1	-	-
6.00 - 6.49	-	1	-	-	-	-	-	-
6.50 - 6.99	1	-	-	-	1	-	1	-
7.00 - 7.49	-	-	-	-	1	-	-	-
7.50 - 7.99	-	-	-	-	2	-	-	-
8.00 - 8.49	-	-	-	-	2	-	-	-
8.50 - 8.99	-	-	-	-	1	-	-	-
9.00 - 9.49	-	-	-	-	-	-	-	-
9.50 - 9.99	-	-	-	-	1	-	-	-
10.00 - 10.49	-	-	-	-	2	-	-	-
10.50 - 10.99	-	-	-	-	3	-	-	-
11.00 - 11.49	-	-	-	-	4	-	-	-
11.50 - 11.99	-	-	-	-	3	-	-	-
12.00 - 12.99	-	-	-	-	1	-	-	-
13.00 - 13.99	-	-	-	1	17	1	-	-
14.00 - 14.99	-	-	-	-	18	1	-	-
15.00 - 15.99	-	-	-	-	12	-	-	-
16.00 - 16.99	-	-	-	-	6	-	-	-
17.00 - 17.99	-	-	-	-	11	-	-	1
18.00 - 18.99	-	-	3	-	3	-	-	-
19.00 - 19.99	-	-	1	-	-	-	-	3
20.00 - 20.99	-	-	-	-	1	-	-	1
21.00 - 21.99	-	-	2	-	-	-	-	5
22.00 - 22.99	-	-	2	-	-	-	-	3
23.00 - 23.99	-	-	-	-	-	-	-	-
24.00 - 24.99	-	-	4	1	-	-	-	-
25.00 - 25.99	-	-	2	-	-	-	-	-
26.00 - 26.99	-	-	1	-	-	-	-	-
27.00 - 27.99	-	-	1	-	-	-	-	-
28.00 - 28.99	-	-	-	-	-	-	-	-
29.00 - 29.99	-	-	-	-	-	-	-	-
30.00 - 30.99	-	-	-	-	-	-	-	-
31.00 - 31.99	-	-	-	-	-	-	-	-
32.00 - 32.99	-	-	-	-	-	-	-	-
33.00 - 33.99	-	-	-	-	-	-	-	-
34.00 - 34.99	-	-	-	-	-	-	-	-
35.00 - 35.99	-	-	-	-	-	-	-	-
= > 36.00	-	-	-	-	-	-	-	-
Total	1	1	16	2	94	3	1	13
Min. Length	6.54	6.38	18.19	13.66	3.98	5.63	6.61	17.05
Max. Length	6.54	6.38	27.76	24.65	20.08	14.41	6.61	22.91
Mean Length	6.54	6.38	23.02	19.15	13.57	11.25	6.61	20.79
Nbr. Measured	1	1	16	2	94	3	1	13
No Lengths for	0	0	0	0	0	0	0	0

LENGTH FREQUENCY DISTRIBUTIONS (*Continued*)

Length Frequency Distribution for SEF (*Continued*)

Special sampling, electrofishing (2 stations) - Field work conducted on 05/26/2020

LENGTH (inches)	(2) SEF-9			SEF TOTAL				
	NOP	SMB	WAE	BLC	BLG	CCF	NOP	SMB
< 3.00	-	-	-	-	-	-	-	-
3.00 - 3.49	-	-	-	-	-	-	-	-
3.50 - 3.99	-	1	-	-	-	-	-	2
4.00 - 4.49	-	-	-	-	-	-	-	4
4.50 - 4.99	-	-	-	-	-	-	-	-
5.00 - 5.49	-	-	-	-	-	-	-	-
5.50 - 5.99	-	-	-	-	-	-	-	-
6.00 - 6.49	-	-	1	-	1	-	-	-
6.50 - 6.99	-	-	-	1	-	-	-	1
7.00 - 7.49	-	1	-	-	-	-	-	2
7.50 - 7.99	-	-	-	-	-	-	-	2
8.00 - 8.49	-	1	-	-	-	-	-	3
8.50 - 8.99	-	-	-	-	-	-	-	1
9.00 - 9.49	-	2	1	-	-	-	-	2
9.50 - 9.99	-	2	-	-	-	-	-	3
10.00 - 10.49	-	2	-	-	-	-	-	4
10.50 - 10.99	-	3	-	-	-	-	-	6
11.00 - 11.49	-	2	-	-	-	-	-	6
11.50 - 11.99	-	2	-	-	-	-	-	5
12.00 - 12.99	1	3	3	-	-	-	1	4
13.00 - 13.99	1	5	2	-	-	-	2	22
14.00 - 14.99	-	6	1	-	-	-	-	24
15.00 - 15.99	1	6	-	-	-	-	1	18
16.00 - 16.99	1	4	-	-	-	-	1	10
17.00 - 17.99	-	3	-	-	-	1	-	14
18.00 - 18.99	-	4	-	-	-	3	-	7
19.00 - 19.99	1	2	-	-	-	4	1	2
20.00 - 20.99	1	1	1	-	-	1	1	2
21.00 - 21.99	-	-	-	-	-	7	-	-
22.00 - 22.99	-	-	-	-	-	5	-	-
23.00 - 23.99	-	-	-	-	-	-	-	-
24.00 - 24.99	1	-	-	-	-	4	2	-
25.00 - 25.99	-	-	-	-	-	2	-	-
26.00 - 26.99	1	-	-	-	-	1	1	-
27.00 - 27.99	-	-	-	-	-	1	-	-
28.00 - 28.99	-	-	-	-	-	-	-	-
29.00 - 29.99	-	-	-	-	-	-	-	-
30.00 - 30.99	-	-	-	-	-	-	-	-
31.00 - 31.99	-	-	-	-	-	-	-	-
32.00 - 32.99	-	-	-	-	-	-	-	-
33.00 - 33.99	-	-	-	-	-	-	-	-
34.00 - 34.99	-	-	-	-	-	-	-	-
35.00 - 35.99	-	-	-	-	-	-	-	-
= > 36.00	-	-	-	-	-	-	-	-
Total	8	50	9	1	1	29	10	144
Min. Length	12.52	3.86	6.38	6.54	6.38	17.05	12.52	3.86
Max. Length	26.77	20.24	20.47	6.54	6.38	27.76	26.77	20.24
Mean Length	18.53	13.81	12.86	6.54	6.38	22.02	18.65	13.65
Nbr. Measured	8	50	9	1	1	29	10	144
No Lengths for	0	0	0	0	0	0	0	0

LENGTH FREQUENCY DISTRIBUTIONS (*Continued*)

Length Frequency Distribution for SEF (*Continued*)

Special sampling, electrofishing (2 stations) - Field work conducted on 05/26/2020

LENGTH (inches)	SEF TOTAL	
	WAE	YEP
< 3.00	-	-
3.00 - 3.49	-	-
3.50 - 3.99	-	-
4.00 - 4.49	-	-
4.50 - 4.99	-	-
5.00 - 5.49	-	-
5.50 - 5.99	1	-
6.00 - 6.49	1	-
6.50 - 6.99	-	1
7.00 - 7.49	-	-
7.50 - 7.99	-	-
8.00 - 8.49	-	-
8.50 - 8.99	-	-
9.00 - 9.49	1	-
9.50 - 9.99	-	-
10.00 - 10.49	-	-
10.50 - 10.99	-	-
11.00 - 11.49	-	-
11.50 - 11.99	-	-
12.00 - 12.99	3	-
13.00 - 13.99	3	-
14.00 - 14.99	2	-
15.00 - 15.99	-	-
16.00 - 16.99	-	-
17.00 - 17.99	-	-
18.00 - 18.99	-	-
19.00 - 19.99	-	-
20.00 - 20.99	1	-
21.00 - 21.99	-	-
22.00 - 22.99	-	-
23.00 - 23.99	-	-
24.00 - 24.99	-	-
25.00 - 25.99	-	-
26.00 - 26.99	-	-
27.00 - 27.99	-	-
28.00 - 28.99	-	-
29.00 - 29.99	-	-
30.00 - 30.99	-	-
31.00 - 31.99	-	-
32.00 - 32.99	-	-
33.00 - 33.99	-	-
34.00 - 34.99	-	-
35.00 - 35.99	-	-
= > 36.00	-	-
Total	12	1
Min. Length	5.63	6.61
Max. Length	20.47	6.61
Mean Length	12.45	6.61
Nbr. Measured	12	1
No Lengths for	0	0

Note: Unless all fish were measured in the catch, totals shown for some length frequency distributions may differ from the total number of fish in the catch, due to rounding of fractions used in the estimation of length frequency from a subsample of measured fish.

Fish Species Key: BLC = Black Crappie, BLG = Bluegill, CCF = Channel Catfish, NOP = Northern Pike, SMB = Smallmouth Bass, WAE = Walleye, YEP = Yellow Perch.

NARRATIVES

STATUS OF FISHERY AND FIELD NOTES

Revision: 20181210

Field Notes - Status Narrative

1-2;Active;fishcrew;06/17/2020 09:14 AM;(PROP)
2-2;Active;Fishcrew;07/06/2020 09:09 AM;(UPLOAD SYNCH)
2-7;Field Work Complete;stmarod;12/14/2020 09:46 AM;(ACTIV)
Area Signed by user 'eraltena' on 03/24/2021Field Work Complete by user 'eraltena' on 03/24/2021Area Signed by user 'eraltena' on 03/24/2021Region Signed by user 'Nevander' on 03/29/2021

Field Notes - General Field

Mississippi River Gamefish Assessments typically utilize two netters. Only one netter was used in the assessment due to coronovirus pandemic protocols. Water level was above average during the survey and weather was misty rain/cloudy. No MUE were observed in this survey. Saw many other CCF that were not netted.

Discussion

Six different gamefish species were sampled in 1.27 hours of electrofishing effort in two stations combined on May 26 2020. Species captured included: Northern Pike, Channel Catfish, Bluegill, Smallmouth Bass, Black Crappie and Walleye. Smallmouth bass were the most abundant species in the catch. A total of 144 Smallmouth were sampled in 2020 for a CPUE of 113.4/hour. This represented the second highest number and catch rate observed on this stretch of the Mississippi River. Catch rates in prior assessments from 1994 through 2012 ranged from 13.0/hour (n=12) in 1996 to 120.6/hour (n=211) in 2012. High catch rates observed in 2020 may be attributed to ideal flow conditions and precise timing of sampling when adult Smallmouth Bass were congregating for spawning season. Mean total length of Smallmouth Bass captured in the 2020 assessment was 13.7 inches and individuals captured ranged from 3.9 to 20.2 inches in total length. Smallmouth Bass greater than 16.0 inches comprised 25.7% of the catch. Calculated PSD values for bass have historically been very high ranging from 85.5 in 2012 to 100 in 1995-1997 and 2000. The PSD value calculated in 2020 was 83.2 and was the lowest PSD ever recorded. PSD values may be biased high due to sampling during spawning season when mature fish dominate the catch. RSD-17 values have ranged from 12.5 (1995) to 66.7 (1996) and averaged 35.4. The RSD-17 value computed for 2020 was 18.2 and was on the lower end of the range observed in previous surveys.

Otoliths were taken from a subsample of 80 Smallmouth Bass for age determination. This was the first survey otoliths were used as it was deemed a more accurate method of age determination. Fish age 1 through 12, 14, 15 17 and 20 were present in the subsample suggesting that consistent recruitment is characteristic of this stretch of the river and fish can live a very long time. In general, Smallmouth exceeded quality and preferred size (11.0 and 13.8 inches) in their third and fifth year respectively and can exceed 16.0 inches in 7 years. Use of otoliths for aging suggest that fish grow slower than what prior scale aging suggested. Fish exceeding memorable size (17.0 inches) ranged from 9 to 20 years old. Past surveys identified that trophy size individuals exceeding 20.0 inches were typically age 10 or older. Two fish exceeding 20 inches were age 14 and 15 respectively, and an 18.7 inch Smallmouth bass was determined to be age 20.

Twelve Walleye averaging 12.5 inches and ranging from 5.6 to 20.5 inches were captured during the 2020 assessment. CPUE for Walleye in 2012 sampling was 40.0/hour, which was the highest catch rate ever observed on this stretch of the river. CPUE in previous assessments ranged from 4.6/hour in 1994 to 40.0/hour in 2012. Walleye were not aged in this survey as state work from home orders reduced personnel available to do the work. Previous assessments showed that Walleye grow slow to average when compared to area means.

The Northern Pike catch rate (CPUE=7.9/hour) was near average (8.2/hour) and within the range of catch rates observed for this stretch of the Mississippi River in past surveys. Catch rates in prior surveys ranged from 4.3/hour in 2006 to 16.6/hour in 2012. Ten Northern Pike averaging 18.7 inches and ranging from 12.5 to 26.8 inches in total length were sampled. Northern Pike were not aged in 2020. In prior surveys, growth rates were in the normal range when compared to area means.

A total of 29 Channel Catfish were captured during 2020 sampling for a catch rate of 22.8/hour which was the highest catch rate observed on this stretch of the Mississippi River. Channel Catfish were reported rarely by local anglers and were not sampled during an assessment until 2006. Catfish numbers appear to be increasing in abundance. Catch rates ranged from 1.4/hour in 2006 to 16.6/hour in 2016 in past surveys. Catfish averaged 21.9 inches in total length and ranged from 17.0 inches to 27.8 inches. No aging structures were taken during sampling in 2020 although prior aging suggested Channel Catfish grew

STATUS OF FISHERY AND FIELD NOTES (*Continued*)

Discussion (*Continued*)

slowly in this stretch of the river. Field notes suggested that many Channel Catfish were observed but not netted during this survey suggesting the catch rate could have been significantly higher. This was probably a consequence of having only one netter on the front of the boat due to Covid-19 social distancing requirements implemented by the state.

Bluegill and Black Crappie are typically sampled in low numbers on this stretch of the Mississippi River. Only one Black Crappie (6.5 inches) and one Bluegill (6.4 inches) were sampled in 2020. Catch rates for both species was 0.8/hour. Historical CPUE for Black Crappie ranged from 0.0 to 2.3 per hour and 0.0 to 9.5 per hour for Bluegill. Muskellunge were not sampled in this assessment. Catch rates are typically low for this species but they have been documented in nine of twelve assessments completed since 1994. Largemouth Bass is also a species typically sampled in low numbers but was also absent from the catch in 2020.
Catch rates for all species were probably negatively impacted by the use of only one netter due to Covid-19 social distancing guidelines. It is likely that catch rates would be somewhat higher using two netters.

Hydrology

Mississippi River discharge information was obtained from the USGS Water Resources website. Daily discharge has been monitored near Royalton, MN since 1924. Flow measured at Royalton ranged from 254 cfs on November 25, 1936 to 38,200 cfs on April 8, 1997. Discharge in 2020 had above average peak spring flows from runoff beginning in late March and declined to below normal in early May. Flows fell below normal from early May through late July. Rain events caused two peaks of above average discharge in early and late August. Flows during fall from early September on, were slightly above average. Peak discharge occurred on April 7, 2020 at 23,100 cfs while the lowest discharge was on August 11, 2020 at 2,750 cfs. Discharge during the survey on 4/26/2020 was 12,300 cfs. Historically, years with low flows and high spring/summer temperatures have produced large year classes of Smallmouth Bass. Flow and air temperature in 2020 appeared to replicate this type of pattern. Late summer young of year Smallmouth Bass sampling on this stretch of the Mississippi River and the stretch from Brainerd to Little Falls suggest a large year class of Smallmouth Bass was produced.

Status Of The Fishery

Six different gamefish species were sampled in 1.27 hours of electrofishing effort in two stations combined on May 26 2020. Species captured included: Northern Pike, Channel Catfish, Bluegill, Smallmouth Bass, Black Crappie and Walleye. Smallmouth bass were the most abundant species in the catch. A total of 144 Smallmouth were sampled in 2020 for a CPUE (Catch per unit of effort) of 113.4/hour. This represented the second highest number and catch rate observed on this stretch of the Mississippi River. Catch rates in prior assessments from 1994 through 2012 ranged from 13.0/hour (n=12) in 1996 to 120.6/hour (n=211) in 2012. Mean total length of Smallmouth Bass captured in the 2020 assessment was 13.7 inches and individuals ranged from 3.9 to 20.2 inches in total length. Smallmouth Bass greater than 16.0 inches comprised 25.7% of the catch. Calculated PSD, a measure of the proportion of quality size fish (> 11.0 inches) in the catch, has historically been very high ranging from 85.5 in 2012 to 100 in 1995-1997 and 2000. The PSD value calculated in 2020 was 83.2 and was the lowest PSD ever recorded. PSD values may be biased high due to sampling during spawning season when mature fish dominate the catch. RSD-17 values, a measure of the proportion of fish exceeding 17.0 inches, have ranged from 12.5 (1995) to 66.7 (1996) and averaged 35.4. The RSD-17 value computed for 2020 was 18.2 and was on the lower end of the range observed in previous surveys.

Otoliths, a bone associated with hearing in fish, were taken from a subsample of 80 Smallmouth Bass for age determination. Otoliths can be sectioned and annual growth lines counted to determine age. This was the first survey otoliths were used as it was deemed a more accurate method of age determination compared to scale samples. Fish age 1 through 12, 14, 15 17 and 20 were present in the subsample suggesting that consistent recruitment is characteristic of this stretch of the river and fish can live a very long time. In general, Smallmouth exceeded quality and preferred size (11.0 and 13.8 inches) in their third and fifth year respectively, and can exceed 16.0 inches in 7 years. Use of otoliths for aging revealed that fish grow slower than what prior scale aging suggested. Fish exceeding memorable size (17.0 inches) ranged from 9 to 20 years old. Past surveys identified that trophy size individuals exceeding 20.0 inches were typically age 10 or older. Two fish exceeding 20 inches were age 14 and 15 respectively, and an 18.7 inch Smallmouth bass was determined to be age 20.

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STATUS OF FISHERY AND FIELD NOTES (*Continued*)

Status Of The Fishery (*Continued*)

in this survey as state work from home orders reduced personnel available to do the work. Previous assessments showed that Walleye grow slow to average when compared to area means.

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Catch rates for all species were probably negatively impacted by the use of only one netter due to Covid-19 social distancing guidelines. It is likely that catch rates would be somewhat higher using two netters.

APPROVAL DATES AND NOTICES

Approval Dates:

Date Approved by Little Falls Area Fisheries Supervisor: March 24, 2021

Date Approved by Central Region Fisheries Manager: March 29, 2021

Approval Notices:

Survey Life Status: Region Signed

Notes: (1) By accepting the data in this report, the user agrees the data will be used for personal benefit and not for profit. Any other uses or publication of the data needs the consent of the Department. The Minnesota Department of Natural Resources assumes no responsibility for actual or consequential damage incurred as a result of any user's reliance on the data.

(Stream Survey Report revision 20190402, Waterbody ID 6000040, Survey ID 16132016933262000)

INDEX

(End of report. Report sections are listed in all capital letters. Sub-component reports are listed in blue font with an asterisk, and can be viewed separately.)

DEPARTMENT OF NATURAL RESOURCES

Fisheries Management

LAKE SURVEY REPORT

Lake Name: Placid | **Survey Type: Population Assessment**

DOW Number: 49-0080-00 | **Survey ID Date: 06/17/2014**

Lake Identification

Alternate Lake Name: N/A
Primary Lake Class ID: 34
DNR Sounding Map Number: C0158
Alternate Lake Class ID: N/A

Lake Location

Primary County: Morrison
Nearest Town: Pillager

All Counties: Cass, Morrison.

Legal Descriptions

Lake Center: Township - 133N Range - 30W Section - 30
PLS Section Lake Center: 13303030

All Legal Descriptions:

Cass County:	Township - 133N	Range - 30W	Sections - 19, 20
Morrison County:	Township - 133N	Range - 30W	Sections - 29, 30
	Township - 133N	Range - 31W	Sections - 25, 26

Area Office

Area Name: Little Falls
Region Name: Central
ORG Code: F312
Region Number: 3

Lake Access

(Information based on Initial Survey dated 07/03/1958)

Station ID	Ownership	Public Use	Type	Location / Comments
AC - 1	DNR	Open to Public use	Concrete	STATE OWNED ACCESS ON THE NORTHEAST END OF THE LAKE.

Lake Characteristics

Lake Area (planimetered acres): 459.00
GIS Lake Area (acres): 537.46
DOW Lake Area (acres): 462.00
Littoral Area (acres): 340.00
Area in MN (acres): 537.46
Maximum Depth (feet): 25.0
Mean Depth (feet): 15.0

GIS Shoreline Length (miles): 10.72
Maximum Fetch (miles): 3.03
Fetch Orientation (degrees): 67
USGS Quad Map Number: M11d
USGS Quad 24K GIS Index: 2522

Watershed Characteristics

Major Watershed

Name: Crow Wing River
Watershed Number: 12
Watershed size (acres): 1,268,954

Minor Watershed

Name: Crow Wing R
Watershed Number: 41
Watershed size (acres): 20,693

Surveys and Investigations

Initial Survey: 07/03/1958.
Re-Survey: 06/16/2008, 06/17/1996, 06/17/1985.
Population Assessment: 06/17/2014, 06/17/2002, 06/19/1990.
Special Assessment: 09/05/2000.
Natural Reproduction Check: 09/08/2009.
Targeted Survey: 06/30/1985, 06/30/1958, 06/19/1958.

Water Level History - Readings

Station ID	Date	Level	Reading (feet)	Reading Type
BM - 1	06/17/2008	Normal	3.35	Above or below Benchmark

Water Level History - Station Summary

	Minimum Level		Maximum Level		Range	Average	Reading Type
Station ID	Feet	Date	Feet	Date	(feet)	Level (feet)	(and number of readings)
BM - 1	3.35	06/17/2008	3.35	06/17/2008	0.00	3.35	Above or below Benchmark (1)

Field Measurements of Water Quality

Station ID	Sampling Date	Sample Depth (Feet)	Secchi Depth (Feet)	Field pH	Alkalinity (ppm)	Water Color	Color Cause
WQ - 1	06/25/2014	Surface	N/A	8.15	190	N/A	N/A

Notes: No oxygen / temperature profile done as only trap nets were set for the population assessment.

Net Catch Summary by Numbers for TN

Standard 3/4-in mesh, double frame trap net sets

Number of Sets: 9
First Set Date: 06/17/2014
Last Lift Date: 06/19/2014
Target Species: N/A

Abbr	Species	Total Fish	Number Per Set	Quartiles for Lake Class 34[1] 25%	50%	75%
BLC	Black Crappie	5	0.56	0.88	3.18	8.00
BLG	Bluegill	11	1.22	5.91	20.00	43.33
BRB	Brown Bullhead	12	1.33	0.65	1.50	5.22
CAP	Common Carp	8	0.89	0.33	0.60	1.50
GRR	Greater Redhorse	9	1.00	N/A	N/A	N/A
HSF	Hybrid Sunfish	1	0.11	N/A	N/A	N/A
NOP	Northern Pike	5	0.56	N/A	N/A	N/A
PMK	Pumpkinseed	8	0.89	1.50	3.25	9.07
RKB	Rock Bass	17	1.89	0.25	0.62	1.00
SHR	Shorthead Redhorse	4	0.44	0.63	1.78	3.15
SLR	Silver Redhorse	2	0.22	N/A	N/A	N/A
WTS	White Sucker	8	0.89	0.25	0.65	1.25
YEB	Yellow Bullhead	2	0.22	2.43	4.71	9.09
		Total Fish/Set:	10.22			

[1] Quartiles for Number Per Set

Net Catch Summary by Weight for TN

Standard 3/4-in mesh, double frame trap net sets

Abbr	Species	Total Weight (Pounds)	Pounds Per Set	Mean Weight[2]	Quartiles for Lake Class 34[1] 25%	50%	75%
BLC	Black Crappie	1.92	0.21	0.38	0.22	0.32	0.48
BLG	Bluegill	1.57	0.17	0.14	0.14	0.19	0.33
BRB	Brown Bullhead	8.74	0.97	0.73	0.43	0.66	0.92
CAP	Common Carp	43.93	4.88	5.49	2.71	4.41	6.29
GRR	Greater Redhorse	41.44	4.60	4.60	N/A	N/A	N/A
HSF	Hybrid Sunfish	0.17	0.02	0.17	N/A	N/A	N/A
NOP	Northern Pike	8.52	0.95	1.70	N/A	N/A	N/A
PMK	Pumpkinseed	0.71	0.08	0.09	0.11	0.15	0.23
RKB	Rock Bass	1.49	0.17	0.09	0.23	0.30	0.59
SHR	Shorthead Redhorse	10.64	1.18	2.66	1.87	2.53	2.86
SLR	Silver Redhorse	7.42	0.82	3.71	N/A	N/A	N/A
WTS	White Sucker	17.49	1.94	2.19	1.60	2.50	2.87
YEB	Yellow Bullhead	1.01	0.11	0.50	0.45	0.64	0.81
		Total Pounds Fish/Set:	16.12				

[1] Quartiles for Mean Weight

[2] Mean Weights are based on measured fish counts only.

Electrofishing Catch Summary for EF

Standard electrofishing

Number of Stations: 3
Total run-time for all stations: 01:03:00
Total on-time for all stations: 00:51:41
First Sampling Date: 06/09/2014
Last Sampling Date: 06/09/2014
Daylight Sampling: Yes
Target Species: All ages black crappie, All ages largemouth bass, All ages smallmouth bass, All ages northern pike, All ages walleye

		Summary By Numbers			Summary By Weight (pounds)			
		Total	Number per Hour		Total	Lbs per Hour		Mean
Abbr	Species	Number	Run-Time	On-Time	Weight	Run-Time	On-Time	Weight
SMB	Smallmouth Bass	18	17.14	20.90	43.60	41.52	50.61	2.42
YEP	Yellow Perch	1	0.95	1.16	0.65	0.62	0.75	0.65

Length Frequency Distribution for TN

Standard 3/4-in mesh, double frame trap net sets
(Field work conducted between 06/17/2014 and 06/19/2014)

	BLC	BLG	BRB	CAP	GRR	HSF	NOP	PMK	RKB	SHR	SLR	WTS	YEB
< 3.00	-	-	-	-	-	-	-	-	-	-	-	-	-
3.00 - 3.49	-	1	-	-	-	-	-	-	-	-	-	-	-
3.50 - 3.99	1	5	-	-	-	-	-	1	3	-	-	-	-
4.00 - 4.49	-	-	-	-	-	-	-	2	5	-	-	-	-
4.50 - 4.99	-	-	-	-	-	-	-	2	5	-	-	-	-
5.00 - 5.49	1	1	-	-	-	-	-	2	1	-	-	-	-
5.50 - 5.99	-	-	-	-	-	1	-	1	1	-	-	-	-
6.00 - 6.49	1	1	-	-	-	-	-	-	1	-	-	-	-
6.50 - 6.99	-	1	-	-	-	-	-	-	1	-	-	-	-
7.00 - 7.49	-	1	-	-	-	-	-	-	-	-	-	-	-
7.50 - 7.99	-	-	-	-	-	-	-	-	-	-	-	-	-
8.00 - 8.49	-	-	-	-	-	-	-	-	-	-	-	-	-
8.50 - 8.99	-	-	-	-	-	-	-	-	-	-	-	-	-
9.00 - 9.49	1	1	2	-	-	-	-	-	-	-	-	-	1
9.50 - 9.99	-	-	2	-	-	-	-	-	-	-	-	-	-
10.00 - 10.49	-	-	1	-	-	-	-	-	-	-	-	-	1
10.50 - 10.99	-	-	3	-	-	-	-	-	-	-	-	-	-
11.00 - 11.49	-	-	-	-	-	-	-	-	-	-	-	-	-
11.50 - 11.99	-	-	1	-	-	-	-	-	-	-	-	1	-
12.00 - 12.99	1	-	1	-	-	-	1	-	-	-	-	-	-
13.00 - 13.99	-	-	2	-	-	-	-	-	-	-	-	-	-
14.00 - 14.99	-	-	-	-	-	-	-	-	-	-	-	-	-
15.00 - 15.99	-	-	-	-	-	-	-	-	-	-	-	-	-
16.00 - 16.99	-	-	-	-	-	-	-	-	-	-	-	2	-
17.00 - 17.99	-	-	-	-	-	-	-	-	-	-	-	1	-
18.00 - 18.99	-	-	-	-	-	-	1	-	-	3	-	1	-
19.00 - 19.99	-	-	-	2	-	-	-	-	-	1	-	2	-
20.00 - 20.99	-	-	-	-	1	-	1	-	-	-	2	-	-
21.00 - 21.99	-	-	-	-	5	-	-	-	-	-	-	-	-
22.00 - 22.99	-	-	-	3	3	-	1	-	-	-	-	-	-
23.00 - 23.99	-	-	-	1	-	-	1	-	-	-	-	-	-
24.00 - 24.99	-	-	-	1	-	-	-	-	-	-	-	-	-
25.00 - 25.99	-	-	-	-	-	-	-	-	-	-	-	-	-
26.00 - 26.99	-	-	-	1	-	-	-	-	-	-	-	-	-
27.00 - 27.99	-	-	-	-	-	-	-	-	-	-	-	-	-
28.00 - 28.99	-	-	-	-	-	-	-	-	-	-	-	-	-
29.00 - 29.99	-	-	-	-	-	-	-	-	-	-	-	-	-
30.00 - 30.99	-	-	-	-	-	-	-	-	-	-	-	-	-
31.00 - 31.99	-	-	-	-	-	-	-	-	-	-	-	-	-
32.00 - 32.99	-	-	-	-	-	-	-	-	-	-	-	-	-
33.00 - 33.99	-	-	-	-	-	-	-	-	-	-	-	-	-
34.00 - 34.99	-	-	-	-	-	-	-	-	-	-	-	-	-
35.00 - 35.99	-	-	-	-	-	-	-	-	-	-	-	-	-
= > 36.00	-	-	-	-	-	-	-	-	-	-	-	-	-

	BLC	BLG	BRB	CAP	GRR	HSF	NOP	PMK	RKB	SHR	SLR	WTS	YEB
Total	5	11	12	8	9	1	5	8	17	4	2	7	2
Min. Length	3.74	3.46	9.33	19.76	20.91	5.94	12.24	3.50	3.62	18.31	20.47	11.93	9.06
Max. Length	12.99	9.13	13.90	26.02	22.64	5.94	23.39	5.71	6.69	19.65	20.79	19.84	10.39
Mean Length	7.46	5.06	10.99	22.64	21.73	5.94	19.38	4.71	4.72	18.83	20.63	17.00	9.72
# Measured	5	11	12	8	9	1	5	8	17	4	2	7	2
No Lengths for	0	0	0	0	0	0	0	0	0	0	0	1	0

Note: Unless all fish were measured in the catch, totals shown for some length-frequency distributions may differ from the total number of fish in the catch, due to rounding of fractions used in the estimation of length frequency from a subsample of measured fish

Length Frequency Distribution for EF

Standard electrofishing
(Field work conducted on 06/09/2014)

	SMB	YEP
< 3.00	-	-
3.00 - 3.49	-	-
3.50 - 3.99	-	-
4.00 - 4.49	-	-
4.50 - 4.99	-	-
5.00 - 5.49	-	-
5.50 - 5.99	-	-
6.00 - 6.49	-	-
6.50 - 6.99	-	-
7.00 - 7.49	-	-
7.50 - 7.99	-	-
8.00 - 8.49	-	-
8.50 - 8.99	1	-
9.00 - 9.49	-	-
9.50 - 9.99	-	-
10.00 - 10.49	-	-
10.50 - 10.99	-	-
11.00 - 11.49	-	1
11.50 - 11.99	-	-
12.00 - 12.99	-	-
13.00 - 13.99	-	-
14.00 - 14.99	4	-
15.00 - 15.99	4	-
16.00 - 16.99	3	-
17.00 - 17.99	3	-
18.00 - 18.99	2	-
19.00 - 19.99	1	-
20.00 - 20.99	-	-
21.00 - 21.99	-	-
22.00 - 22.99	-	-
23.00 - 23.99	-	-
24.00 - 24.99	-	-
25.00 - 25.99	-	-
26.00 - 26.99	-	-
27.00 - 27.99	-	-
28.00 - 28.99	-	-
29.00 - 29.99	-	-
30.00 - 30.99	-	-
31.00 - 31.99	-	-
32.00 - 32.99	-	-
33.00 - 33.99	-	-
34.00 - 34.99	-	-
35.00 - 35.99	-	-
= > 36.00	-	-

	SMB	YEP
Total	18	1
Min. Length	8.54	11.02
Max. Length	19.41	11.02
Mean Length	16.04	11.02
# Measured	18	1
No Lengths for	0	0

Note: Unless all fish were measured in the catch, totals shown for some length-frequency distributions may differ from the total number of fish in the catch, due to rounding of fractions used in the estimation of length frequency from a subsample of measured fish

Length At Capture with Last Incremental Length

(Body-Scale constant, all lengths, and all length increments in inches)

Species: Black Crappie
Body-Scale Constant: 0.79
Total Sample Size: 5

Length at Capture in 2014 for Each Age Class, with Incremental Lengths for 2014

			Length At Capture				Length Increments	
Year Class	Age	Sample Size	Average Length	Maximum Length	Minimum Length	Standard Error	Increment	Standard Error
2012	2	2	4.49	5.24	3.74	0.748	0.53	0.340
2011	3	1	6.10	6.10	6.10	N/A	0.54	N/A
2010	4	0	-	-	-	-	-	-
2009	5	1	9.25	9.25	9.25	N/A	0.18	N/A
2008	6	0	-	-	-	-	-	-
2007	7	1	12.99	12.99	12.99	N/A	0.11	N/A

Species: Bluegill
Body-Scale Constant: 0.79
Total Sample Size: 8

Length at Capture in 2014 for Each Age Class, with Incremental Lengths for 2014

			Length At Capture				Length Increments	
Year Class	Age	Sample Size	Average Length	Maximum Length	Minimum Length	Standard Error	Increment	Standard Error
2012	2	1	3.66	3.66	3.66	N/A	0.29	N/A
2011	3	5	4.44	6.50	3.46	0.595	0.49	0.131
2010	4	2	6.67	7.13	6.22	0.453	0.59	0.179

Species: Northern Pike
Body-Scale Constant: 2.09
Total Sample Size: 5

Length at Capture in 2014 for Each Age Class, with Incremental Lengths for 2014

			Length At Capture				Length Increments	
Year Class	Age	Sample Size	Average Length	Maximum Length	Minimum Length	Standard Error	Increment	Standard Error
2013	1	1	12.24	12.24	12.24	N/A	4.67	N/A
2012	2	1	20.08	20.08	20.08	N/A	2.67	N/A
2011	3	3	21.52	23.39	18.23	1.652	1.00	0.133

Back-Calculated Lengths for Each Age Class and Average Annual Increments of Back-Calculated Lengths

Species: Black Crappie
Gear Type: Combined Gear Types (TN)

Class	Age	N	1	2	3	4	5	6	7
2012	2	2	2.30	3.96	-	-	-	-	-
			2.30	1.66	-	-	-	-	-
2011	3	1	1.86	2.90	5.57	-	-	-	-
			1.86	1.04	2.67	-	-	-	-
2009	5	1	2.36	4.49	6.23	8.73	9.07	-	-
			2.36	2.13	1.74	2.50	0.34	-	-
2007	7	1	2.28	4.07	6.09	9.20	11.41	12.39	12.88
			2.28	1.79	2.02	3.11	2.21	0.98	0.49
Mean Length			2.22	3.88	5.96	8.97	10.24	12.39	12.88
Mean Increment			2.22	1.66	2.14	2.81	1.28	0.98	0.49
Total N			5	5	3	2	2	1	1

Species: Bluegill
Gear Type: Combined Gear Types (TN)

Class	Age	N	1	2	3	4
2012	2	1	1.54	3.37	-	-
			1.54	1.83	-	-
2011	3	5	1.47	2.46	3.95	-
			1.47	0.99	1.49	-
2010	4	2	1.79	3.25	4.90	6.09
			1.79	1.46	1.65	1.19
Mean Length			1.56	2.77	4.22	6.09
Mean Increment			1.56	1.21	1.54	1.19
Total N			8	8	7	2

Species: Northern Pike
Gear Type: Combined Gear Types (TN)

Class	Age	N	1	2	3
2013	1	1	7.58	-	-
			7.58	-	-
2012	2	1	12.25	17.41	-
			12.25	5.16	-
2011	3	3	8.51	16.21	20.52
			8.51	7.70	4.31
Mean Length			9.07	16.51	20.52
Mean Increment			9.07	7.07	4.31
Total N			5	4	3

Age Class Frequency Distribution

Species & SS Type (1)	Number of Fish (2) Aged	Keyed	Unaged	'14 0	'13 1	'12 2	'11 3	'10 4	'09 5	'08 6	'07 7	'06 8	'05 9	'04 10	'03 11	'02 12	'01 13	'00 14	<'00 15+
Black Crappie																			
TN	5	0	0	0	0	2	1	0	1	0	1	0	0	0	0	0	0	0	0
Bluegill																			
TN	8	2	1	0	0	2	6	2	0	0	0	0	0	0	0	0	0	0	0
Northern Pike																			
TN	5	0	0	0	1	1	3	0	0	0	0	0	0	0	0	0	0	0	0

Number of Fish in Year Class ('yy) and Age Class

(1) Key to Sampling Station (SS) Type abbreviations:
TN = Standard 3/4-in mesh, double frame trap net sets

(2) Notes:
Number of Fish Aged: Fish that were aged from bony parts.
Number of Fish Keyed: Fish assigned an age with an age-length key or by expansion of mesh or station age distributions.
Number of Fish Unaged: Fish that were not aged and were not assigned an age.

Other Species

Gear Type (1)	Other Species (Gender) (2)	Total Num	Number Measured	Length (inches) Min - Mean - Max	Number Weighed	Weight (pounds) Min - Mean - Max
TN	Painted Turtle	3	0	N/A	0	N/A
	Snapping Turtle	2	2	11.22 - 11.95 - 12.68	0	N/A
	Spiney Softshell Turtle	1	1	16.73	0	N/A

(1) Key to sampling gear abbreviations:
TN = Standard 3/4-in mesh, double frame trap net sets

(2) Gender: If identified and reported.

Survey Crew Notes

null

Area Signed by user 'eraltena' on 03/13/2015

Region Signed by user 'damccorm' on 04/13/2015

Discussion

A population assessment was conducted on Placid Lake in mid-June to evaluate the fish community. Trap nets and spring electrofishing were the sampling methods used. Setting trap nets in Placid Lake can be a challenge with the current and near shore drop-offs. Several of the trap nets were angled upstream to avoid excessive depths. Trap net 4 was moved to a location with less current. Catches were mediocre in most of the nets with Rock Bass the most abundant fish species caught.

Placid Lake is a reservoir on the Crow Wing River and river current, filamentous algae, and debris in the water has made gill netting impractical. Primary management species for Placid are Walleye and Bluegill with secondary species of Smallmouth Bass, Largemouth Bass, and Black Crappie. The lake has a naturally reproducing Walleye population and fall electrofishing has been the method used to evaluate abundance of that species.

The 2014 Bluegill catch of 1.2/TN (n=11) was a significant decrease from the 2008 catch of 14.1/TN (n=127) and below the 25% quartile of 5.9/TN for lake class 34. The fish ranged from 3.5 to 9.1 inches in length with only two fish (18%) more than seven inches in length. Bluegill in the 2008 survey measured from 3.8 to 8.8 inches in length with 34% (n=43) of the fish that exceeded seven inches. The lake management goals for Placid Lake are to have a trap net catch where the catch rate is within the lake class interquartiles of 5.9 - 43.3/TN and at least 30% of the Bluegill more than seven inches.

Ages 2 through 4 were represented in the 2014 population assessment with all age groups showing fast growth rates when compared to an Area Mean Back-calculated Length table. A few Bluegill were observed during the 2014 spring daytime electrofishing but none were netted.

Spring daytime electrofishing was conducted the week preceding the population assessment to evaluate game fish. A few Walleye and one Northern Pike, but no Largemouth Bass were observed. Smallmouth Bass was the only bass species sampled in the effort. A total of 18 Smallmouth Bass were netted in the electrofishing effort for a catch rate of 21/hour. The fish ranged from 8.5 to 19.4 inches in length with a mean length of 16 inches. Nine of the bass (50%) exceeded 16 inches in length.

Daytime electrofishing was also conducted mid-June in 2008 for bass. Smallmouth Bass were also more numerous in that electrofishing effort when compared to Largemouth Bass. Thirty-nine (58.5/hour) Smallmouth Bass were netted compared to 19 (28.5/hour) Largemouth Bass. The Smallmouth Bass catch was dominated by small fish averaging 7.4 inches or 0.3 pounds while the Largemouth Bass averaged 11.3 inches or 1 pound (PSD = 26). The longest Smallmouth Bass was 18.4 inches and the longest Largemouth Bass 19 inches in length.

Results from the 2008 electrofishing effort met the lake management goals of 50/hour for Smallmouth Bass and 25/hour for Largemouth Bass. The results, however, were below the desired presence of at least 5 year classes in the Smallmouth Bass catch and a PSD of more than 30 for Largemouth Bass. Four year classes were present in the Smallmouth Bass catch. The 2014 electrofishing results met none of the bass lake management goals.

The 2014 Black Crappie catch of 0.6/TN (n=5) was comparable to the 2008 trap net catch of 0.4/set (n=4) and below the 25% quartile of 0.9/TN for lake class 34. Only one of the trap net catches prior to 2008 was within the normal range, 1.3/TN in 1985, all others were below the 25% quartile. Crappie in the 2014 survey ranged from 3.7 to 13 inches in length with two of the five fish caught more than nine inches.

Crappie were sampled in both the 2008 trap nets (n=4) and spring electrofishing (n=6). Both samples also displayed a wide variation in sizes. The smallest crappie was 7.8 inches and the longest 13.6 inches. Four age groups were represented in the 2014 crappie trap net catch, 2, 3, 5, and 7. Growth rates varied between the age groups but sample size was only one to two fish per age group when compared to an Area Mean Back-calculated Length table. No additional crappie were observed during the 2014 spring electrofishing effort.

Northern Pike was the sole game fish species sampled in the 2014 population assessment trap nets. The five fish caught ranged from 18.2 to 23.4 inches in length. Only one 24.8-inch pike was sampled in the 2008 trap nets. Gill nets are usually more effective at providing a pike sample but not used in this population assessment for reasons previously noted. Ages 1 through 3 were represented in the 2014 population assessment with the addition of a small pike sampled in the 2014 spring electrofishing effort. While growth appeared to be normal when compared to an Area

Discussion (*Continued*)

Mean Back-calculated Length table, sample size was small, one to three fish per age group.

Roughfish such as Common Carp, Greater Redhorse, Shorthead Redhorse, Silver Redhorse, and White Sucker, some which are common riverine species, accounted for much of the biomass in the 2014 trap nets. The Common Carp trap net catch of 0.9/set was a significant increase from the 2008 when no carp were caught in the trap nets. The catch remained within the trap net interquartiles of 0.3 - 1.5/TN for lake class 34. The White Sucker catch rate (0.9/TN; n= 8) was within the lake class interquartiles while the Shorthead Redhorse catch rate of 0.4 (n=4) was below the 25% quartile of 0.6/TN. The 2014 trap net catch for Silver Redhorse was a record low for Placid Lake compared to previous catches of 1.2/TN (1985 & 1990) to 4.7/TN (2002).

Rock Bass were the most abundant species caught in the 2014 trap nets and the 1.9/TN catch was above the 75% quartile of 1/TN for lake class 34. Pumpkinseed were also sampled and the catch rate was below the 25% quartile. A single hybrid sunfish was identified. Other fish species caught included Brown and Yellow Bullhead. The 2014 trap net catch rate was normal for Brown Bullhead and low for Yellow Bullhead when compared to their respective lake class trap net interquartiles.

Summary: Electrofishing and trap nets produced low catches and small sample sizes of most fish species.

Status Of The Fishery

Placid Lake or Pillager Reservoir is formed by the Pillager Power Dam on the Crow Wing River near the town of Pillager. Fast drop-offs along shore, sunken bars and vegetation beds, as well as islands provide structure in the lake. Anglers have the choice of fishing in the reservoir or traveling up the Crow Wing River. Water turbidity can be affected by flows from the Crow Wing River and several minor tributaries.

Sampling in the lake has proven to be a challenge with the steep near shore drop-offs, suspended debris in the water column, and current. This assessment was conducted with shoreline trap nets and daytime electrofishing as suspended debris and current makes gill netting difficult.

The species diversity of the fish community is a reflection of a riverine system. Non-game species such as Silver Redhorse, Common Carp, Greater Redhorse, Shorthead Redhorse, and White Sucker account for much of the biomass in the lake. Gamefish species found in the lake include Northern Pike, Walleye, Largemouth Bass, and Smallmouth Bass. The Walleye population has been sustained at low levels by natural reproduction since the mid-90s when stocking was discontinued. Status of Northern Pike was not evaluated well with gear types used in this assessment. Results from early summer electrofishing in 2014 suggest that Placid Lake supports a modest population of Smallmouth Bass. Most of the bass observed in the sampling were more than 14 inches in length with one 19-inch Smallmouth Bass measured. Bluegill provide an important fishery on the lake and the survey did show the presence of "keeper" size fish over seven inches in length. Black Crappie do not appear to be overly abundant but anglers have a chance to find some nice fish over 11 inches. Other panfish species in the lake include Pumpkinseed, hybrid sunfish, and Rock Bass. Two species of bullhead, Brown and Yellow, were sampled in the lake. Brown Bullhead was the more numerous and larger of the two species. The largest Yellow Bullhead was around 10 inches while the largest Brown Bullhead was almost 14 inches.

The connection to Crow Wing River and numerous inlets allows for the movement of fish in and out of the reservoir. Proper timing and duration of drawdowns from dam operations as well as good land use practices around the inlets can minimize impacts to the reservoir.

Approval Dates And Notices

Date Approved By Little Falls Area Fisheries Supervisor: **03/13/2015**

Date Approved By Central Region Fisheries Manager: **04/13/2015**

DEPARTMENT OF NATURAL RESOURCES

Fisheries Management

LAKE SURVEY REPORT

Lake Name: Sl ɑdan | **Surdel Tl ve: Pyvuɑatiyn Assessment**

pOo NumDer: Wb499-0499 | **Surdel 8p pate: 90I6/ I/ 96W**

Lake 8I enti7I2atiyn

Alternate Lake Name:	N/A	DNR Sounding Map Number:	N/A
Primary Lake Class ID:	35	Alternate Lake Class ID:	N/A

Lake Ly2atiyn

Primary County:	Morrison	Nearest Town:	Sylvan
Aɑf yunties:	Cass, Morrison.		

Legacp es2rivtiyns

Lake Center:	Township - 133N	Range - 29W	Section - 30
PLS Section Lake Center:	13302930		
AɑLegacp es2rivtiyns:			
Cass County:	Township - 133N	Range - 29W	Section - 19
Morrison County:	Township - 133N	Range - 29W	Section - 30
	Township - 133N	Range - 30W	Sections - 24, 25

Area O77I2e

Area Name:	Little Falls	ORG Code:	F312
Region Name:	Central	Region Number:	3

Lake A22ess

(Information based on Re-Survey dated 06/09/2008)

Statiyn 8p	OCnershiv	PuDɑ2 Use	Tl ve	Ly2atiyn I f ymments
AC - 1	DNR	Open to Public use	Concrete	STATE OWNED ACCESS ON THE NORTH SIDE OF THE LAKE CTY ROAD 36.

Lake f hara2teristi2s

Lake Area (planimetered acres):	655.00	GIS Shoreline Length (miles):	5.55
GIS Lake Area (acres):	321.49	Maximum Fetch (miles):	1.23
DOW Lake Area (acres):	260.00	Fetch Orientation (degrees):	22
Littoral Area (acres):	190.97	USGS Quad Map Number:	M12c
Area in MN (acres):	321.49	USGS Quad 24K GIS Index:	2523
Maximum Depth (feet):	31.0		
Mean Depth (feet):	N/A		

o atershe1 f hara2teristi2s

Mawr o atershe1

Name: Crow Wing River
Watershed Number: 12
Watershed size (acres): 1,268,954

Minyr o atershe1

Name: unknown DNR Minor Wshd
Watershed Number: 39
Watershed size (acres): 7,006

Surdel s an1 8ndestigatiyns

8nitiacSurdel :	06/23/1958.
Re4Surdel :	06/09/2008, 06/10/1996, 06/10/1985.
Pyvucatiyn Assessment:	06/12/2014, 06/10/2002, 06/11/1990.
Sve2iacAssessment:	09/05/2000.
Targete1 Surdel :	06/09/2020, 06/11/1985.

o ater LedecBistyrl 4Rea1ings

Statiyn 8p	pate	Ledec	Rea1ing HFeet(	Rea1ing Tl ve
BM - 1	06/12/2008	Normal	6.65	Above or below Benchmark

o ater LedecBistyrl 4Statiyn Summarl

	Minimum Ledec		Ma) imum Ledec		Range	Aderage	Rea1ing Tl ve
Statiyn 8p	Feet	pate	Feet	pate	HFeet(	LedecHFeet(	Han1 numDer y7rea1ings(
BM - 1	6.65	06/12/2008	6.65	06/12/2008	0.00	6.65	Above or below Benchmark (1)

Fiec1 Measurements y7o ater x uacitl

Statiyn 8p	Samvcing pate	Samvce pevth HFeet(	Se22hi pevth HFeet(	Fiec1 vB	Ackacinitl Hvvm(	o ater f ycyr	f ycyr f ause
WQ - 1	06/25/2014	Surface	6.0	8.20	197	N/A	N/A

Net f at2h Summarl DI NumDers 7yr TN

Stan1ar1 - IWin meshQ1yuDce 7rame trav net sets

NumDer y7Sets: 12
First Set pate: 06/23/2014
Last Li7t pate: 06/26/2014
Target Sve2ies: N/A

ADDr	Sve2ies	TytacFish	NumDer Per Set	x uartices 7yr Lake f cass - 3% / 3,	39,	53,
BLC	Black Crappie	8	0.67	0.69	1.72	4.32
BLG	Bluegill	238	19.83	4.00	9.25	28.07
BOF	Bowfin (Dogfish)	15	1.25	0.25	0.50	1.21
BRB	Brown Bullhead	2	0.17	0.50	1.42	4.25
CAP	Common Carp	47	3.92	0.27	0.67	1.50
HSF	Hybrid Sunfish	4	0.33	N/A	N/A	N/A
LMB	Largemouth Bass	3	0.25	0.20	0.34	0.60
NOP	Northern Pike	9	0.75	N/A	N/A	N/A
PMK	Pumpkinseed	11	0.92	1.53	2.94	6.80
RKB	Rock Bass	1	0.08	0.25	0.60	1.00
SHR	Shorthead Redhorse	2	0.17	0.16	0.29	1.04
SLR	Silver Redhorse	2	0.17	N/A	N/A	N/A
WAE	Walleye	2	0.17	0.25	0.50	1.06
WTS	White Sucker	15	1.25	0.19	0.50	1.38
YEB	Yellow Bullhead	3	0.25	1.41	2.33	4.98
YEP	Yellow Perch	4	0.33	0.50	1.50	3.26
		Total Fish/Set:	30.50			

[1] Quartiles for Number Per Set

Net f at2h Summarl DI o eight 7yr TN

Stan1ar1 - IWin meshQ1yuDce 7rame trav net sets

ADDr	Sve2ies	Tytaco eight HPyun1s(	Pyun1s Per Set	Mean o eight[1]	x uartices 7yr Lake f cass - 3% / 3,	39,	53,
BLC	Black Crappie	2.44	0.20	0.31	0.21	0.38	0.60
BLG	Bluegill	50.20	4.18	0.21	0.14	0.21	0.34
BOF	Bowfin (Dogfish)	61.60	5.13	4.11	3.31	4.07	5.53
BRB	Brown Bullhead	2.44	0.20	1.22	0.46	0.70	0.91
CAP	Common Carp	240.15	20.01	5.11	2.63	6.30	8.33
HSF	Hybrid Sunfish	0.85	0.07	0.21	N/A	N/A	N/A
LMB	Largemouth Bass	4.37	0.36	1.46	0.23	0.40	0.99
NOP	Northern Pike	18.02	1.50	2.00	N/A	N/A	N/A
PMK	Pumpkinseed	2.08	0.17	0.19	0.13	0.20	0.29
RKB	Rock Bass	0.06	0.01	0.06	0.25	0.44	0.60
SHR	Shorthead Redhorse	5.80	0.48	2.90	1.50	2.96	4.85
SLR	Silver Redhorse	11.42	0.95	5.71	N/A	N/A	N/A
WAE	Walleye	3.49	0.29	1.74	1.21	2.22	3.37
WTS	White Sucker	42.50	3.54	2.83	1.60	2.14	2.98
YEB	Yellow Bullhead	3.28	0.27	1.09	0.38	0.61	0.77
YEP	Yellow Perch	0.56	0.05	0.14	0.10	0.18	0.25
		Total Pounds Fish/Set:	37.44				

[1] Quartiles for Mean Weight

[2] Mean Weights are based on measured fish counts only.

Eœ2try7ishing f at2h Summarl 7yr EF

Stan1ar1 eœ2try7ishing

NumDer y7Statiyns: 2
Tytacrun4time 7yr acstatiyns: 01:35:00
Tytacyn4time 7yr acstatiyns: 01:00:00
First Samvcing pate: 06/12/2014
Last Samvcing pate: 06/12/2014
pal cight Samvcing: Yes
Target Sve2ies: All ages northern pike, All ages walleye, All ages largemouth bass, All ages smallmouth bass

		Summarl j l NumDers			Summarl j l o eight Hvyun1s(			
		Tytac	NumDer ver Byur		Tytac	LDs ver Byur		Mean
ADDr	Sve2ies	NumDer	Run4Time	On4Time	o eight	Run4Time	On4Time	o eight
LMB	Largemouth Bass	49	30.95	49.00	43.19	27.28	43.19	0.88
SMB	Smallmouth Bass	5	3.16	5.00	0.37	0.23	0.37	0.07

Length Fre² uen2I pistriDutiyn 7yr TN

Stan1ar1 - lWin meshQ1yuDe 7rame trav net sets
(Field work conducted between 06/23/2014 and 06/26/2014)

	j Lf	j Lq	j OF	j Rj	f AP	BSF	LMj	NOP	PMK	RKj	SBR	SLR	o AE	o TS	YEj
< 3.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3.00 - 3.49	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-
3.50 - 3.99	1	5	-	-	-	-	-	-	-	-	-	-	-	-	-
4.00 - 4.49	-	7	-	-	-	-	-	-	1	1	-	-	-	-	-
4.50 - 4.99	-	17	-	-	-	1	-	-	3	-	-	-	-	-	-
5.00 - 5.49	1	20	-	-	-	-	-	-	-	-	-	-	-	-	-
5.50 - 5.99	-	31	-	-	-	-	-	-	2	-	-	-	-	-	-
6.00 - 6.49	-	25	-	-	-	1	-	-	2	-	-	-	-	-	-
6.50 - 6.99	2	49	-	-	-	1	-	-	1	-	-	-	1	-	-
7.00 - 7.49	-	54	-	-	-	1	-	-	-	-	-	-	-	-	-
7.50 - 7.99	-	22	-	-	-	-	-	-	2	-	-	-	-	-	-
8.00 - 8.49	-	5	-	-	-	-	-	-	-	-	-	-	-	-	-
8.50 - 8.99	1	-	-	-	-	-	1	-	-	-	-	-	-	-	-
9.00 - 9.49	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9.50 - 9.99	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10.00 - 10.49	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10.50 - 10.99	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11.00 - 11.49	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11.50 - 11.99	-	-	-	-	-	-	-	1	-	-	-	-	-	1	1
12.00 - 12.99	-	-	-	1	-	-	-	-	-	-	-	-	-	-	1
13.00 - 13.99	-	-	-	1	-	-	-	-	-	-	-	-	-	-	1
14.00 - 14.99	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-
15.00 - 15.99	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
16.00 - 16.99	-	-	-	-	-	-	1	-	-	-	-	-	-	1	-
17.00 - 17.99	-	-	-	-	1	-	-	-	-	-	-	-	-	1	-
18.00 - 18.99	-	-	-	-	5	-	-	2	-	-	1	-	-	3	-
19.00 - 19.99	-	-	2	-	3	-	-	1	-	-	1	-	-	7	-
20.00 - 20.99	-	-	-	-	11	-	-	-	-	-	-	-	-	1	-
21.00 - 21.99	-	-	4	-	6	-	-	1	-	-	-	-	1	1	-
22.00 - 22.99	-	-	4	-	4	-	-	2	-	-	-	1	-	-	-
23.00 - 23.99	-	-	1	-	9	-	-	-	-	-	-	-	-	-	-
24.00 - 24.99	-	-	1	-	3	-	-	1	-	-	-	1	-	-	-
25.00 - 25.99	-	-	2	-	-	-	-	1	-	-	-	-	-	-	-
26.00 - 26.99	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-
27.00 - 27.99	-	-	1	-	2	-	-	-	-	-	-	-	-	-	-
28.00 - 28.99	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
29.00 - 29.99	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
30.00 - 30.99	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31.00 - 31.99	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
32.00 - 32.99	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
33.00 - 33.99	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
34.00 - 34.99	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
35.00 - 35.99	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
= > 36.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

	j Lf	j Lq	j OF	j Rj	f AP	BSF	LMj	NOP	PMK	RKj	SBR	SLR	o AE	o TS	YEj
Total	8	238	15	2	47	4	3	9	11	1	2	2	2	15	3
Min. Length	3.74	3.19	19.49	12.80	17.83	4.72	8.62	11.61	4.49	4.41	18.86	22.91	6.50	11.57	11.81
Max. Length	10.67	8.35	27.05	13.86	27.95	7.24	16.38	25.24	7.91	4.41	19.92	24.61	21.46	21.50	13.15
Mean Length	7.62	6.35	22.75	13.33	21.98	6.18	13.16	20.58	5.82	4.41	19.39	23.76	13.98	18.63	12.53
# Measured	8	238	15	2	47	4	3	9	11	1	2	2	2	15	3
No Lengths for	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Nyte: Unless all fish were measured in the catch, totals shown for some length-frequency distributions may differ from the total number of fish in the catch, due to rounding of fractions used in the estimation of length frequency from a subsample of measured fish

Length Fre² uen2I pistriDutiyn 7yr TN H*Continued*(

Stan1ar1 - lW4in meshQ1yuDce 7rame trav net sets

(Field work conducted between 06/23/2014 and 06/26/2014)

	YEP
< 3.00	-
3.00 - 3.49	-
3.50 - 3.99	-
4.00 - 4.49	-
4.50 - 4.99	1
5.00 - 5.49	-
5.50 - 5.99	1
6.00 - 6.49	-
6.50 - 6.99	-
7.00 - 7.49	-
7.50 - 7.99	2
8.00 - 8.49	-
8.50 - 8.99	-
9.00 - 9.49	-
9.50 - 9.99	-
10.00 - 10.49	-
10.50 - 10.99	-
11.00 - 11.49	-
11.50 - 11.99	-
12.00 - 12.99	-
13.00 - 13.99	-
14.00 - 14.99	-
15.00 - 15.99	-
16.00 - 16.99	-
17.00 - 17.99	-
18.00 - 18.99	-
19.00 - 19.99	-
20.00 - 20.99	-
21.00 - 21.99	-
22.00 - 22.99	-
23.00 - 23.99	-
24.00 - 24.99	-
25.00 - 25.99	-
26.00 - 26.99	-
27.00 - 27.99	-
28.00 - 28.99	-
29.00 - 29.99	-
30.00 - 30.99	-
31.00 - 31.99	-
32.00 - 32.99	-
33.00 - 33.99	-
34.00 - 34.99	-
35.00 - 35.99	-
= > 36.00	-

	YEP
Total	4
Min. Length	4.84
Max. Length	7.95
Mean Length	6.52
# Measured	4
No Lengths for	0

Nyte: Unless all fish were measured in the catch, totals shown for some length-frequency distributions may differ from the total number of fish in the catch, due to rounding of fractions used in the estimation of length frequency from a subsample of measured fish

Length Fre² uen2I pistriDutiyn 7yr EF

Stan1ar1 ece2try7ishing

(Field work conducted on 06/12/2014)

	LMj	SMj
< 3.00	-	-
3.00 - 3.49	-	-
3.50 - 3.99	4	2
4.00 - 4.49	4	-
4.50 - 4.99	3	1
5.00 - 5.49	-	-
5.50 - 5.99	-	-
6.00 - 6.49	4	-
6.50 - 6.99	2	2
7.00 - 7.49	3	-
7.50 - 7.99	1	-
8.00 - 8.49	3	-
8.50 - 8.99	1	-
9.00 - 9.49	1	-
9.50 - 9.99	5	-
10.00 - 10.49	2	-
10.50 - 10.99	2	-
11.00 - 11.49	-	-
11.50 - 11.99	-	-
12.00 - 12.99	2	-
13.00 - 13.99	1	-
14.00 - 14.99	2	-
15.00 - 15.99	1	-
16.00 - 16.99	3	-
17.00 - 17.99	1	-
18.00 - 18.99	3	-
19.00 - 19.99	1	-
20.00 - 20.99	-	-
21.00 - 21.99	-	-
22.00 - 22.99	-	-
23.00 - 23.99	-	-
24.00 - 24.99	-	-
25.00 - 25.99	-	-
26.00 - 26.99	-	-
27.00 - 27.99	-	-
28.00 - 28.99	-	-
29.00 - 29.99	-	-
30.00 - 30.99	-	-
31.00 - 31.99	-	-
32.00 - 32.99	-	-
33.00 - 33.99	-	-
34.00 - 34.99	-	-
35.00 - 35.99	-	-
= > 36.00	-	-

	LMj	SMj
Total	49	5
Min. Length	3.70	3.66
Max. Length	19.13	6.85
Mean Length	9.71	5.08
# Measured	49	5
No Lengths for	0	0

Nyte: Unless all fish were measured in the catch, totals shown for some length-frequency distributions may differ from the total number of fish in the catch, due to rounding of fractions used in the estimation of length frequency from a subsample of measured fish

Length At f avture Cith Last 8n2rementacLength

(Body-Scale constant, all lengths, and all length increments in inches)

Sve2ies: Black Crappie
j y1l 4S2ace f ynstant: 0.79
TytacSamvce SiGe: 8

Length at f avture in / 96W7yr Ea2h Age f cassQCith 8n2rementacLengths 7yr / 96W

			Length At f avture				Length 8n2rements	
Year f cass	Age	Samvce SiGe	Aderage Length	Ma) imum Length	Minimum Length	Stan1ar1 Erryr	8n2rement	Stan1ar1 Erryr
2012	2	2	4.51	5.28	3.74	0.768	0.90	0.006
2011	3	1	6.54	6.54	6.54	N/A	0.55	N/A
2010	4	2	7.81	8.86	6.77	1.043	0.55	0.030
2009	5	2	9.57	10.04	9.09	0.472	0.37	0.010
2008	6	1	10.67	10.67	10.67	N/A	0.53	N/A

Sve2ies: Bluegill
j y1l 4S2ace f ynstant: 0.79
TytacSamvce SiGe: 57

Length at f avture in / 96W7yr Ea2h Age f cassQCith 8n2rementacLengths 7yr / 96W

			Length At f avture				Length 8n2rements	
Year f cass	Age	Samvce SiGe	Aderage Length	Ma) imum Length	Minimum Length	Stan1ar1 Erryr	8n2rement	Stan1ar1 Erryr
2012	2	4	3.37	3.58	3.19	0.094	0.34	0.034
2011	3	15	4.52	5.83	3.54	0.167	0.45	0.035
2010	4	10	5.39	6.26	4.33	0.219	0.48	0.045
2009	5	7	6.36	6.85	5.87	0.159	0.31	0.075
2008	6	5	7.08	7.91	6.38	0.338	0.16	0.040
2007	7	13	7.32	8.19	6.57	0.128	0.20	0.021
2006	8	2	7.58	7.68	7.48	0.098	0.16	0.004
2005	9	1	8.35	8.35	8.35	N/A	0.24	N/A

Sve2ies: Northern Pike
j y1l 4S2ace f ynstant: 2.09
TytacSamvce SiGe: 9

Length at f avture in / 96W7yr Ea2h Age f cassQCith 8n2rementacLengths 7yr / 96W

			Length At f avture				Length 8n2rements	
Year f cass	Age	Samvce SiGe	Aderage Length	Ma) imum Length	Minimum Length	Stan1ar1 Erryr	8n2rement	Stan1ar1 Erryr
2013	1	1	11.61	11.61	11.61	N/A	2.76	N/A
2012	2	0	-	-	-	-	-	-
2011	3	2	19.94	21.26	18.62	1.319	0.91	0.338
2010	4	3	21.40	22.95	18.94	1.247	0.96	0.321
2009	5	1	25.24	25.24	25.24	N/A	0.72	N/A
2008	6	1	19.80	19.80	19.80	N/A	0.58	N/A
2007	7	1	24.49	24.49	24.49	N/A	0.50	N/A

Length At f avture Cith Last 8n2rementacLength H*Continued*(

Sve2ies: Walleye
j y1l 4S2ace f ynstant: 1.10
TytacSamvce SiGe: 1

Length at f avture in / 96W7yr Ea2h Age f cassQCith 8n2rementacLengths 7yr / 96W

Year f cass	Age	Samvce SiGe	Length At f avture: Aderage Length	Length At f avture: Ma) imum Length	Length At f avture: Minimum Length	Stan1ar1 Erryr	Length 8n2rements: 8n2rement	Length 8n2rements: Stan1ar1 Erryr
2013	1	1	6.50	6.50	6.50	N/A	0.89	N/A

j a2k4f ac2ucate1 Lengths 7yr Ea2h Age f cass an1 Aderage Annuac8n2rements y7j a2k4f ac2ucate1 Lengths

Sve2ies: Black Crappie
q ear Tl ve: Combined Gear Types (TN)

Class	Age	N	1	2	3	4	5	6
2012	2	2	1.99	3.61	-	-	-	-
			1.99	1.62	-	-	-	-
2011	3	1	2.02	3.99	5.99	-	-	-
			2.02	1.97	2.00	-	-	-
2010	4	2	1.67	3.09	5.29	7.27	-	-
			1.67	1.43	2.20	1.98	-	-
2009	5	2	2.38	4.03	5.97	7.52	9.20	-
			2.38	1.65	1.94	1.56	1.68	-
2008	6	1	1.95	3.39	5.70	7.67	9.20	10.14
			1.95	1.44	2.31	1.97	1.53	0.94
Mean Length			2.01	3.60	5.70	7.45	9.20	10.14
Mean Increment			2.01	1.60	2.10	1.81	1.63	0.94
Total N			8	8	6	5	3	1

Sve2ies: Bluegill
q ear Tl ve: Combined Gear Types (TN)

Class	Age	N	1	2	3	4	5	6	7	8	9
2012	2	4	1.64	3.03	-	-	-	-	-	-	-
			1.64	1.39	-	-	-	-	-	-	-
2011	3	15	1.52	2.78	4.07	-	-	-	-	-	-
			1.52	1.26	1.28	-	-	-	-	-	-
2010	4	10	1.44	2.49	3.71	4.90	-	-	-	-	-
			1.44	1.05	1.22	1.19	-	-	-	-	-
2009	5	7	1.50	2.38	3.57	4.90	6.05	-	-	-	-
			1.50	0.88	1.18	1.34	1.14	-	-	-	-
2008	6	5	1.58	2.57	4.04	5.18	6.34	6.91	-	-	-
			1.58	0.99	1.47	1.13	1.17	0.57	-	-	-
2007	7	13	1.52	2.44	3.68	4.79	5.84	6.62	7.12	-	-
			1.52	0.92	1.23	1.11	1.05	0.79	0.49	-	-
2006	8	2	1.52	2.58	3.64	4.50	5.38	6.10	6.90	7.42	-
			1.52	1.06	1.07	0.86	0.88	0.73	0.80	0.52	-
2005	9	1	1.47	2.18	3.40	4.45	5.80	6.64	7.37	7.74	8.10
			1.47	0.71	1.22	1.05	1.35	0.84	0.73	0.37	0.36
Mean Length			1.52	2.59	3.81	4.87	5.95	6.64	7.11	7.52	8.10
Mean Increment			1.52	1.07	1.25	1.16	1.09	0.73	0.55	0.47	0.36
Total N			57	57	53	38	28	21	16	3	1

j a2k4f ac2ucate1 Lengths 7yr Ea2h Age f cass an1 Aderage Annuac8n2rements y7j a2k4f ac2ucate1 Lengths H*Continued*(

Sve2ies: Northern Pike
q ear Tl ve: Combined Gear Types (TN)

Class	Age	N	1	2	3	4	5	6	7
2013	1	1	8.85	-	-	-	-	-	-
			8.85	-	-	-	-	-	-
2011	3	2	9.33	15.51	19.04	-	-	-	-
			9.33	6.18	3.53	-	-	-	-
2010	4	3	10.61	15.55	18.99	20.45	-	-	-
			10.61	4.94	3.44	1.46	-	-	-
2009	5	1	11.94	17.76	20.99	23.19	24.52	-	-
			11.94	5.82	3.23	2.20	1.33	-	-
2008	6	1	7.38	12.44	15.23	16.75	18.44	19.22	-
			7.38	5.06	2.79	1.52	1.69	0.78	-
2007	7	1	8.21	12.12	15.08	19.02	21.33	23.08	23.99
			8.21	3.91	2.96	3.94	2.31	1.75	0.91
Mean Length			9.65	15.00	18.29	20.05	21.43	21.15	23.99
Mean Increment			9.65	5.25	3.29	2.01	1.78	1.27	0.91
Total N			9	8	8	6	3	2	1

Sve2ies: Walleye
q ear Tl ve: Combined Gear Types (TN)

Class	Age	N	1
2013	1	1	5.61
			5.61
Mean Length			5.61
Mean Increment			5.61
Total N			1

Age f cass Fre² uen2l pistriDutiyn

Sve2ies & SS Tl ve H6(	Number y7Fish H(Age1	Kel e1	Unage1	NumDer y7Fish in Year f cass Hl l (an1 Age f cass '6W 9	'6- 6	'6/ /	'66 -	'69 W	'9b 3	'9z 0	'95 5	'90 z	'93 b	'9W 69	'9- 66	'9/ 6/	'96 6-	'99 6W	<'99 63+
j ca2k f ravvie																			
TN	8	0	0	0	0	2	1	2	2	1	0	0	0	0	0	0	0	0	0
j cuegicc																			
TN	57	181	0	0	0	4	37	42	41	28	73	10	3	0	0	0	0	0	0
Nyrthern Pike																			
TN	9	0	0	0	1	0	2	3	1	1	1	0	0	0	0	0	0	0	0
o accel e																			
TN	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0

H6(Kel ty Samvcing Statiyn HSS(Tl ve aDDrediatiyns:
TN = Standard 3/4-in mesh, double frame trap net sets

Hl (Nytes:
Number of Fish Aged: Fish that were aged from bony parts.
Number of Fish Keyed: Fish assigned an age with an age-length key or by expansion of mesh or station age distributions.
Number of Fish Unaged: Fish that were not aged and were not assigned an age.

Other Sve2ies

q ear Tl ve (1)	Other Sve2ies Hq en1er((2)	Tytac Num	NumDer Measure1	Length Hin2hes(Min 4Mean 4Ma)	NumDer o eighe1	o eight Hyun1s(Min 4Mean 4Ma)
TN	Painted Turtle	6	0	N/A	0	N/A
	Snapping Turtle	5	5	4.92 - 8.67 - 11.02	0	N/A
	Spiney Softshell Turtle (Male)	1	1	7.24	0	N/A

H6(Kel ty samvcing gear aDDrediatiyns:
TN = Standard 3/4-in mesh, double frame trap net sets

Hl (q en1er: If identified and reported.

Surdel f reC Nytes

null

Area Signed by user 'eraltena' on 03/13/2015

Region Signed by user 'damccorm' on 04/17/2015

p is2ussiyn

A population assessment was conducted on Sylvan Lake in mid-June of 2014 utilizing trap nets and electrofishing to evaluate the fish community. No gill nets were used as this has proven in past surveys to be a difficult endeavor with the river current, steep drop-offs, and extensive vegetation beds which grow on the shallow flats created as sediment settles from the water. Sylvan Lake is a reservoir created by a dam downstream of the confluence of the Crow Wing and Gull Rivers. The lake is known for its panfish community and the June trap netting typically coincides with Bluegill and Black Crappie spawning during spring.

Several changes appear to have occurred in the fish community since the last survey in 2008. The most notable and possibly detrimental was the increase in the Common Carp catch. The 3.9/TN (n=47) catch in 2014 was a significant increase from the 2008 catch of 0.6/TN (n=7). The 2014 catch rate was above the lake class 35 75% quartile of 1.5/TN and a record high for the lake. Prior carp catches were 0.3/TN in 2002 and 0.2/TN in 1996. The 2014 fish ranged from 17.8 to 28 inches in length with a mean length of 22 inches. Most of the fish (64%) were from 20 to 24 inches in length suggesting one or two years of good reproduction were responsible for the increased abundance.

The primary management species for Sylvan Lake are Bluegill and Northern Pike with Black Crappie, Walleye, and Largemouth Bass as secondary species. Although some gamefish were caught in the trap nets, gill nets are typically more effective at catching Northern Pike and Walleye and showing their population size structures. Nine Northern Pike between 11.6 and 25.2 inches were netted in the 2014 trap nets along with two Walleye, 6.5 and 21.5 inches in length. Two of the pike (22%) were more than 24 inches in length. Ages 1 and 3 through 7 were represented in the pike sample suggesting low but consistent recruitment. Only the small Walleye was aged which was one year old.

The 2014 Bluegill trap net catch of 19.8/set (n=238) was a record low for Sylvan Lake and down from the 24.6/set (n=295) in 2008. The catch rate, however, remained within the normal range for lake class 35 (interquartile range = 4 - 28.1/GN). The previous four trap net catches, 69.5/TN in 2002, 35.6/TN in 1996, 31.0/TN in 1990, and 103.5/TN in 1985, were all above the 75% quartile.

Bluegill in the 2014 sample measured from 3.2 to 8.4 inches in length with a mean length of 6.4 inches and modal length of 7 - 7.5 inches. Fish that exceeded seven inches accounted for 34% (n=81) of the sample with 2% (n=5) more than eight inches in length. Size structure of the 2008 sample was more desirable. The length range was similar to that in 2014 as was the modal length, but mean length was 7.2 inches and 78% (n=230) of the fish were longer than seven inches with 7% (n=20) more than eight inches in length. Bluegill larger than nine inches have not been recorded in any of the surveys.

Ages 2 through 9 were represented in the 2014 Bluegill sample suggesting consistent recruitment. Growth rates for the age groups were normal to fast when compared to an Area Mean Back-calculated Length table.

The Black Crappie catch (0.7/TN; n=8) in the 2014 population assessment was a record low for Sylvan Lake but not a significant decrease from the 2008 catch of 2.6/TN (n=31). The 2014 catch rate was equal to the 25% quartile for lake class 35. The highest crappie catch was 4.5/TN in 1985. There was a wide range of sizes sampled, from 3.7 to 10.7 inches. Three of the fish (38%) were longer than nine inches in length which met the lake management goal for Black Crappie. Both lake management goals were met by the 2014 trap net catch, having a catch within the lake class interquartiles with at least 25% of the fish more than nine inches.

Ages 2 through 6 were represented by the 2014 crappie catch suggesting low but consistent recruitment. Growth rates appeared to be slow to normal when compared to an Area Mean Back-calculated Length table.

Three Largemouth Bass between 8.6 and 16.4 inches were sampled in the 2014 trap nets. Spring daytime electrofishing was also conducted to better evaluate the bass population. A total of 49 bass were caught in an hour of on-time. The bass measured from 3.7 to 19.1 inches with a mean length of 9.7 inches and 16% (n=8) more than 16 inches in length. PSD for the sample was 50. Results from the electrofishing effort met management goals of 40 bass per hour and PSD over 40.

Pumpkinseed was one fish species to display a significant change in abundance since the last lake survey.

pis2ussiyn H*Continued*(

The 0.9/TN set (n=11) in 2014 was a significant decrease from the 4.8/TN catch of 2008 and lowest on record for the lake as well as below the 25% quartile of 1.5/TN for lake class 35. Other trap net catches ranged from 6.6/set in 1996 to 9.5/set in 1985 for Pumpkinseed. The 2014 Rock Bass catch of 0.08/TN (n=1) was also below the lake class 25% quartile of 0.2/TN. An additional sunfish species sampled in the 2014 population assessment was hybrid sunfish.

Roughfish species sampled in Sylvan Lake included Bowfin or Dogfish, Brown Bullhead, Shorthead Redhorse, Silver Redhorse, White Sucker, and Yellow Bullhead, several which are common in riverine systems. The 2014 Brown and Yellow Bullhead catches were below their 25% quartiles suggesting low abundance. The Yellow Bullhead catch of 0.2/TN (n=3) was also a significant decrease from the 2008 catch of 4.4/TN (n=53). Catch rates for both Shorthead Redhorse and White Sucker were within their respective interquartile ranges suggesting normal abundance. The Bowfin catch of 1.3/TN was just above the 75% quartile of 1.2/TN for lake class 35.

The 2014 catch rate for Yellow Perch (0.3/TN; n=4) was below the 25% quartile of 0.5/TN for the lake class but equal to the 2008 catch. Gill nets are frequently a better indicator of Yellow Perch abundance.

Status O7The FisherI

Sylvan Reservoir is a riverine lake formed at the confluence of the Crow Wing River and Gull Rivers by the Sylvan Dam. Most of the land around the main basin is owned by Minnesota Power and Light Company or is part of the Camp Ripley Military Reservation. Any private development is on the Gull River. Anglers have long used the bridge over the Gull River for fishing. The area around the bridge was improved for shore fishermen with the addition of large granite blocks. Shore anglers also utilize the boat access dock for fishing. The species most sought after from the bridge and dock is Bluegill. Boat anglers fish not only the reservoir for Northern Pike, Walleye, Black Crappie, and Largemouth Bass, but travel up both rivers as well.

Large sediment deposition areas with lush vegetation are located in the middle of the reservoir and on the south side of where the Crow Wing River enters. Curly leaf pondweed is common in both the main reservoir as well as the Gull River. Stream flow from the Crow Wing River has carved a deeper channel in the reservoir, which follows the south shoreline for much of the main basin. Boat anglers are advised to consult maps or watch their depth finders while traveling toward the Crow Wing River. Water clarity is impacted by rain events and flows from the two major tributaries.

Bluegill numbers are considered to be within the normal range when compared to similar type lakes. Fish between 6.5 and 7.5 inches in length were common in the survey. Few Black Crappie were netted during the survey but a wide range of sizes was observed. The two gear types used in this survey, trap nets and spring electrofishing, typically do not represent Northern Pike and Walleye populations well unless performed during spring or fall. The Northern Pike observed in the survey were all less than 26 inches in length but larger pike have been recorded in previous surveys. Sylvan historically has had a low Walleye population despite regular stocking prior to 1994. The population was then sustained by natural reproduction until 2006 when stocking was performed. Fry stocking still occurs, but with two major rivers feeding the reservoir, it is not known if the Walleye are staying in the reservoir. Walleye have been observed and fished below both the Placid Lake Dam and Gull River Dam. Some nicer Largemouth Bass were documented during daytime electrofishing on the reservoir. Although the average size of the bass caught was about 10 inches, there were some fish up to 19 inches measured. Five smaller Smallmouth Bass, under seven inches in length, were also sampled during the electrofishing effort.

Sylvan Reservoir supports a diverse roughfish community that is indicative of a riverine system. White Sucker, Shorthead Redhorse, and Silver Redhorse were all sampled in the survey along with Bowfin or Dogfish, Brown Bullhead, Yellow Bullhead, and Common Carp. Some other fish species found in the reservoir include Pumpkinseed Sunfish, hybrid sunfish, and Rock Bass.

Avvrydacpates An1 Nyti2es

Date Approved By Little Falls Area Fisheries Supervisor: 9- I6- I/ 963

Date Approved By Central Region Fisheries Manager: 9W65I/ 963

Stream Management Plan

Stream Name: Mississippi River		**Reach:** Little Falls Dam to Blanchard Dam (9 miles) – Zebulon Pike Reservoir	**Tributary Number:** M-1
Region: III	**Area:** 350	**Ecological Classification:** Class II – SMB, MUE, WAE	**County (ies):** Morrison

Long Range Goal: Protect and improve water quality, stream habitat, and flow regimes within the stream and its watershed to provide adequate conditions for the maintenance of self-sustaining populations of smallmouth bass, muskellunge, walleye and northern pike and to maintain species diversity within the fish community. Maintain spring electrofishing Catch per unit effort (CPUE) of 30 per hour and RSD-15 of 50 or greater for smallmouth bass. Maintain spring muskellunge electrofishing CPUE of 0.2 per hour or 0.02 per hour by angling with 25% being 40 inches or larger. Maintain the presence of muskellunge over 50 inches and protect the genetic integrity of the population. Maintain spring electrofishing CPUE of 15 per hour or greater for walleye age I and older. Maintain Index of Biotic Integrity (IBI) scores in full surveys and population assessments of 60 or greater at all stations.

Operational Plan:

1) Work with riparian landowners, citizen groups, agencies such as the Mississippi Headwaters Board, National Resources Conservation Service (NRCS), Morrison County Soil and Water Conservation District (SWCD), Minnesota Pollution Control Agency (MPCA), watershed districts, local water planners, local planning and zoning, U. S. Fish and Wildlife Service (USFWS), county and municipal governments, high schools and colleges, other DNR sections, and state agencies to plan, implement and document proper watershed and riparian land use practices.
2) Support regulatory authority of the Mississippi Headwaters Board (MHWB) to maintain uniform shoreline development regulations on the river corridor.
3) Work in coordination with the MPCA and Morrison SWCD to evaluate and monitor water quality using biotic and physical indicators. Work to include water quality monitoring on major tributaries.
4) Investigate Division of Waters (D.O.W.) and Aquatic Plant Management (A.P.M.) permits to ensure protection of riparian and in-stream habitat within the watershed and maintain ecological integrity of the stream corridor.
5) Provide fish samples requested by the Department of Public Health and the USFWS for continued contaminant monitoring.
6) Conduct fish population assessments with an IBI component in cooperation with other DNR Area Offices every 10 years with the next assessment in 2017.
7) Conduct directed smallmouth bass/gamefish electrofishing assessments every four years with the next in the spring of 2012.

Mississippi River – Little Falls to Blanchard Dam - Stream Management Plan

Operational Plan (continued):

8) Review hydropower re-licensing documents in coordination with DNR Ecological Resources Division to minimize flow fluctuations by requiring specific guidelines are followed for "run-of-the-river" operation. Monitor compliance of hydropower operations by requesting and analyzing hydrographic data from operators.
9) Area Fisheries staff will actively participate in the development of the Mississippi River Low Flow Water Plan.
10) Protect critical gamefish spawning and wintering habitats identified in various studies (ie. MUE telemetry), population assessments and surveys.
11) Educate riparian landowners of river resource ecology and the importance of instituting best management practices (BMPs) to protect shoreline and near shore habitats.
12) Support wetland improvement/restoration projects proposed by USFWS, Ducks Unlimited, Minnesota Waterfowler's Association, and county and state conservation agencies within the watershed.
13) Support the purchase of conservation easements in the watershed.
14) Support efforts by other DNR sections, private land trusts, and local government agencies to establish, protect and connect sensitive and outstanding resources by helping to identify potential "greenways" or natural corridors worth protecting for their habitat and wildlife value in the watershed.
15) Pursue construction of proposed fish passage around Little Falls Dam.
16) Provide input to Army Corps of Engineers' (COE) Reservoir Operation Plan Evaluation (ROPE) so that resources are protected or enhanced due to changes in upper Mississippi reservoir management/manipulation.

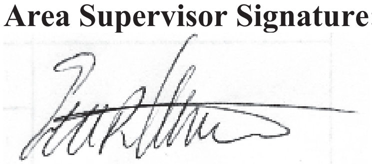
Mid Range Objectives:

1) Monitor shoreline habitat and determine whether protective development standards are being followed in the riparian corridor.
2) Determine if improvements and protection of water quality and habitat have been achieved through the development of partnerships with other agencies and organizations.
3) Collation of pertinent biological, limnological, and physical information relative to the stream and watershed.
4) Adequate inventory of fish populations to assess progress toward management goals.
5) Complete construction of fish passage.
6) Monitor operation of upstream and downstream dams to determine that compliance to specific "run-of-river" operational guidelines is occurring.

Mississippi River – Little Falls to Blanchard Dam - Stream Management Plan

Potential Plan:

1. Conduct a creel/recreational use survey to estimate fishing pressure and recreational use.	**$10,000.00**
2. Purchase AMAs and conservation easements that contain valuable fish habitats on the Miss. R. and its tributaries.	**$250,000.00**
Total Cost:	**$260,000.00**

Primary Species Management: Smallmouth bass, Walleye, Muskellunge	**Secondary Species Management:** Northern pike
Area Supervisor Signature: 	**Date:** **4/28/2009**
Regional Manager Signature:	**Date:**

Mississippi River – Little Falls Dam to Blanchard Dam (Zebulon Pike Reservoir) Stream Management Plan – Narrative

<u>Past Surveys:</u> Stream surveys were completed in 1965, 1982 and 2007/2008. Population assessments were completed in 1987, 1992 and 1995. Spring smallmouth bass assessments were completed in 1994, 1995, 1996, 1997, 2000, 2002, 2004, 2006 and 2008. Annual aerial fish house counts were taken from 1985 through 1993. DNR Ecological Services conducted a fish survey to develop a species list in 1989. DNR Fisheries Research performed a muskellunge telemetry study from 1990 to 1993. A muskellunge strain study was conducted in 1990. Water quality on the Mississippi and Swan Rivers was monitored by Little Falls High School students under the Riverwatch Program (later Aquatech) from 1991 to 2004.

<u>Past Management:</u> A total of 1,140 muskellunge of unknown strain were stocked from 1976 through 1980. Muskellunge fingerlings from Mississippi River brood stock were stocked in 1988 (1,000), 1990 (514), and 1991 (614). All muskies stocked were given a right pelvic fin clip. Muskellunge stocked in 1988 were tagged with blue or green floy tags. Eighteen adult and yearling muskellunge were removed from 1987 to 1990 in an attempt to develop Lake Alott (Camp Ripley) as a brood lake. A total of 1,400,000 walleye fry were stocked in 1984. Brood stock smallmouth bass (200) were collected in 1992 for introduction into the Otter Tail River (Fergus Falls area). An erosion control (rip-rap) project was completed at Maple Island Park in 1988. Fishing was closed (750 feet on the east bank and 900 feet on the west bank) below Little Falls Dam to protect spawning walleye through mid-May from 1981 through 1993. Ecological Services conducted a fisheries survey in 1989. Boating and angling were prohibited in a

<u>Past Management (continued):</u>
muskellunge spawning area established in 1985 approximately 4 miles downstream of Little Falls Dam. The Morrison SWCD completed an erosion control project (rip-rap) and a fencing project (cattle exclusion) on this stretch of the river. Catch and release regulations for muskellunge were instituted in 2007.

<u>Stream and Watershed Alterations:</u>

1) Two hydropower dams affect this stretch of the Mississippi River and its watershed. The Blanchard and Little Falls Dams, owned by Minnesota Power Company, are located at opposite ends of this stretch of the river and are barriers to fish movement. Blanchard Dam is responsible for creating Zebulon Pike Reservoir.
2) Agriculture is a major land use in the watershed and has impacts including: nutrient loading, erosion, sedimentation, pesticide runoff, channelization and wetland drainage. The Swan River watershed is heavily impacted by agricultural land uses. The use of center pivot irrigation within the Mississippi watershed is common.
3) Municipal and residential development continues to increase along the stream corridor.
4) Logging takes place in parts of the watershed but not on a large enough scale to be of major concern.
5) Riprap has been placed along the shoreline at Maple Island Park and other areas.
6) A man-made channel diversion through Hennepin Paper Company breeched to the west channel of the Mississippi River in 2001 and eroded large amounts of sediment and debris into the river. The site was restored in 2004. A park has been erected at the Hennepin Paper mill site.
7) Channelization of tributary streams such as Pike Creek has adversely affected potential gamefish and preyfish spawning habitat.

<u>Social Considerations:</u>

1) The City of Little Falls is located on the banks of the river and has been a cooperative partner on some projects but has not been a good steward of riparian lands.
2) The Mississippi Headwaters Board has jurisdiction regarding shoreland ordinances within this stretch of the river. Conflicts have occurred with riparian landowners disputing the need for restrictive ordinances.
3) Operation of hydropower dams has impacts on fish populations. These impacts are currently mitigated through the Blanchard facility hydropower license through a $10,000/year payment by MP&L.
4) Agricultural land and water use practices greatly impact the watershed. Working with agencies and landowners is vital to proper watershed management. Urban

and rural land use planning will become increasingly important to river management.

Social Considerations (continued):

5) This portion of the river is a state designated canoe route.
6) The City of Little Falls has a wastewater treatment plant that discharges treated water to this section of the river.
7) Municipal and residential development continues to increase near and below Little Falls. Enforcement of shoreland ordinances is needed to minimize impacts to riparian habitats.
8) Spill containment sites have been identified along this section of the Mississippi River by the U.S. Army Corp of Engineers.
9) Two public access sites are available, one at the confluence of Pike Creek and another immediately upstream of Blanchard Dam on the east bank.
10) Public shore-fishing sites are located in Little Falls below the dam at Maple Island Park on the east side of the river and Mill Park on the west side of the river.
11) Recreational use including fishing pressure appears to be moderate and increasing.
12) Commercial fishing has taken place on a very limited basis. Commercial harvest of turtles has occurred. During 1992 a request was made to harvest mussel shells from Brainerd to Royalton. This request was denied.
13) A petroleum pipeline crossing exists approximately 2.8 miles downstream of Little Falls Dam.
14) A fish passage around Little Falls Dam is proposed through the diversion channel used by the former Hennepin Paper Company.
15) Zebra mussels, purple loosestrife, and curlyleaf pondweed are exotic species present in this stretch of the river.

Cultural and Natural Elements:

1) Lindbergh State Park is located on the west bank, south of Little Falls.
2) The site of Zebulon Pike's fort is located immediately downstream of the mouth of the Swan River and is flooded by Zebulon Pike Reservoir.
3) The Weyerhauser Museum, which emphasizes the river and the area's logging history, is located on the west bank near Lindbergh State Park.

Limiting Factors:

1) Water level fluctuations and seasonal flow regimes created by hydropower operations and natural events can limit fish populations and cause changes to habitat. Climatic factors such as precipitation and temperature have major impacts on populations of certain species. Large year classes of smallmouth bass have been correlated with low water and warm temperatures.
2) Water quality in the Mississippi River and its tributaries is impacted by agricultural activities in the watershed through nutrient loading, pesticide runoff, erosion and sedimentation. Irrigation, ditching, channelization of tributaries, and wetland drainage may also affect river flows.

3) Industrial impacts to the river include changes in stream characteristics and fish migrations due to dams, and release of contaminants and toxic substances.

Limiting Factors (continued):

4) Increasing development along the stream corridor is reducing the available riparian habitat.
5) Purple loosestrife, an exotic plant, has become established on a large portion of the river bottomlands below Little Falls resulting in the loss of more desirable native shoreline cover types.
6) Zebra mussels have been identified below Blanchard Dam and are considered to be present in this stretch of the river.

Survey Needs and Evaluation Plans:

1) A comprehensive river survey, in conjunction with other DNR Fisheries Areas, will be conducted every 10 years with the next survey in 2017.
2) Special smallmouth bass assessments will be conducted every four years with the next to be completed in 2012.
3) Past statewide muskie angler diary research has been valuable for monitoring catch rates and population trends on this stretch of the river.
4) Recreational use/creel surveys would be valuable to monitor trends in the fishery on this stretch of the river.

Land Acquisition Needs: None pending, however, acquisition of riparian lands (AMAs) critical to fish management will be considered if such sites become available.

Habitat Development Needs: The need for erosion and sedimentation control, pollution abatement and habitat development projects will be identified from stream inventories and GIS generated maps in partnership with individuals and agencies listed in the operational plan. Technical advice and professional guidance will be provided to Morrison County and City of Little Falls officials pertaining to erosion control measures for impacted sites. Use of "Best Management Practices" in riparian zones on this section of the Mississippi River and its tributaries will minimize impacts and maintain or improve in-stream habitat. A greater emphasis needs to be placed on comprehensive watershed management planning to initiate projects of this type. Completion of a proposed fish passage around Little Falls Dam would add riffle habitat and also benefit species requiring long unimpeded stretches of river for their life history.

Habitat Protection Needs: Working with the Mississippi Headwaters board to ensure maintenance and enforcement of shoreland ordinances that protect riparian areas will be done to protect habitat. Protecting riparian habitat will also be accomplished by providing recommendations to the City of Little Falls, Local Water Planners, the NRCS, Morrison SWCD, and other agencies. Critical review of DNR D.O.W. and A.P.M. permits will be important for habitat protection. Information gathered on stream inventories and GIS watershed mapping will be useful in identifying habitat protection needs.

Stocking: None needed.

Mississippi River – Little Falls Dam to Blanchard Dam – Stream Management Plan

Regulations: Catch and release regulations have been in effect for muskellunge since 2007. Boating and angling are prohibited in a muskellunge spawning area established in 1985 approximately 4 miles downstream of Little Falls Dam. Special smallmouth bass regulations could be implemented if an increase in angling pressure/harvest is detected.

Mississippi River – Little Falls Dam to Blanchard Dam
Fish Population Description

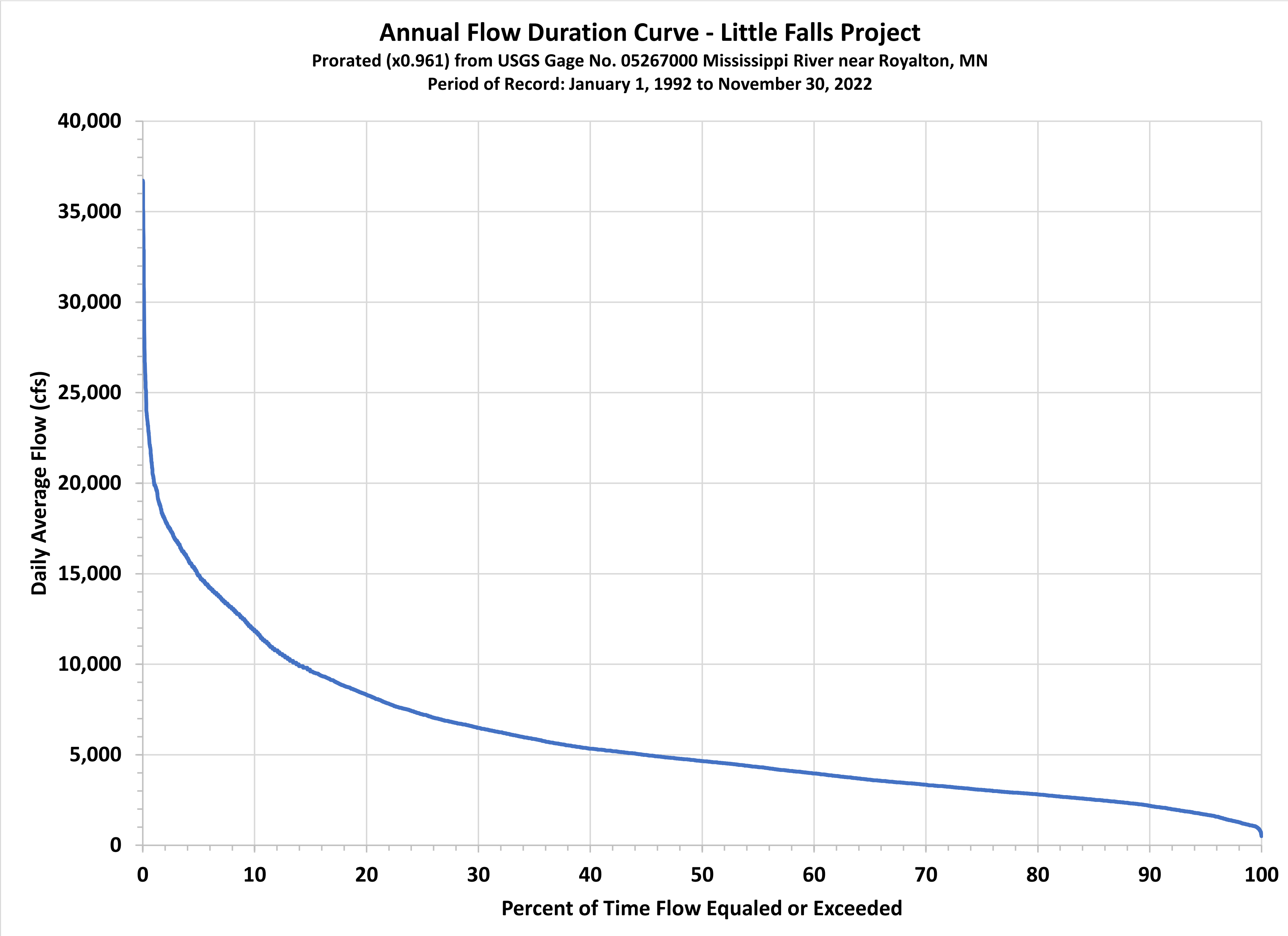
A diverse fish community exists in this section of the Mississippi River. A total of 37 different fish species have been sampled in five DNR Fisheries conducted population assessments/stream surveys. Common carp, silver and shorthead redhorse and smallmouth bass typically dominate catch biomass and CPUE. Other species commonly caught included common shiner, white sucker, rock bass, yellow perch, logperch and walleye. Several species considered sensitive to pollution were present in the fish community including, muskellunge, hornyhead chub, spottail shiner, blacknose shiner, greater redhorse, rock bass, and smallmouth bass.

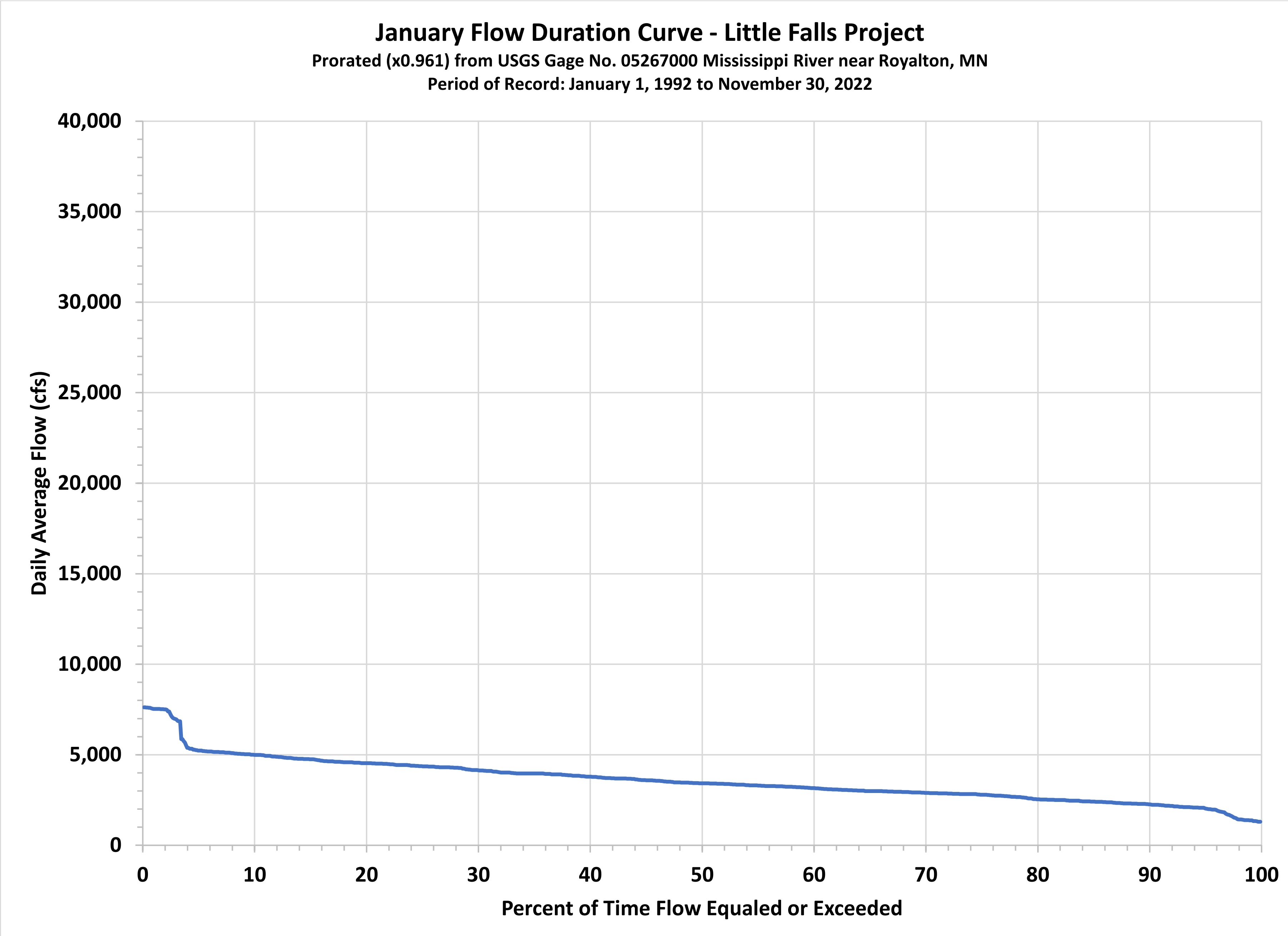
All gamefish present in the Mississippi River are natural and self-sustaining with the exception of channel catfish. In addition, introduced channel catfish have also become naturalized and reproduce successfully. Special assessments directed at smallmouth bass have provided valuable information for most gamefish species. Nine such assessments have been conducted since 1994. CPUE for smallmouth bass has ranged from 13.0/hour to 68.9/hour with a mean of 43.5/hour. PSD values for bass are typically very high for these assessments ranging from 87 to 100. Growth rates are fast when compared to other Midwest populations. CPUE for walleye ranged from 4.6/hour to 36.5/hour with a mean of 22.8/hour. The majority of fish sampled are less than 16.0 inches and typically age IV and younger, however, walleye to 26 inches and age IX have been observed. Growth rates are typically moderate to slow, but variable depending on the individual fish and sex. Northern pike CPUE ranged from 4.3/hour to 9.8/hour with a mean of 7.2/hour. Northern pike from yearling size to 35.5 inches have been sampled in special smallmouth bass assessments. Although difficult to sample efficiently, muskellunge are typically seen or captured during spring assessments. Individuals in the 40+ inch range are commonly observed and anglers report fish in the 50+ inch range have been caught. Channel catfish up to 26.7 inches have been sampled. Anglers have reported fish in excess of 15 pounds. An increase in angler reports suggests this species may be increasing in this river section. Black crappie and bluegill have been sampled in low numbers in most assessments. Recent assessments and surveys have sampled panfish in higher numbers and anglers have begun to target these species. Growth rates for both bluegill and black crappie are fast. Largemouth bass are occasionally sampled during assessments but do not provide a significant angling opportunity.

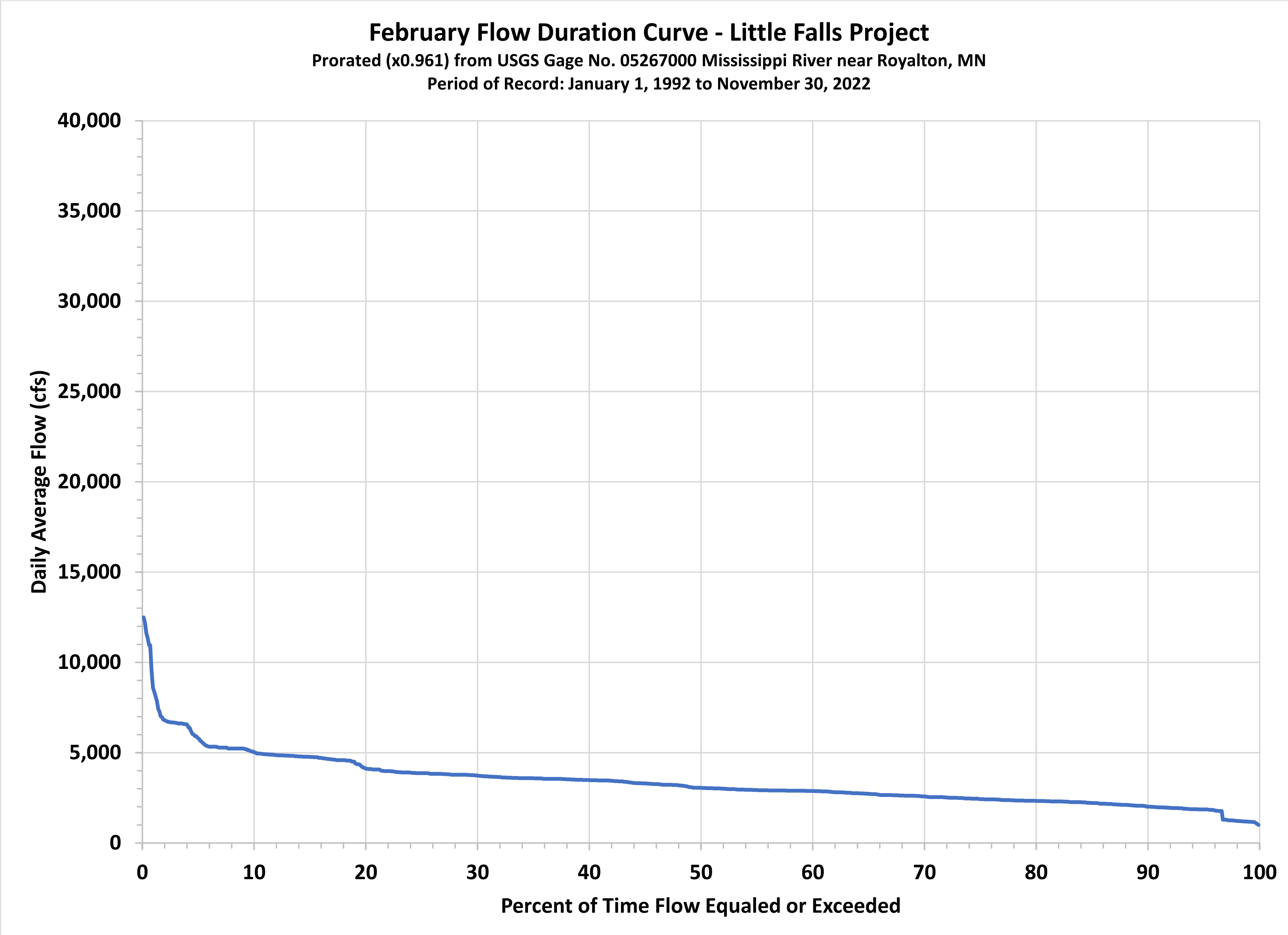
The Mississippi River from Little Falls to Blanchard Dam provides excellent angling opportunities for walleye, smallmouth bass, and muskellunge. Catch rates for walleye are high during spring and fall while bass are typically sought in spring, late summer, and fall. Muskellunge are targeted primarily during summer. Most anglers release the smallmouth bass and muskellunge they catch. Catch and release regulations for muskellunge have been in effect since 2007. Anecdotal evidence suggests angling for channel catfish, bluegill and black crappie is becoming more popular. A creel/recreational use survey would be beneficial to document angling trends on this stretch of the river.

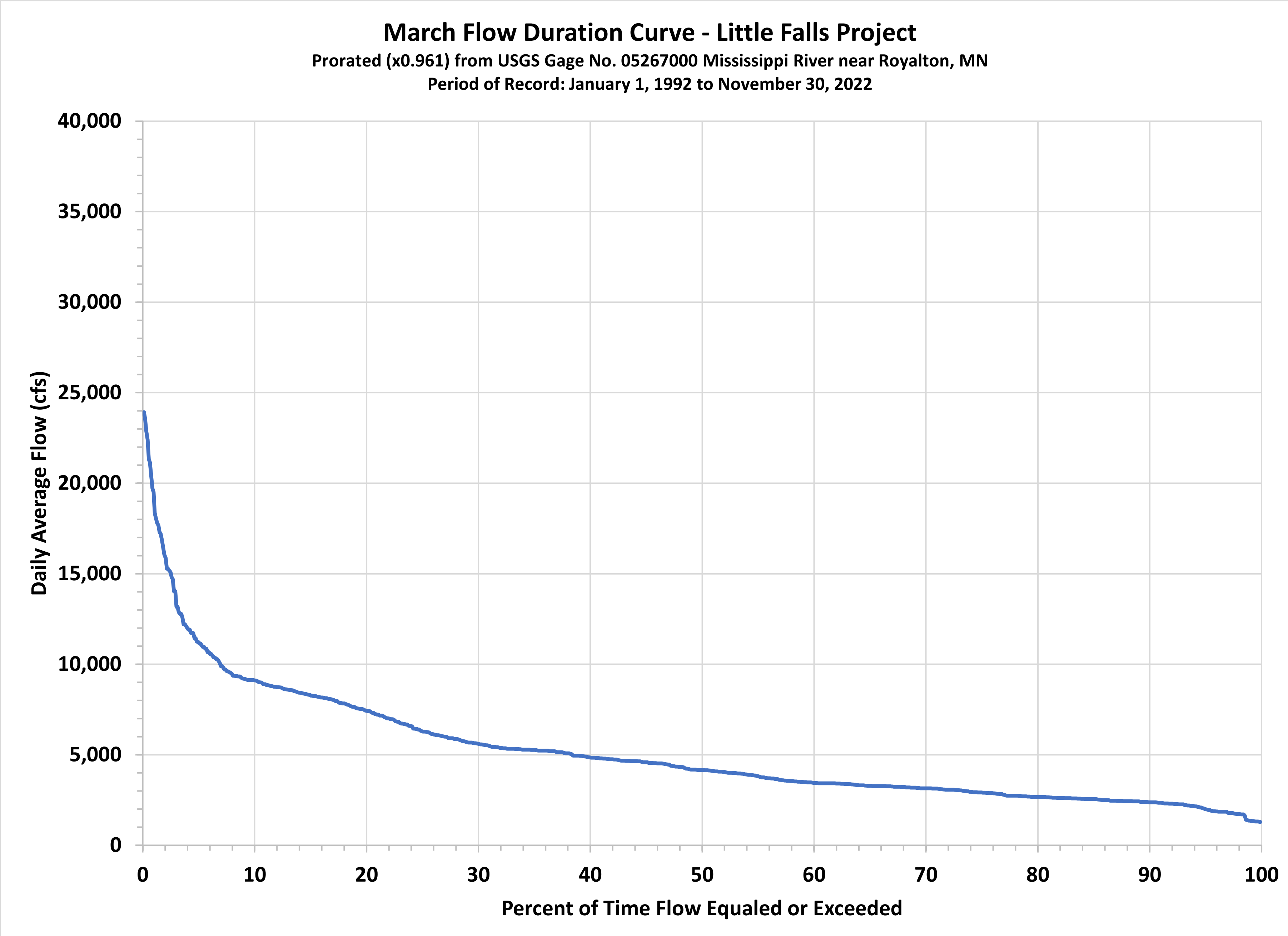
APPENDIX B

FLOW DURATION CURVES

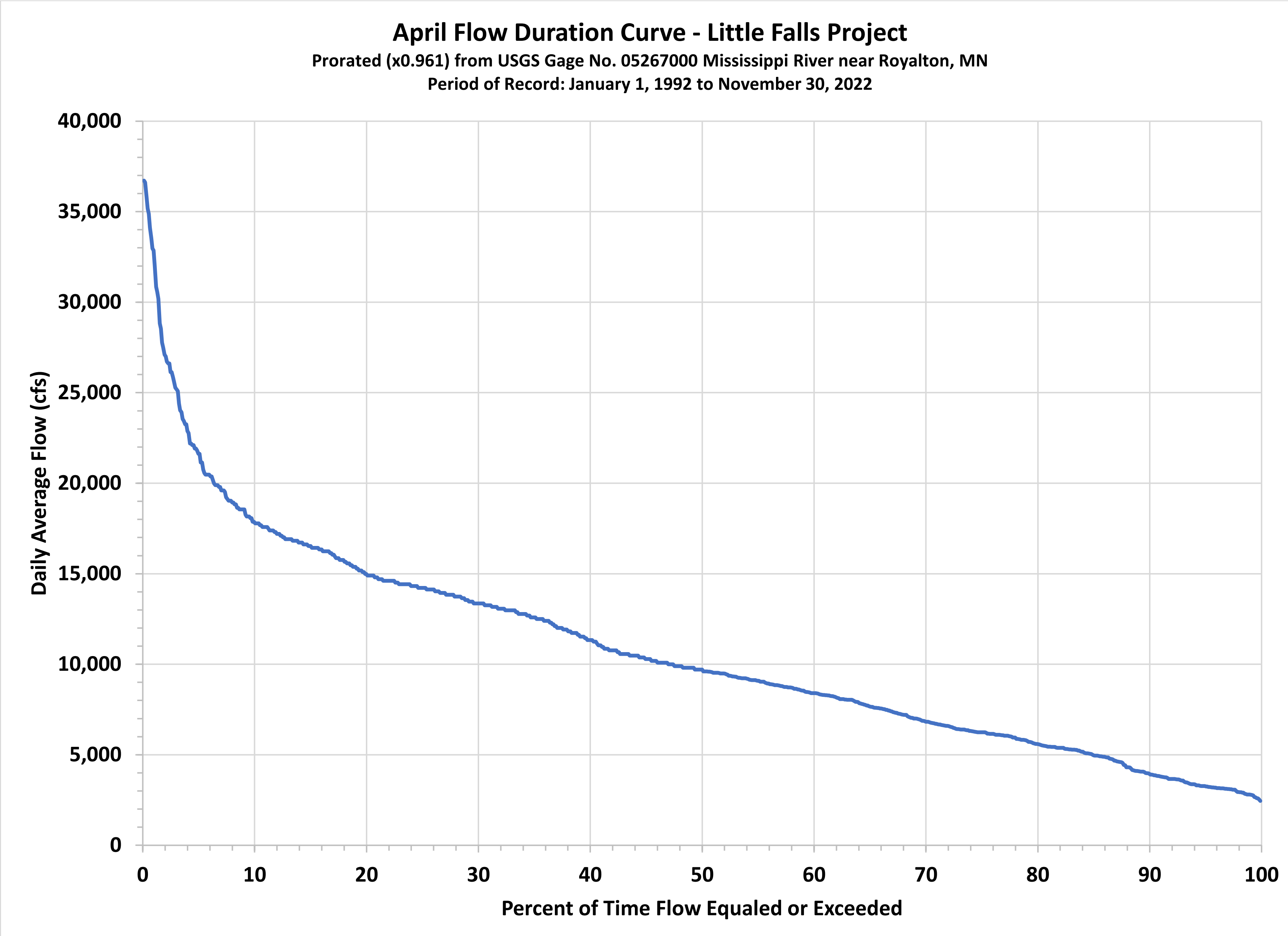

Annual Flow Duration Curve - Little Falls Project
Prorated (x0.961) from USGS Gage No. 05267000 Mississippi River near Royalton, MN
Period of Record: January 1, 1992 to November 30, 2022
Daily Average Flow (cfs)
40,000
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
0
10
20
30
40
50
60
70
80
90
100
Percent of Time Flow Equaled or Exceeded

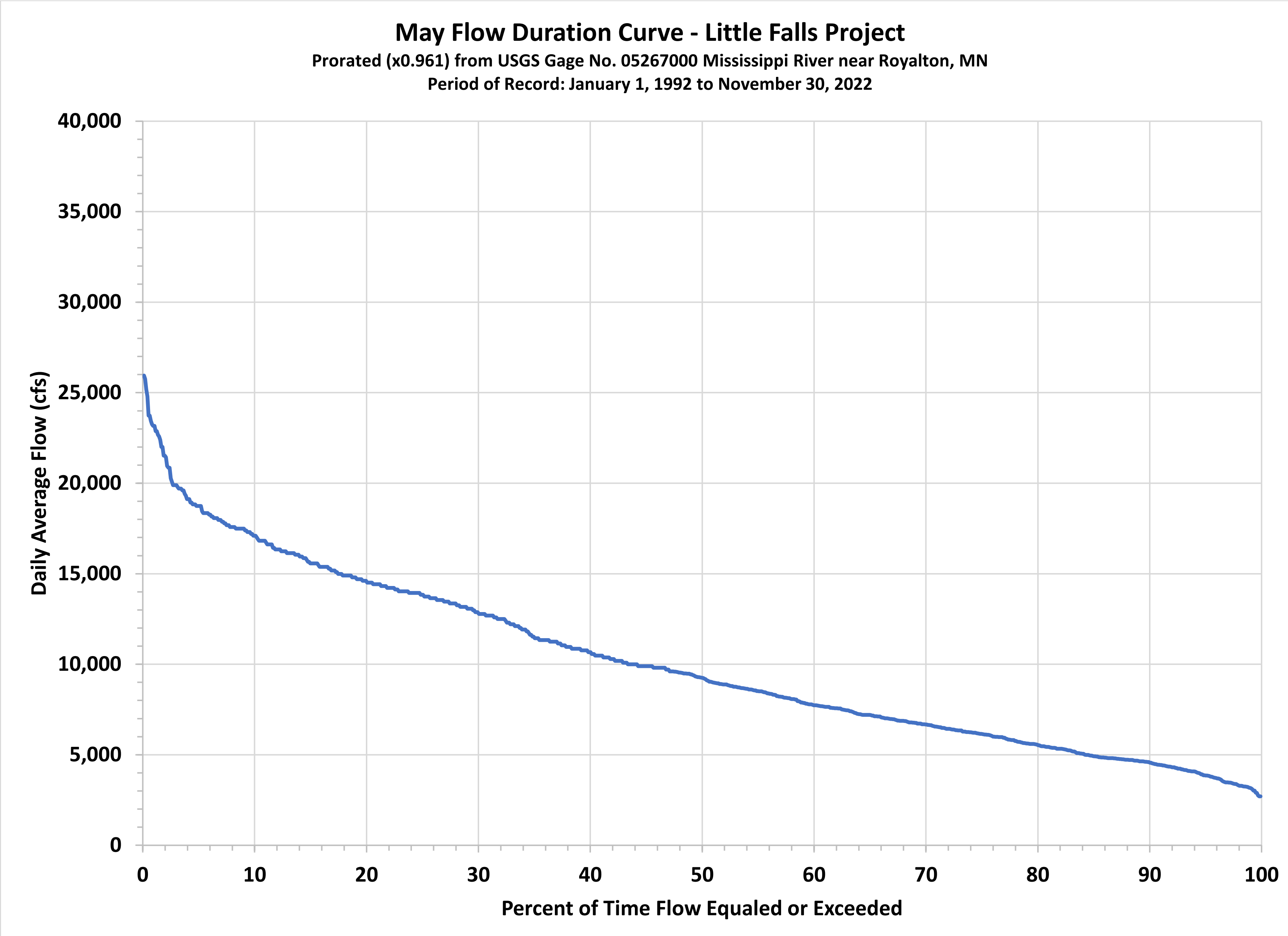

January Flow Duration Curve - Little Falls Project
Prorated (x0.961) from USGS Gage No. 05267000 Mississippi River near Royalton, MN
Period of Record: January 1, 1992 to November 30, 2022
Daily Average Flow (cfs)
40,000
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
0
10
20
30
40
50
60
70
80
90
100
Percent of Time Flow Equaled or Exceeded

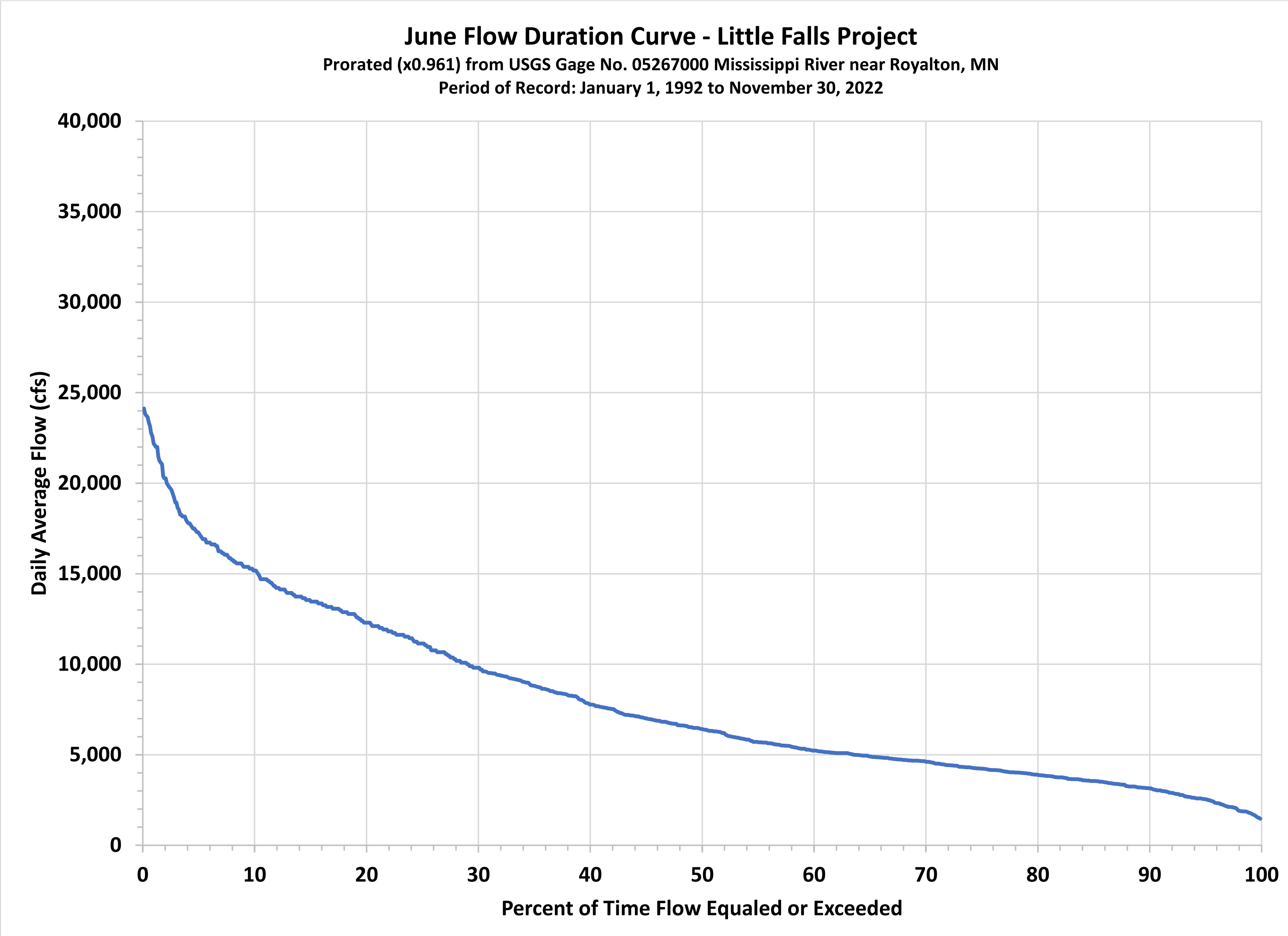

February Flow Duration Curve - Little Falls Project
Prorated (x0.961) from USGS Gage No. 05267000 Mississippi River near Royalton, MN
Period of Record: January 1, 1992 to November 30, 2022
Daily Average Flow (cfs)
40,000
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
0
10
20
30
40
50
60
70
80
90
100
Percent of Time Flow Equaled or Exceeded

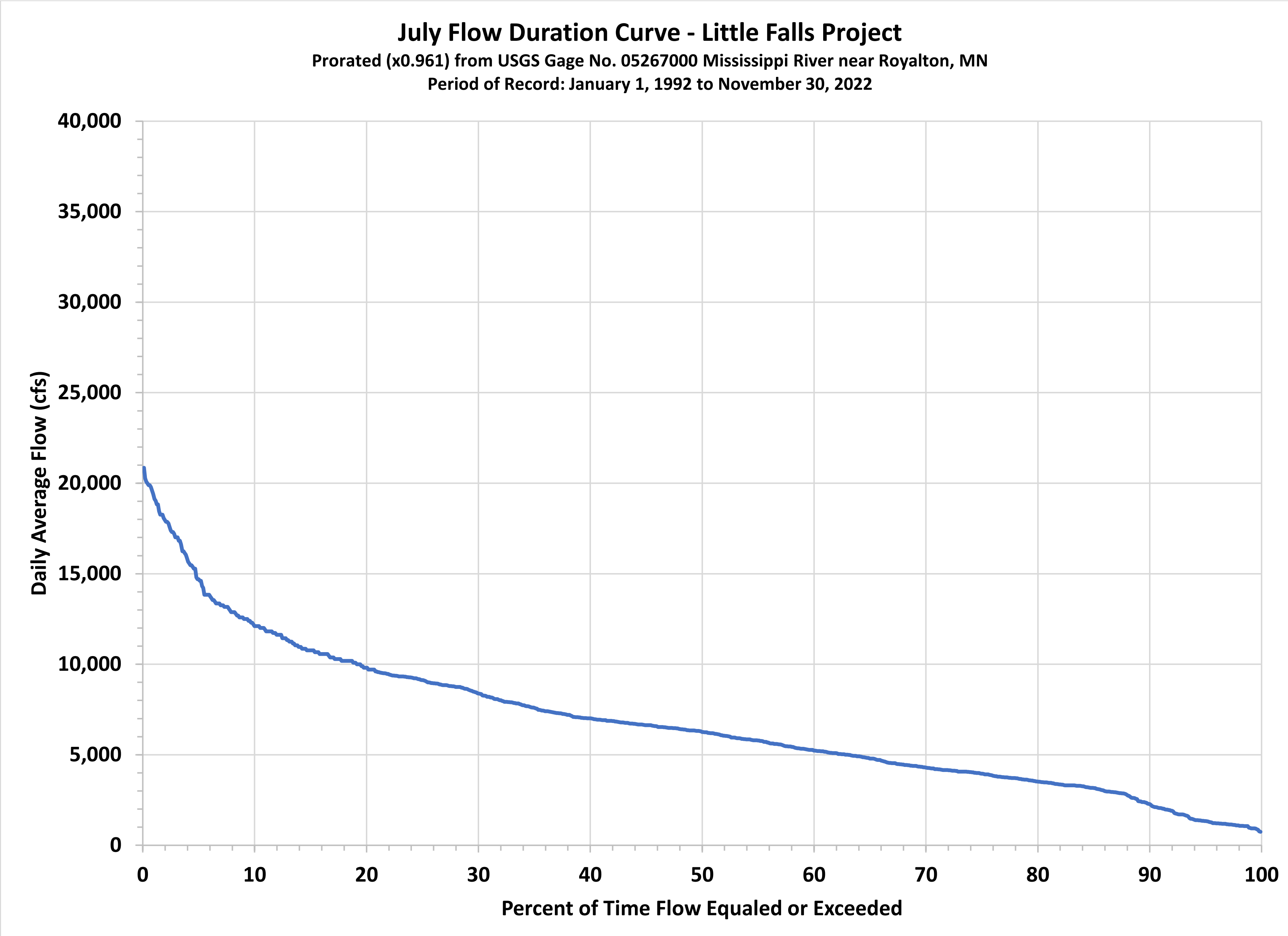


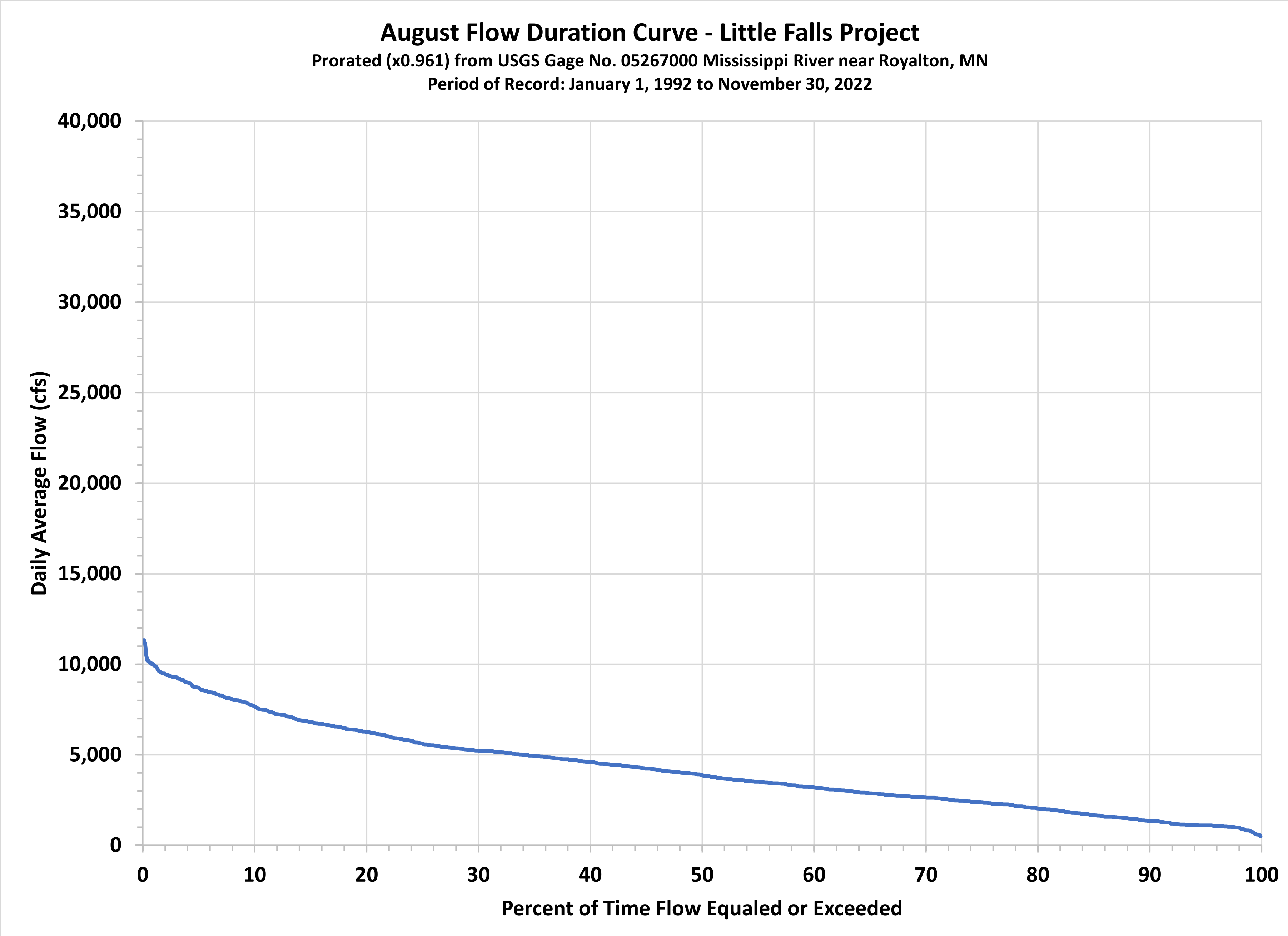
March Flow Duration Curve - Little Falls Project
Prorated (x0.961) from USGS Gage No. 05267000 Mississippi River near Royalton, MN
Period of Record: January 1, 1992 to November 30, 2022
Daily Average Flow (cfs)
40,000
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
0
10
20
30
40
50
60
70
80
90
100
Percent of Time Flow Equaled or Exceeded

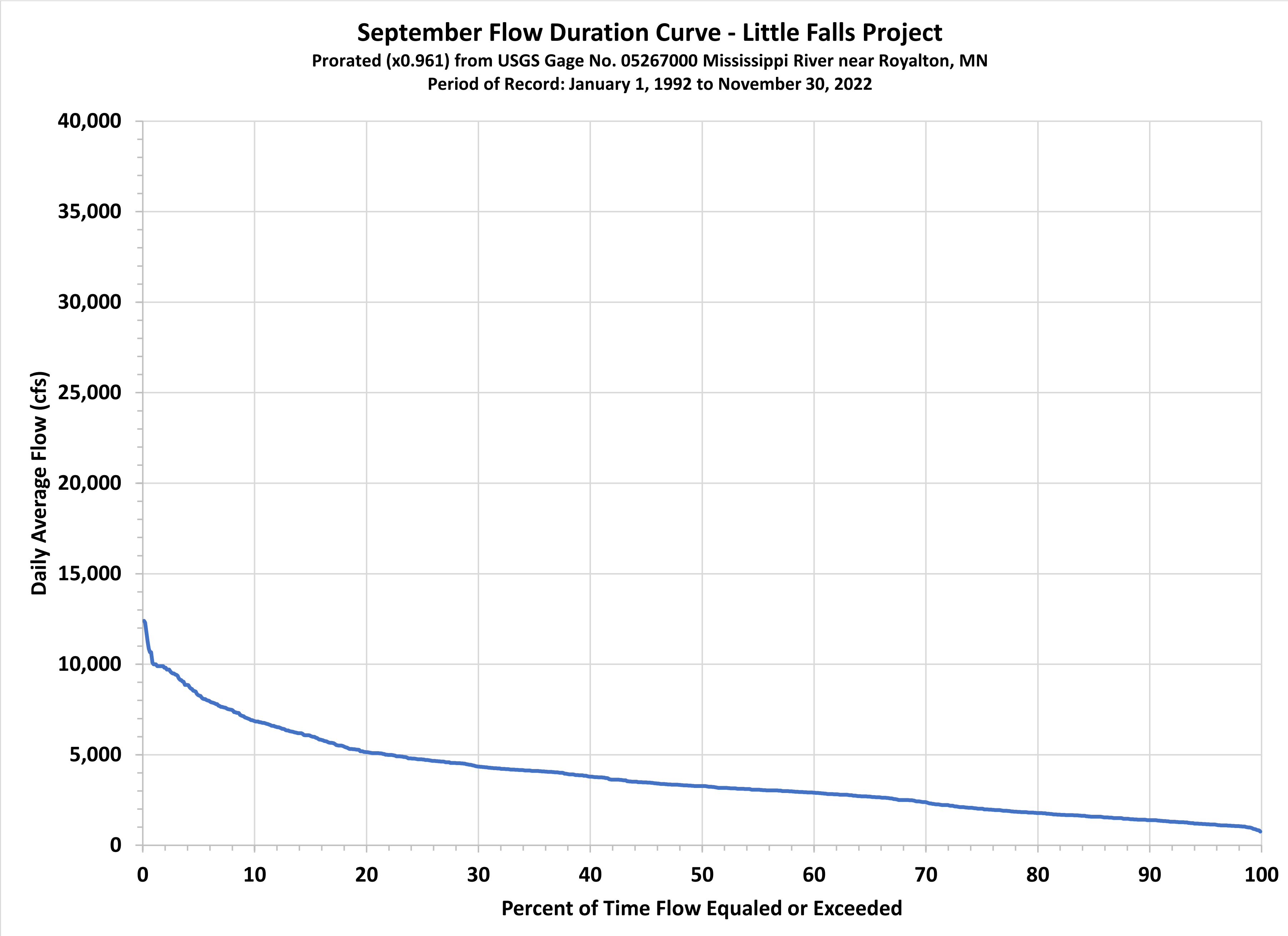

April Flow Duration Curve - Little Falls Project
Prorated (x0.961) from USGS Gage No. 05267000 Mississippi River near Royalton, MN
Period of Record: January 1, 1992 to November 30, 2022
Daily Average Flow (cfs)
40,000
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
0
10
20
30
40
50
60
70
80
90
100
Percent of Time Flow Equaled or Exceeded


May Flow Duration Curve - Little Falls Project
Prorated (x0.961) from USGS Gage No. 05267000 Mississippi River near Royalton, MN
Period of Record: January 1, 1992 to November 30, 2022
Daily Average Flow (cfs)
40,000
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
0
10
20
30
40
50
60
70
80
90
100
Percent of Time Flow Equaled or Exceeded

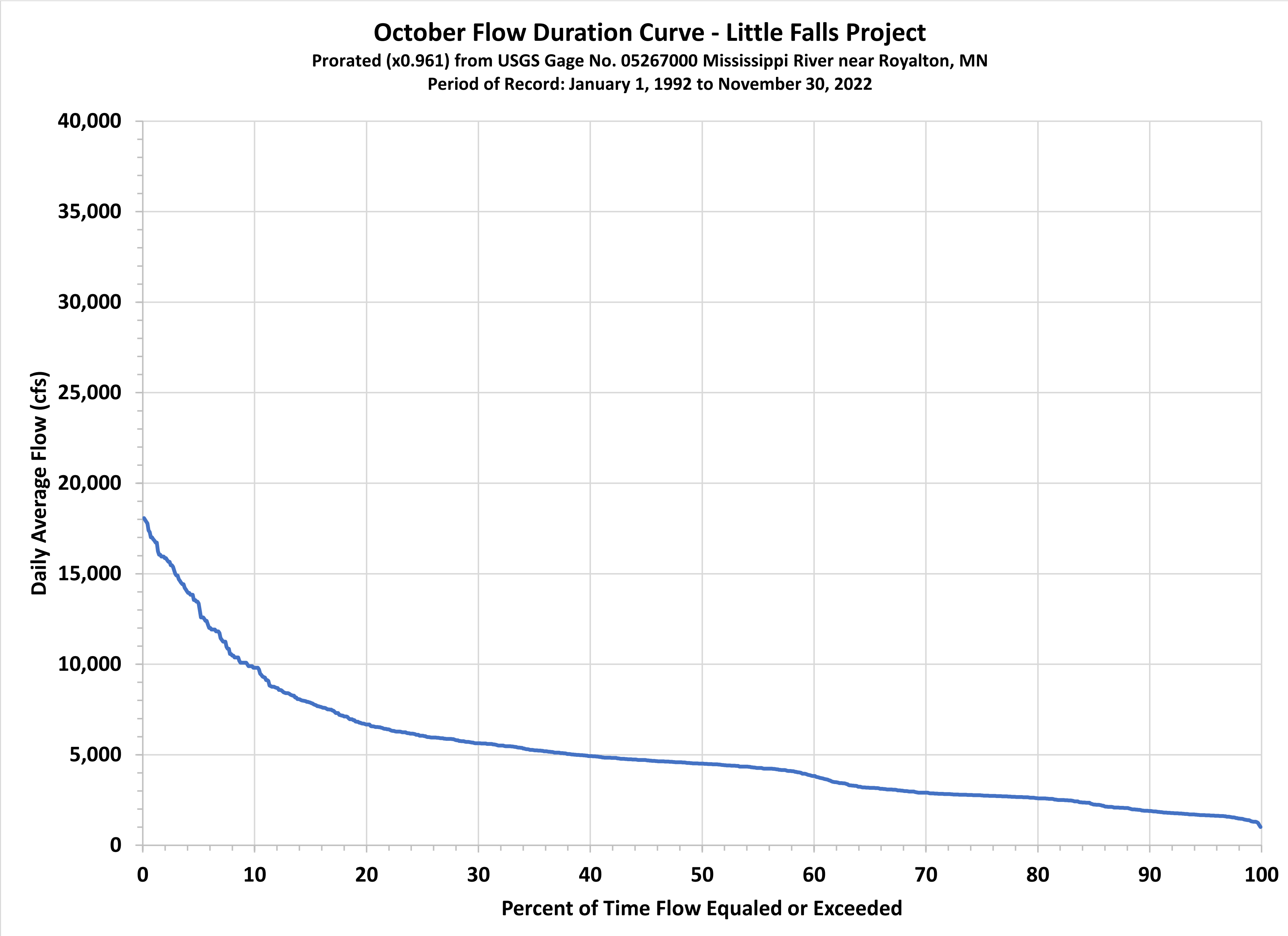

June Flow Duration Curve - Little Falls Project
Prorated (x0.961) from USGS Gage No. 05267000 Mississippi River near Royalton, MN
Period of Record: January 1, 1992 to November 30, 2022
Daily Average Flow (cfs)
40,000
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
0
10
20
30
40
50
60
70
80
90
100
Percent of Time Flow Equaled or Exceeded

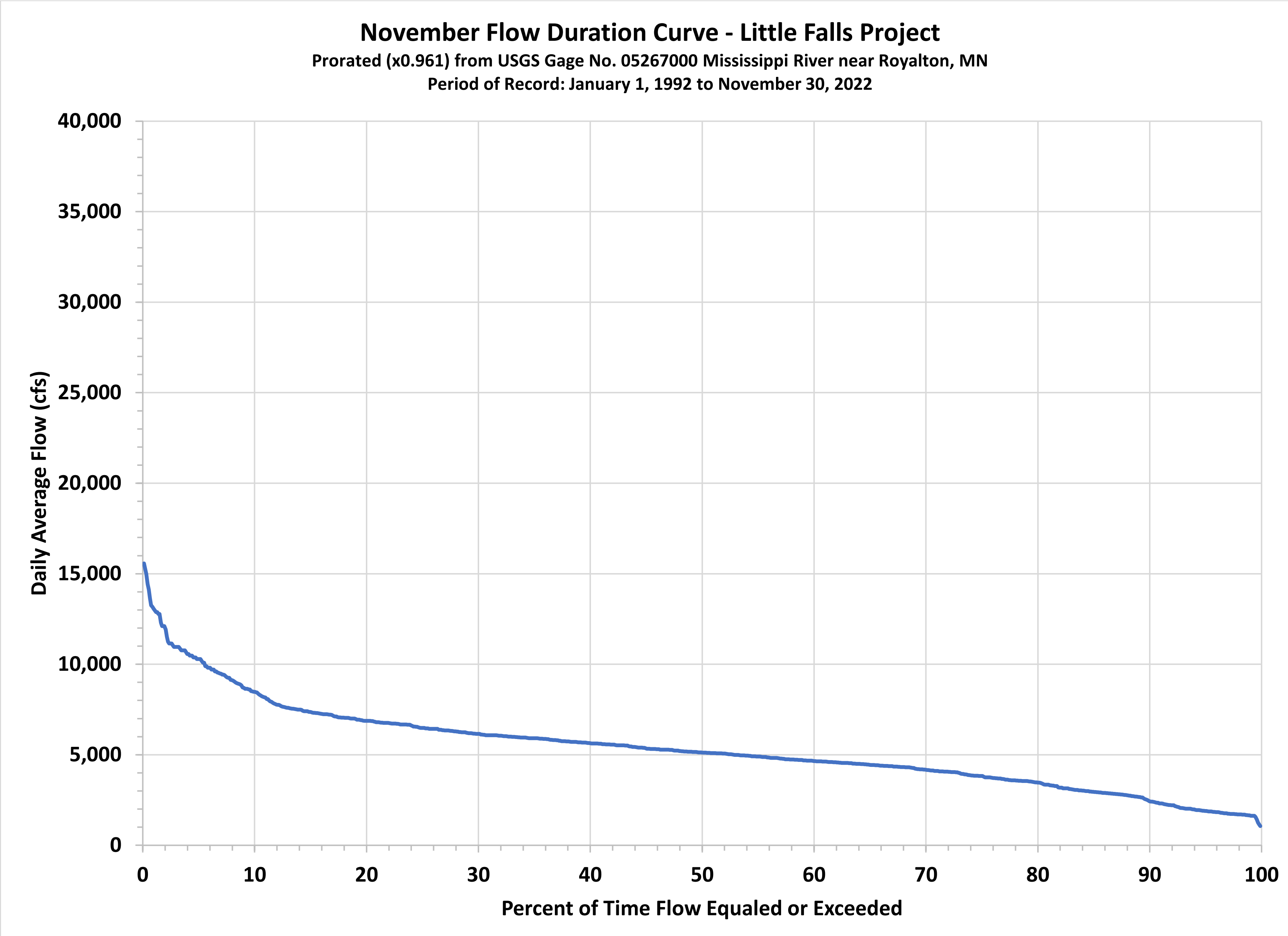

July Flow Duration Curve - Little Falls Project
Prorated (x0.961) from USGS Gage No. 05267000 Mississippi River near Royalton, MN
Period of Record: January 1, 1992 to November 30, 2022
Daily Average Flow (cfs)
40,000
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
0
10
20
30
40
50
60
70
80
90
100
Percent of Time Flow Equaled or Exceeded

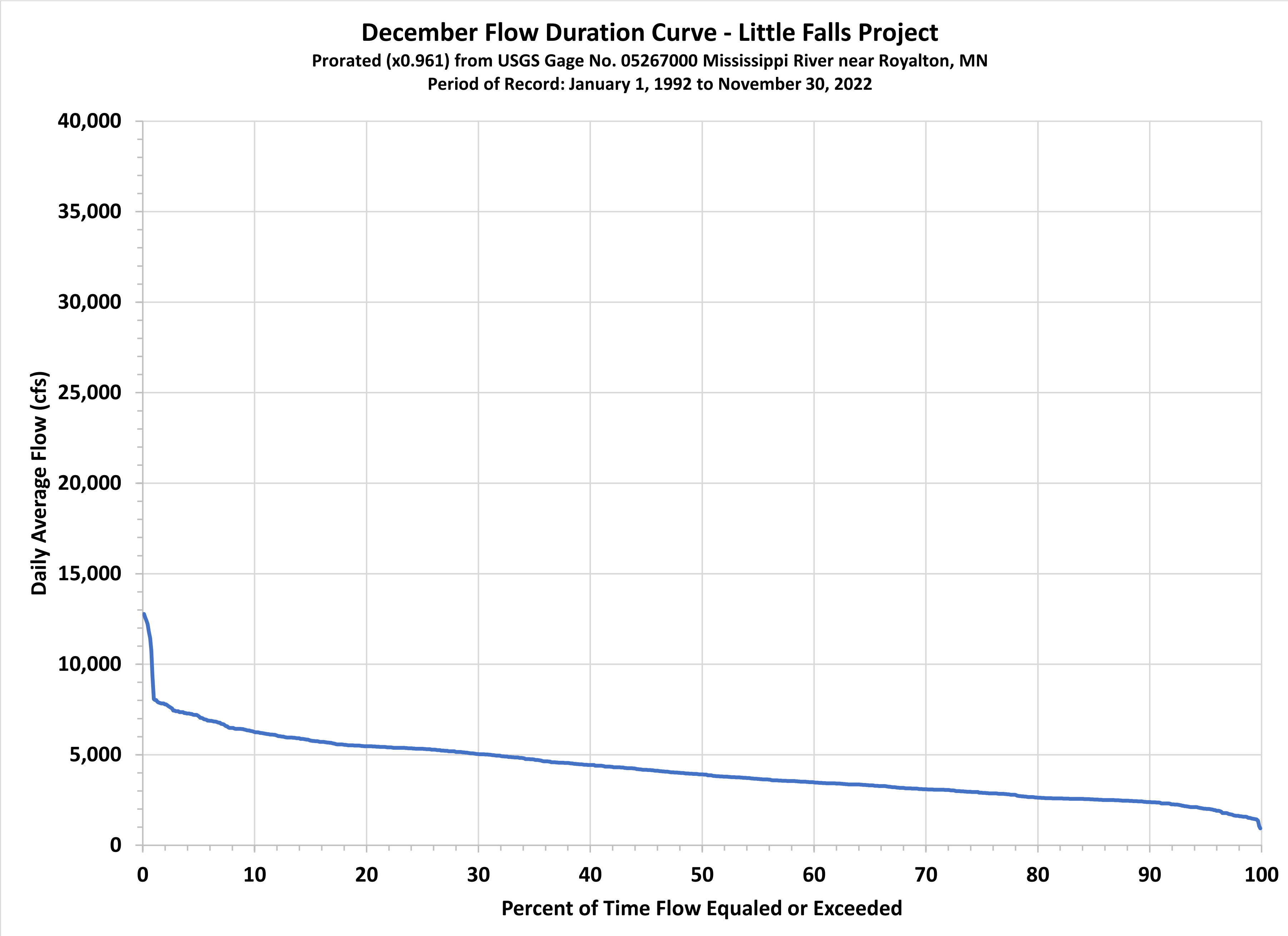

August Flow Duration Curve - Little Falls Project
Prorated (x0.961) from USGS Gage No. 05267000 Mississippi River near Royalton, MN
Period of Record: January 1, 1992 to November 30, 2022
Daily Average Flow (cfs)
40,000
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
0
10
20
30
40
50
60
70
80
90
100
Percent of Time Flow Equaled or Exceeded

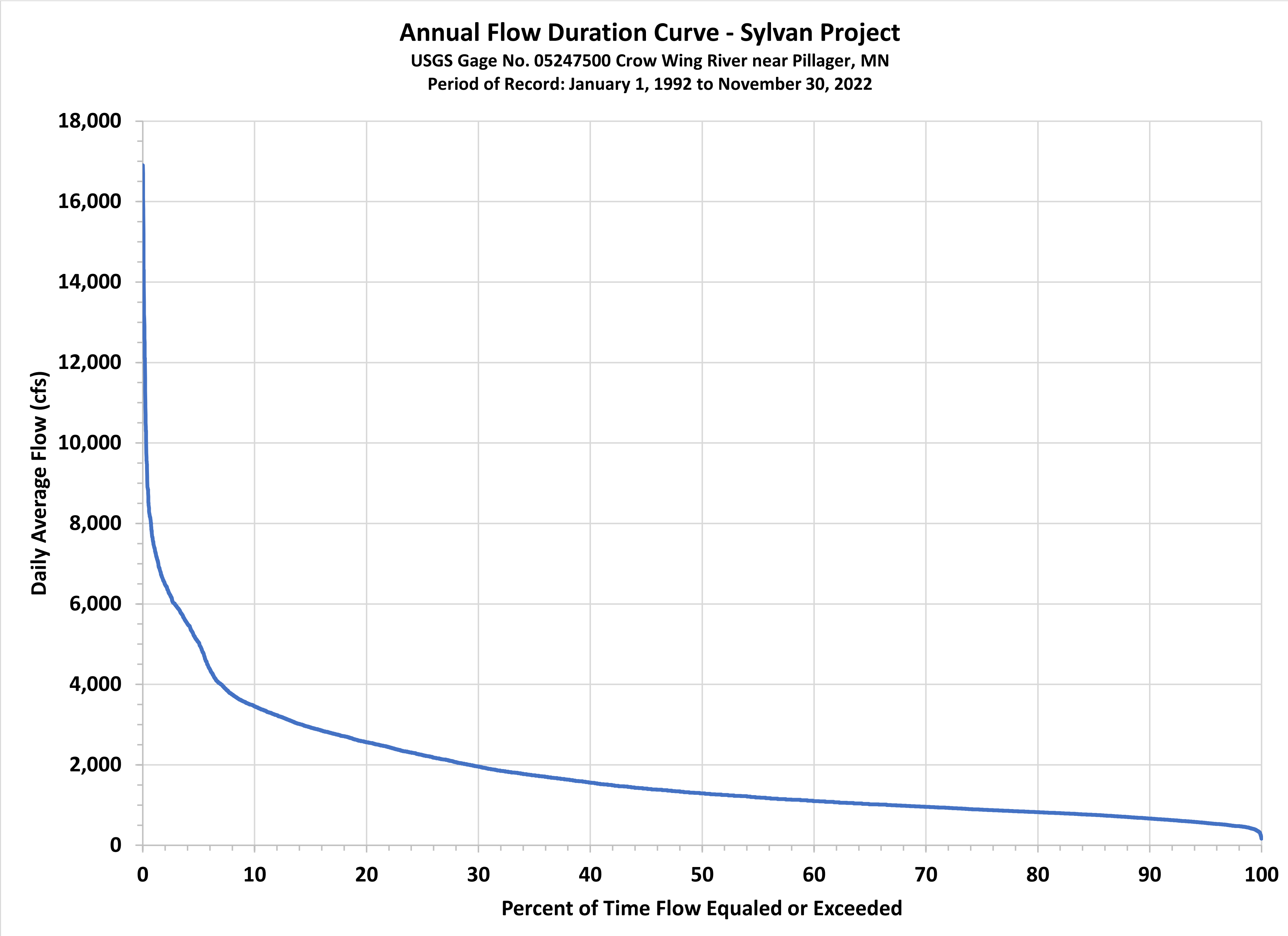


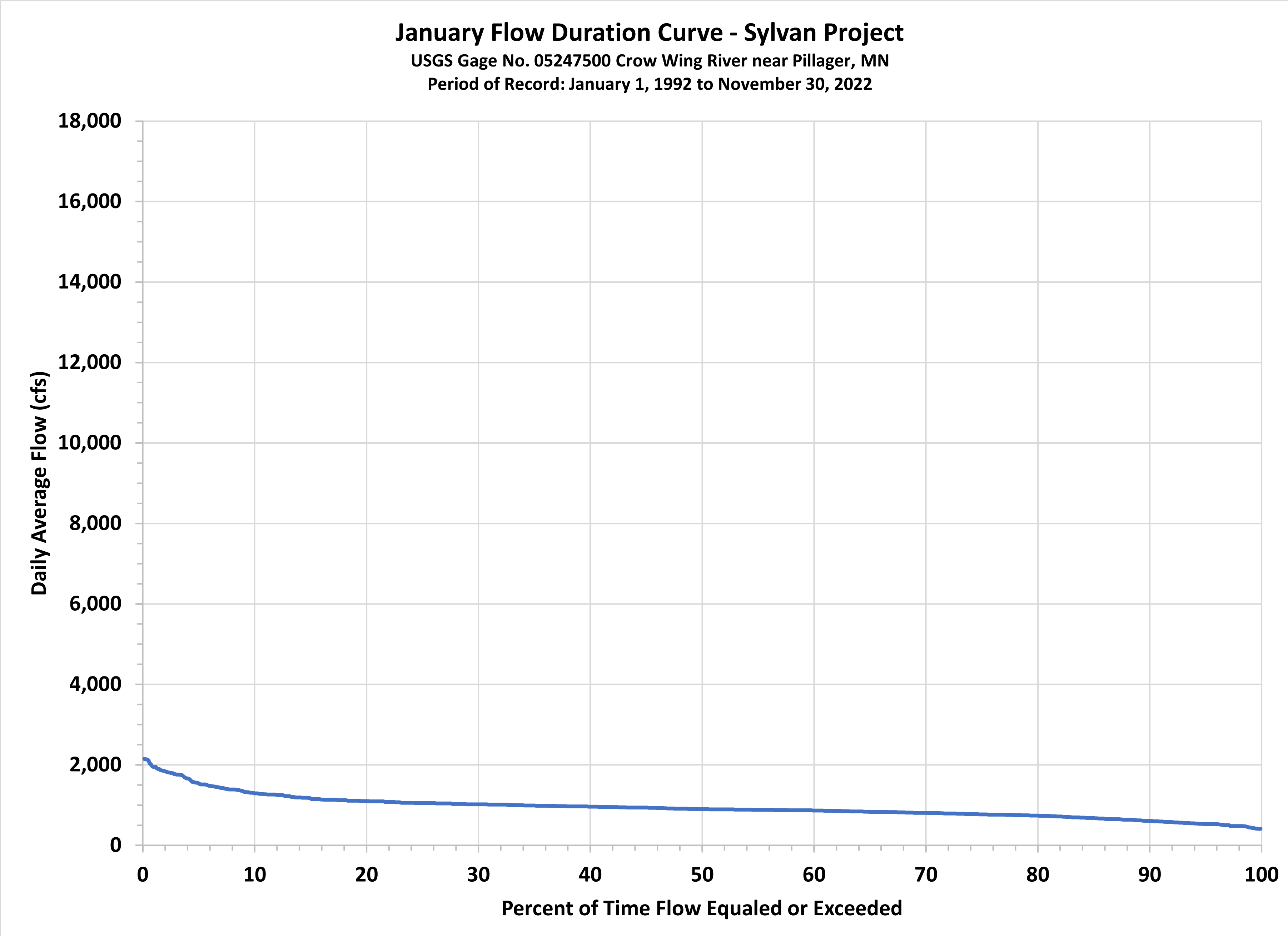
September Flow Duration Curve - Little Falls Project
Prorated (x0.961) from USGS Gage No. 05267000 Mississippi River near Royalton, MN
Period of Record: January 1, 1992 to November 30, 2022
Daily Average Flow (cfs)
40,000
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
0
10
20
30
40
50
60
70
80
90
100
Percent of Time Flow Equaled or Exceeded


October Flow Duration Curve - Little Falls Project
Prorated (x0.961) from USGS Gage No. 05267000 Mississippi River near Royalton, MN
Period of Record: January 1, 1992 to November 30, 2022
Daily Average Flow (cfs)
40,000
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
0
10
20
30
40
50
60
70
80
90
100
Percent of Time Flow Equaled or Exceeded

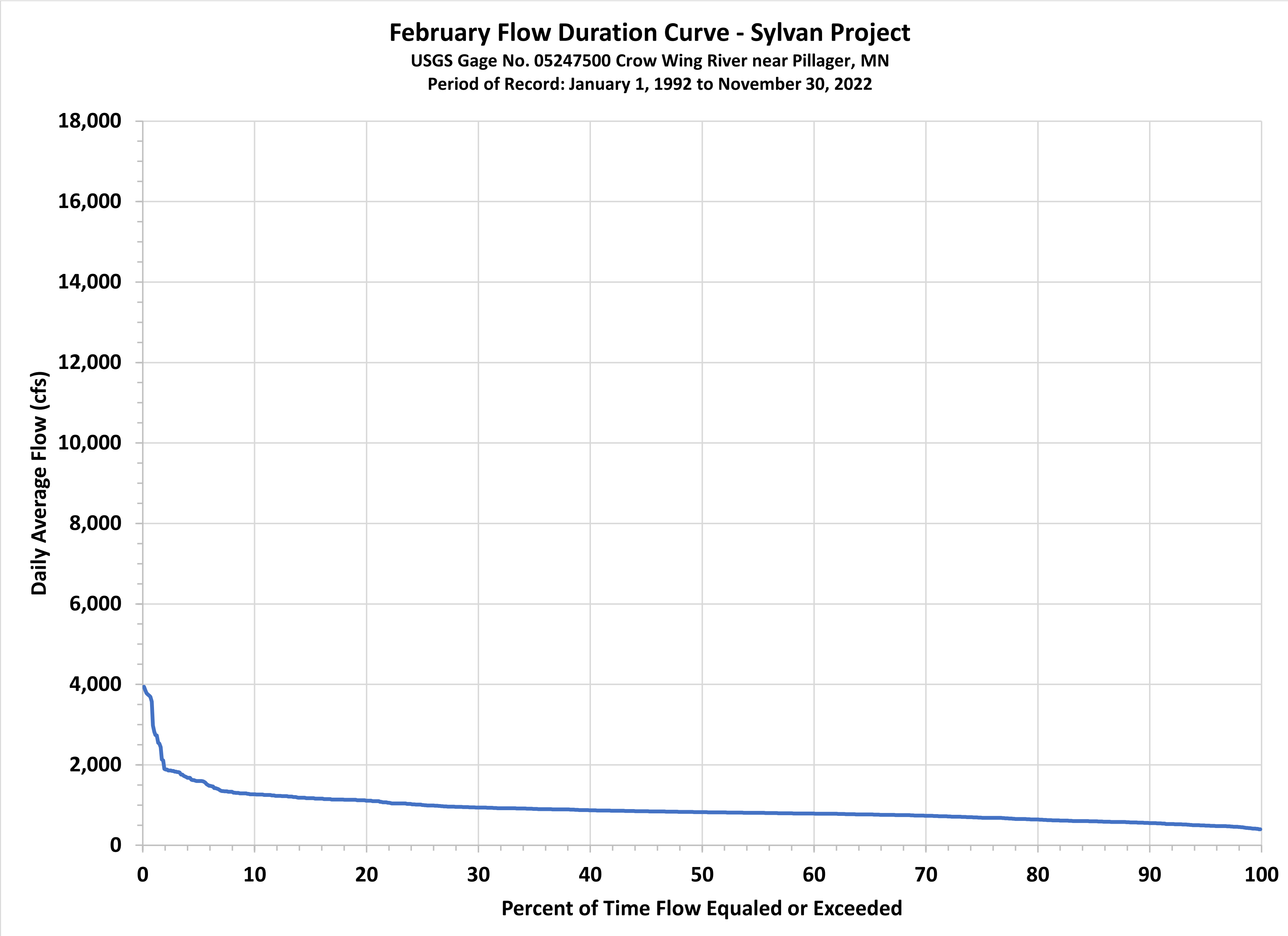

November Flow Duration Curve - Little Falls Project
Prorated (x0.961) from USGS Gage No. 05267000 Mississippi River near Royalton, MN
Period of Record: January 1, 1992 to November 30, 2022
Daily Average Flow (cfs)
40,000
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
0
10
20
30
40
50
60
70
80
90
100
Percent of Time Flow Equaled or Exceeded

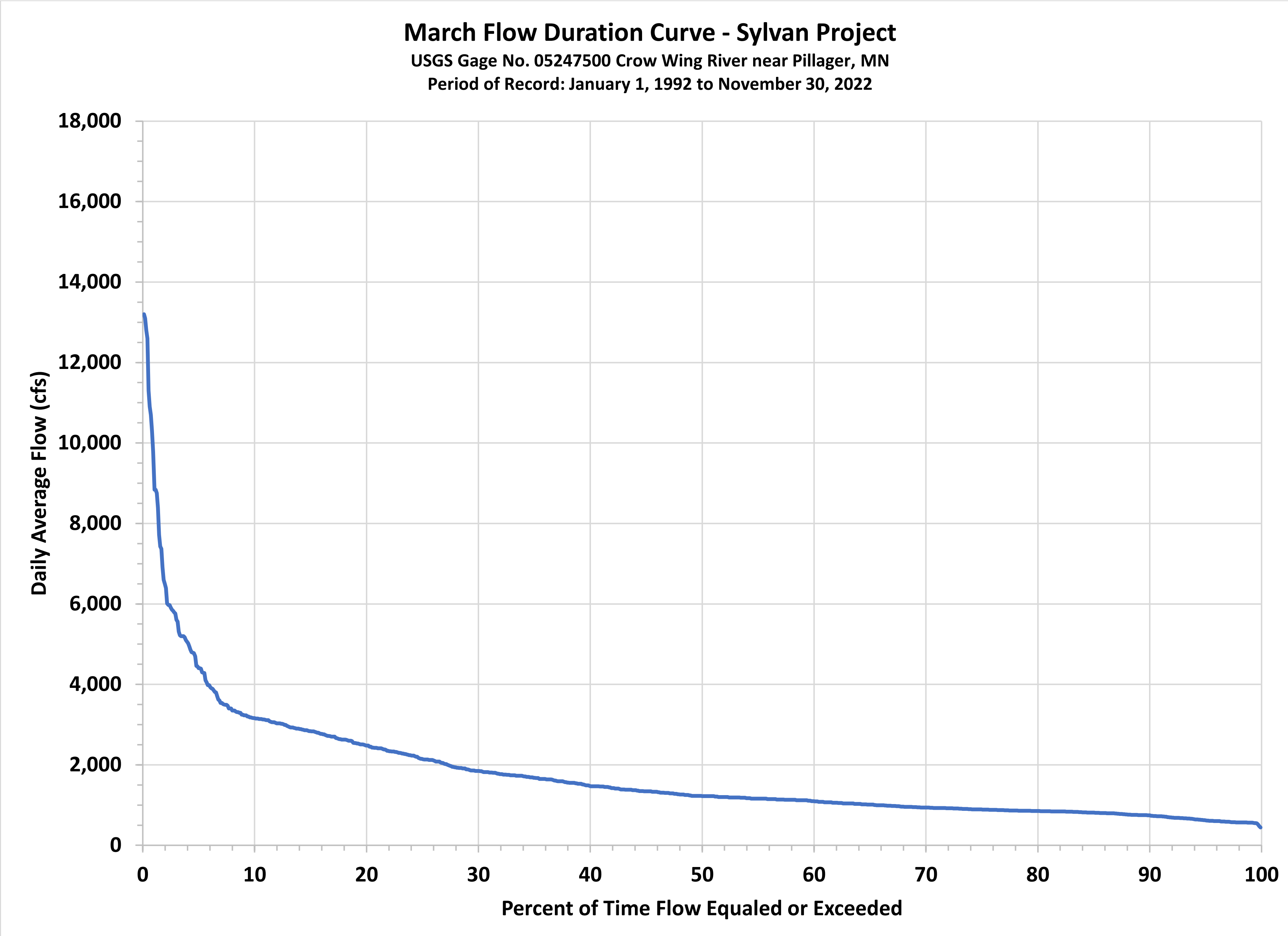

December Flow Duration Curve - Little Falls Project
Prorated (x0.961) from USGS Gage No. 05267000 Mississippi River near Royalton, MN
Period of Record: January 1, 1992 to November 30, 2022
Daily Average Flow (cfs)
40,000
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
0
10
20
30
40
50
60
70
80
90
100
Percent of Time Flow Equaled or Exceeded

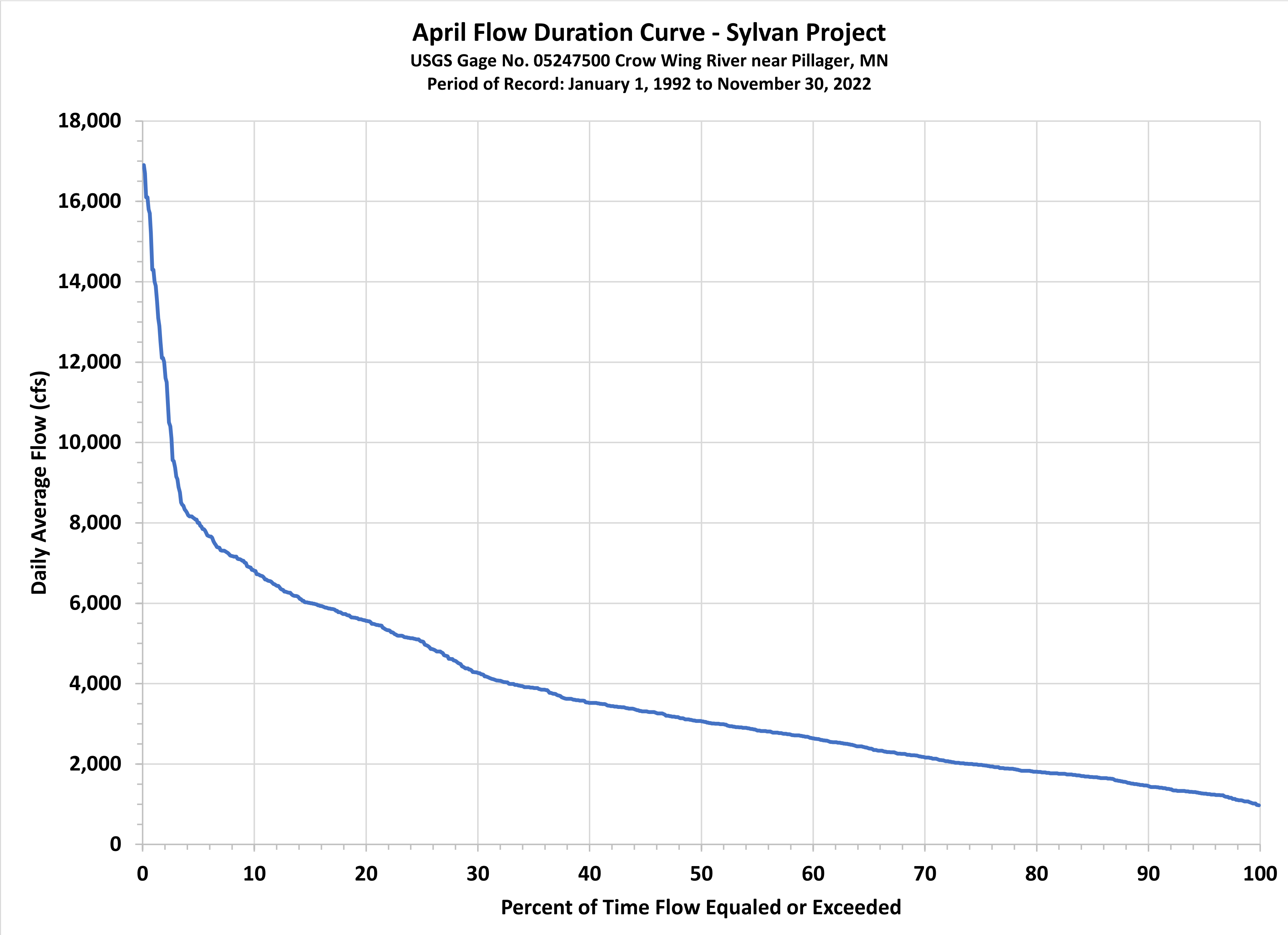

Annual Flow Duration Curve - Sylvan Project
USGS Gage No. 05247500 Crow Wing River near Pillager, MN
Period of Record: January 1, 1992 to November 30, 2022
Daily Average Flow (cfs)
18,000
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
0
10
20
30
40
50
60
70
80
90
100
Percent of Time Flow Equaled or Exceeded

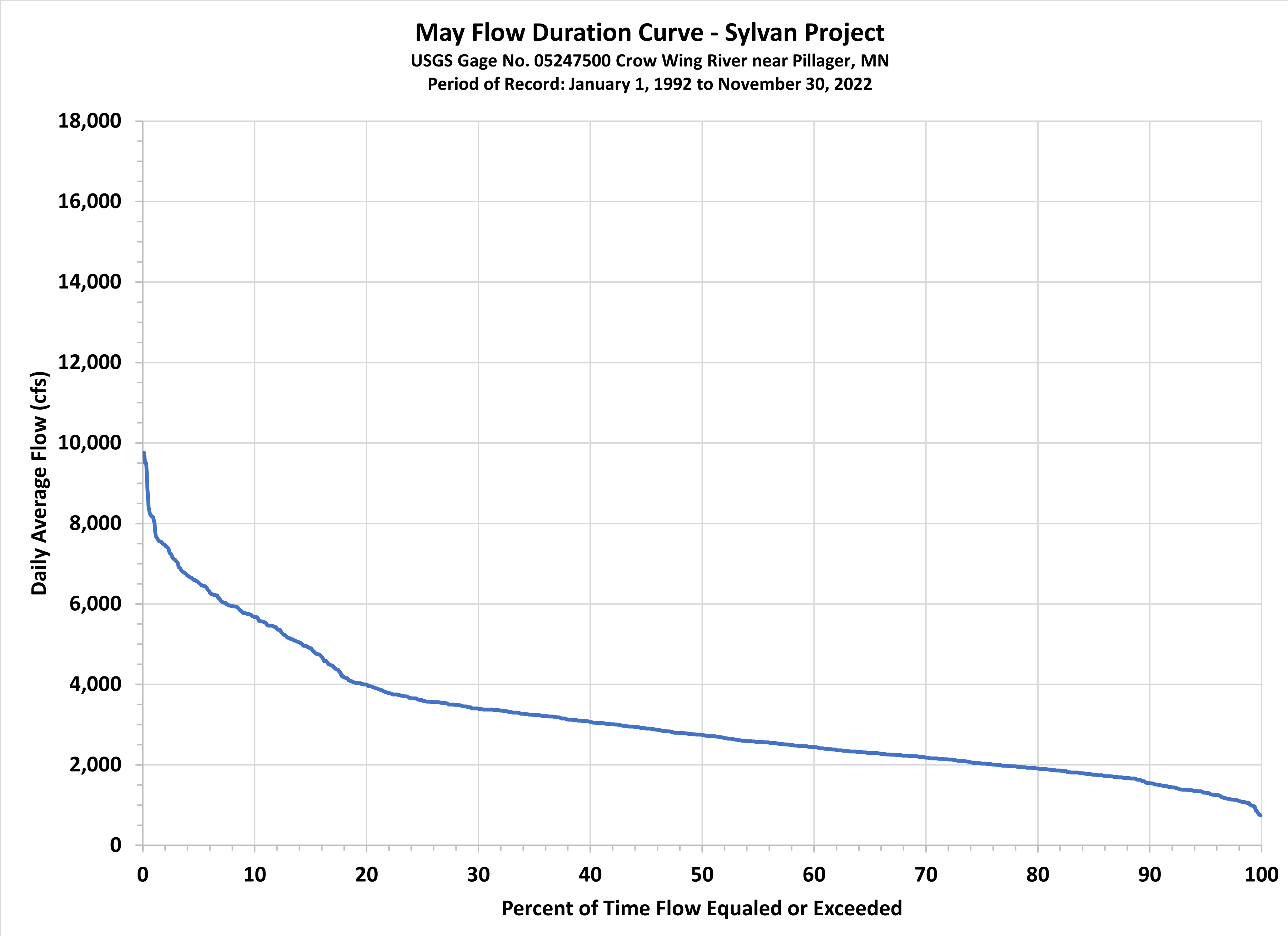


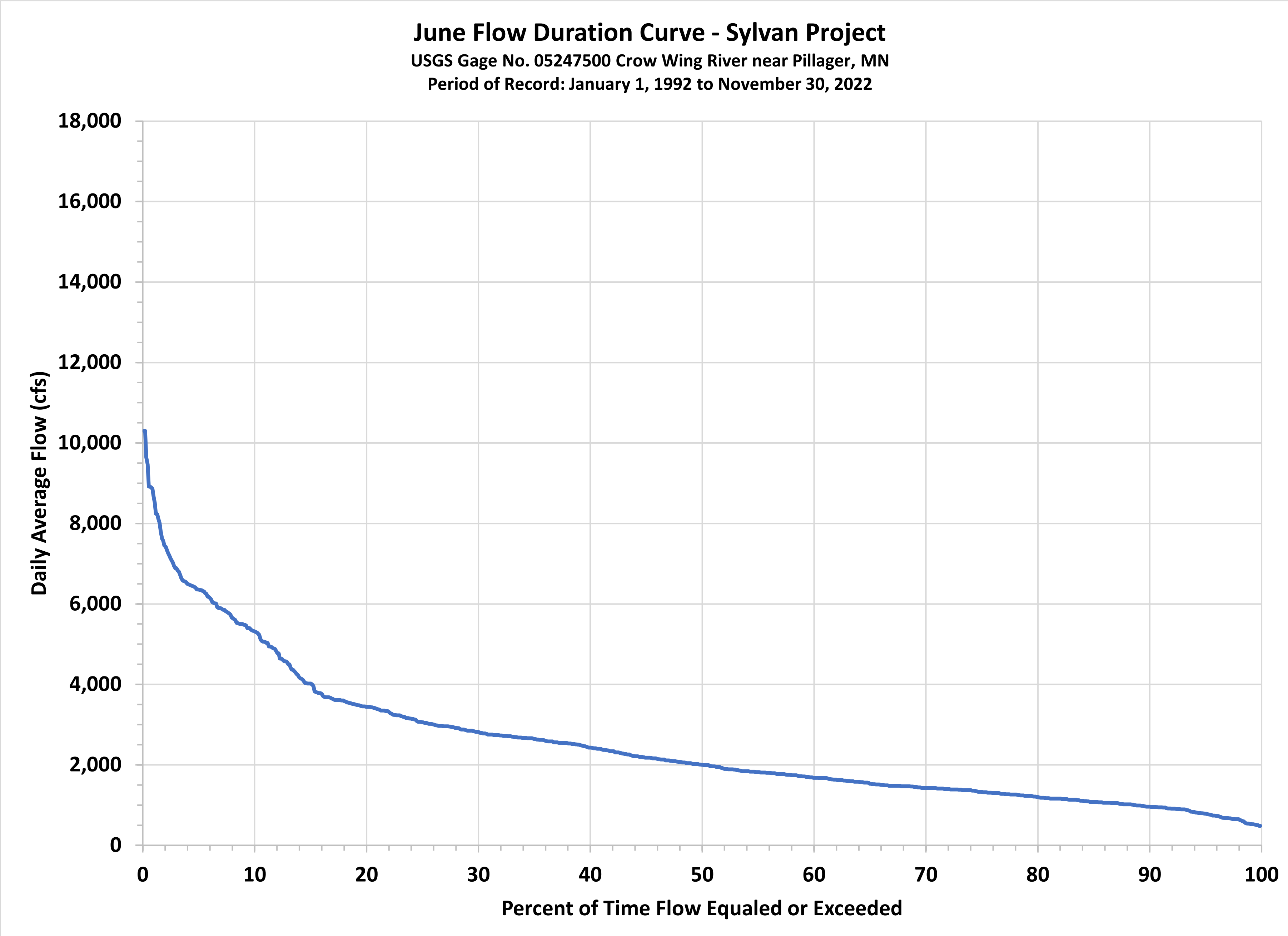
January Flow Duration Curve - Sylvan Project
USGS Gage No. 05247500 Crow Wing River near Pillager, MN
Period of Record: January 1, 1992 to November 30, 2022
Daily Average Flow (cfs)
18,000
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
0
10
20
30
40
50
60
70
80
90
100
Percent of Time Flow Equaled or Exceeded


February Flow Duration Curve - Sylvan Project
USGS Gage No. 05247500 Crow Wing River near Pillager, MN
Period of Record: January 1, 1992 to November 30, 2022
Daily Average Flow (cfs)
18,000
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
0
10
20
30
40
50
60
70
80
90
100
Percent of Time Flow Equaled or Exceeded

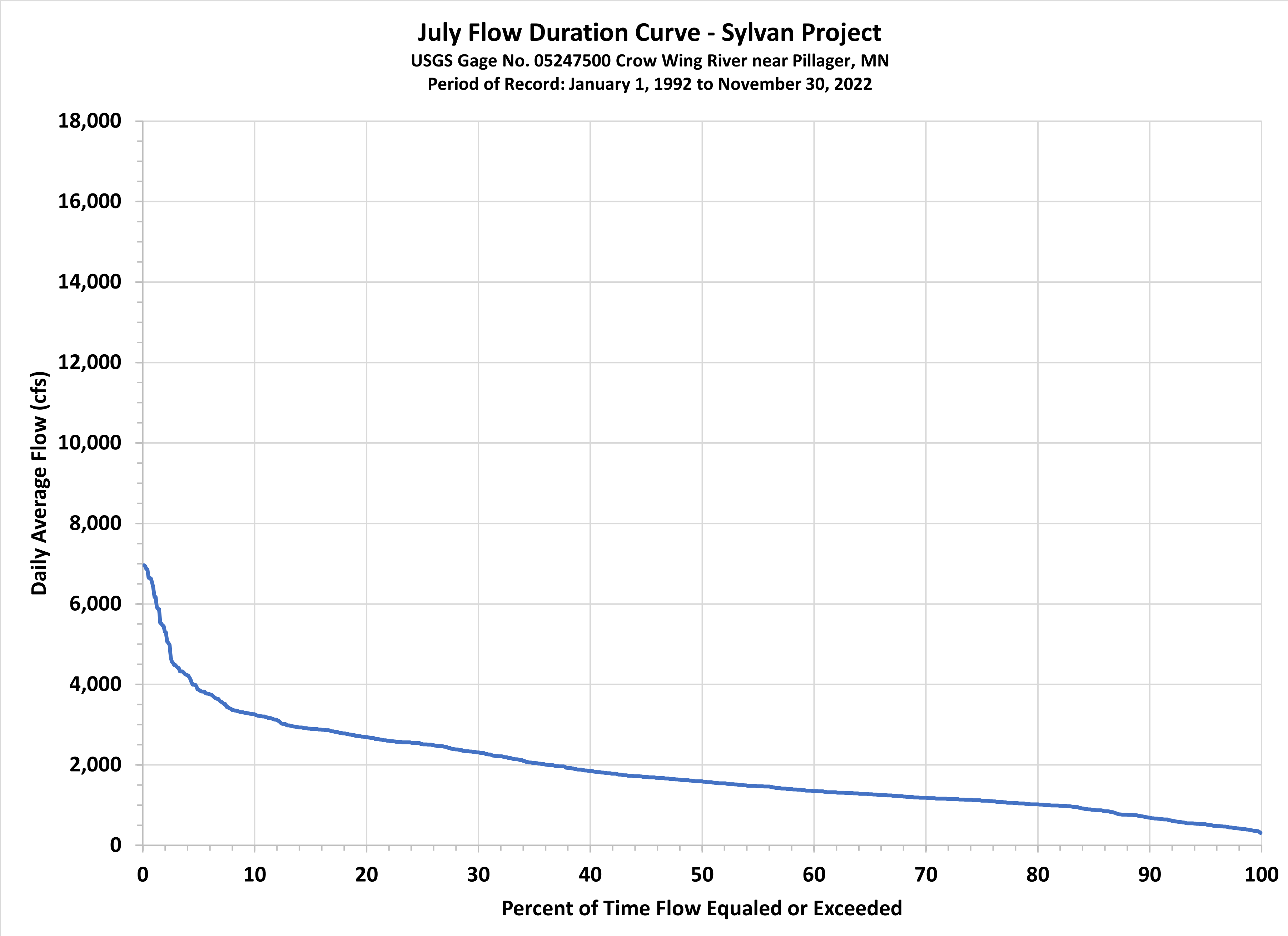

March Flow Duration Curve - Sylvan Project
USGS Gage No. 05247500 Crow Wing River near Pillager, MN
Period of Record: January 1, 1992 to November 30, 2022
Daily Average Flow (cfs)
18,000
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
0
10
20
30
40
50
60
70
80
90
100
Percent of Time Flow Equaled or Exceeded

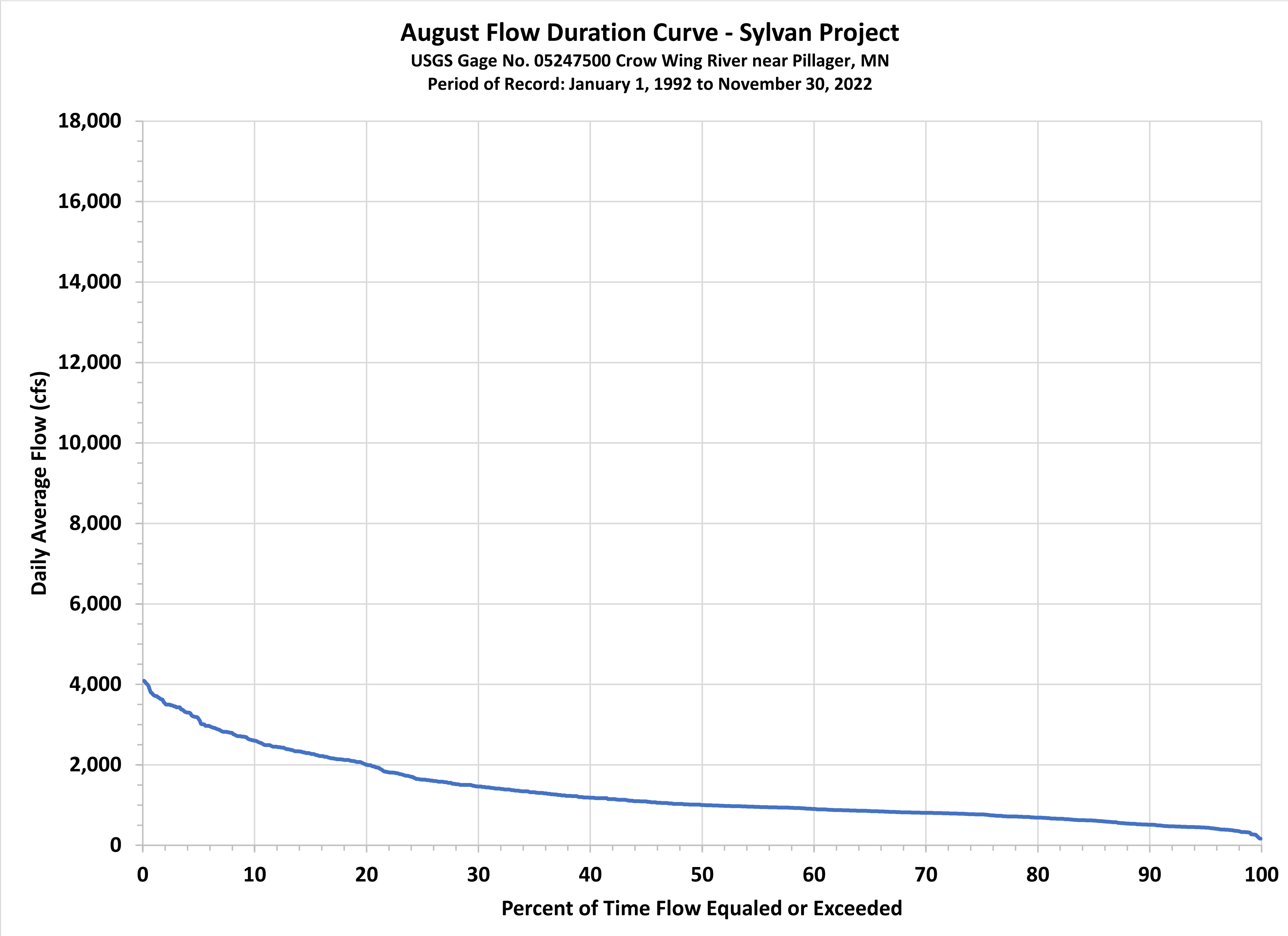

April Flow Duration Curve - Sylvan Project
USGS Gage No. 05247500 Crow Wing River near Pillager, MN
Period of Record: January 1, 1992 to November 30, 2022
Daily Average Flow (cfs)
18,000
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
0
10
20
30
40
50
60
70
80
90
100
Percent of Time Flow Equaled or Exceeded

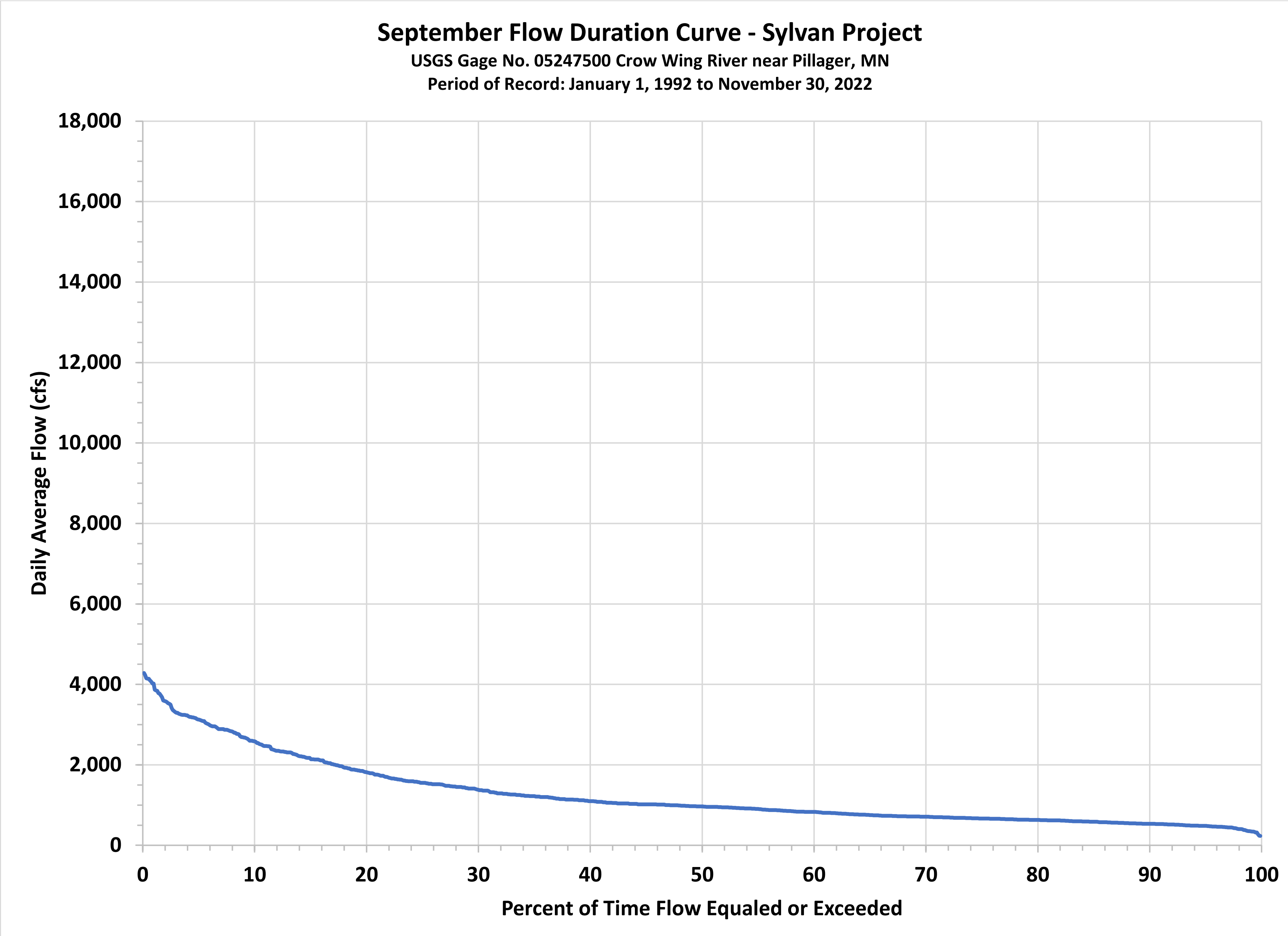

May Flow Duration Curve - Sylvan Project
USGS Gage No. 05247500 Crow Wing River near Pillager, MN
Period of Record: January 1, 1992 to November 30, 2022
Daily Average Flow (cfs)
Percent of Time Flow Equaled or Exceeded
18,000
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
0
10
20
30
40
50
60
70
80
90
100

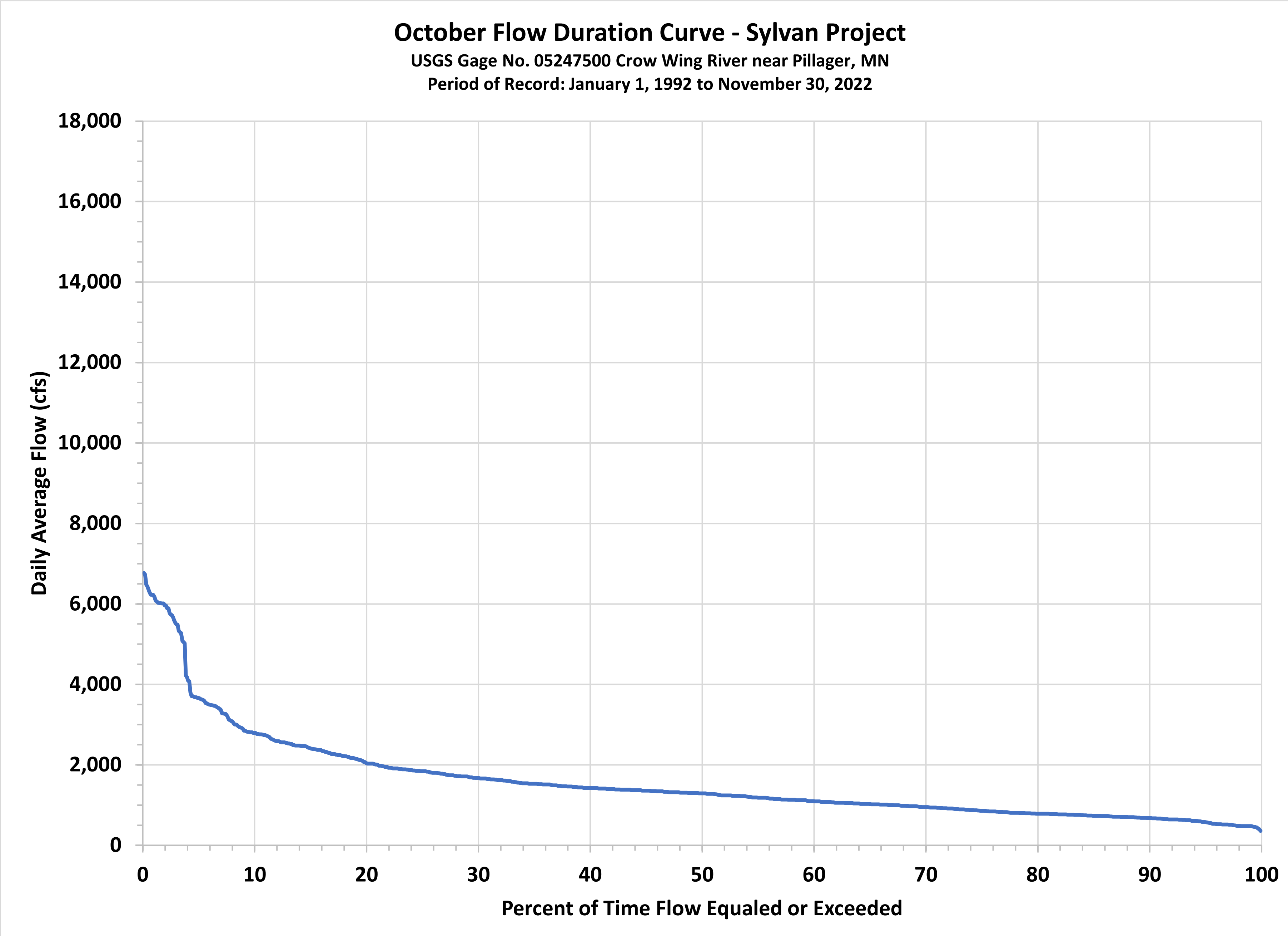


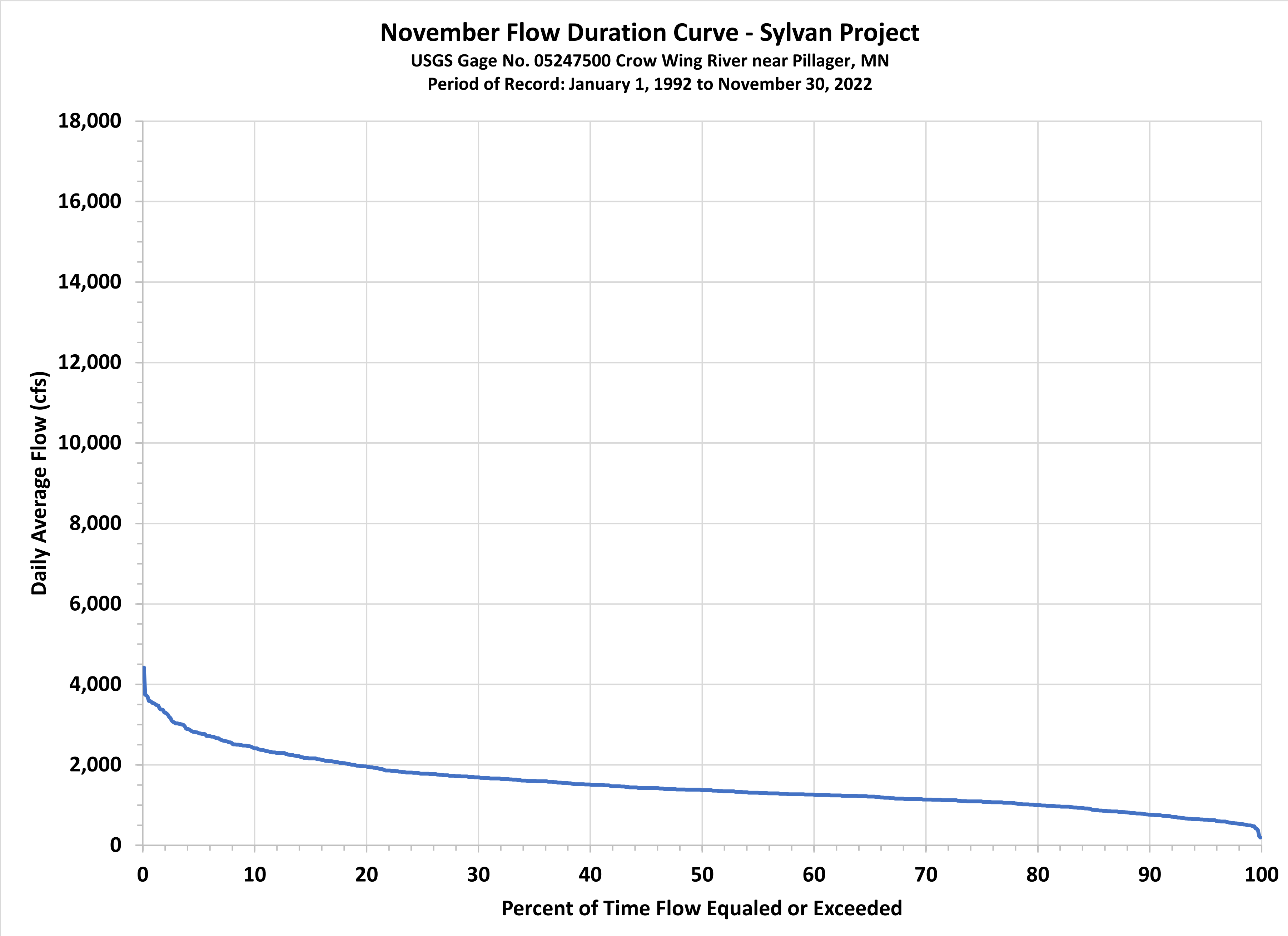
June Flow Duration Curve - Sylvan Project
USGS Gage No. 05247500 Crow Wing River near Pillager, MN
Period of Record: January 1, 1992 to November 30, 2022
Daily Average Flow (cfs)
18,000
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
0
10
20
30
40
50
60
70
80
90
100
Percent of Time Flow Equaled or Exceeded

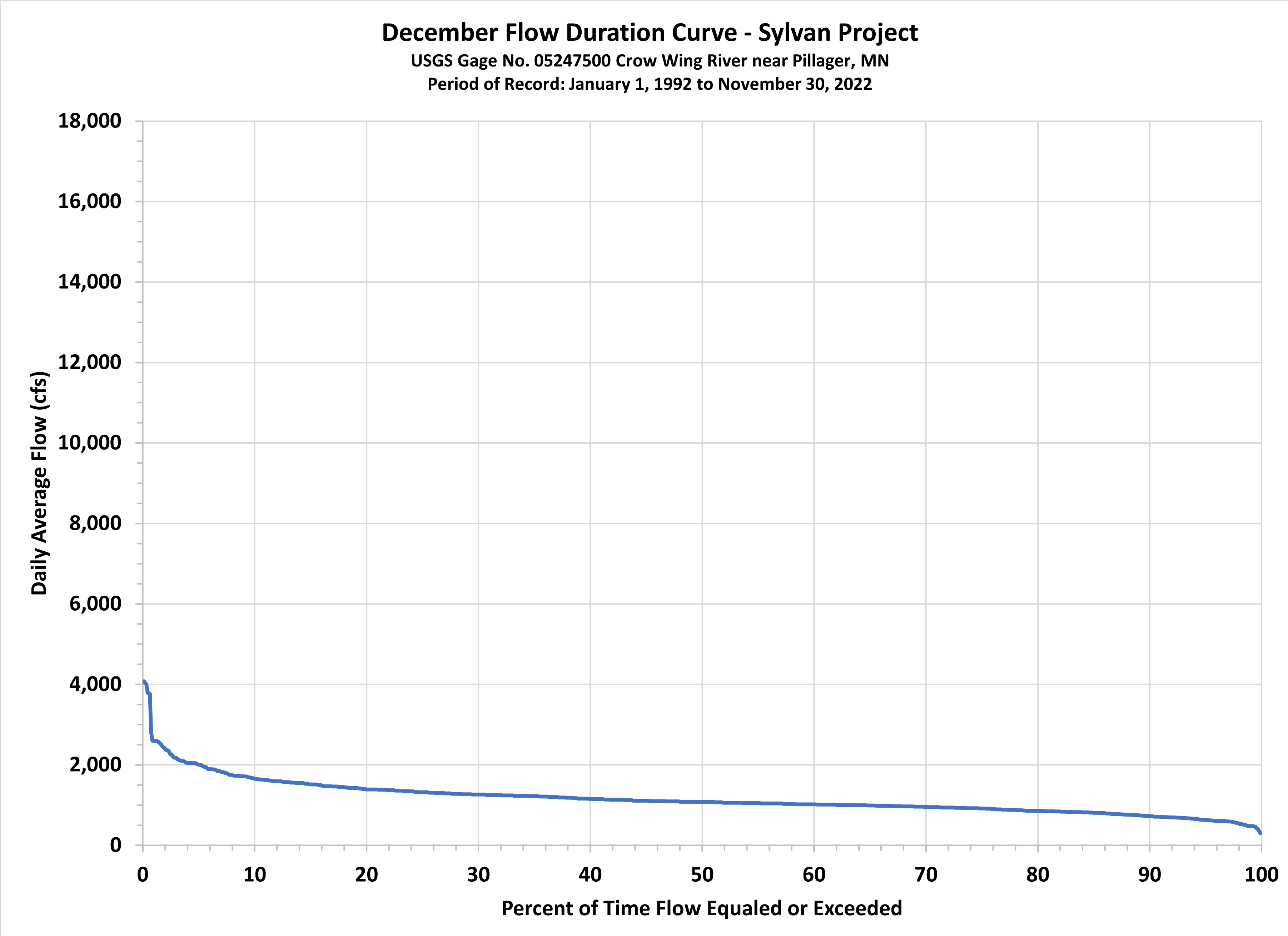

July Flow Duration Curve - Sylvan Project
USGS Gage No. 05247500 Crow Wing River near Pillager, MN
Period of Record: January 1, 1992 to November 30, 2022
Daily Average Flow (cfs)
18,000
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
0
10
20
30
40
50
60
70
80
90
100
Percent of Time Flow Equaled or Exceeded

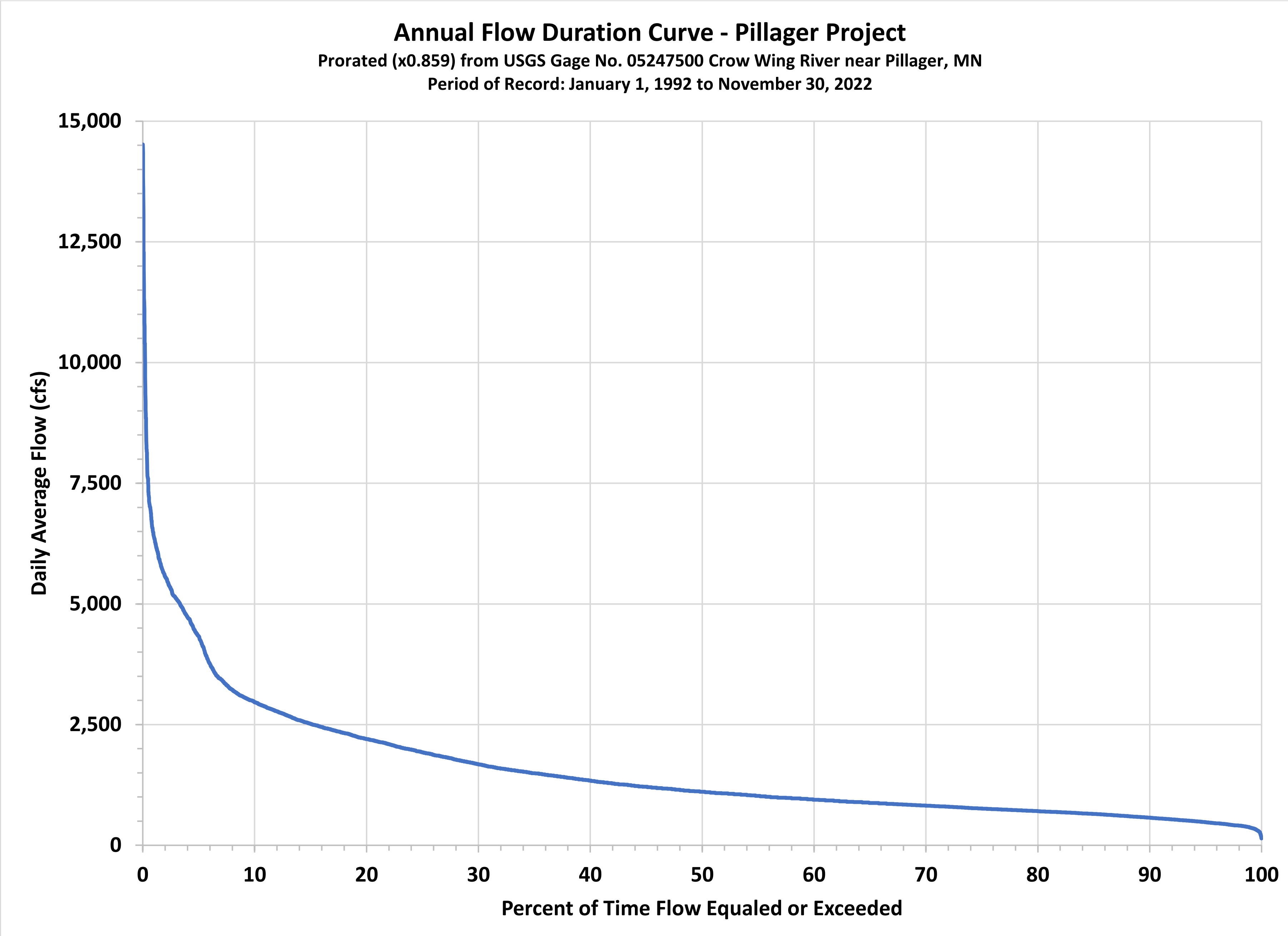

August Flow Duration Curve - Sylvan Project
USGS Gage No. 05247500 Crow Wing River near Pillager, MN
Period of Record: January 1, 1992 to November 30, 2022
Daily Average Flow (cfs)
18,000
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
0
10
20
30
40
50
60
70
80
90
100
Percent of Time Flow Equaled or Exceeded

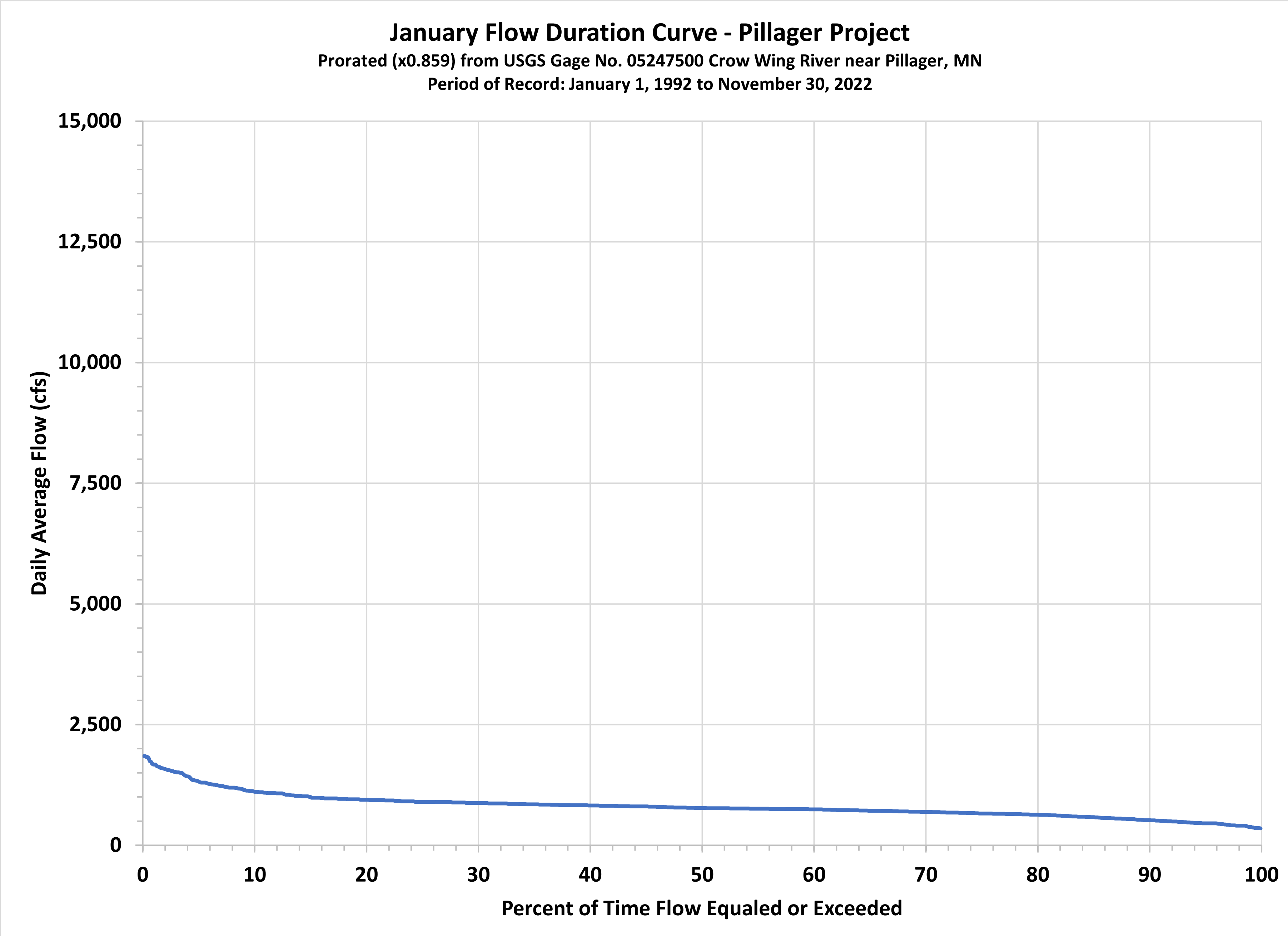

September Flow Duration Curve - Sylvan Project
USGS Gage No. 05247500 Crow Wing River near Pillager, MN
Period of Record: January 1, 1992 to November 30, 2022
Daily Average Flow (cfs)
18,000
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
0
10
20
30
40
50
60
70
80
90
100
Percent of Time Flow Equaled or Exceeded

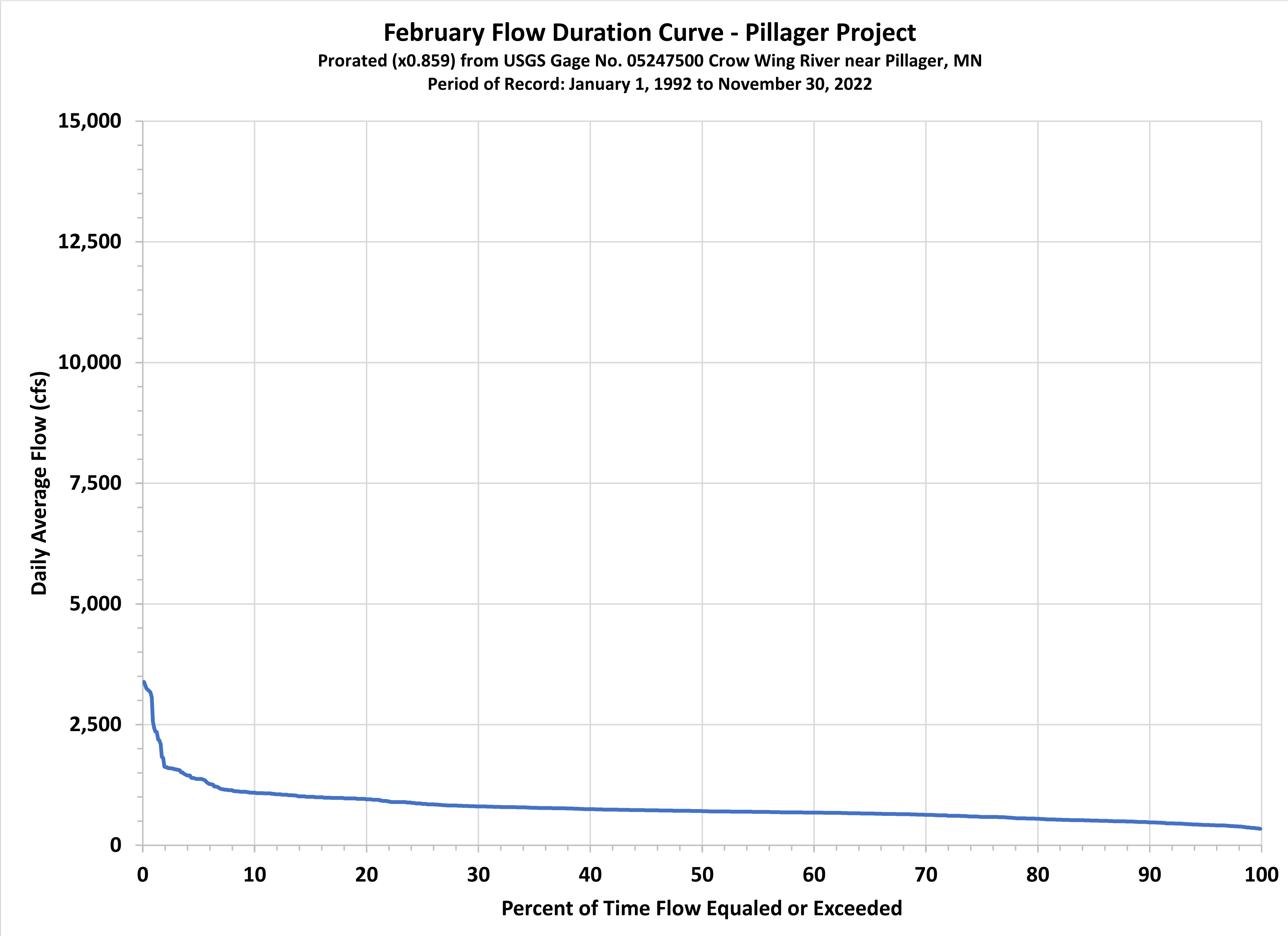

October Flow Duration Curve - Sylvan Project
USGS Gage No. 05247500 Crow Wing River near Pillager, MN
Period of Record: January 1, 1992 to November 30, 2022
Daily Average Flow (cfs)
18,000
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
0
10
20
30
40
50
60
70
80
90
100
Percent of Time Flow Equaled or Exceeded

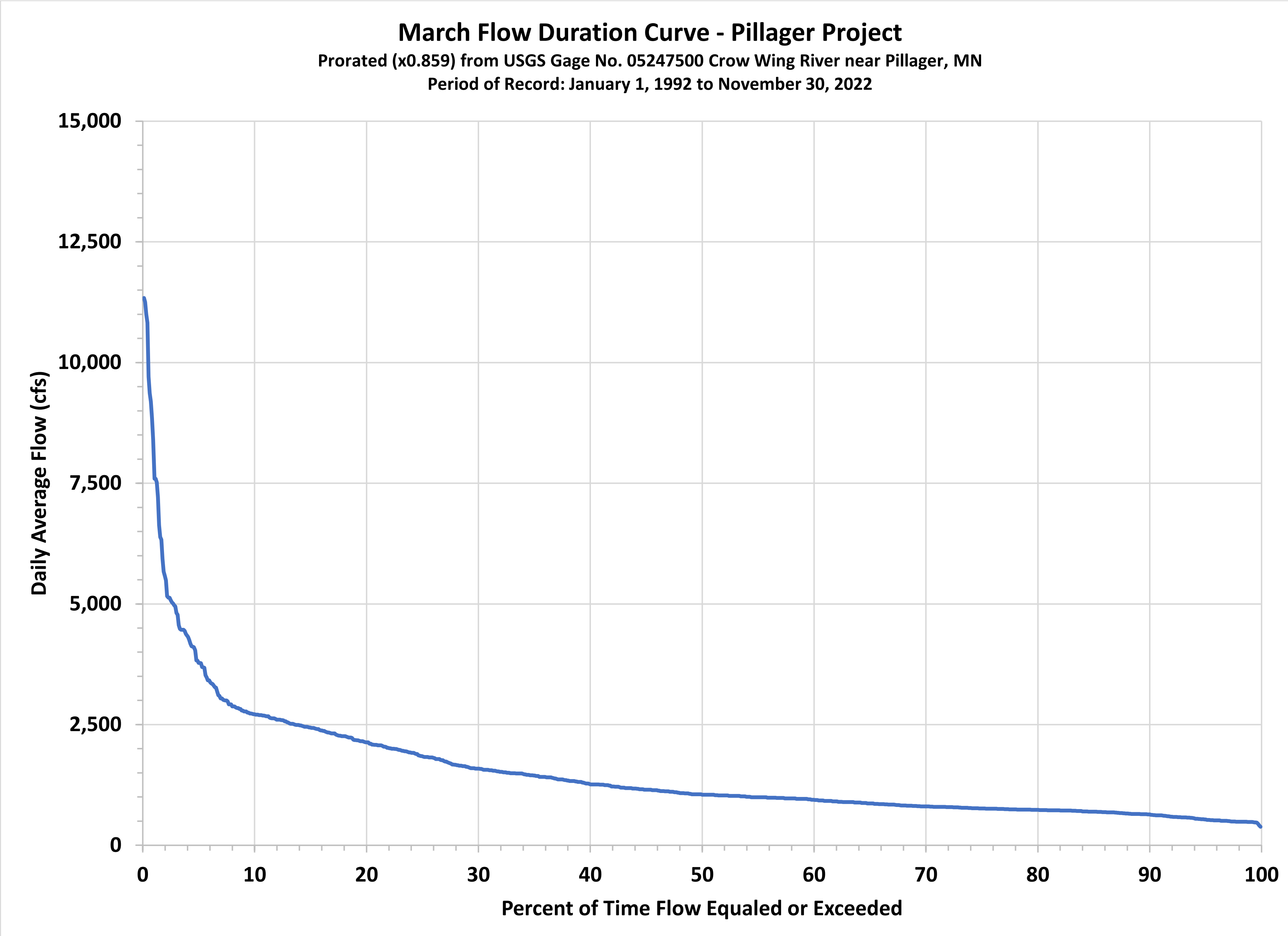

November Flow Duration Curve - Sylvan Project
USGS Gage No. 05247500 Crow Wing River near Pillager, MN
Period of Record: January 1, 1992 to November 30, 2022
Daily Average Flow (cfs)
18,000
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
0
10
20
30
40
50
60
70
80
90
100
Percent of Time Flow Equaled or Exceeded


December Flow Duration Curve - Sylvan Project
USGS Gage No. 05247500 Crow Wing River near Pillager, MN
Period of Record: January 1, 1992 to November 30, 2022
Daily Average Flow (cfs)
18,000
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
0
10
20
30
40
50
60
70
80
90
100
Percent of Time Flow Equaled or Exceeded

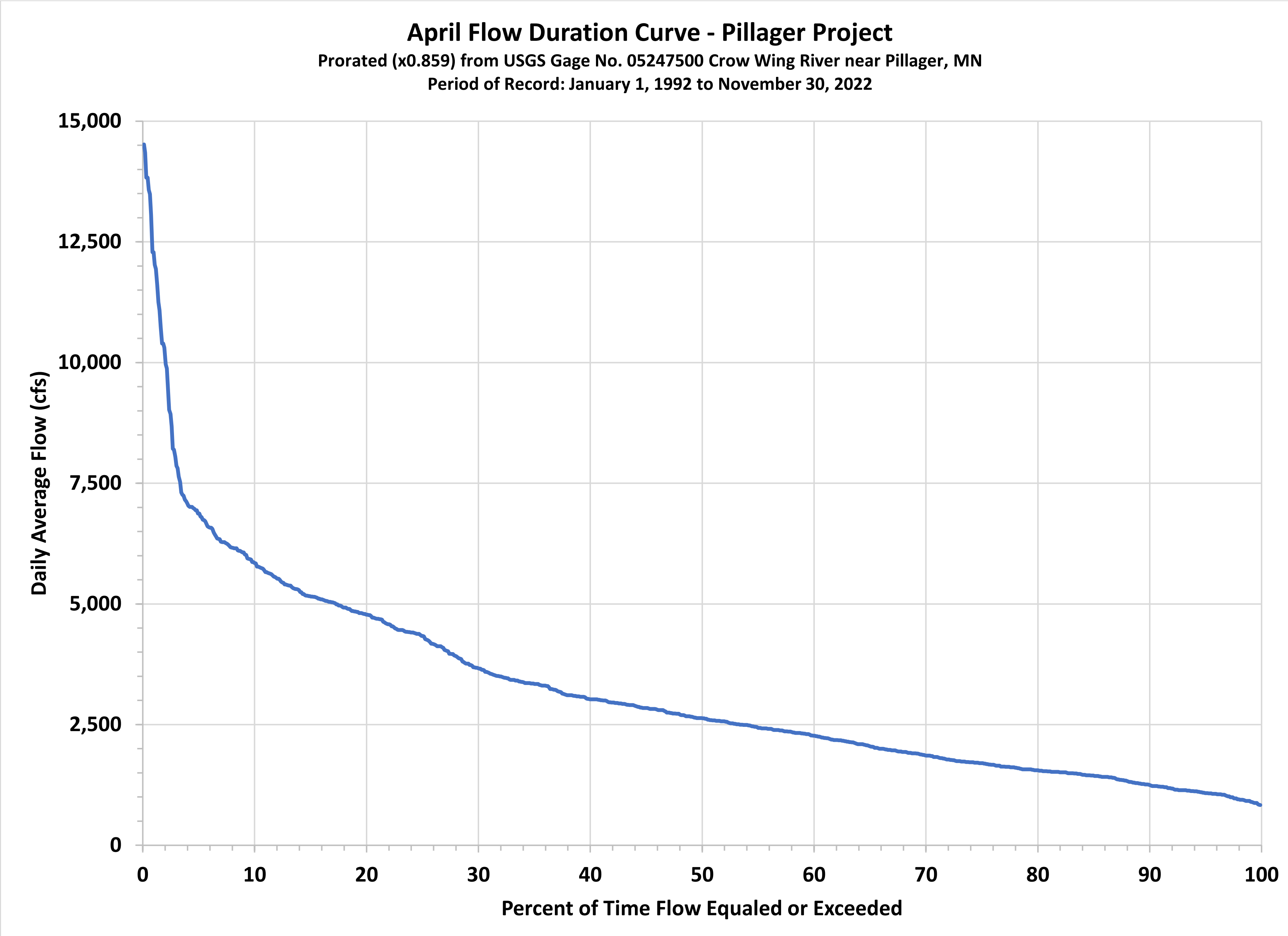

Annual Flow Duration Curve - Pillager Project
Prorated (x0.859) from USGS Gage No. 05247500 Crow Wing River near Pillager, MN
Period of Record: January 1, 1992 to November 30, 2022
15,000
12,500
10,000
7,500
5,000
2,500
0
Daily Average Flow (cfs)
0
10
20
30
40
50
60
70
80
90
100
Percent of Time Flow Equaled or Exceeded


January Flow Duration Curve - Pillager Project
Prorated (x0.859) from USGS Gage No. 05247500 Crow Wing River near Pillager, MN
Period of Record: January 1, 1992 to November 30, 2022
Daily Average Flow (cfs)
15,000
12,500
10,000
7,500
5,000
2,500
0
0
10
20
30
40
50
60
70
80
90
100
Percent of Time Flow Equaled or Exceeded

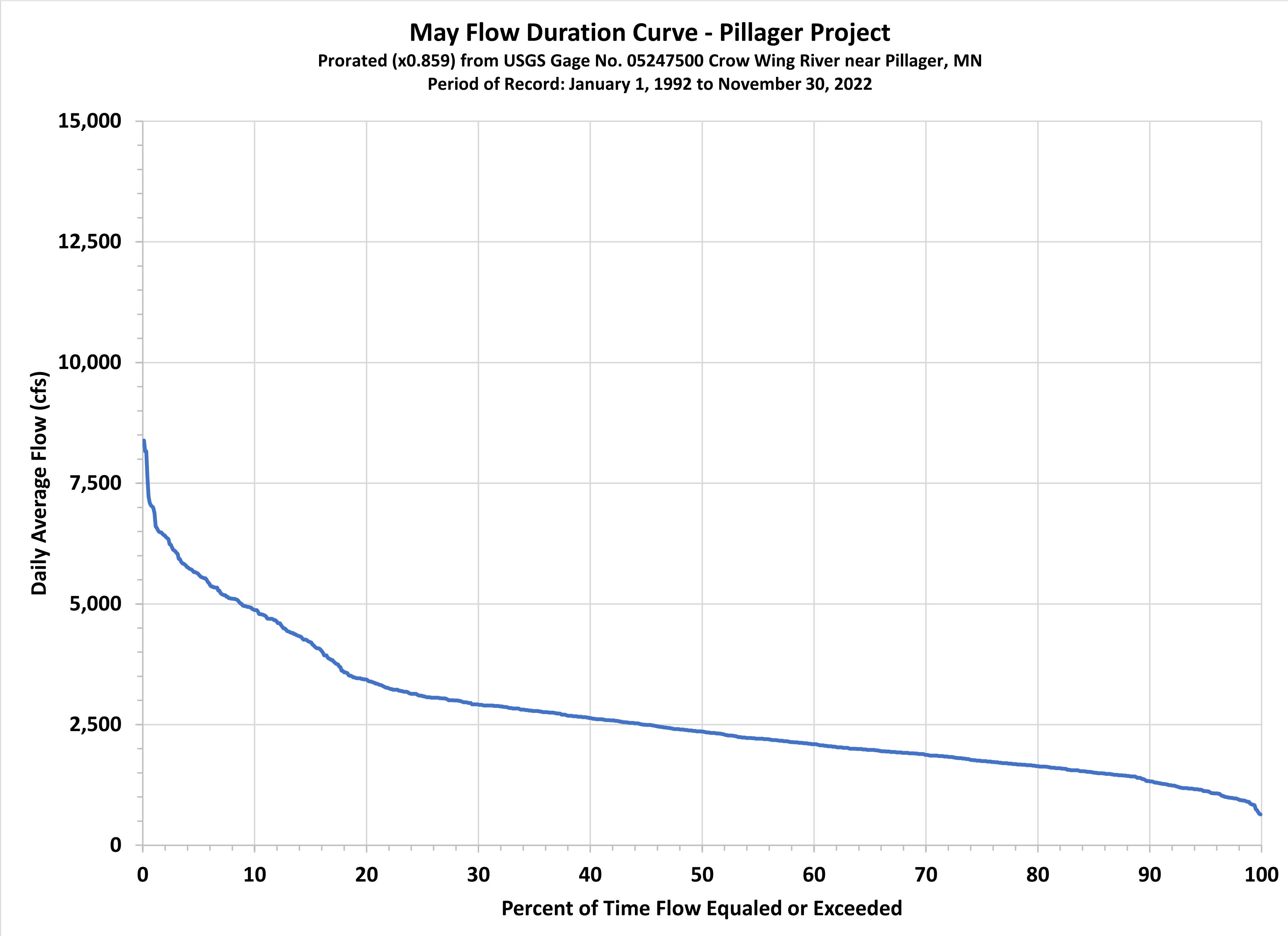

February Flow Duration Curve - Pillager Project
Prorated (x0.859) from USGS Gage No. 05247500 Crow Wing River near Pillager, MN
Period of Record: January 1, 1992 to November 30, 2022
15,000
12,500
10,000
7,500
5,000
2,500
0
Daily Average Flow (cfs)
0
10
20
30
40
50
60
70
80
90
100
Percent of Time Flow Equaled or Exceeded

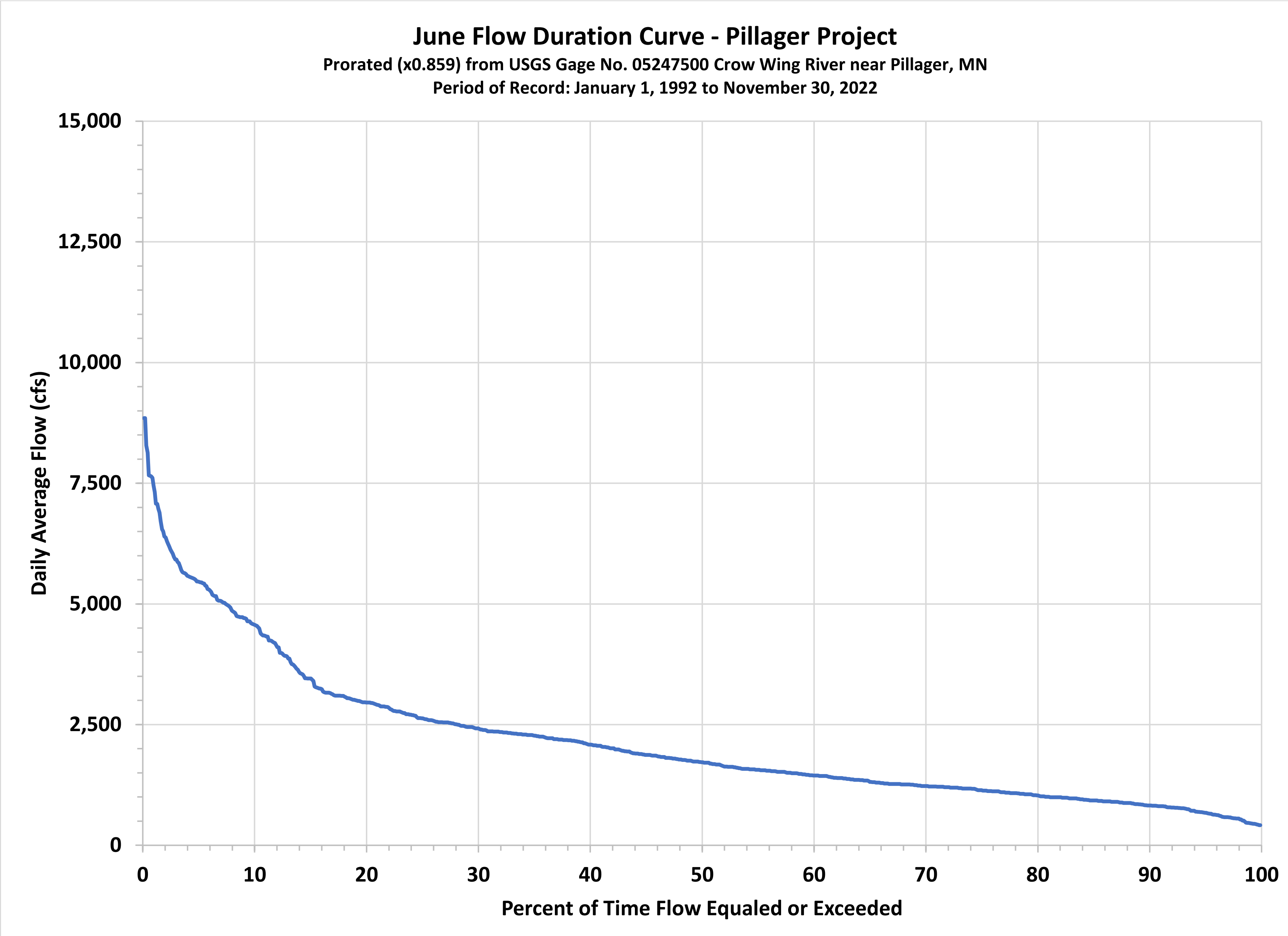


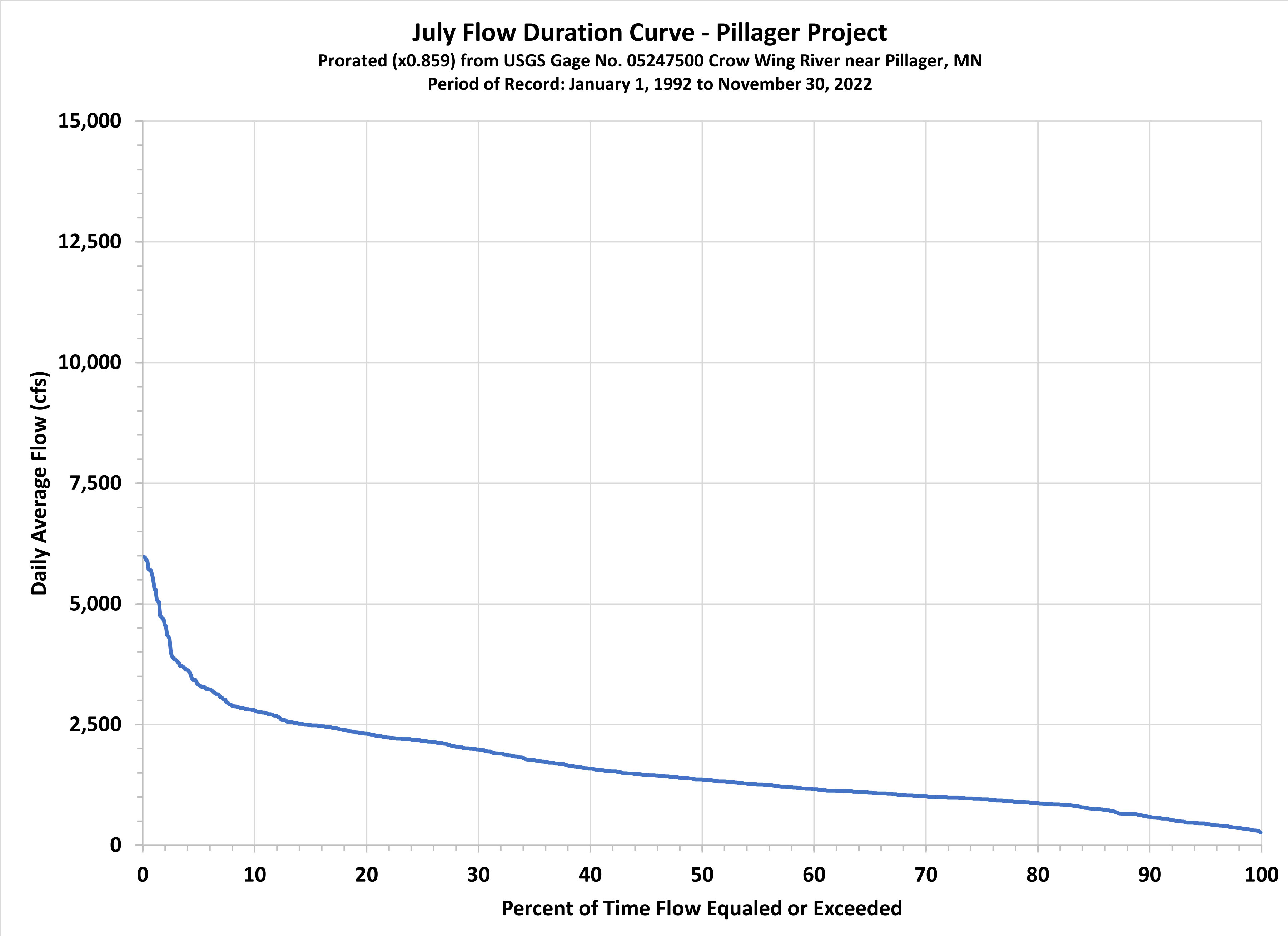
March Flow Duration Curve - Pillager Project
Prorated (x0.859) from USGS Gage No. 05247500 Crow Wing River near Pillager, MN
Period of Record: January 1, 1992 to November 30, 2022
Daily Average Flow (cfs)
15,000
12,500
10,000
7,500
5,000
2,500
0
0
10
20
30
40
50
60
70
80
90
100
Percent of Time Flow Equaled or Exceeded

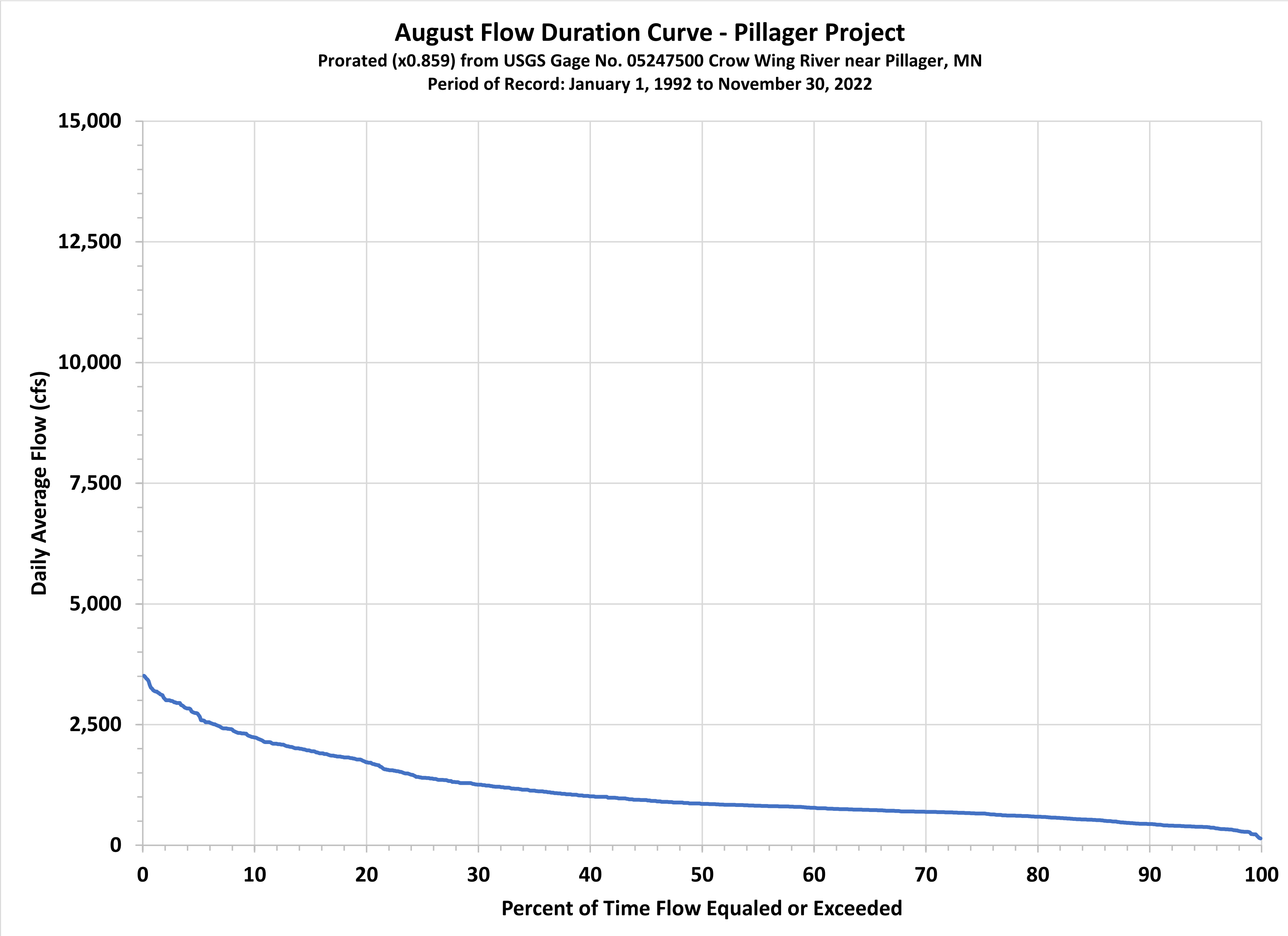


April Flow Duration Curve - Pillager Project
Prorated (x0.859) from USGS Gage No. 05247500 Crow Wing River near Pillager, MN
Period of Record: January 1, 1992 to November 30, 2022
Daily Average Flow (cfs)
15,000
12,500
10,000
7,500
5,000
2,500
0
0
10
20
30
40
50
60
70
80
90
100
Percent of Time Flow Equaled or Exceeded

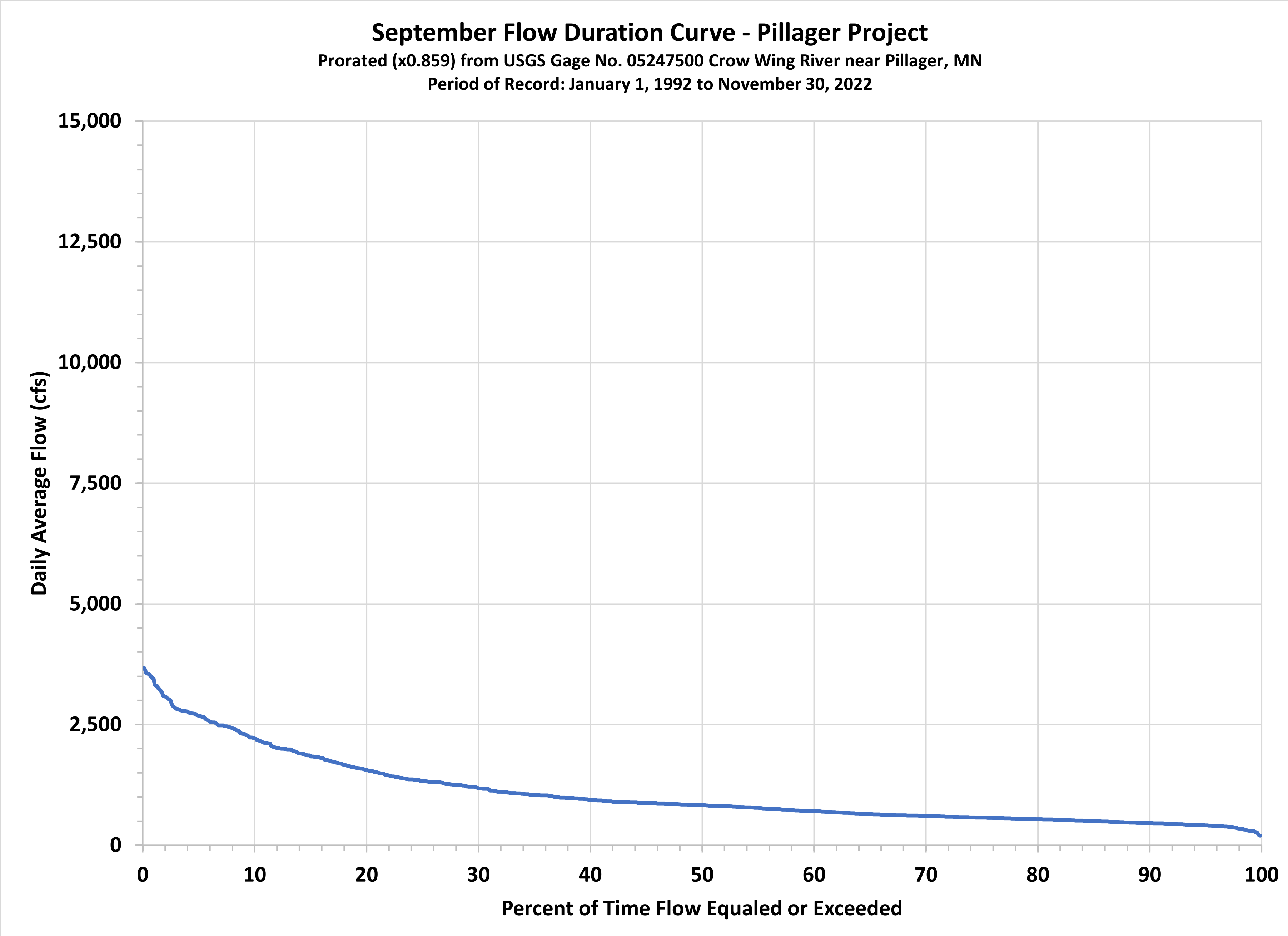

May Flow Duration Curve - Pillager Project
Prorated (x0.859) from USGS Gage No. 05247500 Crow Wing River near Pillager, MN
Period of Record: January 1, 1992 to November 30, 2022
15,000
12,500
10,000
7,500
5,000
2,500
0
Daily Average Flow (cfs)
0
10
20
30
40
50
60
70
80
90
100
Percent of Time Flow Equaled or Exceeded

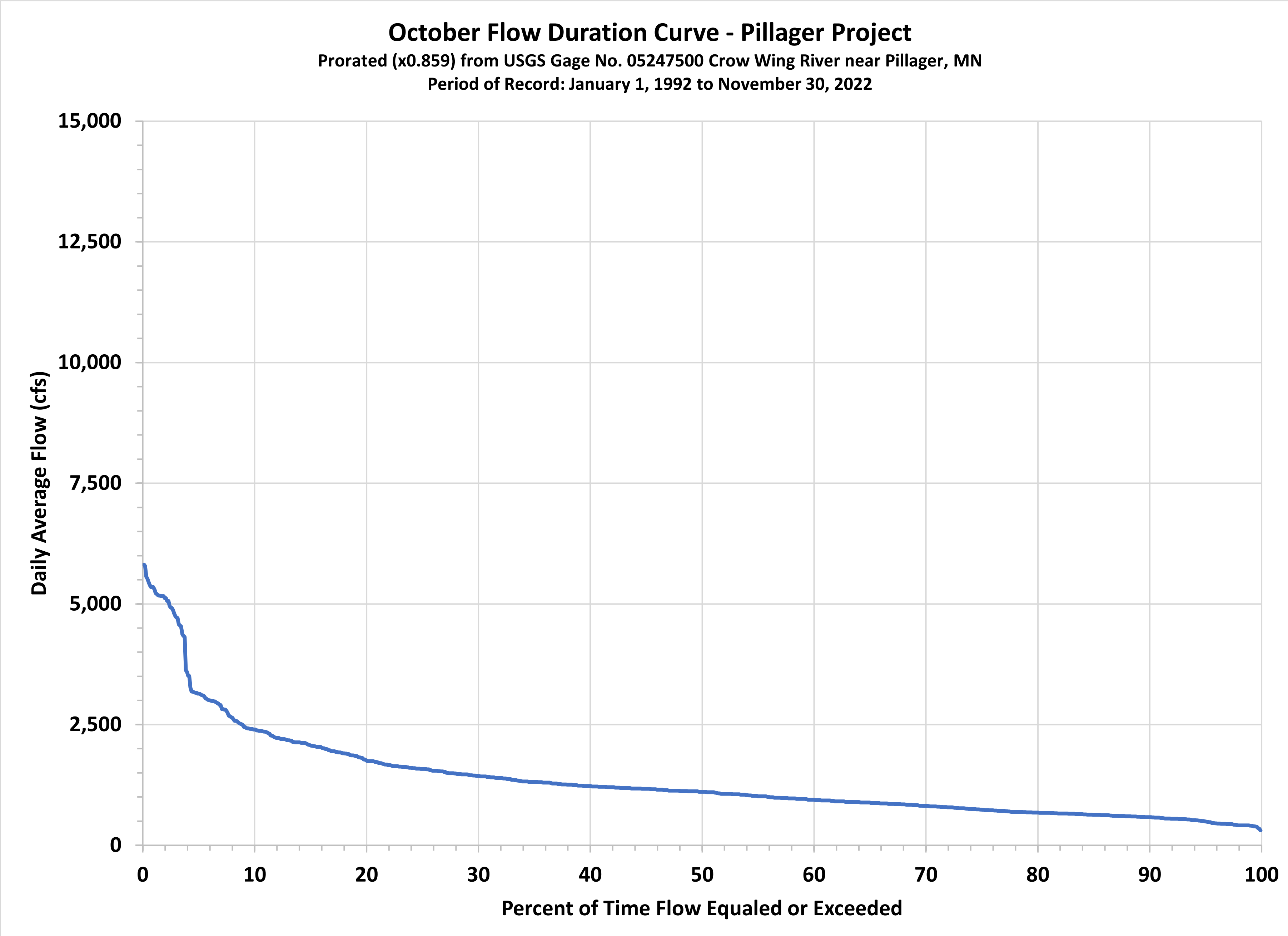

June Flow Duration Curve - Pillager Project
Prorated (x0.859) from USGS Gage No. 05247500 Crow Wing River near Pillager, MN
Period of Record: January 1, 1992 to November 30, 2022
15,000
12,500
10,000
7,500
5,000
2,500
0
Daily Average Flow (cfs)
0
10
20
30
40
50
60
70
80
90
100
Percent of Time Flow Equaled or Exceeded


July Flow Duration Curve - Pillager Project
Prorated (x0.859) from USGS Gage No. 05247500 Crow Wing River near Pillager, MN
Period of Record: January 1, 1992 to November 30, 2022
Daily Average Flow (cfs)
15,000
12,500
10,000
7,500
5,000
2,500
0
0
10
20
30
40
50
60
70
80
90
100
Percent of Time Flow Equaled or Exceeded

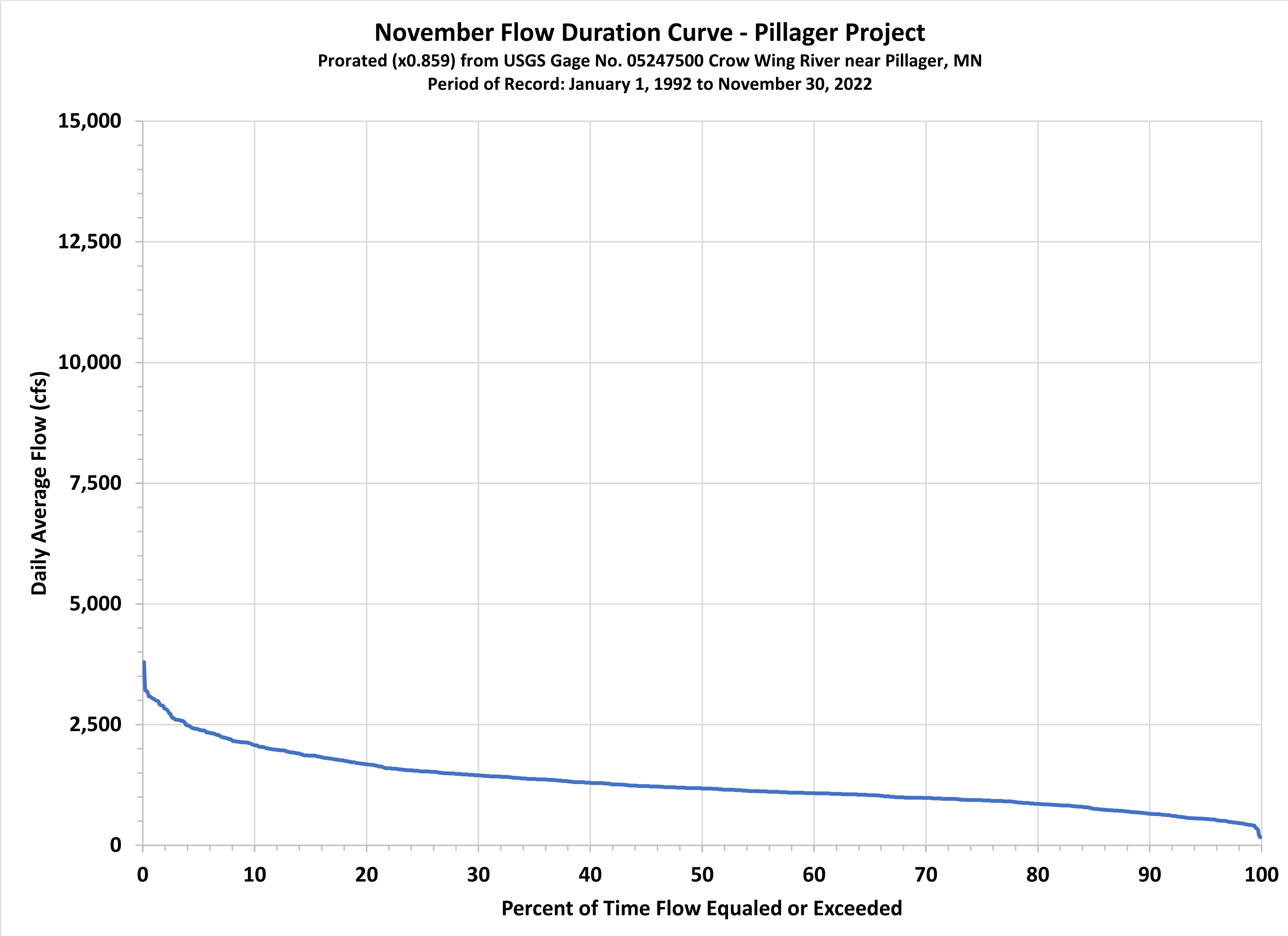


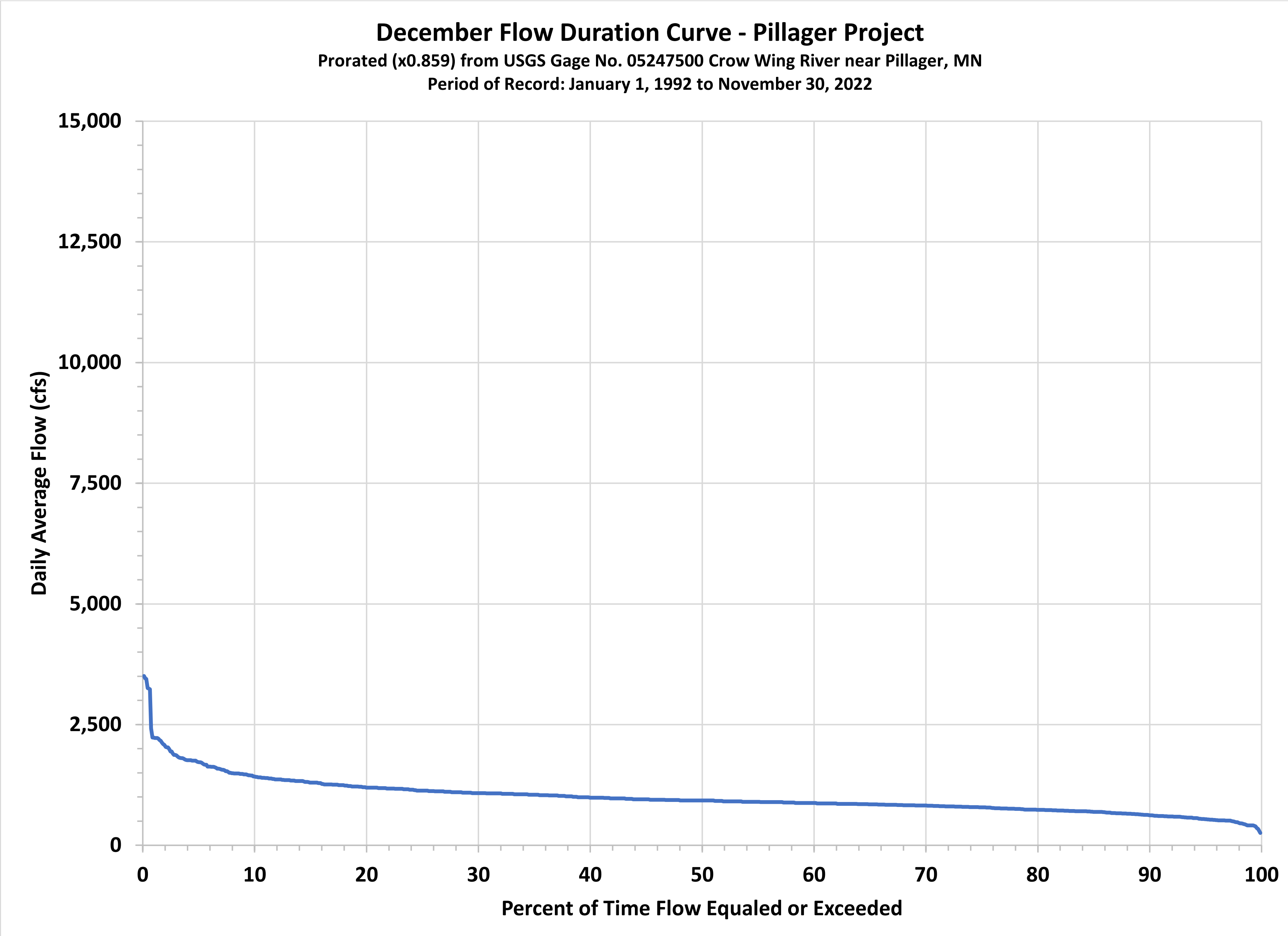
August Flow Duration Curve - Pillager Project
Prorated (x0.859) from USGS Gage No. 05247500 Crow Wing River near Pillager, MN
Period of Record: January 1, 1992 to November 30, 2022
Daily Average Flow (cfs)
15,000
12,500
10,000
7,500
5,000
2,500
0
0
10
20
30
40
50
60
70
80
90
100
Percent of Time Flow Equaled or Exceeded


September Flow Duration Curve - Pillager Project
Prorated (x0.859) from USGS Gage No. 05247500 Crow Wing River near Pillager, MN
Period of Record: January 1, 1992 to November 30, 2022
Daily Average Flow (cfs)
15,000
12,500
10,000
7,500
5,000
2,500
0
0
10
20
30
40
50
60
70
80
90
100
Percent of Time Flow Equaled or Exceeded



October Flow Duration Curve - Pillager Project
Prorated (x0.859) from USGS Gage No. 05247500 Crow Wing River near Pillager, MN
Period of Record: January 1, 1992 to November 30, 2022
Daily Average Flow (cfs)
15,000
12,500
10,000
7,500
5,000
2,500
0
0
10
20
30
40
50
60
70
80
90
100
Percent of Time Flow Equaled or Exceeded


November Flow Duration Curve - Pillager Project
Prorated (x0.859) from USGS Gage No. 05247500 Crow Wing River near Pillager, MN
Period of Record: January 1, 1992 to November 30, 2022
15,000
12,500
10,000
7,500
5,000
2,500
0
Daily Average Flow (cfs)
0
10
20
30
40
50
60
70
80
90
100
Percent of Time Flow Equaled or Exceeded


December Flow Duration Curve - Pillager Project
Prorated (x0.859) from USGS Gage No. 05247500 Crow Wing River near Pillager, MN
Period of Record: January 1, 1992 to November 30, 2022
Daily Average Flow (cfs)
15,000
12,500
10,000
7,500
5,000
2,500
0
0
10
20
30
40
50
60
70
80
90
100
Percent of Time Flow Equaled or Exceeded

APPENDIX C

RARE SPECIES INFORMATION

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Minnesota-Wisconsin Ecological Services Field Office
3815 American Blvd East
Bloomington, MN 55425-1659
Phone: (952) 858-0793 Fax: (952) 646-2873

In Reply Refer To: January 11, 2023
Project Code: 2023-0032681
Project Name: Little Falls Project, Pillager Project, and Sylvan Project

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

To Whom It May Concern:

This response has been generated by the Information, Planning, and Conservation (IPaC) system to provide information on natural resources that could be affected by your project. The U.S. Fish and Wildlife Service (Service) provides this response under the authority of the Endangered Species Act of 1973 (16 U.S.C. 1531-1543), the Bald and Golden Eagle Protection Act (16 U.S.C. 668-668d), the Migratory Bird Treaty Act (16 U.S.C. 703-712), and the Fish and Wildlife Coordination Act (16 U.S.C. 661 *et seq*.).

Threatened and Endangered Species

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and may be affected by your proposed project. The species list fulfills the requirement for obtaining a Technical Assistance Letter from the U.S. Fish and Wildlife Service under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. The Service recommends that verification be completed by visiting the ECOS IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS IPaC system by completing the same process used to receive the enclosed list.

Consultation Technical Assistance

Please refer to refer to our Section 7 website for guidance and technical assistance, including step-by-step instructions for making effects determinations for each species that might be present and for specific guidance on the following types of projects: projects in developed areas, HUD, CDBG, EDA, pipelines, buried utilities, telecommunications, and requests for a Conditional Letter of Map Revision (CLOMR) from FEMA.

Using the IPaC Official Species List to Make No Effect and May Affect Determinations for Listed Species

1. If IPaC returns a result of "There are no listed species found within the vicinity of the project," then project proponents can conclude the proposed activities will have **no effect** on any federally listed species under Service jurisdiction. Concurrence from the Service is not required for **no effect** determinations. No further consultation or coordination is required. Attach this letter to the dated IPaC species list report for your records.
2. If IPaC returns one or more federally listed, proposed, or candidate species as potentially present in the action area of the proposed project – other than bats (see below) – then project proponents must determine if proposed activities will have **no effect** on or **may affect** those species. For assistance in determining if suitable habitat for listed, candidate, or proposed species occurs within your project area or if species may be affected by project activities, you can obtain Life History Information for Listed and Candidate Species on our office website. If no impacts will occur to a species on the IPaC species list (e.g., there is no habitat present in the project area), the appropriate determination is **no effect**. No further consultation or coordination is required. Attach this letter to the dated IPaC species list report for your records.
3. Should you determine that project activities **may affect** any federally listed, please contact our office for further coordination. Letters with requests for consultation or correspondence about your project should include the Consultation Tracking Number in the header. Electronic submission is preferred.

Northern Long-Eared Bats
Northern long-eared bats occur throughout Minnesota and Wisconsin and the information below may help in determining if your project may affect these species.

This species hibernates in caves or mines only during the winter. In Minnesota and Wisconsin, the hibernation season is considered to be November 1 to March 31. During the active season (April 1 to October 31) they roost in forest and woodland habitats. Suitable summer habitat for northern long-eared bats consists of a wide variety of forested/wooded habitats where they roost, forage, and travel and may also include some adjacent and interspersed non-forested habitats such as emergent wetlands and adjacent edges of agricultural fields, old fields and pastures. This includes forests and woodlots containing potential roosts (i.e., live trees and/or snags ≥3 inches dbh for northern long-eared bat that have exfoliating bark, cracks, crevices, and/or hollows), as well as linear features such as fencerows, riparian forests, and other wooded corridors. These wooded areas may be dense or loose aggregates of trees with variable amounts of canopy closure. Individual trees may be considered suitable habitat when they exhibit the characteristics of a potential roost tree and are located within 1,000 feet (305 meters) of forested/wooded habitat. Northern long-eared bats have also been observed roosting in human-made structures, such as buildings, barns, bridges, and bat houses; therefore, these structures should also be considered potential summer habitat and evaluated for use by bats. If your project will impact caves or mines or will involve clearing forest or woodland habitat containing suitable roosting habitat, northern long-eared bats could be affected.

Examples of unsuitable habitat include:

- Individual trees that are greater than 1,000 feet from forested or wooded areas,
- Trees found in highly developed urban areas (e.g., street trees, downtown areas),

- A pure stand of less than 3-inch dbh trees that are not mixed with larger trees, and
- A stand of eastern red cedar shrubby vegetation with no potential roost trees.

If IPaC returns a result that northern long-eared bats are potentially present in the action area of the proposed project, project proponents can conclude the proposed activities **may affect** this species **IF** one or more of the following activities are proposed:

- Clearing or disturbing suitable roosting habitat, as defined above, at any time of year,
- Any activity in or near the entrance to a cave or mine,
- Mining, deep excavation, or underground work within 0.25 miles of a cave or mine,
- Construction of one or more wind turbines, or
- Demolition or reconstruction of human-made structures that are known to be used by bats based on observations of roosting bats, bats emerging at dusk, or guano deposits or stains.

If none of the above activities are proposed, project proponents can conclude the proposed activities will have **no effect** on the northern long-eared bat. Concurrence from the Service is not required for **No Effect** determinations. No further consultation or coordination is required. Attach this letter to the dated IPaC species list report for your records.

If any of the above activities are proposed, please use the northern long-eared bat determination key in IPaC. This tool streamlines consultation under the 2016 rangewide programmatic biological opinion for the 4(d) rule. The key helps to determine if prohibited take might occur and, if not, will generate an automated verification letter. No further review by us is necessary.

Please note that on March 23, 2022, the Service published a proposal to reclassify the northern long-eared bat as endangered under the Endangered Species Act. The U.S. District Court for the District of Columbia has ordered the Service to complete a new final listing determination for the bat by November 2022 (Case 1:15-cv-00477, March 1, 2021). The bat, currently listed as threatened, faces extinction due to the range-wide impacts of white-nose syndrome (WNS), a deadly fungal disease affecting cave-dwelling bats across the continent. The proposed reclassification, if finalized, would remove the current 4(d) rule for the NLEB, as these rules may be applied only to threatened species. Depending on the type of effects a project has on NLEB, the change in the species' status may trigger the need to re-initiate consultation for any actions that are not completed and for which the Federal action agency retains discretion once the new listing determination becomes effective (anticipated to occur by December 30, 2022). If your project may result in incidental take of northern long-eared bats after the new listing goes into effect this will first need to addressed in an updated consultation that includes an Incidental Take Statement. If your project may require re-initiation of consultation, please contact our office for additional guidance.

Whooping Crane

Whooping crane is designated as a non-essential experimental population in Wisconsin and consultation under Section 7(a)(2) of the Endangered Species Act is only required if project activities will occur within a National Wildlife Refuge or National Park. If project activities are proposed on lands outside of a National Wildlife Refuge or National Park, then you are not required to consult. For additional information on this designation and consultation requirements, please review "Establishment of a Nonessential Experimental Population of

Whooping Cranes in the Eastern United States."

Other Trust Resources and Activities

Bald and Golden Eagles - Although the bald eagle has been removed from the endangered species list, this species and the golden eagle are protected by the Bald and Golden Eagle Act and the Migratory Bird Treaty Act. Should bald or golden eagles occur within or near the project area please contact our office for further coordination. For communication and wind energy projects, please refer to additional guidelines below.

Migratory Birds - The Migratory Bird Treaty Act (MBTA) prohibits the taking, killing, possession, transportation, and importation of migratory birds, their eggs, parts, and nests, except when specifically authorized by the Service. The Service has the responsibility under the MBTA to proactively prevent the mortality of migratory birds whenever possible and we encourage implementation of recommendations that minimize potential impacts to migratory birds. Such measures include clearing forested habitat outside the nesting season (generally March 1 to August 31) or conducting nest surveys prior to clearing to avoid injury to eggs or nestlings.

Communication Towers - Construction of new communications towers (including radio, television, cellular, and microwave) creates a potentially significant impact on migratory birds, especially some 350 species of night-migrating birds. However, the Service has developed voluntary guidelines for minimizing impacts.

Transmission Lines - Migratory birds, especially large species with long wingspans, heavy bodies, and poor maneuverability can also collide with power lines. In addition, mortality can occur when birds, particularly hawks, eagles, kites, falcons, and owls, attempt to perch on uninsulated or unguarded power poles. To minimize these risks, please refer to guidelines developed by the Avian Power Line Interaction Committee and the Service. Implementation of these measures is especially important along sections of lines adjacent to wetlands or other areas that support large numbers of raptors and migratory birds.

Wind Energy - To minimize impacts to migratory birds and bats, wind energy projects should follow the Service's Wind Energy Guidelines. In addition, please refer to the Service's Eagle Conservation Plan Guidance, which provides guidance for conserving bald and golden eagles in the course of siting, constructing, and operating wind energy facilities.

State Department of Natural Resources Coordination

While it is not required for your Federal section 7 consultation, please note that additional state endangered or threatened species may also have the potential to be impacted. Please contact the Minnesota or Wisconsin Department of Natural Resources for information on state listed species that may be present in your proposed project area.

Minnesota
Minnesota Department of Natural Resources - Endangered Resources Review Homepage
Email: Review.NHIS@state.mn.us

Wisconsin
Wisconsin Department of Natural Resources - Endangered Resources Review Homepage
Email: DNRERReview@wi.gov

We appreciate your concern for threatened and endangered species. Please feel free to contact our office with questions or for additional information.

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:

Minnesota-Wisconsin Ecological Services Field Office
3815 American Blvd East
Bloomington, MN 55425-1659
(952) 858-0793

Project Summary

Project Code: 2023-0032681
Project Name: Little Falls Project, Pillager Project, and Sylvan Project
Project Type: Dam - Operations
Project Description: FERC hydropower relicensing support for the Little Falls Hydroelectric Project #2532, Sylvan Hydroelectric Project #2454, and Pillager Hydroelectric Project #2663.
Project Location:

Approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@46.3116073,-94.50031361577258,14z

Counties: Cass , Crow Wing , and Morrison counties, Minnesota

Endangered Species Act Species

There is a total of 4 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.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

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.

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1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

Mammals

NAME	STATUS
Gray Wolf *Canis lupus* Population: MN There is **final** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/4488	Threatened
Northern Long-eared Bat *Myotis septentrionalis* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9045	Endangered
Tricolored Bat *Perimyotis subflavus* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/10515	Proposed Endangered

Insects

NAME	STATUS
Monarch Butterfly *Danaus plexippus* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9743	Candidate

Critical habitats

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

USFWS National Wildlife Refuge Lands And Fish Hatcheries

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

THERE ARE NO REFUGE LANDS 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 person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

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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 birds listed below are birds of particular concern either because they occur on the USFWS Birds of Conservation Concern (BCC) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ below. This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the E-bird data mapping tool (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found below.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON
Bald Eagle *Haliaeetus leucocephalus* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.	Breeds Dec 1 to Aug 31
Black Tern *Chlidonias niger* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/3093	Breeds May 15 to Aug 20

NAME	BREEDING SEASON
Black-billed Cuckoo *Coccyzus erythropthalmus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9399	Breeds May 15 to Oct 10
Bobolink *Dolichonyx oryzivorus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 20 to Jul 31
Canada Warbler *Cardellina canadensis* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 20 to Aug 10
Chimney Swift *Chaetura pelagica* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds Mar 15 to Aug 25
Common Tern *Sterna hirundo hirundo* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA	Breeds May 1 to Aug 31
Connecticut Warbler *Oporornis agilis* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds Jun 15 to Aug 10
Eastern Whip-poor-will *Antrostomus vociferus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 1 to Aug 20
Golden-winged Warbler *Vermivora chrysoptera* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/8745	Breeds May 1 to Jul 20
Lesser Yellowlegs *Tringa flavipes* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9679	Breeds elsewhere
Olive-sided Flycatcher *Contopus cooperi* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/3914	Breeds May 20 to Aug 31
Red-headed Woodpecker *Melanerpes erythrocephalus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 10 to Sep 10
Rusty Blackbird *Euphagus carolinus* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA	Breeds elsewhere

NAME	BREEDING SEASON
Wood Thrush *Hylocichla mustelina* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 10 to Aug 31

Probability Of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read and understand the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

Breeding Season (■)
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort (|)
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

No Data (–)
A week is marked as having no data if there were no survey events for that week.

Survey Timeframe
Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.

Additional information can be found using the following links:

- Birds of Conservation Concern https://www.fws.gov/program/migratory-birds/species
- Measures for avoiding and minimizing impacts to birds https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds
- Nationwide conservation measures for birds https://www.fws.gov/sites/default/files/documents/nationwide-standard-conservation-measures.pdf

Migratory Birds FAQ

Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

Nationwide Conservation Measures describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. Additional measures or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the list of migratory birds that potentially occur in my specified location?

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the Rapid Avian Information Locator (RAIL) Tool.

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?
The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets.

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering or migrating in my area?
To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may query your location using the RAIL Tool and look at the range maps provided for birds in your area at the bottom of the profiles provided for each bird in your results. If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?
Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Eagle Act requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the Diving Bird Study and the nanotag studies or contact Caleb Spiegel or Pam Loring.

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the "no data" indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

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.

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

THERE ARE NO WETLANDS WITHIN YOUR PROJECT AREA.

IPaC User Contact Information

Agency: Kleinschmidt Associates
Name: Nicholas Gabuzda
Address: 35 Pratt Street, Suite 201
City: Essex
State: CT
Zip: 06426
Email nicholas.gabuzda@kleinschmidtgroup.com
Phone: 2074161270

Minnesota Department of Natural Resources
Division of Ecological & Water Resources
500 Lafayette Road, Box 25
St. Paul, MN 55155-4025

March 24, 2023
Correspondence # MCE 2022-00072

Elizabeth Krchnavek
Kleinschmidt Associates

RE: Natural Heritage Review of the proposed Little Falls Hydroelectric Project FERC P-2532, T40N R32W Sections 7-8, T41N R32W Sections 14, 23, 26-27, 34-35, T129N R 29W Sections 5, 7-8, 17-19, 32-33; Morrison County

Dear Elizabeth Krchnavek,

As requested, the Minnesota Natural Heritage Information System has been reviewed to determine if the proposed project has the potential to impact any rare species or other significant natural features. Based on the project details provided with the request and given that there is no new construction or changes to operations, and thus no new impacts for us to evaluate, we are unable to provide a Natural Heritage review. Note, there are several state-listed species within 1 mile of the proposed project area.

- Endangered: butternut (*Juglans cinerea*)
- Threatened: Blanding's turtle (*Emydoidea blandingii*), kitten-tails (*Synthyris bullii*)
- Species of special concern: blunt sedge (*Carex obtusata*), Hill's thistle (*Cirsium pumilum* var. *hillii*), creek heelsplitter (*Lasmigona compressa*), black sandshell (*Ligumia recta*)

Federally Protected Species

- To ensure compliance with federal law, conduct a federal regulatory review using the U.S. Fish and Wildlife Service's (USFWS) online Information for Planning and Consultation (IPaC) tool.

Environmental Review and Permitting

- Given the potential presence of state protected species, we encourage submission of Natural Heritage Review requests to ensure avoidance of take for these species and to determine survey needs as individual projects or changes in operational effects are planned.

- Please include a copy of this letter and the MCE-generated Final Project Report in any state or local license or permit application. Please note that measures to avoid or minimize disturbance to the above rare features may be included as restrictions or conditions in any required permits or licenses.

The Natural Heritage Information System (NHIS), a collection of databases that contains information about Minnesota's rare natural features, is maintained by the Division of Ecological and Water Resources, Department of Natural Resources. The NHIS is continually updated as new information becomes available, and is the most complete source of data on Minnesota's rare or otherwise significant species, native plant communities, and other natural features. However, the NHIS is not an exhaustive inventory and thus does not represent all of the occurrences of rare features within the state. Therefore, ecologically significant features for which we have no records may exist within the project area. If additional information becomes available regarding rare features in the vicinity of the project, further review may be necessary.

For environmental review purposes, the results of this Natural Heritage Review are valid for one year; the results are only valid for the project location and project description provided with the request. If project details change or the project has not occurred within one year, please resubmit the project for review within one year of initiating project activities.

The Natural Heritage Review does not constitute project approval by the Department of Natural Resources. Instead, it identifies issues regarding known occurrences of rare features and potential impacts to these rare features. Visit the Natural Heritage Review website for additional information regarding this process, survey guidance, and other related information. For information on the environmental review process or other natural resource concerns, you may contact your DNR Regional Environmental Assessment Ecologist.

Thank you for consulting us on this matter and for your interest in preserving Minnesota's rare natural resources.

Sincerely,

James Drake

James Drake
Natural Heritage Review Specialist
James.F.Drake@state.mn.us

Minnesota Department of Natural Resources
Division of Ecological & Water Resources
500 Lafayette Road, Box 25
St. Paul, MN 55155-4025

March 24, 2023
Correspondence # MCE 2023-00073

Elizabeth Krchnavek
Kleinschmidt Associates

RE: Natural Heritage Review of the proposed Sylvan Hydroelectric Project FERC p-2454, Cass, Crow Wing, Morrison Counties

Dear Elizabeth Krchnavek,

As requested, the Minnesota Natural Heritage Information System has been reviewed to determine if the proposed project has the potential to impact any rare species or other significant natural features. Based on the project details provided with the request and given that there is no new construction or changes to operations, and thus no new impacts for us to evaluate, we are unable to provide a Natural Heritage review. Note, there are several state-listed species within 1 mile of the proposed project area.

- Endangered: Oakes' pondweed (*Potamogeton oakesianus*)
- Threatened: Blanding's turtle (*Emydoidea blandingii*), bog bluegrass (*Poa paludigena*)
- Species of special concern: Red-shouldered hawk (*Buteo lineatus*), lark sparrow (*Chondestes grammacus*), yellow rail (*Coturnicops noveboracensis*), trumpeter swan (*Cygnus buccinator*), big brown bat (*Eptesicus fuscus*), least darter (*Etheostoma microperca*), creek heelsplitter (*Lasmigona compressa*), black sandshell (*Ligumia recta*), prairie vole (*Microtus ochrogaster*), little brown bat (*Myotis lucifugus*), northern long-eared bat (*Myotis septentrionalis*), olive-colored southern naiad (*Naja guadalupensis* ssp. *olivacea*)

Federally Protected Species

- To ensure compliance with federal law, conduct a federal regulatory review using the U.S. Fish and Wildlife Service's (USFWS) online Information for Planning and Consultation (IPaC) tool.

Environmental Review and Permitting

- Given the potential presence of state protected species, we encourage submission of Natural Heritage Review requests to ensure avoidance of take for these species and to determine survey needs as individual projects or changes in operational effects are planned.

- Please include a copy of this letter and the MCE-generated Final Project Report in any state or local license or permit application. Please note that measures to avoid or minimize disturbance to the above rare features may be included as restrictions or conditions in any required permits or licenses.

The Natural Heritage Information System (NHIS), a collection of databases that contains information about Minnesota's rare natural features, is maintained by the Division of Ecological and Water Resources, Department of Natural Resources. The NHIS is continually updated as new information becomes available, and is the most complete source of data on Minnesota's rare or otherwise significant species, native plant communities, and other natural features. However, the NHIS is not an exhaustive inventory and thus does not represent all of the occurrences of rare features within the state. Therefore, ecologically significant features for which we have no records may exist within the project area. If additional information becomes available regarding rare features in the vicinity of the project, further review may be necessary.

For environmental review purposes, the results of this Natural Heritage Review are valid for one year; the results are only valid for the project location and project description provided with the request. If project details change or the project has not occurred within one year, please resubmit the project for review within one year of initiating project activities.

The Natural Heritage Review does not constitute project approval by the Department of Natural Resources. Instead, it identifies issues regarding known occurrences of rare features and potential impacts to these rare features. Visit the Natural Heritage Review website for additional information regarding this process, survey guidance, and other related information. For information on the environmental review process or other natural resource concerns, you may contact your DNR Regional Environmental Assessment Ecologist.

Thank you for consulting us on this matter and for your interest in preserving Minnesota's rare natural resources.

Sincerely,

James Drake

James Drake
Natural Heritage Review Specialist
James.F.Drake@state.mn.us

DEPARTMENT OF NATURAL RESOURCES

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March 24, 2023
Correspondence # MCE 2023-00074

Elizabeth Krchnavek
Kleinschmidt Associates

RE: Natural Heritage Review of the proposed Pillager Hydroelectric Project FERC P-2663,
T133N R30W Sections 19-20, 29-30, T133N R31W Sections 16, 21-27; Cass and Morrison Counties

Dear Elizabeth Krchnavek,

As requested, the Minnesota Natural Heritage Information System has been reviewed to determine if the proposed project has the potential to impact any rare species or other significant natural features. Based on the project details provided with the request and given that there is no new construction or changes to operations, and thus no new impacts for us to evaluate, we are unable to provide a Natural Heritage review. Note, there are state-listed species within 1 mile of the proposed project area.

- Threatened: Blanding's turtle (*Emydoidea blandingii*)
- Species of special concern: Red-shouldered hawk (*Buteo lineatus*)

Federally Protected Species

- To ensure compliance with federal law, conduct a federal regulatory review using the U.S. Fish and Wildlife Service's (USFWS) online Information for Planning and Consultation (IPaC) tool.

Environmental Review and Permitting

- Given the potential presence of state protected species, we encourage submission of Natural Heritage Review requests to ensure avoidance of take for these species and to determine survey needs as individual projects or changes in operational effects are planned.Please include a copy of this letter and the MCE-generated Final Project Report in any state or local license or permit application. Please note that measures to avoid or minimize disturbance to the above rare features may be included as restrictions or conditions in any required permits or licenses.

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Sincerely,

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