# Thompson Falls Hydroelectric Project
# FERC Project No. 1869
# Pre-Application Document

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# List of Abbreviations and Acronyms

| | |
|---|---|
| ADA | Americans with Disabilities Act |
| Agreement | 1988 Mitigation Agreement |
| AIS | aquatic invasive species |
| AKN | Avian Knowledge Network |
| AMFA | Adaptive Management Funding Account |
| ARM | DEQ Administrative Rules of Montana |
| Avista | Avista Utilities |
| BED | Baseline Environmental Document |
| BL BH | Black Bullhead |
| BO | Biological Opinion |
| BULL | Bull Trout |
| BULL x EB | Bull x Brook Trout Hybrid |
| °C | degrees Celsius |
| CaCO3 | Calcium carbonate |
| CFR | Code of Federal Regulations |
| cfs | cubic feet per second |
| CHRU | Columbia Headwater Recovery Unit |
| CHSU | Critical Habitat Subunit |
| CHU | Critical Habitat Units |
| Commission | Federal Energy Regulatory Commission |
| COVID-19 | respiratory illness that is caused by a coronavirus |
| CSKT | Confederated Salish and Kootenai Tribes |
| DEQ | Montana Department of Environmental Quality |
| DLA | Draft License Application |
| DO | dissolved oxygen |
| DNRC | Department of Natural Resources and Conservation |
| EB | Brook Trout |
| E-coli | Escherichia coli bacteria |
| EA | Environmental Analysis |
| ECOS | Environmental Conservation Online System |
| EFH | essential fish habitat |
| EIS | Environmental Impact Statement |
| El. | elevation |
| EPA | United States Environmental Protection Agency |
| ESA | Endangered Species Act |
| °F | Fahrenheit |
| FERC | Federal Energy Regulatory Commission |
| FIRM | FEMA’s Flood Insurance Rate Map |
| FLA | Final License Application |
| FMO | foraging, migration, and overwintering |
| FWP | Montana Fish, Wildlife and Parks |
| FWS | United States Fish and Wildlife Service |
| GBT | Gas Bubble Trauma |
| H-A&E | Historic Architectural-Engineering |
| HAER | Historic American Engineering Record |
| HAP | Historic Archaeological Properties |
| Hp | horsepower |
| IDF | Inflow Design Flood |
| ILP | Integrated Licensing Process |
| IPaC | Information for Planning and Consultation |
| ISB | Northern Intermountain Seismic Belt |
| km | kilometer |

| | |
|---|---|
| $km^2$ | square meter |
| KNF | Kootenai National Forest |
| KOK | Kokanee |
| kV | kilovolts |
| kVA | kilo-volt-ampere |
| L WF | Lake Whitefish |
| Licensee | NorthWestern Energy |
| LDO | luminescent dissolved oxygen |
| LL | Brown Trout |
| LMB | Largemouth Bass |
| LNF | Lolo National Forest |
| LN DC | Longnose Dace |
| LN SU | Longnose Sucker |
| LS SU | Largescale Sucker |
| LT | Lake Trout |
| m | meter |
| m3/sec | cubic meter per second |
| MBTA | Migratory Bird Treaty Act |
| MCL | Maximum contaminant level |
| mg/kg | Milligrams per kilogram |
| mg/L | Milligrams per liter |
| MIS | management indicator species |
| MNHP | Montana Natural Heritage Program |
| MOU | Memorandum of Understanding |
| MPC | Montana Power Company |
| MSDI | Montana Spatial Data Infrastructure |
| MVA | Megavolt amperes |
| MW | Megawatt |
| MWF | Mountain Whitefish |
| n | number |
| N PMN | Northern Pikeminnow |
| NEPA | National Environmental Policy Act |
| new powerhouse | Unit No. 7 powerhouse |
| NISB | Northern Intermountain Seismic Belt |
| NOI | Notice of Intent |
| NorthWestern | NorthWestern Energy |
| NP | Northern Pike |
| NPL | EPA Superfund National Priorities List |
| NPMN x PEA | Northern Pikeminnow x Peamouth |
| NRCS | Natural Resource Conservation Service |
| NRHP | National Register of Historic Properties |
| NTU | nephelometric turbidity units |
| PAD | Pre-Application Document |
| Panel | Thompson Falls Scientific Review Panel |
| PCBs | polychlorinated biphenyl |
| PEA | Peamouth |
| pH | hydrogen ion concentration |
| PIT | passive integrated transponder |
| PLP | Preliminary Licensing Proposal |
| PMF | Probable Maximum Flood |
| pop-eye | exophthalmia |
| Program | Northwest Power Planning Council's Fish and Wildlife Program |
| Project | Thompson Falls Hydroelectric Project |

| | |
|---|---|
| PSP | Proposed Study Plan |
| PUMP | Pumpkinseed |
| RB | Rainbow Trout |
| RBxWCT | Rainbow x Westslope Cutthroat Trout hybrid |
| REA | Ready for Environmental Analysis |
| Relicensing Participants | Local, state, and federal governmental agencies, Native American Indian Tribes, local landowners, non-governmental organizations, and other interested parties. |
| rpm | revolutions per minute |
| RRMP | Recreation Resource Management Plan |
| RS SH | Redside Shiner |
| RSP | Revised Study Plan |
| SCORP | Montana Statewide Comprehensive Outdoor Recreation Plan |
| SHPO | State Historic Preservation Officer |
| SKQ Project | Seli'š Ksanka Qlispe' |
| SMB | Smallmouth Bass |
| SOC | Species of Concern |
| SSS | special status species |
| TAC | Technical Advisory Committee |
| TCs | Terms and Conditions |
| TDG | total dissolved gas |
| TEPC | threatened, endangered, proposed and candidate species |
| TFCT | Thompson Falls Community Trails |
| Thompson Falls Project | Thompson Falls Hydroelectric Project |
| TN | total nitrogen |
| TP | total phosphorous |
| TSIN | total soluble inorganic nitrogen |
| Trails Group | Thompson Falls Community Trails Group |
| U.S. | United States of America |
| USFS | United States Forest Service |
| USGS | United States Geological Survey |
| V | volts |
| VQO | Visual Quality Objectives |
| WCT | Westslope Cutthroat Trout |
| WE | Walleye |
| WMA | Wildlife Management Area |
| YP | Yellow Perch |
| YL BL | Yellow Bullhead |

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# 1. Introduction

## 1.1 Project Background

The Thompson Falls Hydroelectric Project (Thompson Falls Project or Project) is located on the Clark Fork River in Sanders County, Montana. Preliminary development of the Thompson Falls Project began in June 1912, by the Thompson Falls Power Company. Construction commenced in May 1913 and the first generating unit was placed in service on July 1, 1915. The sixth generating unit was placed in service in May 1917. The Project has been operating continuously since 1915.

Non-federal hydropower projects in the United States (U.S.) are regulated by the Federal Energy Regulatory Commission (FERC or Commission) under the authority of the Federal Power Act. Montana Power Company acquired the Thompson Falls Project in 1929. The original license for the Thompson Falls Project was issued effective January 1, 1938 and expired on December 31, 1975. The current FERC License was issued to the Montana Power Company in 1979. The Project was purchased by (and FERC License transferred to) PPL Montana in 1999 and then purchased by (and FERC License transferred to) NorthWestern Corporation, a Delaware corporation, d/b/a NorthWestern Energy (NorthWestern or Licensee) in 2014. An order amending the License was issued in 1990 allowing for construction of an additional powerhouse and generating unit, which was subsequently completed in 1995. With the addition of this new (second) powerhouse, the Project has a total generating capacity of 92.6 megawatts (MW).

The current FERC License is scheduled to expire December 31, 2025. Concurrently with this Pre-Application Document (PAD), NorthWestern is filing a Notice of Intent (NOI) to relicense the Thompson Falls Project using FERC's Integrated Licensing Process (ILP).

## 1.2 Process Plan and Schedule for Project Relicensing Activities

### 1.2.1 *Pre-License Application Filing Process*

#### 1.2.1.1 Preparation of the Pre-Application Document

Before filing a Final License Application (FLA) with FERC, applicants are required to conduct a pre-license application filing process that consists of 1) presenting the Project to Relicensing Participants[1]; 2) consulting with those Relicensing Participants; 3) identifying issues; and 4) gathering available information.

[1] Local, state, and federal governmental agencies, Native American Indian Tribes, local landowners, non-governmental organizations, and other interested parties.

NorthWestern maintains a website with information about the Thompson Falls Project, http://www.northwesternenergy.com/environment/thompson-falls-project.
Relicensing information, including meeting notices and presentations, reports, and other documents are available on this website.

NorthWestern proactively initiated relicensing outreach discussions with Relicensing Participants in 2018 (Table 1-1). The first activity was a training program, “FERC 101,” which was held in Missoula, Montana on September 12, 2018. This program included FERC staff who presented information on the procedures used to relicense hydropower projects under the Commission’s jurisdiction. NorthWestern also presented information on the Thompson Falls Project. The goal of the meeting was to inform Relicensing Participants of the relicensing process and schedule for the Thompson Falls Project (relicensing of Broadwater Hydroelectric Project, a Montana Department of Natural Resources and Conservation (DNRC) project, was also addressed). Presentations from this meeting, and all other Thompson Falls relicensing meetings, are posted on NorthWestern’s website.

Next, NorthWestern voluntarily prepared a Baseline Environmental Document (BED) which was a compilation of existing resource information. This document was released for public comment on November 1, 2018 and is available on the website. A workshop was held in Missoula to discuss the BED and identify any data gaps and resource issues on December 4, 2018 (Table 1-1). The presentations from that meeting are available on the website. NorthWestern received written comments on the BED from Montana Fish, Wildlife and Parks (FWP) and Montana Department of Environmental Quality (DEQ), which are addressed in Section 15.

In October 2019, NorthWestern hosted a public meeting in Thompson Falls to further inform Relicensing Participants about the relicensing process and provide an update on an operational test and resource studies NorthWestern had conducted.

In March 2020, NorthWestern hosted a second public meeting in Thompson Falls to inform the Relicensing Participants of observations made during the October 2019 operational test, and to describe proposed NorthWestern project operations. The meeting also included further information on the relicensing process.

All of these activities, summarized in Table 1-1 below, were done voluntarily by NorthWestern to engage the Relicensing Participants in advance of initiating the ILP. The goals of these extra efforts were to learn about potential concerns or gaps in data and to establish a common understanding among all the interested parties as to what is involved with relicensing a hydroelectric project.

**Table 1-1: Thompson Falls relicensing outreach and other activities conducted to-date.**

| Thompson Falls Relicensing Outreach and Other Activities | Comment | Date |
|---|---|---|
| FERC 101 Relicensing Outreach Training, Missoula. Public invited. | FERC training on the procedures used to relicense hydropower projects. | Sept 12, 2018 |
| Notified Relicensing Participants of availability of BED. | The BED described the hydroelectric project and available fish, wildlife, water quality, cultural and recreation, operational and other Project specific information. | Nov 1, 2018 |
| Workshop to discuss the relicensing (ILP) process and BED and identify data gaps and resource issues. | Workshop included small group breakout sessions to discuss fisheries, water resources and recreation/cultural issues. | Dec 4, 2018 |
| Pre-relicensing data collection. | Included operations, water quality, fisheries, and recreation use data. | 2018-2020 |
| Public meeting in Thompson Falls for Relicensing Participants. | Included updates on studies and the relicensing process. | Oct. 15, 2019 |
| Public meeting in Thompson Falls for Relicensing Participants. | Included observations made during the operational test and information on data collection for the PAD. | March 11, 2020 |

In addition to the outreach efforts, NorthWestern accelerated the schedule to conduct certain resource studies so the information would be available to inform relicensing. Specifically, NorthWestern prepared a water quality monitoring plan which was implemented in 2019 to address data gaps that were noted during the preparation of the BED. Results of the 2019 water quality data collection are reported in Section 4 of this PAD.

A Recreation Visitor Survey was conducted during the 2018 peak recreation season (Memorial Day weekend – Labor Day). In addition, the volume of use at five of the 10 project-related recreation sites was monitored during the 2019 peak recreation season using automatic traffic and trail counters. The results of those surveys are discussed in Section 9 of this PAD.

The 2008 Biological Opinion (BO) issued by the U.S. Fish and Wildlife Service (FWS) for the Project included a requirement for the Licensee to conduct Phase 2 fish passage evaluation studies from 2010 to 2020. At the end of the Phase 2 evaluation period, the Licensee was required to prepare a comprehensive 10-year report for filing with the Commission.

The BO specified that the comprehensive report be completed by December 31, 2020. NorthWestern reviewed the relicensing schedule and found that some adjustments in the compliance reporting schedule could better align the compliance schedule with the relicensing schedule. Specifically, NorthWestern requested, and FWS concurred, that the comprehensive report described in the BO would be submitted a year early. The Comprehensive Phase 2 Fish Passage Report was prepared with guidance from the Technical Advisory Committee (TAC) and filed with FERC on December 20, 2019. The Comprehensive Phase 2 Fish Passage Report summarizes the results of fish passage studies at the Project, conducted in compliance with the BO.

The BO also required that the Licensee conduct a scientific review to determine if the Thompson Falls Project upstream fish passage facility is functioning as intended, and whether operational or structural modifications are needed. The review was to also include a set of recommendations to be submitted to the FWS. The scientific review convened in January 2020, with the formation of the Thompson Falls Scientific Review Panel (Panel). The Panel included representatives from the FWS, FWP, and Water & Environmental Technologies, an environmental and engineering consulting firm. On March 27, 2020, the Panel issued a memo summarizing its evaluation of the upstream fish passage facility and providing recommendations on how to better evaluate the facility in the future. On April 16, 2020, NorthWestern received written confirmation from the FWS that the requirement for a scientific review, as expressed in term and condition (TCs) TC1-h in the BO, had been met with the submittal of the memo summarizing the Panel's findings. The recommendations from the scientific review were considered in the development of NorthWestern's list of preliminary issues and studies, found in Section 14 of this PAD.

The Project is operated to provide baseload and flexible generation within the reservoir elevation and minimum flow requirements of the License. During flexible generation operations[2], the Licensee may use the top 4 feet of the reservoir from full pond while maintaining minimum flows. For several reasons, the full 4 feet typically have not been used over the past 20 years of operation. In order to assess the effects using the Project's full operational flexibility, an operational test was conducted in October 2019. Details of the operational test and observations made during the test are described in Section 14 of this PAD.

Under FERC regulations, NorthWestern is required to submit a PAD 5 to 5.5 years prior to the expiration of the current License (December 31, 2025). The PAD is a document that describes the project proposal and existing, relevant information that can be used to assess potential project effects on natural, cultural, recreational, and Tribal resources. This PAD was prepared by NorthWestern, taking into consideration information in the BED, additional information collected through post-BED Relicensing Participant outreach (Table 1-1), review of federal and state comprehensive plans filed with FERC and listed on FERC's website (Appendix A), and additional data gathering.

An applicant is not required to conduct studies to generate information for the PAD but is expected to exercise due diligence to gather existing information. This includes contacting Relicensing Participants for information relevant to the project, the local area environment, and potential project effects. NorthWestern significantly exceeded these requirements with its voluntary development and distribution of the BED and subsequent Relicensing Participant outreach, as described above.

[2] Flexible generation supports grid reliability by providing spinning reserve and load balancing as river and reservoir conditions allow, by lowering the reservoir to increase generation and raising the reservoir to reduce generation.

#### 1.2.1.2 Integrated Licensing Process

NorthWestern is using the ILP for relicensing of the Thompson Falls Project. The ILP is FERC's default licensing process which evaluates effects of a project based on a nexus to continuing Project operations. In general, the purpose of the pre-filing stage of the ILP is to inform Relicensing Participants about relicensing, to identify issues and study needs (based on a project nexus and established FERC criteria), to conduct those studies per specific FERC requirements which will be defined in the FERC Study Plan Determination, and to prepare the Final License Application (FLA).

FERC staff are active ILP participants during the pre-filing stage, providing oversight to the applicant and Relicensing Participants. National Environmental Policy Act (NEPA) scoping is conducted during the pre-filing phase of the ILP, allowing identification of issues and studies (per FERC criteria) that may be required.

FERC makes a final determination on requested studies based on seven established FERC criteria for all Relicensing Participants during the pre-filing period. These criteria are:

1. Describe the goals and objectives of each study proposal and the information to be obtained;
2. If applicable, explain the relevant resource management goals of the agencies or Indian tribes with jurisdiction over the resource to be studied;
3. If the requester is not a resource agency, explain any relevant public interest considerations in regard to the proposed study;
4. Describe existing information concerning the subject of the study proposal, and the need for additional information;
5. Explain the nexus between project operations and effects (direct, indirect and/or cumulative) on the resource to be studied, and how the study results would inform the development of license requirements;
6. Explain how any proposed study methodology (including any preferred data collection and analysis techniques), or objectively quantified information, and a schedule including appropriate field season(s) and the duration is consistent with generally accepted practice in the scientific community or, as appropriate, considers relevant tribal values and knowledge, and;
7. 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.

The ILP has mandatory timelines and filing requirements to which NorthWestern, as the applicant, and all Relicensing Participants must adhere. The basic steps of the ILP pre-filing process appear in Table 1-2. Under federal law, NorthWestern must file its FLA with FERC by no later than

December 31, 2023, 2 years prior to the expiration of the current License (December 31, 2025) (Table 1-2).

**Table 1-2: Thompson Falls anticipated pre-filing relicensing schedule (FERC activities in green, Relicensing Participant comment opportunities in orange).**

| Activity | Comment | Code of Federal Regulations (CFR Title 18) | Date |
|---|---|---|---|
| File PAD and NOI to Relicense with FERC. (Formal FERC process begins with this filing) | Earliest date to file PAD & NorthWestern's filing date | §5.5 and 5.6 | July 1, 2020 |
| Tribal consultation meetings | With FERC staff | §5.7 | Aug 1, 2020 |
| Notice of Commencement, Scoping Document 1 (SD1) | Within 60 days of PAD/NOI | §5.8 | Aug 30, 2020 |
| Scoping Meetings and On-Site Project Site Visit[3] | Within 30 days after SD1 | §5.8 | Sep 2020 |
| PAD/SD1 Comments and Study Requests Due | 60 days after Notice of Commencement | §5.9 | Oct 29, 2020 |
| Scoping Document 2 (as necessary) | 45 days after comment deadline on SD1 | §5.10 | Dec 14, 2020 |
| File Proposed Study Plan (PSP) based on Relicensing Participants input on PAD | 45 days after comment deadline on SD1 | §5.11 | Dec 14, 2020 |
| Study Plan Meetings | 30 days after PSP filed | §5.11 | Jan 12, 2021 |
| Relicensing Participants Comments on PSP Due | 90 days after PSP filed | §5.12 | Mar 13, 2021 |
| File Revised Proposed Study Plan based on Relicensing Participants input on the PSP | 30 days after comment deadline on PSP | §5.13 | Apr 12, 2021 |
| Relicensing Participants Comments on Revised Study Plan (RSP) Due | 15 days after RSP filed | §5.13 | Apr 27, 2021 |
| FERC Study Plan Determination[4] | | §5.13 | May 12, 2021 |
| Initial Study Season | | §5.15 | Spring/Summer 2021 |
| Initial Study Season Report | One year after study plan determination | §5.15 | May 12, 2022 |
| Initial Study Report Meeting with Relicensing Participants | Within 15 days of study report | §5.15 | May 27, 2022 |
| Initial Study Meeting Summary | Within 15 days of study report meeting | §5.15 | June 11, 2022 |

[3]NorthWestern recognizes that the COVID-19 public health emergency has created significant and immediate challenges for Relicensing Participants to meaningfully participate in this relicensing effort. Due to social distancing and stay-at-home considerations, the Commission's scoping meeting and site visit could be affected.

[4] Agencies and Tribes with mandatory conditioning authority may request the use of a formal dispute resolution process regarding FERC's Study Plan Determination. Within 20 days of the Study Plan Determination, any federal agency or Tribe with authority to include mandatory conditions in a license may file a notice of study dispute with respect to studies pertaining directly to the exercise of their authorities under sections 4(e) and 18 of the Federal Power Act or section 401 of the Clean Water Act.

| Activity | Comment | Code of Federal Regulations (CFR Title 18) | Date |
|---|---|---|---|
| Second Study Season, if needed | | §5.15 | Spring/Summer 2022 |
| Updated Study Report, if needed | Two years after study plan determination | §5.15 | May 12, 2023 |
| Updated Study Report Meeting with Relicensing Participants | Within 15 days of study report | §5.15 | May 27, 2023 |
| Updated Study Meeting Summary | Within 15 days of Study Report meeting | §5.15 | June 11, 2023 |
| Preliminary Licensing Proposal (PLP) or Draft License Application | Target date | §5.16 | Jul 2023 |
| Comment period on PLP or Draft License Application | 90 days after PLP or Draft License Application | §5.16 | Oct 2023 |
| Filing of Final License Application | No later than 2 years prior to license expiration | §5.17 | Dec 31, 2023 |

### 1.2.2 *Post-License Application Filing Process*

The post-license application filing process begins once NorthWestern files the FLA with FERC (by December 31, 2023 per Table 1-2 above).

Once FERC staff determines that the application is ready for environmental analysis, comments are requested through issuance of a public notice. Agencies, Tribes, and other Relicensing Participants will then have the opportunity to submit comments, recommendations, and terms and conditions for the new license to be issued by FERC. In the NEPA document, FERC staff analyzes and makes a recommendation as to effects of the project proposal and alternatives, as well as comments and any agency and Tribe terms and conditions. A final Commission decision follows the issuance of the NEPA document—an Environmental Analysis (EA) or Environmental Impact Statement (EIS)—and that decision considers all information in the public record for the Project. When the new license is issued by the Commission it will include measures it determines necessary for operating the Project for power generation, protecting environmental and cultural resources and the public interest, as well as any mandatory terms and conditions.

The Commission's regulations require all license applicants to consult with FWS regarding any federally listed threatened and endangered species found in the project area. FERC must ensure that there is enough information to independently analyze whether the proposed project may affect any threatened and endangered species and, if there are effects, what the effects would be and what protective measures are needed. As part of this filing, NorthWestern is requesting designation as the non-federal representative for informal consultation with the FWS during the development of the FLA, and will prepare a Biological Assessment for filing with the FLA. If the Project is found to have an adverse effect on a federally listed species, formal consultation will be required, and the FWS will prepare a BO. Consultation with the FWS regarding the Endangered Species Act must be completed prior to FERC's issuance of a new license.

**Table 1-3: Thompson Falls anticipated post-filing relicensing schedule (FERC activities in green, Relicensing Participants comment periods in orange). Dates are approximate, based on an assumed FLA filing date of December 31, 2023.**

| Activity | Comment | Code of Federal Regulations (CFR Title 18) | Approximate Date |
|---|---|---|---|
| File FLA | 2 years before license expiration | §5.17 | Dec 31, 2023 |
| FERC issues Tendering Notice and Schedule | 14 days after FLA filed | §5.19 | Jan 15, 2024 |
| FERC issues Ready for Environmental Analysis Notice (REA) | Target date | §5.22 | Feb 2024 |
| Comments, interventions, and preliminary recommendations and agency conditions and prescriptions due | 60 days after REA | §5.23 | Apr 2024 |
| 401 Water Quality Certification Request submitted by the Applicant | No later than 60 days after REA | §5.23 | Apr 2024 |
| Applicant files Comments on Agency Conditions | 105 days from REA | §5.23 | June 2024 |
| FERC Issues NEPA Document | 120 days from REA | §5.24, 5.25 | Dec 2024 |
| Comments on NEPA Document Due | No more than 60 days | §5.23 | Feb 2025 |
| FWS issues ESA BO, if needed | Target date | | Apr 2025 |
| Modified recommendations, agency conditions and prescriptions due | No later than 60 days from NEPA Document comment due date | §5.24, 5.25 | Apr 2025 |
| FERC Issues Final NEPA Document | Target date | §5.24, 5.25 | Jul 2025 |
| FERC Licensing Decision | Target date | | Oct 2025 |
| Thompson Falls Project FERC License Expires | | | Dec 2025 |

## 1.3 Proposed Location and Date of Scoping Meeting

FERC will hold a scoping meeting and Project site visit in Thompson Falls, Montana tentatively scheduled for the week of September 28, 2020.

NorthWestern recognizes that the COVID-19 public health emergency has created significant and immediate challenges for Relicensing Participants to meaningfully participate in this relicensing effort. Due to social distancing and stay-at-home considerations, the FERC's scoping meeting and site visit may be affected, as determined by FERC.

# 2. Project Location, Facilities, and Operations

## 2.1 Applicant Contact Information

Contact information for applicant's agents:

Mary Gail Sullivan
Director, Environmental & Lands Permitting & Compliance
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Or

John Tabaracci
Corporate Counsel
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Helena, MT 59601
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406-299-0223 (c)

## 2.2 Project Location and Description

The Thompson Falls Hydroelectric Project (Thompson Falls Project or Project) is located on the Clark Fork River in Sanders County, Montana (Figure 2-1). Preliminary development of the Project began in June 1912, by the Thompson Falls Power Company. Construction commenced in May 1913, and the first generating unit was placed in service on July 1, 1915. By May 1917, an additional generation unit was placed in service bringing the total to six generating units. Montana Power Company (MPC) acquired the Project in 1929. An order amending the License was issued to MPC by FERC in 1990 allowing for construction of an additional powerhouse and generating unit, subsequently completed in 1995, giving the Project a total generating capacity of 92.6 megawatts (MW).

Non-federal hydropower projects in the U.S. are regulated by FERC under the authority of the Federal Power Act. The original license for the Project was issued effective January 1, 1938 and expired on December 31, 1975. The current FERC License was issued in December 28, 1979 (Appendix B). A major license amendment was issued April 30, 1990, approving the construction of a new powerhouse and extending the license term to 50 years (Appendix C). The Project was purchased by PPL Montana in 1999 and later purchased by NorthWestern in 2014. With each purchase, the Project’s FERC License was transferred to the new owner. A February 12, 2009 Project License amendment approved construction and operation of upstream fish passage facilities (Appendix D). The current license expires on December 31, 2025.

## 2.3 Project Boundary

The Thompson Falls Project boundary as defined in the FERC License extends approximately 0.3 mile downstream and 12 miles upstream of the Project’s dams (Figure 2-2). The current project boundary was established in the December 28, 1979 license (as amended). The project boundary encompasses a total of 2,001 acres, consisting of 1,446 acres of reservoir and 555 acres of non-reservoir. Federal land managed by the U.S. Forest Service (USFS) (National Forest System Lands) includes 103.78 acres, which are largely open space forest lands. The Thompson River, a major tributary to the Clark Fork River, enters the reservoir about 6.2 miles upstream of the dam. Its lower 0.3 mile is included within the project boundary. The project boundary is a metes and bounds survey that incorporates some uplands in the area around the dams and powerhouse, and upstream from that point it approximates the reservoir's normal full operating level elevation.

**Figure 2-1: Project location and surrounding watersheds.**

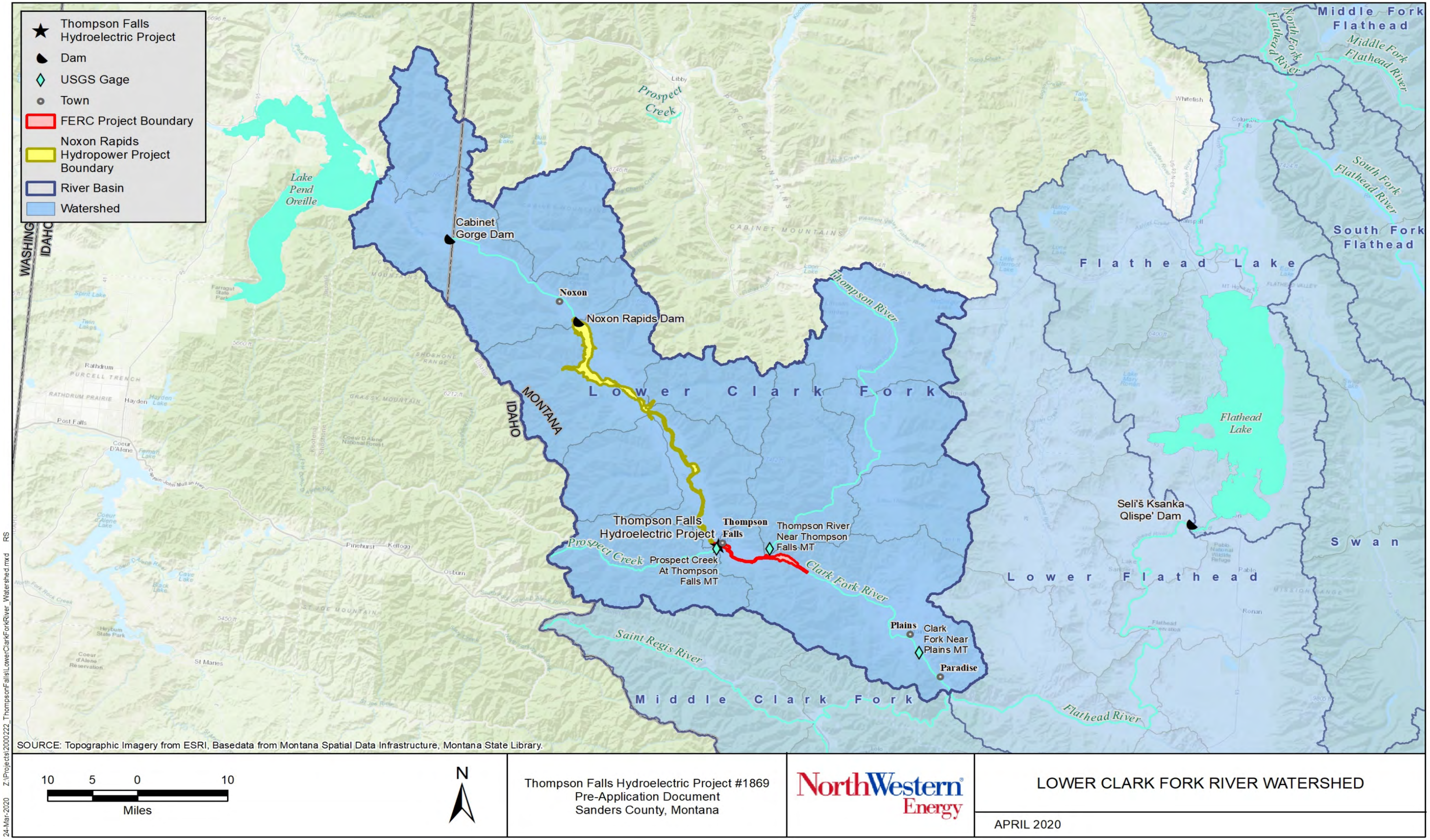
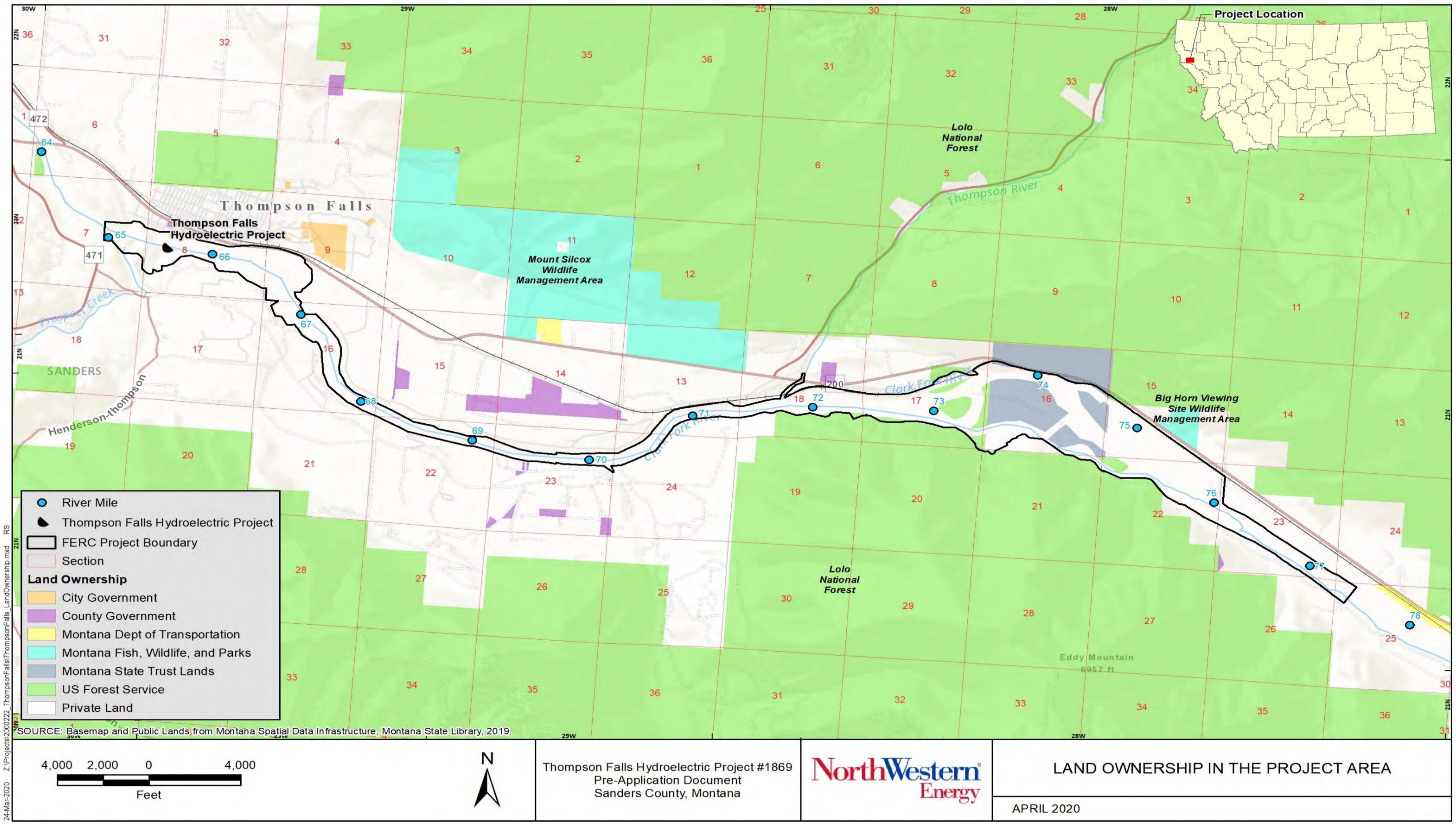


**Figure 2-2: Land ownership in the Thompson Falls Hydroelectric Project Boundary.**



## 2.4 Project Facilities

The Project consists of two curved concrete gravity dams (Dry Channel Dam and Main Channel Dam) with overflow spillways and two powerhouses (Photograph 2-1). In this PAD, all references to river right or left are based on the viewpoint of facing downstream.

**Photograph 2-1: Aerial photo of the Thompson Falls Project looking upstream.**

### 2.4.1 *Project Dams and Spillways*

The Main Channel Dam is a curved gravity ogee spillway section 913 feet long with a net spillway length of 817 feet and an average height of 18-feet above the riverbed. It contains 30 bays divided by concrete piers or permanent steel frames on 24-foot centers, which support the flashboards and removable fixed wheel panels. The remaining part of the Main Channel Dam is a short length of non-overflow gravity wall at the right end of the spillway and four radial gates. The spillway crest is at elevation (El.) 2380 and the top of the fixed wheel panels is El. 2396.5. A concrete apron extends 30 to 50 feet downstream of the entire spillway section. An upstream fish passage facility is located in the right abutment of the non-overflow section.

Two 41-foot-wide by 18-foot-high radial gates are located in panels 16 and 17 (Photograph 2-2). A propane powered generator provides backup station power if normal station power is unavailable. The fixed wheel panels are installed and removed by a crane, which travels along tracks on a 10-foot-wide bridge over the full length of the spillway. The hydraulic lift is stored permanently in a metal enclosure at the left side of the dam. In a high flow event, the flashboards can be tripped by torch cutting the bolt that secures the tripping latch and releasing the entire assembly free of the flashboard support structures. In 2017, NorthWestern began construction of two new radial gates near the left abutment on the Main Channel Dam. The new gates became operational in April 2019. The new gates, located in bays 25 through 29, are similar in dimension and configuration to the existing radial gates. The additional gates allow for greater overall spill capacity at the Main Channel Dam. Each radial gate passes approximately 10,000 cubic feet per second (cfs) of water. With the two new radial gates, flow capacity for spill is just over 40,000 cfs for all four radial gates combined.

**Photograph 2-2: Thompson Falls Project Main Channel Dam, with the new radial gates. (Photo: Kim Bergstrom, Pinnacle Research.)**

Fish passage is provided via a full height upstream fish passage facility in the right abutment of the non-overflow section of the Main Channel Dam. The 48-step pool reinforced concrete fish passage system includes fish sampling facilities consisting of a holding pool with fish collecting mechanism, fish crowder, fish lock, sampling facilities shelter, several sampling and handling tables, and water supply pipelines.

The Dry Channel Dam is located on a former channel of the river separated from the Main Channel Dam by an island. It is a curved concrete gravity dam and consists of two distinct structures:

1. A non-overflow sluiceway section, 122 feet long and 38 feet high is located at the right side of the dam. It contains 10, 5- by 6.5-foot sluiceways that were originally controlled by slide gates operated from the crest of the dam. The slide gates were permanently closed in about 1942 and in 1990 bulkheads were constructed within each sluiceway. (Photograph 2-3)

2. The second part of the dam is an overflow spillway with an ogee crest. It has an overall length of 289 feet and an average height of 17 feet above the riverbed. The overflow spillway contains 12 bays, each with six panels and steel flashboard supports on 24-foot centers. The spillway crest is at El. 2384.0 feet; storage is increased by 4-foot flashboards and 8-foot fixed wheel panels similar to those on the Main Channel Dam. (Photograph 2-3)

The hydraulic lift for removing fixed wheel panels is stored in a metal enclosure at the left side of the dam. As with the Main Channel Dam, the flashboards of the Dry Channel Dam can be released by tripping or by torch cutting the bolt that secures the tripping latch and releasing the entire assembly from the flashboard support structures.

**Photograph 2-3: Dry Channel Dam.**

### 2.4.2 *Project Forebay*

The forebay for the original powerhouse consists of an excavated channel approximately 450 feet long that broadens out to about 80 feet wide across the face of the powerhouse intake section. A short concrete gravity section borders one end of the forebay adjacent to the powerhouse intake. A 300-foot-long by 78-foot-wide excavated channel leads from the Thompson Falls Reservoir to the new powerhouse containing Unit No. 7 but does not include a forebay.

### 2.4.3 *Project Intakes*

The intake structure for the original six-unit powerhouse lies at the end of the forebay channel as described above in Section 2.4.2. It is a concrete gravity structure, 258 feet long and 40 feet high, with an angled wing wall at each end. The area downstream of the left-wing wall has been filled with rockfill from the excavation for the original powerhouse structure. The intake contains six 14-foot-diameter main turbine penstocks, two 6-foot-8-inch-diameter exciter turbine penstocks, and their associated intake gates and trash racks. The top of the intake is at El. 2400.0 feet. At the right end of the main wall is a 10- by 14-foot gate and sluiceway for diverting trash around the original powerhouse.

The reinforced concrete intake and trash rack for the new powerhouse is located at the end of a 140-foot-long by 72-foot-wide and 50-foot-deep rock-cut intake channel. It comprises three closed rectangular water passageways each 39 feet high, 18 feet wide, and 75 feet long, sloping directly to the concrete semi-spiral case of the turbine. Each intake passageway is equipped with an emergency/service gate operated by a hydraulic hoist. The top of the intake at El. 2405.0 feet provides 3.1 feet of freeboard above Probable Maximum Flood (PMF) water surface elevation and 5.2 feet of freeboard under Inflow Design Flood[5] conditions.

### 2.4.4 *Project Powerhouses*

The original powerhouse consists of a mass concrete substructure, a masonry rock wall, concrete and structural steel superstructure, concrete floor, and roof slabs supported on steel framing. The structure is 292 feet long, 97 feet wide and 52.5 feet high from the main floor to the eaves and an additional 5.5 feet from the eaves to the ridge. The structure has a concrete foundation with a basement floor approximately 9 feet below the main floor and a concrete sub-structure, 40 feet below the basement floor. A 75-ton traveling crane services the powerhouse. There are five generators rewound to 8.75 Megavolt amperes (MVA) each and one generator rewound to 7.5 MVA. The total installed capacity of the six turbine-generator units is approximately 40 MWs at a normal water head of 55 feet.

The switchyard and transformers are located inside the original powerhouse. Two three-phase transformers step up the generator voltage of 6.6 kilovolts (kV) to a transmission voltage of 115 kV.

The Unit No. 7 powerhouse ("new powerhouse"), completed in 1995, is a cast-in-place reinforced concrete gravity structure founded on rock and includes an integral intake and headworks. A substantial portion of the new powerhouse is located below grade.

[5] Inflow Design Flood (IDF) - The flood flow above which the incremental increase in water surface elevation due to failure of a dam or other water impounding structure is no longer considered to present an unacceptable threat to downstream life or property. The IDF of a dam or other water impounding structure flood hydrograph is used in the design of a dam and its appurtenant works particularly for sizing the spillway and outlet works, and for determining maximum height of a dam, freeboard, and temporary storage requirements.

The roof deck of the new powerhouse is located at El. 2370.0 feet. The generator is located immediately below the roof deck, which is provided with a hatch cover to allow installation and removal of the generator and turbine rotating parts. The hatch and all major equipment within the new powerhouse are serviced by an external 285-ton traveling gantry crane. The primary laydown area for major equipment is on the roof deck slab. A cantilever on the gantry crane allows the auxiliary hook to handle the draft tube stoplogs as necessary for flow management.

The configuration of the new powerhouse is based primarily on the turbine water passageways and the space needed for auxiliary equipment. The semi-spiral case is designed to direct the water evenly around the turbine distributor ring with minimum hydraulic losses and tapers from 37 feet high to 12 feet high. The turbine water passageways are constructed of reinforced concrete. A single pier divides the horizontal leg of the draft tube and two stoplog gates are provided to isolate the turbine water passageways from the tailrace during maintenance.

The turbine is a vertical shaft, double-regulated Kaplan type rated 52.6 MW at 54.5 feet net head and 94.7 rpm. The range of net head is 40 to 65 feet. Water is directed to the turbine distributor through rectangular concrete intake passageways and a concrete semi-spiral case. The turbine wicket gates and runner blades which control discharge and power are positioned by means of an oil pressure system. The main transformer is located on a concrete foundation adjacent to the new powerhouse. A concrete curb is provided at the transformer to retain transformer oil in case of a rupture.

### 2.4.5 *Project Tailrace*

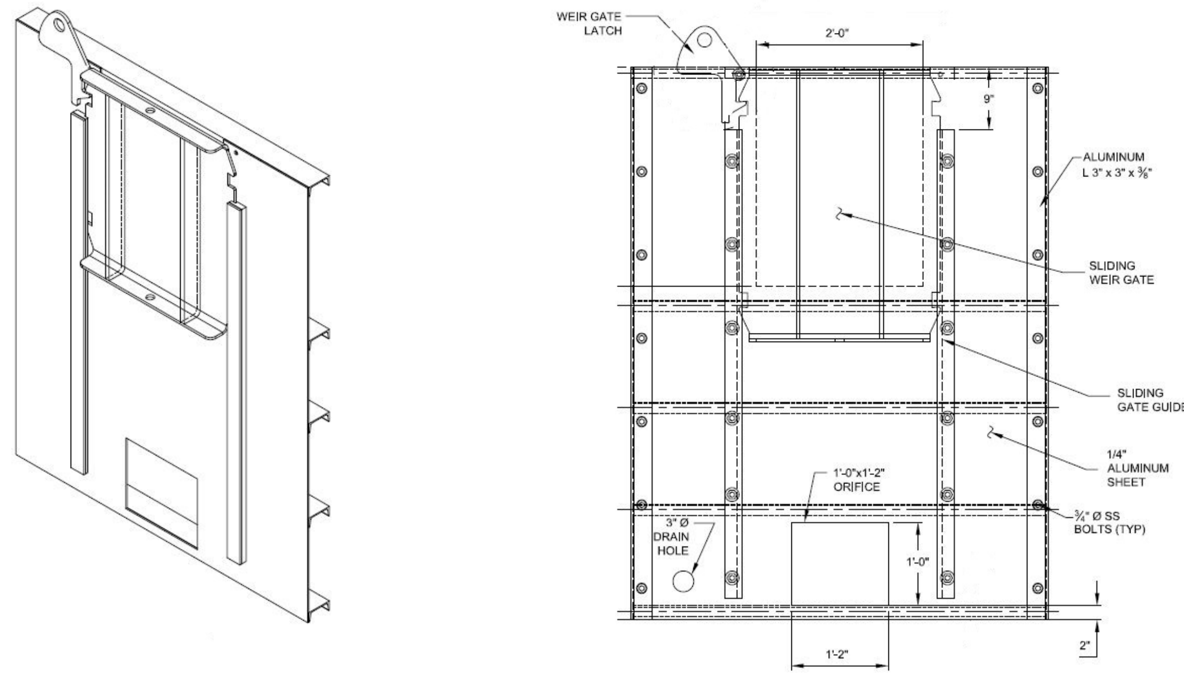
Flow through the original powerhouse is discharged into a tailrace channel that runs perpendicular to the discharge and extends downstream beyond the powerhouse and re-enters the river. Flow from the new powerhouse enters a 1,000-foot-long by 100-foot-wide tailrace that flows directly into the river in the direction of the river flow.

## 2.5 Project Upstream Fish Passage Facility

The Thompson Falls upstream fish passage facility (fish passage facility) was designed in general accordance with the National Oceanic and Atmospheric Administration Fisheries Criteria (NMFS, 2008), which was used by the FWS to provide input to the design of the upstream passage facility. The upstream fish passage facility design incorporates a fish ladder (ladder) with a series of 48 pools, each 6-foot-long by 5-foot-wide by 4-foot-deep (GEI Consultants, Inc. 2007a cited in FWS 2008).

Hydraulically, the ladder was designed to induce a 1-foot-drop in the hydraulic grade line for each of the 48 pools to allow passage of a diverse population of fish over the Main Channel Dam. Each pool is separated by an aluminum weir plate with a sliding weir gate leaf. The weir plate has a square orifice (1’-0” high by 1’-2” wide) at the bottom center of the plate and a 2-foot-wide weir notch cut into the top of the plate. Because the ladder was a pioneering structure in Bull Trout passage, it was designed with flexibility to allow operations of the ladder in one of two modes, “orifice” or “notch.” The ladder was not designed for operating with a combination of the two modes. Raising the central sliding weir gate allows pool-to-pool flow through the bottom orifice (orifice mode). Lowering the weir gate allows pool-to-pool flow through the top weir (notch mode) (Figure 2-3). The upper Pools, 46, 47, and 48 operate solely in orifice mode to reduce the effects of the forebay water level on the ladder hydraulics.

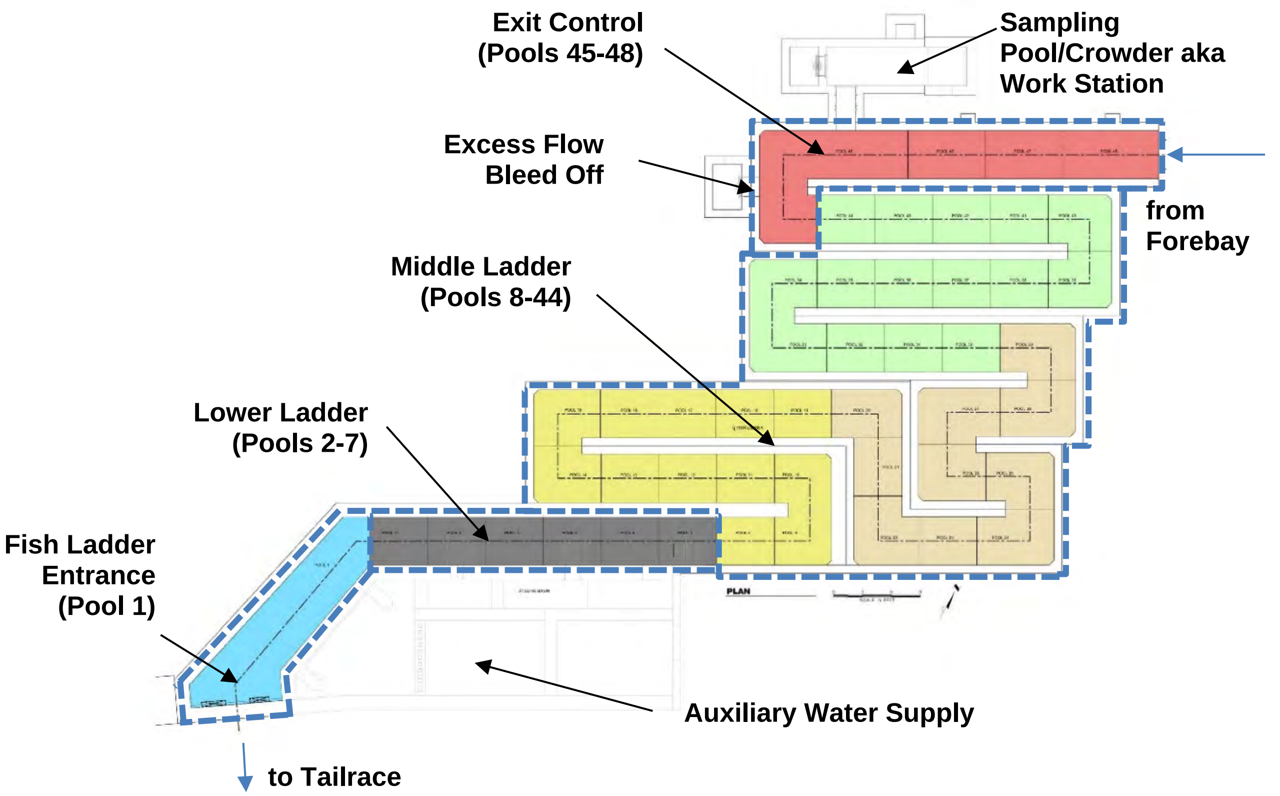
**Figure 2-3: Isometric and front view of aluminum weir plates. By lowering the sliding weir gate down to cover the bottom orifice, the ladder is operated in notch mode.**




By design, the upstream fish passage facility has four distinct areas, as follows (Figure 2-4):

- Fish Ladder Entrance – Pool 1
- Lower Ladder Pools – Pools 2-7
- Middle Ladder Pools – Pools 8-44
- Exit Control Section – Pools 45-48

**Figure 2-4: Thompson Falls upstream fish passage facility**




The upstream fish passage facility is operated from mid-March to mid-October. The ladder seasons ends (and the ladder is dewatered and shut down) when a fall weather freeze is imminent. Temporary closures during the season may occur due to high flows in the spring. The sampling/pool crowder (also referred to as the work station) has 3 cfs flowing and the ladder has 6 cfs flowing pool-to-pool (Figure 2-4). Attractant flows include options of 20 cfs from the high velocity jet and maximum of 54 cfs from the auxiliary water system. Thus, the passage facility may utilize between 9 and 83 cfs. In addition to these operating and attractant flows at the ladder, part of one Main Dam spill panels near the upstream fish passage facility may be opened to provide an additional fish attractant flow of approximately 100 to 125 cfs.

Additional details of the upstream fish passage facility design and operations are provided in the Comprehensive Phase 2 Fish Passage Report (NorthWestern, 2019) http://www.northwesternenergy.com/docs/default-source/thompson-falls/thompson-falls-other-reference-material/2020comprehensivefishladderreport.pdf and Standard Operations Manual http://www.northwesternenergy.com/docs/default-source/thompson-falls/thompson-falls-public-reference-file/thompson-falls-annual-reports-and-ferc-orders/thompson_falls_ferc_fish_ladder_approval-fishway_operations_manual_2011.pdf (PPL Montana, 2010).

## 2.6 Project Reservoir

Thompson Falls Reservoir is about 12 miles (19.3 km) long with a maximum width of about 1,800 feet (548.6 meters [m]). Active storage capacity of the Thompson Falls Reservoir is approximately 15,764 acre-feet between crest El. 2380.0 feet and normal full operating level El. 2396.5 feet. The reservoir surface area is approximately 1,446 acres (5.8 $km^2$). The Thompson Falls Reservoir has a maximum depth in excess of 45 feet (Montana Power Company, 1982). At full powerhouse flow (both powerhouses) (23,000 cfs) the available storage can be discharged in about 8 hours.

## 2.7 Project Turbines/Generators

The Thompson Falls Project has an installed generating capacity of 92.6 MW (Table 2-1).

**Table 2-1: Turbines and generators at Thompson Falls Project.**

| Unit No. | Authorized Turbine Capacity (MW) | Authorized Generator Capacity (MW) | Limiting Factor | Authorized Installed Capacity (MW) | Turbine Flow (cfs) |
|---|---|---|---|---|---|
| 1 | 7.65 | 7.00 | Generator | 7.00 | 1,800 |
| 2 | 7.01 | 7.00 | Generator | 7.00 | 1,833 |
| 3 | 7.65 | 7.00 | Generator | 7.00 | 1,800 |
| 4 | 6.38 | 6.00 | Generator | 6.3 | 1,833 |
| 5 | 6.38 | 7.00 | Turbine | 6.3 | 1,833 |
| 6 | 6.38 | 7.00 | Turbine | 6.4 | 1,833 |
| 7 | 52.61 | 57.06 | Turbine | 52.6 | 12,320 |
| **Total** | | | | **92.6** | **23,252** |

### 2.7.1 *Project Turbines*

Units No. 1 through 6 turbines are Vertical Francis units with a rated net head of 54 feet rotating at 100 rpm. Units No. 1 and 3 turbine runners are American Hydro rated at 10,200 hp and 1,800 cfs. Unit No. 2 is an Allis Chalmers runner rated at 9,350 hp at 1,833 cfs. Units No. 4, 5, and 6 turbine runners are Allis Chalmers runners with a nameplate rating of 8,500 hp with a rated flow of 1,833 cfs. The Unit No. 7 turbine is a Kvaener vertical shaft, double-regulated Kaplan type rated 70,150 hp at 54.5 feet net head and 94.7 rpm.

### 2.7.2 *Project Generators*

Units No. 1 through 6 generators are three-phase, 60-cycle, synchronous type, manufactured by General Electric Company. Units No. 1, 2, 3, 5, and 6 have been rewound to 8,750 kilo-volt-ampere (kVA) with a power factor of 0.8 and operate at 6,600 volts (V). The Unit No. 4 generator has a nameplate rating of 7,500 kVA with a power factor of 0.8. The Unit No. 7 generator has a nameplate rating of 63,400 kVA with a power factor of 0.9 and operates at 13,800 V.

## 2.8 Project Transmission Lines

Project generation is interconnected to NorthWestern's transmission system by the 115 kV Burke A and B lines and the 115 kV Kerr A and B lines on the roof of the original powerhouse. Short generator lead lines connect the plant to the point of interconnection. The lead line connecting Units 1-6 is approximately 50 feet long and the Unit 7 line is approximately 300 feet long.

A one-line diagram is being included in this PAD but is being filed separately, as it contains Critical Energy Infrastructure Information.

## 2.9 Project Appurtenant Facilities and Equipment

### 2.9.1 ***Project Electrical Equipment***

The generators are connected by a three-phase bus to one of three step-up transformers. Transformation from the generating voltage to the transmission voltage of 115 KV is provided by three, three-phase, step-up transformers, two located inside the original powerhouse and one outside of the Unit No. 7 powerhouse. The generating voltage of Units No. 1-6 is 6600 kV, while Unit No. 7 is 13.8 kV.

The mezzanine level of the original powerhouse provides space for control, communication equipment, and switchgear. Control equipment provides local/manual control with provisions for remote/automatic control. The mezzanine level also houses the station service and protection equipment.

Station service power is obtained by tapping the generator bus. Station batteries are provided for the backup protection equipment.

### 2.9.2 ***Project Mechanical Equipment***

The mechanical equipment consists of conventional pumps, compressors, and other powerhouse equipment. Large bridge cranes are provided to service and maintain the turbine/generating equipment in each powerhouse.

Each turbine is controlled by electro-hydraulic governors. The governors sense speed fluctuations and manipulate flow through the units with a hydraulic gate operator that adjusts the wicket gate openings.

## 2.10 Existing License and Project Operations

### 2.10.1 ***Current License Requirements***

The current FERC License, issued in 1979, is included in Appendix B. A major order amending the License was issued in 1990 (Appendix C) allowing for construction of a second powerhouse and seventh generating unit, which was completed in 1995. The 1990 License Amendment extended the license term to December 31, 2025. It also authorized the Licensee to operate the Thompson Falls Project as a load-following or a peaking facility using maximum daily fluctuations of up to 4 feet in the reservoir.

In 1988, during the License amendment proceeding, the Licensee and FWP entered into the 1988 Mitigation Agreement (Agreement) for the Thompson Falls Project where the Licensee agreed to pay $250,000 to FWP to provide full and complete mitigation as required under Section 903(e)(6) of the Northwest Power Planning Council's Fish and Wildlife Program (Program) for impacts caused by the construction and maintenance of the Project. This Agreement was signed on March 22, 1988 by FWP and the $250,000 payment was issued by the License to FWP on March 31, 1988. FWP acknowledged that the $250,000 payment satisfied any responsibilities for mitigation under Section 903(e)(6) of the Program.

FWP also agreed that the $250,000 satisfied fisheries mitigation related to construction activities for expanding generation at the Project. FWP agreed to deposit the $250,000 provided by the Licensee into the Fish and Wildlife Mitigation Trust Fund and, as a Trustee, FWP was to use these funds to annually purchase 10,000 acre-feet of water from Painted Rocks Reservoir to enhance summer and fall flows for resident fish in the Bitterroot River. If requirements of the Program were amended, the funds could be used for amended purposes. The funds could also be used for other means of enhancing fish populations if, in the judgment of FWP, those means are more beneficial to enhancing the resident fisheries in the Montana portion of the Columbia River Basin; provided, however, that any use of the trust fund for purposes other than the purchase of water would not negate the full satisfaction of the Licensee's responsibilities under Section 903(e)(6) of the Program.

The 1990 License Amendment states that the agreement between the Licensee and FWP,

> is generally consistent with section 903(e)(6) of the Program. Since [the Licensee] has already completed with the agreement by depositing $250,000 in a trust fund, no license requirement, as requested by the Department of Natural Resources and Conservation (DNRC) is necessary.

In addition, during the 1990 License amendment proceeding, FWP prepared a wildlife management plan for the Project that included the following measures: (1) improving white-tailed deer winter range; (2) using prescribed fire to maintain grasslands; (3) developing a brood rearing area for Canada geese; (4) cutting vegetation to improve forage quantity and quality; (5) putting up signs to restrict access during the waterfowl nesting and brood rearing seasons; (6) establishing conservation easements to protect private lands for wildlife; (7) placing 19 goose nesting structures, 10 osprey nesting platforms, 12 wood duck boxes, nine bluebird boxes, and 21 bat houses; and (8) monitoring bird nesting and hatching success.

On September 6, 1989, the Licensee entered into an agreement with FWP for FWP to carry out the wildlife management plan for the wildlife and wildlife habitat mitigation required under the Program. The Licensee deposited $123,000 in a trust fund to finance implementation of the Plan.

The 1990 License Amendment included measures to mitigate for any resource impacts from the maximum daily fluctuations of up to 4 feet in the reservoir and 8.4 feet immediately downstream of the tailrace. These measures are described in full in Appendix C.

The 1990 License Amendment also contained specific recreation-related direction to the Licensee. In 1994, the Licensee filed a revised report on recreation resources in compliance with the requirements of the amended License (Appendix C). On September 14, 1994, FERC approved the Licensee's revised recreation report. Details regarding these License requirements are found in Section 9, Recreation and Land Use.

A February 12, 2009 license amendment approved construction and operation of fish passage facilities, as described in Appendix D. NorthWestern has complied with the Terms and Conditions of the FWS's 2008 BO.

### 2.10.2 *Current Project Operations*

The Project is operated to provide baseload and flexible generation within the reservoir elevation and minimum flow requirements of the License. During flexible generation operations, the Licensee may use the top 4 feet of the reservoir from full pond while maintaining minimum flows. For several reasons, the full 4 feet typically have not been used over the past 20 years of operation.

The Licensee utilizes the Project to support grid reliability by providing spinning reserve and load balancing as river and reservoir conditions allow. These operational modes utilize the flexibility, as provided in the license, to vary reservoir elevations. The Project is typically operated to maximize peak generation efficiency across all units with available flows. Unit No. 7 is used as the primary unit for efficiency followed by Units 1 and 3, and finally Units No. 2, 4, 5, 6. Units are typically dispatched in this efficiency priority as flows allow.

The Thompson Falls Reservoir has a total storage capacity of approximately 15,764 acre-feet at the normal full operating level and has a maximum depth of approximately 45 feet. The Project can discharge its total storage in slightly less than 8 hours minus the inflows (FERC, 1990).

When flow exceeds total powerhouse capacity (23,000 cfs), the spillway panels are used along with the radial gates to pass additional flow. As runoff increases, the 4- by 8-foot spillway panels on the Main Channel Dam (Photograph 2-2) are removed for additional spill capacity. As flows increase, more panels are removed to balance flows across the length of the Main Channel Spillway. When the peak flood discharge is less than 70,000 cfs, spill is usually restricted to the Main Channel Dam section. If flows exceed 70,000 cfs, there are 72 Dry Channel Dam spill panels (each 4’ x 8’) available to increase spill capacity. The Dry Channel Spillway has been used in 5 of the past 10 years (2010 to 2019).

Prior to the installation of the new radial gates (which became operational in 2019), flow exceeded the radial gate capacity for approximately 3 months in an average year, leading to a long period of manual spillway operations. The addition of two new radial gates on the Main Dam Spillway will reduce the frequency of tripping stanchions to pass high flows. The new radial gates will also reduce the need to manually remove spill panels, improve safety, and provide an additional avenue to flush debris that builds up on the upstream face of the dam. Prior to the installation of the new radial gates, high flows and debris required tripping of stanchions and spill bays approximately every 7 to 10 years. With the installation of the new radial gates it is estimated that stanchion tripping will only be needed every 20 to 25 years, based on estimated river flows and debris.

NorthWestern is in the process of refining the operation of the spillway using the new radial gates. The new radial gates will be used for reservoir regulation and flow restoration in case of plant trips. The typical spillway opening sequence may be modified to optimize the use the radial gates.

The upstream fish passage facility operations are discussed in Section 2.5.

### 2.10.3 *Generation and Outflow Records (5 years)*

The Thompson Falls Project has averaged 504,300 MW-hours of production annually for the 5-year time period of 2014-2018. Through that time the plant attained a capacity factor of 61.24 percent and an Equivalent Availability Factor of 85.34 percent showing good availability and reliability.

**Table 2-2: Average monthly generation Thompson Falls Plant, 2014–2018.**

| Month | Average Monthly Generation (MW-hr) |
|---|---|
| Jan | 41663 |
| Feb | 42218 |
| Mar | 50525 |
| Apr | 59934 |
| May | 56634 |
| Jun | 51901 |
| Jul | 42431 |
| Aug | 25198 |
| Sep | 23015 |
| Oct | 30074 |
| Nov | 37152 |
| Dec | 43555 |
| **Annual Total** | **504300** |

### 2.10.4 *Current Net Investment*

NorthWestern's net investment (book value) in the Thompson Falls Project is $143,155,943 as of December 31, 2019. This number includes a capitalized investment of $184,964,278 plus construction work in progress of $836,398 less accumulated depreciation of $42,644,734.

### 2.10.5 *Project Compliance History*

As Licensee for the Thompson Falls Project, NorthWestern has an obligation to comply with the requirements of the FERC License. In addition, NorthWestern is committed to its role as one of many public resource stewards in the lower Clark Fork River basin. NorthWestern has and will continue to implement its License obligations as well as partner with others in shared lower Clark Fork River stewardship activities.

#### 2.10.5.1 License Compliance

NorthWestern's review of its compliance history for the Project indicates that no violations of License conditions have been reported, and all required compliance filings have been completed on schedule.

FERC conducted an environmental compliance inspection of the Project on June 30, 2005 and again on August 24, 2017. During both inspections, the Project was found to be in compliance with the License articles related to operations, fish, wildlife, recreation, safety, and cultural resources. No follow up items requiring attention were noted during the inspections (Letters from FERC dated July 20, 2005 and September 20, 2017).

The most recent dam safety inspection report confirmed that the dams meet current standards (FERC, 2018).

#### 2.10.5.2 Natural Resource Stewardship at the Thompson Falls Project

Some of the Licensee's stewardship programs, many of which are voluntary, are designed to collect information about natural resources in the Project area when those resources are potentially impacted by Project operations. Other programs are intended to protect, mitigate or enhance natural resources. Monitoring results are used to evaluate the effectiveness of on-going mitigation and enhancement efforts, and to adaptively manage stewardship efforts. The stewardship programs include:

- **Established the Fisheries Technical Advisory Committee (TAC):** In 1998, the Bull Trout (*Salvelinus confluentus*) was federally listed under the Endangered Species Act (ESA) as a threatened species (Federal Register, 1998). In response to the Bull Trout listing, the Licensee at the time, PPL Montana, voluntarily established a TAC composed of resource agencies and other stakeholders with an interest in fisheries management in the Thompson Falls Project. NorthWestern has continued to support the TAC since becoming the Licensee in 2014. TAC participants include FWP, FWS, the Confederated Salish and Kootenai Tribes (CSKT), Montana Department of Environmental Quality (DEQ), the USFS, Avista Utilities (Avista), Weyerhaeuser (now SPP Montana, LLC), and the Lower Clark Fork Watershed Group. The TAC meets at least once a year, or more often as needed, to advise on fisheries studies and protection, mitigation, and fisheries enhancement measures. These meetings are open to the public.

- **Annual Funding of an Adaptive Management Funding Account (AMFA):** NorthWestern provides $100,000 annually to conduct offsite habitat restoration or acquisition in important Bull Trout spawning and rearing tributaries. The purpose of AMFA-funded projects is to boost recruitment of juvenile Bull Trout, and to mitigate for incidental take of Bull Trout that may be caused by downstream passage through Project turbines and spillways. The TAC advises on which projects to pursue.
- **Established a Memorandum of Understanding (MOU)**: The MOU specifies how funding by NorthWestern in the AMFA is allocated annually and defines TAC membership and operation. Signatories to the MOU are FWS, FWP, CSKT, and the Licensee.
- **Construction and Operation of the Upstream Fish Passage Facility:** A full height upstream fish passage facility was completed in 2010 and placed in operation in 2011 to provide upstream adult fish passage at the Main Channel Dam. The fish passage facility is checked multiple times per week during the operating season (mid-March–mid-October). Between 2011 and 2019, over 33,000 fish were recorded at the fish passage facility representing 14 species plus three types of hybrid fish. Approximately 80 percent of the fish recorded since 2011 were native fish species. NorthWestern personnel operate and maintain the fish passage facility with the assistance of FWP. NorthWestern also supports fish monitoring by funding 1.5 full time equivalents for FWP fisheries biologist positions dedicated to the Project.
- **Provide Water and Power for Upstream Fish Passage Operations:** Water that normally would be used to generate electricity, is spilled over the Main Channel Dam for fish passage and attraction flow. In addition, NorthWestern provides power to the upstream fish passage facility on a year-round basis for operation of the sample loop and for winter deicing.
- **Recreational Improvements**: Numerous recreation improvements have been made at the Project that exceed obligations under the current License. Improvements included addition of interpretive information at the Historic High Bridge and at areas in Island Park, construction of a public viewing platform and interpretative signs above the upstream fish passage facility, construction of designated public parking areas on the north and south shoreline, and addition of vault toilets. NorthWestern also partnered with local organizations on construction of non-motorized trails, installation of benches along trails and recreation/overlook areas, upgrades to Power Park, annual operation

and maintenance funding (for Wild Goose Landing Park), and improvements to the boat launch and dock at Wild Goose Landing Park.

- **Cultural Resource Protection**: The Licensee partnered with Sanders County in a project to rehabilitate the Historic High Bridge. This bridge was included on the National Register of Historic Properties (NRHP) in 1986 as part of the Thompson Falls Hydroelectric Dam Historic District. The bridge was used as a direct transportation route beginning in 1911, linking the Prospect Creek and Cherry Creek areas to Thompson Falls until the early 1970s, when it was closed to vehicular use due to deterioration of the decking. It remained open as a foot and bicycle bridge until 1979, when it was closed to all use due to safety concerns. In 2010, the historic structure was reconstructed by the Sanders County Commission and project partners, including the Licensee, as a foot and bicycle bridge. The project won a 2011 award from the National Trust for Historic Preservation and Engineering Excellence Award from the American Council of Engineering Companies.

#### 2.10.6 *Description of Proposed Physical and Operational Changes to the Project*

NorthWestern does not anticipate proposing additional development or rehabilitation of the Project in the FLA.

NorthWestern does propose that the Project will continue to provide baseflow generation and flexible capacity needs in the new license term Baseflow generation uses the river inflow by matching reservoir inflows to generate electricity while maintaining a stable reservoir elevation. Flexible capacity increases or decreases generation from the baseflow, raising or lowering the reservoir elevation as the flow through the units is changed to support flexible capacity needs. Under normal operations, NorthWestern will maintain the reservoir between El. 2396.5 and 2394 feet (2.5 feet below normal full operating level). The units may increase or decrease generation during normal operations within the above defined, reservoir elevations. Spill gates may be used to maintain reservoir elevation if needed in times of decreased generation. A minimum flow of the lesser or 6,000 cfs or inflow will be maintained downstream during normal operations.

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# 3. Geology, Topography, and Soils

## 3.1 Geological Features

### 3.1.1 *Geologic and Physiographic Setting*

The Project is located in the Rocky Mountain Physiographic Province on the west side of the Continental Divide near the Montana and Idaho border. The region is characterized by rugged mountainous terrane that is interrupted by relatively narrow valleys that interconnect intermontane basins. Many of the rivers and tributary drainages in the region follow ancient bedrock faults that tend to have a northwest trending pattern. The Project resides along the Clark Fork River. The Clark Fork River generally trends east-west through the Project area, and then flows northwesterly downstream of the dam along the Hope Fault Zone. The western part of the Project near the town of Thompson Falls, where the dam is, is within a relatively flat floored 3-mile wide section of the river valley. The upstream portion of the project east of the confluence with the Thompson River is markedly narrower (referred to as Eddy Narrows), flanked on either side by precipitous valley walls. The nominal elevation of the valley floor is 2,400 feet and the neighboring peaks are in excess of 6,000 feet.

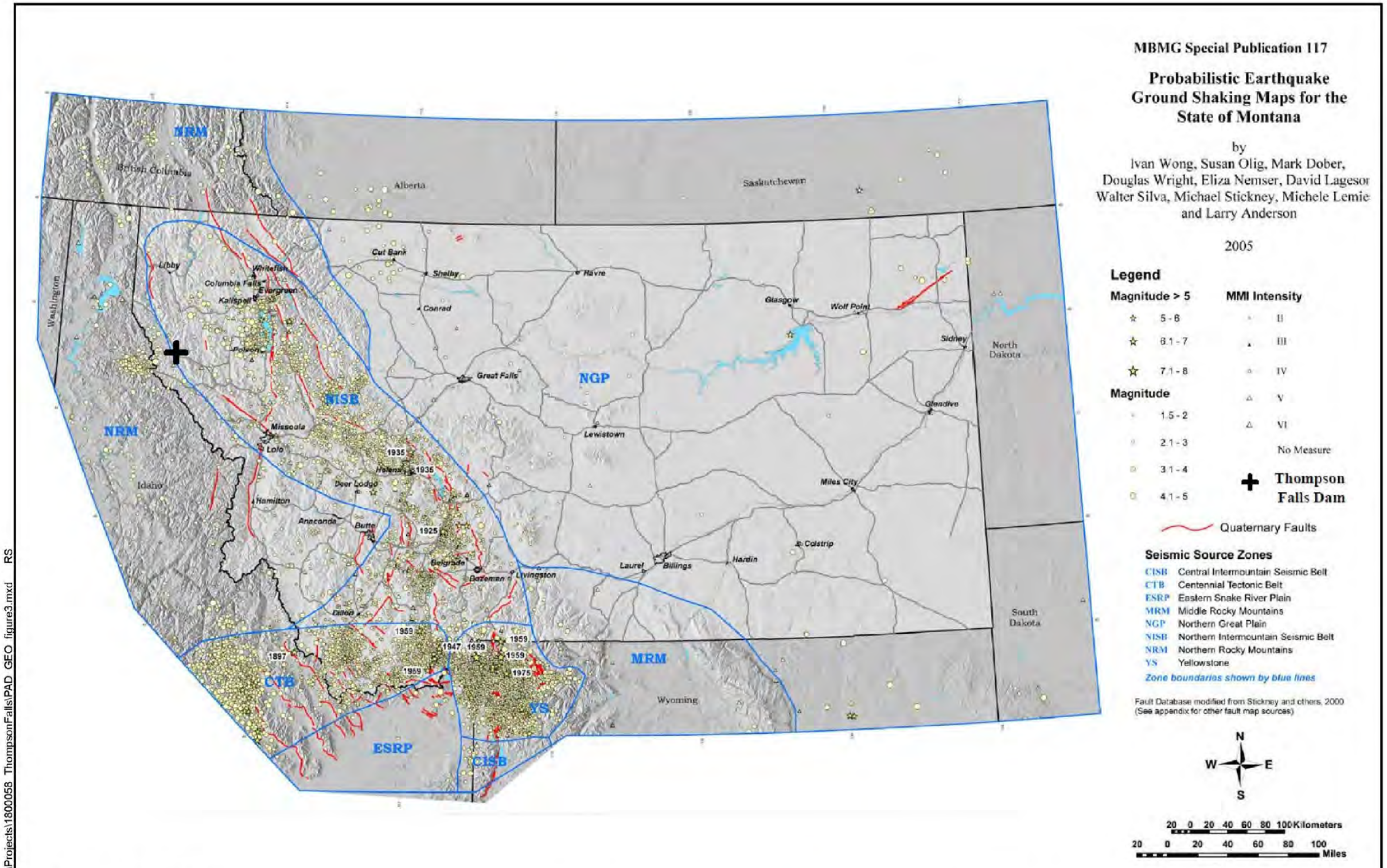
### 3.1.2 *Tectonic Setting*

The Project resides within the Northern Intermountain Seismic Belt (NISB), which is a sub-region of the more extensive Intermountain Seismic Belt (ISB). The ISB is characterized as a broad north-south trending zone of interplate seismicity that extends from northern Arizona to northwestern Montana. The ISB is principally deforming in response to ongoing tectonic extension within the North American Plate. The late-Quaternary normal faulting generally is associated with diffuse shallow (< 15 km) seismicity with surface ruptures resulting from earthquakes that range from **M** 6.5-7.5. Proximal to the Project, within the NISB in western Montana, seismicity is diffuse with generally small magnitude (**M** ≤ 4.0) events, with some larger (**M** ≥ 6.0) events (URS, 2011).

Within the ISB is the Basin and Range Province, the Project is within a portion of the northern Basin and Range Province. The Yellowstone hotspot migration in the late Cenozoic that is associated with Snake River Plain, is considered the boundary between the northern and southern Basin and Range regions. The northern region has a somewhat different tectonic signature than the southern. Typically, the northern region is characterized as north-northwest trending ranges bound on one or more sides by steeply dipping normal faults. The basins formed by the down-dropping are then filled with broad alluvial sediments. The southern Basin and Range also has these similar mountain range geometries, however, listric normal faults that sole into "master" low angle detachments are more common (Arabasz, 1992).

The conspicuous Quaternary age normal faulting along the north-northwest trending range-fronts and historical seismicity in the northern Basin and Range Province suggests crustal extension rates of 2 mm per year that are observed in the southern region may be characteristic for this northern region as well (URS, 2011). There are three principal seismic regimes that contribute to the ground motions at the Project: The NISB, the Centennial Tectonic Belt, and Yellowstone (Figure 3-1). Other regimes that could contribute to the ground shaking hazard in western Montana are the Central ISB, and the Northern and Middle Rocky Mountains.

**Figure 3-1: Historical seismicity 1809–2001.**




Source: Figure extracted from URS (2011)

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|---|---|---|---|
| | Thompson Falls<br>Hydroelectric Project #1869<br>Pre-Application Document<br>Sanders County, Montana | NorthWestern Energy | HISTORICAL SEISMICITY 1809-2001, QUATERNARY FAULTS, AND REGIONAL SEISMIC SOURCE ZONES<br>APRIL 2020 |

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### 3.1.3 *Bedrock*

A detailed geologic map of the Project is the USGS Wallace Quadrangle presented at a scale of 1:250,000 by Harrison et al. (1986) (Figure 3-2). The Project is entirely within Middle Proterozoic (~1.5 billion years ago) bedrock. The downstream portion of the Project area, including the dam site, is underlain by the Wallace Formation, which is a thick sequence of carbonate-bearing laminated black and white argillite, green argillaceous siltite, and minor limestone and dolomite (MPC, 1982). Rock of the underlying Ravalli group are exposed at the mouth of Eddy Canyon at the upstream end of the Thompson Falls Reservoir.

A geologic characterization of the dam site was completed when MPC was planning to expand the Project in the early 1980s (MPC, 1982). This involved mapping and characterization of the dominant discontinuity (i.e., bedding, joints, shears, etc.) sets. The rock near the dam was described as a dark grey argillite of the Wallace Formation. The rock has been subjected to metamorphism several times during its history, resulting in tilted and folded bedding that has also been faulted. Generally, the rock is hard, massive to blocky jointed and not severely weathered (MPC, 1982). Near the dam site MPC (1982) found the predominant dip of the bedding to be at a low angle dipping obliquely downstream with localized variation due to folding. A secondary joint set was observed to be near vertical in a NE-SW direction, which is cut by steeply dipping northwest-southeast primary joints and shears. A fourth set is roughly flat lying, occasionally breaking preferentially along flat lying bedding planes. This last set was interpreted to be an exfoliation joint that is the result of crustal unloading.

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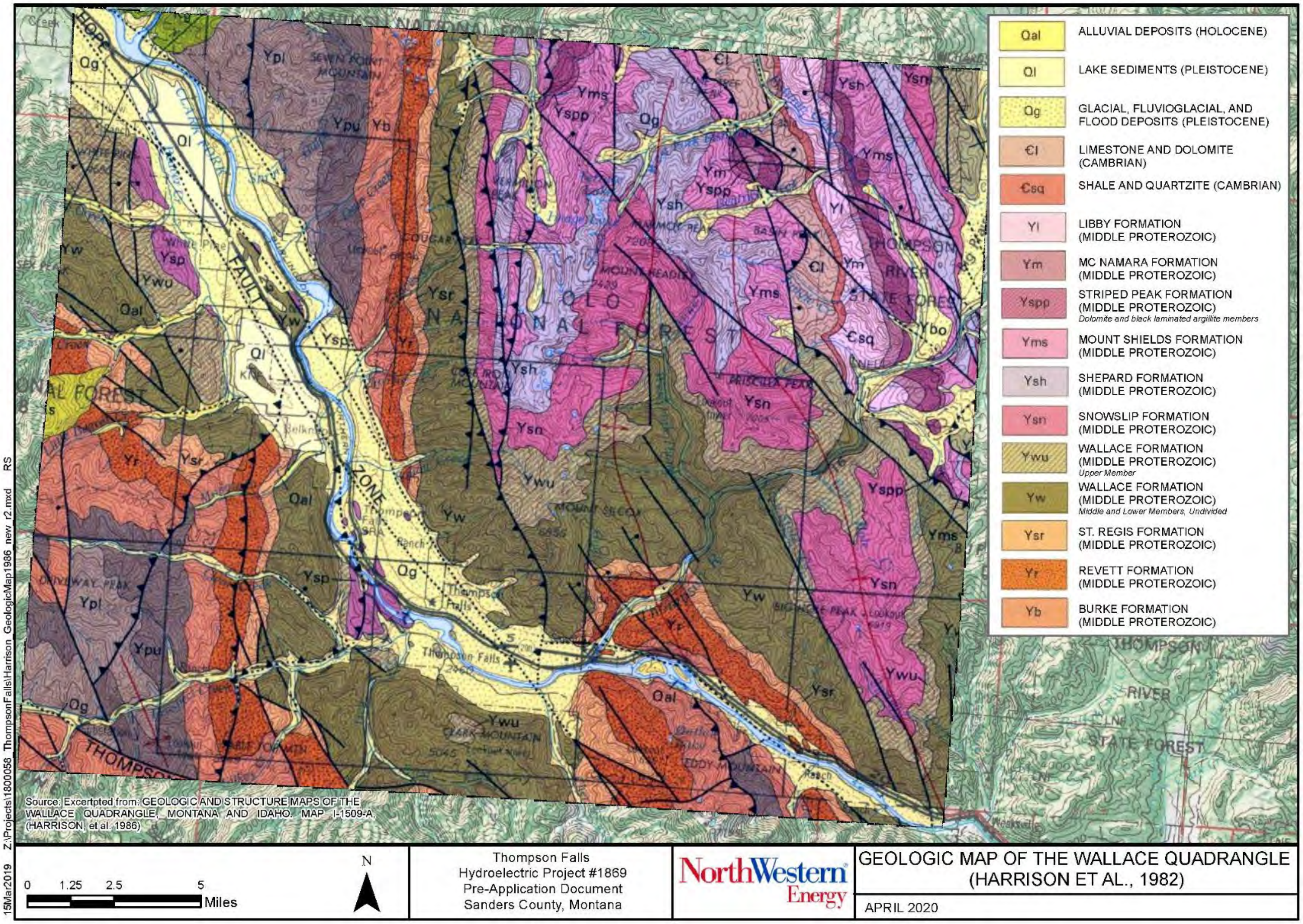
**Figure 3-2: Geologic map of Project Area.**



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### 3.1.5 *Seismicity and Ground Motions*

In 2011 there was a site-specific seismic hazard study performed by URS. The following is an excerpt from that study and summary included in NorthWestern's most recent 2016 18 CFR Part 12 report.

Of the considered seismic sources the Thompson Valley Fault was considered to be the most significant. Although relatively short (~10 km) the proximity to the site (~30 km) increases the significance of the fault structure. The Thompson Valley Fault is not well characterized; however, it is possible that surface rupture has occurred as recent as 30,000 years ago (Ostenaa et al., 1990). URS (2011) considered a preferred maximum magnitude for the Thompson Valley Fault of **M** 6.2 in the PSHA, and a **M** 6.6 in the DSHA, which is typically considered the threshold for surface rupture.

The results from the 2011 Deterministic Seismic Hazard Analysis (DSHA) for the Project found the maximum seismic event to correspond to a **M** 6.6 earthquake on the Thompson Valley fault at a rupture distance of 26.6 km. The $84^{th}$ percentile deterministic PGA is 0.15 g. The results of the PSHA for Thompson Falls Dam estimated peak ground accelerations at the dam site for return periods of 1,000, 3,000, and 5,000 years, and the resulting PGAs are estimated to be 0.14 g, 0.22 g, and 0.26 g, respectively. For the low hazard Thompson Falls Project, the Safety Evaluation Earthquake (SEE) recommended by URS in 2011 and used as the basis for the 2014 dam analyses has a return period of 2,500 years and PGA of 0.22 g in accordance with national practice.

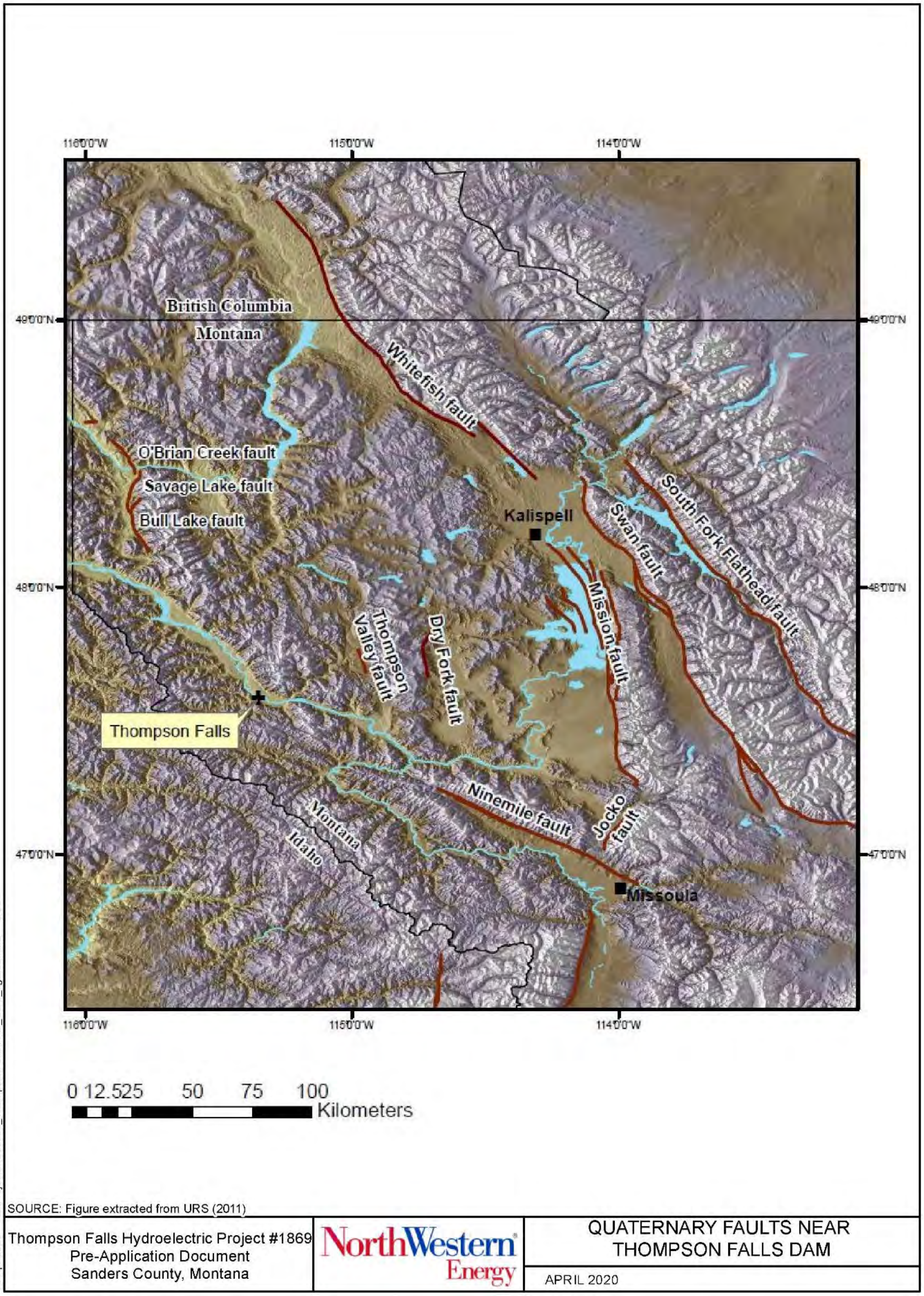
As part of the 2011 URS analysis it considered nine Quaternary active faults and one background source as potential contributors to the seismic hazard. A summary of the seismic sources is included in Table 3-1 and shown on Figure 3-3.

**Table 3-1: Seismic hazards at Thompson Falls Hydroelectric Project.**

| Fault/Source | Maximum Rupture Length(s) (km) | Most Recent Movement |
|---|---|---|
| Thompson Valley Fault | 9.6 | < 130,000 years |
| Ninemile Fault | 70.1 | < 1,600,000 years |
| Bull Lake, Savage Lake and O'Brien Creek faults | 46 (unsegmented), 21 (Bull Lake), 17 (Savage Lake), 15 (O'Brien Creek) | < 1,600,000 years |
| Dry Fork Fault | 19 | Middle or Late Quaternary |
| Jocko Fault | 15.8 | < 130,000 years |
| South Fork Flathead Fault | 75 (unsegmented), 40 (Firefighter Mountain Section), 70 (Hungry Horse Reservoir Section), 50 (Big Salmon Lake Section) | < 1,600,000 years (?) |
| Swan Fault | 75 (unsegmented), 65 (Lake Blaine Section), 90 (Condon Section) | < 1,600,000 years |
| Whitefish Fault | 110 (unsegmented), 84 (Northern Section), 30 (Southern Section) | < 1,600,000 years (?) |
| Mission Fault | 104 (unsegmented), 67 (Flathead Lake Section), 40 (Mission Valley) | < 15,000 years |
| Background Earthquakes | N/A | N/A |

Note: Table adapted and modified from URS (2011), "(?)" indicated additional uncertainty in the age of the most recent movement along the fault source.

**Figure 3-3: Quarternary faults in Project Area.**



#### 3.1.5.1 Historical Seismicity

Minimal seismogenic instrumentation monitoring coverage existed in Montana prior to 1972, reducing the certainty in locating epicenters of older events. It is estimated that about a dozen earthquakes of **M** 6.0 or greater have occurred since 1900. Of these significant earthquakes one occurred in or near eastern Montana in 1909, and the others have occurred along the ISB and Centennial Tectonic Belt in western Montana (URS, 2011). Historical earthquakes of note that are indicative of the seismogenic potential in the ISB are: 1925 **M** 6.6 Clarkston Valley Earthquake, 1935 **M** 6.3 Helena Earthquake, 1959 **M** 7.3 Hebgen Lake earthquake, and the 1983 **M** 6.8 Borah Peak earthquake. These earthquakes generated significant damages in their respective regions. Of note is the 1925 Clarkston Valley event, as it is considered the "typical background earthquake". Background earthquakes are considered "floating" earthquakes that are not attributed to a specific known mapped fault. Historical seismicity near Thompson Falls is shown in Figure 3-4.

### 3.1.6 *Structural Features*

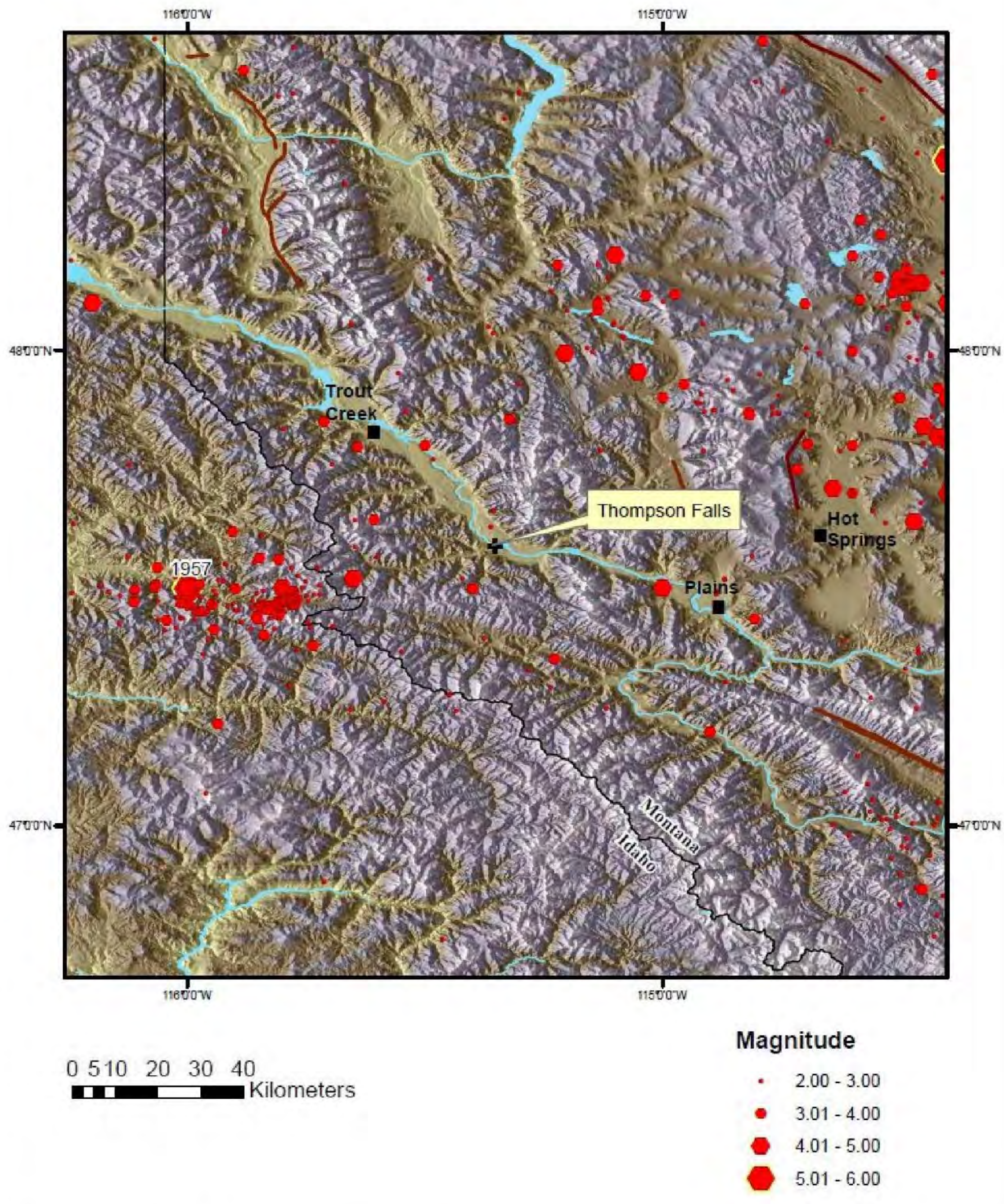
The Project lies on the southwest limb of a northwest trending anticlinorium (MPC 1982). The anticlinal axis can be traced from Eddy Canyon at the Oak Fork drainage across the Thompson River to the northwest, crossing the Thompson River 2 miles upstream from the confluence of the Thompson and Clark Fork rivers (MPC 1982). The Revett quartzite located near the mouth of Eddy Canyon and the Thompson River strikes northwest, parallel to the axis of the major anticlinal system. The Revett quartzite lies on the southwest dipping limb of the anticline (Figure 3-2).

The Hope fault zone lies along the relatively straight escarpment forming the north wall of the Clark Fork Valley at Thompson Falls (MPC 1982). The trace of the fault is buried beneath the valley fill upstream from Thompson Falls. The Hope fault leaves the Clark Fork Valley at Cherry Creek and follows that drainage to the southeast. Geologic evidence indicates that right-lateral strike-slip movement occurred along the Hope fault during the Precambrian.

The widening drainage pattern of the Clark Fork River Valley below the mouth of the Thompson River suggests that the river has eroded into a basin-and-range type graben structure (MPC 1982). The north and east walls of the valley are anomalously straight, indicating fault scarps on the up thrown horst blocks. The valley thus resides within a relatively small graben block upstream of the dam site. Water well records show that the portion of the valley upstream from Thompson Falls has been eroded to El. 2050 feet (3299 km), compared to a bedrock El. of 2350 to 2400 feet (3,782–3,862 km) on the upthrown block at the dam site and under the bench north of Thompson Falls. This relative upward movement on the downstream side of the graben at Thompson Falls created a bedrock step (Thompson Falls at the location of the present dam).

Evidence of ancient thrust faulting is found on the north-northwest-trending parallel faults mapped at the Thompson Falls Project (MPC 1982). Both strike and dip-slip movement are found on these structures. The orientation of drag folds and slicken-sided bedding plane features associated with these faults suggest that at least minor thrusting has occurred (MPC 1982). The relative movement on these faults indicates a slight thrusting of the horst over the western portion of the graben at the Thompson Falls dam site. Historical seismicity in the valley is generally very low (Figure 3-4), further indicating these are ancient structures rather than active faults.

**Figure 3-4: Historical seismicity near Project Area.**




SOURCE: Figure extracted from URS (2011)

| Thompson Falls Hydroelectric Project #1869<br>Pre-Application Document<br>Sanders County, Montana | NorthWestern Energy | HISTORICAL SEISMICITY NEAR THOMPSON FALLS DAM<br>APRIL 2020 |
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### 3.1.7 *Surficial Geology*

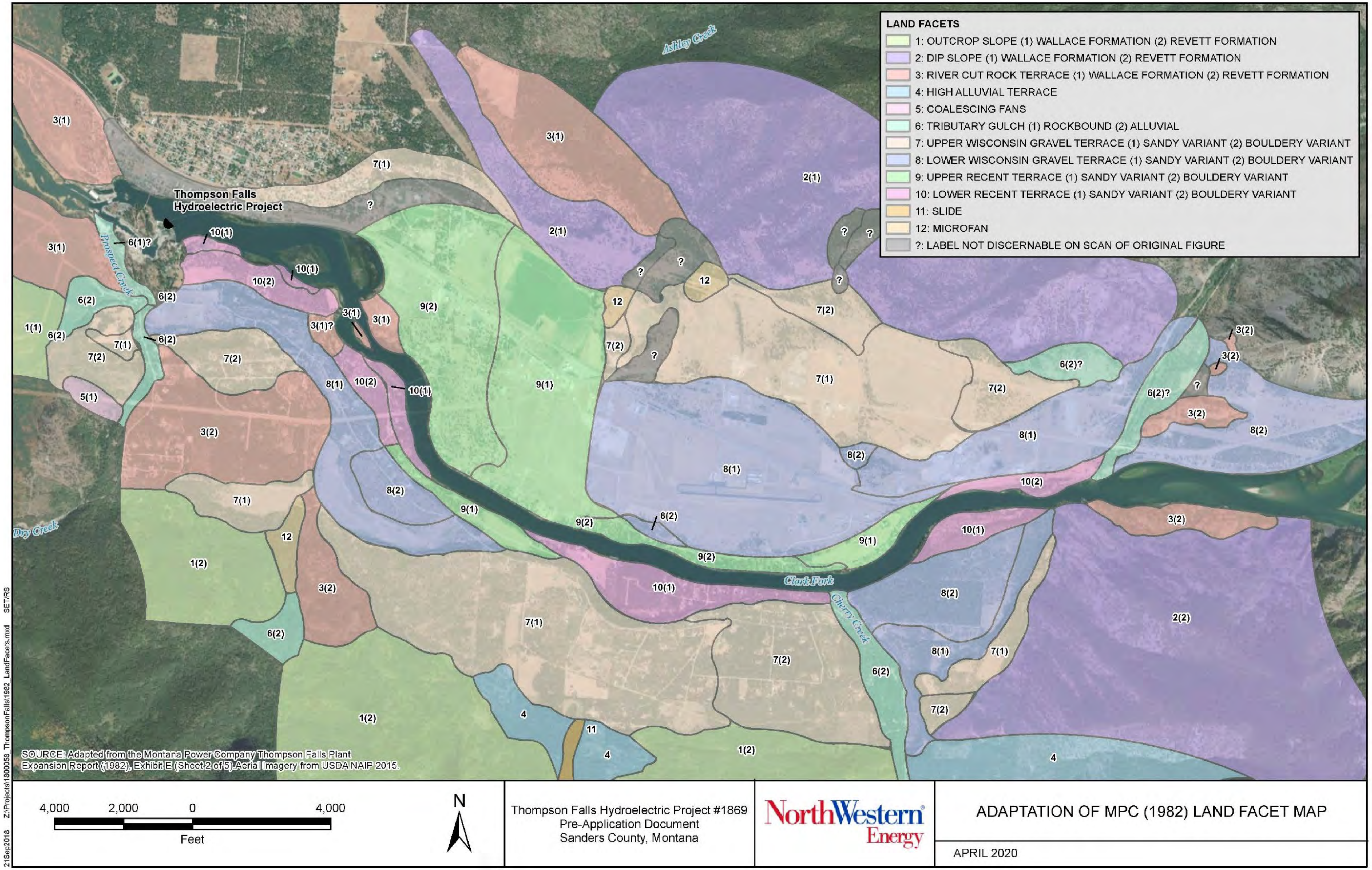
The distribution and types of Quaternary (last 2.6 million years) deposits within the Project area have a complex history. The entire Project area is within the inundation zone of the Pleistocene (0.126-2.6 million years ago) age Glacial Lake Missoula. The lake was formed when the Purcell Lobe terminated near the basin of Pend Oreille Lake, thus crowding the valley of the Clark Fork River and impounding water in the Clark Fork Valley to a maximum El. 4150 feet, which is approximately 1,750 deep at the Project (Pardee, 1942). The ice dam was breached catastrophically and was reestablished tens of times in the Late Pleistocene (12.6–130 thousand years ago) (Baker, 1981).

Quaternary mapping of the Project area was conducted by Pardee in 1942. His mapping suggested that following the breach of the ice dam(s) the flood waters of Glacial Lake Missoula likely took days, possibly a week to recede from the Project area. The flood waters were estimated to be as high as 1000 feet above the valley floor within Eddy Narrows at the east end of the Project and cover the entire width of the Clark Fork Valley in which Thompson Falls resides. These enormous flood events command stream powers not demonstrated in modern times. Within the east end of the Project the velocities were high enough to presumably strip any remnant Glacial Lake Missoula fine grained slack water deposits leaving a thin cover of alluvium that ranges from gravel and sand to large boulder sized clasts. Where the flood waters emptied to the Clark River Valley of Thompson Falls, the energy dissipated but was generally swift, also likely striping away any Glacial Lake Missoula slack water deposits and blanketing the floor with stratified sand, gravel, and boulder deposits (Pardee, 1942).

Following these epic flooding events in the Late Pleistocene there have been a series of river terraces (straths) cut into the older Missoula Flood deposits. The stepwise downcutting during late Pleistocene and recent times has produced four major erosional terrace levels with numerous small intermediate levels (MPC 1982). Alden (1953) identified two Latest Pleistocene (12.6–16 thousand years ago) age terraces. Two additional lower level terraces mapped by GeoWest (1981) were inferred to be recent (Holocene) in age. Much of the development adjacent to the Project reservoir resides on these younger alluvial deposits that are cored at depth by the older coarse-grained flood deposits. In places such as at the dam site and near Steamboat Island 1.3 miles upstream of the dam, bedrock crops out above the alluvium. However, a water well at the former Champion Lumber Company, now Thompson River Lumber (located just west of the confluence of the Thompson River and the Clark Fork River) penetrated 432 feet of alluvium before encountering bedrock (MPC, 1990). This demonstrates the considerable variability in alluvial depth throughout the Project area.

Quaternary geomorphic mapping specific to the Project was conducted by Geowest (1981). Geowest mapped a series of units along the Project defined as “land facets”. The land facets are divided based on the geomorphic characteristics (fluvial terrace, alluvial fans, etc.), topographic position, as well as the material properties of the land facet verified through test pitting (Figure 3-5). The younger terraces, channels, and point bars often have a veneer of sand that is typically thin (<1-foot) but reaches thicknesses of 7 to 10 feet locally (MPC, 1982). These finer grained sediments indicate a relative lower energy depositional environment compared to the Pleistocene age higher energy sediments. The Agricultural cultivation activity is confined to the sandy depositional terraces. The soils are classified as sandy loams.

**Figure 3-5: Land facet map, Thompson Falls, Montana.**



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### 3.1.8 *Mineral Resources*

The Wallace Formation at the Project does not have significant mineralization potential (MPC, 1990).

## 3.2 Soils

The intent of this section when referring to "soil" is to describe the upper topsoil. This is not to be confused with discussion of "soils" as typically used for engineering analyses, which focus upon the strength and geologic characteristics of sediments to considerable depths. This discussion is intended to characterize the agricultural economic value of the soils within and near the Project, as well as the susceptibility of the given unit to erosion.

### 3.2.1 *Soil Type and Occurrence*

Soil types found within the Project are shown in Figure 3-6. Horseplains fine sandy loam are the most common soils found within the Project. This type of soil is found upstream of the confluence with Thompson River as islands within the Thompson Falls Reservoir. Generally, the soil types in the Project are sandy-skeletal and loamy-skeletal which are moderately to well drained. The soils, where they occur, are usually less than 0.5-foot-thick (MPC, 1982).

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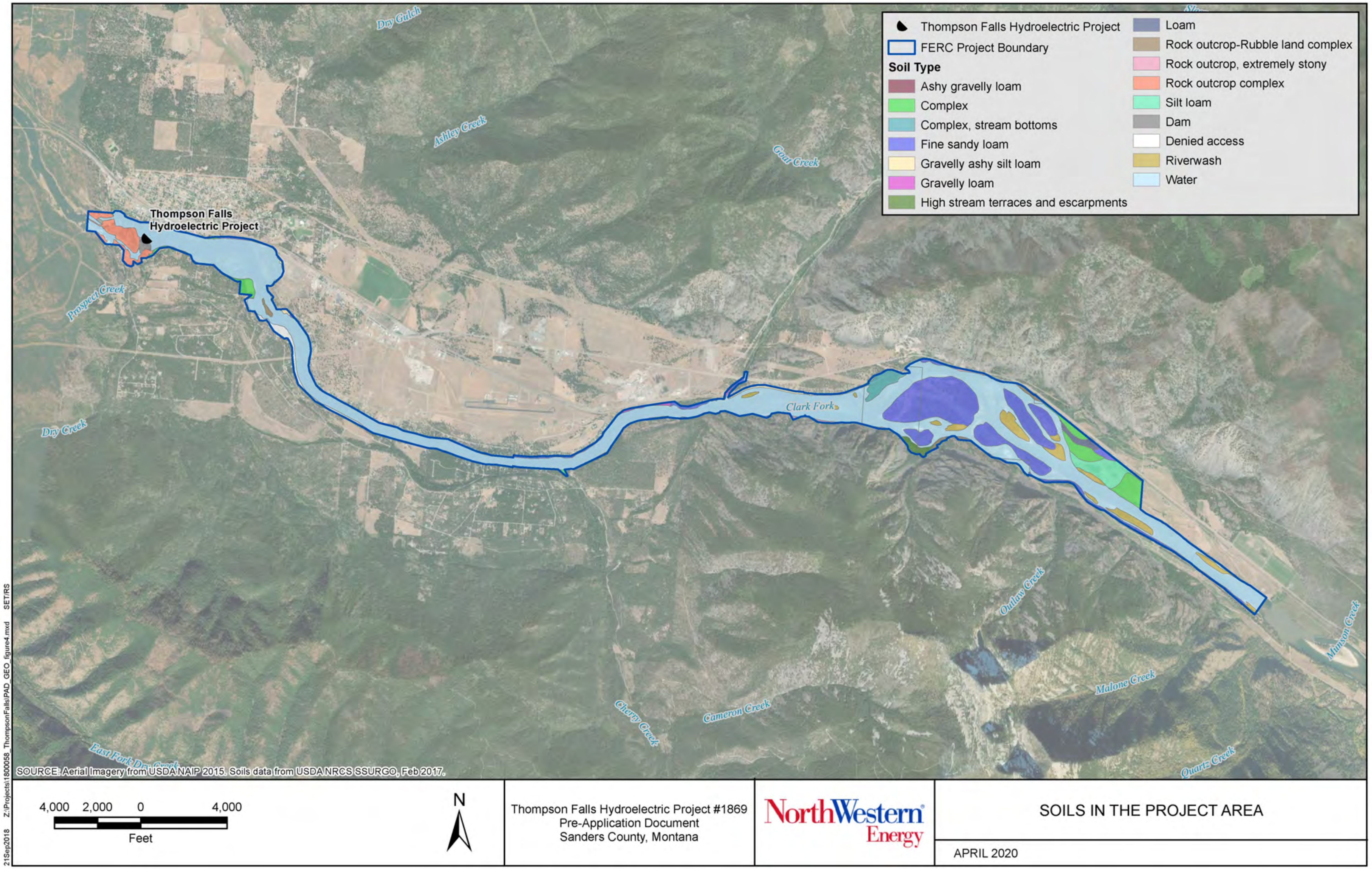
**Figure 3-6: Soils in the Project Area.**



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### 3.2.2 *Physical and Chemical Characteristics*

The soils near the Project are of the Mollisol order of soils (MPC 1982). As described by MPC (1982), due to the shallow soil depths found at many of the sites investigated, much of this area is not suitable for crop production. There were a few cultivated sites investigated, but most were capable of sustaining range grasses only, and several of those would require limited grazing.

Using the Natural Resources Conservation Service's system of land classification, most of the classifications were represented in this investigation (MPC 1982). The extremes vary from Class II to Class VIII, based upon a scale of I (good crop production) to VIII (limited use due to severe limitations).

### 3.2.3 *Erodibility*

Previous characterizations of the Project by Geowest (1981), MPC (1982, 1989) found that in general the soils typically are a thin veneer overlying coarse grained alluvium parent material. The thin nature of the topsoil does not present a geohazard due to its limited volume. Moreover, the coarse-grained soils that are found at depth typically resist erosion.

### 3.2.4 *Topography*

The topography in Sanders County of Western Montana consists of rugged mountain ranges, and broad intervening drainages that provide substantial local relief. The Cabinet and Salish mountains, and Bitterroot Range occupy the northern and southern parts of the county, respectively. These two mountain regimes are separated by the northwest flowing Clark Fork River.

### 3.2.5 *Shoreline Composition and Vegetative Cover*

Shoreline composition and vegetative cover are discussed in Section 6.

### 3.2.6 *Existing Soil Instability*

Shallow raveling and minor slumps typically occur in finer grained soil types (i.e., sandy deposits or 'Sandy Variant' (MPC, 1982)). These finer grained deposits are less resistant to being undercut by wave action that results from dominant wind patterns and increased fetch distances, whereas the more bouldery and gravelly dominated deposits are more capable of resisting erosion and maintaining a steeper angle of repose. In 1982, MPC reported that two terraces along the southern shoreline of the Thompson Falls Reservoir had experienced relatively more erosion than elsewhere within the reservoir. These two surfaces are referred to as, "Land Facet 10(1): Lower Recent Terrace, Sandy Variant" and "Land Facet 8(2): Lower Wisconsin Terrace, Bouldery Variant" (Figure 3-5). They noted erosion to the boulder variant was anomalous and attributed it to increased fetch distances. The exact locations described by

MPC (1982) are not certain. More recently, NorthWestern staff has observed minor bank erosion along the south side of the reservoir. It is not clear if these may be the same locations observed by MPC (1982). Stabilization measures that NorthWestern promotes for these relatively shallow slope failures include bioengineered stabilization measures. This approach entails strategic planting of native vegetation to stabilize slopes with deep-binding root structure to create a stable and resilient bank capable of withstanding wave action and other localized forces that may cause erosion (NorthWestern, 2020).

The second type of slope instabilities observed are related to deep drawdowns that are necessary to facilitate spillway repairs after large, infrequent flooding events. Most recently, in May 2018, a drawdown occurred that lowered the reservoir 16.5 feet. During this drawdown, NorthWestern acquired Unmanned Aerial Vehicle (UAV) imagery for the project. The data included a high resolution georectified aerial image, and a structure-from-motion (photogrammetric) derived point cloud data set and associated digital elevation model.

The 2018 deep drawdown resulted in several smaller, shallow, slumps below the normal full pool level in what appeared to be fine-grained recent reservoir infilling. These slumps do not impact the reservoir rim stability. However, in two locations relatively larger slope movements occurred that encroach outboard from the reservoir rim, notably upstream of the original powerhouse, near Power Park. NorthWestern is currently conducting further research into these sites and will implement control measures if needed as a matter of project maintenance.

## 3.3 Potential Impacts Related to Operation or Maintenance

As required by 18 CFR § 5.6(3)(i)(C), NorthWestern has identified the following known or potential adverse impacts of the Project as related to geological resources.

### 3.3.1 *Current Operations*

The Project is operated to provide baseload and flexible generation within the reservoir elevation and minimum flow requirements of the License. During flexible generation operations, the Licensee may use the top 4 feet of the reservoir from full pond while maintaining minimum flows. For several reasons, the full 4 feet typically have not been used over the past 20 years of operation.

As described in Section 3.2.6, there are two general types of slope stability issues around the reservoir rim: 1) relatively shallow slope raveling, and minor slumps near the reservoir rim; and 2) slope instability related to infrequent deep reservoir drawdowns.

### 3.3.2 *Future Proposed Operations*

NorthWestern proposes that the Thompson Falls Project continue to provide baseflow generation and meet flexible capacity needs. Under normal operations, NorthWestern will maintain the reservoir between El. 2396.5 and 2394 feet (2.5 feet below normal full operating level) and maintain a minimum flow downstream of the lesser of 6,000 cfs or inflow.

In the future, shallow slope raveling and minor slumps near the reservoir rim are likely to continue to occur in localized areas with finer grained soil types. To the extent that larger slope movements are associated with deeper drawdowns, they will occur less frequently than in the past, as a result of the installation of new radial gates on the Main Dam Spillway (described in Section 3.4).

## 3.4 Resource Protection and Mitigation Measures

This section describes protection, mitigation, and enhancement measures that have been undertaken at the Project or that are currently ongoing.

NorthWestern maintains Shoreline Standards: *Standards for the Design, Construction, Maintenance, and Operation of Shoreline Facilities on NorthWestern Hydroelectric Projects* (Standards). These Standards are described in more detail in Section 9.11. The Standards serve to guide the design and construction of shoreline facilities, shoreline bank stabilization projects, as well as management of shoreline facilities. The purpose of the Standards is to provide general standards such that shoreline facilities are designed, constructed, maintained, and operated in a safe, effective, and environmentally friendly manner to protect and/or enhance adjacent recreation and natural aesthetic resources

Since the 2018 drawdown, two new 18 feet high radial gates have been brought into service on the Main Dam Spillway. These gates provide a discharge capacity of 20,000 cfs (10,000 cfs each). The addition of the gates add substantial reservoir operational control by reducing the frequency of tripping stanchions to pass high flows, resulting in less frequent deep drawdowns of the reservoir.

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# 4. Water Resources

## 4.1 River Basin Description

### 4.1.1 *River Basin Area*

The Project is located at approximately River Mile 65 on the Clark Fork River, the largest river in the state of Montana based on flow. The Clark Fork River is a tributary of the Columbia River. The drainage area that contributes flow to the Clark Fork River, at the Project, is 20,904 square miles (54,140 square kilometers [$km^2$]) (USGS StreamStats 2018) and includes upstream flow from the Thompson, Flathead, Blackfoot, and Bitterroot rivers. (Section 2, Figure 2-1).

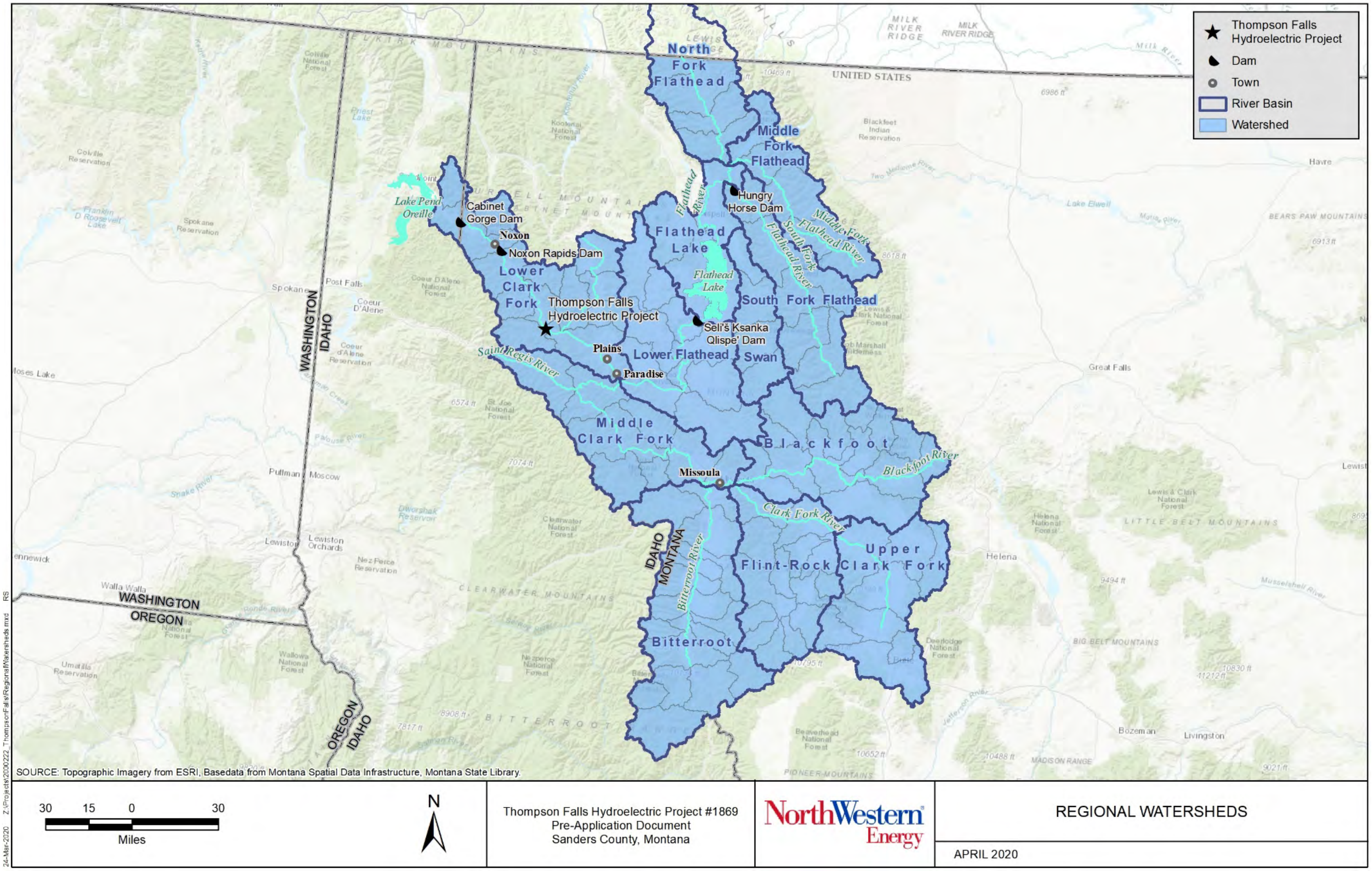
Thompson Falls Project is within the Lower Clark Fork Watershed. Table 4-1 lists the name and area of the 12 upstream regional watersheds. In addition to Lower Clark Fork, these include Blackfoot, Middle Clark Fork, North Fork Flathead, Middle Fork Flathead, Flathead Lake, South Flathead Lake, Swan, Lower Flathead, Upper Clark Fork, Flint-Rock, and Bitterroot.

**Table 4-1: Regional watershed drainage area.**

| Year | Area (acres) | Area (miles$^2$) |
|---|---|---|
| Blackfoot | 1,480,174 | 2,313 |
| Middle Clark Fork | 1,270,130 | 1,985 |
| North Fork Flathead | 1,002,762 | 1,567 |
| Middle Fork Flathead | 726,346 | 1,135 |
| Flathead Lake | 762,183 | 1,191 |
| South Fork Flathead | 1,072,560 | 1,676 |
| Swan | 466,557 | 729 |
| Lower Flathead | 1,285,636 | 2,009 |
| Lower Clark Fork | 1,495,418 | 2,337 |
| Upper Clark Fork | 1,199,997 | 1,875 |
| Flint-Rock | 1,164,568 | 1,820 |
| Bitterroot | 1,828,993 | 2,858 |
| **Regional Watershed Total** | **13,755,324** | **21,493** |

Figure 4-1 shows that the Clark Fork River and its tributaries drain a large portion of western Montana. After passing through the Thompson Falls Project, the Clark Fork River travels northwest through multiple other hydroelectric projects to eventually join the Pack River in Lake Pend Oreille. Outflows from the Lake Pend Oreille create the Pend Oreille River, which ultimately reaches its confluence with the Columbia River. The Columbia River Drainage Basin is estimated to have a drainage area of 258,000 square miles (668,000 $km^2$), of which the regional watersheds upstream of the Lower Clark Fork comprise approximately 8 percent (Marts, 2019).

**Figure 4-1: Regional watersheds.**



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### 4.1.2 *Major Land and Water Use in Project Area*

The Thompson Falls Project boundary (Section 2, Figure 2-2) encompasses about 2,001 acres, which is about 0.01 percent of the river basin. The Project is 1,446 acres of reservoir and 555 acres of non-reservoir. NorthWestern owns about 40 acres in fee, approximately 104 acres are National Forest System Lands and the remainder of the land is owned by other public and private owners. A more detailed description of these land uses is in Sections 9.6 and 9.7.

### 4.1.3 *Dams and Diversion Structures in the Clark Fork River Basin*

Upstream of the Thompson Falls Project is the Seli'š Ksanka Qlispe' (SKQ) Project (formerly known as Kerr Dam, FERC Project P-5), located on the Flathead River, approximately 100miles (160 km) upstream (Figure 4-1). The Flathead River is a tributary to the Clark Fork River. The Confederated Salish and Kootenai Tribes are owners and its wholly owned, federally chartered corporation, Energy Keepers, Inc. is operator of the FERC licensed SKQ Project. The only other major dam in the watershed upstream of the Thompson Falls Project is Hungry Horse Dam on the South Fork of the Flathead River, managed by the U.S. Bureau of Reclamation (Figure 4-1).

Downstream of the Thompson Falls Project is Avista's Clark Fork River Project (FERC Project P-2058) consisting of Noxon Rapids Dam, located approximately 33 miles (53 km) downstream of Thompson Falls Project in Montana and Cabinet Gorge Dam, and approximately 19 miles (31 km) downstream of Noxon Rapids Dam in Idaho (Figure 4-1).

### 4.1.4 *Potentially Affected Tributary Rivers and Streams*

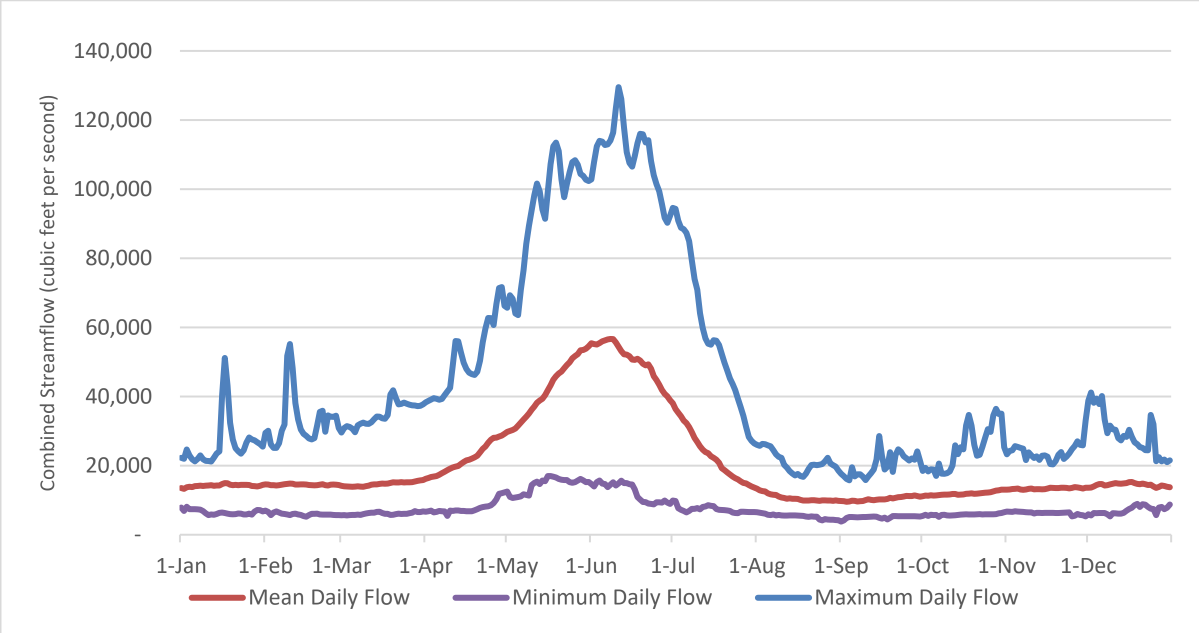
The primary tributaries of the Clark Fork River within the Project area are the Thompson River and Cherry, Dry, Ashley and Prospect creeks. Prospect Creek flows into the Clark Fork River downstream of the Main Channel Dam and flows eastward into the Clark Fork River from the mountain range separating Idaho and Montana. The Thompson River flows into the Clark Fork River approximately 6 miles (9.6 km) upstream of the dam. Cherry Creek flows northward and enters Thompson Falls Reservoir approximately 4 miles upstream of the dam. Other streams in the Project area are ephemeral drainages which flow subsurface when they reach the valley alluvium. No artesian conditions are known to occur within the Project area.

## 4.2 Clark Fork River Flow at the Project

### 4.2.1 *Adjusted Minimum, Mean, and Maximum Recorded Flows*

The Clark Fork River is gaged near Plains, MT approximately 30 miles (48 km) upstream of the Thompson Falls Project. There is only one tributary with significant flow between the Plains gage station and the Project, the Thompson River. The Thompson River contributes on average 2.0 percent of the flow in the Clark Fork River with a range of 0.7 percent up to 5.4 percent. The USGS also maintains a gage on the Thompson River. Flow statistics were derived by combining USGS gages on Clark Fork River at Plains, Montana (USGS gage 12389000) with Thompson River near Thompson Falls (USGS gage 12389500), to calculate streamflow in Clark Fork River at the Project (Figure 4-2).

**Figure 4-2: Daily minimum, maximum, and mean streamflow at Thompson Falls Project from April 1, 1956 to present. (Source: USGS, Gage Stations 12389000 and 12389500.)**




Mean daily streamflow data was recorded at the USGS gage on the Clark Fork River at Plains from October 1, 1910 to present. The Thompson River near Thompson Falls flow data was recorded from March 1 to September 29, 1911 and from April 1, 1956 to present. To ensure that the hydrograph is representative of current conditions, Figure 4-2 represents the minimum, maximum, and mean daily flows from April 1, 1956 to present. This period of record allows complete datasets for both USGS gages (Clark Fork River at Plains and Thompson River near Thompson Falls) to be analyzed and also provides representative data of upstream flows since the construction of upstream dams on the Flathead River.

The ascending limb of the hydrograph begins between mid- and late March, peaks between late May and mid-June, and descends to base flow levels around mid-August (Figure 4-2).

A summary of the minimum, maximum, and mean daily streamflow from the Clark Fork River at Plains and Thompson River near Thompson Falls gages combined for 2014 through 2018 appears in Table 4-2. Minimum daily streamflow showed little variation from 2014 to 2018, while both mean and maximum daily streamflow showed substantial variation. Mean daily flows were greater in 2014, 2017, and 2018 compared to the 62-year average. Additional analysis showed that spring runoff flows came earlier in 2015 and 2017 compared to the 62-year average.

Mean daily streamflow in recent years ranged from 16,119 cfs (2015) to 25,341 cfs (2018) and maximum daily streamflow ranged from 36,037 cfs (2015) to 104,540 cfs (2018). In 2014, minimum streamflow of 8,235 cfs was recorded in the winter (early March), and for 2015 to 2018 the recorded minimum was in the autumn (mid-August to September).

**Table 4-2: Summary of estimated minimum, maximum, and mean daily mean streamflow at Thompson Falls Project for 2014, 2015, 2016, 2017, 2018 and from historic 62-year data (1956-2018). Year of streamflow record in parentheses. (Source: USGS, Gage Stations 12389000 and 12389500.)**

| Year | Minimum Daily Streamflow (cfs) | Mean Daily Streamflow (cfs) | Maximum Daily Streamflow (cfs) |
|---|---|---|---|
| 2014 | 8,235 | 23,210 | 83,930 |
| 2015 | 5,498 | 16,119 | 36,037 |
| 2016 | 6,246 | 16,785 | 44,529 |
| 2017 | 6,493 | 23,496 | 82,600 |
| 2018 | 7,900 | 25,341 | 104,540 |
| **1956-2018** | **3,806** (1958) | **20,186** | **129,510** (1964) |

Maximum daily streamflow data was recorded at 129,510 cfs on June 11, 1964, and the minimum daily streamflow for the period of record was 3,806 cfs on September 1, 1958. The average daily streamflow from 1956 to present was calculated from the combined streamflow data of the two recorded USGS gage data to be 20,186 cfs (*refer to* Table 4-2).

### 4.2.2 *Monthly Flow Duration Curve*

The monthly flow duration curve data[6] is from USGS gages on Clark Fork River at Plains, Montana (USGS gage 12389000) and Thompson River near Thompson Falls (USGS gage 12389500) combined (Figure 4-3).

The total capacity of the two powerhouses at Thompson Falls is approximately 23,320 cfs (651 $m^3$/sec). River flow in excess of this amount is routed over the spillways. Typically, spill begins in late April, peaks in early June, and ends in mid- July. Approximately 80 cfs (2.3 $m^3$/sec) is passed downstream of the Main Channel Dam Spillway during the fish passage season (March–October) to enhance operation of the fish passage facility and fish attraction flow.

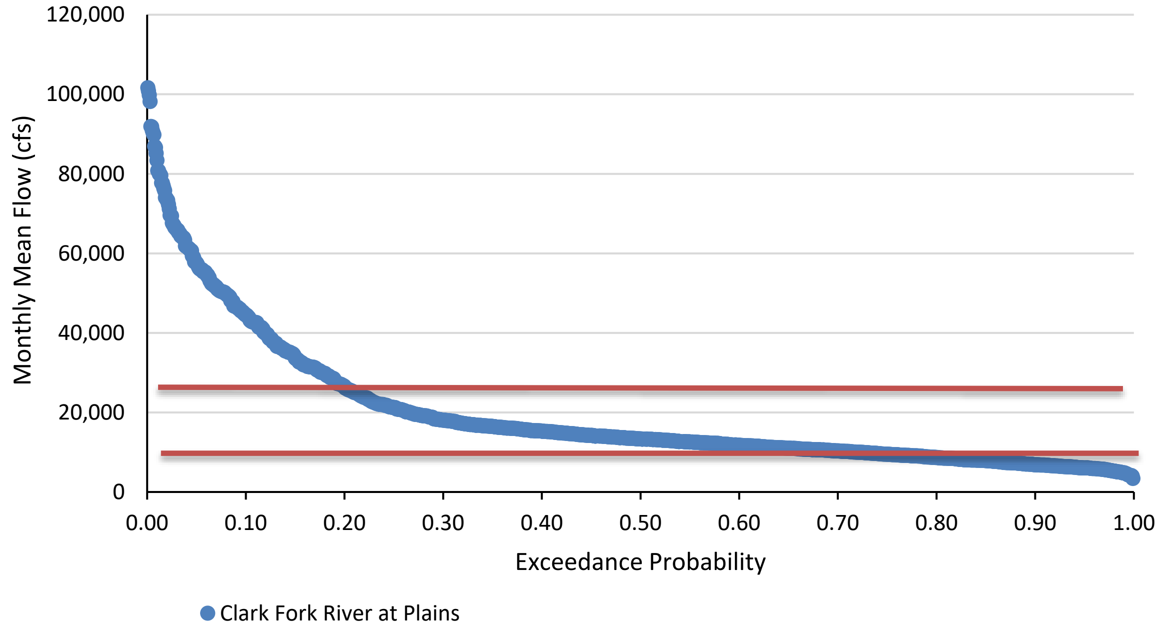
The average annual usable flow is approximately 10,000 cfs, which produces approximately 40 MW of generation. At the minimum flow of 6,000 cfs, the plant will produce approximately

[6] The flow-duration curve is a cumulative frequency curve that shows the percent of time specified discharges were equaled or exceeded during a given period. It combines in one curve the flow characteristics of a stream throughout the range of discharge, without regard to the sequence of occurrence. These curves are often used to predict the distribution of future flows.

24 MW of generation. The plant performs well throughout the typical range of annual flows and typically achieves an annual capacity factor of 60 to 65 percent.

The typical operational range of the plant for power generation (6,000 cfs to 23,320 cfs), shown on Figure 4-3.

**Figure 4-3: Monthly Flow Duration Curve of the Clark Fork River at Thompson Falls Project from October 1911-September 2017.**
**(Source: USGS, Gage Stations 12389000 and 12389500). Maximum hydraulic capacity and minimum flow shown with orange lines.**




## 4.3 Existing and Proposed Water Uses and Upstream and Downstream Requirements

The largest consumptive water use in the Clark Fork River basin is for irrigation, which accounts for about 93 percent of all diversions. The other 7 percent is a combination of public water supply, domestic, stock water use, and industrial. The largest consumption of water occurs in the agricultural areas of the Mission, Bitterroot, Upper Clark Fork, and Blackfoot valleys, upstream of the Project area (Figure 4-1) (DNRC, 2014).

Water use in the Clark Fork watershed upstream of Noxon, Montana indicates that 1,651,784 acre-feet of water is diverted to service the estimated 456,455 acres of irrigation. Only a portion of the water diverted for irrigation uses is consumed. The volume of water diverted from groundwater and surface water to meet the irrigation demands of crops is typically three times the actual volume of water consumed by the crop. This is due to conveyance losses, efficiencies of the irrigation method, and irrecoverable losses. Ultimately, a significant portion of diverted water is returned to the source via surface flows or groundwater. The timing of when the water is returned can vary greatly depending on location and local hydrogeologic conditions. On average during the irrigation season in the Clark Fork basin, 5 percent (448,685 acre-feet) of water is diverted and consumed, 13 percent (1,203,099 acre-feet) is diverted and not consumed, and 80 percent (7,079,909 acre-feet) is not diverted. Reservoir evaporation is 2 percent of water use (155,000 acre-feet) (DNRC, 2014).

Hydropower generation and instream flow rights for fisheries are the primary non-consumptive water uses in the Clark Fork Basin. The largest water storage projects in the basin are for flood control and hydropower and include Hungry Horse, SKQ (upstream of the Project) and Noxon Rapids and Cabinet Gorge Dams (downstream of the Project) (DNRC, 2014).

Instream flow water rights, temporary leases and storage contracts are used in the Clark Fork Basin for the purpose of fish and wildlife. FWP is the largest holder of water rights, leases and contracts for environmental uses. Conservation groups and private citizens also hold water rights, leases and contracts for environmental uses (DNRC, 2014).

Downstream of Thompson Falls, hydropower is the primary water use in the lower Clark Fork River.

## 4.4 Existing Instream Flow Uses and Water Rights

NorthWestern owns nine active water rights from the Clark Fork River, eight of them are for power generation and the remaining one is for domestic use[7] (DNRC, 2018). Flow rate for the water rights for power generation total 30,967 cfs.

As described in Section 2.10.1, under an Agreement for the Thompson Falls Project related to MPC's Application for Amendment of the FERC License to expand hydroelectric generation at the Project, MPC agreed to make a one-time payment of $250,000 to FWP to be deposited into a trust for FWP to annually purchase 10,000 acre-feet of water from Painted Rocks Reservoir to enhance summer and fall flows for resident fish in the Bitterroot River. Currently, FWP hold contracts of 15,000 acre-feet of water, including those funded by MPC, in Painted Rocks Reservoir for the purpose of augmenting stream flows downstream in the Bitterroot River during low water periods (DNRC, 2014).

Avista holds water rights for 50,000 cfs at the Noxon Rapids Dam near the Idaho border (DNRC, 2014).

## 4.5 Reservoir Information

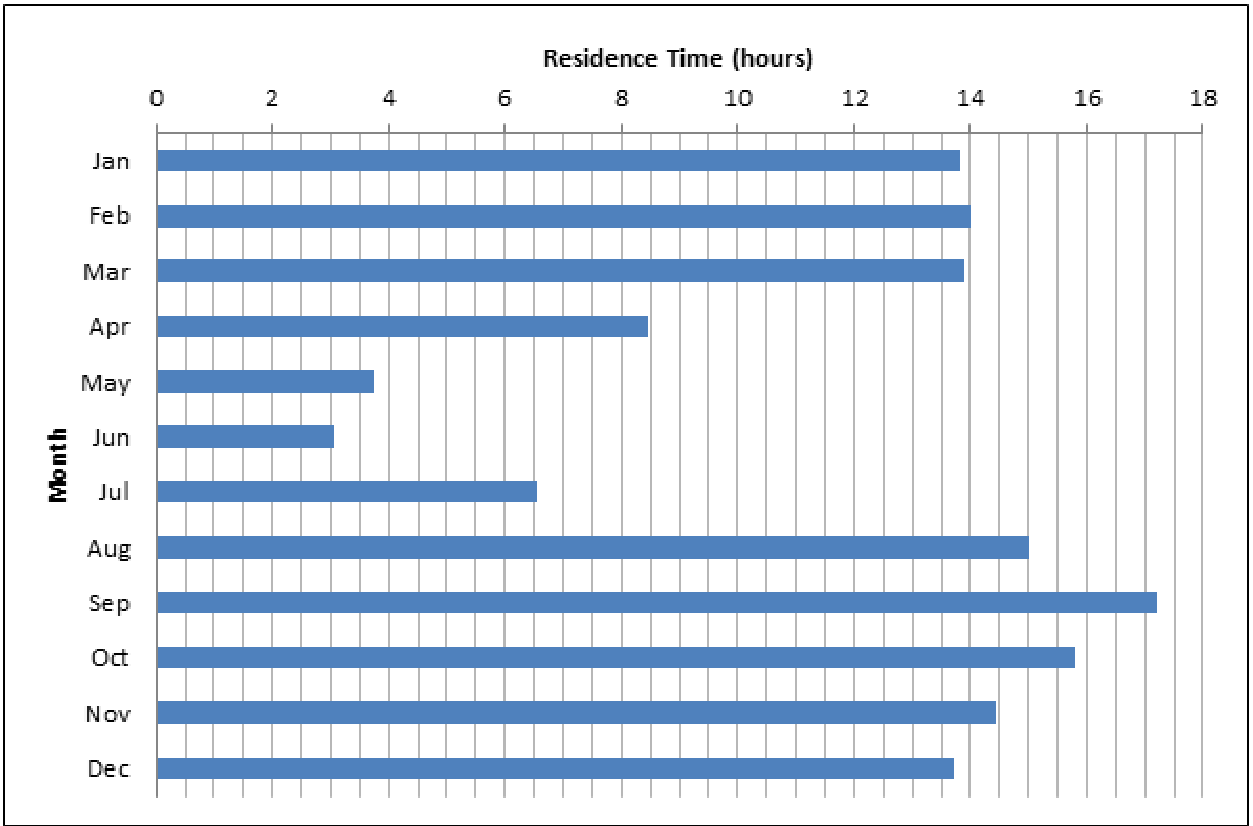
Thompson Falls Reservoir is about 12 miles long with a maximum width of about 1,800 feet. The shoreline length is therefore approximately 25 miles. Active storage capacity of the Thompson Falls Reservoir is approximately 15,764 acre-feet between crest El. 2380 feet and normal full operating level El. 2396.5 feet. At the normal full operating level El. 2396.5 feet,

[7] The State of Montana has not fully adjudicated the Clark Fork Basin below Flathead River, which includes the Project area.

the reservoir surface area is approximately 1,446 acres. The Thompson Falls Reservoir has a maximum depth in excess of 45 feet (MPC, 1982). At full powerhouse flow (both powerhouses) (23,000 cfs) the available storage (15,764 acre-feet) can be discharged in about 8 hours.

The monthly fluctuation of average residence time (flushing rate) is displayed in Figure 4-4. The results indicate that residence time in Thompson Falls Reservoir is very short, particularly in the spring when residence time is, on average, less than 4 hours. The residence time ranges from less than 4 hours (June) to approximately 17 hours (September).

**Figure 4-4: Estimated average monthly residence time in Thompson Falls Reservoir.**




## 4.6 Reservoir Substrate

### 4.6.1 *Substrate Composition*

No information has been located on the substrate composition of the reservoir.

### 4.6.2 *Substrate Quality*

In Montana there are 17 EPA Superfund National Priorities List (NPL) sites (EPA, 2018a). Five NPL sites are located upstream of Thompson Falls Dam including one NPL site, Anaconda Aluminum Co. Columbia Falls Reduction Plan (listed in September 2016) located along the Flathead River in Columbia Falls, Montana and four sites located along or near tributaries to the Clark Fork River. The four NPL sites located in the Clark Fork River basin include Milltown Reservoir Sediments located at the former Milltown Dam upstream of Missoula (listed in 1983), Anaconda Co. Smelter in Anaconda (listed in 1983), Silver Bow Creek/Butte Area (listed in 1983), and Montana Pole and Treating in Butte (listed in 1987). These sites present a health and environmental risk to fisheries and other biota due to elevated concentrations of pollutants such as antimony, arsenic, cadmium, copper, lead, and zinc that are present in soils, groundwater, and/or surface water. Details of these NPL sites are available on the EPA's Superfund NPL site: https://www.epa.gov/superfund/national-priorities-list-npl-sites-state#MT.

In addition to the NPL sites, the Smurfit-Stone Mill Frenchtown site is proposed for NPL listing and is located adjacent to the Clark Fork River near Frenchtown, Montana and located about 111 miles (178 km) upstream of the Project. The Smurfit-Stone Mill site was a former pulp and paper mill site that operated from 1957 to 2010. The site activities and waste disposal practices on site have resulted in a release of hazardous substances such as polychlorinated dibenzodioxins (dioxins), polychlorinated dibenzofurans (furans), arsenic, chromium, lead, and manganese into the environment, including surface soils, surface water, river sediments, and groundwater (EPA, 2018b). This site is being actively investigated and monitored, and details are available on the EPA's Superfund site for Smurfit-Stone Mill Frenchtown: https://cumulis.epa.gov/supercpad/cursites/csitinfo.cfm?id=0802850.

The Milltown Reservoir Sediment site contained contaminants from historic mining, milling, and smelting processes associated with operations in the towns of Butte and Anaconda located in the upper Clark Fork River basin (Respec, 2014). The source of contamination was associated with the tailings and contaminated sediments mixed with soils in the streambanks and floodplains that eroded during high streamflow events entering the river and other surface waters (Respec, 2014).

Sediment quality (arsenic and copper) in Thompson Falls Reservoir was characterized in May 2006 as part of a Baseline Study before the remediation and removal of the Milltown Dam. Characterization of the sediment concluded that sediment in the Thompson Falls Reservoir was not of concern for human or ecological receptors (HDR, 2008).

Following the Baseline Study, sediment traps were established in locations where hydraulic conditions were conducive to sedimentation. The sediment traps were used to monitor the effects of remedial work at the Milltown Site on metal concentrations in sediments transported to Thompson Falls Reservoir. The sediment traps were sampled from October 2005 through September 2012.

Thompson Falls Reservoir sediment data was collected between October 2006 and May 2007, before the removal of Milltown Dam, and analyzed for total arsenic, cadmium, copper, lead, and zinc. The review of these metal concentrations in the sediment shows all metal concentrations increased and remained elevated after the 2007 spring runoff event and through the end of 2007, except for arsenic (HDR, 2008). The average concentrations in Thompson Falls Reservoir sediment trap samples from the four sampling events between May and October 2007 was 14 mg/kg of arsenic and 195 mg/kg of copper (HDR, 2008).

Surface water chemical data (arsenic, copper, lead, and zinc) collected on June 20, 2007 around the Milltown work area were used along with USGS flow data to perform a mass balance resulting in an estimate of metal loading originating from the Milltown Reservoir (HDR, 2008). The results suggest a significant portion of metal load measured below Milltown Dam originated from the Milltown Reservoir on the sampling day, June 20, 2007. This evidence indicates that the increases in contaminant concentrations observed in the Thompson Falls Reservoir sediment result from the Milltown remediation.

Sediment sampling conducted after 2007 showed a spike in metal concentrations in sediment in Thompson Falls Reservoir in spring/summer of 2008, just after the breaching of Milltown Dam. Subsequent sediment sampling found that the concentration of metals arriving at the Thompson Falls Reservoir steadily decreased since 2008, and eventually returned to at or near baseline conditions (unpublished file data maintained by NorthWestern, 2008).

NPL sites in the Clark Fork River basin, as well as the Smurfit-Stone Mill sediment site, are being addressed by federal and state regulatory agencies under laws and regulations on remediation of contaminated industrial sites.

## 4.7 Gradient of Downstream Reaches

The gradient of the downstream reach was determined through GIS analysis from downstream of the Main Dam to the Birdland Bay Bridge. The water surface elevation in this reach is estimated to lose a total of 1.8 meters (6 feet) in elevation over 4.4 km or 2.75 miles (~ -0.04%).

The project boundary for the Noxon Rapids Hydroelectric Project is contiguous with the Thompson Falls project boundary downstream of the original powerhouse. The actual backwater of Noxon Rapids Dam varies depending on flow in the Clark Fork River and the operation at Noxon powerhouse. However, the Birdland Bay Bridge is typically the upstream end of Noxon Reservoir.

## 4.8 Applicable Water Quality Standards

The Clark Fork River at the Thompson Falls Project is classified as B-1 in the Administrative Rules of Montana (ARM 17.30.607) implemented by the DEQ. Waters classified B-1 are to be maintained suitable for drinking, culinary, and food processing purposes after conventional treatment; bathing, swimming, and recreation; growth and propagation of salmonid fishes and associated aquatic life, waterfowl and furbearers; and agricultural and industrial water supply.

Montana's Surface Water Quality Standards and Procedures includes language specific to dams. ARM 17.30.602 defines "naturally occurring" as "conditions or material present from runoff or percolation over which man has no control or from developed land where all reasonable land, soil and water conservation practices have been applied. Conditions resulting from the reasonable operation of dams in existence as of July 1, 1971, are natural." (ARM 17.30.636 (1)) states that owners and operators of water impoundments that cause conditions harmful to prescribed beneficial uses of state water shall demonstrate to the satisfaction of the department that continued operations will be done in the best practicable manner to minimize harmful effects.

Montana's water quality standards include numeric and narrative criteria as well as non-degradation policy that applies to any activity of humans resulting in a change in existing water quality occurring on or after April 29, 1993. The numeric surface water quality standards were developed for numerous parameters to protect human health and aquatic life and are located in the Circular DEQ-7 (DEQ, 2019). The acute and chronic freshwater aquatic life and human health standards for certain metals are included in Table 4-3.

**Table 4-3: Summary of acute and chronic freshwater aquatic life and human health standards for metals (in $\mu$g/L). Dash [ - ] = the lack of a standard.**

| Metals | Aquatic Life Standards | | Human Health Standards | |
|---|---|---|---|---|
| | Acute | Chronic | Surface Water | Ground Water |
| Aluminum | 750 | 87 | - | - |
| Arsenic | 340 | 150 | 10 | 10 |
| Cadmium | 0.49* | 0.25* | 5 | 5 |
| Chromium (III) | 579* | 27.7* | 100 | 100 |
| Chromium (IV) | 16 | 11 | - | - |
| Copper | 3.79* | 2.85* | 1,300 | 1,300 |
| Iron | - | 1000 | - | - |
| Lead | 13.98* | 0.545* | 15 | 15 |
| Mercury | 1.7 | 0.91 | 0.05 | 2 |
| Nickel | 145* | 16.1* | 100 | 100 |
| Selenium | 20 | 5 | 50 | 50 |
| Silver | 0.374* | - | 100 | 100 |
| Zinc | 37* | 37* | 7,400 | 2,000 |

* Metals are expressed as a function of total hardness (mg/L, $CaCO_3$); table values were calculated using a total hardness of 25 mg/L. Source: DEQ 2019.

The DEQ Department Circular DEQ-12A contains the base numeric nutrient standards and their implementation (DEQ, 2014). Nutrient standards, including total nitrogen and phosphorus for the Clark Fork River, have not been developed, so the narrative standard in

ARM 17.30.637(1)(e) applies. The narrative standard states, "…surface waters must be free from substances attributable to municipal, industrial, agricultural practices or other discharges that will…create conditions which produce undesirable aquatic life" (DEQ, 2019). For reference, the numeric nutrient standards for the Clark Fork River from the confluence of the Blackfoot River to the confluence of the Flathead River (upstream of the Project area) are as follows: Total Phosphorus = 39 ug/L, Total Nitrogen = 300 ug/L, Chlorophyll-a = 100 $mg/m^2$ (summer mean) and 150 $mg/m^2$ (maximum). These standards apply seasonally from June 21 to September 21 (ARM 17.30.631(2)(b)).

Numeric nutrient standards for wadeable streams like the Thompson River were developed based on Ecoregion, and for the Northern Rockies Ecoregion, the following nutrient standards apply: Total Phosphorus = 25 *u*g/L, Total Nitrogen = 275 *u*g/L, Chlorophyll-a = 125 $mg/m^2$ (DEQ, 2014). There is not currently a numeric nutrient standard for Nitrate+Nitrite, but DEQ recommends using a Nitrate+Nitrite concentration of 100 ug/L for a water quality target in wadeable streams (DEQ, 2013).

For waters classified as B-1, a 1 degree Fahrenheit (ºF) maximum increase above naturally occurring water temperature is allowed within the range of 32 to 66 ºF (0 to 18.9 degrees Celsius [°C]); within the naturally occurring range of 66º to 66.5 ºF (18.9 to 19.2 °C), no discharge is allowed which will cause the water temperature to exceed 67 ºF (19.4 °C); and where the naturally occurring water temperature is 66.5 °F or greater (19.2 °C or greater), the maximum allowable increase in water temperature is 0.5 °F. A 2 °F per-hour maximum decrease below naturally occurring water temperature is allowed when the water temperature is above 55 ºF (12.8 °C). A 2 °F maximum decrease below naturally occurring water temperature is allowed within the range of 55 to 32 °F (12.8 to 0 °C) (ARM 17.30.623(e)).

The freshwater aquatic life standards for dissolved oxygen for the Clark Fork River at the Thompson Falls Project are presented in Table 4-4 (DEQ, 2017). The early life stage water column concentrations are the concentrations recommended to achieve the required inter-gravel dissolved oxygen concentrations shown in parentheses. For species that have early life stages exposed directly to the water column, the numerical values in the parentheses apply. Early life stages include all embryonic and larval stages and all juvenile fish for 30 days following hatching. Note that early life stages in the vicinity of the Thompson Falls Project are found in the water column, therefore the relevant standards for "Early Life Stages" (Table 4-4) are those that are in parentheses.

**Table 4-4: Freshwater aquatic life standards for Dissolved Oxygen (mg/L) for the Clark Fork River around the Thompson Falls Project. N/A = Not Applicable. (Source: DEQ, 2019.)**

| | Early Life Stages[1,2] | Other Life Stages |
|---|---|---|
| **30 Day Mean** | N/A[3] | 6.5 |
| **7 Day Mean** | 9.5 (6.5) | N/A[3] |
| **7 Day Mean Minimum** | N/A[3] | 5.0 |
| **1 Day Minimum[4]** | 8.0 (5.0) | 4.0 |

[1] These are water column concentrations recommended to achieve the required inter-gravel dissolved oxygen concentrations shown in parentheses. For species that have early life stages exposed directly to the water column, the numerical values in parentheses apply.
[2] Includes all embryonic and larval stages and all juvenile forms of fish for 30 days following hatching.
[3] N/A (Not Applicable).
[4] All minima should be considered as instantaneous concentration to be achieved at all times.

Montana Water Quality Standards Circular DEQ-7 (DEQ, 2019) sets a standard of 110 percent of saturation for total dissolved gas (TDG) in the Clark Fork River near the Project. This water quality standard was developed to protect fish from high levels of TDG, which may cause Gas Bubble Trauma (GBT). ARM 17.30.637(7) also includes a TDG standard, “no pollutants may be discharged, and no activities may be conducted which, either alone or in combination with other wastes or activities, result in the total dissolved gas pressure relative to the water surface exceeding 110 percent of saturation.”

The water quality standard for Escherichia coli bacteria (E-coli) varies according to season.

> From April 1 through October 31, the geometric mean number of E-coli may not exceed 126 colony forming units per 100 milliliters and 10 percent of the total samples may not exceed 252 colony forming units per 100 milliliters during any 30-day period. Additionally, from November 1 through March 31, the geometric mean number of E-coli may not exceed 630 colony forming units per 100 milliliters and 10 percent of the samples may not exceed 1,260 colony forming units per 100 milliliters during any 30-day period (ARM 17.30.623(a)).

The maximum allowable increase above naturally occurring turbidity is 5 nephelometric turbidity units (NTU) except as permitted in 75-5-318, MCA (ARM 17.30.623(d)).

Montana’s standard restrictions on induced variation of hydrogen ion concentration (pH) within the range of 6.5 to 8.5 must be less than 0.5 pH. Natural pH outside this range must be maintained without change. Natural pH above 7.0 must be maintained above 7.0 (ARM 17.30.623(c)).

There is to be no increase of concentrations of sediment or suspended sediment, settable solids, oils, or floating solids above naturally occurring concentrations (ARM 17.30.623(f)). The color cannot be increased more than five color units about the naturally occurring[8] color (ARM 17.30.623(g)). Concentrations of carcinogenic, bioconcentrating, toxic, radioactive, nutrient, or harmful parameters may not exceed the applicable standards set forth in the 2017 DEQ-7, unless a nutrient standards variance has been granted in the Department Circular DEQ-12A (ARM 17.30.623(h)).

## 4.9 Water Quality in the Project Area

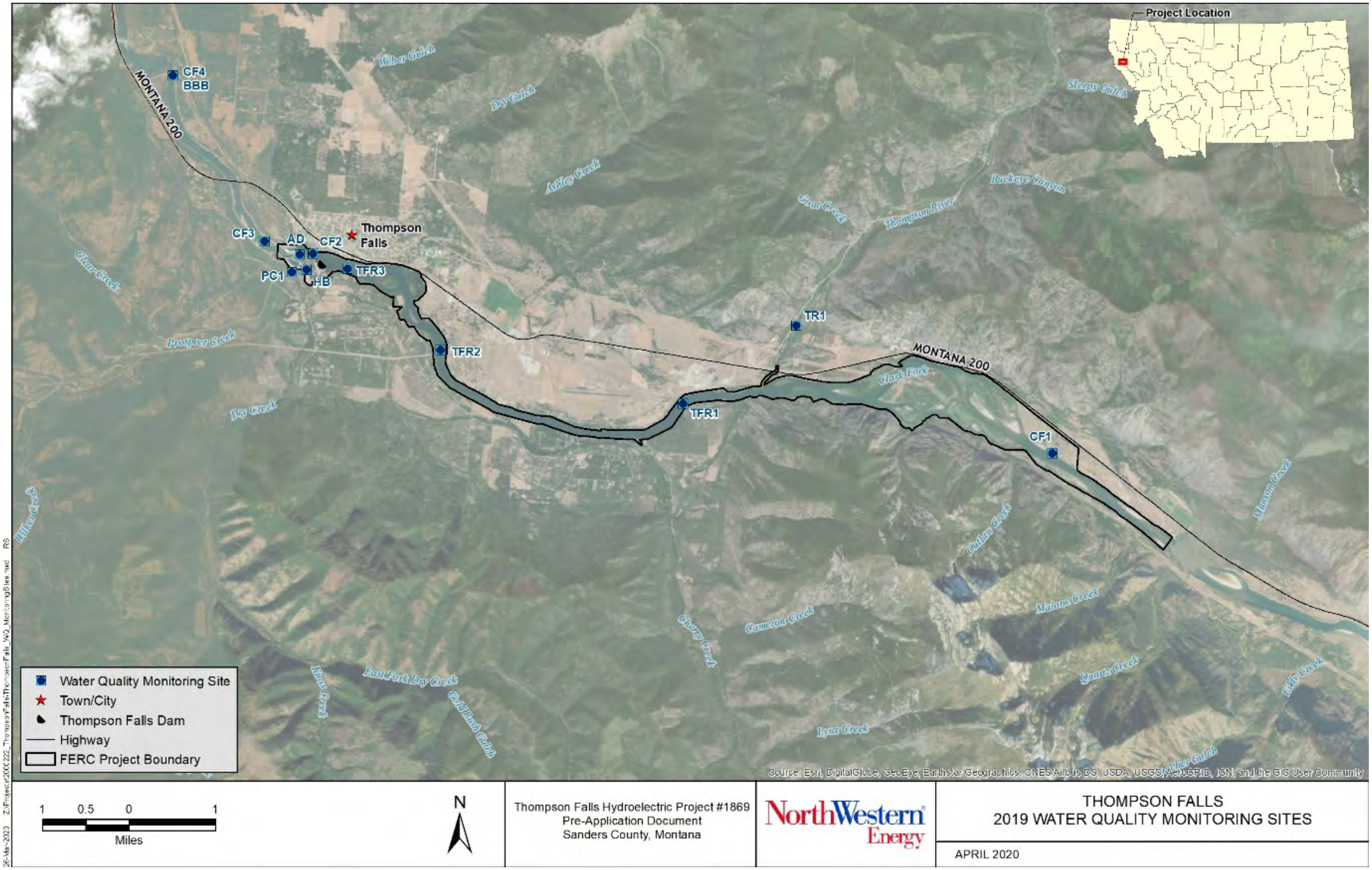
### 4.9.1 ***Water Chemistry***

#### 4.9.1.1 Water Chemistry Monitoring in the Project Area

In 2019, NorthWestern conducted water quality monitoring to collect baseline water quality information related to the Thompson Falls Project. A water quality monitoring plan was developed, with concurrence from the DEQ, to outline the water quality monitoring activities associated with this effort (NorthWestern, 2019). Water chemistry data was collected at six unique locations within the vicinity of the Thompson Falls Project, including four sites on the Clark Fork River and two tributary sites (Figure 4-5). This was intended to characterize the water chemistry entering the Project (Site CF1), upstream of the powerhouse (CF2), downstream of the powerhouse (CF3), and the downstream extent of the Project (CF4), and two tributary stream sites (TR1 and PC1). In addition to these six sites, there were five other monitoring sites utilized in 2019 to measure water quality parameters other than water chemistry (Figure 4-5). Water quality monitoring was conducted at various times throughout 2019 to characterize the condition of the water in the Project area under different flow regimes.

[8] As stated above, "Naturally occurring" means conditions or material present from runoff or percolation over which man has no control or from developed land where all reasonable land, soil and water conservation practices have been applied…Conditions resulting from the reasonable operation of dams in existence as of July 1, 1971, are natural (ARM 17.30.602(17)).

**Figure 4-5: Map showing locations of the 2019 water quality monitoring sites.**



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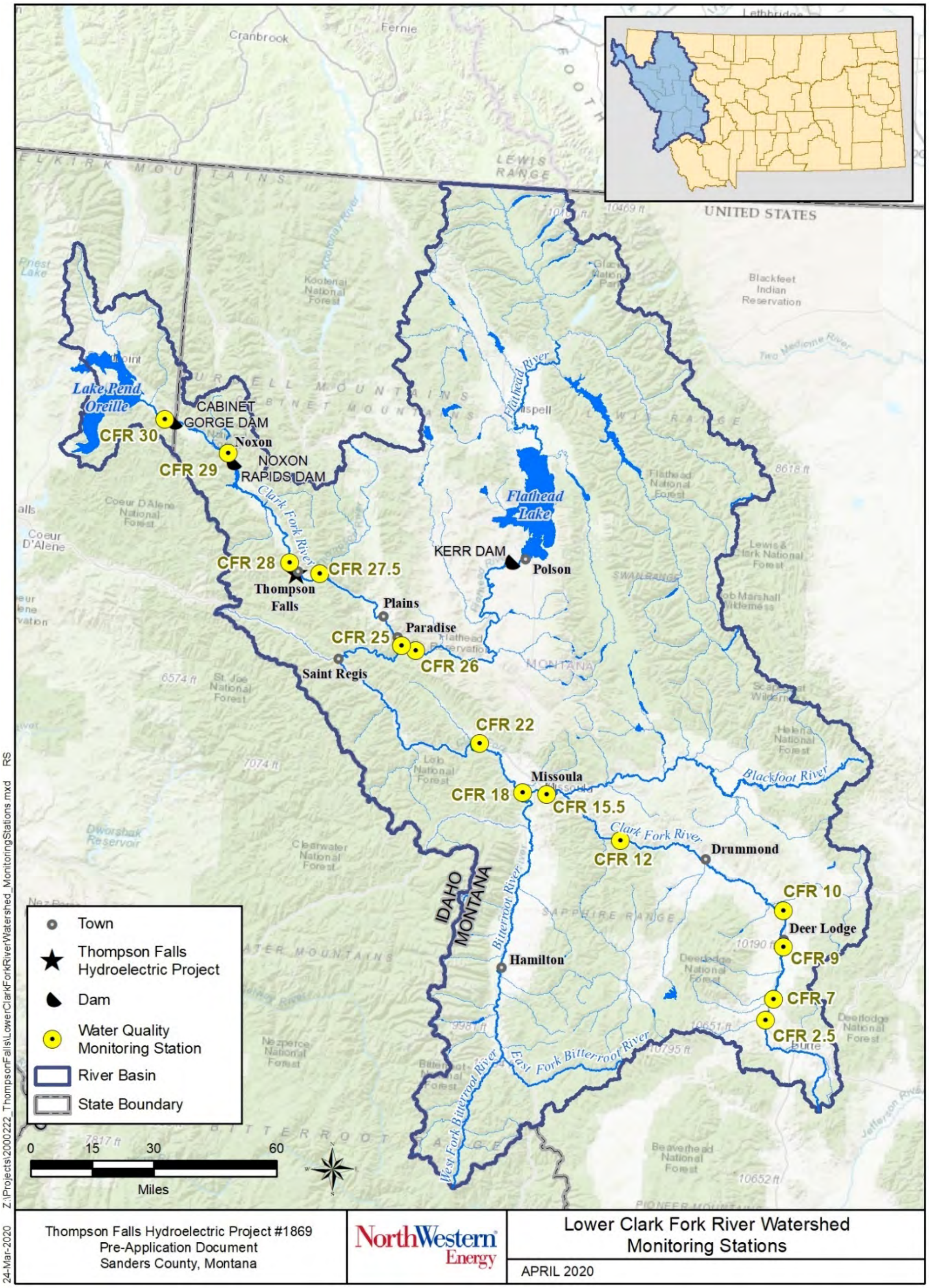
Other water quality sampling in the Project area is documented in an annual report prepared by HydroSolutions, Inc. titled *Annual Water Quality and Benthic Algae Monitoring Results for the Clark Fork River Basin*. The most recent version of this report provides 2017 water quality results from sampling in the Clark Fork River at 13 sites (HydroSolutions, 2018). The Clark Fork River (CFR-28) site is just downstream of the Thompson Falls Project, and the remaining sites are at least 48 km (30 miles) upstream or downstream of the Thompson Falls Project (Figure 4-6). The nutrients monitored include total phosphorous (TP), soluble reactive phosphorous (SRP), total nitrogen (TN), nitrate and nitrite, and ammonia. Data were typically collected monthly from July to September at CFR-28, but 2017 monitoring at this station also occurred in March and April, for a total of 5 events.

In addition to the basin wide sampling described above, water samples were collected from the public boat dock at Thompson Falls Reservoir on October 2, 2007 to test for metals (HDR, 2008).

**Figure 4-6: Clark Fork River monitoring stations. (Source: HydroSolutions, 2018.)**



### 4.9.1.2 Water Chemistry Monitoring Results

#### *4.9.1.2.1 Nutrients*

Nutrients within the Thompson Falls Project area are generally low in concentration, which is reflected in both the water chemistry data as well as the biological data. Table 4-5 below shows the nutrient concentrations measured in the study area that were measured within the applicable seasonal collection periods.

**Table 4-5: Clark Fork and Thompson River nutrient concentrations measured within the summer growing season in 2019.**

| Site Name | Site Description | Date of Sample | Analyte | Concentration |
|---|---|---|---|---|
| **CF1** | Clark Fork River upstream of Thompson Falls Reservoir | 7/30/19 | Total Nitrogen | 100 ug/L |
| | | 7/30/19 | Nitrate +Nitrite | 20 ug/L |
| | | 7/30/19 | Total Phosphorus | 8 ug/L |
| | | 8/1/19 | Chlorophyll-*a* | 34.6 mg/m$^2$ (mean); 49.9 mg/m$^2$ (maximum) |
| **CF2** | Clark Fork River upstream of Thompson Falls Powerhouse | 7/30/19 | Total Nitrogen | 100 ug/L |
| | | 7/30/19 | Nitrate +Nitrite | 20 ug/L |
| | | 7/30/19 | Total Phosphorus | 9 ug/L |
| **CF3** | Clark Fork River downstream of Thompson Falls Powerhouse | 8/1/19 | Chlorophyll-*a* | 17.5 mg/m$^2$ (mean); 22.8 mg/m$^2$ (maximum) |
| **CF4** | Clark Fork River at Birdland Bay Bridge | 7/30/19 | Total Nitrogen | 100 ug/L |
| | | 7/30/19 | Nitrate +Nitrite | 10 ug/L |
| | | 7/30/19 | Total Phosphorus | 6 ug/L |
| **TR1** | Thompson River at Mouth | 7/30/19 | Total Nitrogen | 30 ug/L |
| | | 7/30/19 | Nitrate +Nitrite | ND |
| | | 7/30/19 | Total Phosphorus | 7 ug/L |

In the basinwide sampling conducted in 2017, TP was less than 20 µg/L, and TN was below 300 ug/L[9] for all of the Clark Fork River downstream of Bonita (128 km or 80 miles upstream of Thompson Falls Project site) (Table 4-6). Concentrations of nitrate and nitrite were generally low at all the stations in the lower Clark Fork River and Flathead River, remaining below 50 µg/L. Nitrate and nitrite as a percentage of total nitrogen was 3 percent at the Thompson Falls monitoring site. SRP was generally below 5 µg/L at monitoring stations downstream of Bonita. The mean percentage SRP of TP was 22 percent at the Thompson Falls

[9] except on September 20th at Huson, upstream of the Project area, where the TN concentration was 327 µg/L

monitoring site. All measurements of ammonia were at or below the lower reporting limit of 10 µg/L at the Thompson Falls monitoring site (HydroSolutions, 2018).

**Table 4-6: 2017 Nutrient Results for the Clark Fork River below Thompson Falls Hydroelectric Project (CFR-28). (*Source*: HydroSolutions, 2018)**

| Date | Sample Type | Ammonia (ug/L) | Nitrate + Nitrite (ug/L) | Total Persulfate Nitrogen (ug/L) | Orthophosphate (ug/L) | Total Phosphorus (ug/L) |
|---|---|---|---|---|---|---|
| 3/14/2017 | Routine | < 10 | 39.3 | 259 | 1.7 | 14.4 |
| 4/11/2017 | Routine | < 10 | 26.9 | 181 | 2.9 | 12.8 |
| 7/11/2017 | Routine | 7.5 | 14 | 113 | < 2 | 7.4 |
| 8/15/2017 | Routine | < 10 | 21.9 | 179 | 2.1 | 7.8 |
| 9/14/2017 | Routine | < 10 | 12 | 137 | 1.3 | 5.7 |

In addition to the HydroSolutions 2018 report, the *Clark Fork River Water Quality Trends Reports* (HydroSolutions 2014) is also instructive, as it provides long-term trends for TN, total soluble inorganic nitrogen (TSIN), TP, and SRP from 1998-2012. It should be noted that the HydroSolutions 2014 report includes data from the CFR-27.5 (Thompson River) monitoring site, which is not included in the HydroSolutions 2018 report. The results of the HydroSolutions 2014 report are reprinted below.

> The trend analysis for summertime TN and TSIN found no trend detected at eleven of the thirteen Clark Fork River monitoring stations. Highly significant decreasing trends were found at Station CFR-18 for both TN and TSIN concentrations. There was a marginally significant increasing trend found in TN concentrations at CFR-28, and a marginally significant decreasing trend found in TSIN concentrations at CFR-29.
>
> The trends analysis for summertime TP found the most number of trends and the most number of decreasing trends. Trends were found at seven of thirteen Clark Fork River monitoring stations, including six stations with decreasing trends and one station with an increasing trend. Of the six decreasing trends, three are considered highly significant and three significant. Significant decreasing trends for TP occurred at six consecutive monitoring stations from Station CFR-10, Clark Fork River above Little Black Foot River, downstream to Station CFR-25, Clark Fork River above Flathead River. Highly significant decreasing trends in TP concentrations were found at stations CFR-15.5, CFR-18, and CFR-22. Station CFR-2.5 was found to have a significant increasing trend in TP concentrations.
>
> The trends analysis for summertime SRP found the highest number of increasing trends. Highly significant increasing trends in SRP concentrations were found at Stations CFR-2.5, CFR-09, and CFR-29. A marginally significant increasing trend in SRP concentrations was found at

Station CFR-27.5, in the Thompson River. One significant decreasing trend in SRP concentrations was found at Station CFR-18. Increasing trends in SRP concentrations were found at stations on both ends of the Clark Fork River, at the headwaters in Silver Bow Creek and also in the Clark Fork River at Noxon. The trend over the entire 1998 to 2012 time period found at Station CFR-29 is inconclusive for this trends analysis, since SRP had not been monitored at that Station, nor at Station CFR-28, since 2007.

The following provides a summary of the findings from the HydroSolutions 2014 report, as it pertains to the Thompson Falls Project (CFR-27.5 and CFR-28).

- CFR-27.5 (Thompson River): no trend was observed for summertime TN, TSIN, or TP, but a marginally significant increasing trend in SRP was observed.
- CFR-28 (Clark Fork River downstream of Thompson Falls): no trend was observed for summertime TSIN, TP, or SRP, but a marginally significant increasing trend in TN was observed.

Therefore, both the recent sampling and the long-term monitoring show that nutrients in the lower Clark Fork River in the Thompson Falls area are generally low in concentration.

#### 4.9.1.3 Metals

Metals sampling was also conducted in 2019 in conjunction with the nutrient sampling events. Generally, aqueous metal concentrations within the Project area are meeting water quality standards at all sites. Two samples from Birdland Bay Bridge (site CF4) downstream of the Project showed lead levels exceeding the water quality standard for chronic aquatic life. These two samples were collected during low flow periods, and the source of the lead is currently unknown because all other samples had non-detectable concentrations of lead. One potential source of lead at Birdland Bay Bridge during a low flow scenario could be Prospect Creek. Prospect Creek enters the Clark Fork between sites CF2 and CF4, and on the opposite side of the river from site CF3. Synoptic sampling was conducted on October 16, 2019 to determine the source of lead, but samples collected at CF2, CF3, CF4, and PC1 all had non-detectable levels of lead. All other metals analyzed for in 2019 were found to be at concentrations below water quality standards and are summarized in Table 4-7 below.

**Table 4-7: Clark Fork, Prospect Creek, and Thompson River metals concentrations measured in 2019.**

| Site Name | Site Description | Dates of Samples | Analyte | Concentration[1] |
|---|---|---|---|---|
| **CF1** | Clark Fork River upstream of Thompson Falls Reservoir | 4/18/19, 6/4/19, 7/30/19, 10/15/19 | Arsenic | Min: 1 ug/L<br>Mean: 2 ug/L<br>Max: 2 ug/L |
| | | | Copper | Min: ND<br>Mean: 3 ug/L<br>Max: 5 ug/L |
| | | | Iron | Min: ND<br>Mean: 183 ug/L<br>Max: 360 ug/L |
| | | | Lead | Min: ND<br>Mean: ND<br>Max: ND |
| | | | Zinc | Min: ND<br>Mean: ND<br>Max: ND |
| | | | Cadmium | Min: ND<br>Mean: ND<br>Max: ND |
| **CF2** | Clark Fork River upstream of Thompson Falls Powerhouse | 4/18/19, 6/4/19, 7/30/19, 10/8/19, 10/16/19 | Arsenic | Min: ND<br>Mean: 1 ug/L<br>Max: 2 ug/L |
| | | | Copper | Min: 1 ug/L<br>Mean: 3 ug/L<br>Max: 5 ug/L |
| | | | Iron | Min: ND<br>Mean: 132 ug/L<br>Max: 310 ug/L |
| | | | Lead | Min: ND<br>Mean: ND<br>Max: ND |
| | | | Zinc | Min: ND<br>Mean: ND<br>Max: ND |
| | | | Cadmium | Min: ND<br>Mean: ND<br>Max: ND |
| **CF3** | Clark Fork River downstream of Thompson Falls Powerhouse | 10/16/19 | Arsenic | 1 ug/L |
| | | | Copper | ND |
| | | | Iron | 50 ug/L |
| | | | Lead | ND |
| | | | Zinc | ND |
| | | | Cadmium | ND |

| Site Name | Site Description | Dates of Samples | Analyte | Concentration[1] |
|---|---|---|---|---|
| **CF4** | Clark Fork River at Birdland Bay Bridge | 4/18/19, 6/4/19, 7/30/19, 10/16/19 | Arsenic | Min: 1 ug/L<br>Mean: 2 ug/L<br>Max: 2 ug/L |
| | | | Copper | Min: 1 ug/L<br>Mean: 3 ug/L<br>Max: 5 ug/L |
| | | | Iron | Min: ND<br>Mean: 183 ug/L<br>Max: 420 ug/L |
| | | | Lead | Min: ND<br>Mean: 3 ug/L<br>Max: 7 ug/L |
| | | | Zinc | Min: ND<br>Mean: 3 ug/L<br>Max: 10 ug/L |
| | | | Cadmium | Min: ND<br>Mean: ND<br>Max: ND |
| **TR1** | Thompson River at Mouth | 4/18/19, 6/4/19, 7/30/19, 10/15/19 | Arsenic | Min: ND<br>Mean: ND<br>Max: ND |
| | | | Copper | Min: ND<br>Mean: ND<br>Max: ND |
| | | | Iron | Min: ND<br>Mean: 65 ug/L<br>Max: 190 ug/L |
| | | | Lead | Min: ND<br>Mean: ND<br>Max: ND |
| | | | Zinc | Min: ND<br>Mean: ND<br>Max: ND |
| | | | Cadmium | Min: ND<br>Mean: ND<br>Max: ND |
| **PC1** | Prospect Creek at Mouth | 10/16/19 | Arsenic | ND |
| | | | Copper | ND |
| | | | Iron | ND |
| | | | Lead | ND |
| | | | Zinc | ND |
| | | | Cadmium | ND |

[1] "ND" = sample results were non-detectable.

Data collected on October 2, 2007 at the public boat dock at Thompson Falls Reservoir 2007 also supports the conclusion of low levels of metals in Thompson Falls Reservoir. Those samples did not reveal detectable contaminant concentrations of arsenic, cadmium, copper lead, zinc, and total dissolved solids (HDR, 2008). Results were below detection limits (detection limits were less than the corresponding maximum contaminant limit (MCL).

### 4.9.2 *Water Temperature*

In 2019, water temperature data were collected at multiple locations throughout the Project area to characterize the existing thermal regime of the reservoir, its inputs and outputs. In June, after high flows, thermographs were placed at four locations across the Project area and monitored water temperature at 15-minute intervals throughout the summer months.

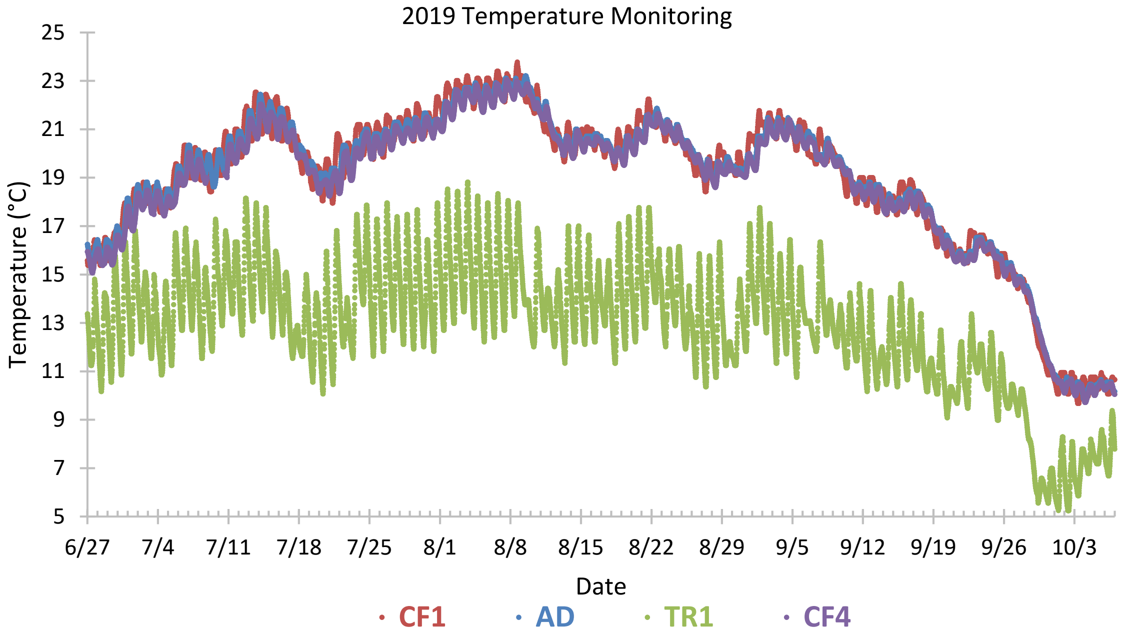
The instantaneous and 7-day maximum water temperatures in the Clark Fork River upstream of Thompson Falls Reservoir was just slightly higher than the comparable measurements collected downstream of the Project at the Birdland Bay Bridge (Table 4-8). Water temperature in the Thompson River is cooler than water temperature in the Clark Fork River, with the 7-day maximum water temperature being about 7 to 8 °F lower (~4.5 to 5.0 °C lower) than the comparable measurement in the Clark Fork River (Table 4-8).

**Table 4-8: Summary of 2019 water temperature data.**

| Site Name | Site Description | Date of Sample | Variable | Temperature (°F) | Temperature (°C) |
|---|---|---|---|---|---|
| **CF1** | Clark Fork River upstream of Thompson Falls Reservoir | 8/8/19 | Instantaneous Maximum Temperature | 74.79 | 23.77 |
| | | 8/3/19-8/9/19 | 7-Day Maximum | 73.93 | 23.29 |
| **AD** | Clark Fork River upstream of the Dry Channel Dam | 8/9/19 | Instantaneous Maximum Temperature | 73.75 | 23.19 |
| | | 8/3/19-8/9/19 | 7-Day Maximum | 73.33 | 22.96 |
| **CF4** | Clark Fork River at Birdland Bay Bridge | 8/7/19 | Instantaneous Maximum Temperature | 73.47 | 23.04 |
| | | 8/3/19-8/9/19 | 7-Day Maximum | 73.15 | 22.86 |
| **TR1** | Thompson River at Mouth | 8/3/19 | Instantaneous Maximum Temperature | 65.85 | 18.81 |
| | | 8/1/19-8/7/19 | 7-Day Maximum | 65.00 | 18.33 |

This pattern was consistent throughout the 2019 warm season, with the Thompson River being cooler than the Clark Fork River from late June until early October (Figure 4-7). In addition, the three measurement sites on the Clark Fork River all had very similar water temperature from late June until early October (Figure 4-7). These data support the conclusion that water temperature is consistent from upstream to downstream of the Project.

**Figure 4-7: Thompson Falls Project (CF1, AD, TR1, CF4) water temperatures (°C) from June 27 through October 6, 2019.**




Vertical profiles of water temperature were collected on July 21, 2009 along three transects in Thompson Falls Reservoir: just downstream of the confluence of Thompson River and Clark Fork River; about 1.6 km (1 mile) downstream of first transect; and approximately 3.2 km (2 miles) downstream of the confluence (PPL Montana, 2010). Vertical temperature profiles were measured at three locations at each site. The temperature of Thompson Falls Reservoir was nearly uniform on July 21, 2009. Temperatures were approximately 20 °C (68 °F) at almost all locations and depths, except for Transect 1 Profiles A and B, which showed slightly colder temperatures (14-15 °C, 58-59 °F). Transect 1 was approximately 100 meters (328 feet) downstream of the confluence of the Thompson River within 50 meters (164 feet) of the right bank of the Thompson Falls Reservoir, so the cooler temperatures at Profiles A and B on Transect 1 seem to show the Thompson River influence. This was the only area of the reservoir that was found to be cooler than the main body of the reservoir. Transects 2 and 3 (1.6 and 3.2 km, or 1 and 2 miles downstream from the confluence with the Thompson River, respectively) showed no cool water influence from the Thompson River (PPL Montana, 2010b).

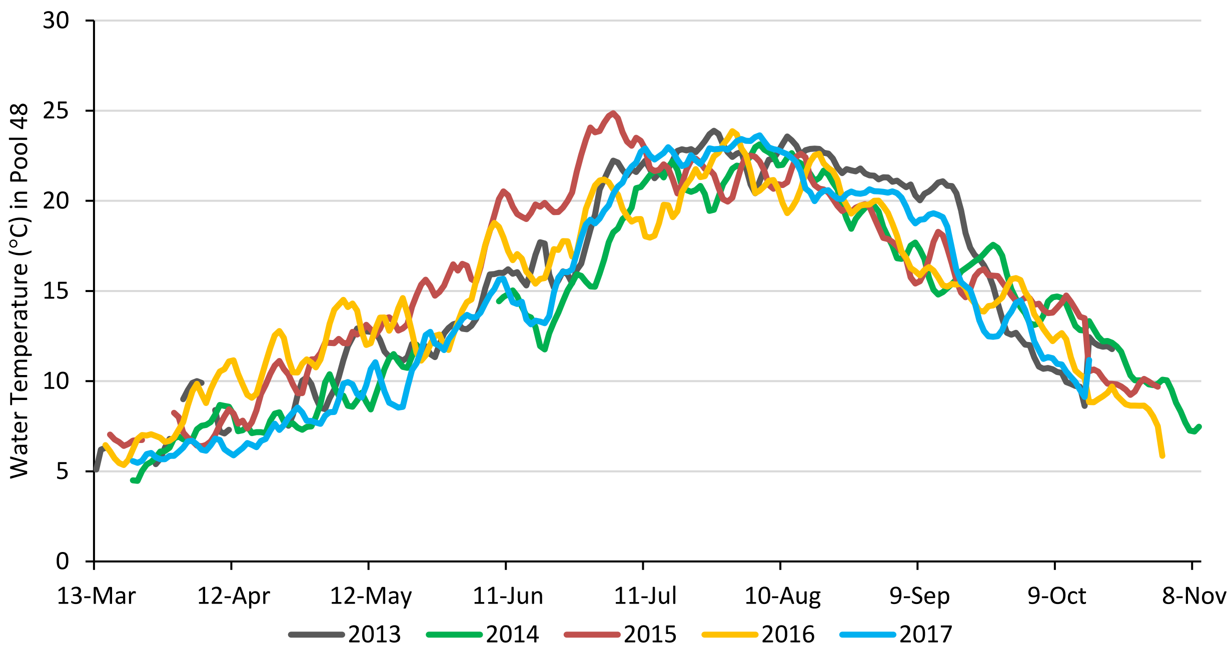
On July 30, 2009, water temperatures warmed in the Thompson Falls Reservoir (PPL Montana, 2010b). There was still no evidence of thermal plume extending from the Thompson River to Thompson Falls Dam. A cooler, shallow water temperature profile was recorded immediately downstream of the mouth of the Thompson River, but cooler temperatures were not detected approximately 100 meters (328 feet) downstream of the confluence with the Thompson River.

Most of the temperature profiles showed isothermal conditions between 21.5 and 22.6 °C or 70.7 and 72.7 °F. The evidence indicates that Thompson Falls Reservoir does not stratify.

As part of the annual monitoring of the Project's upstream fish passage facility, water temperature has been recorded annually since 2011. During each operating season (approximately mid-March through mid-October), water temperatures recorded through a combination of a single measurement (coinciding with each check of the upstream fish passage facility) and continuously recording thermographs. When the upstream fish passage facility is operating, water temperatures are recorded in Pool 48, at the top of the upstream fish passage facility. In 2011, the upstream fish passage facility was shut down as a result of high spring flows and maintenance activities for the majority of time between May 25 and August 22 resulting in no water temperature during this period (PPL Montana 2012). In 2012, there were technical issues with the thermograph and a continuous temperature log was not obtained; only daily temperature measurements were recorded (PPL Montana 2013).

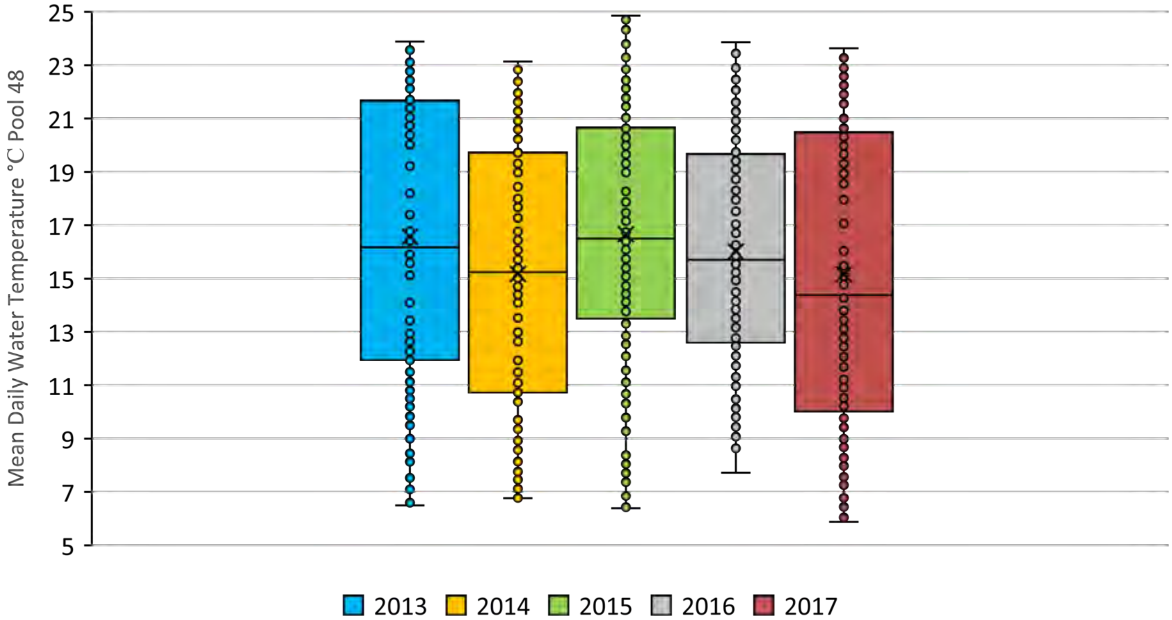
For a comparison of mean daily temperatures recorded during the operations of the upstream fish passage facility, data from 2013 through 2017 are presented in Figure 4-8. In general, water temperatures remain cool in the spring, warm up in the summer with peak temperatures generally occurring in July or August before declining (Figure 4-8).

**Figure 4-8: Daily mean water temperature (in degrees Celsius) from the upstream fish passage facility pool 48 annually, March through early November, 2013-2017.**




Mean daily water temperature data from loggers in the upstream fish passage facility were evaluated for daily minimum, maximum, mean, median, and 1st and 3rd quartiles (Figure 4-9).

Figure 4-9: Mean daily water temperatures (in degrees Celsius) between April 1 through October 15 annually between 2013 and 2017. Includes daily minimum, maximum, mean (“x”), median, and 1st and 3 quartiles temperatures.




### 4.9.3 *Dissolved Oxygen*

Dissolved oxygen (DO) requirements for freshwater aquatic life are discussed in Table 4-4. There are multiple variables to consider when establishing thresholds for DO. Generally, warmer water and younger (embryotic) stages of development require a higher concentration of DO to avoid stressful or lethal conditions for aquatic life (Chapman, 1986).

DO data was collected from mid-April to mid-August of 2018. This period of data collection corresponds with the times in which DO concentrations are recognized as being most likely to harm aquatic life. Data was collected at three points: Above Dam; Birdland Bay Bridge; and Below the Main Dam (High Bridge). These data collection points are each shown with yellow leaders on Figure 4-16.

A summary of the minimum, maximum, and mean DO for each sampling location is provided in Table 4-9. For minimum and maximum DO, the date on which these levels were recorded is shown in parentheses.

**Table 4-9: Minimum, maximum, and mean dissolved oxygen (DO) near Thompson Falls Project.**

| | Above Dam | Birdland Bay Bridge | High Bridge |
|---|---|---|---|
| **Minimum DO [mg/l]** | 7.10 (7/13/2018) | 7.88 (8/12/2018) | 6.84 (8/19/2018) |
| **Maximum DO [mg/l]** | 10.93 (5/13/2018) | 12.94 (5/2/2018) | 13.01 (5/12/2018) |
| **Mean DO [mg/l]** | 9.05 | 10.07 | 10.05 |

For the period of record, the mean DO was 10.07 mg/l and 10.05 mg/l at Birdland Bay Bridge and High Bridge sites, respectively. These sites are both downstream of the Thompson Falls dams. In comparison, mean DO upstream of the dam was 9.05 mg/l at the Above Dam site. Both the minimum (6.84 mg/l) and maximum (13.01 mg/l) DO measurement was recorded at the High Bridge site.

The DO levels (mg/l) and DO saturation (%) for each of the three sites are shown in Figures 4-10 through 4-12. It is observed that the one-day minimum (8 mg/l) and seven-day mean (9.5 mg/l) standards established for the Thompson Falls Project (*refer to* Table 4-4) are most relevant beginning in early July until the end of data collection in August. The data collection instruments were calibrated on May 8th, June 19th, and July 13th, resulting in jumps in the data surrounding these dates.

As described in the following text, the DO standards established in the Montana Water Quality Standards Circular DEQ-7 (2012) were met at the measurement locations (Above Dam, High Bridge, and Birdland Bay Bridge) in 2018 when considering “other life stages” and “early life stages” in the water column.

**Figure 4-10: Dissolved oxygen level at Above Dam site.**

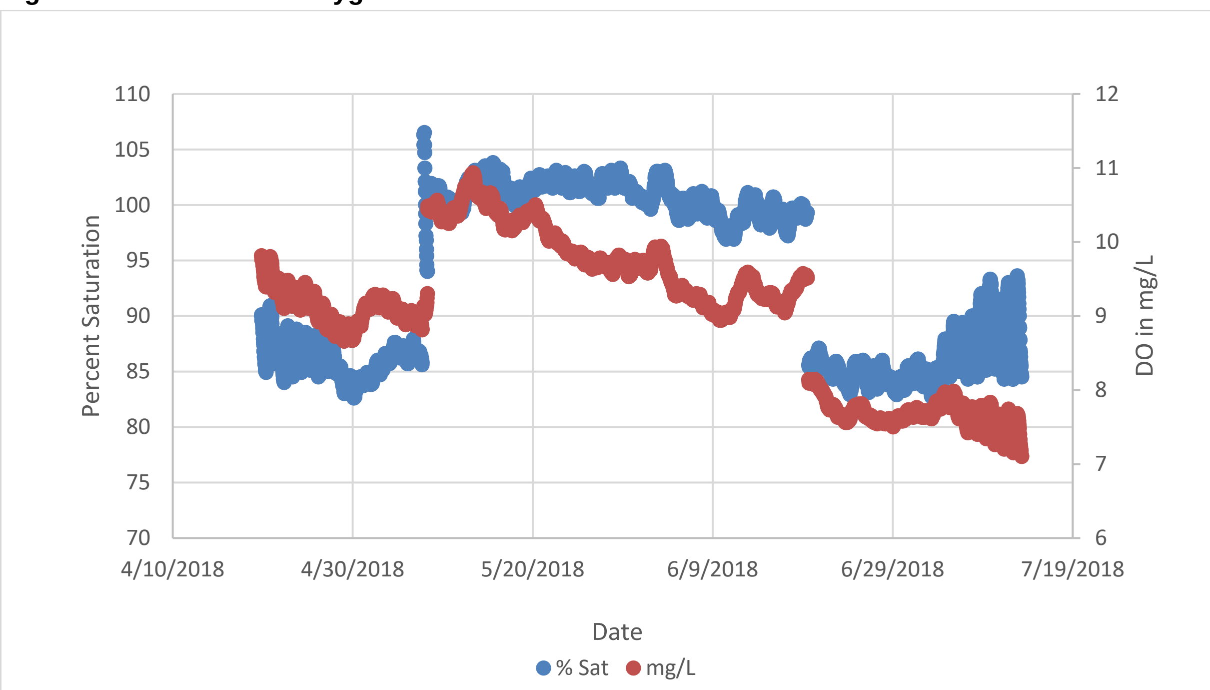


**Figure 4-11: Dissolved oxygen level at Birdland Bay Bridge site.**

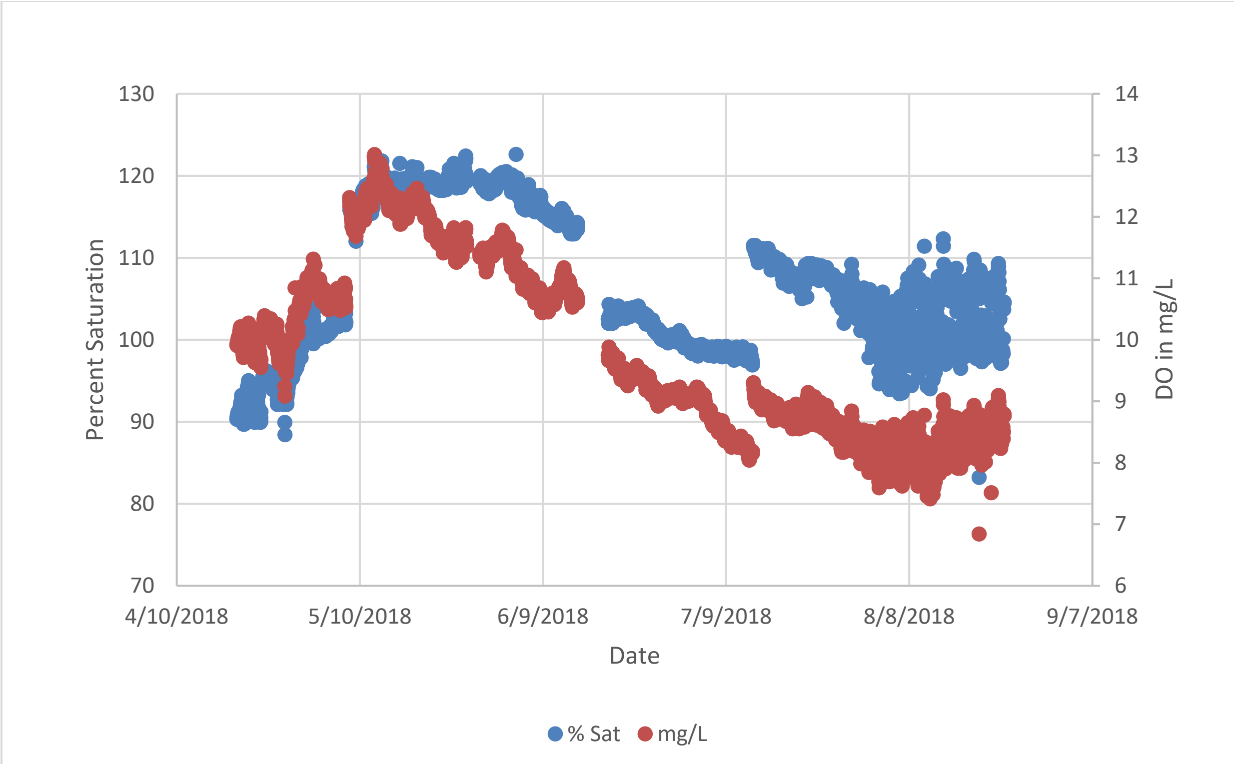
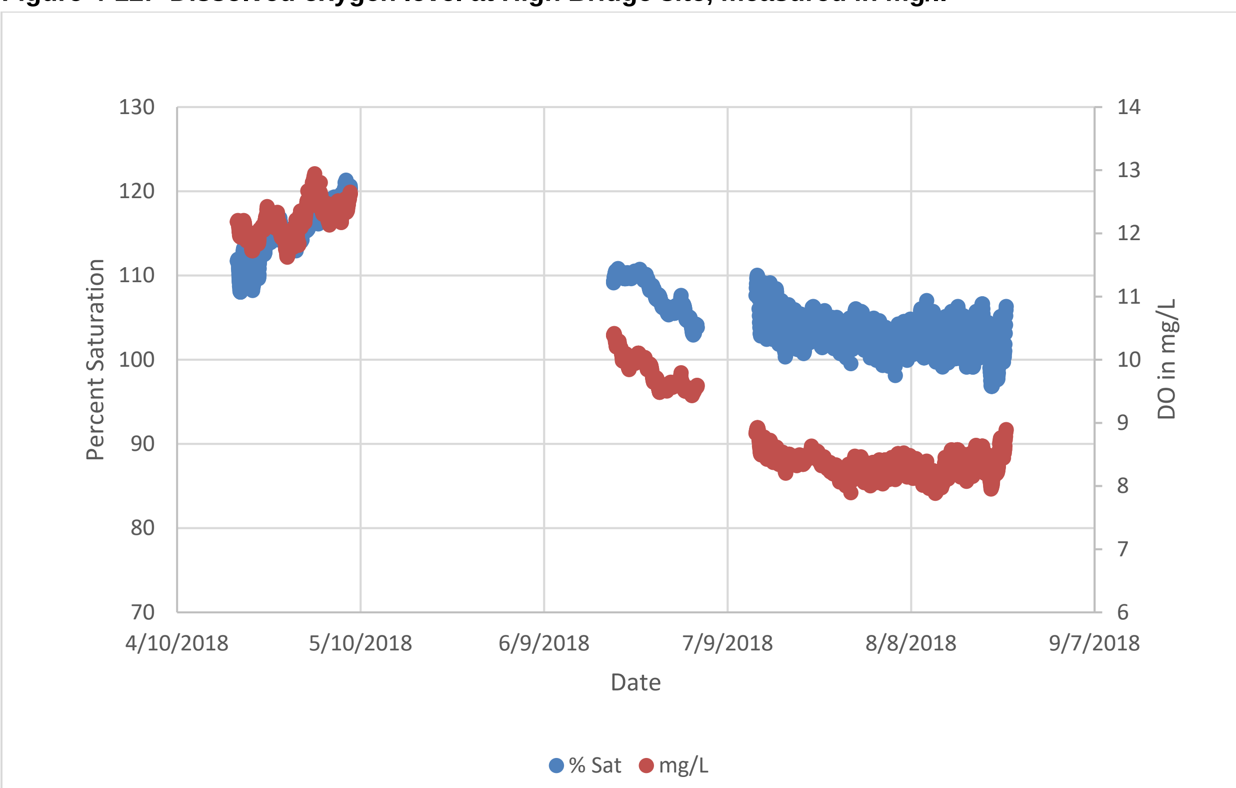
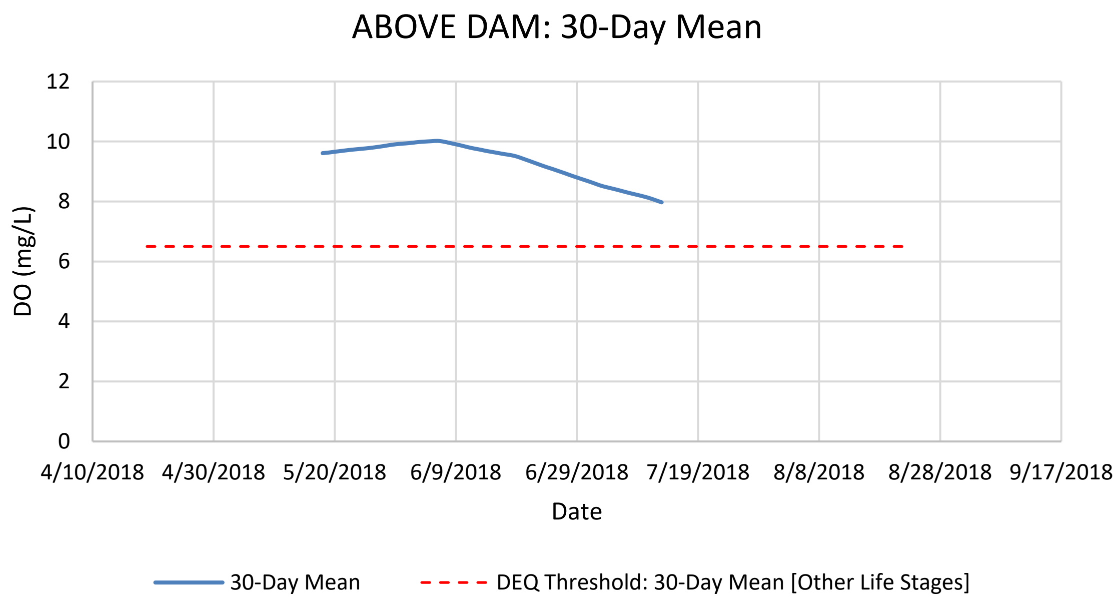


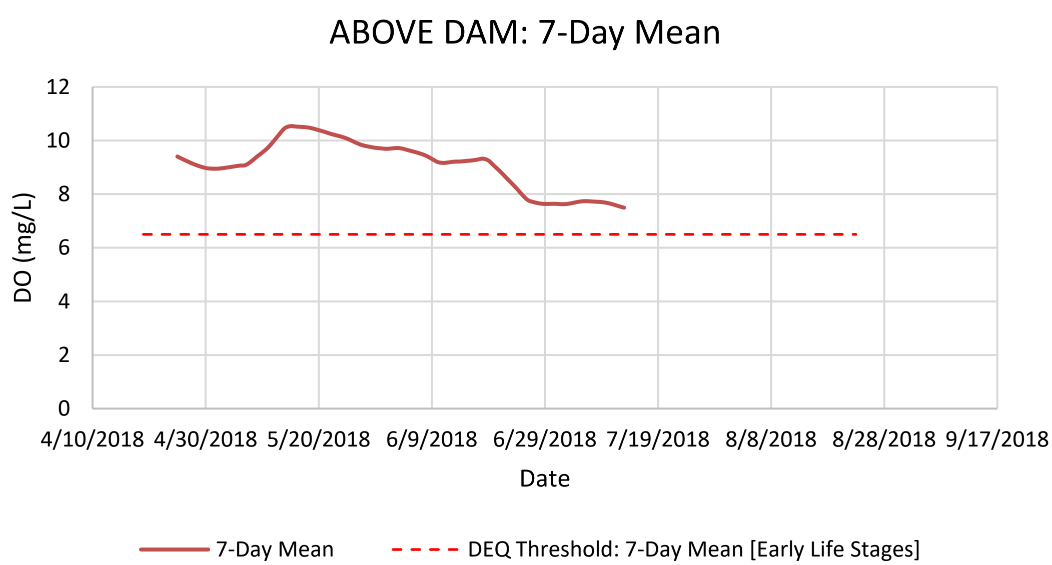

**Figure 4-12: Dissolved oxygen level at High Bridge site, measured in mg/l.**



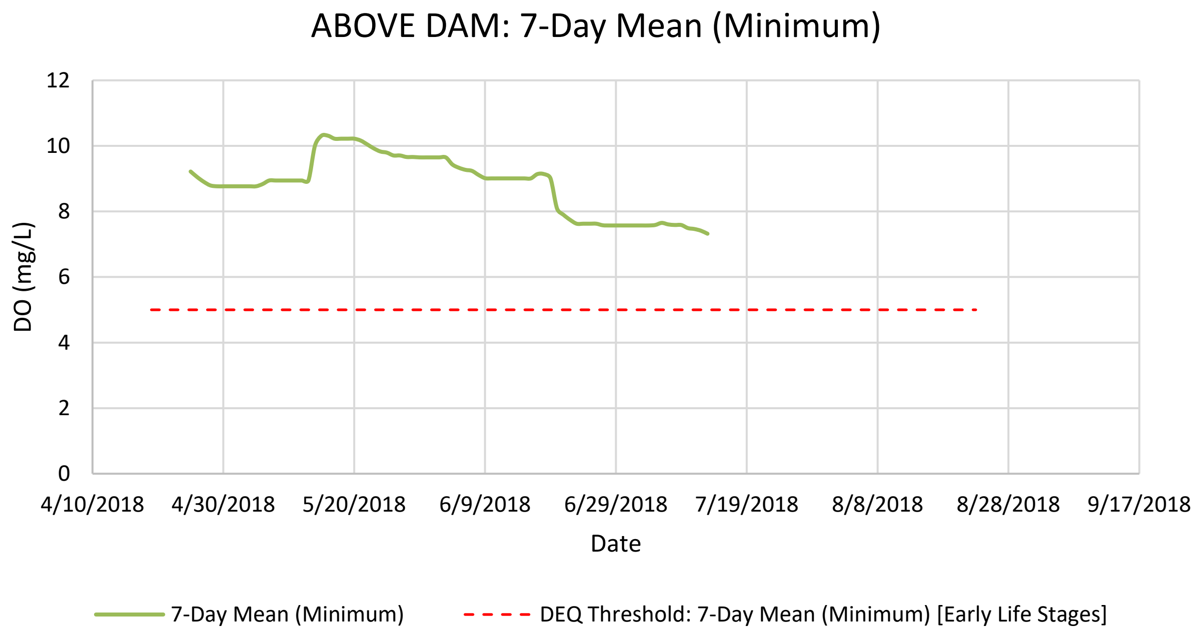
Statistics for 30-Day Mean, 7-Day Mean, 7-Day Mean (Minimum), and 1-Day Mean (Minimum) were compared to the freshwater aquatic life standards for DO presented in the Montana Water Quality Standards Circular DEQ-7 (DEQ, 2019). The statistics are shown in Figures 4-13, 4-14, and 4-15 for the Above Dam, Birdland Bay Bridge, and Below Dam measurement sites, respectively. A short discussion of trends observed for each Figure is provided at the end of this section.

**Figure 4-13: Above Dam Dissolved oxygen: 30-Day Mean, 7-Day Mean, 7-Day Mean (Minimum), and 1-Day Mean (Minimum)[10].**




[10] Early life stages of fish in the Project area are most likely exposed directly to the water column rather than being buried in the stream gravel. Therefore, the aquatic life standards of 6.5 mg/L is used for the 7-day mean, and 5.0 mg/L for the 1-day minimum.


ABOVE DAM: 7-Day Mean (Minimum)
12
10
8
6
4
2
0
DO (mg/L)
4/10/2018
4/30/2018
5/20/2018
6/9/2018
6/29/2018
7/19/2018
8/8/2018
8/28/2018
9/17/2018
Date
7-Day Mean (Minimum)
DEQ Threshold: 7-Day Mean (Minimum) [Early Life Stages]

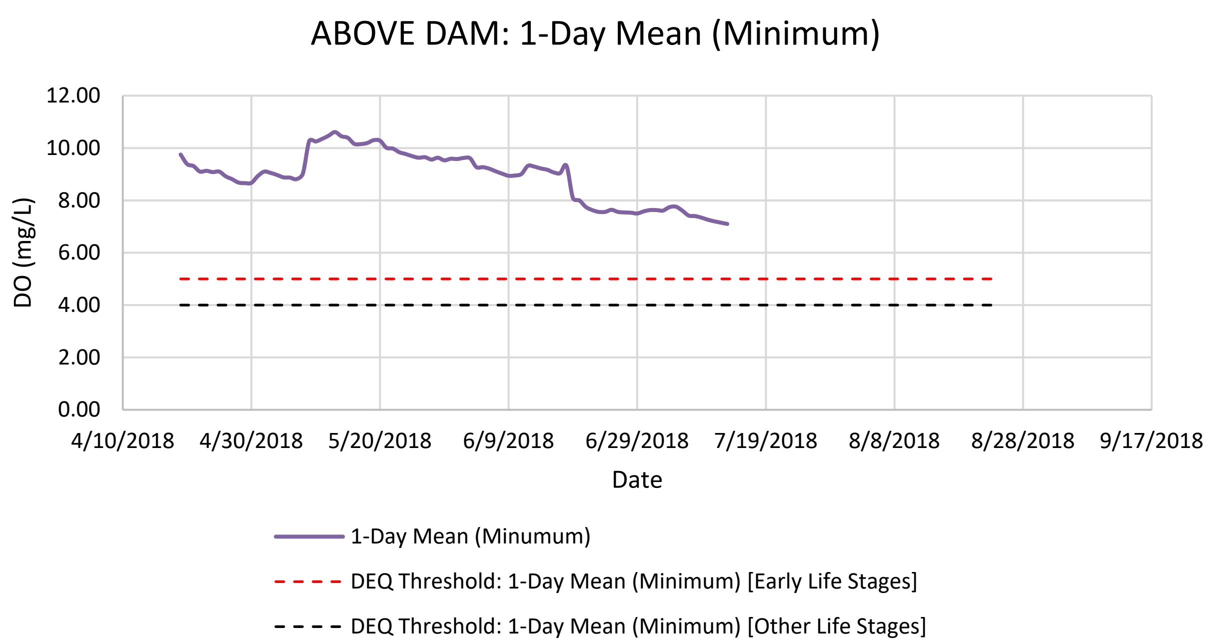
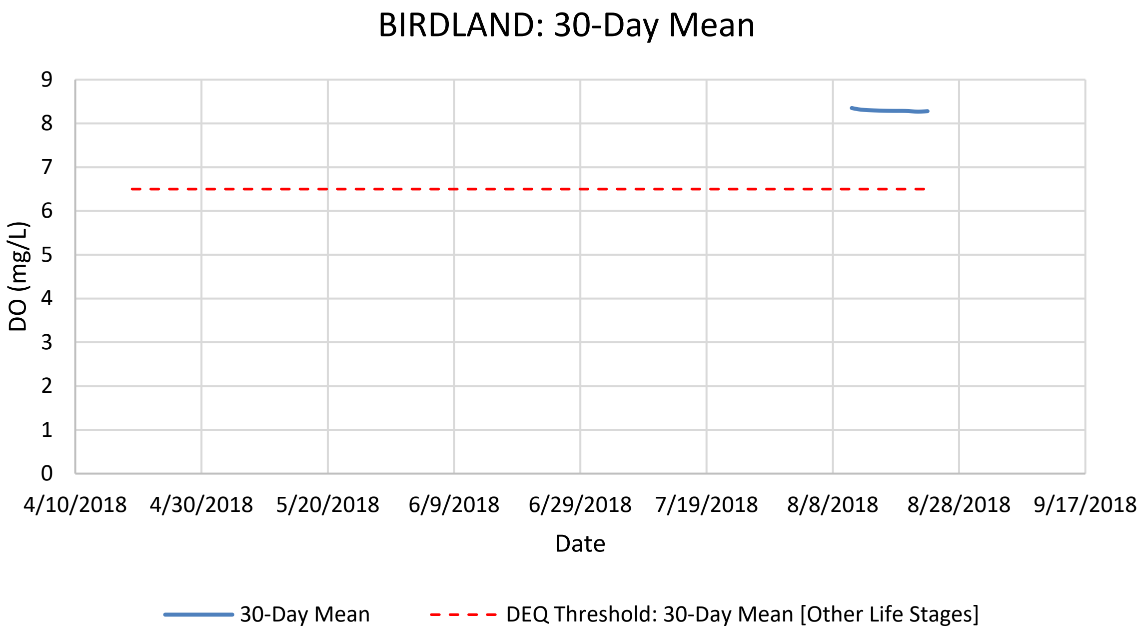
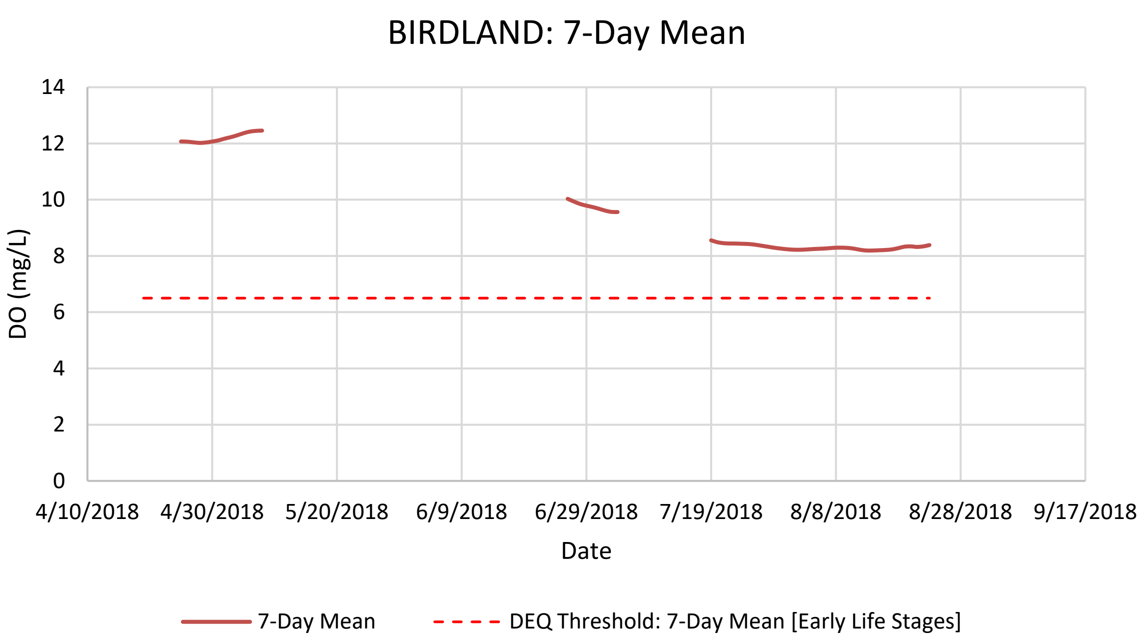
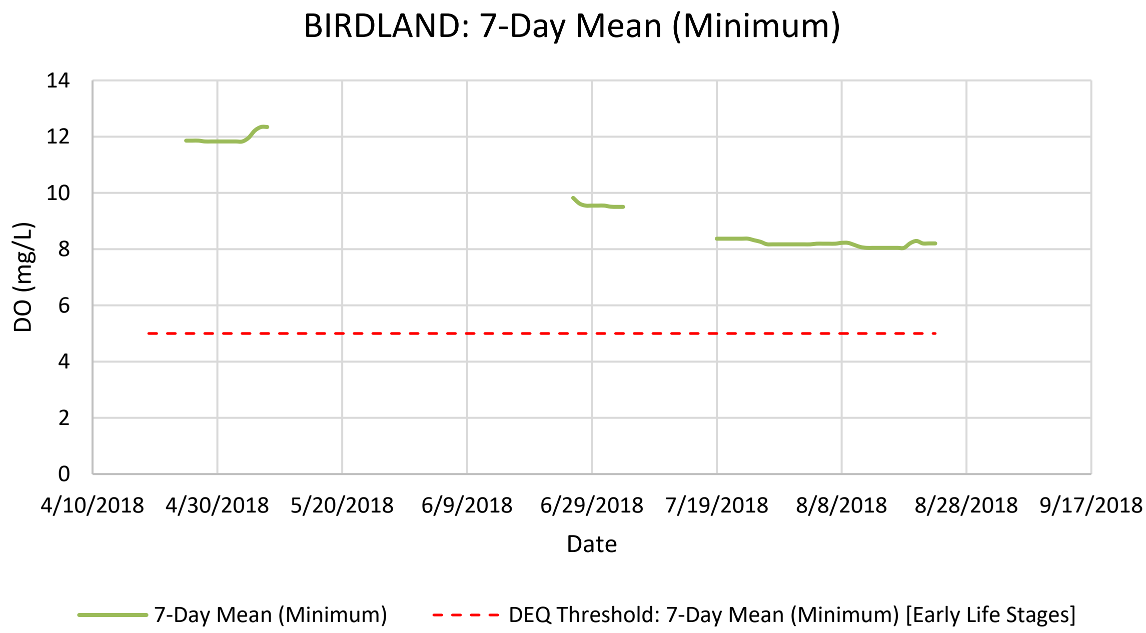

ABOVE DAM: 1-Day Mean (Minimum)
12.00
10.00
8.00
6.00
4.00
2.00
0.00
DO (mg/L)
4/10/2018
4/30/2018
5/20/2018
6/9/2018
6/29/2018
7/19/2018
8/8/2018
8/28/2018
9/17/2018
Date
1-Day Mean (Minumum)
DEQ Threshold: 1-Day Mean (Minimum) [Early Life Stages]
DEQ Threshold: 1-Day Mean (Minimum) [Other Life Stages]

**Figure 4-14: Birdland Bay Bridge Dissolved oxygen: 30-Day Mean, 7-Day Mean, 7-Day Mean (Minimum), and 1-Day Mean (Minimum).**




BIRDLAND: 7-Day Mean (Minimum)
DO (mg/L)
14
12
10
8
6
4
2
0
4/10/2018
4/30/2018
5/20/2018
6/9/2018
6/29/2018
7/19/2018
8/8/2018
8/28/2018
9/17/2018
Date
7-Day Mean (Minimum)
DEQ Threshold: 7-Day Mean (Minimum) [Early Life Stages]

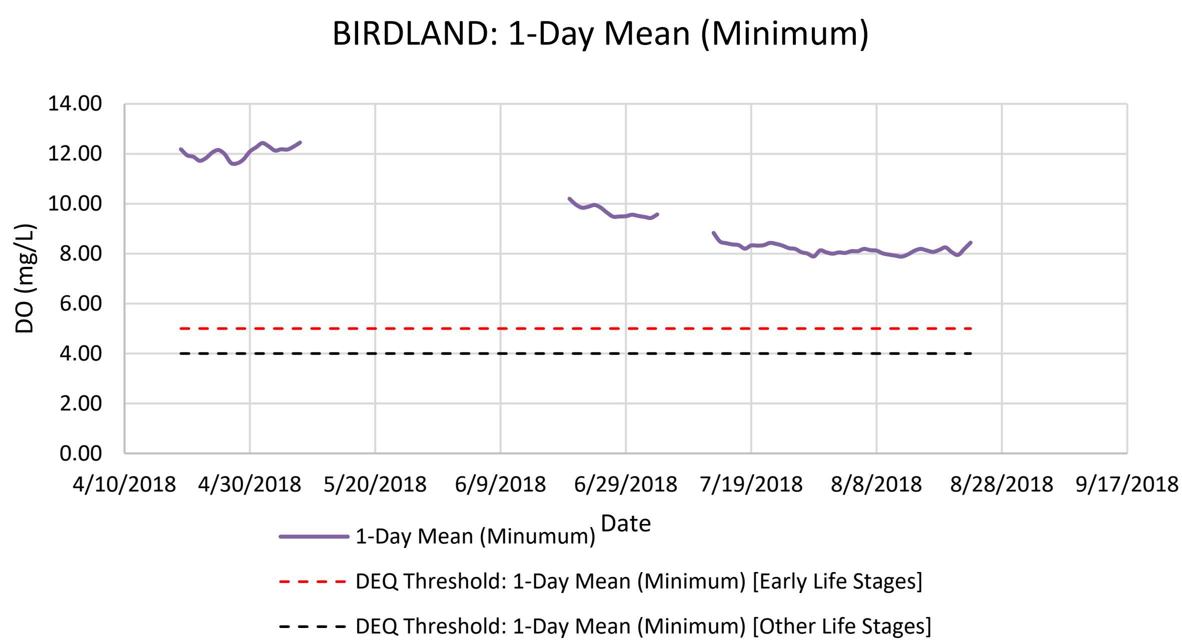
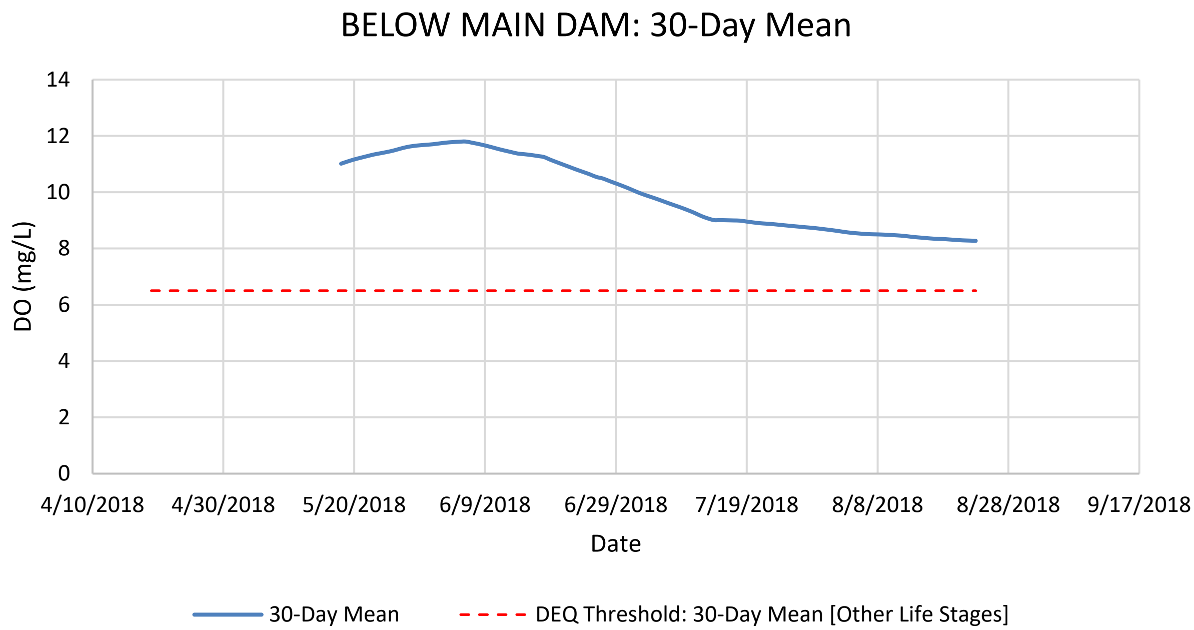
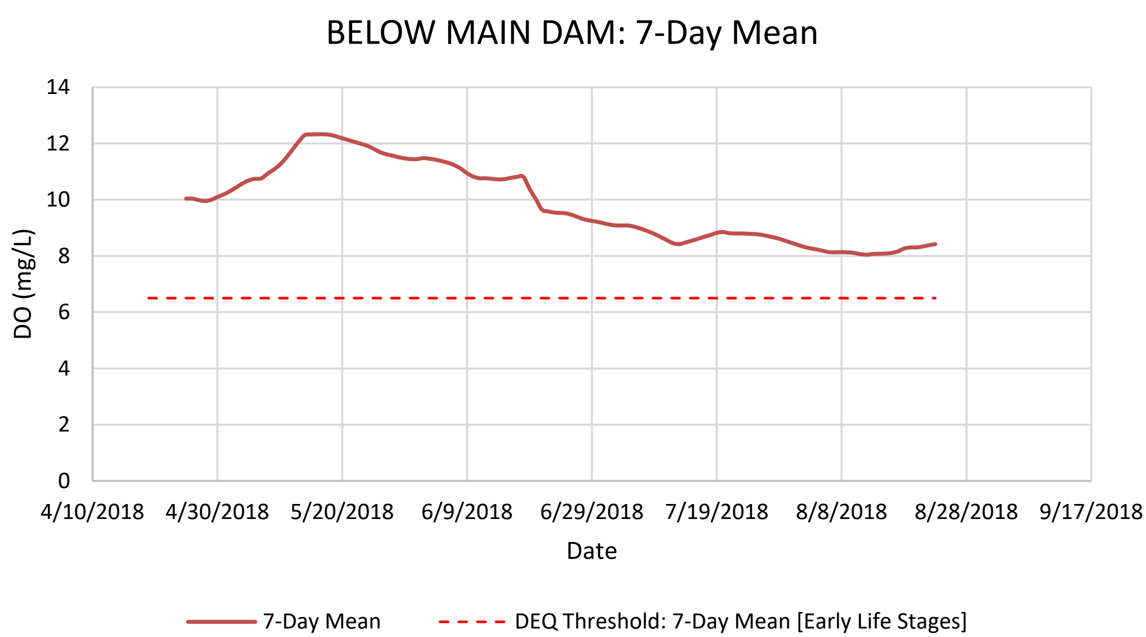
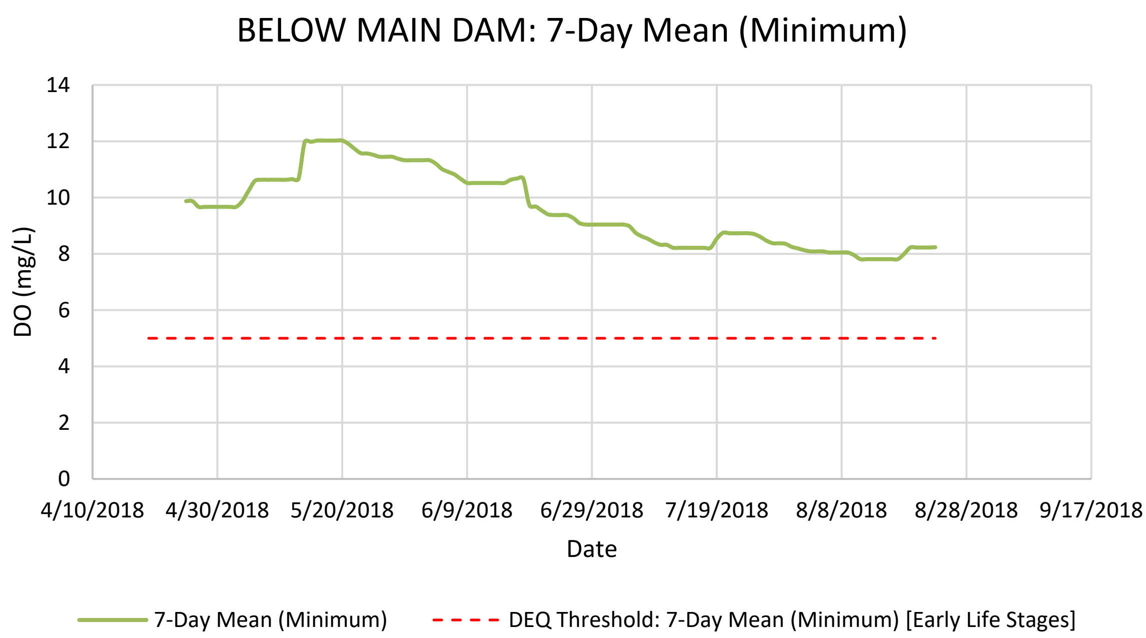
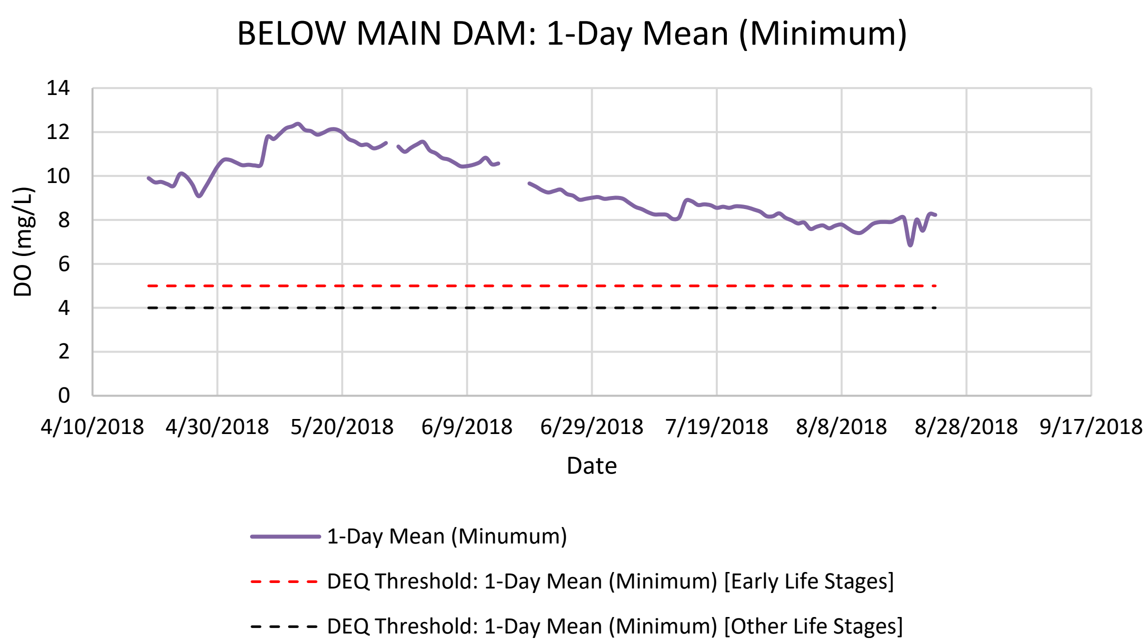

BIRDLAND: 1-Day Mean (Minimum)
DO (mg/L)
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
4/10/2018
4/30/2018
5/20/2018
6/9/2018
6/29/2018
7/19/2018
8/8/2018
8/28/2018
9/17/2018
Date
1-Day Mean (Minumum)
DEQ Threshold: 1-Day Mean (Minimum) [Early Life Stages]
DEQ Threshold: 1-Day Mean (Minimum) [Other Life Stages]

**Figure 4-15: Below Main Dam Dissolved oxygen: 30-Day Mean, 7-Day Mean, 7-Day Mean (Minimum), and 1-Day Mean (Minimum).**






The charts presented in Figure 4-13, 4-14, and 4-15 show a general trend of elevated DO levels during the spring freshet and then a gradual decline as summer progresses. The observations discussed below hold true for each standard described in Table 4-4: 30-Day Mean, 7-Day Mean, 7-Day Mean (Minimum), and 1-Day Mean (Minimum).

Figures 4-13, 4-14, and 4-15 illustrate that the DO standards established in the Montana Water Quality Standards Circular DEQ-7 were met at the monitoring sites when considering "other life stages" and "early life stages".

## 4.10 Total Dissolved Gas

The 110 percent of saturation water quality standard was developed to protect fish from high levels of TDG, which may cause GBT, a condition that affects many aquatic organisms residing in fresh or marine waters which are supersaturated with atmospheric gases. Both natural and human-induced processes are known to create supersaturated waters. When water plunges into a pool, air becomes entrained regardless of whether the plunge is a natural waterfall or a dam spillway (Weitkamp and Katz 1980). Supersaturation at hydroelectric projects is primarily caused by water containing gas that was dissolved under a higher than atmospheric pressure. GBT can cause injury and, in severe cases, death to fish.

At many dams, water passing over the dam (known as spill) plunges into a deep armored stilling basin. Stilling basins are designed to confine energy dissipation in the armored zone, so that erosion does not scour and undermine the spillway. As spill plunges, a turbulent energy dissipation zone is created, characterized by unsteady flow and high shear forces. Vertical circulation cells often take turbulence aeration to depth, where hydrostatic pressure collapses bubbles, forcing gas into solution and elevating TDG levels (gas absorption).

At the Thompson Falls Project, the spillway is built on bedrock. Therefore, scour is not a concern and thus there is no formal spillway stilling basin and no plunge pool. The depth of the bedrock shelf immediately downstream of the spillway apron appears not to be deep enough for appreciable gas absorption to occur on the basis of required hydrostatic pressure. The rock shelf extends downstream to a waterfall which has a deeper downstream pool where there is enough depth for appreciable TDG uptake.

The Thompson Falls Project was built on a natural river falls (Photographs 4-1, 4-2). No data on TDG during the pre-Project time period are available. However, the natural waterfalls likely elevated TDG in the Clark Fork River.

**Photograph 4-1: View of Thompson Falls, Montana (in background) and the Clark Fork River (in foreground), at the site of the Main Channel Dam of the Thompson Falls Project. Circa 1908. Woodworth Photo. Photo courtesy of the University of Montana, K. Ross Toole Archives.**

**Photograph 4-2: View of Thompson Falls, Montana (in background) and the Clark Fork River (in foreground), circa 1908. Woodworth Photo. Photo courtesy of the University of Montana, K. Ross Toole Archives.**

TDG carrying capacity depends on temperature and ambient pressure. TDG supersaturation is an unstable condition, and if the river channel downstream of a spillway is sufficiently wide and shallow, and with an appreciable enough hydraulic gradient, channel boundary roughness will force flow to “tumble” in a manner where there is increased water surface exposure of ambient air conditions. Where this kind of open-channel flow conditions occur, TDG levels rapidly drop back to near the stable, 100 percent saturation level. The distance that is required for this to happen varies from site to site.

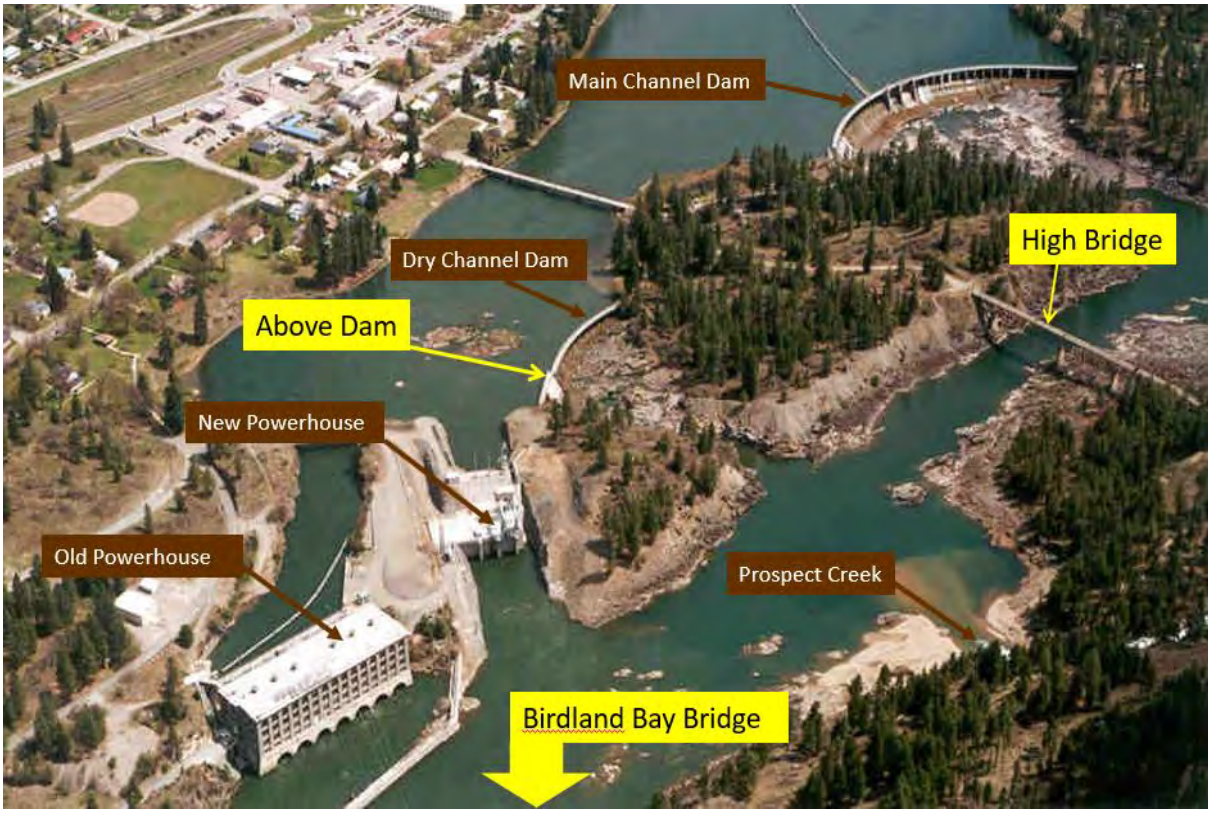
However, if there is a downstream reservoir impounded near the powerhouse tailrace, as is the case at the Project, the normal river gradient is reduced, and the flow regime becomes more stable. Lower reservoir velocities result in less turbulence, and elevated TDG levels often persist above saturation after entering the impoundment. If there are elevated wind levels, enough shear can be created to induce the vertical circulation necessary to reduce TDG levels. Otherwise, the elevated reservoir TDG levels wane slowly, by delayed replenishment by lower level TDG inflows.

### 4.10.1 *TDG Monitoring*

The Licensee has frequently monitored TDG in the Clark Fork River during the 2003 to 2019 time period. Monitoring sites include 1) above dam, 2) immediately below the Main Channel Dam, 3) below the Dry Channel Dam, 4) Historic High Bridge, 5) Birdland Bay Bridge, and 6) below the powerhouses (Figure 4-16). Not all sites were monitored in all years. In the normal course of business, NorthWestern monitors TDG when the April 1st Natural Resource Conservation Service (NRCS) most probable (50%) runoff forecast for the Clark Fork River is at or above 125 percent. Decisions to monitor dissolved gas outside of the runoff forecast conditions is made annually by the Thompson Falls TAC.

The High Bridge monitoring site captures information on TDG at a location that is downstream of the Main Channel Dam spillway and the falls but is upstream of where the Dry Channel Dam spill enters the river. The Birdland Bay Bridge monitoring site captures information on the level of TDG entering Noxon Rapids Reservoir.

**Figure 4-16: Monitoring locations for TDG at the Thompson Falls Project.**




### 4.10.2 *TDG Monitoring Results*

TDG upstream of the Thompson Falls Project, measured in the forebay, is generally between 100 and 108 percent of saturation regardless of river flow.

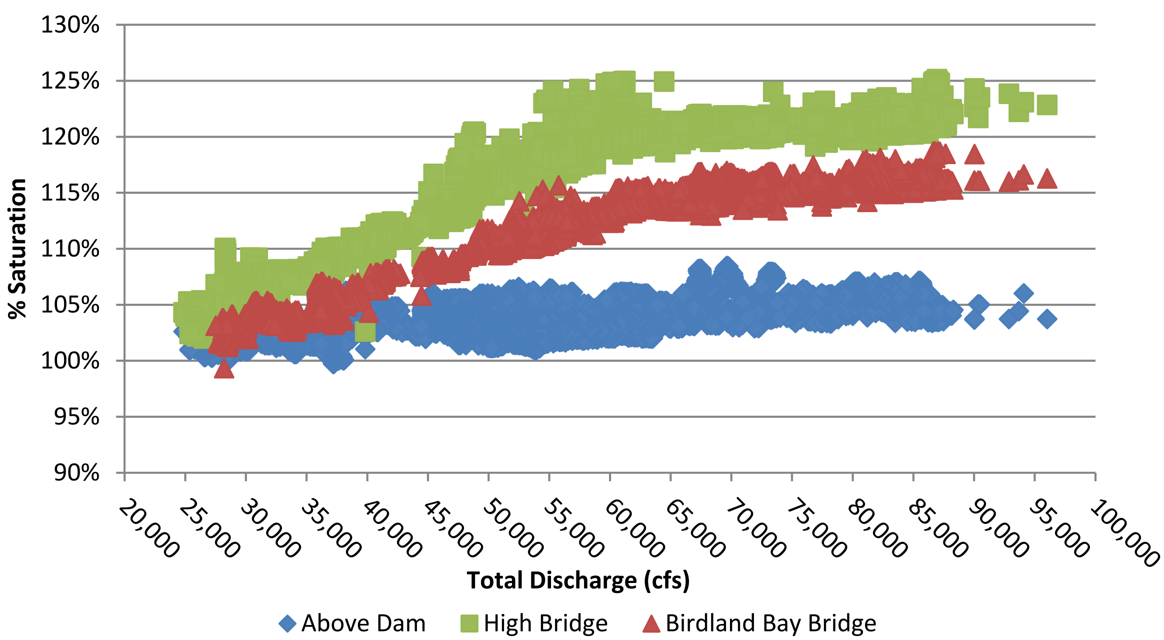
The Project routes flow through the powerhouses at a discharge less than 23,000 cfs, with no need to operate the spillways except a small discharge released at the Main Channel Dam for fish passage purposes. These lower discharges occur more than 85 percent of the time. TDG measurements collected above the Project and below the powerhouses in 2003 found that TDG in the powerhouse tailrace was generally 1 to 2 percent lower than TDG in the forebay (PPL Montana, 2010). Therefore, passing flow through the powerhouses results in slight de-gassing of the flow. For this reason, during the time periods when the spillways are not in use, TDG as measured at the Birdland Bay Bridge is generally equal to or slightly less than the TDG measured above the dams (PPL Montana, 2010).

When river discharge exceeds the capacity of the powerhouses, flow passes over the spillways, then passes over the natural falls, adding TDG at both points. Higher flows create higher levels of TDG, up to a point, though the relationship between flow and TDG is non-linear. At the highest levels of discharge, TDG at sites downstream of the Project increases with increasing discharge, but at a much slower rate.

During the highest discharge, the tailwater elevation downstream of the spillway and falls rises enough to backwater the falls, and there is a reduced plunging action into the deep pool below the falls. These high flows occur less than 1 percent of the time. During peak discharge time periods, when flow at the Project site exceeds 60,000 cfs, TDG exceeds 120 percent at the Historic High Bridge, which is downstream of the Main Channel Dam but upstream of the powerhouses. Figure 4-17 displays the TDG data from 2014, a high flow year with data collected up to nearly 100,000 cfs. This figure illustrates the pattern of TDG with discharge at the Project. In many years, flow does not exceed 60,000 cfs, or does so for only a short time.

TDG dissipates downstream of the Historic High Bridge. In addition, low TDG water from the powerhouses mixes with higher TDG water that has passed over the spillways and falls. Therefore, TDG is lower at the Birdland Bay Bridge than it is at the Historic High Bridge. Water entering Noxon Reservoir has an average peak TDG of approximately 110 to 117 percent, depending on discharge. However, there is considerable variability in TDG at higher discharge (Table 4-10).

**Figure 4-17: TDG measured at the Thompson Falls Project in 2014.**




While the levels of TDG with discharge varies from year to year, as shown in Table 4-10, there does not appear to be a pattern of changing TDG over time. At the Birdland Bay Bridge, mean TDG rarely exceeds 115 to 116 percent saturation, except at the very highest levels of discharge.

**Table 4-10: Mean TDG (%) recorded over a range of discharge at the Birdland Bay Bridge on the Clark Fork River, Montana, 2003-2019. N/A = data not available at that flow range.**

| Total Flow (thousand cfs) | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2014 | 2017 | 2018 | 2019 | Mean 2003-2019 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **>23, <30** | 102.1 | 103.5 | 103.6 | 103.6 | 102.5 | 102.2 | 102.6 | 102.0 | 102.9 | 102.3 | 102.7 | 103.0 | 104.0 | 102.5 | **102.8** |
| **>30, <40** | 104.7 | 105.0 | 107.1 | 106.7 | 105.2 | 105.6 | 105.2 | 106.6 | 105.8 | 104.4 | 104.7 | 105.2 | 106.8 | 104.6 | **105.6** |
| **>40, <50** | 109.5 | 107.5 | 110.4 | 110.6 | 109.0 | 110.6 | 109.2 | 110.9 | 108.1 | 108.8 | 108.6 | 108.7 | 110.1 | 110.5 | **109.4** |
| **>50, <60** | 111.0 | N/A | 112.7 | 114.3 | N/A | 114.9 | 113.0 | 111.6 | 111.0 | 111.2 | 111.5 | 113.9 | 113.3 | 112.9 | **112.6** |
| **>60, <70** | 112.9 | N/A | 114.1 | 115.7 | N/A | 116.0 | 113.1 | N/A | 113.5 | 113.0 | 114.8 | 115.2 | 112.5 | 113.2 | **114.1** |
| **>70, <80** | 113.2 | N/A | 114.0 | 115.7 | N/A | 115.9 | N/A | N/A | 116.0 | 112.7 | 115.4 | 115.6 | 115.0 | N/A | **114.8** |
| **>80, <90** | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 116.8 | 112.5 | 116.2 | 116.6 | 115.7 | N/A | **115.6** |
| **>90, <100** | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 119.7 | N/A | N/A | N/A | N/A | N/A | **119.7** |
| **>100, <110** | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 120.6 | N/A | N/A | N/A | N/A | N/A | **120.6** |
| **>110, <120** | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 119.9 | N/A | N/A | N/A | N/A | N/A | **119.9** |

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### 4.10.3 ***TDG Effects on Fish***

Dissolved gas super-saturation can cause a variety of physiological symptoms (GBT), which can be harmful or fatal to fish and other aquatic organisms. The risk to aquatic life from elevated levels of TDG increases with dosage and exposure (Weitkamp and Katz, 1980). In addition, the level of TDG that salmonids can tolerate varies depending on species, body size, general physical condition, swimming depth and water temperature (Johnson et al., 2005). Weitkamp and Katz (1980) concluded that a dramatic change occurs in both the number of deaths and the time to death at approximately 120 to 125 percent TDG in shallow water (1 meter or less). At gas pressures below this general level, a low incidence of GBT will be found in juvenile salmonids, and deaths will occur at a low rate. Above 120 to 125 percent TDG, mortality due to GBT increases dramatically. More recent studies confirm these conclusions in natural waters. Weitkamp et al. (2003) evaluated the incidence of GBT below Cabinet Gorge Dam on the Clark Fork River and found that continuous supersaturation exceeding about 125 to 130 percent of saturation for prolonged periods produced GBT in at least some fish in the lower Clark Fork River. However, intermittent exposure to 120 to 130 percent TDG produced GBT signs in a very small number of Largescale Sucker and Yellow Bullhead. Backman and Evans (2002) examined 4,667 adult Chinook Salmon (*Oncorhynchus tshawytscha)*, 1,878 Sockeye Salmon (*O. nerka*), and 1,431 Steelhead (*O. mykiss*) at Bonneville Dam for incidences of GBT at Bonneville Dam on the Columbia River. They found GBT symptoms were uncommon (<0.5%) among all species when TDG remained below 125 percent. The severity of GBT increased as TDG increased, but most symptoms were minor. Severe symptoms were observed only when TDG exceeded 126 percent.

Fish depth plays a crucial role in the expression of GBT because hydrostatic pressure has a strong influence on the TDG exposure to individual fish. Each meter (3.3 feet) of depth exerts pressure that increases the solubility of dissolved gas to compensate for 10 percent of saturation. That is, a fish at 3.3 feet (1 meter) depth is exposed to 10 percent lower TDG than it would be exposed to if swimming at the surface. This may explain why so few fish are found with GBT when TDG is less than 120 percent saturation. Johnson et al. (2005) found that adult spring and summer Chinook Salmon spent a majority of the time at depths that would have provided adequate hydrostatic compensation for average conditions in the Columbia River. Weitkamp et al. (2003) also found salmonids in the Clark Fork River spent enough time at depth to reduce the incidence of GBT.

In 2008, 2009, 2011, 2012, and 2014 fish were captured via electrofishing conducted by boat during high flow downstream of the Thompson Falls Project and upstream of the Highway 200 Bridge. Fish were captured and visually inspected for signs of GBT before being released. The gills, lateral line, dorsal fin, and caudal fin were visually examined for blistering, bubbling, boils, or discoloration of the gills.

A total of 220 fish representing 16 species were collected between May and June 2008. Of the 220 fish, one lake whitefish sampled on June 3 displayed visual signs of GBT. The signs documented included visual markings on the caudal fin, pelvic fins, dorsal fin, and anal fin, as well as signs of hemorrhaging and discoloration of the gills (darker than normal) Table 4-11.

In 2009 a total of 276 fish representing 14 species were examined for visual signs of GBT. After visual examination of all 276 fish, there were no visual indications of any fish exhibiting GBT symptoms (Table 4-11).

In 2011, higher TDG resulted in a higher number of fish detected with external GBT symptoms. Of the 67 fish of six species (rainbow and brown trout, lake whitefish, largescale sucker, pumpkinseed, and northern pikeminnow) with symptoms, seven fish were noted to have bubbles and one rainbow trout was noted to have exophthalmia ('pop-eye'). All the other external symptoms noted were minor (Table 4-11).

In 2012, 3 of 295 fish (1 largescale sucker; 1 rainbow trout; 1 smallmouth bass) examined were identified as having 1 to 5 percent of the fins covered in bubbles (Table 4-11).

In 2014, a total of 340 fish were examined; none were noted to have symptoms of GBT during the May 28 sampling, though 23 fish were noted as having "possible" symptoms of GBT, with frayed caudal fins, but no noticeable bubbles. During the June 3 sampling, eight fish of five species (rainbow and brown trout, lake whitefish, mountain whitefish, and smallmouth bass) were noted as having symptoms of GBT (Table 4-8).

In the Thompson Falls Project tailrace, TDG exceeds 110 percent in most, but not all, years as measured at the Birdland Bay Bridge site. Mean TDG is more than 115 percent at the Birdland Bay Bridge only in the highest flow years (*refer to* Table 4-10). During the 14 years of data collection, the percentage of time when TDG exceeded 120 percent was very low, and only at the Historic High Bridge Site. TDG has never exceeded 120 percent at the Birdland Bay Bridge site. Although the Clark Fork River exceeds the water quality standard of 110 percent saturation at the Historic High Bridge and Birdland Bay Bridge sites during peak flow seasons in most years, no significant adverse impact to fish has been documented.

**Table 4-11: Gas bubble trauma in fish collected downstream of the Thompson Falls Project, 2008 through 2014.**

| Year | Peak Flow (cfs) | # of Fish | # of Species | # of Fish with GBT Symptoms (% of fish sampled) | Species with Symptoms |
|---|---|---|---|---|---|
| **2008** | 75,600 | 220 | 16 | 1 (0.4%) | L WF |
| **2009** | 57,700 | 276 | 14 | 0 | None |
| **2010** | 58,000 | No Sampling | - | - | - |
| **2011** | 104,000 | 949 | 15 | 67 (7%) | RB, L WF, LS SU, PUMP, N PMN, LL |

| Year | Peak Flow (cfs) | # of Fish | # of Species | # of Fish with GBT Symptoms (% of fish sampled) | Species with Symptoms |
|---|---|---|---|---|---|
| **2012** | 75,300 | 295 | 11 | 3 (1%) | LS SU, SMB, RB |
| **2013** | 63,700 | No Sampling | - | - | - |
| **2014** | 96,020 | 340 | 13 | 8 (2%)[11] | RB, LL, L WF, MWF, SMB |

**Key**

| | | | |
|---|---|---|---|
| LL | Brown Trout | N PMN | Northern Pikeminnow |
| LS SU | Largescale Sucker | PUMP | Pumpkinseed |
| L WF | Lake Whitefish | RB | Rainbow Trout |
| MWF | Mountain Whitefish | SMB | Smallmouth Bass |

## 4.11 Biological Monitoring

### 4.11.1 *Biological Monitoring Methods*

Aquatic macroinvertebrates and periphyton, the assemblage of aquatic organisms that attach to substrate, are strong bioindicators of stream health. Healthy streams support diverse macroinvertebrate communities of mayflies (Ephemeroptera), stoneflies (Plecoptera), caddisflies (Trichoptera), true flies (Diptera), beetles (Coleoptera), and many others. Macroinvertebrate and periphyton assemblages reflect cumulative impacts of all pollutants, such as toxic substances, organic pollution, or excessive sediment loading.

Between 1987 and 2001, McGuire Consulting completed annual macroinvertebrate surveys in the Clark Fork River at 28 stations along a 267-mile (430 km) reach from Silver Bow Creek (upper Clark Fork River) downstream to Thompson Falls Reservoir (McGuire, 2002). The Thompson Falls Reservoir was the furthest downstream station on the Clark Fork River and the only site near the Project.

As a part of the 1987-2001 biomonitoring study, McGuire developed numerical criteria for the assessment of biologically significant environmental degradation that continues to be used and referenced today (McGuire, 2002; Respec, 2014). McGuire (2002) refers to Karr and Dudley (1981) to define biointegrity as:

> …the capacity of supporting and maintaining a balanced, integrated, adaptive community having species composition diversity and functional organization comparable to that of natural habitat of the region” and Meyer (1997) that further defines biointegrity as “an ecosystem that is sustainable and resilient, maintaining its ecological structure and function over time while continuing to meet societal needs and expectations.

[11] An additional 23 fish (21 L WF, 1 MWF, 1 SMB) were noted as having a frayed caudal fin, but no bubbles.

Biointegrity in the Clark Fork River may be categorized as nonimpaired (90-100%), slightly impaired (70-90%), moderately impaired (50-70%), or severely impaired (<50%) (McGuire, 2002).

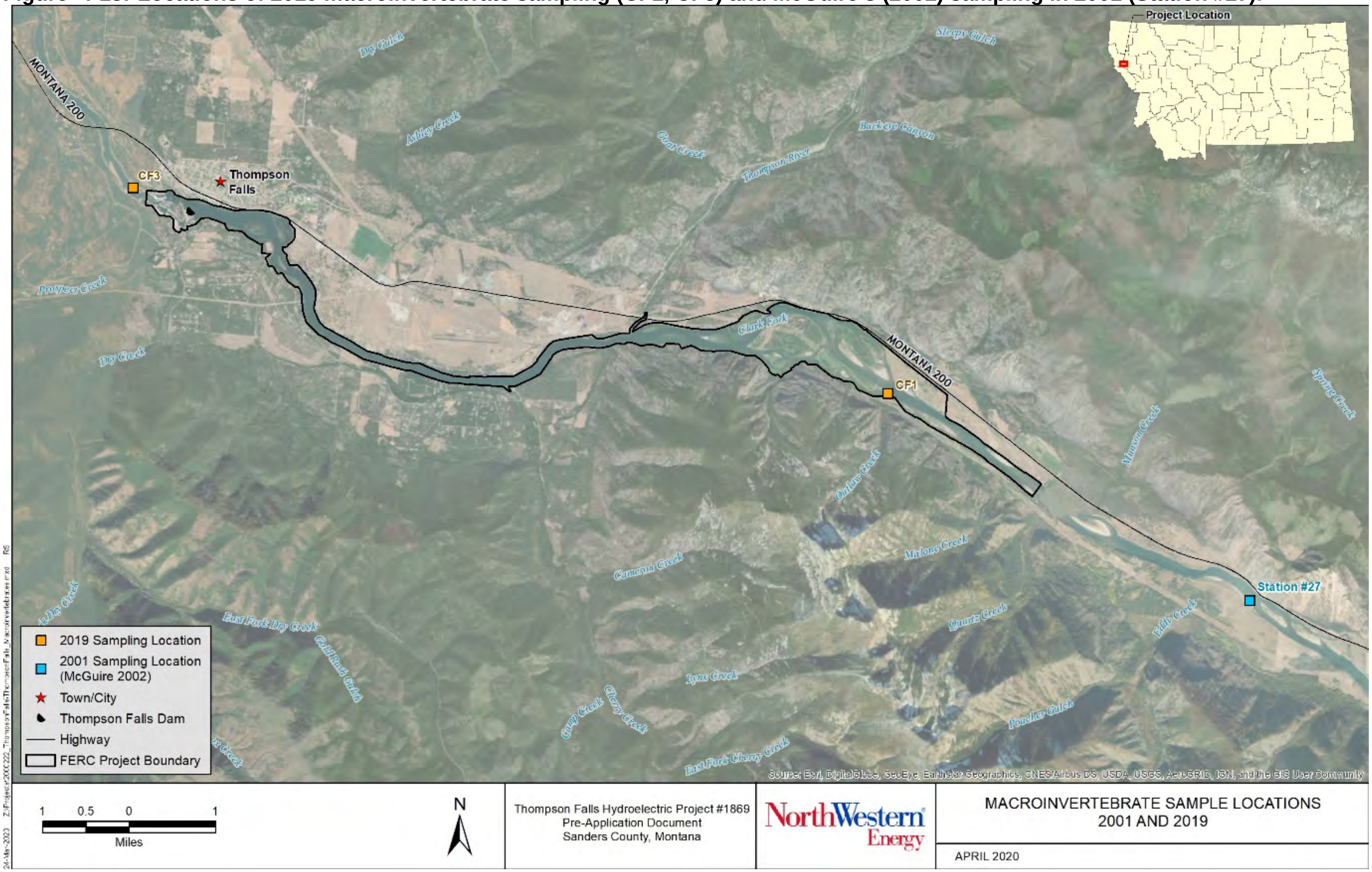
McGuire (2002) indicated that the sampling technique and analyses used for the upstream sites were only “marginally” applicable to the Thompson Falls Reservoir site (Station 27) due to the large river habitat, high discharge, and unique benthic community. However, McGuire did state the data could be used to monitor trends.

In 2019, macroinvertebrate and periphyton samples were collected at sites CF1 and CF3 to determine if there were any changes in the biological community upstream and downstream of the reservoir (Figure 4-18).

Macroinvertebrate samples were collected at sites CF1 and CF3 during the July 31, 2019 biological sampling event, and methods used were consistent with NorthWestern’s large river macroinvertebrate sampling methodologies. Sites CF1 and CF3 were chosen because the riffle habitat at these sites was the only appropriate habitat available in the Project area that meets the sampling criteria. The previous macroinvertebrate sampling efforts in this area were collected in 2001 as a part of a long-term trend monitoring effort by the Tri-State Water Quality Council and the Montana DEQ. Site #27 from this monitoring effort is located approximately five miles upstream of site CF1 and can be used as supporting data, although collection methods and location differ from site CF1, so this is not an exact comparison site (Figure 4-18).

In addition to the macroinvertebrate and periphyton samples collected upstream and downstream of the reservoir, zooplankton samples were also collected at three sites on the reservoir, TFR1, TFR2, and TFR3 to determine the existing species composition (*see* Figure 4-5). Vertical plankton tows were collected using an 80 µm mesh Wisconsin plankton net. Tow lengths were from the reservoir bed to the water surface.

**Figure 4-18: Locations of 2019 macroinvertebrate sampling (CF1, CF3) and McGuire's (2002) sampling in 2001 (Station #27).**



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### 4.11.2 *Biological Monitoring Results*

#### 4.11.2.1 Aquatic Macroinvertebrates

The long-term Montana DEQ monitoring (McGuire 2002) found that the biointegrity score averaged 61 percent during the 15 years of monitoring at the Thompson Falls Reservoir site (#27) with consistently higher scores since 1997. Between 1987 and 1995, the average biointegrity score was 59 percent (range 33-67%). between 1997 and 2001 the average biointegrity score was 80 percent (values of either 75 or 83%). No value was available for 1996.

The 2019 biological monitoring found that the Clark Fork River upstream (CF1) and downstream of Thompson Falls (CF3) support very similar macroinvertebrate benthic densities. Late-July density estimates at CF3 reported 5,560 (±563) benthic macroinvertebrates per square meter (1,390 per sample), while upstream (CF1) densities averaged 5,115 (±950) per $m^2$ (Table 4-12). The last two years of previously reported macroinvertebrate densities at DEQ site #27 (2000 and 2001) were 2,580 (±500) and 4,310 (±700) individuals per $m^2$, respectively. Therefore the 2019 data represent a substantial, but not significant (T-test, p=0.08) increase in benthic densities compared to 2001, likely due to increases in numbers of the midge family, Chironomidae.

This pattern is counterintuitive to what has been reported following years of higher than normal discharge (2018 and 2019) where macroinvertebrate densities are usually lower. Higher flows can reduce benthic macroinvertebrate densities by directly removing less velocity tolerant organisms (scuds, snails) or by removing silt in the gravels that favor midges and aquatic worms. This was not the case at either site where midges (Diptera family: Chironomidae) dominated the samples, much more so than in 2001 (Montana Biological Survey/Stag Benthics. 2019).

**Table 4-12: Mean macroinvertebrate values for 8 metrics used in the bioassessment scores for 2001 and 2019 samples.**

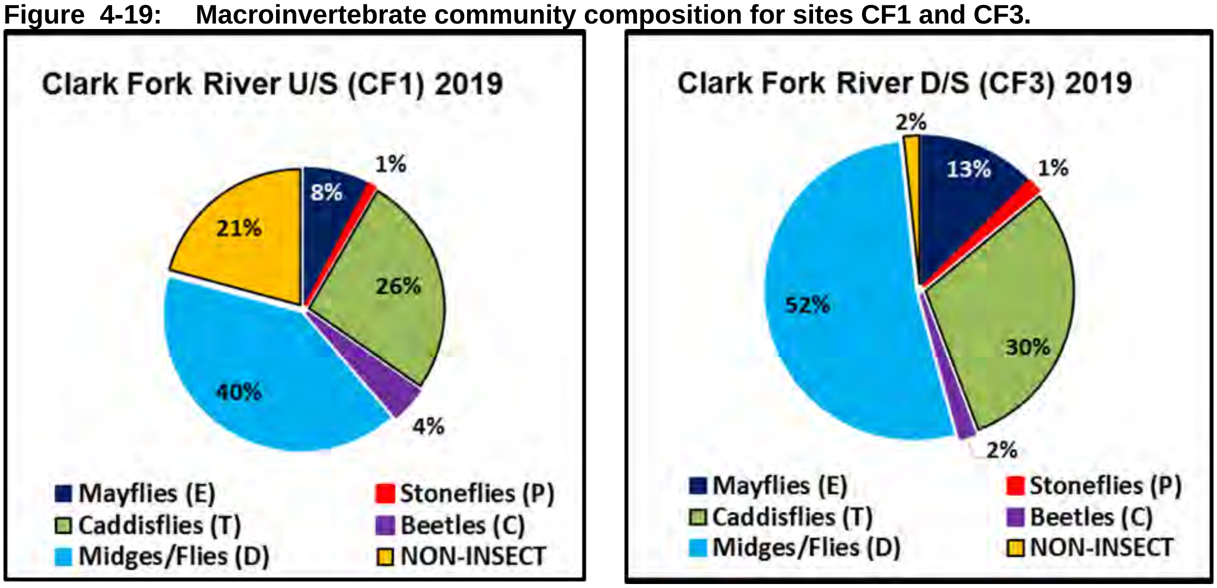
| Metric | DEQ Site # 27 (Upstream of CF1) 2001 | CF1 (Upstream of TF Reservoir) 2019 | CF3 (Downstream of TF Reservoir) 2019 |
|---|---|---|---|
| Taxa Richness | 34 | 37 | 38.4 |
| EPT Richness | 17 | 16.4 | 19.6 |
| Shannon Diversity (log2) | 4.1 | 3.6 | 3.4 |
| Biotic Index | 4.7 | 5.3 | 5.0 |
| % EPT | 69% | 36% | 44% |
| % Chironomidae | 9% | 40% | 48% |
| % Filterers | 53% | 49% | 67% |

| Metric | DEQ Site # 27 (Upstream of CF1) 2001 | CF1 (Upstream of TF Reservoir) 2019 | CF3 (Downstream of TF Reservoir) 2019 |
|---|---|---|---|
| EPT/EPTC | 89% | 47% | 48% |
| Mean Densities (per $m^2$) | 4,310 (± 702) | 5,115 (± 956) | 5,568 (± 563) |
| Metals Tolerance Index | 3.6 | 2.5 | 2.9 |

The variety and diversity of macroinvertebrates inhabiting the Clark Fork River upstream and downstream of Thompson Falls as measured by mean total taxa richness is similar and has slightly increased since last sampled in 2001, but diversity as measured by the Shannon's Diversity has decreased at both sites (Table 4-12). An average of 37 benthic macroinvertebrate taxa, including 16 EPT species were collected per sample upstream of Thompson Falls, while 38 total taxa and 20 EPT taxa were reported downstream in 2019**.**

Macroinvertebrate community composition was also fairly similar upstream and downstream of the Project except for a higher relative abundance of non-insect taxa reported at the CF1 site (Figure 4-19). The large non-insect taxa component at CF1 was largely comprised of Lymnaeidae and Physidae snails in the genera *Fossaria* and *Physella*, respectively. Dipterans accounted for 40 and 52 percent of the benthic community composition for CF1 and CF3 in 2019, respectively; this was largely composed of the midges, Chironomidae. Riffle beetles (Coleoptera: family Elmidae) made up a small, but not insignificant, component of the benthic community at each Clark Fork River site (Montana Biological Survey/Stag Benthics. 2019).

**Figure 4-19: Macroinvertebrate community composition for sites CF1 and CF3.**




Mayflies and caddisflies are important components of the Clark Fork River benthic community and to the bioassessment metrics, while Stoneflies represent a relatively small component (~1%) (Figure 4-19). Caddisflies were the most abundant of the EPT taxa in the Clark Fork

River samples collected in 2019, representing 26 percent and 30 percent of the upstream (CF1) and downstream (CF3) communities, respectively. Of the 11 species of caddisflies collected at these sites, populations of three net-spinning caddisflies (*Cheumatopsyche, Hydropsyche occidentalis* and *H. morosa gr.*) were most abundant below the dam at site CF3, while the net-spinner, *Cheumatopsyche* and the long-horned caddisflies, *Ceraclea* and *Oecetis* were most abundant upstream of the reservoir at site CF1 (Montana Biological Survey/Stag Benthics. 2019).

Mayflies were the third most abundant invertebrate group at the downstream site (CF3) in 2019, while upstream (CF1) they were the fourth most abundant order (Figure 4-19). Of the 13 species of mayflies reported at site CF3, the most common were Trico's (mayflies in the genera Tricorythodes), *Tricorythodes minutus,* Blue-winged Olives *Acentrella and Baetis tricaudatus* and *Macaffertium* in the family Heptageniidae. A few *Attenella margarita* have been collected at this site. Site CF1 reported 8 species of mayflies with the dominant being Trico's, two Heptageniidae species, *Macaffertium* and *Heptagenia* and *Attenella margarita* (Montana Biological Survey/Stag Benthics. 2019).

#### 4.11.2.2 Periphyton

In the periphyton assemblage, there were two predominant taxa found both upstream and downstream of the reservoir, *Achnanthidium minutissimum* and *Achnanthidium subatomus*. These two species comprised of 57.17 percent of the upstream sample and 55.97 percent of the downstream sample. There was little change between the upstream and downstream metric scores, which ranged from good to excellent (Table 4-13).

**Table 4-13: 2019 Clark Fork periphyton metric scores upstream and downstream of Thompson Falls Reservoir.**

| Site Name | Site Description | Date of Sample | Metric | Value | Rating[12] |
|---|---|---|---|---|---|
| **CF1** | Clark Fork River upstream of Thompson Falls Reservoir | 7/31/19 | Shannon H | 3.394 | Excellent |
| | | | Species Richness | 44 | Excellent |
| | | | Dominant Taxon Percent | 40.82% | Good |
| | | | Siltation Taxa Percent (Sediment) | 11.24% | Excellent |
| | | | Pollution Index (Nutrients) | 2.792 | Excellent |

[12] Montana Mountains Metric

| Site Name | Site Description | Date of Sample | Metric | Value | Rating[12] |
|---|---|---|---|---|---|
| | | | Disturbance Taxa Percent (Metals) | 40.82% | Good |
| | | | Abnormal Cells Percent (Metals) | 0.00% | Excellent |
| | | | Bioindex (Montana DEQ Mountains) | N/A | Good |
| **CF3** | Clark Fork River downstream of Thompson Falls Powerhouse | 7/31/19 | Shannon H | 3.670 | Excellent |
| | | | Species Richness | 52 | Excellent |
| | | | Dominant Taxon Percent | 30.22% | Good |
| | | | Siltation Taxa Percent (Sediment) | 9.83% | Excellent |
| | | | Pollution Index (Nutrients) | 2.729 | Excellent |
| | | | Disturbance Taxa Percent (Metals) | 30.22% | Good |
| | | | Abnormal Cells Percent (Metals) | 0.00% | Excellent |
| | | | Bioindex (Montana DEQ Mountains) | N/A | Good |

#### 4.11.2.3 Zooplankton Results

Zooplankton were collected at three sites in Thompson Falls Reservoir in July 2019 using a vertical plankton tow. Results of the zooplankton tows are displayed in Table 4-14. Zooplankton concentrations in the reservoir were quite low, which is not surprising given the short residence time of water in the reservoir. Reservoir residence times of greater than 18 days are generally required to support a sustainable zooplankton population (Brook and Woodward, 1956). This time is needed for the zooplankton to successfully reproduce before being flushed downstream. Typical residence times of water in Thompson Falls Reservoir range from less than 4 hours in June to approximately 17 hours in September (r*efer to* Figure 4-4).

**Table 4-14: Zooplankton data collected from Thompson Falls Reservoir in 2019.**

| Taxon | | Site TFR1 (Upstream end of TF Reservoir) 2019 | | Site TFR2 (Mid TF Reservoir) 2019 | | Site TFR3 (Downstream end of TF Reservoir) 2019 | |
|---|---|---|---|---|---|---|---|
| | | Count | Cells / ml | Count | Cells / ml | Count | Cells / ml |
| Cladocera | Chydoridae | 0 | 0 | 0 | 0 | 1 | 0.00000161 |
| Copepoda | Cyclopoida | 1 | 0.00000189 | 4 | 0.00000821 | 5 | 0.00000804 |
| Copepoda | Harpacticoida | 0 | 0 | 1 | 0.00000205 | 0 | 0 |
| Rotifera | Conochilus | 0 | 0 | 2 | 0.00000411 | 0 | 0 |
| Rotifera | Euchlanis | 3 | 0.00000568 | 9 | 0.00001848 | 6 | 0.00000965 |
| Rotifera | *Filinia longiseta* | 2 | 0.00000378 | 0 | 0 | 0 | 0 |
| Rotifera | *Filinia terminalis* | 0 | 0 | 4 | 0.00000821 | 7 | 0.00001126 |
| Rotifera | *Gastropus hyptopus* | 1 | 0.00000189 | 0 | 0 | 1 | 0.00000161 |
| Rotifera | *Kellicottia longispina* | 9 | 0.00001703 | 3 | 0.00000616 | 4 | 0.00000643 |
| Rotifera | *Keratella cochlearis* | 5 | 0.00000946 | 1 | 0.00000205 | 4 | 0.00000643 |
| Rotifera | *Keratella testudo* | 9 | 0.00001703 | 0 | 0 | 7 | 0.00001126 |
| Rotifera | Lecane | 0 | 0 | 0 | 0 | 2 | 0.00000322 |
| Rotifera | Monostyla lunaris | 0 | 0 | 0 | 0 | 1 | 0.00000161 |
| Rotifera | Pompholyx | 0 | 0 | 2 | 0.00000411 | 3 | 0.00000483 |
| Rotifera | Rotifera | 4 | 0.00000757 | 6 | 0.00001232 | 8 | 0.00001287 |
| Rotifera | Synchaeta | 1 | 0.00000189 | 0 | 0 | 0 | 0 |
| Rotifera | *Trichotria tetractis* | 1 | 0.00000189 | 0 | 0 | 0 | 0 |

## 4.12 Potential Impacts Related to Operation or Maintenance

As required by 18 CFR § 5.6(3)(i)(C), NorthWestern has identified the following known or potential adverse impacts of the Project as related to water resources.

### 4.12.1 *Current operations*

The Project is operated to provide baseload and flexible generation within the reservoir elevation and minimum flow requirements of the License. During flexible generation operations, the Licensee may use the top 4 feet of the reservoir from full pond while maintaining minimum flows. For several reasons, the full 4 feet typically have not been used over the past 20 years of operation.

Operation of the Project results in TDG levels in excess of 110 percent during periods of high flow. However, no significant adverse impacts to fish have been found as a result of the TDG levels at the Project.

In 2019, NorthWestern conducted test to determine what effect radial gate configurations had on TDG during high flow conditions in the spring. Testing was conducted when river discharge was between 45,000 and 61,000 cfs. Preliminary testing showed that using the newly installed radial gates (2018) to spill during this period produced TDG concentrations that were approximately 2 percent higher than when the two older radial gates were used to spill. These results will vary at different levels of river stage below the main dam, and therefore more testing of scenarios is needed.

Generally, aqueous metal concentrations within the Project area are meeting water quality standards at all sites. Two samples from downstream of the Project contained lead levels exceeding the water quality standard for chronic aquatic life. The source of the lead is unlikely to be related to Project operation.

### 4.12.2 *Future Proposed Operations*

NorthWestern proposes that the Thompson Falls Project continue to provide baseflow generation and meet flexible capacity needs. Under normal operations, NorthWestern will maintain the reservoir between El. 2396.5 and 2394 feet (2.5 feet below normal full operating level) and maintain a minimum flow downstream of the lesser of 6,000 cfs or inflow.

NorthWestern will continue to monitor TDG during high flow periods to assess the potential impact of the new radial gates on TDG in the tailrace.

Potential impacts from variations in the reservoir level (maximum of 4-foot) to water resources were evaluated in October 2019 and are described in Section 14. No water quality impacts were noted, other than a slight increase in turbidity.

## 4.13 Resource Protection and Mitigation Measures

This section describes protection, mitigation, and enhancement measures that have been undertaken at the Project or that are currently ongoing.

The Licensee has frequently monitored TDG in the Clark Fork River during the 2003 to 2019 time period. NorthWestern has also conducted fisheries monitoring to assess the frequency of occurrence of GBT. In 2010, NorthWestern developed a Total Dissolved Gas Control Plan to minimize TDG in the tailrace, while maintaining operational safety and maximizing attraction flow for fish passage.

# 5. Fisheries and Aquatic Resources

## 5.1 Resource Area

This fisheries and aquatic resource review includes a large portion of the Lower Clark Fork River drainage (*refer to* Figure 2-2), as well as parts of the Middle Clark Fork River and Lower Flathead River drainages with emphasis on aquatic resources within the FERC Project boundary. Two tributaries are also highlighted in this section; Prospect Creek flows into the Clark Fork River immediately downstream of the Main Channel Dam; and the Thompson River flows into Thompson Falls Reservoir approximately 6 miles upstream of the dam. The confluences of these two tributaries to the Clark Fork River are within the FERC Project boundary. Additionally, both tributaries include designated critical Bull Trout habitat. Collectively the area in review in this section is referred to as the study area. Note that special status species, the Bull Trout (federally threatened) and the Westslope Cutthroat Trout (Montana Species of Concern), are discussed in more detail in Section 8.

Given the extensive reporting that has been completed on fisheries in the study area, this section gives a brief overview of existing fish and aquatic communities. The reader is directed to the Phase 2 Comprehensive Fisheries Report (NorthWestern, 2019a) and the Thompson Falls Fish Passage Program Annual Reports from 2011 to 2018 (PPL Montana 2010; 2011; 2012; 2013; 2014 and NorthWestern, 2015; 2016; 2017; 2018; 2019) for more detailed information. These reports are available for download at the Project website: http://www.northwesternenergy.com/environment/thompson-falls-project.

## 5.2 Essential Fish Habitat

The Magnuson-Stevens Fishery Conservation and Management Act is the primary law that governs marine fisheries in U.S. federal waters. The Magnuson-Stevens Act requires federal agencies to consult with the National Marine Fisheries Service on all actions that may adversely affect essential fish habitat (EFH). Freshwater EFH for salmon in the Pacific Northwest includes all water bodies currently or historically accessible to salmon, except areas upstream of certain impassable natural barriers in Washington, Oregon, Idaho, and California (PFMC, 2014). The Project is upstream of the historic range of anadromous fish and therefore there is no proposed or designated EFH in the Thompson Falls Project vicinity or in Montana, thus no EFH consultation is required.

## 5.3 Fish and Aquatic Communities

Fish residing upstream of Thompson Falls Dam or fish that ascend the Thompson Falls upstream fish passage facility and are released upstream of the Main Channel Dam have approximately 597 miles of unimpeded mainstem river habitat available. The 597 miles of river include 274 miles of free-flowing Clark Fork River, 73 miles of the lower Flathead River, 39 miles of St. Regis River, 84 miles of the Bitterroot River, and 127 miles of the Blackfoot River (*refer to* Figure 2-1). There are no constructed barriers on the mainstem Clark Fork River upstream of Thompson Falls Dam (since the removal Milltown Dam near Missoula, Montana in 2008). The lower Flathead River is impounded by the SKQ Project at the outlet of Flathead Lake (*refer to* Figure 2-2).

The Project is located within the Lower Clark Fork River drainage, which starts with the confluence of the Flathead River and terminates downstream at the inlet to Lake Pend Oreille in Idaho. The drainage provides warm, cool, and cold-water sport fisheries for a mix of native and nonnative species as well as important habitat for native species (FWP, 2013; 2019). Some nonnative fish species were introduced into the drainage by the state of Montana for fisheries management purposes, and others were illegal introductions (e.g., Northern Pike, Walleye).

Located further upstream of the Project, the Middle Clark Fork River drainage extends from the confluence of the Clark Fork with the Blackfoot rivers at Milltown and extends downstream 120 miles to the mouth of the lower Flathead River (FWP, 2019). The drainage currently has low numbers of Bull Trout and moderate numbers of Westslope Cutthroat Trout present, but is dominated by nonnative Rainbow Trout, Rainbow x Westslope Cutthroat Trout hybrids, and Brown Trout (FWP, 2019). Rainbow hybrids represent about 70 to 80 percent of the trout population within the Middle Clark Fork River drainage. Brown Trout densities decline in the lower reaches of the drainage. Mountain Whitefish are common through the drainage.

Native species present in the study area include salmonids (Westslope Cutthroat Trout, Bull Trout, and Mountain Whitefish) and non-salmonids (Longnose and Largescale sucker, Northern Pikeminnow, Peamouth, Longnose Dace, Redside Shiner, and sculpin). FWP's native species management focuses on native salmonids with emphasis on the federally threatened Bull Trout (FWP, 2013; 2019). Restoration, maintenance, and protection of native species and their habitats is one of FWP's high priorities under their fisheries management program (FWP, 2019). Some of the more common nonnative species present in the study area include several game fish such as Largemouth Bass, Smallmouth Bass, Northern Pike, Yellow Perch, Rainbow Trout, and Brown Trout (FWP, 2013; 2019). Walleye (nonnative), another popular sportfish for anglers, are established downstream of the Project (Noxon Reservoir). However, west of the continental divide, Walleye are not considered or managed as a game fish by FWP (2019).

Fish species known to be present downstream and upstream of the Project are summarized in Table 5-1. The locations of fish surveys referenced in Table 5-1, are shown in Figures 5-1 and 5-2. Figures 5-1 and 5-2 show the sampling locations where NorthWestern conducts routine fisheries surveys upstream and downstream of the Project. These routine surveys include fall gillnetting in Thompson Falls Reservoir, spring electrofishing the Thompson Falls Reservoir (upper and lower sections) and fall electrofishing in two reaches of the Clark Fork River (the reach referred to as the Above Islands Complex and between the towns of Paradise and Plains).

The routine electrofishing and gillnetting fisheries surveys were set up with the intention of monitoring the impact of salmonids passed (after ascending the upstream fish passage facility) upstream of Thompson Falls Dam. The objective for these sampling efforts is to collect information on species composition and relative abundance within and upstream of the Thompson Reservoir. This information helps track annual and long-term changes to the fish community, which is especially important with operation of the upstream fish passage facility.

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**Table 5-1: Summary of fish recorded downstream of Thompson Falls Dam, at the work station at the upstream fish passage facility, and at 3 locations upstream of Thompson Falls Dam. Source: J. Blakney, FWP, personal communication, March 21, 2018; PPL Montana 2010-2014; NorthWestern, 2015-2018. P = present; - = not observed; *= not passed upstream of the upstream fish passage facility.**

| | | | Downstream of Thompson Falls Dam | Work Station | Upstream of Thompson Falls Dam | | |
|---|---|---|---|---|---|---|---|
| **Fish** | **Common Name** | **Scientific Name** | **Noxon Reservoir** | | **Thompson Falls Reservoir** | **Clark Fork River-Above Islands** | **Clark Fork River Paradise-to-Plains** |
| **NATIVE SPECIES** | | | | | | | |
| **BULL** | Bull Trout | *Salvelinus confluentus* | P | P | P | P | P |
| **LN DC** | Longnose Dace | *Rhinichthys cataractae* | P | - | - | P | - |
| **LN SU** | Longnose Sucker | *Catostomus castostomus* | P | P | P | P | P |
| **LS SU** | Largescale Sucker | *Catostomus macrocheilus* | P | P | P | P | P |
| **MWF** | Mountain Whitefish | *Prosopium williamsoni* | P | P | P | P | P |
| **N PMN** | Northern Pikeminnow | *Ptychocheilus oregonensis* | P | P | P | P | P |
| **PEA** | Peamouth | *Mylocheilus caurinus* | P | P | P | P | P |
| **NPMN x PEA** | Northern Pikeminnow x Peamouth | *Ptychocheilus oregonensis x Mylocheilus caurinus* | P | P | - | - | - |
| **RS SH** | Redside Shiner | *Richardsonius balteatus* | P | - | P | P | P |
| **WCT** | Westslope Cutthroat Trout | *Oncorhynchus clarkii lewisi* | P | P | P | P | P |
| **COT** | Sculpin spp. | *Cottus spp.* | P | - | P | P | P |
| **NONNATIVE SPECIES** | | | | | | | |
| **BL BH** | Black Bullhead | *Ameiurus melas* | P | - | P | - | - |
| **BULL x EB** | Bull x Brook Trout Hybrid | *Salvelinus confluentus x S. fontinalis* | P | P* | - | - | - |
| **EB** | Brook Trout | *Salvelinus fontinalis* | P | P | - | - | - |
| **LL** | Brown Trout | *Salmo trutta* | P | P | P | P | P |
| **KOK** | Kokanee | *Oncorhynchus nerka* | P | - | - | - | - |
| **LMB** | Largemouth Bass | *Micropterus salmoides* | P | P | P | - | - |
| **LT** | Lake Trout | *Salvelinus namaycush* | P | P* | P | - | - |
| **L WF** | Lake Whitefish | *Coregonus clupeaformis* | P | - | - | - | - |
| **NP** | Northern Pike | *Esox lucius* | P | - | P | P | P |
| **PUMP** | Pumpkinseed | *Lepomis gibbosus* | P | - | P | P | P |
| **RB** | Rainbow Trout | *Oncorhynchus mykiss* | P | P | P | P | P |
| **RBxWCT** | Rainbow x Westslope Cutthroat Trout hybrid | *Oncorhynchus clarkii lewisi x O. mykiss* | P | P | P | P | P |
| **SMB** | Smallmouth Bass | *Micropterus dolomieu* | P | P | P | P | P |
| **WE** | Walleye | *Sander vitreus* | P | P* | - | - | - |
| **YP** | Yellow Perch | *Perca flavescens* | P | - | P | P | P |
| **YL BL** | Yellow Bullhead | *Ameiurus natalis* | P | - | P | - | - |

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**Figure 5-1: Electrofishing and gillnetting sampling locations downstream and upstream of the Thompson Falls Hydroelectric Project.**

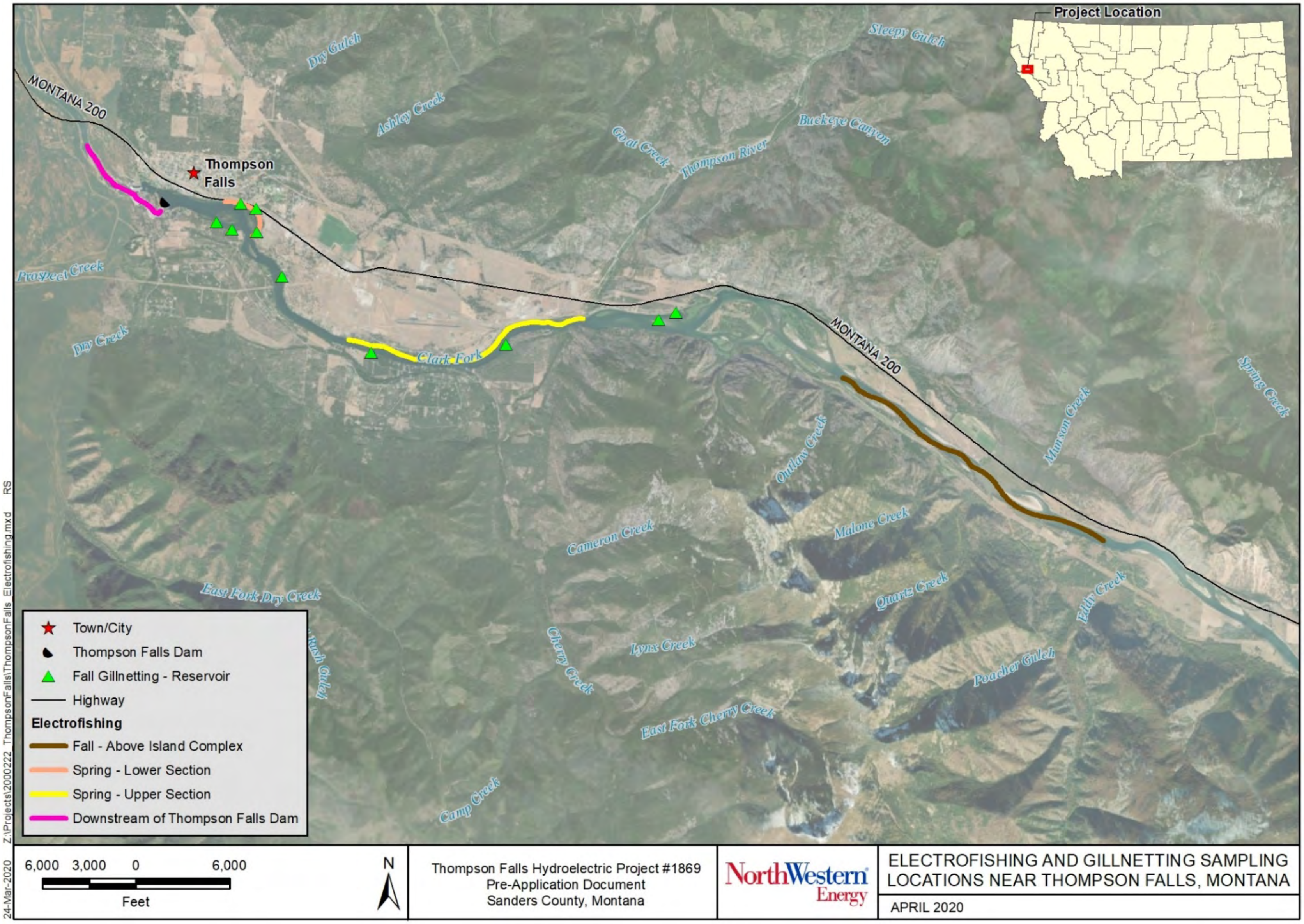
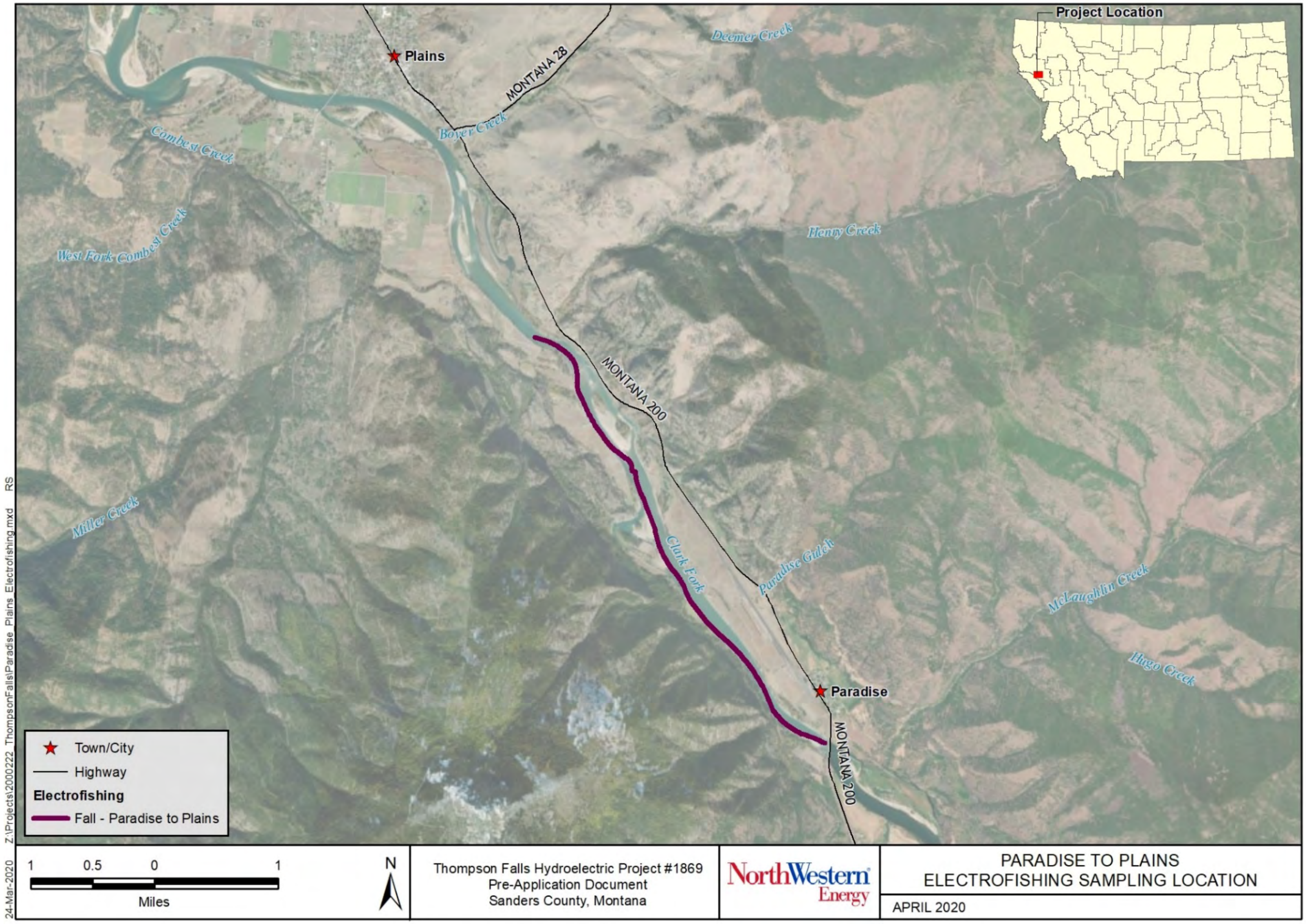


**Figure 5-2: Paradise-to-Plains electrofishing sampling location upstream of the Thompson Falls Hydroelectric Project.**



## 5.4 Prospect Creek Fisheries

Prospect Creek flows into the Clark Fork River about 800 meters (0.5 mile) downstream of the Main Dam and directly across the Dry Channel Dam (Photograph 5-1). Prospect Creek drains about 471 km2 (182 mi2) along the eastern slopes of the Bitterroot Mountains (DEQ, 2009). Mean annual streamflow in Prospect Creek over the last 20 years (2000-2019) was 209 cfs with and average peak flow 2,111 cfs occurring in May and early June (USGS Gage #12390700). Majority (94%) of the drainage is on Lolo National Forest lands (GEI, 2005). Details of the drainage, habitat features, fisheries communities, limiting factors, and restoration efforts/opportunities have been documented in several reports (GEI, 2005; DEQ, 2009; Moran and Storaasli, 2013; Nyquist, 2018; Bowman and Olson, 2019).


**Photograph 5-1. Aerial of Thompson Falls Hydroelectric Project and Prospect Creek, June 2017.**

Prospect Creek provides important spawning and rearing habitat for native salmonids and sculpin. The fisheries community includes native species such as resident and migratory Bull Trout and Westslope Cutthroat Trout, as well as Mountain Whitefish and Cedar Sculpin (*Cottus schitsuumsch*). Nonnative species present include Rainbow Trout, Rainbow x Westslope Cutthroat trout hybrid, Brown Trout, and Brook Trout. Abundance and distribution of these fish from data collected in 2003 and 2012 by Avista are available in Moran and Storaasli (2013).

NorthWestern partnered with Avista in 2018 to install a remote passive integrated transponder (PIT)-tag array system in Prospect Creek (near the confluence with the Clark Fork River) with the capability of detecting directionality of upstream and downstream fish movement. The remote-tag array system was operational on August 28, 2018.

NorthWestern monitors the tag array system for detections of fish that have been tagged in the Project area, including at the upstream fish passage facility (fish known as 'ladder fish'). From August 2018 through 2019, a total of 9 ladder fish (4 RB, 4 LL, 1 WCT) were detected in Prospect Creek (NorthWestern 2019, 2020). Additionally, one juvenile Bull Trout tagged in the Thompson River (a tributary upstream of the dam) in 2015, as well as one adult Bull Trout with a transport history from below Cabinet Gorge Dam to the Thompson River drainage in 2015 were both detected in Prospect Creek in September 2018. Twenty-seven other fish (24 WCT, 3 BULL) were also detected in Prospect Creek, however these fish were all initially captured and tagged in Prospect Creek, with the exception of one Bull Trout initially captured and tagged a different tributary, Graves Creek located about 8 miles downstream (NorthWestern, 2019; 2019a; 2020).

## 5.5 Fish Populations in Thompson Falls Reservoir

The Licensee has evaluated fish populations in Thompson Falls Reservoir through annual fall gillnetting in Thompson Falls Reservoir since 2004 and spring electrofishing the Thompson Falls Reservoir (upper and lower sections) since 2009. In addition, in 2009, the Licensee and FWP joined in a collaborative effort to investigate Northern Pike populations in the Thompson Falls Reservoir up to and including the island complex (PPL Montana 2010b).

The total number of fish captured annually via gillnetting has varied between 33 and 231 fish (annual median = 54 fish) representing 14 species (Table 5-2). The most common fish species annually captured in gillnets within the Thompson Falls Reservoir are Black Bullhead, Northern Pike, Largescale Sucker, Northern Pikeminnow, and Yellow Perch (in bold in Table 5-2). With the exception of Black Bullhead, the other four most common species (NP, LSSU, NPMN, YP) recorded during annual gillnetting are considered to be in low abundance (Terrazas and Kreiner, 2017). Salmonids occur in relatively low abundance in Thompson Falls Reservoir. Rainbow Trout have been found more commonly than Brown or Westslope Cutthroat trout, but Rainbow Trout were still very uncommon, averaging 0.1 fish per net (or an average of one fish per year).

**Table 5-2: Annual catch per net, by species (*refer to* Table 5-1 for common names), during annual October gillnetting series on Thompson Falls Reservoir between 2004 and 2019.**

| 2004-2019 | | | |
|---|---|---|---|
| **Species** | **Min Fish Per Net** | **Max Fish Per Net** | **Average Fish Per Net** |
| **BL BH** | 0 | 14.1 | 3.4 |
| LL | 0 | 0.2 | - |
| LMB | 0 | 0.3 | 0.1 |
| LN SU | 0 | 0.5 | 0.1 |
| **LS SU** | 0.2 | 1.3 | 0.8 |
| **NP** | 1.0 | 4.9 | 2.5 |
| **N PMN** | 0 | 1.0 | 0.4 |
| PEA | 0 | 0.1 | - |
| PUMP | 0 | 1.8 | 0.3 |
| RB | 0 | 0.4 | 0.1 |
| SMB | 0 | 0.5 | 0.2 |
| WCT | 0 | 0.2 | - |
| **YP** | 0.1 | 1.8 | 0.7 |
| YL BL | 0 | 0.1 | - |
| **Total** | 3.3 | 23.1 | **8.6** |

Thompson Falls Reservoir was electrofished annually each spring, 2009 to 2016 and again in 2018. The reservoir is separated into two reaches, the lower and upper sections (Figure 5-1). The upstream section has riverine characteristics, with noticeable flowing water, average widths around 459 feet (140 meters) and little to no aquatic vegetation. The downstream section has substantially lower water velocity, mean widths near 1,673 feet (510 meters), abundant aquatic vegetation, and is off the main river channel (NorthWestern, 2019).

Fish species composition varied from the lower section to the upper section (Figures 5-3 and 5-4). The total number of fish captured annually varied from 34 to 207 fish (1–17 salmonids) in the lower section and 63 to 253 fish (10–115 salmonids) in the upper section.

The catch per unit effort (CPUE) of salmonids remains greatest in the upper section, averaging 29 salmonids per hour (2009-2018). The lower section averages five salmonids per hour (2009-2018). Non-salmonids such as Largemouth Bass, Northern Pike, Pumpkinseed, and Yellow Perch are on average the most common species captured in the lower section; whereas, species such as Largescale Suckers, Northern Pikeminnow, and Rainbow Trout are on average the most common species captured in the upper section. In 2018, Black Bullhead was also among the most abundant species in the lower section. Brown and Rainbow Trout were among the most abundant species in the upper section. The differences in species composition and abundance of salmonids is likely related to habitat conditions in each survey section.

**Figure 5-3: Summary of the 2009-2016, 2018 annual catch rate and average catch rate for salmonids and all fish species captured during spring electrofishing efforts in the lower section of the Thompson Falls Reservoir.**

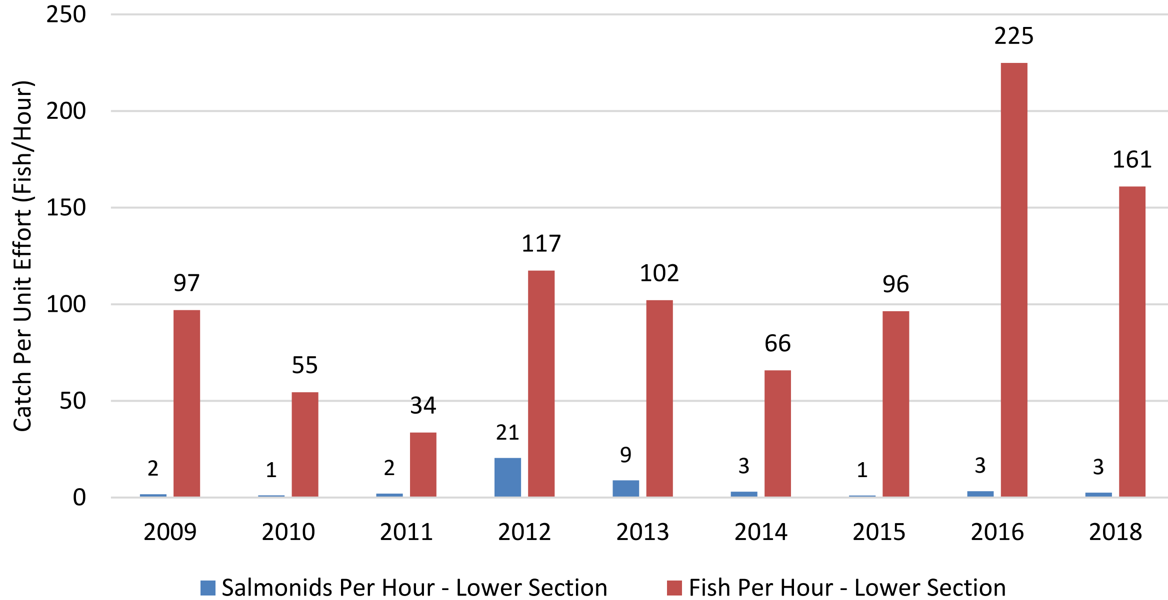
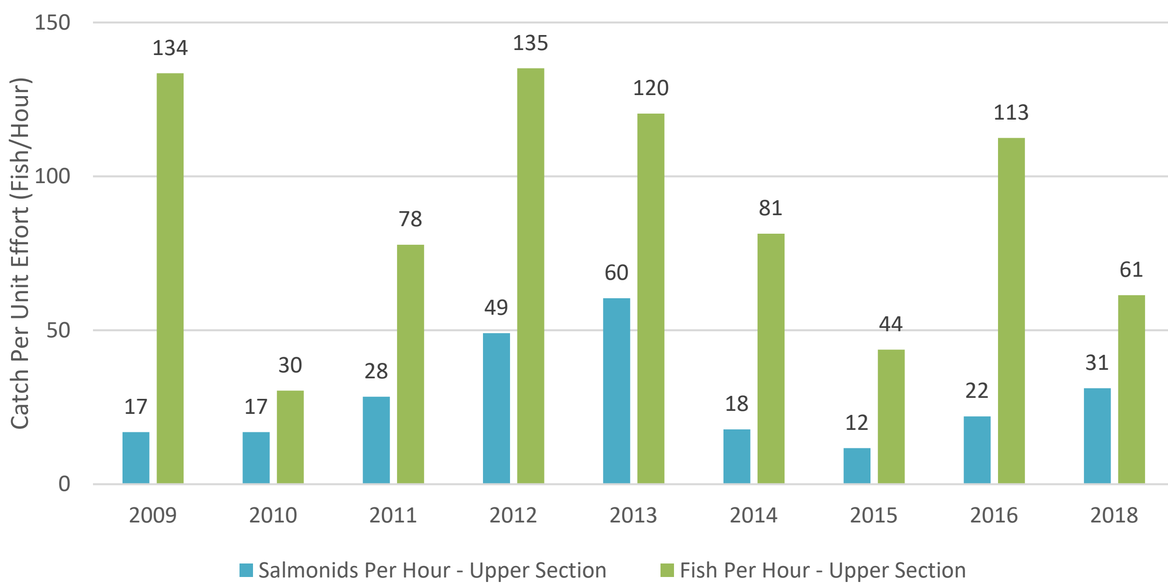



**Figure 5-4: Summary of the 2009-2016, 2018 annual catch rate for salmonids and all fish species captured during spring electrofishing efforts in the upper section of the Thompson Falls Reservoir.**




Since the upstream fish passage facility began operating in 2011, four ladder fish (3 RB, 1 WCT) were recorded in the lower electrofishing section and seven ladder fish (4 LL; 3 RB) were detected in the upper electrofishing section. Three of the four fish collected in the lower electrofishing section were subsequently detected in the Thompson River (NorthWestern, 2019).

## 5.6 Thompson Falls Dam Upstream Fish Passage

### 5.6.1 ***Fish Passage Development***

Section 1.5 of the Comprehensive Phase 2 Fish Passage Report includes a detailed description of the process used to develop upstream adult fish passage at the Project. In summary, the process included the preparation of a Thompson Falls Dam Fish Passage Study Plan (Pre-Design Phase Plan) and subsequent studies to implement the Pre-Design Phase Plan, developed cooperatively with the TAC. Radio-telemetry studies were implemented between 2004 and 2006 to evaluate the optimal location for an entrance to a fish passage facility at the Project. The fisheries telemetry work concluded that fish were moving upstream to the uppermost terminus of the Project, the Main Dam spillway during the ascending the limb of the hydrograph and would leave the area and move downstream at peak flows. Fish were not sedentary and were constantly on the move. Initial monitoring efforts showed more fish moving to the left abutment than the right abutment. However, it was found that spill could be configured to attract fish to the right abutment (GEI, 2007). Based on the results of the fish behavior and movement studies (GEI, 2007), it was determined that the optimal location of the upstream fish ladder was the uppermost terminus of the Project, the Main Dam spillway.

Next, the Licensee conducted a feasibility study and evaluated alternatives. The feasibility study evaluated three alternatives: 1) full-height ladder along the right abutment at the Main Dam, 2) full-height ladder along the left abutment at the Main Dam, and 3) a fish lock trap and haul facility. The draft feasibility study was reviewed and discussed by the TAC and the preferred alternative, which was the consensus agreement of the TAC, was documented in the final feasibility study (GEI, 2007b).

The right bank was selected as the location because the fish passage facility could be constructed downstream of the non-overflow section of the spillway, providing protection of the fish passage facility site. In addition, the right bank, full height fish ladder alternative had limited upstream tunneling construction needs, space available for fish sampling facilities, limited imported fill placement/removal, a small amount of rock excavation, and relatively low operations and maintenance requirements (GEI, 2007b). Design details of the Thompson Falls upstream fish passage facility is provided in Section 2.5.

### 5.6.2 ***Summary of Fish Passage 2011-2019***

This section provides a summary of the results of monitoring at the fish passage facility. From 2011 through 2019, there were 33,035 fish recorded as successfully ascending the upstream fish passage facility, representing 14 species and three hybrids (Table 5-3). Fish that swim to the upstream end of the upstream fish passage facility are collected and interrogated at the work station (*see* Figure 2-3). The majority (32,515 fish) were subsequently released upstream of the Main Channel Dam, except for Walleye, Lake Trout, Brook Trout (starting in 2016), Brook x Bull Trout hybrid, fish mortalities at the work station, and Smallmouth Bass starting in 2019.

Total length and weight measurements were documented for approximately 97 percent of 3,642 salmonids and 32 percent of the 29,393 non-salmonids recorded at the upstream fish passage facility work station. The length of salmonids recorded range from a 98 mm Rainbow Trout to a 785 mm Lake Trout. The size of non-salmonids ranged from a 69 mm Smallmouth Bass to a 610 mm Northern Pikeminnow. A summary of the mean length and weight by species is provided in each annual report.

**Table 5-3. Summary of fish recorded at the upstream fish passage facility, 2011-2019. LT, WE are not released upstream of Thompson Falls Dam, 2011-2019. EB, BULLxEB not released upstream starting in 2016. SMB not released upstream starting in 2019.**

| Recorded at the work station | Relative Abundance in Clark Fork River Upstream of Dam | Spawning Information | | Total Range Lengths (mm) | Min – Max Fish Count Per Year | Total Collected at upstream fish passage facility |
|---|---|---|---|---|---|---|
| **Species** | **Unknown, Rare, Common, Abundant (FWP, 2019)** | **Season** | **Habitat (Tributary/ River/Lake)** | **2011-2019** | **2011-2019** | **2011-2019** |
| **BULL** | Rare | Fall | Tributary | 365-620 | 0-5 | 17 |
| **BULL x EB*** | Unknown | Fall | Tributary | 248 | 1 | 1 |
| **LN SU** | Unknown | Spring or Summer | Lake/River | 262-477 | 0-26 | 45 |
| **LS SU** | Common | Spring or Summer | Lake/River | 128-568 | 6-6,327 | 17,319 |
| **MWF** | Common | Fall | Tributary | 225-441 | 0-254 | 367 |
| **N PMN** | Common | Spring or Summer | Lake/River | 82-610 | 10-3,356 | 7,635 |
| **PEA** | Common (declining) | Spring | Lake/River | 272-380 | 0-120 | 122 |
| **NPMN x PEA** | Unknown | Spring | Lake/River | 295-390 | 0-13 | 17 |
| **WCT** | Rare | Spring | Tributary | 180-486 | 14-48 | 248 |
| **EB** | Rare | Fall | Tributary | 354-420 | 0-2 | 4 |
| **LL** | Common | Fall | Tributary | 107-699 | 28-210 | 1,031 |
| **LMB** | Rare | Spring or Summer | Lake/River | 180 | 0-1 | 1 |
| **LT** | Rare | Fall | Lake/River | 463-785 | 0-6 | 11 |
| **RB** | Common | Spring | Tributary | 98-632 | 124-366 | 1,910 |
| **RBxWCT** | Common | Spring | Tributary | 193-610 | 1-13 | 53 |
| **SMB** | Abundant-Common | Spring | Lake/River | 69-480 | 5-1,356 | 4,251 |
| **WE** | None in the Clark Fork River Drainage Upstream of Thompson Falls Dam – Common Downstream of Thompson Falls Dam | Spring | Lake/River | 282-419 | 0-2 | 3 |
| **TOTAL** | | | | **69-785** | **227-11,647** | **33,035** |

Relative Abundance Source: FWP Fish MT. 2019. https://myfwp.mt.gov/fishMT/distribution/speciesdistribution. Accessed June 26, 2019.

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Salmonids, and sometimes other species, are implanted with a PIT tag prior to being released upstream of the Main Channel Dam. Approximately 10 percent of salmonids PIT-tagged and released upstream of the dam have returned and ascended a second time (NorthWestern, 2019). Annual evaluations also show about 3 to 13 percent of salmonids PIT-tagged in a given year return and ascend the upstream fish passage facility the following year.

Many ladder fish released upstream of the dam are detected upstream of the dam in or near Lower Clark Fork River and Middle Clark Fork River tributaries during spawning season (e.g., Thompson River, Petty Creek, St. Regis River, Rattlesnake Creek) and the lower Flathead River. One Rainbow Trout traveled over 150 miles in 16 days, another Rainbow Trout traveled about 82 miles in 23 days, and a Westslope Cutthroat Trout traveled an estimated 65 miles within 37 days. These data indicate fish are successfully reconnecting to previously blocked habitat and accessing large portions of the 274 miles of free-flowing Clark Fork River, the lower Flathead River, and St. Regis River. Additionally, many of these fish either remain upstream for multiple years (e.g., Thompson River) or return downstream of the dam and repeat their upstream journey (via the upstream fish passage facility) for 1 or more years (NorthWestern, 2019a).

### 5.6.3 *Independent Scientific Panel Review of Upstream Fish Passage*

Per the FWS's 2008 BO and FERC license requirements and associated amendments (2009, 2019), NorthWestern prepared and submitted the Comprehensive Phase 2 (2011-2019) Fish Passage Report (NorthWestern, 2019a) to FERC, FWS, and TAC members in December 2019. The report summarized upstream and downstream fish passage studies at the Project and study area, with emphasis on Bull Trout.

Per the BO (FWS, 2008), a Thompson Falls Scientific Review Panel (Panel) was established and tasked with review of the Comprehensive Phase 2 Fish Passage Report (NorthWestern, 2019a), along with other publicly available reports, to evaluate whether the upstream fish passage facility is functioning as intended and whether operational or structural modifications of the upstream fish passage facility are needed. Panelists were selected in consultation with the TAC.

NorthWestern, in consultation with the TAC, developed a list of questions for the panelists to consider in their deliberations. The Panel began their work in January 2020. During the data review, weekly calls between panel members were scheduled to discuss the questions presented and any questions or issues that developed. The Panel met with NorthWestern and the TAC on March 10, 2020 to discuss their findings and recommendations and submitted their final report March 23, 2020 (Thompson Falls Scientific Review Panel, 2020). NorthWestern filed the final report from the Panel with FERC on April 1, 2020. On April 16, 2020, NorthWestern received written confirmation from the FWS that the requirement for a scientific review, as expressed in term and condition TC1-h in the BO, had been met with the submittal of the memo summarizing the Panel's findings.

The Panel was asked to evaluate the effectiveness of the upstream fish passage facility. In response, the Panel requested the existing definition of effectiveness from the TAC. The TAC proposed that an abridged version for the current standard for effectiveness would be “the [fish passage facility] is successful in passing upstream motivated adults that are near the Main Dam apron in a safe and timely manner”. The Panel recommended developing a definition of effectiveness that is both quantifiable by Project components and measurable, either directly or indirectly.

The Panel recommended the adoption of proportion-time-effect metrics to quantify effectiveness. These metrics are defined as follows:

- Proportion: quantify efficiency in 3 parts (attraction/entry/internal[13])
- Time: quantify delay acceptable to (or associated with) efficiency metric
- Effect: fish are safe; not injured

The Panel did not offer an opinion on the fish passage facility entrance effectiveness and found there was insufficient data to determine if delays at the fish ladder entrance are concerning, or if fallback is an issue.

The Panel suggested that it is likely that improvements (perhaps even minor ones) can increase the effectiveness of the fish passage facility entrance. They expressed concern about passage at high spring flows. They recommended using surrogate species, such as Rainbow and Brown trout, which are far more abundant in the lower Clark Fork River than Bull Trout. They noted that while issues related to internal passage effectiveness are the simplest to solve and identify, they are low in priority, as compared to the other identified issues at this site. The additional studies recommended by the Panel, which NorthWestern plans to conduct, are described in Section 14.5.2.

## 5.7 Thompson Falls Dam Downstream Fish Passage

In 2007, a literature review of downstream fish passage applicable to the Thompson Falls Project was completed (GEI, 2007). This review concluded that, based on combined survival estimates for passage through the Francis turbines in the Original Powerhouse, the new vertical Kaplan turbine (in the new powerhouse) and the spillway, the average downstream passage survival at the Project for trout measuring greater than 100 millimeters is likely 91 to 94 percent. No significant fish entrainment or impingement issues have been observed at the Project.

[13] ‘Attraction’ includes the far field area which is downstream of the upstream fish passage facility and dams where powerhouse discharge and spill serves as the primary attraction to migrating fish and near field which is in proximity to the upstream fish passage facility where attraction flow may lure fish to entrance. ‘Entry’ refers to the area immediately downstream of the entrance channel/gate where upstream fish passage facility discharge dominates hydraulics/velocity field/fish behavior. Internal passage refers to hydraulics, structures and fish movement within the ladder (i.e., entrance channel, pools, trap, exit channel)

When water is spilling over the dam, fish can migrate downstream via spillway, outlet works or through the turbines. During non-spill periods, the primary means of downstream passage is through the turbines. Studies done on anadromous fishes have generally indicated that passage via spill poses less risk than via turbine. Mortality is typically 0 to 2 percent for standard spill bays and 5 to 15 percent for turbine passage at most hydroelectric facilities (Whitney et al. 1997). However, mortality at a specific facility can vary depending on the specific configuration of the turbines and spillways and type and timing of fish being passed. In general, at any given time throughout the year, approximately 50 to 70 percent of the Lower Clark Fork River at Thompson Falls flows through the new vertical Kaplan unit. Based on an assumed 1:1 ratio of fish-to-flow, GEI (2007) assumed that 50 to 70 percent of the migrants that pass through the turbines at the Project pass through the new Kaplan unit during non-spill time periods. If spillway efficiency is 1:1, the number of migrants passing the dam in spill is similar in proportion to water being spilled.

Additional information has been collected since the downstream passage literature review (GEI, 2007). Data collected at the upstream fish passage facility indicate fish are able to move downstream of the Project in consecutive years and for multiple years (NorthWestern, 2019a). As previously mentioned, about 3 to 13 percent of the PIT tagged salmonids released upstream make an annual round trip (NorthWestern, 2018), indicating that they are passing downstream through the Project successfully. Some fish have made this round-trip multiple times, including a Brown Trout that has ascended the upstream fish passage facility six times over 5 years (NorthWestern, 2019). PIT tagged adult and juvenile Bull Trout have been detected in tributaries both upstream and downstream of the Project (NorthWestern, 2019; 2019a), also indicating that they have survived downstream passage through the Project. Species documented to return to the upstream fish passage facility after initial ascent and upstream release include Largescale Sucker, Northern Pikeminnow, Bull Trout, Mountain Whitefish, Rainbow Trout and hybrids, Westslope Cutthroat Trout, Brown Trout, and Smallmouth Bass. Details for other species such as Peamouth is limited because not all fish received a unique tag or mark prior to their release upstream.

Other studies provided additional information regarding risk of downstream migration for Bull Trout and general presence of salmonids in the Thompson Falls Reservoir. In May 2009 a juvenile Bull Trout was found in the stomach of a Northern Pike (captured in the Above Island Complex area) during a food habits study indicating that there is some risk of nonnative species predation on juvenile Bull Trout (PPL Montana, 2010b). However, a multi-year study in 2014-2015 on out-migration of juvenile Bull Trout out of the Thompson River drainage and into the Thompson Reservoir did not identify nonnative predation as a critical limiting factor (Glaid, 2017). Glaid (2017) found Bull Trout appear to use Thompson Falls Reservoir as a migratory corridor, but no specific migratory pathway was defined due to the lack of data.

Based on spring electrofishing data (since 2009), five Bull Trout were recorded in the upper section of the reservoir versus one Bull Trout in the lower section (NorthWestern, 2019). Fall gillnet data (2004-2019) did not record any Bull Trout. Based on the fisheries survey data for the reservoir, salmonids are more common in the upper section of the reservoir than the lower section (*see* Figures 5-3 and 5-4). The lower section of Thompson Falls Reservoir is more lacustrine environment dominated by nonnative species, including Yellow Perch, Pumpkinseed, Black Bullhead, Largemouth Bass, and Northern Pike (NorthWestern, 2019).

## 5.8 Clark Fork River Upstream of Thompson Falls Reservoir

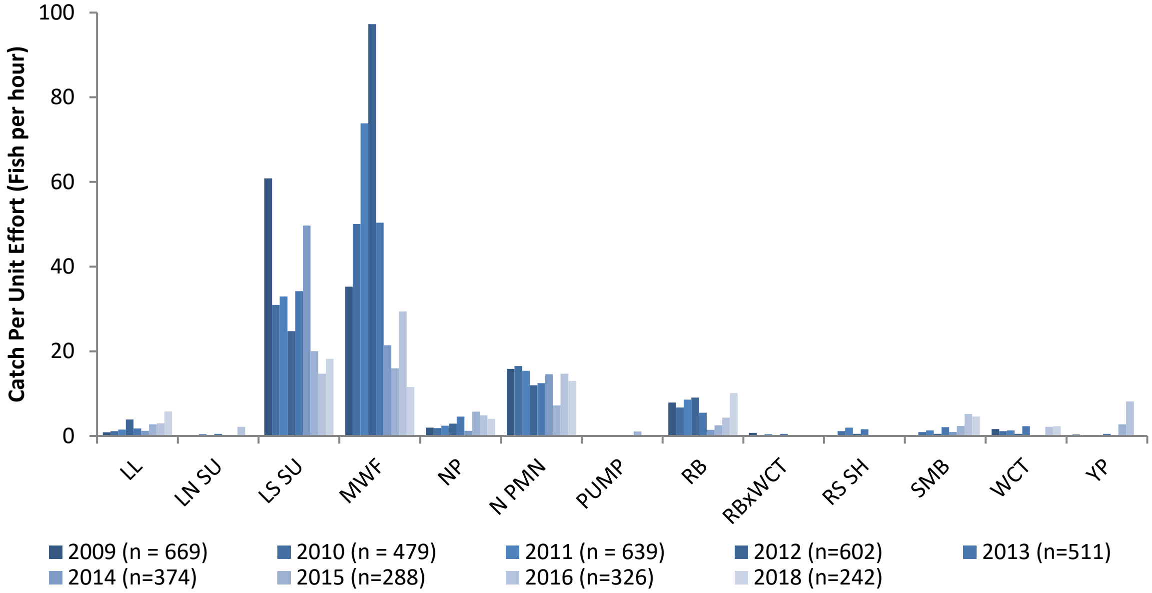
The Licensee and FWP have electrofished two reaches, Above Islands and Paradise-to-Plains (*refer to* Figure 5-1, 5-2), upstream of the Project (outside the Project boundary) on a routine basis during fall months. The Above Islands reach was surveyed annually between 2009 and 2016 and in 2018 and the Paradise-to-Plains reach was surveyed in 2010 to 2012, 2014, 2016, and 2018. Fish species recorded in these reaches is shown in Table 5-1.

### 5.8.1 ***5.5.1 Above Islands Reach***

The species composition in the Above Islands reach has remained consistent since sampling began in 2009 with native Largescale Sucker, Mountain Whitefish, and Northern Pikeminnow most abundant (Figure 5-5).

Between 2009 and 2018, the number of fish captured in the Above Islands reach ranged between 242 fish and 699 fish. Catch rates for salmonids varied from a low of 21.7 salmonids per hour in 2015 to a high of 111 salmonids per hour in 2012. Catch rates for all species has varied from a low of 61 fish per hour in 2015 to a high of approximately 152 fish per hour in 2012 (NorthWestern, 2019). Sampling has occurred between late September and the end of October.

**Figure 5-5: The average catch rate (fish per hour) between 2009 and 2018 in the Clark Fork River – Above Islands Reach.**

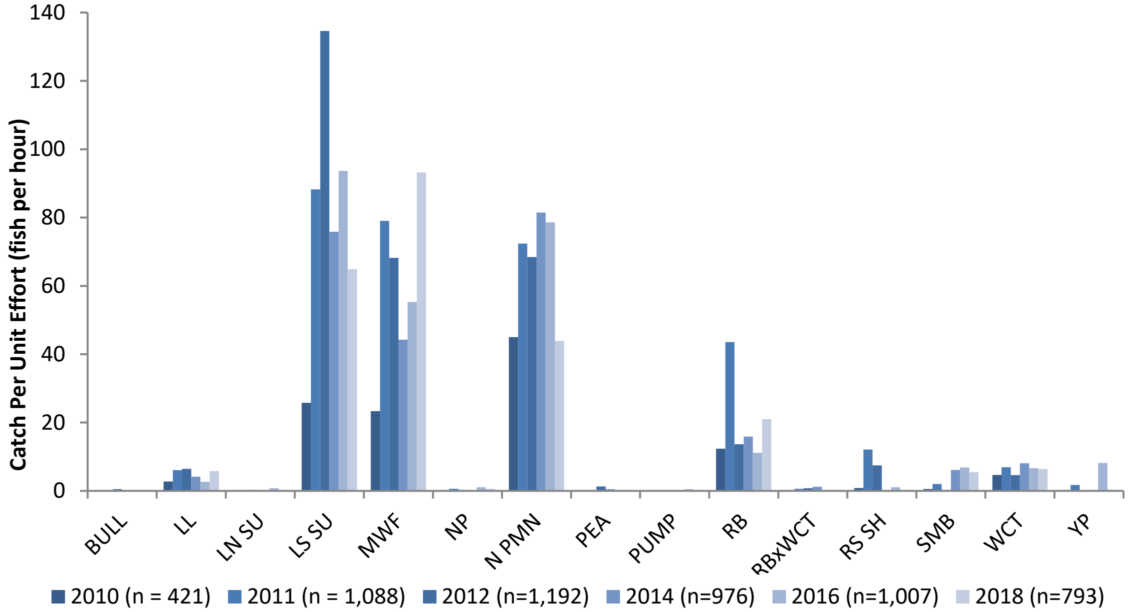



## 5.8.2 *5.5.2 Paradise-to-Plains*

Fish species composition and catch rates observed over the 6 years of sampling remained relatively consistent. Largescale Sucker, Northern Pikeminnow, and Mountain Whitefish (all native species) remained the most common species (Figure 5-6).

Salmonids represent approximately 28 to 43 percent of the fish recorded in the Paradise-to-Plains reach since sampling commenced in 2010. The catch rate for salmonid species, primarily represented by native Mountain Whitefish, has varied between 43 and 136 fish per hour. The catch rate for all species has varied between 115 fish per hour to 314 fish per hour (NorthWestern, 2019).

**Figure 5-6: The annual CPUE (2010, 2011, 2012, 2014, 2016, 2018) during the Clark Fork River autumn electrofishing in the Paradise-to-Plains reach.**




## 5.9 Thompson River Fisheries

The Thompson River is the largest tributary (by flow) to the Clark Fork River in the Project area. It flows into Thompson Falls Reservoir about 6 miles upstream of the Thompson Falls Dam. The Thompson River supports populations of Bull Trout and Westslope Cutthroat Trout, as well as non-native sport fish such as Rainbow and Brown Trout. Because of its large size, importance for native trout species (including federally threatened Bull Trout), and proximity to the Thompson Falls Project, a significant amount of research and habitat improvement effort has been expended in this watershed.

The Thompson River drains an estimated 639 mi$^2$ with a stream network of 1,326 linear miles. Elevations in the drainage vary from 2,457 feet at the confluence with the Clark Fork River to 7,464 feet on Baldy Mountain in the southeast corner of the drainage. Landownership is primarily split between USFS lands (Lolo National Forest) and private Weyerhaeuser lands (now SPP Montana, LLC) with small parcels of Montana State Land and other private holdings. Approximately 0.3 miles of the Thompson River at the confluence with the Clark Fork River are within the FERC Project boundary.

The Thompson River originates from the Thompson Chain of Lakes and runs about 53 river miles (85 km) south to southwest to the confluence with the Clark Fork River (Kreiner and Terrazas, 2018). The river consists of two very different sections. The upper section extends from the lakes downstream to a bridge about 17 miles (28 km) upstream of the mouth. This section is relatively low in gradient flowing through a wide valley. The lower section, which includes the area from the 17-Mile Bridge to the mouth of the river, is higher in gradient, flowing through a confined canyon. The lower half of the drainage is a narrower valley with a greater frequency of bedrock outcrops and sections of high gradient channel, steep valley walls, and a few short gorge sections (Kreiner and Terrazas, 2018).

Two roads parallel the mainstem Thompson River following general morphologic characteristics of the valley wall or terraces. Where the valley is narrower, such as the lower 17 miles (28 km) of the drainage, the roads hug both the valley walls and the banks of the river. Based on radio telemetry data and monitoring of Bull Trout, a large section of the mainstem Thompson River between the mouth of the Thompson River and the confluence of Fishtrap Creek, appears to provide important foraging, migration, and overwintering (FMO) habitat for Bull Trout (Glaid 2017; GEI and Steigers Corporation, 2013). The proximity of the roads to the stream channel adversely impact the habitat by reduced habitat complexity, altered and reduced riparian buffer vegetation and shade, reduced large wood debris inputs, reduced floodplain connectivity, and increase direct sediment transport to the stream channel (Bowman and Olson, 2018; Kreiner and Terrazas, 2018). The roads leave the banks of the river only when the valley widens in the upper portion of the drainage.

The Thompson River has several major tributaries including the West Fork Thompson River, Fishtrap Creek, the Little Thompson River, Chippy Creek, Murr Creek, and Big Rock Creek (Figure 5-7). The confluence of the Little Thompson River is near the 17-Mile Bridge, and both Fishtrap Creek and the West Fork Thompson River join the Thompson River downstream of the mouth of the Little Thompson River.

Contrary to most systems in the region, the warmest water temperatures in the Thompson River occur just downstream from the confluence of the Little Thompson River and upstream of the confluence of Fishtrap Creek. In most rivers and streams the warmest water temperatures occur near their mouths, but in the Thompson River, the coolest water temperatures occur near its mouth. The Thompson River begins to cool about 12 miles (20 km) downstream of the headwaters with contributions from several tributaries. However, stream temperatures are elevated slightly from contributions from the Little Thompson River (Kreiner and Terrazas, 2018).

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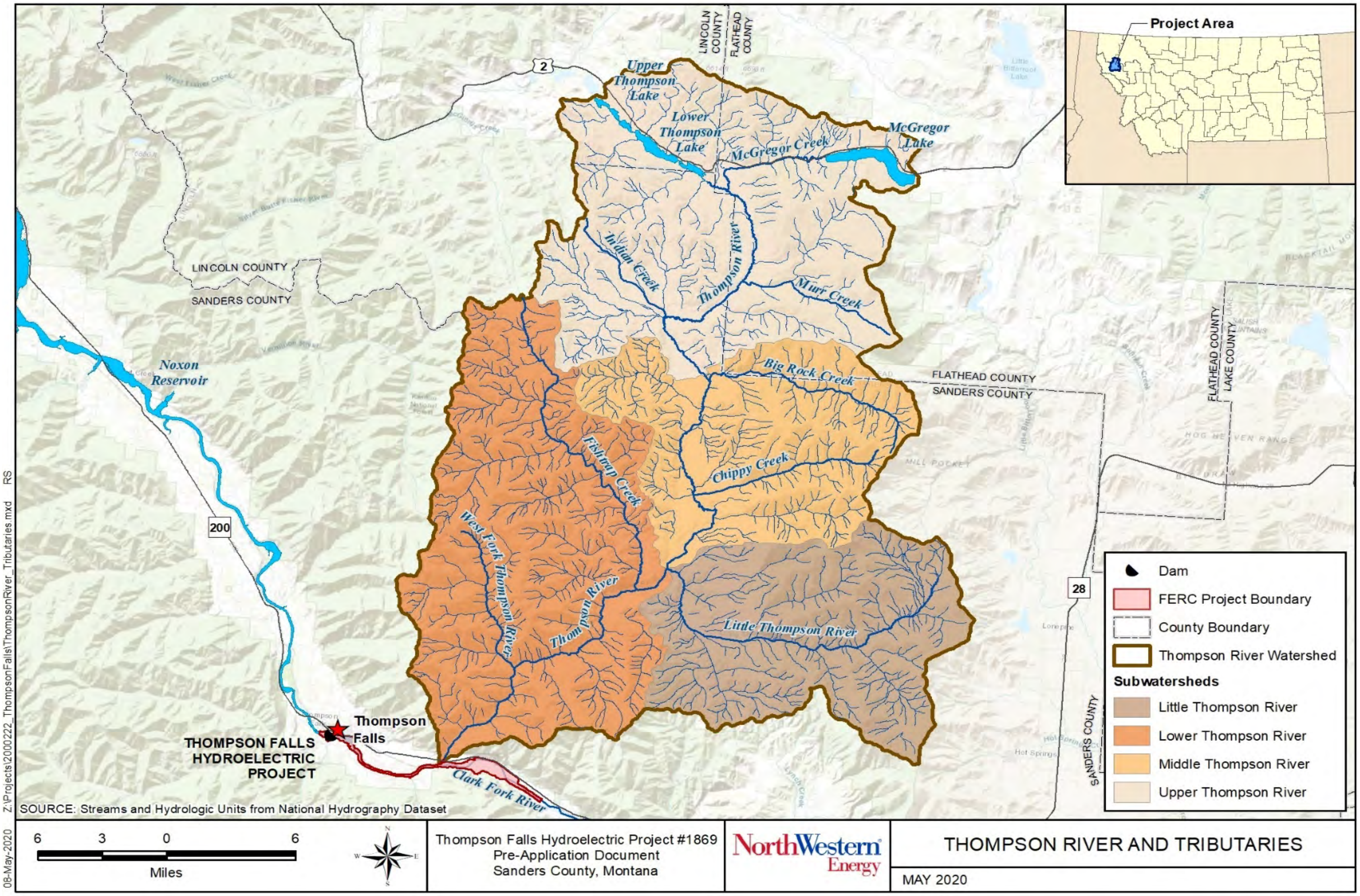
**Figure 5-7: Thompson River drainage and its tributaries.**



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The Thompson River and its tributaries contain native Bull Trout, Westslope Cutthroat Trout, and Mountain Whitefish as well as native suckers and sculpins. Other common nonnative recreational fish in the Thompson River include Rainbow Trout and Brown Trout and to a lesser extent Brook Trout (Copenhaver et al., 2006; Katzman, 2006; GEI Consultants, Inc. and Steigers, 2013; NorthWestern, 2015-2018; Kreiner and Terrazas, 2018).

The Thompson River is popular for fishing with about 13,000 angler days reported in 2015 with an average of 8,229 angler days per year (FWP, 2019). Historic records show various stocking efforts by FWP with Rainbow, Yellowstone Cutthroat Trout, Brown Trout, and Brook Trout in the Thompson River drainage (FWP, 2019). Most extensive stocking history in the tributaries and mainstem occurred from 1930 to 1989 of Brook Trout, Brown Trout, cutthroat trout, Rainbow Trout. In the 1950s and 1960s, anglers reported Rainbow, cutthroat, Brook Trout, and Mountain Whitefish as the most abundant catch (FWP, 2019). Currently, Brown Trout are the most abundant game species in the upper section of the Thompson River (FWP, 2019).

FWP has monitored the recreational fishery in the Thompson River for over 30 years. FWP endeavors to sample every other year three sections of the Thompson River (the Big Hole section, 19-mile section, and Big Rock Creek section) to evaluate the fish community over time including species composition, species distribution, size structure, and abundance. The 19-mile section is located 19 river miles upstream (30 km), the Big Hole section is located at river mile 30 (river km 49), and the Big Rock Creek section, recently added to the survey in 2013, is upstream of where the tributary enters the Thompson River over 32.6 river miles (52 km).

Rainbow trout are estimated to range from 200 to 600 fish per mile for fish greater than 150 millimeters in the Big Hole Section and only about 50 fish per mile (≥150 mm) in the 19-mile section (Kreiner and Terrazas, 2018). Brown trout are estimated to range from 250 to 450 fish per mile (≥150 mm) in the Big Hole section and 200 to 800 fish per mile in the 19-miles section (≥150 mm) (Kreiner and Terrazas, 2018). Rainbow Trout were most dominant in the Big Hole section between 1985 and 2005, where after Brown Trout are sampled more frequently in the Big Hole section and dominant in the 19-mile section and Big Rock Creek section (Kreiner and Terrazas, 2018). Brown Trout represent about 84 to 95 percent of trout in the two upper sections.

Brook Trout are not a dominant species in the Thompson River and represent less than 1 percent of the trout composition in the 19-mile and Big Hole sections (Kreiner and Terrazas, 2018). In Big Rock Creek, Brook Trout were more common during the 2013 sampling than 2016 sampling with about 150 fish per mile compared to only two fish sampled in 2016.

Mountain Whitefish are abundant in the Thompson River drainage. In the mid-1980s, Mountain Whitefish were sampled more frequently than Rainbow Trout. In recent years, the species remains abundant in the two sections but is not consistently netted during sampling events (Kreiner and Terrazas, 2018).

Approximately 54 phenotypically identified Westslope Cutthroat Trout were sampled in the Big Hole and 19-mile sections since 1985 with about two-thirds from the Big Hole section. Westslope Cutthroat Trout mean length was 227 mm and varied from 108 to 384 mm (Kreiner and Terrazas, 2018).

Trout species composition in the 19-mile and Big Hole sections (Figure 5-8 and 5-9, respectively) are based on total numbers of fish netted on the first two-mark runs for sampling years between 1986 through 2017 (Kreiner and Terrazas, 2018).

**Figure 5-8: Trout species composition in the 19-mile section in the Thompson River from 1985 through 2017. (Source: Kreiner and Terrazas, 2018).**

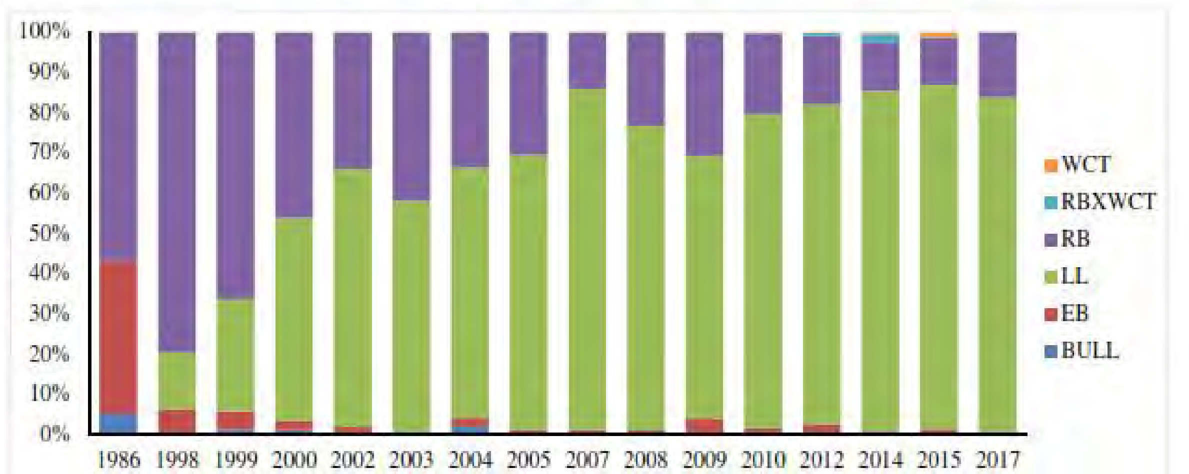
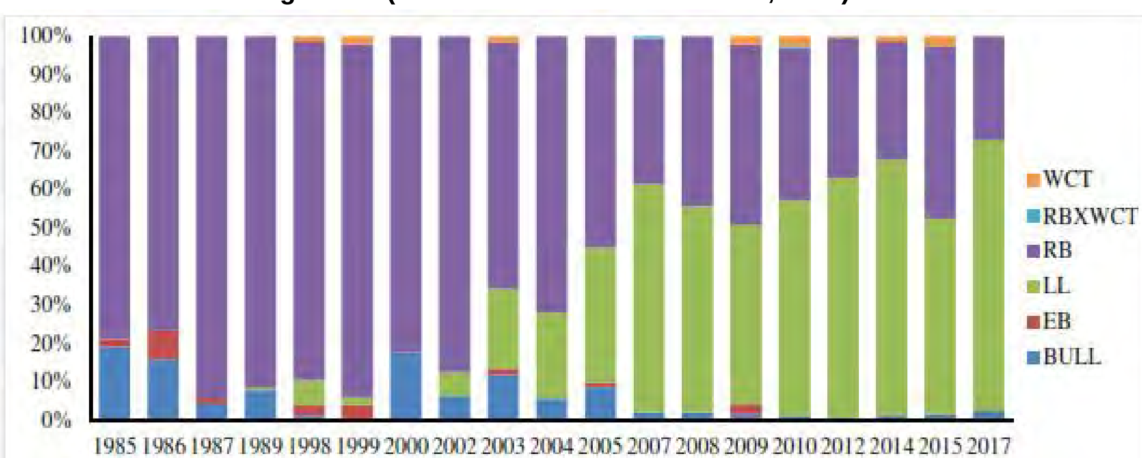



**Figure 5-9. Trout species composition in the Big Hole section in the Thompson River from 1985 through 2017 (Source: Kreiner and Terrazas, 2018).**




The Thompson River also provides critical habitat for migratory (adfluvial/fluvial) and resident Bull Trout, including spawning and rearing habitat in Fishtrap Creek and West Fork Thompson River as well as important habitat for adfluvial/fluvial and resident Westslope Cutthroat Trout.

Recent data collection from 746 subadult Bull Trout PIT-tagged in these two tributaries to the Thompson River, from 2014 through June 2019, indicate the Bull Trout migratory life history form in the Thompson River drainage is less abundant than expected (Glaid, 2017; Kreiner and Terrazas, 2018; NorthWestern, 2019a). Based on recent tagging studies, the percentage of juvenile Bull Trout found to outmigrate from the Thompson River drainage to the Clark Fork River is less than 7 percent (NorthWestern, 2019a).

Presumably resident, Bull Trout are also present in the tributary, Big Rock Creek based on 2010 (PPL Montana, 2011) and 2018 surveys (FWP, unpublished; 2019).

FWP reported sampling 185 Bull Trout since 1985 during mainstem electrofishing efforts in the Big Hole section (Kreiner and Terrazas, 2018). Sample frequency was too low to generate fish per mile estimate. The mean length of Bull Trout recorded in the Big Hole section was 228 millimeters and varied from 87 to 775 millimeters. The highest number of Bull Trout captured in a sample year was 36 fish in 1986. Fewer Bull Trout were recorded in the 19-mile section, with 25 Bull Trout documented since 1986 and seven of these fish captured in 1986. These fish had a mean length of 219 mm (Kreiner and Terrazas, 2018).

### 5.9.1 *Thompson Falls Ladder Fish in the Thompson River Drainage, 2014-2019*

The upstream fish passage facility at Thompson Falls began operation in 2011. Due to the proximity of the Thompson River to the Project and likely benefits to the Thompson River from upstream fish passage, a remote PIT-tag antenna array was installed in the mainstem of the Thompson River on September 26, 2014 to detect PIT-tagged ladder fish. The periods of operation and data collection were between September 26 and December 22, 2014; between February and December 2015; year-round from 2016 through 2018. In 2019, the array continued to collect information until the end of August. The last fish detection occurred on August 28, 2019.

The array does not detect directionality of fish, but the entry of the fish into the drainage can be assumed by cross-referencing the release date upstream of the Main Channel Dam and the first detection recorded in the Thompson River.

Between 2011 and 2019 there were over 3,000 uniquely PIT-tagged fish released upstream of Thompson Falls Dam (NorthWestern, 2020). Although the Thompson River array was not in place until autumn 2014 and the 2019 detection season was shortened, the detection data (September 2014 - August 2019) indicate a minimum of 25 percent of the individually tagged-fish that ascended the upstream fish passage facility and released upstream of the dam were later detected in the mainstem of the Thompson River, including 4 of the 16 tagged-Bull Trout (Table 5-4). These Bull Trout were detected in the mainstem Thompson River in June and July 2015, September 2016, October 2017, February and March 2018 as well as in two critical spawning tributaries, Fishtrap Creek in 2018 and West Fork Thompson River in 2015 (NorthWestern, 2018).

**Table 5-4. Summary PIT-tagged ladder fish (2011-2019) detected by the remote array in the Thompson River between 2014 and 2019.**

| Species | # of Ladder Fish Detected in the Thompson River drainage, 2014-2019 | % of Species PIT-tagged and Released Upstream of Thompson Falls Dam, 2011-2019 |
|---|---|---|
| BULL | 4 | 25% |
| EB | 2 | 50% |
| LL | 338 | 39% |
| RB | 369 | 23% |
| RBxWCT | 7 | 15% |
| MWF | 9 | 11% |
| WCT | 47 | 21% |
| **Salmonids** | **776** | **27%** |
| LS SU | 4 | 3% |
| NPMN | 2 | 1% |
| **Non-Salmonids** | **6** | **2%** |
| **Total** | **782** | **25%** |

Between 2014 and 2019, there were 2,846 ladder fish detections documented by 782 individual ladder fish. Ladder fish detections in the Thompson River are primarily Rainbow and Brown Trout, which is expected because these two species represent 80 percent of the all PIT-tagged-fish released upstream of the dam since 2011. Rainbow Trout peak detections (>50%) in the Thompson River occur in July and August with steady presence in the spring (March–June), as shown in Figure 5-10. Brown Trout peak detections (39%) occur in the summer (Figure 5-10), June and July, and in October (17%).

The monthly ladder fish detections for all species from 2014 through 2019 are shown in Figure 5-11. Peak detections of ladder fish consistently occur in the warmer months, June through August (Figure 5-11). The remote tag-array data indicate Thompson River provides important habitat (e.g., spawning, foraging, migration, overwintering) and likely thermal refugia for several species throughout the year.

**Figure 5-10. Percentage of total PIT-tagged Brown Trout (LL) and Rainbow Trout (RB detected in the Thompson River (by month), 2014-2019.**

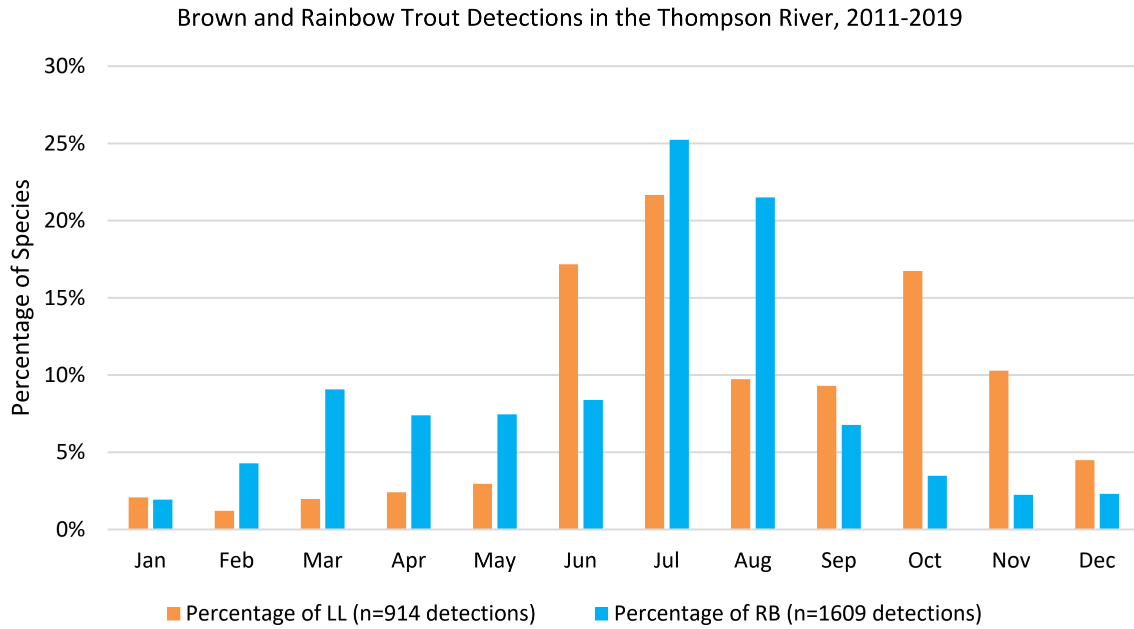


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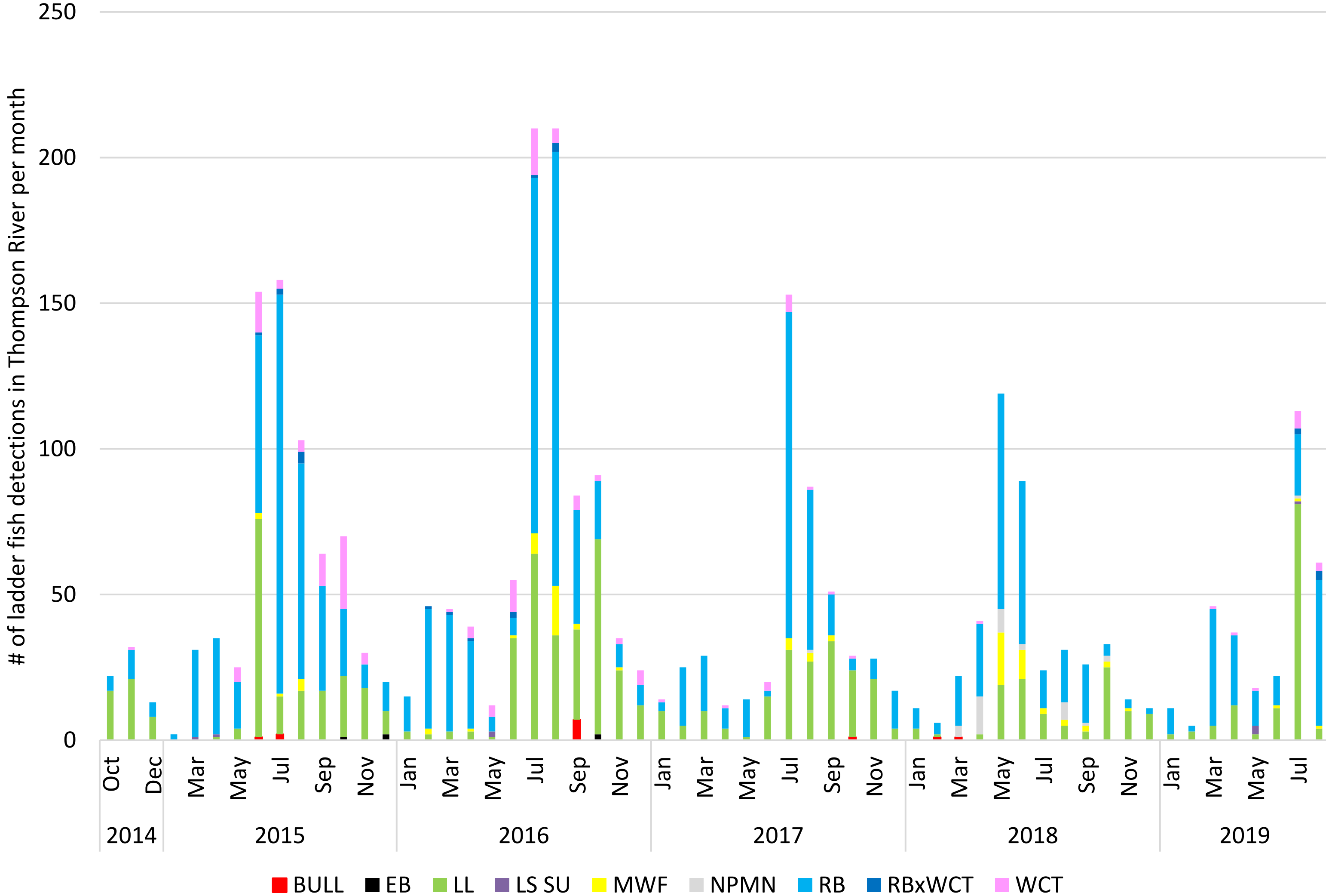
**Figure 5-11. Summary of monthly detections of ladder fish, by species in the Thompson River, 2014-2019.**



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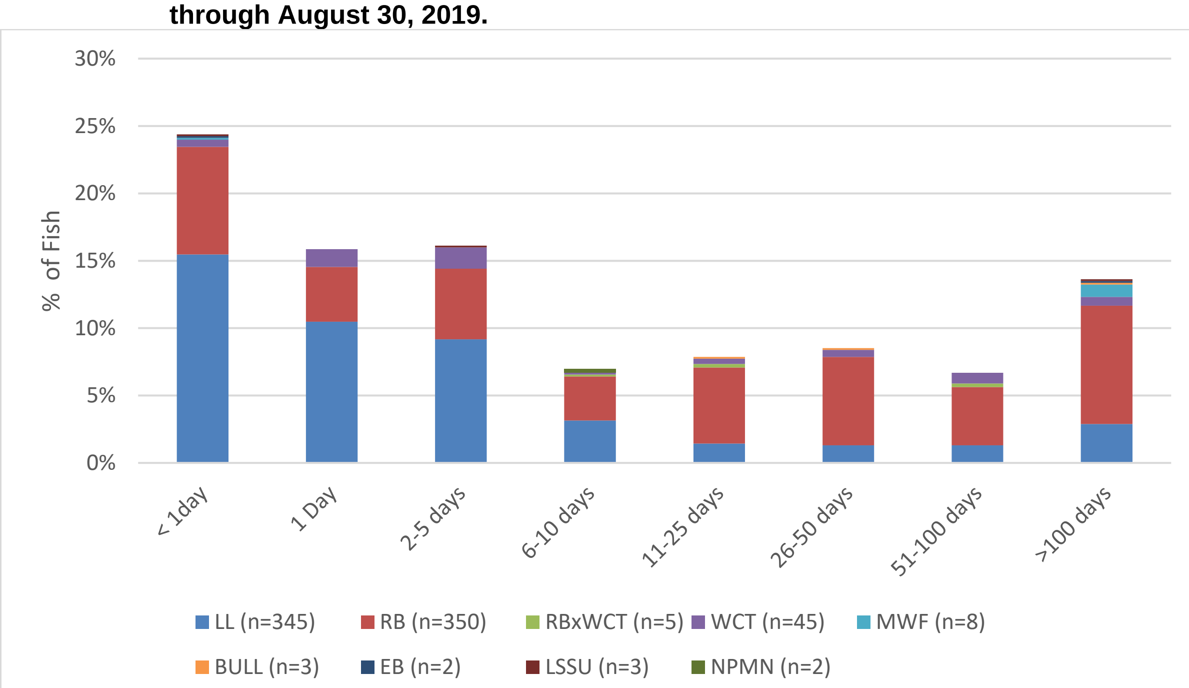
The duration between when a fish was released upstream of Thompson Falls Dam after ascending the upstream fish passage facility and detection in the mainstem Thompson River was evaluated for the period the array was operating, September 26, 2014 through August 30, 2019. Travel time data was available for 763 fish representing 8 species and 1 hybrid. The travel time for fish to reach the roughly 6-mile distance varied from about 5.5 hours to 619 days. The majority of the ladder fish detected in the Thompson River were detected within 1 day of their release upstream of Thompson Falls Dam and most of those fish (62%) spent 10 days or less to enter the Thompson River (Figure 5-12).These data indicate many fish made a direct migration to the Thompson River, while others spent time elsewhere for over 1 year and in one case, for nearly 2 years prior to being detected in the Thompson River.

**Figure 5-12. Time (days) ladder fish spent between release upstream of Thompson Falls Dam and first detection in the Thompson River, September 26, 2014 through August 30, 2019.**




Three Bull Trout were detected in the Thompson River, ranging from 16 days, 35 days, and 124 days after their release upstream of Thompson Falls Dam. The fourth ladder fish released upstream of Thompson Falls Dam was not detected by the mainstem array, but was detected in the West Fork Thompson River, a tributary, 42 days after its passage of the Project.

FWP also monitored one PIT-tag array in Fishtrap Creek and in West Fork Thompson River, both critical Bull Trout spawning tributaries in the Thompson River drainage. These arrays have functioned sporadically since installation (2014 in West Fork Thompson River and 2015 in Fishtrap) due to various technical challenges. The 2019 season also faced technical challenges and data collection was not continuous.

A total of 21 ladder fish have been detected in the two tributaries since 2014 with eight individual ladder fish (1 BULL, 4 LL, 3 RB) detected in West Fork Thompson River and 13 individual ladder fish (1 BULL, 6 LL, 3 RB, 3 WCT) detected in Fishtrap Creek. The Bull Trout in West Fork Thompson River was detected in July 2015 after ascending the upstream fish passage facility and being released upstream of Thompson Falls Dam on June 3, 2015. The Bull Trout in Fishtrap Creek was detected in June 2018 and September 2018 after ascending the upstream fish passage facility and being released upstream of Thompson Falls Dam on September 18, 2017.

## 5.10 Contaminants in Fish Tissues

FWP samples and analyzes fish tissue samples for mercury (Hg) concentrations in the Lower Clark Fork River reservoirs every 5 years (Selch, 2017). Noxon Rapids and Cabinet Gorge reservoirs contain fish with some of the highest Hg concentrations in Montana (Selch, 2017). Mercury accumulates in the tissue as a result of the physio-chemical characteristics of the reservoir, and food habits and growth rates of fish.

Elevated levels of Hg were detected in various size groups and species in 2005, 2010, and 2015 in the lower Clark Fork reservoirs (Thompson Falls, Noxon Rapids, Cabinet Gorge). Sampling completed in 2015 assessed seasonal variation in Hg concentrations in resident fish, compared Hg concentrations between species and size groups in Noxon Rapids and Cabinet Gorge reservoirs, evaluated temporal trends from 2005, 2010 and 2015, determined if a single advisory is warranted for the lower Clark Fork reservoirs (including Thompson Falls Reservoir), and compared selenium concentrations in Noxon Rapids and Cabinet Gorge reservoirs.

Northern Pike Hg concentrations in Thompson Falls Reservoir are substantially lower than levels found in Noxon Rapids and Cabinet Gorge reservoirs for larger size groups of fish (26–30 and 30+inches) (Selch, 2017). Thompson Falls Reservoir fish also consistently contain lower Hg concentrations in smaller size groups (Selch, 2017).

One single Smallmouth Bass was sampled in 2010 in Thompson Falls Reservoir. The Hg concentration was two-to-three times lower than similar fish collected in Noxon Rapids and Cabinet Gorge reservoirs in 2005, 2010, and 2015 (Selch, 2017).

Yellow perch in Thompson Falls Reservoir had lower Hg concentrations compared to Noxon Rapids and Cabinet Gorge reservoirs (Selch, 2017).

Selenium concentrations in Noxon Rapids and Cabinet Gorge fish are considered to be within typical levels found in freshwater fish (Selch, 2017).

Dioxins, furans, and polychlorinated biphenyls (PCBs) contaminants were found elevated in Northern Pike sampled in the Middle Clark Fork River downstream of the Smurfit-Stone Mill, resulting in a fish consumption advisory in 2013 (Schmetterling and Selch, 2013). In 2014, Selch (2015) analyzed fish tissue samples for dioxins, furans, and PCBs from samples taken from Thompson Falls and Noxon Rapids reservoirs. Northern Pike, Walleye, Smallmouth Bass, and Yellow Perch were sampled in Noxon Rapids Reservoir in 2014 and results were compared to 2013 samples taken from fish upstream in the Clark Fork River (Selch, 2015; Schmetterling and Selch, 2013). The results found that 13 of the 17 dioxins and furans detected in Northern Pike and Rainbow Trout in the Middle Clark Fork River in 2013 were also found in fish in the Noxon Rapids Reservoir in 2014. Noxon Rapids Reservoir already contained fish with some of the highest concentrations of Hg in Montana, thus the results from the 2014 study did not result in changes to most of the existing fish consumption advisories (Selch, 2015).

In fall 2014, two Northern Pike were sampled from the Thompson Falls Reservoir and analyzed for dioxins and furans (co-planar PCBs were not analyzed) (Selch, 2015). Results found low levels of dioxins and furans (0.002 ng/kg ww) in a single Northern Pike composite (n=2, 26–30 inches or 660–762 mm) (Selch, 2015). The results from samples in Noxon Rapids Reservoir, Thompson Falls Reservoir, and the Middle Clark Fork River support the conclusion that there is wide-spread presence of toxins (furans, dioxins, and PCBs) in the system (Selch, 2015). FWP publishes sport fish consumption guidelines which recommend that women of childbearing age, and children, limit their consumption of Northern Pike, Rainbow Trout, Smallmouth Bass, and Yellow Perch caught in Thompson Falls Reservoir. These species are safe to eat for adult men and women not of childbearing age (FWP, 2015).

## 5.11 Fisheries Pathogens

FWS conducts a survey of fish pathogens in the Lower Clark Fork River drainage every 5 years. The objective of the study is to examine the distribution and prevalence of selected pathogens which can cause disease in free-ranging salmonids (Cordes, 2019).

In 2014 and 2019, samples were taken upstream of Thompson Falls Dam, between Thompson Falls Dam and Noxon Rapids Dam, and between Noxon Rapids Dam and Cabinet Gorge Dam (Table 5-5). This summary provides results from the two upstream reaches. The samples included fish tissue from Brook Trout, Brown Trout, and Rainbow Trout.

**Table 5-5. Sample sites and number of fish examined upstream of Thompson Falls Dam and between Thompson Falls Dam and Noxon Rapids Dam in 2019. (Source: Cordes, 2019.)**

| Survey Sections | Sample Site | EB | LL | RB |
|---|---|---|---|---|
| Upstream of Thompson Falls Dam<br>n = 240 | Thompson River | - | 31 | 29 |
| | Little Thompson River | 50 | 5 | 5 |
| | Big Rock Creek | 5 | 55 | - |
| | Chippy Creek | 20 | 40 | - |
| Between Thompson Falls Dam and Noxon Rapids Dam<br>n = 215 | Prospect Creek | 60 | - | - |
| | Marten Creek | 25 | 12 | - |
| | Clear Creek | 58 | - | - |
| | Vermilion River | 30 | 30 | - |

The study focused on using other salmonids as surrogates for Bull Trout because Bull Trout are not common in the drainage. In 2014, there was one pathogen detected compared to three pathogens (1 bacterial, 2 parasitic) detected during the 2019 survey in the Lower Clark Fork River basin (Cordes, 2019). No viral pathogens were detected in 2014 or 2019. The 2019 pathogens include *Renibacterium salmoninarum* which causes bacterial kidney disease, *Myxobolus cerebralis* which causes whirling disease, and *Tetracapsuloides bryosalmonae* which causes proliferative kidney disease. Even with positive detections of pathogens, the majority of fish examined were clinically healthy with no external signs of disease in either sample year (Cordes, 2019).

Tests in 2014 did not detect whirling disease in the Lower Clark Fork River basin. The detection of *M. cerebralis* in 2019 in the Thompson River and Prospect Creek may indicate whirling disease may be spreading downstream to the Lower Clark Fork River basin.

The presence of *T. bryosalmonae* detected in the Thompson River drainage also suggest this pathogen may be moving downstream. *T. bryosalmonae* is widespread in many western river basins and also reported in the Flathead River basin.

*R. salmoninarum* was the most prevalent pathogen during the 2019 survey, including the Brook Trout in the Little Thompson River. Brook Trout are known to be common *R. salmoninarum* carriers. Cordes (2019) notes there is difference in accuracy of the various screening techniques for *R. salmoninarum* and the use of direct fluorescence antibody tests and real-time polymerase chain reaction may provide a more accurate portrayal of prevalence in the Lower Clark Fork River.

## 5.12 Total Dissolved Gas and Gas Bubble Trauma

*Refer to* Section 4.7 TDG, for details on TDG and GBT.

## 5.13 Aquatic Macroinvertebrates

*Refer to* Section 4.8 Biological Monitoring – Aquatic Macroinvertebrates, for details on macroinvertebrate monitoring.

## 5.14 Aquatic Invasive Species

Aquatic invasive species (AIS) can be in the form of aquatic plants, animals, and pathogens. AIS include nonnative fish, mussels, clams, plants, and disease-causing pathogens. Montana Aquatic Invasive Species Act specifically identified Zebra Mussel (*Dreissena polymorpha*) and the Quagga Mussel (*Dreissena bugensis*) as invasive species that, "…could cause catastrophic damage to not only our waterways, rivers, and lakes, our water storage delivery, and irrigation systems, our hydroelectric power structures and systems, and our aquatic ecosystems, but also to the entire state economy" (Montana Code Annotated § 80-7-1002). Known distribution of aquatic mollusks in Montana as of 2020 (FWP, 2020) are shown in Figure 5-13. In 2016, water samples from Tiber Reservoir and Canyon Ferry tested positive for mussel larvae. In 2019, FWP sampled more than 300 waterways in Montana which included more than 2,100 individual water samples (200 sampled from Tiber and Canyon Ferry reservoirs) and no new positive hits for mussel larvae or adults were detected.

Aquatic invasive plants are discussed in Section 7.2.

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**Figure 5-13: Aquatic invasive invertebrate distribution in Montana (FWP, 2020).**

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## 5.15 Potential Impacts Related to the Project Operation or Maintenance

As required by 18 CFR § 5.6(3)(i)(C), NorthWestern has identified the following known or potential adverse impacts of the Project as related to fish and aquatic resources.

### 5.15.1 *Current Operations*

#### 5.15.1.1 Upstream Fish Passage

Since the upstream fish passage facility became operational in 2011, fish passage has been provided for over 33,000 fish representing 11 species and two hybrids. Upstream adult fish passage continues to be unavailable for fish motivated to move upstream when the upstream fish passage facility is closed seasonally, from October to March. The upstream fish passage facility may be closed if debris and sediment accumulate in the lower pools of the ladder section and operations of the passage facility become limited during high spring flows.

The Project is operated to provide baseload and flexible generation within the reservoir elevation and minimum flow requirements of the License. During flexible generation operations, the Licensee may use the top 4 feet of the reservoir from full pond while maintaining minimum flows. For several reasons, the full 4 feet typically have not been used over the past 20 years of operation.

The ladder section of the upstream fish passage facility loses functionality when the reservoir elevation is more than 1 foot below normal full operating level. During deep drawdowns, the upstream fish passage facility is dewatered and shutdown until the reservoir returns to normal full operating level.

#### 5.15.1.2 Impacts of Reservoir Drawdowns

Infrequently, the reservoir is drawn down below normal operating levels for Project maintenance purposes. For example, in 2008, Project maintenance required a reservoir drawdown for about two weeks in October. This particular drawdown had no impact to upstream fish passage because it occurred before the upstream fish passage facility was constructed. In addition, the upstream fish passage facility is typically shut down for the winter season in October, so October drawdowns may not impact upstream fish passage.

In the past, when the Lower Clark Fork River peak flow approached or exceeded 100,000 cfs, flow would be passed over the spillways by releasing stanchions to increase spillway capacity. The stanchions would then be replaced after high water. These events occur approximately every 7 to 10 years with the most recent in 2011 and 2018. In order to repair the stanchions, the reservoir must be drawn down to crest (16 feet below normal full operating level) elevation. This can result in the reservoir being drawn down to crest for several weeks in the summer.

In 2011 and 2018, very high flows resulted in the stanchions being tripped. When high flows subsided, the Licensee drew down the reservoir in order to replace stanchions on the dam. In

2011, the upstream fish passage facility was closed for about 84 days between May 25 and August 21. The maintenance work resulted in a reservoir drawdown of about 10 feet by the end of July and an additional 3 feet (total 13 feet below normal full operating level) between August 7 and 19. In 2018, the fish passage facility was closed for 89 days between May 1 and August 8.

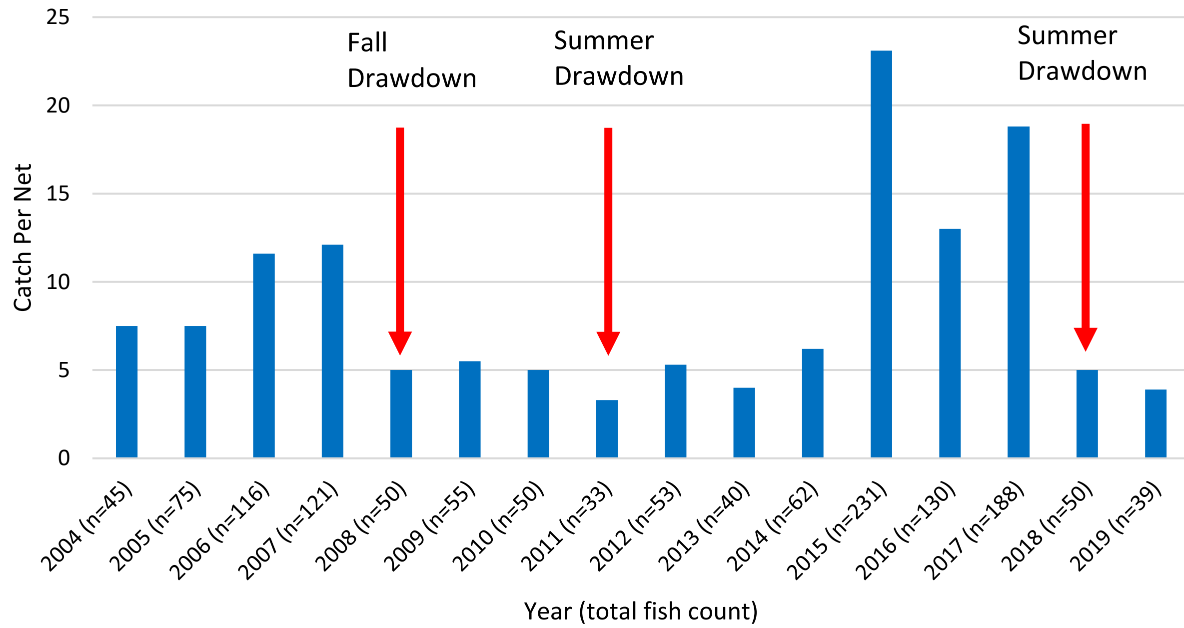
Since the 2018 drawdown, two new 18 feet high radial gates have been brought into service on the Main Dam Spillway. These gates provide a discharge capacity of 20,000 cfs (10,000 cfs each). The addition of the gates add substantial reservoir operational control by reducing the frequency of tripping stanchions to pass high flows, resulting in less frequent deep drawdowns of the reservoir.

The abundance of some fish species in Thompson Falls Reservoir appear to be reduced by extended drawdowns, such as the 2011 and 2018 drawdowns. Annual gillnetting results since 2004 are shown in Figure 5-12. Total fish caught and catch per net declined from the previous year in years following a deep drawdown. For example, the low number of fish caught in the gillnets in October 2011 (the lowest total number of fish caught via gillnetting since monitoring began in 2004) may be a result of the Thompson Falls Reservoir drawdown of up to 13 feet below normal full operating level in August 2011.

The impact of reservoir drawdowns on the numbers of Black Bullhead has been most apparent. Black Bullhead were the most abundant fish species caught in the years prior to the 2008 drawdown (range 2.4–8.3 fish per net). After a 2-week drawdown in fall 2008, no Black Bullheads were caught between 2009 and 2012 and a rebound of Black Bullhead was not documented until 2015 (14.1 fish per net). Black Bullhead catch rate declined to 1.4 in 2018 and was zero in 2019.

Northern Pike catch rates also appear to have responded to the drawdowns. Over the years Northern Pike catch rates range from 1.0 to 4.9 fish per net. Northern Pike catch rate declined from 2.4 fish per net in 2010 to 1.0 fish per net in 2011; and from 4.2 fish per net in 2017 to 1.9 fish per net in 2018. Northern Pike catch rate numbers appear to return to the average rate (2.5 fish per net) within 1 year following a long-term (1-2 month) drawdown to crest in 2011 and 2018. Other species did not indicate any immediate response and overall catch rates per net remain low for Thompson Falls Reservoir with Black Bullhead driving up overall catch rate numbers up in 2006, 2007, 2015, and 2017.

**Figure 5-14. Summary of the Thompson Falls Reservoir gillnetting efforts 2004-2019. Substantial drawdowns occurred in the fall of 2008 and summers of 2011 and 2018.**




### 5.15.2 *Future Proposed Operations*

NorthWestern proposes that the Thompson Falls Project will continue to provide baseflow generation and meet flexible capacity needs. Under normal operations, NorthWestern will maintain the reservoir between El. 2396.5 and 2394 feet (2.5 feet below normal full operating level) and maintain a minimum flow downstream of the lesser of 6,000 cfs or inflow.

The upstream fish passage facility was designed to operate with reservoir elevations at or near normal full pool. Depending on the timing and extent of the reservoir level variations, engineered solutions may need to be developed to maintain efficiencies in the upstream fish passage facility when the reservoir is drawn down.

Other potential impacts may include dewatering of shallow areas of the reservoir and side channels, fish stranding, reductions or modification in species composition in the macrophyte (plant) community and impacts to habitat downstream of the Project during the drawdown.

## 5.16 Resource Protection and Mitigation Measures

This section describes protection, mitigation, and enhancement measures that have been undertaken at the Project or that are currently ongoing.

As described in Section 2.10, in 1988 the Licensee and FWP entered into an Agreement for the Project where the Licensee agreed to pay $250,000 to FWP to provide full and complete mitigation as required under Section 903(e)(6) of the Program for impacts caused by the construction and maintenance of the Project.

The 1990 FERC License amendment included measures to mitigate for resource impacts of daily variation of the reservoir and immediately downstream of the tailrace. These mitigative measures include a minimum flow requirement downstream of the Project. The Licensee is required to discharge a continuous minimum flow of 6,000 cfs or inflow to the Thompson Falls Reservoir downstream of the powerhouse, whichever is less. These flows may be temporarily modified if required by operating emergencies beyond the control of the licensee and for short periods on mutual agreement between the licensee and FWP.

As described in Section 5.15, two new 18 feet high radial gates have been brought into service on the Main Dam Spillway. The addition of the gates adds substantial reservoir operational control, resulting in less frequent deep drawdowns of the reservoir and associated closing of the upstream fish passage facility.

### 5.16.1 *Applicable Fisheries and Aquatic Studies/Actions*

Applicable fisheries and aquatic studies/actions completed by the Licensee and/or collaborative partners within the study area are listed in Table 5-5. Studies and actions include fish movement studies, passage planning, fish ladder construction, baseline fisheries monitoring, monitoring of the upstream fish passage facility, annual reports, hydraulics assessment of the ladder section of the upstream fish passage facility, a 9-year comprehensive review of fish passage operations, and other fish and aquatic surveys.

**Table 5-6. Summary of fisheries and aquatic studies/actions completed in the study area since 1999.**

| Study/Action | Study Description | Year Study/Action Completed |
|---|---|---|
| **Fish Movement Studies** | Preliminary radio telemetry and trapping studies in Project area. | 1999-2001 |
| **Preliminary Fish Movement Studies for Passage Planning** | PPL Montana prepares plan to develop upstream adult fish passage and identifies the need for additional fish behavior and project operations data prior designing a permanent fish passage facility. | 2003-2004 |
| | Radio-Telemetry Studies to identify fish behavior (Bull Trout, Westslope Cutthroat Trout, Rainbow Trout) and determine optimal location for upstream fish ladder. | 2004-2006 |
| | Review fish behavior studies, operational flexibility at the Project, and identify optimal fish ladder location. | 2005-2006 |
| **Study Fishway Alternatives** | Upstream Fishway Feasibility Study for three fish ladder alternatives. | 2006 |
| **Construction of Fish Passage** | Upstream fish passage facility Construction Period. | 2009-2010 |

| Study/Action | Study Description | Year Study/Action Completed |
|---|---|---|
| **Nonnative Predator Study** | 2009 Northern Pike Study in Thompson Falls Reservoir. | 2009 |
| **Baseline Fisheries Data Collection** | Spring Electrofishing Thompson Falls Reservoir. | 2009-2016, 2018 |
| | Gillnet Thompson Falls Reservoir. | 2004-2019 |
| | Fall Electrofishing Clark Fork River, above islands. | 2009-2016, 2018 |
| | Fall Electrofishing Clark Fork River, Paradise-to-Plains. | 2010-2012, 2014, 2016, 2018 |
| **Annual Reports – Upstream Fish Passage** | Annual Reporting on upstream fish passage results at Thompson Falls Dam (available on Project website). | 2011 through term of license (2025) |
| **Phase 2 Upstream Fish Passage Evaluation (2010-2019)** | Comprehensive review of upstream fish passage since 2011 and evaluation of optimal operations for fish passage, with emphasis on Bull Trout (NorthWestern, *2019a*). | 2011-2019 |
| **Fish Passage Operations** | Weir mode evaluation (NorthWestern 2018)<br>Ladder Hydraulics Evaluation (NorthWestern, 2018a). | 2011-2019<br>2016, 2017 |
| **5-Year Thompson Falls Reservoir Monitoring Plan** | Fish surveys in West Fork Thompson River 2010. | 2010 |
| | Fish surveys in Fishtrap Creek in 2011. | 2011 |
| | Fish surveys in Lazier Creek, Indian Creek, Twin Lakes Creek, and Big Rock Creek in 2013. | 2013 |
| | Fish surveys in Murr Creek in 2014. | 2014 |
| | Thompson River drainage baseline database review, 1973-2011. | 1973-2011 |
| | GEI and Steigers (2013) prepared the *Thompson River Bull Trout Enhancement and Recovery Plan.* | 2012 |
| | Glaid (2017) completed a multi-year study (2014-2015) on juvenile Bull Trout outmigration from the Thompson River drainage. | 2014-2015 |
| **Fish Consumption Guidelines** | FWP tested two Northern Pike in Thompson Falls Reservoir in 2014 (Selch, 2015). | 2014 |
| | Mercury assessment in lower Clark Fork reservoirs, including some samples in Thompson Falls Reservoir (Selch, 2017). | 2015 |
| **Macroinvertebrates** | 2 Sites in Project area (Montana Biological Survey/Stag Benthics, *2019*). | 2019 |
| **Pathogens** | Lower Clark Fork River Fisheries Pathogens Study (*Cores, 2019*). | 2019 |

### 5.16.2 *Upstream Fish Passage Mitigation Measures*

The Licensee completed construction of an upstream fish passage facility at the Main Channel Dam in 2010. The upstream fish passage facility, designed and built in collaboration with FWS and other TAC members, began operating in 2011. NorthWestern continues to collaborate with FWS and other TAC members to evaluate, assess, and optimize upstream fish passage for Bull

Trout, native salmonids, and nonnative sport fish with the ultimate goal of providing volitional upstream fish passage.

### 5.16.3 *Downstream Passage Mitigation Measures*

NorthWestern provides $100,000 annually to an AMFA designated to conduct offsite habitat restoration or acquisition in upstream Bull Trout spawning and rearing tributaries. The purpose of AMFA-funded projects is to increase recruitment of juvenile Bull Trout, and to mitigate for incidental take of Bull Trout that may be caused by limited downstream passage through Project turbines and spillways. These habitat projects are in addition to studies, monitoring activities, report development, operations of the upstream fish passage facility, gas abatement monitoring, and other NorthWestern-funded efforts to reduce impacts on Bull Trout caused by operation of the Project.

A MOU among NorthWestern, the FWS, FWP, and CSKT specifies how the AMFA funding provided by NorthWestern is allocated by the TAC annually for the purpose of downstream Bull Trout (and other fish) passage mitigation measures (MOU, 2008). The MOU, which was originally implemented in 2008, was renewed in 2013 and now expires December 31, 2020. NorthWestern is coordinating with TAC members to extend the existing MOU through December 31, 2025 (the present license expiration date).

NorthWestern coordinates with TAC members throughout the year and any qualifying proposal(s) submitted during the year are distributed to the TAC members for review and approval. A summary of projects funded by the TAC since 2009 is provide in Table 5-6. NorthWestern has spent a total of $1,148,123 on this program between 2009 and 2019.

**Table 5-7. Summary of Projects TAC approved for funding from the Licensee through the MOU that focuses on downstream Bull Trout passage mitigation measures, 2009-2019.**

| Year | **Project Name** - Project Description | Project Submitted By | Funding Approved by TAC |
|---|---|---|---|
| 2009-2010 | **Oregon Gulch Mine Restoration** – A tributary to Cedar Creek near Superior, MT flows into the Middle Clark Fork River. Fluvial Bull Trout documented to spawn in lower Oregon Gulch. Project objective is to restore about 2,000 feet of stream channel and 10 acres of adjacent floodplain and wetlands. | Trout Unlimited, FWP | $15,000 in 2009<br>$51,500 in 2010 |
| 2009, 2010, 2011, 2012, 2014, 2016, 2017 | **Bull Trout DNA Sampling, Clark Fork River** – Funds available for processing genetic samples taken of Bull Trout to improve genetic assignment database in the Lower Clark Fork River drainage. | Licensee | $5,000 in 2009,<br>$5,000 in 2010,<br>$5,000 in 2011,<br>$5,000 in 2012,<br>$10,000 in 2014,<br>$10,000 in 2016,<br>$16,500 in 2017,<br>$10,000 in 2018 |
| 2009-2010 | **Fish Creek Aquatic Passage Enhancement** – Fish Creek is a tributary to the Middle Clark Fork River and supports a fluvial Bull Trout population. Project objective is to restore unimpeded aquatic passage at three sites within the Fish Creek drainage. | Trout Unlimited, FWP, Nature Conservancy | $24,000 in 2009<br>$37,770 in 2010 |
| 2010 | **Big Rock Creek Road Rehabilitation** – A tributary to the Thompson River which flows into the Lower Clark Fork River about 6 miles upstream of the Project and supports a resident population of Westslope Cutthroat Trout and Bull Trout. Project focused on providing stability and habitat to a meander bend that washed a portion of the road out, and to scarify and heavily revegetate the remnant road. Stabilizing the area will reduce sediment inputs and provide cover for fish and improve riparian area and channel form and function. | FWP | $6,000 |
| 2012 | **Large Woody Debris (LWD) Placement in South and West Fork Fish Creek** – Project will place 21 structures of LWD in 5 reaches. DNRC donated trees and assistance. | Trout Unlimited | $20,000 |
| 2012 | **Thompson River Drainage Evaluation Plan** – Produce a Bull Trout Recovery and Restoration Plan for the Thompson River drainage. Evaluate water temperatures in the drainage during the summer. | Licensee | $39,475 |
| 2012, 2014 | **Main Stem Fish Creek Land Acquisition** – Hulme Property – Funding used for the purchase of two private inholdings (80-acre and 148-acre parcels) along the lower main stem of Fish Creek to conserve vital Bull Trout habitat, provides a key migratory corridor and sub-adult rearing area for fluvial Bull Trout. FWP will own and include property in the Fish Creek Wildlife Management Area. Properties contain about 40 acres of riparian land and over 4,000 feet of Fish Creek channel. | Five Valleys Lands Trust and FWP | $115,300 in 2012<br>$120,000 in 2014 |

| **Year** | **Project Name -** Project Description | **Project Submitted By** | **Funding Approved by TAC** |
|---|---|---|---|
| 2013, 2014, 2015, 2016 | **Juvenile Bull Trout Outmigration of the Thompson River and into and through Thompson Falls Reservoir** (Montana State Study) – Characterize movement of juvenile Bull Trout in the Thompson river and through Thompson Falls. The objective was to calculate travel time, describe travel rout, describe habitat use, and estimate survival. Glaid (2017) prepared a Master's Thesis summarizing results. A technical memo summarizing information is also available on the Project website. | Montana State University, FWP | $37,932 in 2013, $50,405 in 2014, $50,966 in 2015, $24,669 in 2016 |
| 2013 | **Update Jocko River Drainage Bull Trout Genetics** - Update the Jocko River drainage baseline for the Bull Trout genetics assignment database. Jocko River is a fourth order tributary to the Flathead River. Portions of the drainage are designated as critical habitat for Bull Trout, and collectively these areas comprise the Jocko River Core Area. | CSKT | $5,280 |
| 2014 | **Thompson River Fish Surveys** – Survey streams in Thompson River for Bull Trout presence; fish surveys in Murr Creek, Mudd Creek, Alder Creek. | FWP | $29,933 |
| 2014 | **Strategic Prioritization of Native Trout Restoration Actions in the Lower Clark Fork Using Spatially Explicit Decision Support Modeling** – Providing support for development of model. | FWS | $ 6,704 |
| 2014 | **Bull Trout Sex Identification Marker** – Support funding for rapid response analysis. Abernathy Fish Technology Center has acquired the Bull Trout sex identification marker and is planning on incorporating this marker into their normal rapid response Bull Trout analysis. | Avista | $ 2,000 |
| 2014 | **Prospect Creek Remote PIT Tag Reader (HDX tags)** – A tributary to the Lower Clark Fork River, located about 0.5 mile downstream of the Main Dam at Thompson Falls. The goal is to install HDX PIT tag antenna arrays in the Prospect Creek drainage to monitor movements of PIT tagged adult and juvenile Bull Trout that migrate through the drainage. Avista installed a temporary HDX PIT Tag array in lower Prospect Creek. It was operational through mid-May (2014) when the upper and lower antenna broke. The array was reinstalled in August 27 and operational for the remainder of 2014 season. | Avista | $ 2,507 |
| 2015 | **Update Little Joe Creek Bull Trout Genetics** – Update baseline data for Bull Trout in Little Joe Creek to accomplish routine updates to the lower Clark Fork genetic assignment database. The database is used to ensure correct assignment and transport of lower Clark Fork adult Bull Trout to their geographic basin of origin. | FWP | $3,000 |

| Year | **Project Name** - Project Description | Project Submitted By | Funding Approved by TAC |
|---|---|---|---|
| 2015 | **West Fork Fish Creek Land Acquisition** – Rehbein Property – This parcel contains approximately 60 acres of riparian area and more than 10,000 feet of perennial stream channel (Bull Trout critical habitat), including West Fork Fish Creek, lower Bear Creek and lower Trail Creek (Middle Clark Fork River drainage). The West Fork Fish represents the migratory corridor for the two major Bull Trout spawning and rearing areas in Fish Creek (upper North and West Forks) and the two smaller tributaries that support viable westslope cutthroat trout populations. The project would permanently protect a significant reach of the West Fork of Fish Creek and the lower portions of two tributaries from habitat degradation and facilitate enhancement activities along the stream corridor important to Bull Trout and Westslope Cutthroat Trout. | FWP | $40,000 |
| 2016 | **Cedar Creek Road Relocation and LWD Enhancement Phase 2** – Cedar Creek flows northeast from the Idaho/Montana state line for approximately 20 miles before flowing into the Middle Clark Fork River. Cedar Creek is listed as a Priority Bull Trout Watershed by the Forest Service and was designated as core Bull Trout habitat by the Montana Bull Trout Scientific Group. Phase II includes rerouting a 0.18 section of road away from Cedar Creek and installing LWD in that section of stream to connect with work completed in 2015. This reroute section would be one of the largest within the project area and further reduce sediment and provide for properly functioning channel and floodplain processes. Approximately 5-10 LWD structures would be augmented within this area to provide habitat, promote stream meandering and substrate sorting. | Trout Unlimited<br>USFS | $30,000 |
| 2016 | **Beartrap Fork Culvert Removal** (implemented in 2018) – Beartrap Fork is a large tributary to Radio Creek which flows into Fishtrap Creek in the Thompson River drainage. West Fork Fishtrap is an important for Bull Trout and Westslope Cutthroat providing spawning and rearing habitat. The cool water inputs from Beartrap Creek illustrate the importance to Fishtrap mainstem and the potential for Beartrap to at least provide thermal refuge to Bull Trout. The culvert on Beartrap Fork was identified as a partial fish barrier at higher flows, and possibly at low summer/fall flows. The Project will remove the culvert and reconstruct the stream channel providing 5 miles of upstream access. | USFS | $11,000 |

| **Year** | **Project Name** - Project Description | **Project Submitted By** | **Funding Approved by TAC** |
|---|---|---|---|
| 2016 | **Rattlesnake Creek Fish Screen Phase 1** – Rattlesnake Creek flows for 26 miles, beginning in the Rattlesnake Wilderness north of Missoula, Montana and ending at its confluence with the Middle Clark Fork River. Rattlesnake Creek is one of the major sources of trout recruitment for the middle Clark Fork River, a 100-mile reach of river located between Missoula and the Flathead River confluence. It supports a significant population of migratory Bull Trout and is one of only 6 major tributaries in the area known to support fluvial spawning. The creek also supports populations of native westslope cutthroat trout, mountain whitefish and sculpin, as well as rainbow trout, brown trout, and brook trout. The Project will include survey and design on the four irrigation diversions that do not currently have functional fish screens. | Trout Unlimited<br>FWP | $13,125 |
| 2016,<br>2017,<br>2018,<br>2019 | **Thompson River Coordinator** – Funding for the Thompson River watershed coordinator, whom works for the Lower Clark Fork Watershed Group (LCFWG) a 501(c)(3) non-profit that works to facilitate collaborative restoration in the tributaries of the Lower Clark Fork River for the benefit of water quality, native fish and wildlife. The Coordinator will work with partners in the Thompson River area to identify possible habitat improvement projects and opportunities through which NorthWestern could continue its efforts to recover native fish populations. Additionally, the Coordinator would work to secure grant funding sources and work with additional partners/landowners in the drainages in order to assist with large-scale projects. | FWP | $16,500 in 2016,<br>$10,000 in 2017,<br>$16,500 in 2018,<br>$9,900 in 2019 |
| 2018 | **Lower Fish Creek Property Acquisition** – Koch In-holding - Among FWP’s purposes for purchasing the land (78 acres) is the objective to enhance fish and wildlife species and prevent this habitat from potentially being subdivided for development. More specifically, to “protect some of the last and best remaining habitat for Bull Trout and Westslope Cutthroat Trout in the Clark Fork region by securing 1.2 miles of stream frontage and riparian habitat along Fish Creek.” | FWP | $60,000 |
| 2018,<br>2019 | **Crow Creek Design Phase 1 and Phase 2** – Crow Creek is a tributary to Prospect Creek which enters into the Lower Clark Fork River in the upper Noxon Reservoir (downstream of Thompson Falls Dam). Project is focused on design and implementation of channel restoration to improve channel pattern and profile, sinuosity, habitat diversity and complexity for native species such as Bull Trout, Westslope Cutthroat, and Cedar Sculpin. | FWP | $30,000 in 2018<br>$51,500 in 2019 |

| Year | **Project Name** - Project Description | Project Submitted By | Funding Approved by TAC |
|---|---|---|---|
| 2018, 2019 | **Rattlesnake Dam Removal, Phase 1 and Rattlesnake Dam Removal** – Since that time the Dam has served no water storage or delivery purpose (and is no longer even viable as a back-up municipal system) but has continued to impact fish migrations and river processes (e.g., floodplain connections, sediment transport). The Project will restore habitat for native fish (e.g., Bull Trout, Westslope Cutthroat Trout) and terrestrial wildlife, improving water quality in Rattlesnake Creek, improving riparian function and floodplain connectivity. Phase 1 – design. Phase 2 – project permitting, final design, and bid development. | Trout Unlimited | $20,000 in 2018, $50,000 in 2019 |
| 2018 | **Prospect Remote PIT Tag Array System** – Installation of a remote PIT tag array near the mouth of Prospect to monitor PIT-tagged fish in the system. Array system will provide directionality and function year-round. | Avista, Licensee | $30,000 |
| 2018, 2019 | **Misc. Funding** – Funds available for processing genetic samples taken of Bull Trout to improve genetic assignment database in the Lower Clark Fork River drainage. Allows for immediate funding of equipment, stream restoration assessments or other conditions that may require urgent attention. | Licensee | $10,000 in 2018 $10,000 in 2019 |
| 2019 | **West Fork Fishtrap Creek Road Realignment** – Fishtrap Creek and tributaries provide important Bull Trout habitat for spawning and rearing. The Project has the following objectives: 1) Build new connector road between existing roads #7609 and #516 perpendicular to Fishtrap Creek. 2) Decommission approximately 600 feet of existing road #7609 parallel to mainstem Fishtrap Creek. 3) Reconstruct floodplain and stabilize newly constructed streambank and floodplain with large woody debris placement and woody vegetation. | USFS, Lower Clark Fork Watershed Group | $30,627 |
| | **TOTAL 2009-2019** | | **$1,148,123** |

# 6. Wildlife and Botanical Resources

This section provides a description of the wildlife and botanical resources within the Project boundary with the understanding that wildlife resources may move in and out of the physical boundaries of the Project. Therefore, areas adjacent to or near the Project are included in the description of wildlife and botanical resources to provide an overall context of the larger geographic area used by wide-ranging wildlife species. Botanical resources are grouped according to vegetative communities or habitat types with some individual species analysis. Habitat types help determine actual and potential occurrence of wildlife species. Wetland, riparian, and littoral habitats are specifically addressed in Section 7.

Information regarding the current status of wildlife, specifically big-game species and birds, was obtained through consultation with FWP wildlife biologist Bruce Sterling (April 5, 2018) and USFS Plains/Thompson Falls Ranger District wildlife biologist Dave Wrobleski (April 5, 2018) and review of the Montana Natural Heritage Program (MNHP) database (March 2018) and Avian Knowledge Network (AKN, 2019). Wildlife and botanical surveys specific to the Project were completed in the 1980s (Wood and Olsen 1984; MPC 1982, 1982a). Rare, threatened, and/or endangered species as well as species of special status are addressed in Section 8.

## 6.1 Wildlife Resources

Wildlife populations in the Project area are abundant and diverse (Wood and Olsen, 1984). A summary of known species, though not an exhaustive list—including big-game, small furbearers, other mammals, waterfowl, raptors, and other bird species known to occur in the Project area is provided in Table 6-1. Species of special status by the state of Montana and/or federally are identified by an asterisk (*) and included in Section 8. Data used to develop Table 6-1 originated from surveys completed in the 1980s, communication with agency wildlife biologists managing resources in the area in 2018, and queries of available databases such as MNHP (2018) and AKN (2019).

Many of the birds listed in Table 6-1 are migratory and protected by the Migratory Bird Treaty Act (MBTA) of 1918. Migratory species range from ducks and aquatic birds to grassland and high-elevation, forest-dependent species.

**Table 6-1. Summary of wildlife species known to occur in the Project area[14].**

| Common Name | Scientific Name | Bird/ Mammal |
|---|---|---|
| Beaver | *Castor canadensis* | Mammal |
| Bighorn sheep* | *Ovis canadensis* | Mammal |
| Black bear | *Ursus americanus* | Mammal |
| Bobcat | *Lynx rufus* | Mammal |
| Elk | *Cervus canadensis* | Mammal |
| Fringed myotis* | *Myotis thysanodes* | Mammal |
| Grizzly bear* | *Ursus arctos horribilis* | Mammal |
| Mink | *Mustela vison* | Mammal |
| Moose | *Alces alces* | Mammal |
| Mountain lion | *Puma concolor* | Mammal |
| Mule deer | *Odocoileus hemionus* | Mammal |
| Muskrat | *Ondatra zibethicus* | Mammal |
| River otter | *Lontra canadensis* | Mammal |
| White-tailed deer | *Odocoileus virginianus* | Mammal |
| American coot | *Fulica americana* | Bird |
| American crow | *Corvus brachyrhynchos* | Bird |
| American dipper | *Cinclus mexicanus* | Bird |
| American goldfinch | *Spinus tristis* | Bird |
| American kestrel | *Falco sparverius* | Bird |
| American redstart | *Setophaga ruticilla* | Bird |
| American robin | *Turdus migratorius* | Bird |
| American wigeon | *Mareca americana* | Bird |
| Bald eagle* | *Haliaeetus leucocephalus* | Bird |
| Barn swallow | *Hirundo rustica* | Bird |
| Barrow's goldeneye | *Bucephala islandica* | Bird |
| Belted kingfisher | *Megaceryle alcyon* | Bird |
| Black-chinned hummingbird | *Archilochus alexandri* | Bird |
| Black-capped chickadee | *Poecile atricapillus* | Bird |
| Black-headed grosbeak | *Pheucticus melanocephalus* | Bird |
| Blue jay | *Cyanocitta cristata* | Bird |
| Blue-winged teal | *Anas discors* | Bird |
| Brewer's blackbird | *Euphagus cyanocephalus* | Bird |
| California scrub-jay | *Aphelocoma californica* | Bird |

[14] *Sources*: MPC, 1982; 1982a; Wood and Olsen, 1984; D. Wrobleski, USFS, Wildlife Biologist, personal communication, April 5, 2018; B. Sterling, FWP, personal communication, April 5, 2018; MNHP, 2018; AKN, 2019

| Common Name | Scientific Name | Bird/ Mammal |
|---|---|---|
| Calliope hummingbird | *Selasphorus calliope* | Bird |
| Canada goose | *Branta canadensis* | Bird |
| Cassin's vireo | *Vireo cassinii* | Bird |
| Cedar waxwing | *Bombycilla cedrorum* | Bird |
| Chipping sparrow | *Spizella passerina* | Bird |
| Clark's nutcracker* | *Nucifraga columbiana* | Bird |
| Common golden eye | *Bucephala clangula* | Bird |
| Common merganser | *Mergus merganser* | Bird |
| Common nighthawk | *Chordeiles minor* | Bird |
| Common raven | *Corvus corax* | Bird |
| Common yellowthroat | *Geothlypis trichas* | Bird |
| Cooper’s hawk | *Accipiter cooperii* | Bird |
| Cordilleran flycatcher | *Empidonax occidentalis* | Bird |
| Dark-eyed junco | *Junco hyemalis* | Bird |
| Downy woodpecker | *Dryobates pubescens* | Bird |
| Dusky flycatcher | *Empidonax oberholseri* | Bird |
| Eastern kingbird | *Tyrannus tyrannus* | Bird |
| European starling | *Sturnus vulgaris* | Bird |
| Evening grosbeak* | *Coccothraustes vespertinus* | Bird |
| Gadwall | *Anas strepera* | Bird |
| Golden-crowned kinglet | *Regulus satrapa* | Bird |
| Gray catbird | *Dumetella carolinensis* | Bird |
| Gray jay | *Perisoreus canadensis* | Bird |
| Great blue heron* | *Ardea herodias* | Bird |
| Hairy Woodpecker | *Dryobates villosus* | Bird |
| Hammond's flycatcher | *Empidonax hammondii* | Bird |
| Hermit thrush | *Catharus guttatus* | Bird |
| Hooded merganser | *Lophodytes cucullatus* | Bird |
| House finch | *Haemorhous mexicanus* | Bird |
| House sparrow | *Passer domesticus* | Bird |
| Lazuli bunting | *Passerina amoena* | Bird |
| Least flycatcher | *Empidonax minimus* | Bird |
| Lesser scaup | *Aythya affinia* | Bird |
| MacGillivray's warbler | *Geothlypis tolmiei* | Bird |
| Mallard | *Anas platyrhynchos* | Bird |
| Merlin | *Falco columbarius* | Bird |
| Mountain chickadee | *Poecile gambeli* | Bird |

| Common Name | Scientific Name | Bird/ Mammal |
|---|---|---|
| Mourning dove | *Zenaida macroura* | Bird |
| Northern flicker | *Colaptes auratus* | Bird |
| Northern flicker (Red-shafted) | *Colaptes auratus cafer* | Bird |
| Northern pintail | *Anas acuta* | Bird |
| Northern rough-winged swallow | *Stelgidopteryx serripennis* | Bird |
| Northern waterthrush | *Parkesia noveboracensis* | Bird |
| Olive-sided flycatcher | *Contopus cooperi* | Bird |
| Orange-crowned warbler | *Oreothlypis celata* | Bird |
| Osprey | *Pandion haliaetus* | Bird |
| Pacific wren | *Troglodytes pacificus* | Bird |
| Pied-billed grebe | *Podilymbus podiceps* | Bird |
| Pileated woodpecker | *Dryocopus pileatus* | Bird |
| Pine siskin | *Spinus pinus* | Bird |
| Pygmy nuthatch | *Sitta pygmaea* | Bird |
| Red crossbill | *Loxia curvirostra* | Bird |
| Red-breasted nuthatch | *Sitta canadensis* | Bird |
| Red-eyed vireo | *Vireo olivaceus* | Bird |
| Red-naped sapsucker | *Sphyrapicus nuchalis* | Bird |
| Red-tailed hawk | *Buteo jamaicensis* | Bird |
| Red-winged blackbird | *Agelaius phoeniceus* | Bird |
| Ringed-neck duck | *Aythya collaris* | Bird |
| Rock pigeon | *Columba livia* | Bird |
| Ruby-crowned kinglet | *Regulus calendula* | Bird |
| Ruffed grouse | *Bonasa umbellus* | Bird |
| Rufous hummingbird | *Selasphorus rufus* | Bird |
| Song sparrow | *Melospiza melodia* | Bird |
| Spotted sandpiper | *Actitis macularius* | Bird |
| Spotted towhee | *Pipilo maculatus* | Bird |
| Steller's jay | *Cyanocitta stelleri* | Bird |
| Swainson's thrush | *Catharus ustulatus* | Bird |
| Townsend's solitaire | *Myadestes townsendi* | Bird |
| Townsend's warbler | *Setophaga townsendi* | Bird |
| Tree swallow | *Tachycineta bicolor* | Bird |
| Trumpeter swan | *Cygnus buccinator* | Bird |
| Turkey vulture | *Cathartes aura* | Bird |
| Varied thrush* | *Ixoreus naevius* | Bird |

| Common Name | Scientific Name | Bird/ Mammal |
|---|---|---|
| Vaux's swift | *Chaetura vauxi* | Bird |
| Violet-green swallow | *Tachycineta thalassina* | Bird |
| Warbling vireo | *Vireo gilvus* | Bird |
| Western tanager | *Piranga ludoviciana* | Bird |
| Wild turkey | *Meleagris gallopavo* | Bird |
| Willow flycatcher | *Empidonax traillii* | Bird |
| Wilson's warbler | *Cardellina pusilla* | Bird |
| Wood duck | *Aix sponsa* | Bird |
| Yellow warbler | *Setophaga petechia* | Bird |
| Yellow-rumped warbler | *Setophaga coronata* | Bird |

*= Species of special status.

The bottomlands provide important winter-feeding habitat for wildlife, especially during harsh winters for deer and other ungulates that typically remain in higher elevations. Douglas-fir and larch stands with their needles and the understory shrub community represented by mountain berry, service berry, and lichen provide foraging opportunities for wildlife. Many big-game species utilize the areas near the Project either seasonally or year-round.

The assemblage of islands located immediately upstream of the confluence with the Thompson River provide important habitat for many species including elk, black bear, whitetail, bald eagle, other bird species as well as resident and migratory waterfowl. It is estimated that about 40 to 50 elk also use the islands for calving each spring (B. Sterling, FWP, personal communication, April 5, 2018).

One species closely monitored by FWP is the bighorn sheep. Bighorn sheep are vulnerable to collisions with cars (and trains) on Highway 200 where the road is confined by near vertical talus slopes to the north and the rail-line and the Clark Fork River to the south. FWP estimates the population of the Thompson Falls bighorn sheep heard is approximately 75–80 individuals (B. Sterling, FWP, personal communication, April 5, 2018). Bighorn sheep do not use the immediate area around the Project boundary but tend to congregate west of the Project between October/November and April/May (MPC, 1982; B. Sterling, FWP, personal communication, April 5, 2018). One popular area for the public to view bighorn sheep and other wildlife is the 1,535-acre Mount Silcox Wildlife Management Area (WMA) located northeast of the town of Thompson Falls.

Other wildlife species that are likely to pass through the Project but are not commonly observed include moose, grizzly bear, and North American wolverine (wolverine). In April 2018, FWP confirmed a grizzly bear sighting east of the Project in Buffalo Bill Creek (Weeksville Creek drainage) and in 2016, FWP confirmed a radio-collared grizzly bear was in the Thompson River drainage. Wolverines have also been documented in the Thompson River drainage and in the Weeksville Creek drainage (B. Sterling, FWP, personal communication, April 5, 2018).

The river corridor between the towns of Thompson Falls and Plains provides optimal nesting habitat for peregrine falcon and bald eagles. Peregrine falcon nesting sites were located about one every 5 miles in cliffs along the Clark Fork River where they can dive for prey such as ducks and other small birds (D. Wrobleski, USFS, Wildlife Biologist, personal communication, April 5, 2018). Bald eagle nests were located about one every 5 miles, including one located along the Thompson Falls Reservoir and one in the islands just upstream of confluence with the Thompson River (D. Wrobleski, USFS, Wildlife Biologist, personal communication, April 5, 2018).

LNF has designated elk, goshawk, and pileated woodpecker as wildlife management indicator species for the LNF (D. Wrobleski and J. Hanson, USFS, personal communication, March 6, 2018). Management indicator species are used by LNF to assess the effects of management activities and forest plan implementation.

### 6.1.1 *Commercial, Recreation, or Cultural Value of Wildlife Species*

Residents and non-resident visitors are attracted to Montana for the recreation opportunities (*see* Section 9 for details) that the rugged outdoors and wild nature provide, including hunting. Hunting is a significant component of the culture in Montana (Eliason, 2008) and a significant economic contributor to the state economy (FWP, 2016). Hunting has various motivations and can be affiliated with spending time with friends and family, gathering meat for the family, enjoying the outdoors and nature, and/or personal achievement (Eliason, 2008). Sanders County is a hunting destination for various wildlife such as white-tailed deer, mule deer, Rocky Mountain elk, Shiras moose, mountain goat, bighorn sheep, mountain lion, and black bear. Big game hunting (for elk and deer) related expenditures in 2016 in Sanders County was estimated at 12.7 million dollars (FWP, 2016). Additional socioeconomic evaluation information is discussed in Section 10.

## 6.2 Habitat

The Project area is characteristic of a U-shaped river valley at approximately 2,400 feet (732 m) that is bounded by steep mountainous terrain that exceed 5,900 feet (1,798 m). The Cabinet Mountains border the north and the Coeur d’Alene Mountains extend along the south side of the Clark Fork River.

General vegetative habitat in the Project reflects mild Pacific maritime climate (Wood and Olsen, 1984). The general habitat types in the Project include aquatic, gravel bars, grasslands/hay meadows, human developed areas, riparian tree-shrubs/shrub steppe, and mixed deciduous/conifer forest (Wood and Olsen, 1984; MNHP, 2018). Aquatic habitat includes all open water areas associated with rivers, streams, ponds, sloughs, and marshes (including emergent vegetation zones along the edge of open water). Gravel bars are typically represented by less stable areas associated with islands and streambanks that are generally covered during high streamflow and are visible at lower flows and remain sparsely vegetated. Grasslands are dominated by sedges and rushes and influenced by the presence of an elevated water table. Agricultural hay bottoms and grain fields are included in this habitat type. Occasionally trees and/or shrubs are present in grasslands but they represent a small portion of the total canopy.

Land development includes cultivated lands of small grains and hay dispersed in the valley and residential development. Where land development is absent, the benches and slopes above the Clark Fork River are dominated by forests of Douglas-fir (*Pseudotsuga menziesii*), lodgepole pine (*Pinus contorta*), western larch (*Larix occidentalis*), and ponderosa pine (*Pinus ponderosa*). Broadleaf trees and shrubs are confined to the river's edge. Riparian tree-shrub/shrub steppe is associated with the riverine systems and is primarily black cottonwood (*Populus trichocarpa*) with deciduous shrub understory such as serviceberry (*Amelachier*), Rocky Mountain maple (*Acer glabrum*), and snowberry (*Symphoricarpos*). The mixed deciduous/conifer forest occupies the floodplain between the riparian vegetation and dense conifer forests and represents a mosaic of conifer trees (Douglas-fir, Ponderosa pine, lodgepole pine) and deciduous trees (cottonwood and birch) and shrubs (Wood and Olsen, 1984).

The two primary areas within the Project boundary where wildlife is more likely to be present include Island Park located between the Main Dam and Dry Channel Dam and the group of islands in the Clark Fork River located upstream of the confluence with the Thompson River. Both areas provide a mix of conifer dominated forests and woodlands, grasslands, wet meadow/herbaceous marshes, and floodplain/riparian areas. Land cover data provided by MNHP (2016) are the source for the land cover types shown in Figure 6-1.

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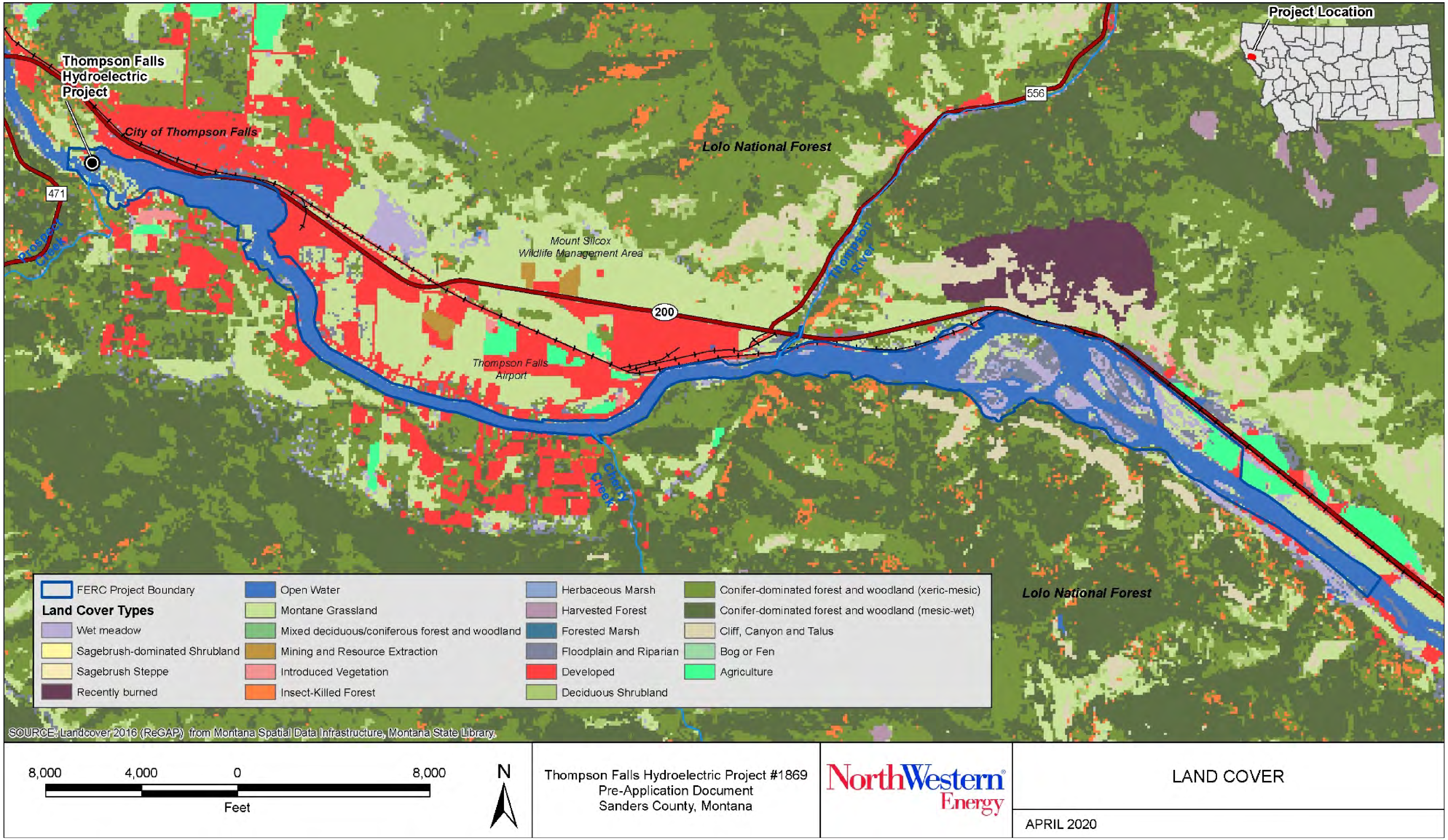
Figure 6-1. Thompson Falls Project and land cover types in Project Area (MNHP, 2016).



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### 6.2.1 *Invasive Species - Noxious Weeds*

Nonnative plant species, specifically invasive or noxious weeds, can adversely impact wildlife habitat and survival of native species and reduce the ecology integrity for aquatic and terrestrial systems. Invasive plant species such as noxious weeds are defined as, "any exotic plant species established or that may be introduced in the state that may render land unfit for agriculture, forestry, livestock, wildlife, or other beneficial uses or that may harm native plant communities…" (Montana Code Annotated § 7-22-2101)

Montana first introduced weed legislation in 1895 and established a noxious weed program in 1921. Since then several laws and rules have been added to strengthen weed management efforts and most recently in 2017, eight additional laws were enacted. In addition, Montana updated its Montana Noxious Weed Management Plan in 2017. The Montana County Weed Control Act specifies that the local county level is responsible for implementation and enforcement of noxious weed management.

NorthWestern refers to the Montana noxious weed list described below as guidance for prioritizing and targeting management efforts, if present in the area. Annually NorthWestern applies herbicides to control weeds on its property, including recreational trails, trailheads, and parking lots.

Montana Department of Agriculture (2018) maintains an updated state noxious weed list at https://agr.mt.gov/Weeds. The most recent Montana noxious weed list was issued in February 2017 (as of June 18, 2019). Montana's 2017 noxious weeds are delineated into the five groups:

- Priority 1A – These weeds are not present or have a very limited presence in Montana. Management criteria will require eradication if detected, education, and prevention.
- Priority 1B – These weeds have a limited presence in Montana. Management criteria will require eradication if detected, and education.
- Priority 2A – These weeds are common in isolated areas of Montana. Management criteria will require eradication or containment where less abundant. Management shall be prioritized by local weed districts.
- Priority 2B – These weeds are abundant in Montana and widespread in many counties. Management criteria will require eradication or containment where less abundant. Management shall be prioritized by local weed districts.
- Priority 3 – Regulated Plants (not Montana listed noxious weeds). These regulated plants have potential to have significant negative impacts. The plant may not be intentionally spread or sold other than as a contaminant in agricultural products. The state recommends research education and prevention to minimize the spread of the regulated plant.

Table 6-2 summarizes the Montana noxious weed list plus three species Sanders County has included in its 2018 management plan. Aquatic invasive plants such as Eurasian watermilfoil, curlyleaf pondweed, flowering rush, and yellow flag iris included on the Montana State noxious weed list are discussed in greater detail in Section 7.3.

**Table 6-2. Montana noxious weed list (2017) plus Sanders County noxious weeds (2018).**

| Classification | Common Name | Scientific Name |
|---|---|---|
| Priority 1A | Yellow starthistle | *Centaurea solstitialis* |
| | Dyer's woad | *Isatis tinctoria* |
| | Common reed | *Phragmites australis ssp. australis* |
| | Medusahead | *Taeniatherum caput-medusae* |
| Priority 1B | Knotweed complex | *Polygonum cuspidatum, P. sachalinense, P. × bohemicum, Fallopia japonica, F. sachalinensis, F. × bohemica, Reynoutria japonica, R. sachalinensis, and R.× bohemica* |
| | Purple loosestrife | *Lythrum salicaria* |
| | Rush skeletonweed | *Chondrilla juncea* |
| | Scotch broom | *Cytisus scoparius* |
| | Blueweed | *Echium vulgare* |
| Priority 2A | Tansy ragwort | *Senecio jacobaea, Jacobaea vulgaris* |
| | Meadow hawkweed complex | *Hieracium caespitosum, H. praealturm, H. floridundum, and Pilosella caespitosa* |
| | Orange hawkweed | *Hieracium aurantiacum, Pilosella aurantiaca* |
| | Tall buttercup | *Ranunculus acris* |
| | Perennial pepperweed | *Lepidium latifolium* |
| | Yellow flag iris | *Iris pseudacorus* |
| | Eurasian watermilfoil | *Myriophyllum spicatum, Myriophyllum spicatum x Myriophyllum sibiricum* |
| | Flowering rush | *Butomus umbellatus* |
| | Common buckthorn | *Rhamnus cathartica L.* |
| Priority 2B | Canada thistle | *Cirsium arvense* |
| | Field bindweed | *Convolvulus arvensis* |
| | Leafy spurge | *Euphorbia esula* |
| | Whitetop | *Cardaria draba, Lepidium draba* |
| | Russian knapweed | *Acroptilon repens, Rhaponticum repens* |
| | Spotted knapweed | *Centaurea stoebe, C.maculosa* |
| | Diffuse knapweed | *Centaurea diffusa* |
| | Dalmatian toadflax | *Linaria dalmatica* |
| | St. Johnswort | *Hypericum perforatum* |
| | Sulfur cinquefoil | *Potentilla recta* |
| | Common tansy | *Tanacetum vulgare* |
| | Oxeye daisy | *Leucanthemum vulgare* |
| | Houndstongue | *Cynoglossum officinale* |
| | Yellow toadflax | *Linaria vulgaris* |
| | Saltcedar | *Tamarix spp.* |
| | Curlyleaf pondweed | *Potamogeton crispus* |
| | Hoary alyssum | *Berteroa incana* |
| Priority 3 | Cheatgrass | *Bromus tectorum* |
| | Hydrilla | *Hydrilla verticillata* |
| | Russian olive | *Elaeagnus angustifolia* |
| | Brazilian waterweed | *Egeria densa* |

| Classification | Common Name | Scientific Name |
|---|---|---|
| | Parrot feather watermilfoil | *Myriophyllum aquaticum or M. brasiliense* |
| Sanders County | Medusahead<br>Baby's Breath<br>Common Mullein | *Taeniathum caput-medusa*<br>*Gypsophila paniculate*<br>*Verbascum thasus* |

## 6.3 Potential Adverse Impacts and Issues Related to Operation or Maintenance

As required by 18 CFR § 5.6(3)(i)(C), NorthWestern has identified the following known or potential adverse impacts of the Project as related to wildlife and botanical resources.

### 6.3.1 *Current Operations*

The Project is operated to provide baseload and flexible generation within the reservoir elevation and minimum flow requirements of the License. During flexible generation operations, the Licensee may use the top 4 feet of the reservoir from full pond while maintaining minimum flows. For several reasons, the full 4 feet typically have not been used over the past 20 years of operation.

The presence of disturbed land, vehicle traffic, and pedestrian traffic entering and existing the Project provides a vector for introducing noxious weeds. Sources for noxious weeds on Project lands may be upstream or are brought to Project lands by various wildlife vectors (birds, ungulates, small mammals), and anthropogenic sources (vehicles, recreationists, etc.). Noxious weeds are most common in disturbed areas (e.g., around hardscaped areas, gravel parking areas, around buildings/infrastructure, areas cleared of vegetation, etc.). Noxious weeds can impact wildlife by crowding out indigenous grasses and forbs that wildlife eat, reducing the amount of available forage. NorthWestern engages in annual control measures for noxious weeds on NorthWestern-owned property.

### 6.3.2 *Proposed Future Operations*

NorthWestern proposes that the Thompson Falls Project continue to provide baseflow generation and meet flexible capacity needs. Under normal operations, NorthWestern will maintain the reservoir between El. 2396.5 and 2394 feet (2.5 feet below normal full operating level) and maintain a minimum flow downstream of the lesser of 6,000 cfs or inflow. No new impacts to wildlife and botanical resources are anticipated from future operations.

## 6.4 Resource Protection and Mitigation Measures

This section describes protection, mitigation, and enhancement measures that have been undertaken at the Project or that are currently ongoing.

As a land-owner NorthWestern recognizes the importance of minimizing and mitigating the presence and potential dispersal of noxious weeds. Annually, NorthWestern implements control measures on its lands for noxious weeds in high use disturbed areas where weeds are more likely to occur (e.g., trailheads, parking lots, buildings).

During the 1990 License amendment proceeding, FWP prepared a wildlife management plan for the Project that included the following measures: 1) improving white-tailed deer winter range; 2) using prescribed fire to maintain grasslands; 3) developing a brood rearing area for Canada geese; 4) cutting vegetation to improve forage quantity and quality; 5) putting up signs to restrict access during the waterfowl nesting and brood rearing seasons; 6) establishing conservation easements to protect private lands for wildlife; 7) placing 19 goose nesting structures, 10 osprey nesting platforms, 12 wood duck boxes, nine bluebird boxes, and 21 bat houses; and 8) monitoring bird nesting and hatching success (FWP, 1985).

On September 6, 1989, MPC entered into an agreement with FWP to carry out the wildlife management plan for the wildlife and wildlife habitat mitigation. The Licensee deposited $123,000 in a trust fund to finance implementation of the Plan.

# 7. Wetland, Riparian, and Littoral Habitats

This section provides a description of the wetland, riparian, and littoral habitats within the FERC Project boundary as well as macrophyte surveys completed within the Thompson Falls Reservoir. Macrophyte surveys include an evaluation of aquatic invasive species identified in the littoral zone of the reservoir as well as review of FWP's statewide database (2020) on the current distribution of aquatic invasive species.

Floodplains, wetlands, riparian areas, and littoral zones are often interconnected. Floodplains are flat, low-elevation areas adjacent to the river or lake that are subject to periodic flooding during times of high flow (Allen, 1995). Riparian areas are part of the floodplain and represent the transitional interface between land and water and generally describe the river bank. The flood plain or riparian zone may also include a complex of wetlands (Tockner and Stanford, 2002). Wetlands refer to land that is wet for some period of time during the growing season, supports predominantly hydrophytic vegetation, and the substrate is mostly undrained hydric soils (Cowardin et al., 1979). Wetlands support both aquatic and terrestrial species. Littoral zones provide the fringe habitat along the shoreline that supports the growth of aquatic plants. Aquatic plants may be emergent, submerged or floating.

## 7.1 Existing Wetland, Riparian and Littoral Habitats

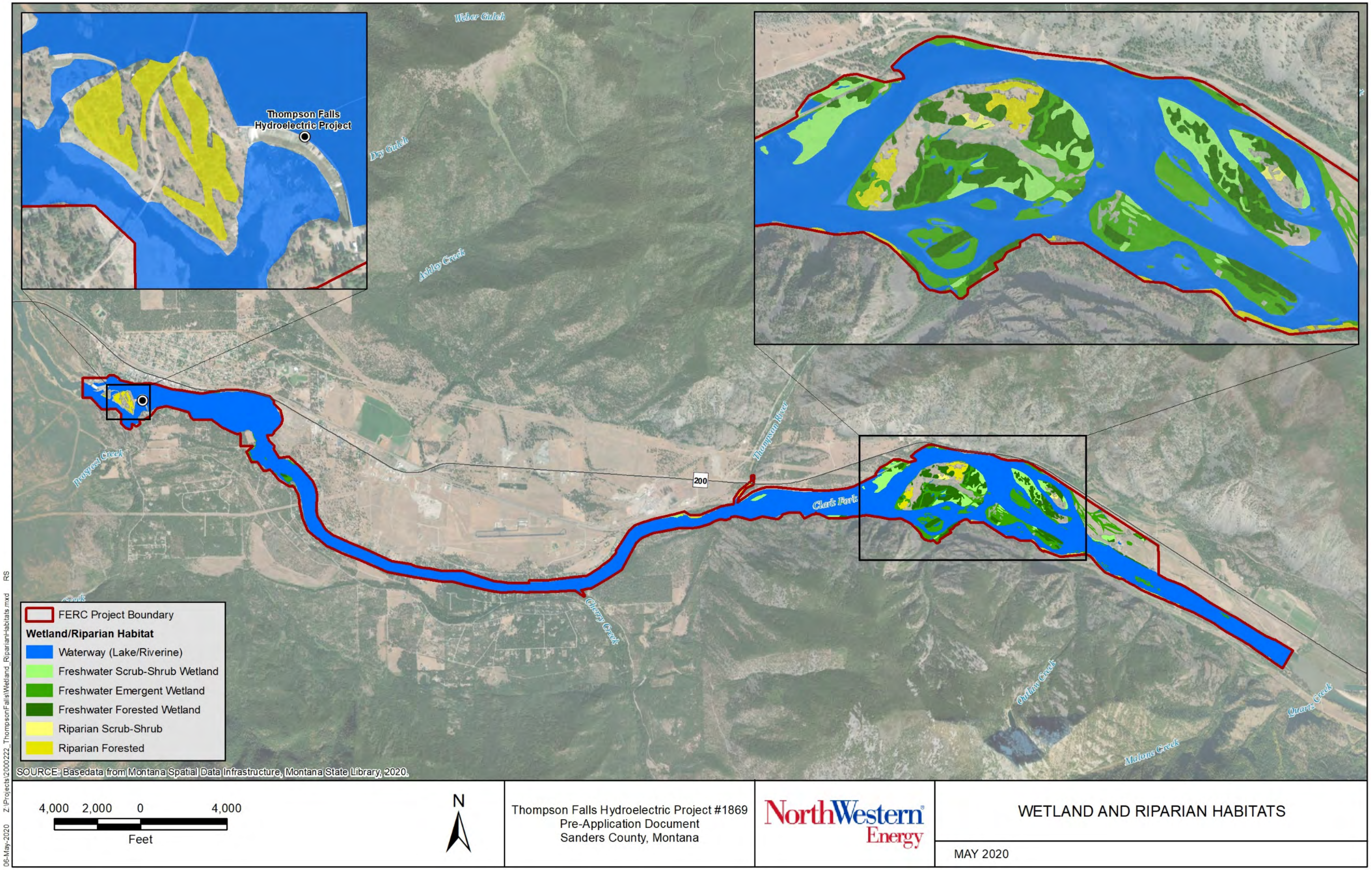
Riparian and wetland data were obtained from the Montana Spatial Data Infrastructure (MSDI, 2020). Wetland and riparian habitats within the Project boundary are limited (Figure 7-1). There is riverine riparian habitat along the shoreline and there are dispersed wetland areas and shallow channels around the islands at the upper extent of the Project boundary near the confluence of the Thompson River (MSDI, 2020). Some aquatic plant communities are native, while some species are invasive and less desirable (Madsen and Cheshier, 2009; Hansen Environmental, 2016). These habitat types (riparian, wetland, littoral) provide cover, shelter, food, nesting/breeding area for various types of species. The aforementioned islands provide important riparian/wetland habitat utilized by various wildlife in the area (*refer to* Section 6.1).

A summary of the illustrated wetland, and riparian habitat types shown in Figure 7-1 is provided in Table 7-1 with the respective acreage within the Project boundary.

**Table 7-1: Wetland, riparian, and waterway habitat types identified in the Thompson Falls Project (MSDI, 2020).**

| Wetland and Riparian Habitat Type | Area in FERC boundary (acres) |
|---|---|
| Freshwater Emergent Wetland | 131 |
| Waterways (Lake/Riverine/Pond) | 1372 |
| Freshwater Forested/Shrub Wetland | 171 |
| Forested/Shrub Riparian | 45 |
| **Total** | **1,719** |

**Figure 7-1: Montana wetland and riparian habitats within the FERC Project boundary (MSDI, 2020).**



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### 7.1.1 *Species Using Wetland, Riparian Habitat*

Aquatic and terrestrial animal species that use various habitats within the Project are discussed in Section 6 (Wildlife and Botanical Resources) and Section 8 (Threatened, Endangered, Proposed, Candidate Sensitive Species, and Species of Concern).

### 7.1.2 *Macrophyte Survey of Littoral Habitat*

Aquatic vegetation surveys in Thompson Falls Reservoir and other reservoirs in the Lower Clark Fork River were conducted in 2008, Figure 7-2 (Madsen and Cheshier, 2009) and in 2016, Figure 7-3 (Hansen Environmental, 2016) and managed by the Sanders County Aquatic Invasive Plants Task Force. Surveys were completed in August in both years.

In 2008, the Thompson Falls Reservoir was described as having good water clarity. The littoral zone area, where light will penetrate to the substrate, was defined as 25 feet deep, which covers approximately 65 percent of the Thompson Falls Reservoir (Madsen and Cheshier, 2009). However, depths between 12 and 23 feet were not suitable for plant colonization in most areas due to steep slopes. Aquatic plants were present in about 63 percent of the 40 sites surveyed in the Thompson Falls Reservoir (Figure 7-2). A total of nine species were recorded in the littoral zone. Aquatic plants were not present at depths greater than 11 feet. The aquatic plant community was dominated by native species Eloda (*Elodea Canadensis*), coontail (*Ceratophyllum demersum*), and northern watermilfoil (*Myriophyllum sibiricum*). Nonnative invasive species observed include curlyleaf pondweed (*Potamogeton cripus*) (~ 77 acres [~0.3 $km^2$]) and flowering rush (*Butomus umbellatus*) (~ 28 acres [~0.1 $km^2$]) (Madsen and Cheshier, 2009).

In 2016, Hansen Environmental surveyed 112 points in the Thompson Falls Reservoir at depths less than 15 feet (Figure 7-3). There were 11 species of aquatic plants identified and no aquatic plants were observed at depths greater than 13 feet. The aquatic plant community included primarily native species with the most dominant native plants represented by Eloda, coontail, and northern watermilfoil and other native plants including Chara (*Chara* spp.), water stargrass (*Heteranthera dubia*), white water buttercup (*Ranunclus aquatilis*), leafy pondweed (*P. foliosus*), sago pondweed (*P. pectinatus*), and Richardson's pondweed (P. rishardonsii). The two non-native species observed in the 2008 and 2016 surveys were flowering rush and curlyleaf pondweed (Madsen et al., 2009; Madsen and Cheshier, 2009; Hansen Environmental, 2016). Curlyleaf pondweed was observed at 19 percent of the sites, and flowering rush was observed at 13 percent of the sites (Hansen Environmental, 2016). Although sampling methods differed between the 2008 and 2016 surveys, Hansen Environmental (2016) concluded the occurrence of these two-nonnative species appeared similar to 2008 results.

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**Figure 7-2: Thompson Falls Reservoir aquatic plant survey points, August 2008 (Source: Madsen and Cheshier, 2009).**

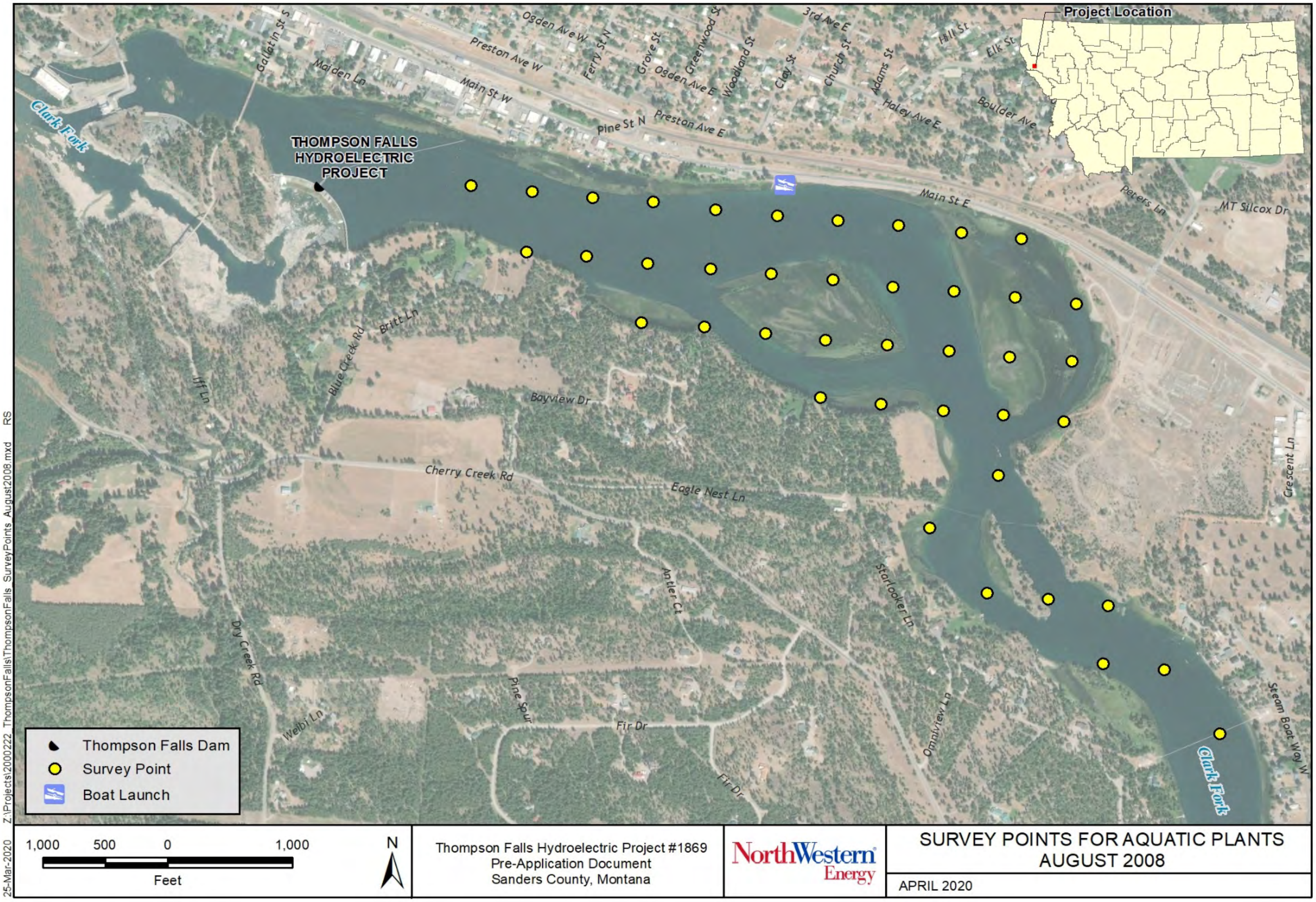
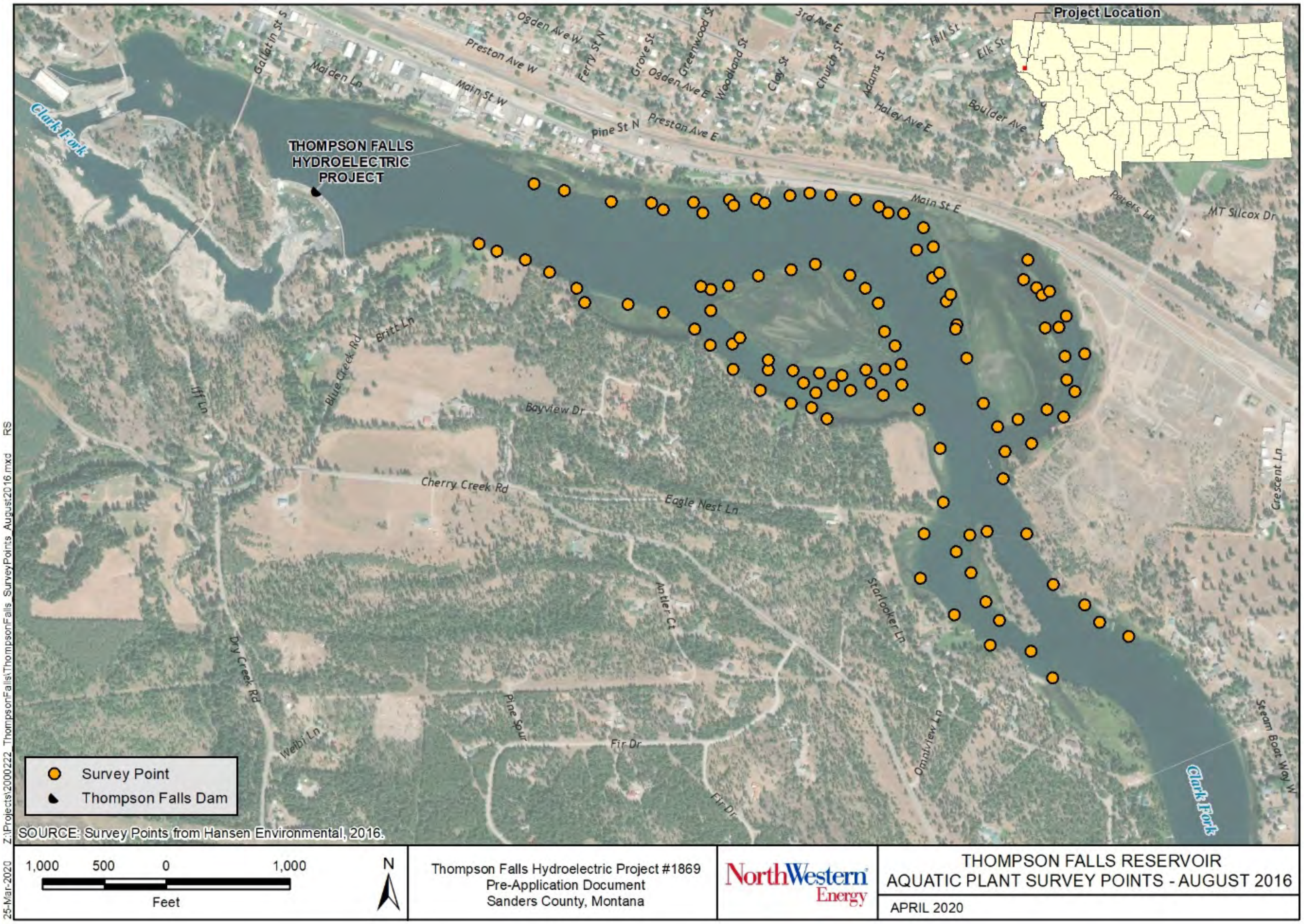


**Figure 7-3: Thompson Falls Reservoir aquatic plant survey points, August 2016 (Source: Hansen Environmental, 2016).**



### 7.1.3 *Aquatic Invasive Plants*

Aquatic invasive plants documented (Madsen et al., 2009; Madsen and Cheshier, 2009; Hansen Environmental, 2016) or observed in the Thompson Falls Reservoir include curlyleaf pondweed, flowering rush, and yellow flag iris, all of which are priority 2A or 2B weeds on Montana's 2017 noxious weed list (Table 6-2). Aquatic invasive plants known to occur in Montana (FWP, 2020) are shown in Figure 7-4.

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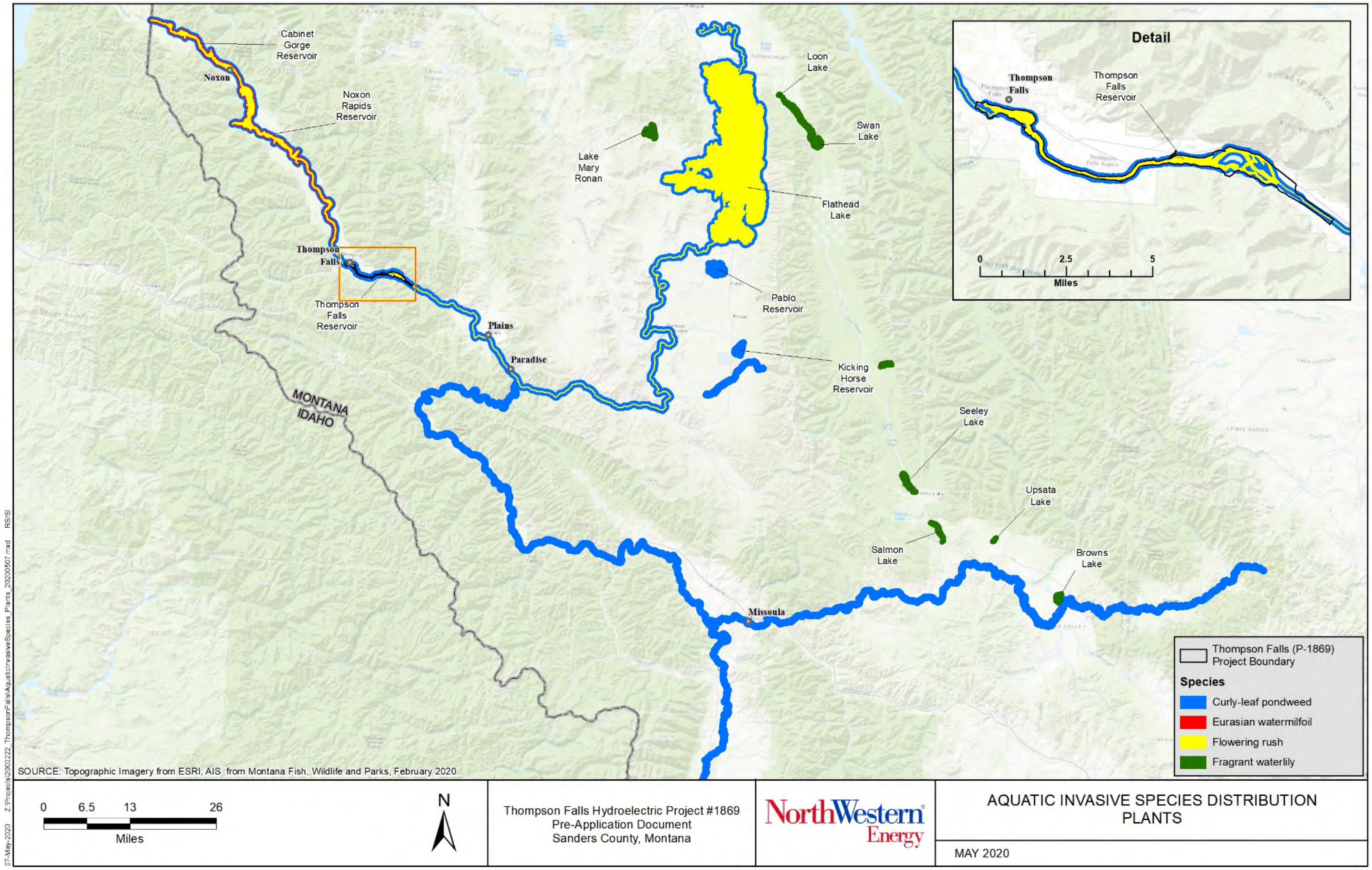
**Figure 7-4: Aquatic invasive species locations in Montana (FWP, 2020).**



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### 7.1.4 *Curlyleaf pondweed*

Curlyleaf pondweed (*Potamogeton crispus*) is a nonnative invasive submersed aquatic plant species introduced to North American in the mid- 1800s (Madsen and Cheshier, 2009) and first reported in Montana in 1973. It is currently present throughout the Clark Fork River drainage (Parkinson et al., 2016). Curlyleaf pondweed creates dense mats, is very hardy, and can survive extreme conditions. These dense mats can outcompete native vegetation and inhibit recreational activities. The dense mats die off in the summer and can alter water quality, impacting oxygen levels, nutrient levels, and potentially increase algal blooms. Plants are most often found at depths between 3.2 and 10 feet but can grow at depths of 18 feet (Parkinson et al., 2016). Suitable substrate can vary from sandy to hard bottom. Curlyleaf pondweed spreads primarily via stem fragments with turions (pinecone like vegetative structures). These stem fragments can attach to recreational equipment or be dispersed via waterfowl. Some ecological benefits of the plant species include a food source to waterfowl, habitat for macroinvertebrates for fish, and potentially improving early season habitat for aquatic animals (Parkinson et al., 2016).

Herbicides are the primary management tool to mitigate and control curlyleaf pondweed infestations (Madsen and Cheshier, 2009; Parkinson et al., 2016). Mechanical management efforts, such as raking and hand-cutting, are alternative measures implemented to prevent or reduce turion formation, but these manual efforts must be repeated for many years to prevent re-establishment of the species. Other physical controls may include benthic barriers, drawdowns, and dredging (Parkinson et al., 2016). Benthic barriers are non-selective and prevent all plant growth. Drawdowns in the fall and early winter cause turions to freeze when exposed to the air, thus interrupting the plant’s life cycle. Dredging to deepen the water may prevent light penetration to the substrate and prevent plant survival. The only biological control used in the U.S. is grass carp (*Ctenopharyngodon idella*). However, grass carp stocking is prohibited in Montana (Parkinson et al., 2016).

### 7.1.5 *Yellow flag iris*

Yellow flag iris is a nonnative plant documented in North America as early as 1771 and is now widely distributed across the U.S. This plant is classified as Priority 2A noxious weed in Montana and was first documented in Montana in 1966 in Lake County and is now present in at least seven counties, including Sanders County. The yellow flag iris was introduced as a horticultural plant and the potential to spread continues as it is still available for gardeners. The plant reproduces by seed and vegetatively through rhizomes. The plant can grow 3 to 5 feet (1-1.5 m) tall and has a large pale yellow to deep yellow flower blooming between May and July (Jacobs et al., 2011). The species forms dense monotypic colonies in riparian areas and can crowd out native plant species and reduce plant community diversity. The change in the plant community can adversely impact habitat function and reduce wildlife diversity.

Management techniques for yellow flag iris infestations include chemical and mechanical control methods. Chemical controls may require direct application to wetland and riparian areas; thus, herbicides must be approved for aquatic use by the EPA. Glyphosate is the most widely used chemical (Jacobs et al., 2011). In Montana, weed managers have had 90 percent control using 8 percent glyphosate solution when yellow flag iris begins to flower by applying the herbicide to the fold of the leaves (Jacobs et al., 2011. Mechanical control techniques include digging or grubbing rhizomes, which is most effective if all rhizomes are removed. Mowing or cutting plants may prevent seed production or reduce spread of rhizomes (Jacobs et al., 2011).

### 7.1.6 *Flowering rush*

Flowering rush (*Butomus umbellatus*) is a nonnative invasive aquatic plant present in the Flathead and Clark Fork River drainage, including Thompson Falls Reservoir (Madsen and Cheshier, 2009; Jacobs et al., 2011a; Beck, 2013, Hansen Environmental, 2016). Flowering rush is present in shallow waters up to 10 feet (3 m) deep as an emergent plant or in deeper waters 10 to 20 feet deep (3-6.1 m) as a submerged plant (Parkinson et al., 2010; Jacobs et al., 2011a). Flowering rush spreads by rhizome fragments. Flowering rush negatively impacts recreation activities and equipment and can alter aquatic habitat that may adversely impact native fish species. Dense stands of flowering rush provide aquatic habitat more suitable and preferred by nonnative fish species such as largemouth bass, yellow perch, and northern pike that are known predators to desirable, native fish species (Jacobs et al., 2011a).

Management techniques available to control infestations of flowering rush are limited (Parkinson et al., 2010; Jacobs et al., 2011a). Studies regarding chemical control methods (e.g., Flathead Lake) are ongoing (Jacobs et al., 2011a). Effective management methods are not well-known. Some case studies on Flathead Lake and in Minnesota found that mechanical methods such as hand-digging and raking may in fact increase flowering rush populations (Jacobs et al., 2011a). Biological control using two weevil species, an agromyzid fly, and white smut fungus are currently being evaluated for their effectiveness by the Centre for Agriculture and Bioscience International in Switzerland but have not yet been approved for release in the U.S. (CABI, 2020).

## 7.2 Potential Impacts Related to Operation or Maintenance

As required by 18 CFR § 5.6(3)(i)(C), NorthWestern has identified the following known or potential adverse impacts of the Project as related to wetland, riparian, and littoral habitats.

### 7.2.1 *Current Operations*

The Project is operated to provide baseload and flexible generation within the reservoir elevation and minimum flow requirements of the License. During flexible generation operations, the Licensee may use the top 4 feet of the reservoir from full pond while maintaining minimum flows. For several reasons, the full 4 feet typically have not been used over the past 20 years of operation.

Current operations support shallow areas with aquatic plant growth, backwater channels, and wetland areas in Thompson Falls Reservoir, as described in Section 7.1.

As described in Section 2.10.2, emergency operations occasionally occur when stanchions are tripped, and the reservoir is drawn down to crest for repairs. During the deep drawdowns, some littoral habitat is dewatered, and wetlands may temporarily lose connectivity to the main river channel. The prolonged drawdowns associated with tripping stanchions may help control aquatic invasive species by desiccating exposed aquatic plants.

### 7.2.2 *Proposed Future Operations*

NorthWestern proposes that the Thompson Falls Project will continue to provide baseflow generation and meet flexible capacity needs. Under normal operations, NorthWestern will maintain the reservoir between El. 2396.5 and 2394 feet (2.5 feet below normal full operating level) and maintain a minimum flow downstream of the lesser of 6,000 cfs or inflow. Varying the level of the reservoir has the potential to effect riparian vegetation, wetlands, and littoral habitats.

## 7.3 Resource Protection and Mitigation Measures

This section describes protection, mitigation, and enhancement measures that have been undertaken at the Project or that are currently ongoing.

NorthWestern is voluntarily collaborating with Green Mountain Conservation District to implement a shoreline stabilization pilot study. The pilot study is intended to test a bioengineering approach in the Thompson Falls Project vicinity. The key component of this approach is propagation of plantings of native vegetation from cuttings, bareroot, and potted plantings. The goal of the pilot project completed in spring 2020 was to slope back a nearly vertical bank to a slope less than or equal to 2:1 and to utilize native willow cuttings to develop deep-binding root mass to stabilize the newly constructed bank. Bareroot and potted shrub species (red osier dogwood, northern choke cherry, and service berry) were planted on the upper two-thirds of the bank for increased bank stability and also to provide shade and riparian habitats benefitting terrestrial bug species and songbirds. Results from the pilot project will be used to inform the approach and design of future similar projects around Thompson Falls Reservoir.

Fewer emergency drawdowns will occur in the future as a result of the expanded radial gate capacity on the Main Channel Dam. This will result in a lower frequency of extreme dewatering events and associated impacts to riparian, wetland, and littoral habitats and associated biota. These habitat types are closely linked to wet areas/waterways, thus reducing the extreme drawdowns is likely beneficial to long-term stability (Wood and Olsen, 1984).

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# 8. Threatened, Endangered, Proposed, Candidate Sensitive Species, and Species of Concern

This section provides a summary of threatened, endangered, proposed, candidate sensitive (TEPC) species, Montana special status species (SSS) or species of concern (SOC), and USFS sensitive species and management indicator species (MIS) that are known to occur or have the potential to occur in the FERC Project boundary. Data were derived from FWS, USFS, FWP, MNHP, and other available reports and publications. These data sources provide an evaluation of known occurrence or potential occurrence of species and habitat based on various scales such as the county level, National Forest System Lands (Lolo National Forest and Kootenai National Forest), or other geographic/watershed delineations which overlap with the Project and often expand beyond the confines of the FERC Project boundary.

## 8.1 Threatened, Endangered, Proposed, and Candidate Species

A formal request was made on June 18, 2019 to FWS through the Environmental Conservation Online System (ECOS) – Information for Planning and Consultation (IPaC) system for a species list that identifies TEPC species as well as proposed and final designated critical habitat. Information was also cross-referenced with TEPC species FWS identified for Sanders County (dated October 23, 2018).

The FWS TEPC list identified through ECOS-IPaC combined with the list for Sanders County is provided in Table 8.1. A list of known biological opinion, status reports, or recovery plan(s) pertaining to the TEPC list of species is summarized in Table 8.2. The only designated critical habitat within the FERC Project boundary is for Bull Trout (*see* Figure 8-1 in Section 8.1.1).

Each TEPC species is described briefly with focus on the extent and location of any federally designated critical habitat, or other suitable habitat available or potentially available for the species within the FERC Project boundary or vicinity (Assessment Area), as well as the known temporal and spatial distribution of the species, as applicable.

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**Table 8-1 List of threatened, endangered, proposed, and candidate species identified by FWS ECOS-IPaC (2019) and by the FWS county list for Sanders County (FWS, 2018).**

| Species | Fish, Plant, or Mammal | Scientific Name | FWS Status (Year) | Habitat | Occurrence Potential |
|---|---|---|---|---|---|
| Bull Trout | Fish | *Salvelinus confluentus* | Threatened (1998)<br>Critical Habitat (2010) | Clear streams, rivers, and lakes west of the Continental Divide<br>Cool, clear, connected, complex stream habitat. | Present |
| Grizzly Bear | Mammal | *Ursus arctos horribilis* | Threatened (1975) | Variable habitats including meadow, forest and riparian. Requires large tracts of wilderness. | Potential. Transient (no denning sites). |
| Canada Lynx | Mammal | *Lynx canadensis* | Threatened (2000) | Subalpine coniferous forests, with a deep winter snowpack, dense understory, and high density of snowshoe hares. | Unlikely |
| Wolverine | Mammal | *Gulo gulo luscus* | Proposed Threatened (2000) | Large tracts of essentially roadless wilderness in high elevation alpine and subalpine terrain. | Potential. Transient (no denning sites). |
| Yellow-billed Cuckoo | Bird | *Coccyzus americanus* | Threatened (2014) | Tall, dense, expansive cottonwood and willow riparian forest. Requires habitat patches at least 25 acres in size. | Unlikely |
| Spalding's Campion (Spalding's Catchfly) | Plant | *Silene spaldingii* | Threatened (2001) | Open, mesic grasslands in the valleys and foothills, in deep, loamy soils along northerly aspects. | Unlikely |
| Whitebark Pine | Plant | *Pinus albicaulis* | Candidate (2008) | Subalpine and krummholz habitats (mostly mountain ranges). | Not Present |

**Table 8-2 List of biological opinion, status reports, or recovery plan(s) pertaining to each TEPC species in Table 8-1.**

| Species | Document/Report Title | Type | Date |
|---|---|---|---|
| Bull Trout | ECOS Species Profile and Updates https://ecos.fws.gov/ecp0/profile/speciesProfile?spcode=E065 | Status Updates | Accessed June 2019 |
| | Endangered Species – Mountain-Prairie Region https://www.fws.gov/mountain-prairie/es/bullTrout.php | Status Updates | Accessed June 2019 |
| | FWS Bull Trout Recovery Planning https://www.fws.gov/pacific/bulltrout/ | Status Updates | Accessed June 2019 |
| | FWS. 2008. Biological Opinion for Thompson Falls Hydroelectric Project Bull Trout Consultation. FERC Docket No. 1869-048- Montana. http://www.thompsonfallsfishpassage.com/pdf_2009/081028-BO-Wilson_FERC-TFalls-Fina-B.pdf | Biological Opinion | October 2008 |
| | FWS. 2015. Columbia Headwater Recovery Unit Implementation Plan for Bull Trout. US Fish and Wildlife Service, Montana Ecological Services Office. https://www.fws.gov/pacific/bulltrout/pdf/Final_Columbia_Headwaters_RUIP_092915.pdf | Recovery Plan | September 2015 |
| Grizzly Bear | ECOS Species Profile and Updates https://ecos.fws.gov/ecp0/profile/speciesProfile?spcode=A001#recovery | Status Updates | Accessed June 2019 |
| | Endangered Species – Mountain-Prairie Region https://www.fws.gov/mountain-prairie/es/grizzlyBear.php | Status Updates | Accessed June 2019 |
| | Grizzly Bear (*Ursus arctos horribilis*) 5-Year Review: Summary and Evaluation. https://ecos.fws.gov/docs/five_year_review/doc3847.pdf | Status Report | August 2011 |
| | Kasworm, W. F., T. G. Radandt, J.E. Teisberg, A. Welander, M. Proctor, and H. Cooley. 2018. Cabinet-Yaak grizzly bear recovery area 2017 research and monitoring progress report. U.S. Fish and Wildlife Service, Missoula, Montana. 102 pp. https://www.fws.gov/mountain-prairie/es/species/mammals/grizzly/cabinet-yaak-grizzly-bear-recovery-area-2017.pdf | Status Report | 2018 |
| Canada Lynx | ECOS Species Profile and Updates https://ecos.fws.gov/ecp0/profile/speciesProfile?spcode=A073 | Status Updates | Accessed June 2019 |
| | Endangered Species – Mountain-Prairie Region https://www.fws.gov/mountain-prairie/es/canadaLynx.php | Status Updates | Accessed June 2019 |
| | U.S. Fish and Wildlife Service. 2017. Species Status Assessment for the Canada lynx (*Lynx canadensis*) Contiguous U.S. Distinct Population Segment. Version 1.0, October 2017. Lakewood, Colorado. https://www.fws.gov/mountain-prairie/es/species/mammals/lynx/SSA2018/01112018_SSA_Report_CanadaLynx.pdf | Status Report | October 2017 |

| Species | Document/Report Title | Type | Date |
|---|---|---|---|
| North American Wolverine | ECOS Species Profile and Updates https://ecos.fws.gov/ecp0/profile/speciesProfile?sId=5123 | Status Updates | Accessed June 2019 |
| | FWS Endangered Species – Mountain-Prairie Region https://www.fws.gov/mountain-prairie/es/wolverine.php | Status Updates | Accessed June 2019 |
| | FWS. 2013. Draft Recovery Outline North American Wolverine (*Gulo gulo luscus*) Contiguous U.S. Distinct Population Segment. Montana Ecological Services Field Office. https://www.fws.gov/mountain-prairie/es/species/mammals/wolverine/02112013DraftRecoveryOutline.pdf | Draft Recovery Plan | February 2013 |
| Yellow-billed Cuckoo | ECOS Species Profile and Updates https://ecos.fws.gov/ecp0/profile/speciesProfile?sId=3911 | Status Updates | Accessed June 2019 |
| | Marks, J.S., P. Hendricks, and D. Casey. 2016. Birds of Montana. Arrington, VA. Buteo Books. 659 pages | Conservation Status, Habitat Use, Ecology | 2016 |
| Spalding's Campion (Spalding's Catchfly) | ECOS Species Profile and Updates https://ecos.fws.gov/ecp0/profile/speciesProfile?sId=3681 | Status Updates | Accessed June 2019 |
| | U.S. Fish and Wildlife Service. 2007. Recovery Plan for *Silene spaldingii* (Spalding's Catchfly). U.S. Fish and Wildlife Service, Portland, Oregon. xiii + 187 pages. https://www.fws.gov/montanafieldoffice/Endangered_Species/Recovery_and_Mgmt_Plans/Spaldings_Campion_Recovery_Plan.pdf | Recovery Plan | October 2007 |
| Whitebark Pine | ECOS Species Profile and Updates https://ecos.fws.gov/ecp0/profile/speciesProfile?spcode=R00E | Status Updates | Accessed June 2019 |

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### 8.1.1 *Regulatory History of Bull Trout at the Project*

In 1998, the Bull Trout was federally listed under the Endangered Species Act (ESA) as a threatened species (Federal Register, 1998). Critical habitat was designated in 2005 and revised in 2010 (Federal Register 2005; 2010). In 2015, FWS developed a recovery plan for Bull Trout (FWS, 2015). Bull Trout are present within the Clark Fork River drainage and known to occur within the FERC Project boundary.

After Bull Trout were federally listed as a threatened species under the ESA in 1998, the Licensee prepared a 2003 Biological Evaluation (BE) that concluded the Project was likely adversely affecting Bull Trout. This determination led to a process to determine conservation measures to reduce "take." An interagency TAC was established and includes the Licensee, FWS, FWP, Avista, DEQ, USFS, and CSKT.

From 2003 to 2008, the Licensee worked cooperatively with the TAC members to clarify regulatory issues and conduct significant scientific and engineering evaluations and in-situ testing. The objectives of the evaluations and testing were to determine factors affecting Bull Trout and other fish passage behavior, full height upstream fish passage design and construction, and subsequent upstream fish passage facility and Project operations.

In 2008, a MOU (2008) was established among the Licensee, the FWS, FWP, and CSKT (voting TAC members) which established the terms and conditions for collaborating on the implementation of Bull Trout conservation measures at the Project. The MOU also specifies how AMFA funding by the Licensee is allocated by the TAC annually for the purpose of downstream Bull Trout (and other fish) passage mitigation measures. The MOU, which was originally signed by each party and implemented in 2008, was renewed in 2013, and will expire on December 31, 2020.

On November 4, 2008, the FWS filed the BO with FERC, concluding that the Project adversely affects Bull Trout and that the Licensee's proposed conservation measures would reduce, but not eliminate, adverse impacts of the Project. The BO accepted the Licensee's proposal to construct a full-height pool and weir fish ladder. On February 12, 2009, FERC approved construction and operation of the upstream fish passage facility. The Thompson Falls upstream fish passage facility was completed in 2010 and placed in operation in 2011. Priorities for upstream fish passage at Thompson Falls defined by the TAC are:

- Pass Bull Trout
- Pass native species
- Pass non-native salmonid sport fish, but not to the detriment to the first two objectives (e.g., if Brown Trout expansion extends into Bull Trout systems)
- Overarching goal is volitional passage

However, volitional passage through the upstream fish passage facility is not permitted by FWP and FWS due to the presence of Walleye downstream of Thompson Falls Dam and the absence of an established Walleye population upstream.

As described in Section 5.6.3, the BO (FWS, 2008) included a requirement for the Licensee to conduct Phase 2 fish passage evaluation studies. The Comprehensive Phase 2 Final Fish Passage Report was filed with FERC on December 23, 2019 and provided a summary of fish passage results through July 1, 2019 (NorthWestern, 2019a).

The BO also required the Licensee to convene an independent, structured scientific review of the Project, guided by the TAC. The Thompson Falls Scientific Review Panel (Panel) utilized the Comprehensive Phase 2 Fish Passage Report (NorthWestern, 2019a), along with other publicly available reports and meetings with the Licensee and TAC members, to develop and submit a set of recommendations to FWS (filed with FERC on April 1, 2020). The recommendations from the Panel evaluate whether the upstream fish passage facility is functioning as intended and whether operational or structural modifications are needed (Thompson Falls Scientific Review Panel, 2020). NorthWestern has reviewed the recommendations and identified preliminary issues and studies in Section 14.

### 8.1.2 *Bull Trout Critical Habitat and Distribution*

Critical habitat for Bull Trout has been defined as a habitat unit that can maintain and support viable Bull Trout core areas (Federal Register, 2005). The Project is within the Columbia Headwater Recovery Unit (CHRU). Within the CHRU there are 35 Bull Trout core areas that occur within four geographic regions including the Clark Fork River, Flathead Lake, Coeur d'Alene Lake, and Kootenai River (FWS, 2015). The Project is within the Lake Pend Oreille core area that includes the former lower Clark Fork River and Flathead River core areas (2002 designation), representing 35 local Bull Trout populations.

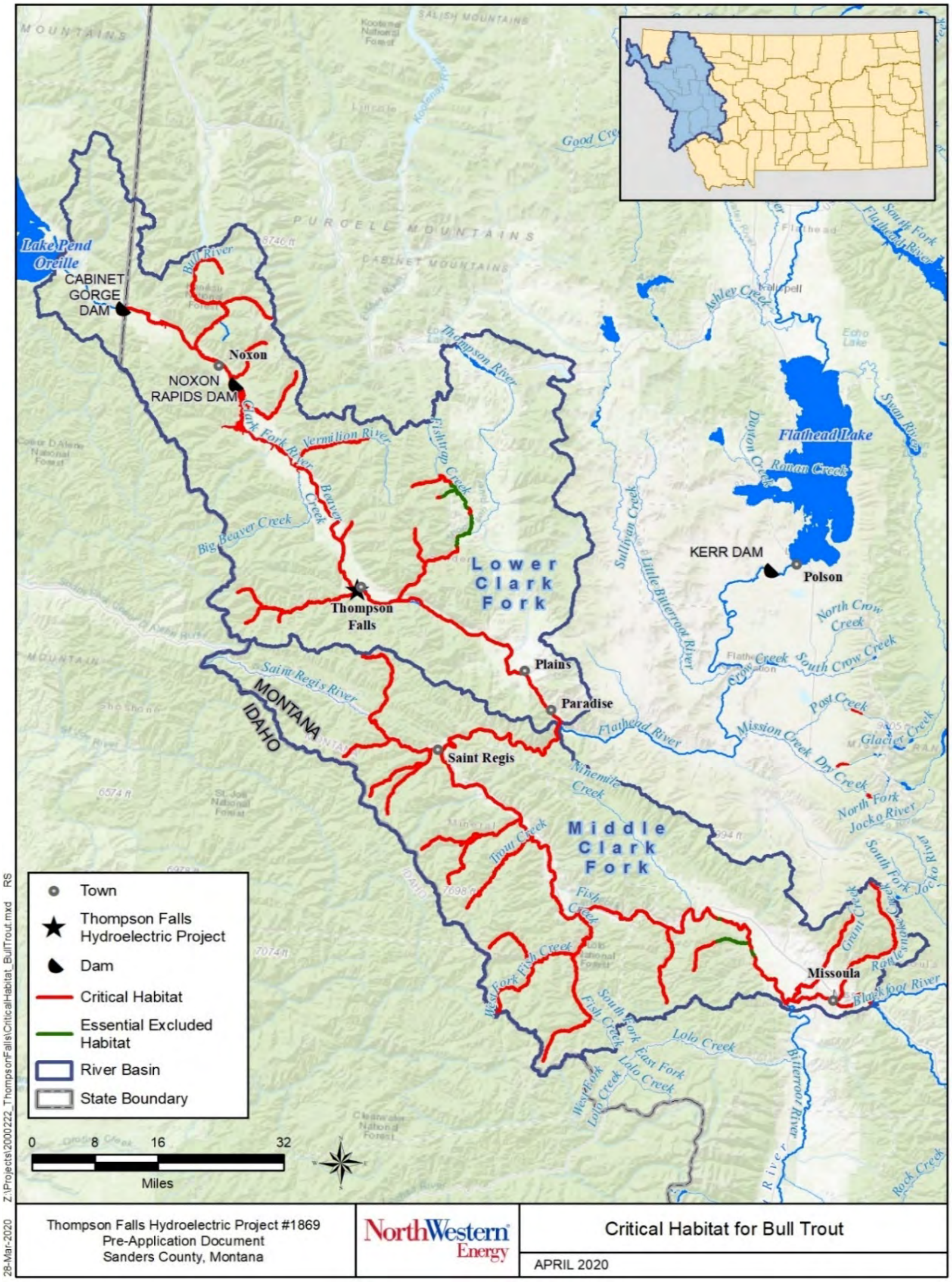
Within the CHRU, FWS identified 32 Critical Habitat Units (CHUs), including the Clark Fork River Basin CHU. The Clark Fork River Basin CHU (Unit 31) includes 3,328 stream miles (5,356 km) and 295,587 acres (119,620 ha) of lakes and reservoirs as critical Bull Trout habitat (Federal Register 2010). The Clark Fork River Basin has 12 subunits including the Lower Clark Fork River Critical Habitat Subunit (CHSU) encompassing the Project, located in Sanders and Missoula counties covering 295 miles (474.9 km) of stream and 9,719 acres (3,933 ha) of surface area as designated Bull Trout habitat (Federal Register, 2010).

The Lower Clark Fork River CHSU (Figure 8-1) provides essential FMO habitat for Bull Trout from potentially several local Bull Trout populations and included designated critical Bull Trout habitat (FWS, 2010a). The Project is located within designated critical Bull Trout habitat for the Lower Clark Fork River CHSU. As part of the critical habitat designation, the Thompson Falls Reservoir is considered a stream reach and not a lake due to the lack of reservoir storage capacity (Federal Register, 2010). Two tributaries near the Project including Prospect Creek, located immediately downstream of the dam, and the Thompson River, located about 6 miles upstream of the dam, are designated Bull Trout critical habitat. Designated critical habitat in the Lower Clark Fork River and Middle Clark Fork River, representing CHU Unit 31, is shown in Figure 8-1. The following table (Table 8-3) identifies the Lower and Middle Clark Fork River reaches and respective local Bull Trout populations identified by FWS (2015).

**Table 8-3. Bull trout spawning and rearing tributaries to the Lower and Middle Clark Fork rivers and Lower Flathead River (FWS, 2015).**

| Upstream or Downstream of Project | River Reach Description | Bull Trout Spawning and Rearing Tributaries to the Clark Fork River/Flathead River (smaller tributaries) |
|---|---|---|
| Downstream | Noxon Rapids Dam upstream to Thompson Falls Dam | Swamp Creek, Vermilion River, Graves Creek, Prospect Creek |
| Upstream | Lower Clark Fork River - ends at the confluence with the lower Flathead River | Thompson River (West Fork Thompson River, Fishtrap Creek) |
| Upstream | Lower Flathead River | Jocko River (North Fork and South Fork), Mission Creek, Post Creek, Dry Creek |
| Upstream | Middle Clark Fork River - starts at the confluence with the lower Flathead River and ends at the confluence with the Blackfoot River | St. Regis River (Little Joe Creek, Ward Creek, Twelvemile Creek), Cedar Creek (Oregon Gulch), Fish Creek (North Fork, West Fork and South Fork, Cache Creek), Petty Creek, Albert Creek, Grant Creek, Rattlesnake Creek |

**Figure 8-1. Map of Bull Trout designated critical habitat (CHSU Unit 31) in the Lower Clark Fork River and Middle Clark Fork River in Montana (FWS, 2010)[15].**




[15] Under section 4(b)(2) of the Endangered Species Act, Congress provided discretionary authority to the Secretary of the Interior to exclude any specific area from a critical habitat designation—Essential Excluded Habitat—if the benefits of such exclusion outweigh the benefits of designation, so long as the exclusion will not result in the extinction of the species.

### 8.1.3 *Bull Trout Life History*

Life history characteristics of Bull Trout have been reported by several authors (Pratt, 1985 and 1996; Fraley and Shepard, 1989; Brown, 1992; Thomas, 1992; McPhail and Baxter, 1996; Nelson et al., 2002). In the Clark Fork River drainage, Bull Trout have three life history patterns: resident, fluvial, and adfluvial. Resident Bull Trout spend their entire lives in the same (or nearby) streams in which they were hatched. Resident Bull Trout adults and juveniles generally confine their migrations to their natal streams. In fluvial and adfluvial populations, the adults spawn in tributary streams where the young rear for 1 to 4 years (Fraley and Shepard, 1989). The juvenile Bull Trout then migrate downstream to a larger body of water, either a lake (adfluvial fish) or a river (fluvial fish), where they grow to maturity.

It has been suggested that the ability for Bull Trout to express multiple life history forms is an adaptive mechanism to variable environmental conditions (Nelson et al., 2002). For example, adfluvial and fluvial migration movement to lakes and larger rivers may take advantage of more abundant food sources allowing for greater growth and fecundity (Gross, 1987 cited in Nelson et al., 2002). The resident life history form may be an adaptation to the presence of migration barriers/restrictions or where growth opportunities in the headwaters are greater than the cost of migration (Nelson et al., 2002).

In the Lower Clark Fork River drainage, there appears to be a wide season, approximately between April and August, when adult Bull Trout leave Lake Pend Oreille to begin their upstream migrations to headwater streams to spawn (Normandeau Associates, 2001). Bull trout records at the upstream fish passage facility indicate most Bull Trout are moving upstream between April and June with some additional Bull Trout detections in the fish passage facility between August and October (NorthWestern, 2018). Mature adults spawn in headwater streams during the fall (September and October). However, the timing of movement into the tributaries may vary. Radio telemetry data indicate a relatively wide range of time during which Bull Trout move into spawning areas, between the middle of July and the middle of October (Lockard et al., 2002; 2003; 2004).

Adult Bull Trout leaving Lake Pend Oreille are captured downstream of Cabinet Gorge Dam and transported to their assumed natal waters (after being genetically tested and assigned to an upstream tributary) upstream of either Cabinet Gorge Dam (genetic assignment to Region 2), Noxon Rapids Dam (genetic assignment to Region 3), or to above Thompson Falls Dam (genetic assignment to Region 4).

Bull Trout have more specific habitat requirements compared to other salmonids, requiring clean, cold, complex, and connected habitat. Spawning grounds are generally low gradient (less than 2%) with a water depth range from 0.1 to 0.6 meters, stream velocity between 0.09 meters per second (m/s) and 0.61 m/s, comprised of gravel/cobble substrate with less than 35 to 40 percent of sediments smaller than 6.35 millimeters in diameter, and high gravel permeability (MBTRT, 2000). In the Lower Clark Fork River drainage spawning activity peaks in September (Katzman and Hintz, 2003; Katzman, 2003; Moran, 2003) when stream temperatures are generally less than 8 °C (McPhail and Baxter, 1996; Pratt, 1996). Sexually mature adult Bull Trout may spawn in multiple years, although they do not necessarily spawn in consecutive years (Downs et al., 2006).

Rearing habitat requirements for juvenile Bull Trout include cold summer water temperatures (less than 15 °C) provided by sufficient surface and groundwater flows. Warmer temperatures are associated with lower Bull Trout densities and can increase the risk of invasion by other species that could displace, compete with, or prey on juvenile Bull Trout. Juvenile Bull Trout are generally benthic foragers, rarely stray from cover, and they prefer complex forms of cover. High sediment levels and embeddedness can result in decreased rearing densities. Unembedded cobble/rubble substrate is preferred for cover and feeding and also provides invertebrate production. Highly variable streamflow, reduction in large woody debris, bedload movement, and other forms of channel instability can limit the distribution and abundance of juvenile Bull Trout. Habitat characteristics that are important for juvenile Bull Trout of migratory populations are also important for stream resident subadults and adults.

Both migratory and stream-resident Bull Trout move in response to developmental and seasonal habitat requirements. Migratory individuals can move great distances (up to 156 miles [250 km]) among lakes, rivers, and tributary streams in response to spawning, rearing, and adult habitat needs (MBTRT, 2000). Stream-resident Bull Trout migrate within tributary stream networks for spawning purposes, as well as in response to changes in seasonal habitat requirements and conditions. Open migratory corridors, both within and among tributary streams, larger rivers, and lake systems are critical for maintaining Bull Trout populations.

Historically, juvenile adfluvial Bull Trout in the Clark Fork River drainage outmigrated from tributary streams to feed and mature in Lake Pend Oreille. The adults would then migrate upstream from Lake Pend Oreille to the natal streams to spawn. This migration pattern has been disrupted by the construction of Cabinet Gorge Dam, Noxon Rapids Dam, and Thompson Falls Dam. Today, Bull Trout passage in the Lower Clark Fork drainage is, in part, facilitated by Avista's trap and transport programs managed. Avista captures a portion of juvenile Bull Trout within their natal streams, implants them with PIT tags, and transports them to Lake Pend Oreille. Avista seasonally collects adult Bull Trout upstream of Lake Pend Oreille near the vicinity of Cabinet Gorge Dam[16]. A fin clip from each Bull Trout is genetically tested to determine their natal stream so they can be transported to (or near) their tributary of origin. Avista has operated the adult Bull Trout transport program since 2001. Transport of Bull Trout to Region 4, upstream of Thompson Falls Dam, began in 2007. For the last 12 years, Avista has annually transported an average 37 Bull Trout upstream of Cabinet Gorge Dam with about 21 percent (7 Bull Trout) transported to Region 4 each year. A portion of the adults captured at Cabinet Gorge Dam are fish that were previously transported downstream as juveniles.

[16] Bull Trout have been collected for the transport program via trapping, electrofishing, and angling downstream of Cabinet Gorge Dam. An upstream fish passage facility is currently under construction at Cabinet Gorge Dam.

Avista’s downstream transport program does not include tributaries upstream of Thompson Falls Dam.

As described in Section 5.8, the Thompson River provides critical habitat for migratory (adfluvial/fluvial) and resident Bull Trout. Outmigrating juvenile Bull Trout from the Thompson River may pass downstream of Thompson Falls Dam and residualize in Noxon Rapids Reservoir. As adults, they can migrate upstream to their natal stream using the upstream fish passage facility at Thompson Falls Dam. Alternatively, they may continue their downstream movement to Cabinet Gorge Reservoir, or further to Lake Pend Oreille. There is no upstream fish passage facility or program at Noxon Rapids Dam, so Bull Trout that residualize in Cabinet Gorge Reservoir cannot return to tributaries upstream.

### 8.1.4 *Grizzly Bear Habitat and Distribution*

The grizzly bear was federally listed as a threatened species in 1975 in the conterminous 48 states, and the current distribution is limited to five areas in the western U.S. The Project is closest to the Cabinet-Yaak Grizzly Bear recovery zone (Figure 8-2). The Cabinet-Yaak recovery zone is about 6,800 $km^2$ of northwestern Montana and northern Idaho. The town of Thompson Falls is located adjacent to the East Cabinet Mountains portion of the Cabinet-Yaak recovery zone (Figure 8-2).

FWS estimated the 2016 grizzly population in the Cabinet-Yaak recovery zone to be approximately 55 individuals using mark-recapture techniques to estimate the population (Kasworm et al., 2017). Using all methods of detection (capture, rub tree DNA, corral DNA, photos), FWS identified a minimum of 35 individual grizzlies in the Cabinet-Yaak recovery zone in 2016. Thirteen of those bears were detected in the Cabinet Mountains (Kasworm et al., 2017). The recovery target population is 100 bears. Grizzly presence or occurrence within the FERC Project boundary is not common. The majority of sightings and habitat use appear to be more closed timber, timbered shrubfield areas in the Cabinet Mountains and less populated areas (Kasworm et al., 2007; 2017). Food habits for grizzlies in the Cabinet-Yaak recovery zone varies seasonally and includes, but is not limited to plants (grasses, shrubs, forbs), meat (deer, elk, moose), berries (huckleberry, whortleberry, serviceberry), and insects (Kasworm et al., 2017). Recently, FWP has confirmed one grizzly bear sighting in the Thompson River drainage in 2016 and one in the Weeksville Creek drainage in 2018 (B. Sterling, FWP, personal communication, April 5, 2018).

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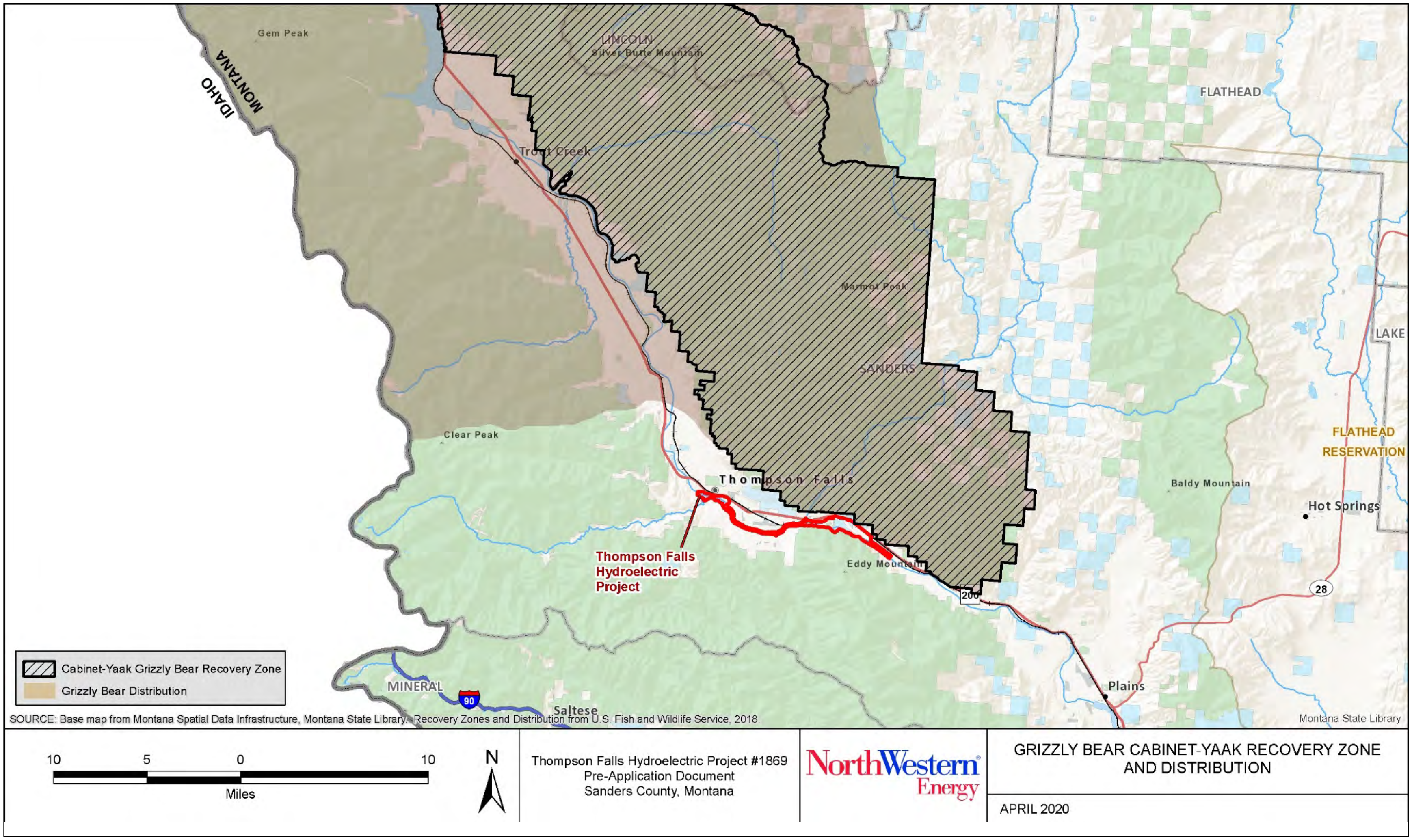
**Figure 8-2. Grizzly Bear Cabinet-Yaak Recovery Zone and Distribution.**



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### 8.1.5 *Canada Lynx Habitat and Distribution*

The contiguous U.S. distinct population segment of Canada lynx includes breeding populations in northwestern Montana/northern Idaho, north-central Washington, northeastern Minnesota, and Maine (FWS ECOS, 2019). The U.S. distinct population segment Canada lynx was federally listed as threatened species in 2000. Following the completion of the 5-year status review (FWS, 2017), FWS announced on January 11, 2018 that Canada lynx may no longer warrant protection under the ESA and should be considered for delisting due to recovery (FWS, 2018a).

Canada lynx are non-migratory, but movements of 27 to 137 miles (43–220 km) have been recorded by lynx in northwestern Montana and northern Idaho (FWS, 2017). Lynx occur in mesic coniferous forests that experience cold, snowy winters and provide a prey base of snowshoe hare (Ruediger et. al., 2000). Most of the lynx occurrences in the Northern Rocky Mountains are in the 4,920- to 6,560-foot (1,500–2,000 m) elevation range (FWS, 2000). The FERC Project boundary does not contain elevations within that range.

Critical habitat was initially designated in 2006 with revisions in 2009 and 2014, generally covering the boreal forests of northwestern Montana and the area around the Greater Yellowstone Ecosystem (79 FR 35303). Designated Canada lynx critical habitat is located in Lincoln, Missoula, Flathead, Glacier, and Lewis and Clark counties, approximately 32 miles northeast of the Project (FWS, 2014). No critical habitat was designated in Sanders County, where the Project is located.

Habitat types within the FERC Project boundary do not contain or represent suitable habitat for Canada lynx. Canada lynx are not anticipated to be present within the FERC Project boundary or proximity of the Project (B. Sterling, FWP, personal communication, April 5, 2018).

### 8.1.6 *Wolverine Habitat and Distribution*

FWS proposed the North American wolverine to be listed as a threatened species in 2000 (FWS, 2000). Currently, wolverines are managed at the state level and have no federal status (FWS, 2011; FWS ECOS, 2018).

Wolverine populations in Montana are considered healthy and a stronghold due to the available wilderness areas and roadless habitat in contrast to other states. It is estimated that populations are about 250 to 300 wolverines in the lower 48 states with the majority believed to inhabit Montana (FWP, 2013). Until 2012, FWP regulated wolverine as a furbearer with a seasonal harvest season. The wolverine trapping season has been discontinued for an undetermined period of time.

Wolverines depend on large wilderness areas of alpine tundra and boreal mountain forests, relying primarily on coniferous forests in the western mountains. Individual dispersal movements can extend beyond 185 miles (300 km) with seasonal habitat use changing from higher elevations in the summer to lower elevations in the winter (MNHP and FWP, 2019). Denning habitat includes caves, rock crevices, crevices/opening under fallen trees, thickets, and or similar type of locations.

Wolverines have been observed west of Thompson River, in the Thompson River drainage, and Weeksville Creek drainage (B. Sterling, FWP, personal communication, April 5, 2018). It is possible that wolverine may pass through the Project, but the FERC Project boundary lacks wolverine habitat.

### 8.1.7 *Whitebark Pine Habitat and Distribution*

Whitebark pine has been a candidate species for federal listing since 2008 (FWS, 2016). Whitebark pine is located in the upper and subalpine ecosystems (5,900–9,300 feet; 1,798–2,834 m). The Project is located below 3,000 feet (914 m) and does not include upper or subalpine habitat. The species is not present and there is no suitable habitat for whitebark pine within the Project or immediate area.

### 8.1.8 *Spalding's Campion Habitat and Distribution*

The Spalding's campion (also known as the Spalding's catchfly) was federally listed as threatened in 2001 (FWS, 2001). The preferred habitat for this species is mesic (not extremely wet or dry) Pacific bunchgrass prairie dominated by native perennial grasses such as Idaho and rough fescue at elevations between 1,500 to 5,100 feet (457–1554 m) (USDA, 2011). The plant species is documented in Sanders County near the borders with Lake and Flathead counties. Based on MNHP's predicted suitable habitat model, the Project and general Lower Clark Fork River drainage is unlikely to provide suitable habitat for Spalding's campion (Burkholder, 2017).

### 8.1.9 *Yellow-billed Cuckoo Habitat and Distribution*

The western distinct population segment of the yellow-billed cuckoo was federally listed as threatened west of the Continental Divide in Montana in 2014 (FWS, 2014a). In the west, yellow-billed cuckoo nest in tall cottonwood and willow riparian woodlands (MNHP and FWP, 2019). In Montana, the yellow-billed cuckoo is only known to occur in June and July (MNHP and FWP, 2019) and sightings are rare. The most recent sighting of the yellow-billed cuckoo bird in Montana was in the Lolo National Forest near Missoula in 2012 (MNHP, 2019). FWS proposed designated critical habitat for the yellow-billed cuckoo in 2014, but none is proposed within Montana (FWS, 2014a). A review of available habitat in the Prospect Creek drainage, near the Project area, determined habitat of low suitability occurs along the lower end of Prospect Creek. However, based on a site visit conducted in June of 2018, there were no patches of dense riparian forest large enough to provide adequate breeding habitat (Nyquist, 2018). There are no known nesting areas or sightings of the yellow-billed cuckoo near or within the FERC Project boundary.

## 8.2 USFS R1 Sensitive Aquatic and Terrestrial Species

The Project is within USFS Region 1 – Northern Region. Region 1 encompasses all of Montana, North Dakota, northern Idaho, and parts of northwest South Dakota. The USFS Region 1 list of sensitive species, including for the Lolo National Forest (LNF) and Kootenai National Forest (KNF) (Figure 8-3), was last updated in 2011.

LNF covers over 2 million acres (3,434 $mi^2$) with about 103.78 acres (40 ha) of federal lands within the FERC Project boundary. KNF borders LNF and is located downstream of the Project. KNF covers about 2.2 million acres of the northwestern section of Montana bordering Canada. There are no KNF lands in the FERC Project boundary. Although all of the Project is outside of KNF and most of the Project is outside of the LNF, there is potential for some of these Region 1 sensitive species to occur in the Project.

There are 20 USFS Region 1 sensitive species, including three amphibians, six birds, one fish, one invertebrate, and nine mammals known or suspected to occur in the LNF and/or KNF (Table 8-4). The majority of the USFS sensitive species (16) are also recognized as Montana SOC or SSS with the exception of gray wolf, long-eared myotis, long-legged myotis, and bighorn sheep.

There are 18 USFS R1 sensitive species known to occur in both the LNF and KNF (Table 8-4). The presence designation (known or suspected) for two species, northern leopard frog and fringed-myotis, vary between the two forests (Table 8-4). The northern leopard frog is known to occur in KNF and suspected to occur in LNF. The fringed-myotis is known to occur in KNF and has no designation for LNF. However, MNHP data indicate fringed-myotis has an observation record in the Assessment Area (Figure 8-3). There are nine species in Table 8-4 with an observation record with MNHP (Figure 8-3). Where a species is designated with the "potential" to occur in Table 8-4, this indicates habitat exists in the Assessment Area, but no observation was identified through the 2018 MNHP query. Species "unlikely" to be present indicate suitable habitat does not exist in the area for breeding, nesting, or denning purposes.

In addition to the sensitive species list (USFS, 2011), the LNF has designated elk, goshawk (*Accipiter gentilis*), and pileated woodpecker (*Hylatomus pileatus*) as wildlife management indicator species for the LNF (D. Wrobleski and J. Hanson, USFS, personal communication, March 6, 2018). Management indicator species are used to assess the effects of management activities and forest plan implementation.

**Figure 8-3. The Project location with respect to Lolo National Forest and Kootenai National Forest.**

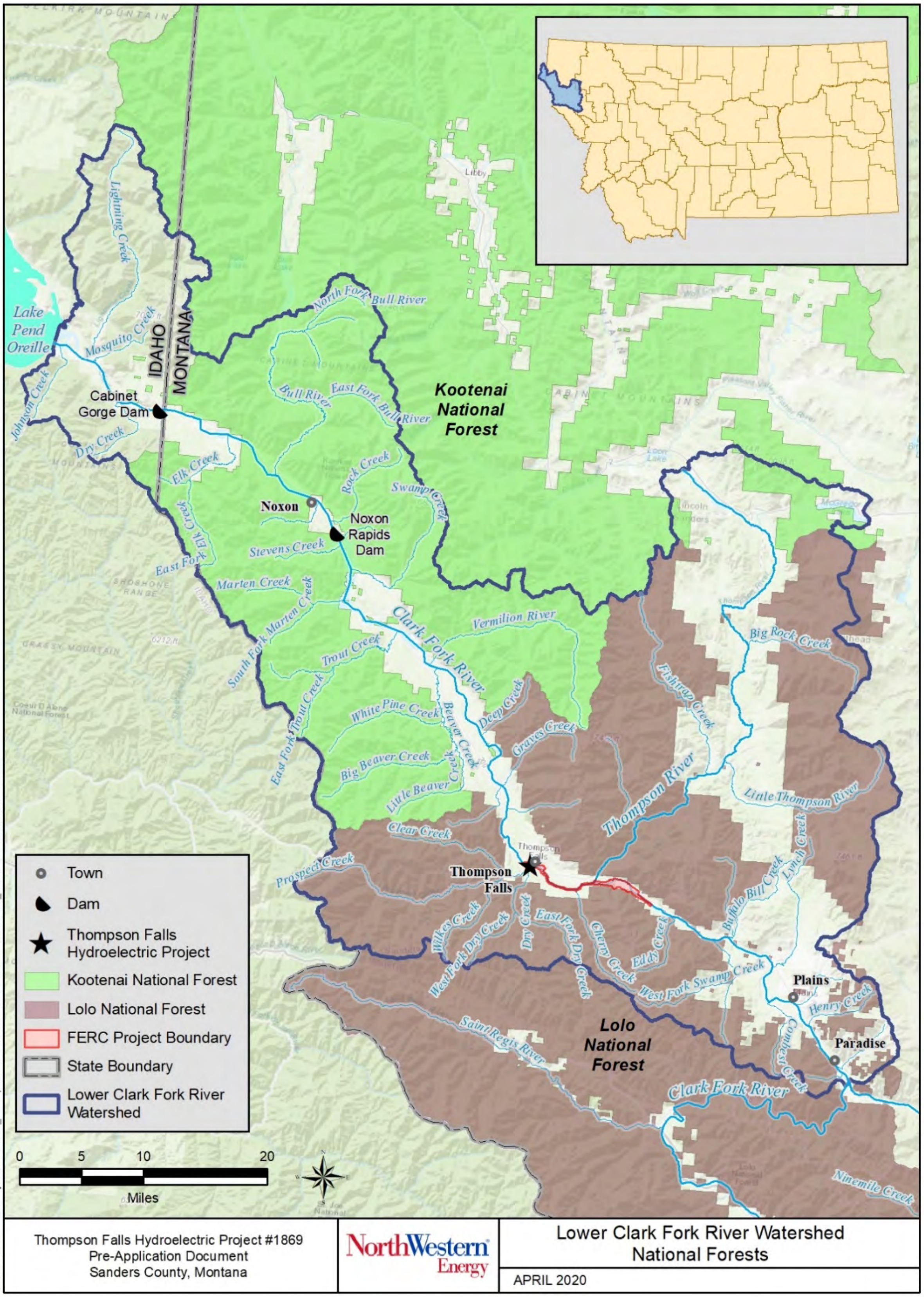

**Table 8-4: Summary of USFS R1 sensitive species (2011) for aquatics, birds, mammals, and amphibians with known (K) or suspected (S) presence in LNF and/or KNF, habitat type requirements described, additional special species designations noted (MT SSS or SOC), and likelihood of occurrence in proximity of Project. (USFS, 2011; Montana Field Guide, 2018).**

| Taxon | Common Name | Scientific Name | Known (K) or Suspect (S) Presence in LNF/KNF | Habitat Type/ Requirement(s) | Additional Special Species Status | Likelihood of Occurrence in proximity of Project |
|---|---|---|---|---|---|---|
| Amphibian | Northern leopard frog | *Rana pipiens* | K in KNF; S in LNF | Perennial wetlands and larger water bodies | MT SOC | Potential |
| Amphibian | Western toad | *Bufo boreas* | K | Wetlands and upland habitats | MT SOC | Observed |
| Amphibian | Coeur d'Alene salamander | *Plethodon idahoensis* | K | Streams, seeps, and springs | MT SOC | Potential |
| Bird | American peregrine falcon | *Falco peregrinus anatum* | K | Cliffs near water bodies | MT SOC | Observed |
| Bird | Bald eagle | *Haliaeetus leucoephalus* | K | Riparian forest | MT SSS | Observed |
| Bird | Black-backed woodpecker | *Picoides arcticus* | K | Forest affected by wildfire | MT SOC | Observed |
| Bird | Common Loon | *Gavia immer* | K | Fish-bearing lakes | MT SOC | Observed |
| Bird | Flammulated owl | *Otus flammeolus* | K | Forest | MT SOC | Observed |
| Bird | Harlequin Duck | *Histrionicus histrionicus* | K | Low gradient streams with little or no in-stream disturbance | MT SOC | Observed - no suitable breeding habitat is within the Project boundary |
| Fish | Westslope Cutthroat Trout | *Oncorhynchus clarki lewisi* | K | Water bodies | MT SOC | Observed |
| Invertebrate | Western Pearlshell | *Margaritifera falcata* | K | Streams | MT SOC | Unlikely |
| Mammal | Bighorn sheep | *Ovis canadensis* | K | Open habitat and cliffs | | Potential |
| Mammal | Fisher | *Martes pennant* | K | Mixed conifer forests | MT SOC | Unlikely |

| Taxon | Common Name | Scientific Name | Known (K) or Suspect (S) Presence in LNF/KNF | Habitat Type/ Requirement(s) | Additional Special Species Status | Likelihood of Occurrence in proximity of Project |
|---|---|---|---|---|---|---|
| Mammal | Fringed-myotis | *Myotis thysanodes* | K in KNF; No designation in LNF | Desert shrublands, sagebrush-grassland, and woodland habitats (ponderosa pine, oak and pine, Douglas-Fir); caves, mines, rock crevices | MT SOC | Observed |
| Mammal | Gray wolf | *Canis lupus* | K | Generalists | | Potential |
| Mammal | Long-eared myotis | *Myotis evotis* | K | Cluttered forest habits, including Douglas-fir and spruce-fir forests; hollow trees, under rocks on ground, under loose bark | | Potential |
| Mammal | Long-legged myotis | *Myotis volans* | K | Forested mountain regions, river bottoms, high elevations; caves and mines | | Potential |
| Mammal | North American wolverine | *Gulo gulo luscus* | K | Higher elevations with snow cover | MT SOC | Potential |
| Mammal | Northern bog lemming | *Synaptomys borealis* | K | Wet meadows, sphagnum bogs, and swamps | MT SOC | Potential |
| Mammal | Townsend's big-eared bat | *Corynorhinus townsendii* | K | Caves in forested habitats (Douglas-fir and lodgepole pine forests, ponderosa pine woodlands, cottonwood bottomland, Utah juniper-sagebrush scrub) | MT SOC | Potential |

## 8.3 USFS R1 Sensitive Plant Species

The list of USFS R1 sensitive species known or suspected to occur in the LNF include 35 species of plants (USFS, 2011). KNF was not included in this review. Of the 35 plant species identified, 13 species are known to occur in Sanders County (Montana Field Guide, 2018) and eight species were considered to have potential to occur in the Project based on habitat requirements. A summary of the USFS sensitive plant species known or suspected to occur in the LNF, their habitat requirements, and likelihood of occurrence in the Project is provided in Table 8-2. One of the sensitive plant species, tapertip onion is also identified as a Montana SOC. No on-the-ground survey has been conducted in recent history to inventory presence of sensitive plant species.

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**Table 8-5: USFS, Region 1 sensitive plant species (2011) with known (K) or suspected (S) presence in Lolo National Forest (LNF). Species with potential to occur in proximity of the Project are in bold. (USFS, 2011; Montana Field Guide, 2018)**

| Common Name | Scientific Name | Presence in LNF Known (K) or Suspect (S) | Known Occurrence in Sanders County | Habitat Type and Known Locations | Likelihood of Occurrence in proximity of Project |
|---|---|---|---|---|---|
| Sapphire rockcress | *Arabis fecunda (syn. Boechera fecunda)* | S | | Endemic to state. Present in southwest MT in Ravalli, Beaverhead, and Silver Bow counties. | Unlikely |
| Peculiar moonwort | *Botrychium paradoxum* | S | | Mesic meadows and bunchgrass communities in western MT. | Unlikely |
| **Giant helleborine** | ***Epipactis gigantea*** | **K** | **X** | **Streambanks, lake margins, fens with springs, and seeps, often near thermal waters. Western and southwestern MT.** | **Potential** |
| **Britton's Dry Rock Moss** | ***Grimmia brittoniae*** | **K** | **X** | **Vertical faces of shaded, calcareous cliffs (1,640-2,300 feet amsl). Endemic to northwestern MT and border with Idaho. Known presence in Flathead, Lincoln and Sanders counties.** | **Potential** |
| Howell's gumweed | *Grindelia howellii* | K | | Roadsides and other similarly disturbed habitat. Regionally endemic Missoula and Powell counties in MT and Benewah County, Idaho. | Unlikely |
| Missoula phlox | *Phlox kelseyi* | S | | Endemic to west-central MT. Range is Missoula to the Little Belt Mountains and the southern end of the Rocky Mountain Front south of Granite County. | Unlikely |
| Whitebark pine | *Pinus albicaulis* | K | X | Subalpine and krummholtz habitats in most mountain ranges in MT. | Unlikely |
| Idaho barren strawberry | *Waldsteinia idahoensis* | K | | Endemic to north-central Idaho with one occurrence in MT. Open coniferous forest in the montane zone. One known site in MT in Missoula County. | Unlikely |
| Musk-root | *Adoxa moschatellina* | K | | Sparsely distributed in Southwest MT in unimpacted areas by human disturbance or invasive weeds. | Unlikely |

| Common Name | Scientific Name | Presence in LNF Known (K) or Suspect (S) | Known Occurrence in Sanders County | Habitat Type and Known Locations | Likelihood of Occurrence in proximity of Project |
|---|---|---|---|---|---|
| **Tapertip Onion** | ***Allium acuminatum*** | **K** | **X** | **Scattered sites in western MT, but rare. Known to occur in Ravalli and Sanders counties.** | **Potential** |
| Round-leaved Orchis | *Amerorchis rotundifolia* | S | | Rocky Mountain Front, Bob Marshall Wilderness Complex, Swan Valley and northwest corner of MT. Spruce forest around seeps or along streams. | Unlikely |
| Sandweed | *Athysanus pusillus* | S | | Limited to Bitterroot Mountains in MT. Vernal moist, shallow soil of steep slopes and cliffs in the lower montane zone. | Unlikely |
| Beck Water-marigold | *Bidens beckii* | K | | Still or slow-moving water of lakes, rivers and sloughs in valleys, 0.1-3meters deep. Western valleys of MT. | Unlikely |
| Watershield | *Brasenia schreberi* | K | X | Shallow waters in the valleys of northwest corner of MT. | Unlikely |
| Creeping Sedge | *Carex chordorrhiza* | S | | Rare in MT. Fens and wet meadows in the northwest corner of MT. | Unlikely |
| Glaucus beaked sedge | *Carex rostrate* | K | | Rare in MT. Wet, organic soils of fens in the montane zone, including floating peat mats. | Unlikely |
| **Diamond clarkia** | ***Clarkia rhomboidea*** | **K** | **X** | **Rare in MT, known in northwest corner of MT along lower Clark Fork River drainage and known in Sanders and Lincoln counties. Dry, open forest slopes with gravelly soils in the montane zone.** | **Potential** |
| **Sand Springbeauty** | ***Claytonia arenicola*** | **K** | **X** | **Rare in MT, one localized area in western MT in Sanders County. Mossy, forested, north-facing talus slopes in the lower montane zone.** | **Potential** |
| **Cluster's Lady's-slipper** | ***Cypripedium fasciculatum*** | **K** | **X** | **Northwest portion of MT in warm, dry mid-seral montane forest in the Douglas fir/ninebark and grand fir/ninebark habitat types.** | **Potential** |

| Common Name | Scientific Name | Presence in LNF Known (K) or Suspect (S) | Known Occurrence in Sanders County | Habitat Type and Known Locations | Likelihood of Occurrence in proximity of Project |
|---|---|---|---|---|---|
| Small Yellow Lady's-slipper | *Cypripedium parviflorum* | K | X | Western half of MT. Fens, damp mossy woods, seepage areas, and moist forest-meadow ecotones in the valley to lower montane zones. Calcareous derived soils. | Unlikely |
| Sparrow's-egg Lady's slipper | *Cypripedium passerinum* | S | | Mossy, moist, or seepy places in coniferous forests often on calcareous substrates. Occurrences are either in designated wilderness areas or Glacier National Park. | Unlikely |
| English sundew | *Drosera anglica* | K | X | Sphagnum moss in wet, organic soils of fens in the montane zone. | Unlikely |
| Crested Shieldfern | *Drypteris cristata* | K | | Moist to wet, organic soils at the forest margins of fens and swamps in the montane zone. Known to occur in Flathead, Lake, Missoula, Ravalli and Beaverhead counties. | Unlikely |
| Western Joepey-weed | *Eupatorium occidentale* | S | | Western part of MT in Mineral and Ravalli counties. Rocky outcrops and slopes in the montane and lower subalpine zones. | Unlikely |
| Hiker's gentian | *Gentianopsis simplex* | S | | Rare in MT. Fens, meadows, and seeps usually in areas of crystalline parent material in montane and subalpine zones. | Unlikely |
| **Western pearl-flower** | ***Heterocodon rariflorum*** | **K** | **X** | **Northwest MT in vernally moist grassland slopes, mossy, ledges, and riparian swales in valley, foothills and montane zones.** | **Potential** |
| Scalepod | *Idahoa scapigera* | S | | Rare and peripheral in MT. Known to be present in Bitterroot Mountains. Vernal moist, open soil on rock ledges in the lower montane zone. | Unlikely |
| Meesia Moss | *Meesia triquetra* | S | | Wet soil and peat in fens and bogs, soil in wet woods. Known in Flathead County. | Unlikely |

| Common Name | Scientific Name | Presence in LNF Known (K) or Suspect (S) | Known Occurrence in Sanders County | Habitat Type and Known Locations | Likelihood of Occurrence in proximity of Project |
|---|---|---|---|---|---|
| Oregon bluebells | *Mertensia bella* | K | | Wet, seepy, open or partially shaded slopes in the montane and subalpine zones. Rare in MT and only known in parts of LNF in Missoula County. | Unlikely |
| **North Idaho monkeyflower** | ***Mimulus clivicola*** | **K** | **X** | **Known to occur in Sanders County in vernally moist soil of partially wooded slopes in the montane zone.** | **Potential** |
| Blunt-leaved Pondweed | *Potamogeton obtusifolius* | S | | Shallow water of lakes, ponds, and sloughs in the valley, foothill, and montane zones. Known in northwest MT. | Unlikely |
| Pod Grass | *Scheuchzeria palustris* | K | | Wet, organic soil of fens in the valley and montane zones, usually with Sphagnum moss. Known west of continental divide in MT. | Unlikely |
| Water Bulrush | *Schoenoplectus subterminalis* | K | | Open water and boggy margins of ponds, lakes, and sloughs at 0.1-3 m depth in the valley, foothill, and montane zones. Known in western MT. | Unlikely |
| **Red Clover** | ***Trifolium eriocephalum*** | **S** | **X** | **Native to Europe and introduced for forage and hay in N. America. Meadows, fields, lawns, roadsides, riverbanks, plains, valleys, montane zone.** | **Potential** |
| Hollyleaf Clover | *Trifolium gymnocarpon* | K | | Open woods and slopes, usually in dry soil of sagebrush steppe to ponderosa pine forest in the foothills to lower montane zone. Known within the West Fork Bitterroot River drainage, Rock Creek drainage. | Unlikely |

## 8.4 Montana Special Status Species and Species of Concern

The MNHP database was queried for SSS and SOC occurring within the FERC Project boundary and the general area (March 14, 2018). Montana SSS have some legal protections in place but are otherwise not Montana SOC. Montana SOC are designated by the state and is not a statutory or regulatory classification. These species are considered "at risk" due to declining populations, declining habitat, and/or restriction in distribution. Many of the Montana SOC are also identified by the USFS as sensitive species in Region 1 or LNF MIS, and/or classified by FWS as TEPC.

A summary of the 32 species (21 birds, three mammals, three plants, two fish, one amphibian, one invertebrate, one reptile) identified as SSS and SOC with occurrence/observations in the Assessment Area is shown in Figure 8-3 (MNHP, 2018). Observations and occurrence do not indicate presence of suitable habitat or breeding/nesting/denning areas. These are just accounting of a species presence in the area. The bald eagle is the only SSS identified in the area. The other 31 species are all classified as SOC.

In July 2019 (Montana Biological Survey/Stag Benthics, 2019), one additional Montana SOC was observed in the Assessment Area, Shortface Lanx (*Fisherola nuttalli*). This is a native freshwater snail that did not have any records in the Assessment Area (Figure 8-3) prior to 2019. Previous records of this species were observed upstream of the FERC Project boundary by McGuire (2002) in 2001 and 2002 while sampling for macroinvertebrates at Station 27 (*refer to* Figure 4-18 in Section 4.11.1). More information about the freshwater snail is included in Section 8.4.3.

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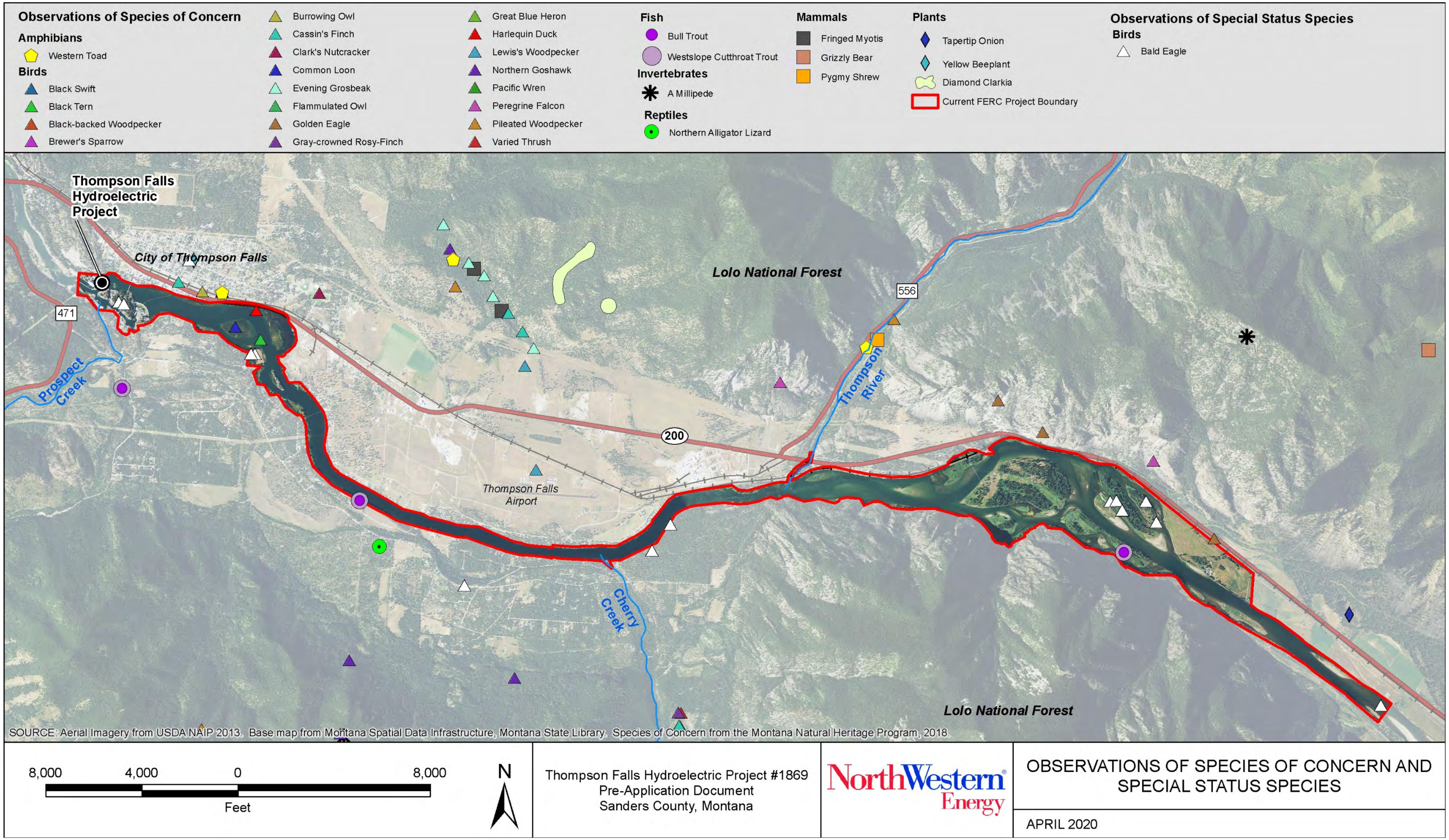
**Figure 8-4. Montana SSS and SOC with species occurrence or observations in the assessment area (MNHP, 2018).**



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The majority of the Project boundary is comprised of the Clark Fork River and a short reach of the confluence of the Thompson River. Thus, aquatic species are of greater focus due to the relationship of life history requirements to river and reservoir ecosystems Besides the federally threatened Bull Trout previously discussed, there are three additional aquatic species of special status, including the Westslope Cutthroat Trout and Western Pearlshell Mussel, both MT SOC and USFS sensitive species, and the Shortface Lanx (*Fisherola nuttalli*) a MT SOC with known historic range in the Project area. Each of these three species is discussed in the following sections, including a brief life history background, known distribution of the species in the Project area, threats and limiting factors for each species.

### 8.4.1 ***Westslope Cutthroat Trout***

Westslope Cutthroat Trout are designated as a sensitive species by the USFS Region 1 (2011) and they are also a Montana SOC. These designations are due to the decline in historic range that is attributed to hybridization, most notably with Rainbow Trout, habitat loss and fragmentation, diversion and dam construction, competition from nonnative species, and overfishing and harvesting (Shepard et al., 2005; Shepard et al., 1997; FWS, 1999; MNHP and FWP, 2018). Historically Westslope Cutthroat Trout were prevalent in headwater streams on both sides of the Continental Divide (~33,000 miles or ~53,100 km in Montana) and are now estimated to be present in about 13,000 miles or 20,921 km (39%) of their historical range in Montana (Shepard et al., 2003; Shepard et al., 2005).

Hybridization has likely occurred throughout the Lower Clark Fork River drainage based on the distribution and abundance of Rainbow Trout in the system as a result of historic stocking efforts in the main Clark Fork River and tributaries. As an example, between 1960 and 1983, after construction of Noxon Rapids and Cabinet Gorge dams (located downstream of the Project), a mix of Westslope Cutthroat Trout, Yellowstone Cutthroat Trout, and Rainbow Trout were stocked in Noxon Reservoir and in some tributaries (Kreiner and Terrazas, 2018). Westslope Cutthroat Trout are present within the FERC Project boundary. Currently, fish surveys and studies at the Thompson Falls upstream fish passage facility, baseline fisheries surveys in Thompson Falls Reservoir/Clark Fork River and in the Thompson River rely on phenotypic (visual) characteristics for identification of Westslope Cutthroat Trout.

Westslope Cutthroat Trout life history traits and habitat requirements have been well documented (GEI, 2005; FWS, 1999; McIntyre and Rieman, 1995; Shepard et al., 1984; Shepard et al. 2003; COSEWIC, 2006). In the Lower Clark Fork River drainage, Westslope Cutthroat Trout are either migratory (fluvial/adfluvial) or resident fish. Migratory life forms are either fish that spend most of their adult lives in lakes (adfluvial) or rivers (fluvial) and migrate into tributaries to spawn. Resident Westslope Cutthroat Trout are fish that generally spend their entire lives in the tributaries of which they were reared and are usually much smaller in size than their migratory counterparts.

Stream temperature is a key factor in determining distribution and persistence of Westslope Cutthroat Trout (Bear et al., 2005). Westslope Cutthroat Trout prefer clean and cold waters and have similar optimal growth temperatures, 13.6 °C (Bear et al. 2005), similar to Bull Trout, 13.2 °C (Selong et al., 2001). In general, juvenile Westslope Cutthroat Trout prefer temperatures ranging between 7 and 16 °C in the tributaries and adult Westslope Cutthroat Trout prefer temperatures less than 16 °C (McIntyre and Rieman, 1995; Sloat, 2001). Juvenile Westslope Cutthroat Trout (in laboratory studies) survival at water temperature 20 °C was greater than 90 percent for 30 days, thereafter it declined precipitously (Bear et al., 2005; Bear et al., 2007). The ultimate upper incipient lethal temperature (UUILT) for Westslope Cutthroat Trout (the temperature that is lethal to 50% of the test fish) was 19.6 C (95% CI, 19.1-19.9 C) (Bear et al., 2007).

Migratory cutthroat home to their natal streams and have been observed traveling over 120 miles (>200 km) in the Flathead River drainage (Shepard et al., 1984) and between 2.6 to 70 miles (4.2 to 113.9 km) in the Upper Clark Fork River drainage (Schmetterling, 2001). NorthWestern has also documented the movement pattern of a Westslope Cutthroat Trout after it ascends the Project's upstream fish passage facility. In 2018, a Westslope Cutthroat Trout ascended the fish passage facility in April 2018 and was recaptured by an angler (and released) 37 days later about 65 miles upstream, and returned downstream (date unknown) and ascended the fish passage facility (and released upstream again) the following April 2019 (NorthWestern, 2018).

After 9 years of operations (2011-2019), a total of 248 Westslope Cutthroat Trout (227 PIT-tagged) have ascended the Project fish passage facility with a range of 14 to 48 per year measuring between 180 to 486 mm. Westslope Cutthroat Trout are observed at the fish passage facility in the spring (March–May), after the peak streamflows (June–July), occasionally in August, and again in the fall months before the fish passage facility closes for the season (*refer to* Appendix A in the 2017 Annual Report, NorthWestern, 2018). Approximately 21 percent of the Westslope Cutthroat Trout PIT-tagged and released upstream of the fish passage facility were subsequently detected entering the Thompson River drainage between 2014 and 2019 and three of these fish were also detected in the tributary Fishtrap Creek (*refer to* Section 5.7).

### 8.4.2 *Western Pearlshell Mussel*

The *Margaratifera falcata*, commonly called the Western Pearlshell is a freshwater mussel and was identified as a species of concern in Montana in 2008 and a USFS sensitive species in 2010. The freshwater mussel relies on a suitable host fish which is also critical to the dispersal and survival of *Margaritifera* spp. (Jackson, 1925; Roscoe & Redelings, 1964; Young & Williams, 1984b). Bauer (1994) concludes the only suitable host for the glochidia, larval stage, of *Margaritifera* spp. is the subfamily Salmoninae, restricting these freshwater mussels to trout streams. Specific host fish are often not known, however studies have shown brown, brook, rainbow, and cutthroat trout are suitable hosts for *M. falcata* glochidia (Murphy, 1942; Toy, 1998; Young & Williams, 1984b). The distribution of the freshwater mussel is often more geographically limited than the distribution of salmonid fish (Hovingh, 2004).

The most suitable habitat for the Western Pearlshell Mussel are lotic systems that are oligotrophic with cooler temperatures, low turbidity, low levels of calcium carbonate ($CaCO_3$), and high levels of dissolved oxygen (Bauer, 1987; Bauer, 1992; Jackson, 1925; Roscoe & Redelings, 1964; Toy, 1998; Young & Williams, 1984a). Habitat preferences are toward streams with clean and cold water with relatively stable substrates (Stagliano, 2010; MNHP, 2018). Substrate composition is usually composed of sand, gravel, and cobbles that are "open" graded enough to allow for physical movement and water percolation. In steeper streams, larger boulders may provide small suitable sites immediately downstream of them. In larger streams the streambank provides for flow disruption and energy dissipation which can result in the formation and maintenance of desired substrates.

The Western Pearlshell Mussel, a freshwater mussel, is sensitive to water quality issues such as sedimentation and eutrophication. The distribution of this species has also been threatened by impoundments and diversions (MNHP and FWP, 2019). Water quality issues and fragmentation of habitat as a result of water diversions or dam structures can adversely impact their host fish which the freshwater mussel relies on for distribution and survival. These freshwater mussel are susceptible to adverse impacts to their environment due to their sedimentary lifestyle after the larval stage and general intolerance to pollutants.

There are no documented occurrences of live Western Pearlshell within the FERC Project boundary in recent times. Historically, the Western Pearlshell was present throughout the Clark Fork River drainage (Stagliano et al., 2007). Populations of the Western Pearlshell Mussel in larger rivers such as the Clark Fork River are believed to be extirpated or are at such low densities that long-term viability is unlikely (Stagliano et al., 2007). Stagliano revisited stream reaches in the Clark Fork River where 20-year-old or older records of the Western Pearlshell Mussel were known and found no populations (Stagliano et al., 2007). However, in 2014 Stagliano (2015) documented a few isolated populations in the Thompson River drainage.

### 8.4.3 *Shortface Lanx*

The Shortface Lanx is a native freshwater snail categorized as a Montana Species of Concern. This snail was historically present throughout the Columbia River Basin (Nietzel and Frest, 1989), but known occurrences are limited to parts of the Salmon and Snake rivers, Okanagan River drainage in British Columbia, and Deschutes River in Oregon (MNHP and FWP, 2020). The species was presumed extirpated in Montana (Stagliano et al., 2007), likely due to historically suitable habitat been lost due to impoundments (MNHP and FWP, 2020). Reports of the species in the Lower Clark Fork River basin have been isolated and few (MNHP and FWP, 2020).

The Shortface Lanx is commonly referred to as a "limpet" although it is not a "true limpet". This common name "limpet" is applied to this species based on the limpet-like appearance (having a simple shell which is conical in shape rather than being spirally coiled), which distinguishes it from all other freshwater snails living in the Columbia River drainage of Canada and the US. These snails are generally triangular-shaped and measure about 12 millimeters in length, 10 millimeters in width and 6 millimeters in height (MNHP and FWP, 2020).

The Shortface Lanx prefers cool, cold, clean waters that are well-oxygenated and consist of permanent flow and cobble-boulder substrate (Nietzel and Frest, 1989). Stream habitat type includes large perennial rivers ranging from 30 to 100 meters (98–300 feet) wide. This species primarily feeds on algae and diatoms by scraping rock surfaces. It is not present in areas with a high abundance of macrophytes or epiphytic algae, in areas with a bedrock substrate, or in areas of heavy disturbance (Frest, 1999). Distribution and movement are either from a slow snail-like crawl or stream current. These species are not active in the winter.

Specific threats to populations of Shortface Lanx have been identified as loss of habitat through impoundments, degraded water quality and siltation of cobbles, as well as nutrient enrichment (Nietzel and Frest, 1989; Frest and Johannes, 1995).

MNHP records show only three observations of the Shortface Lanx in Montana over the last 50 years (MNHP, 2020). McGuire (2002) identified the snail in August 2000 and 2001 in the Lower Clark Fork River, upstream of Thompson Fall Reservoir at Station 27 with an average relative abundance of eight snails per Hess sample (*refer to* Figure 4-18 in Section 4 for location). This section of river is not influenced by the reservoir and is outside the study area presented in Figure 8-3, Montana SOC records. In July 2019, Stagliano (Montana Biological Survey/Stag Benthos, 2019) identified one specimen of the snail from five samples identified at site CF3 located immediately downstream of Thompson Falls Dam (*see* Figure 4-18 for location). No individuals were located in the upstream site, CF1. The current distribution or abundance of this species in the Lower Clark Fork River is not known. No additional sampling for the Shortface Lanx at Station 27 since 2001 or beyond the 2019 sampling at sites CF1 and CF3 the Assessment Area have been completed (Montana Biological Survey/Stag Benthics, 2019).

## 8.5 Potential Adverse Impacts and Issues Related to Operation or Maintenance

As required by 18 CFR § 5.6(3)(i)(C), NorthWestern has identified the following known or potential adverse impacts of the Project as related to special status species.

### 8.5.1 *Current Operation*

The Project is operated to provide baseload and flexible generation within the reservoir elevation and minimum flow requirements of the License. During flexible generation operations, the Licensee may use the top 4 feet of the reservoir from full pond while maintaining minimum flows. For several reasons, the full 4 feet typically have not been used over the past 20 years of operation.

Project-related impacts from current operations to species of special status (TEPC, USFS Sensitive, Montana SSS or SOC) are discussed in Section 5 - Fisheries and Aquatic Resources.

### 8.5.2 *Proposed Future Operations*

NorthWestern proposes that the Thompson Falls Project will continue to provide baseflow generation and meet flexible capacity needs. Under normal operations, NorthWestern will maintain the reservoir between El. 2396.5 and 2394 feet (2.5 feet below normal full operating level) and maintain a minimum flow downstream of the lesser of 6,000 cfs or inflow.

Potential Project-related impacts resulting from proposed future operations to species of special status (TEPC, USFS Sensitive, Montana SSS or SOC) are discussed in Section 5 – Fisheries and Aquatic Resources.

## 8.6 Resource Protection and Mitigation Measures

This section describes protection, mitigation, and enhancement measures that have been undertaken at the Project or that are currently ongoing.

NorthWestern continues to implement and comply with the TCs of FWS's 2008 BO. Protection and mitigation measures implemented or funded by the Licensee in recent years affecting fisheries and aquatic resources that directly or indirectly affect federally threatened Bull Trout and their critical habitat and SOC Westslope Cutthroat Trout and their habitat are summarized in Section 5.14. In addition, specific projects are listed in Table 5-7 in Section 5.16.

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# 9. Recreation and Land Use

## 9.1 Recreation Overview

This section provides a detailed description of Project-related recreation resources within the Project area, which includes within a half-mile of the FERC Project boundary.

Ten sites are directly related to the Project that offer developed and dispersed recreation opportunities. These sites support water-based activities such as fishing, motor boating, use of personal motorized watercraft, non-motorized canoes, kayaks, and similar vessels, along with floating and swimming. These sites also offer terrestrial-based activities including day hiking, running, and picnicking, as well as passive activities such as photography, wildlife viewing, and sight-seeing.

The April 30, 1990 FERC order amending the license contains specific recreation-related direction to the Licensee. Article 404 approved a Licensee plan for recreation development of Island Park. Article 405 required the Licensee to construct a parking area, restrooms, garbage facilities, and interpretive signs on the south shore of the Clark Fork River. Article 406 required monitoring of recreational use of the Project area. Article 407 required the installation of a boat ramp and floating dock at Wild Goose Landing Park, improvements to the Flat Iron Ridge Fishing Access Site boat launch downstream of the Project, and installation of signs around Project shorelines warning visitors of potentially fluctuating water levels.

Article 404 was subsequently amended by FERC on May 21, 1993 to allow the Licensee to file a revised report on recreation resources detailing the Licensee’s proposal for recreation development of Island Park. On March 24, 1994, the Licensee filed a revised report on recreation resources in compliance with the requirements of amended Article 404. On September 14, 1994, FERC approved the Licensee’s revised recreation report.

The FERC-approved recreation report called for developments on the Island Park to emphasize the natural setting, with foot trails and bicycle paths on the island, and eliminate motorized travel. The recreation report also proposed that the Licensee contribute $20,000 towards the rehabilitation of the Historic High Bridge.

## 9.2 Existing Project-Related Recreation Facilities

Following is a description of the Project-related sites that within the Project boundary, or are on NorthWestern-owned property, or where maintenance of the site is funded by NorthWestern. These 10 sites support recreation use of the Project (Table 9-1, Figure 9-1).

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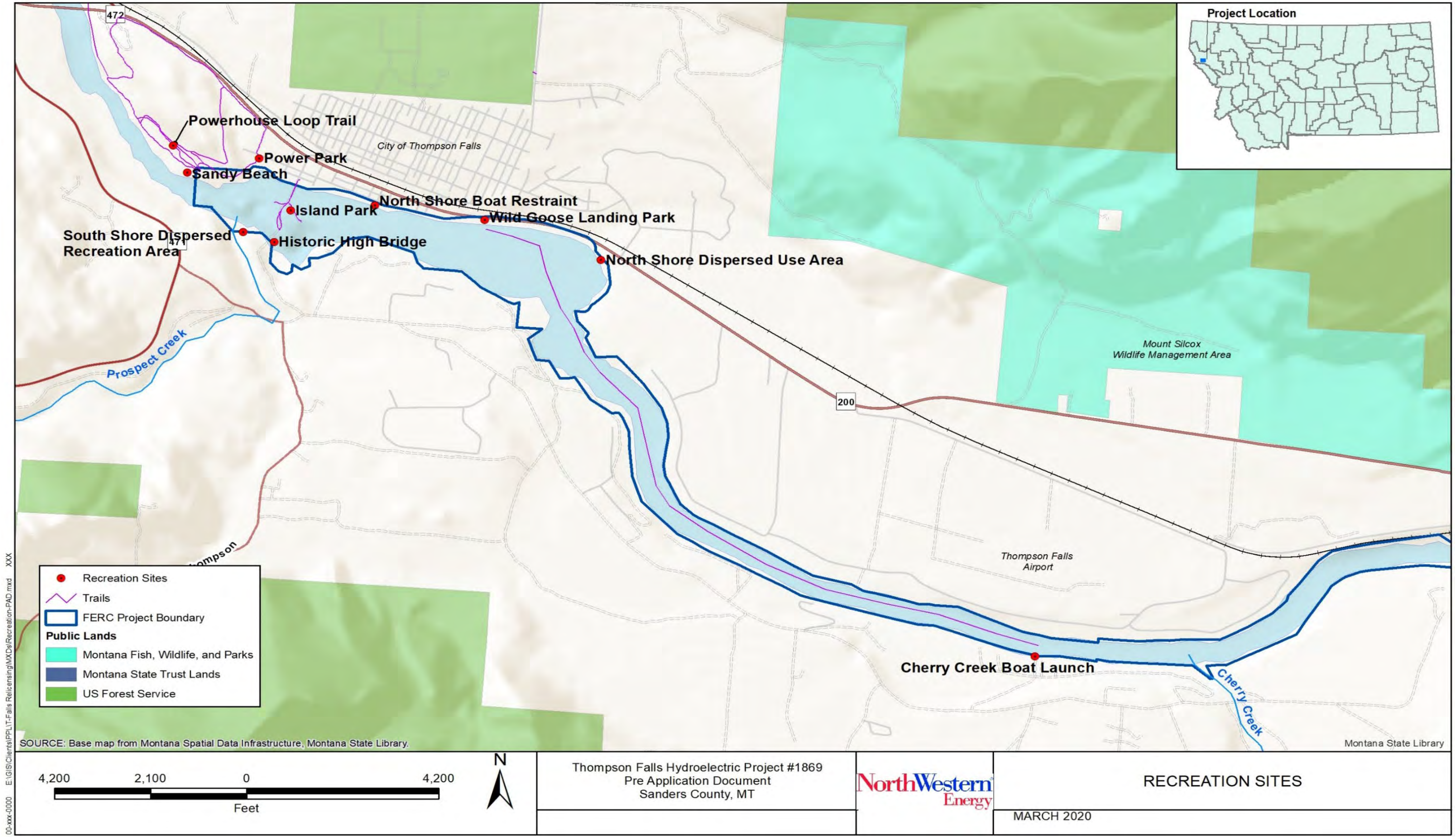
**Table 9-1: Property ownership and managing entity of Project related recreation areas.**

| Recreation Area | Property Ownership and Managing Entity | Inside FERC Project Boundary? | Obligation for Development or O&M Under FERC License? | Site Amenities |
|---|---|---|---|---|
| Island Park | Located on NorthWestern property. Managed by NorthWestern. | Yes | Site development guided by Article 404 and Revised Report on Recreation Resources approved by FERC 9/14/1994. NorthWestern provides O&M. | Day use site between Main Dam and powerhouse. Non-motorized access with adjacent parking areas, interpretation, picnic tables, benches, trails, fish passage viewing, garbage facilities, and vault toilets. |
| Historic High Bridge | Located within Sanders County easement on NorthWestern property. Managed by Sanders County. | Partially | $20,000 contribution toward reconstruction by Article 405. No O&M requirement. | Pedestrian bridge linking Island Park to south shore with interpretation, adjacent parking area, garbage facilities, and vault toilet. |
| Cherry Creek Boat Launch | Located on Sanders County property. Managed by Sanders County. | Partially | No development or O&M requirement. | Day use boat launch site with picnic facilities and vault toilet. |
| South Shore Dispersed Recreation Area | Located on NorthWestern property. Managed by NorthWestern. | Partially | No development required by License. NorthWestern voluntarily provides O&M. | Day use shoreline access area with dispersed parking, informational signs, and nearby vault toilet and garbage facilities. |
| Wild Goose Landing Park | Located on NorthWestern and city property. Managed by city under management agreement with NorthWestern. | Partially | Boat launch and dock construction guided by Article 407. NorthWestern voluntarily provides O&M funding. | Community park with boat launch and dock, swimming dock, toilets, informational signs, parking, and picnic facilities. |
| Power Park | Located on NorthWestern property. Managed by NorthWestern. | No | Development and O&M of the site is voluntarily provided by NorthWestern. | Community park with benches, group use pavilion with running water, toilets, and parking. |
| Powerhouse Loop Trail | Located on NorthWestern and other private property, and within Highway 200 right-of-way. Managed by Thompson Falls Community Trails Group. | Partially. Part of this trail is within the Project boundary for Avista's Clark Fork River Project, P-2058. | No development or O&M requirement. NorthWestern voluntarily assists with O&M activities. | Non-motorized trail with benches, vault toilet, and adjacent parking. |

| Recreation Area | Property Ownership and Managing Entity | Inside FERC Project Boundary? | Obligation for Development or O&M Under FERC License? | Site Amenities |
|---|---|---|---|---|
| Sandy Beach (dispersed) | Dispersed beach area located on NorthWestern property adjacent to Powerhouse Loop Trail. | No. This site is within the Project boundary for Avista's Clark Fork River Project, P-2058 | No development or O&M requirement. NorthWestern voluntarily assists with O&M activities. | Undeveloped beach area along the Powerhouse Loop Trail below the tailrace. |
| North Shore Boat Restraint | Located on NorthWestern property. Managed by NorthWestern. | Partially | No development requirement. NorthWestern provides O&M voluntarily. | Undeveloped shoreline above the Main Dam with a bench. |
| North Shore Dispersed Use Area (including former sawmill site) | Dispersed shoreline access partially located on NorthWestern property and within Highway 200 right-of-way, and partially on private property. | Partially | No development or O&M requirement. | Undeveloped shoreline area along the northeast shoreline of the main reservoir, popular for dispersed shoreline fishing. |

**Figure 9-1: Map of Project-related public recreation areas.**



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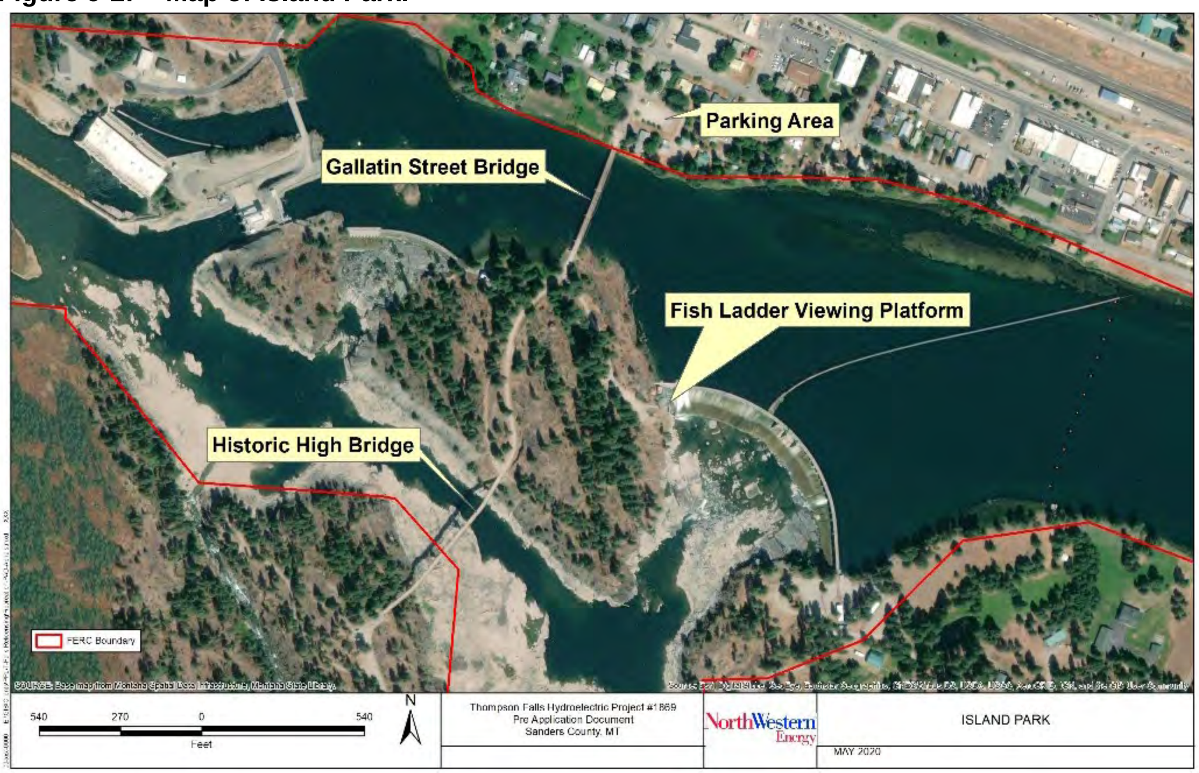
### 9.2.1 *Island Park*

Located on NorthWestern-owned property, Island Park is operated and maintained by NorthWestern. The site offers trail-based recreation with views of the waterway and Project facilities. To better accommodate public access to the island from the north shoreline, the Licensee purchased three undeveloped city lots 100 feet from the Gallatin Street Bridge and developed them to provide a public parking area. Designated Americans with Disabilities Act (ADA) parking is available directly adjacent to the bridge. The parking area accommodates 17 vehicles and the Gallatin Street Bridge provides walk-in access to the island.

Benches, picnic tables, and an ADA-accessible restroom are provided along trails on the island. The upstream fish passage facility public viewing platform, constructed in 2012 on the eastern edge of the island, offers views of the Main Channel Dam and the fish passage facility. Interpretive information regarding operation of the fish passage facility and fish species of interest was placed at the viewing platform as well. Interpretation throughout Island Park includes historical information related to building of the Thompson Falls Project, the Prospect Plant, and other geographically and culturally significant topics. The island is linked to the south shore by the Historic High Bridge (Figure 9-2 and Photographs 9-1).

**Figure 9-2: Map of Island Park.**



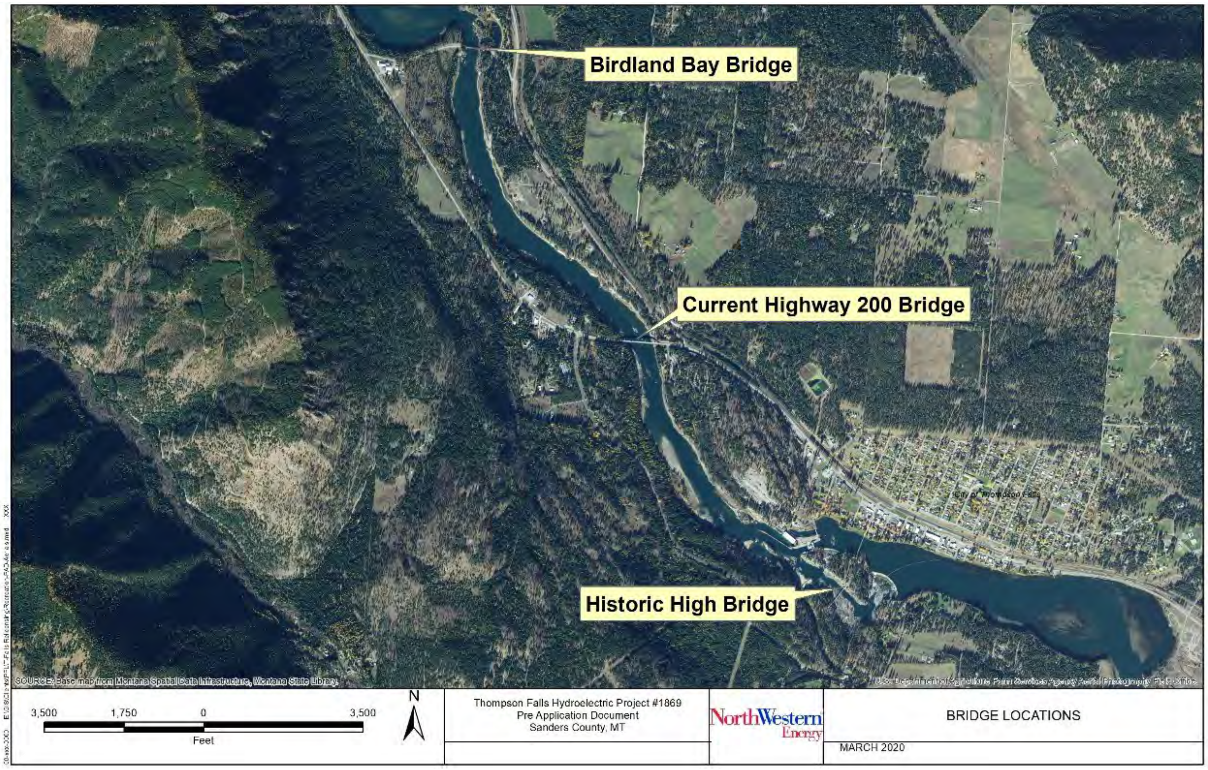
**Photographs 9-1:** **Island Park at Gallatin Street Bridge (top left); internal island trails (top right), visitors on the fish passage facility viewing platform (bottom left); interpretive panels at overlook above Main Channel Dam (bottom right).**

### 9.2.2 *Historic High Bridge*

The Historic High Bridge links Island Park to the south shore and completes the non-motorized throughway from homes along the south shore to the downtown area of Thompson Falls on the north shore. The Historic High Bridge is located on NorthWestern-owned property, which is subject to a 60-foot easement held by Sanders County. The county operates and maintains the bridge.

Originally constructed in 1911 to support construction of the Thompson Falls Project, the bridge was the primary route across the Clark Fork River at Thompson Falls until 1928, when a new bridge was built over the river at Birdland Bay (Figure 9-3). The Historic High Bridge linked the Prospect Creek and Cherry Creek areas to Thompson Falls until the early 1970s, when it was closed to vehicular use due to deterioration of the decking. It remained open as a foot and bicycle bridge until 1979, when it was closed to all use due to safety concerns.

**Figure 9-3: Map of the location of nearby bridges.**




The Historic High Bridge is a 588-foot long Parker/Pratt Deck-Truss designed bridge. It was included on the National Register of Historic Places in 1986 as part of the Thompson Falls Hydroelectric Dam Historic District. The design is unique as the deck is built atop the trusses. It has eight spans, a wood deck and stringer spans. The trusses are constructed of steel connected by pins and supported on concrete piers. Sanders County and project partners facilitated reconstruction of the bridge and opened it for non-motorized public use in 2010. The project won a 2011 award from the National Trust for Historic Preservation and an Engineering Excellence Award from the American Council of Engineering Companies. Designated parking for four vehicles, including one ADA parking spot, and an ADA-accessible restroom are provided adjacent to the south end of the Historic High Bridge (Figure 9-4 and Photographs 9-2).

**Figure 9-4: Map of the Historic High Bridge.**

**Photographs 9-2: The original Historic High Bridge (top, circa 1920); the deteriorated bridge, prior to reconstruction (2008, middle left); current day view of the reconstructed pedestrian and bicycle bridge (2018, middle right); interpretation and picnic facilities at north end of bridge (bottom left); parking area and restroom at south end of bridge (bottom right).**

### 9.2.3 *Cherry Creek Boat Launch*

About 4 miles upstream of the Main Channel Dam, the Cherry Creek Boat Launch is located on Sanders County-owned property and operated and maintained by Sanders County. The site provides public access for launching small watercraft on the south shoreline. Picnic facilities, parking for about six vehicles, and a restroom are provided at the site (Figure 9-5 and Photographs 9-3). Cherry Creek Boat Launch is also the beginning of a water trail with a take-out at Wild Goose Landing Park on the north shoreline.

**Figure 9-5: Map of the Cherry Creek Boat Launch.**


**Photographs 9-3: Cherry Creek Boat Launch restroom and picnic areas (left); boat ramp and launch dock (right).**

### 9.2.4 *South Shore Dispersed Recreation Area*

The South Shore Dispersed Recreation Area, which is located on NorthWestern-owned property and operated and maintained by NorthWestern, encompasses the south shoreline of the river upstream and downstream of the Historic High Bridge. Large rocks line the upstream shoreline, while the downstream shoreline offers wooded day use areas for picnicking or relaxing as well as shoreline areas along the rocky banks and gravel bars near the mouth of Prospect Creek. The area is popular for fishing near the mouth of Prospect Creek and in the main river channel. The dispersed use area accommodates parking and has informational signage related to fluctuating water levels as required by Article 407 of the Project License (Figure 9-6 and Photographs 9-4).

**Figure 9-6: Map of the South Shore Dispersed Recreation Area.**

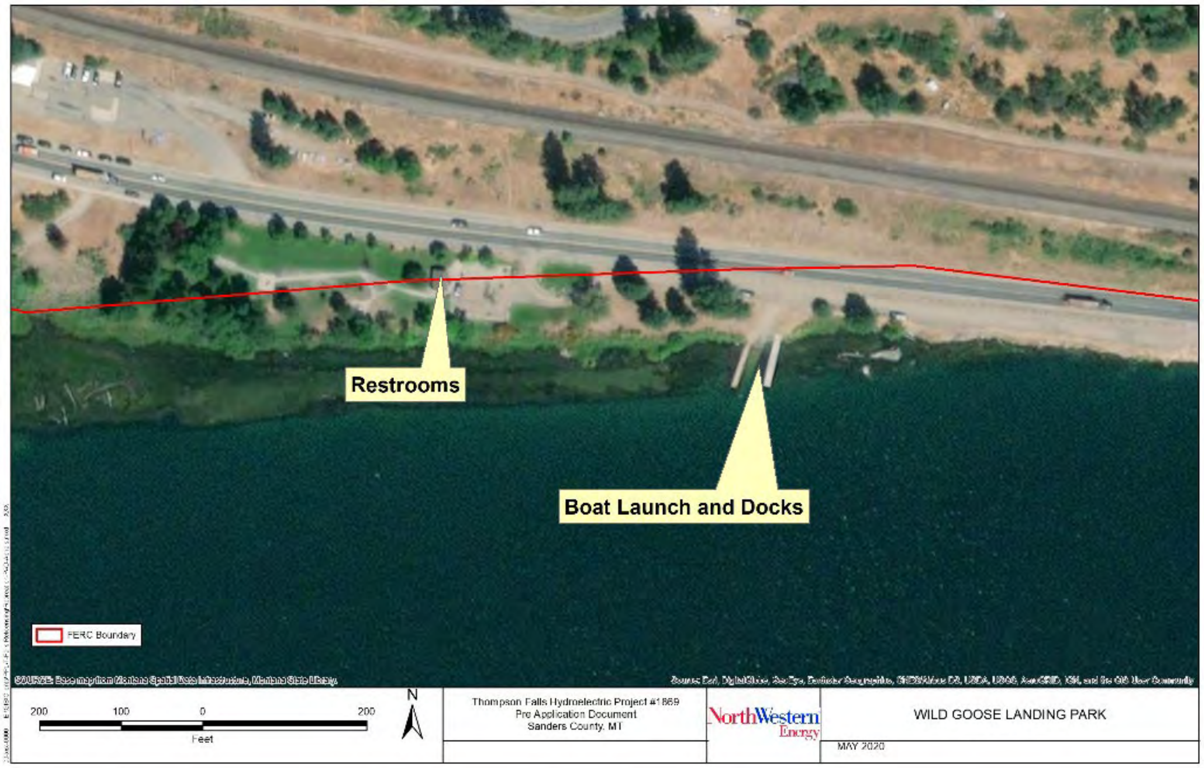
**Photographs 9-4: South shore area (top left); fishing along the shoreline at the south shore area (right); parking area at south shore area (bottom left).**

### 9.2.5 *Wild Goose Landing Park*

Wild Goose Landing Park is managed by the city of Thompson Falls. The eastern portion of the park is located on property owned by NorthWestern and the western portion is on property owned by the city of Thompson Falls. The park provides open space, picnic facilities, plumbed restrooms, a boat launch and dock, a separate swimming dock, and shoreline fishing. Designated parking adjacent to the restroom facility accommodates 10 vehicles, including one ADA-designated parking space, while about 10 more vehicles may park in dispersed areas along the access road adjacent to the boat launch (Figure 9-7 and Photographs 9-5).

NorthWestern partnered with the Sanders County Community Development Corporation in 2018 to improve the approach to the launch dock, add a boat bumper to the dock, install fold-down cleats for boat mooring, and add an information kiosk and site signage.

**Figure 9-7: Map of Wild Goose Landing Park.**



**Photographs 9-5: Wild Goose boat launch and dock after 2018 upgrades (top left); picnic area near boat launch (top right); park picnic area (bottom left); restrooms (bottom right).**

### 9.2.6 *Power Park*

Power Park, which is located on NorthWestern-owned property and operated and maintained by NorthWestern, is an ADA-accessible city park along the north shoreline, just above the original powerhouse. The park offers a group use pavilion with power, running water, and plumbed restrooms, as well as multiple picnic tables, benches, and mature shade trees. Parking is available for 10 vehicles. The park contains an information sign related to the hydroelectric generating capacity of the Project (the FERC-required Part 8 sign), as well as an information kiosk which directs visitors to public recreation opportunities in and near Thompson Falls. The park also serves as a parking area for visitors that seek to access the Powerhouse Loop Trail by following sidewalks within the park to trail segments linked by the Powerhouse access road. Recent improvements at Power Park include upgraded wiring in the pavilion to accommodate electric cookers, hot plates, and small appliances, construction and installation of the information kiosk and addition of a pet waste station to assist visitors in cleaning up after their pets. The park is a popular venue for numerous outdoor events each year (Figure 9-8 and Photographs 9-6).

**Figure 9-8: Map of Power Park.**

**Photographs 9-6: Information kiosk (top); trail access at edge of park (middle left); restroom (middle right); group use portion of pavilion (bottom).**

### 9.2.7 *Powerhouse Loop Trail and Sandy Beach*

Following completion of the Historic High Bridge reconstruction project, the Thompson Falls Community Trails Group (Trails Group) was formed in partnership with NorthWestern and other community stakeholders with the intent of constructing non-motorized trails in and around Thompson Falls.

The first trail segment to be completed under direction of the Trails Group was the Powerhouse Loop Trail, a 2.3-mile loop trail downstream of the Thompson Falls Powerhouse. This trail and its various routes were supported by volunteer workdays, trail construction grants, and efforts by the Licensee to construct linking trail segments. The Licensee also installed a new vault toilet near the trailhead.

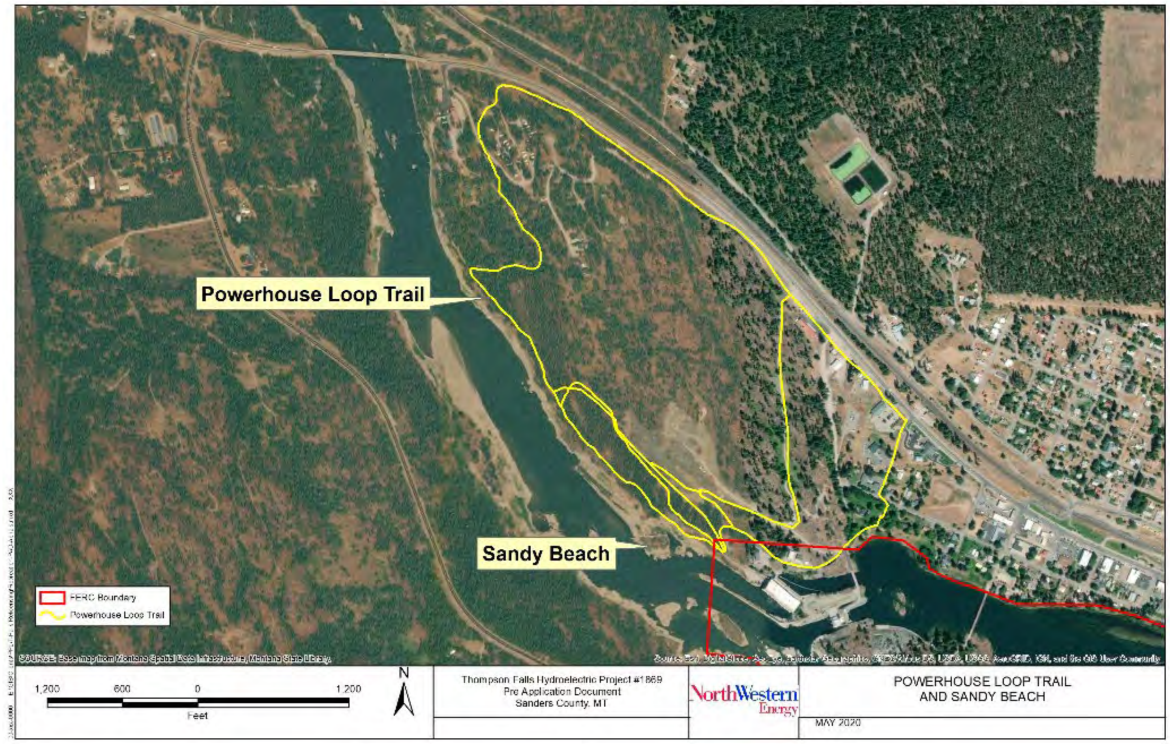
After a need for benches along the trail was identified, donations were received to purchase two benches for an overlook area along the trail, and eventually for other trail locations and at Island Park. The Licensee assisted by assembling and installing the benches.

The trail is located on property owned by NorthWestern downstream of the powerhouse and on property owned by other public and private entities and supported by trail easements. A portion of the trail is also within the Highway 200 right-of-way and is operated and maintained by the Trails Group, with assistance from NorthWestern and Sanders County. The 2.3-mile trail begins at Power Park and follows the shoreline downstream through lands that are within Avista's Clark Fork River Hydroelectric Project, Noxon Rapids Project boundary to the area near privately-owned Rimrock Lodge adjacent to the Highway 200 bridge. From there, the trail loops up through Rimrock Lodge property, follows Highway 200 east to Pond Street where it then links back to Power Park via Pond Street.

Connecting trail segments exist in addition to the main loop trail described above. These segments offer a low-water route along the shoreline of the upstream portion and a high-water route atop a tall embankment of the upstream portion when the low-water route is flooded during spring run-off. These connecting segments offer options for visitors to utilize and experience different portions of the area.

Sandy Beach is a popular swimming hole that is accessed by the low-water route of the Powerhouse Loop Trail. The dispersed swimming hole is nestled behind a large rock outcrop, providing for a deep pool adjacent to a sandy shoreline. Density of vegetation at the site varies throughout the peak recreation season. The small beach comfortably accommodates a few people, but typically not more than one or two recreation groups at a time. (Figure 9-9 and Photographs 9-7).

**Figure 9-9: Map of Powerhouse Loop Trail and Sandy Beach.**



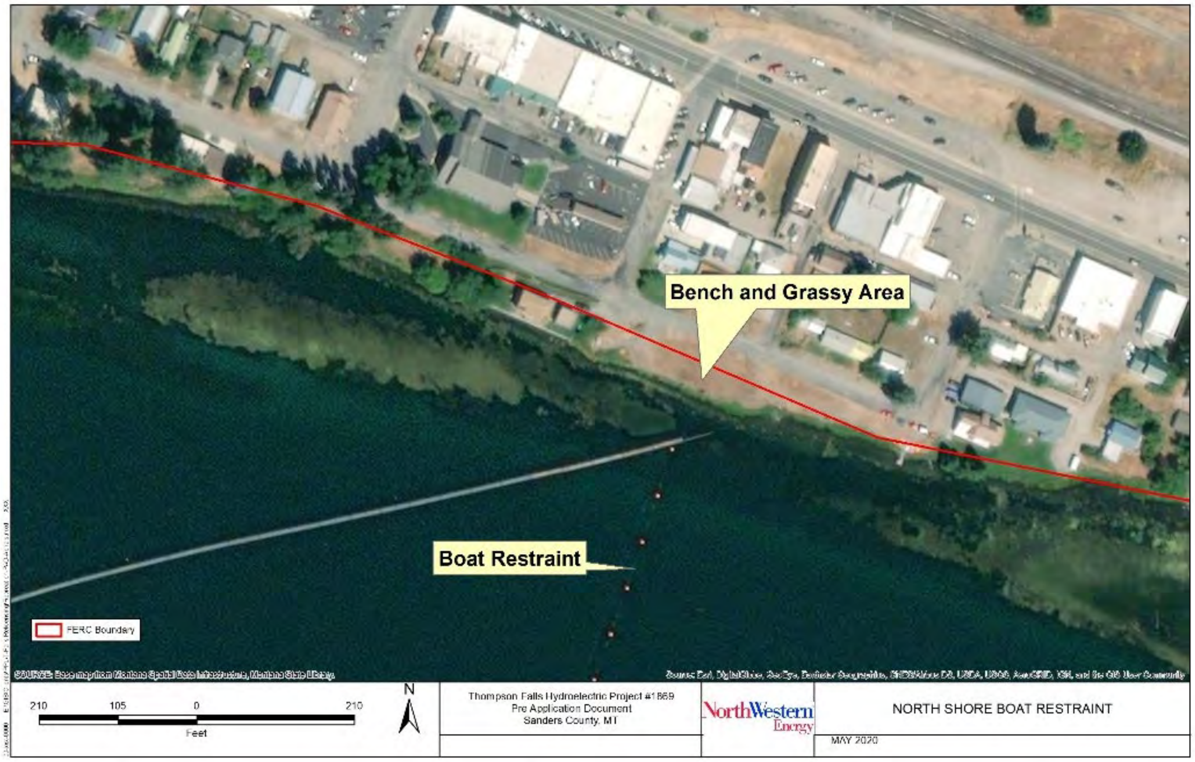


**Photographs 9-7: Trailhead area (top left); restroom (top middle); bench at overlook (top right); junction of high water and low water trails (bottom left); Sandy Beach (bottom right).**

### 9.2.8 *North Shore Boat Restraint*

The North Shore Boat Restraint is anchored on north shoreline property owned and operated by NorthWestern. The site includes a bench and an open grassy area for viewing the waterway and Project facilities (Figure 9-10 and Photographs 9-8).

**Figure 9-10: Map of North Shore Boat Restraint.**

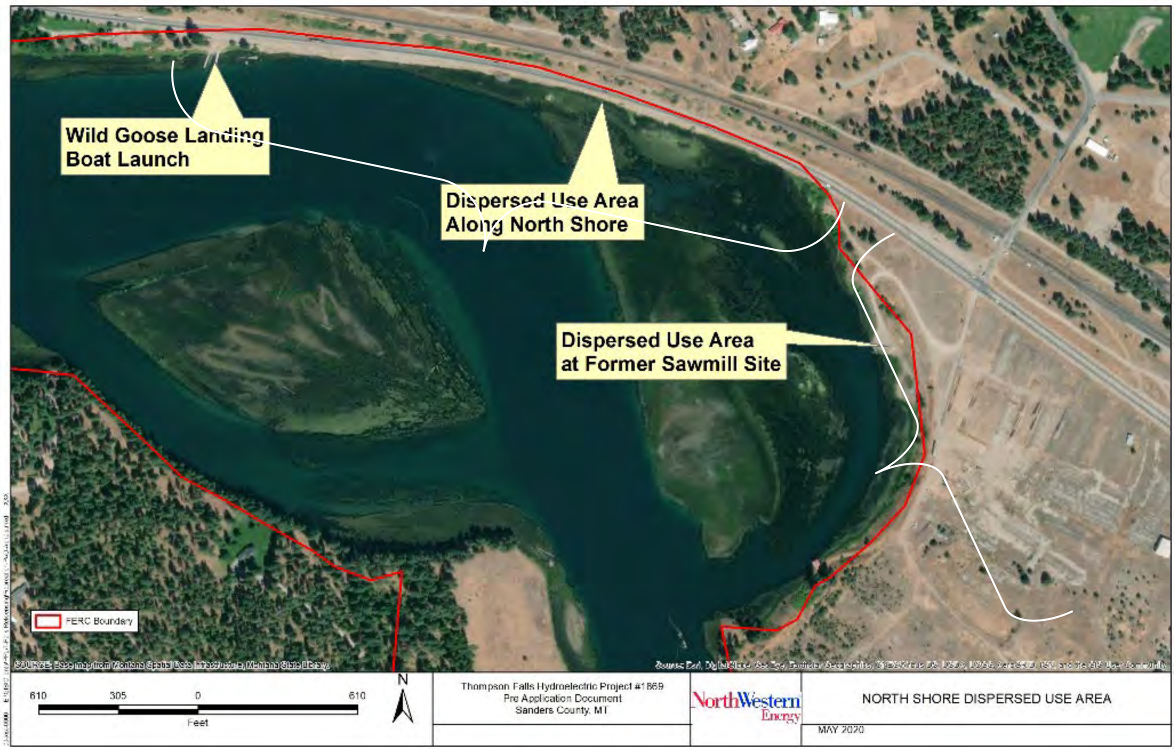



**Photographs 9-8: Upstream view of boat restraint area (left); downstream view of boat restraint area(right).**

### 9.2.9 *North Shore Dispersed Use Area (including former sawmill site)*

A substantial amount of dispersed fishing occurs on the north and northeast shorelines of the reservoir, upstream of Wild Goose Landing Park and adjacent to Highway 200 and the former sawmill site. There are no facilities, improvements, or direct management of the area, which is a mix of ownership and easements by Montana Department of Transportation and private entities (NorthWestern, BNSF Railway, and former sawmill operators) (Figure 9-11 and Photographs 9-9).

**Figure 9-11: Map of North Shore dispersed use area (including former sawmill site).**



**Photographs 9-9: North shoreline along highway 200 (top row); northeast shoreline adjacent to former sawmill site (bottom row).**

## 9.3 Visitor Use Survey Results

Recreation visitor monitoring has been conducted for the Thompson Falls Project since the early 1990s pursuant to Article 406 of the 1990 amendment. Following issuance of the amended license, the Licensee conducted peak-season surveys of visitors to Project-related sites in 1993, 2003, 2008, 2014, and most recently in 2018. The primary goal of the visitor survey is to better understand recreation use of Project-related sites and identify any issues related to public recreation access. Specifically, the surveys examined visitor and trip characteristics related to previous site use, length of visit, group size, recreation activity participation, motivations to visit, opinions about the adequacy of recreation facilities, any problems encountered, and visitor demographics. Results from the 2018 Thompson Falls Recreation Visitor Survey conclude that visitors to the Thompson Falls Project are highly satisfied with the facilities and opportunities available. A full analysis of 2018 visitor survey results is provided in the following section.

Another dimension of visitor monitoring includes examination of the volume of visitor use at Project-related recreation sites. Technologies allow for monitoring vehicle access or pedestrian access to recreation sites. When coupled with visitor and trip characteristics gathered by the recreation visitor survey, this information provides a more complete picture of public recreation use of Project-related sites. An analysis of the volume of visitor use of recreation sites is provided in the following section.

### 9.3.1 *Recreation Visitor Satisfaction and Site Use Monitoring*

The 2018 Recreation Visitor Survey was conducted during the peak recreation season Memorial Day weekend through Labor Day). Three-fourths of all visitors to Project-related recreation sites were from Montana and half of all visitors were from Thompson Falls (Pinnacle Research, 2019). Visitors from Washington and Idaho comprised 12 percent of all visitors (7 and 5%, respectively). Most visitors (66%) were repeat visitors, while 34 percent were first time visitors (Pinnacle Research 2019).

Overall, 97 percent of all visitors in 2018 indicated they were very or extremely satisfied with the site(s) they were using. Additionally, feelings of crowdedness were low, with 92 percent indicating they felt not at all or not very crowded. Being outdoors and enjoying nature were primary motivations for visits, and only 2 percent of visitors reported experiencing problems of any kind during their visit.

Over time, while visitor and trip characteristics and visitor satisfaction have remained fairly consistent, visitors' desire for changes to recreation facilities or management declined from 43 percent in 2008 to 26 percent in 2014 and 15 percent in 2018. This decline is largely due to the numerous upgrades made to recreation sites and expansion of recreation opportunities related to the Thompson Falls Project since 2008. Upgrades have largely consisted of additional amenities such as trails, benches and picnic tables, as well as more toilet facilities and designated parking areas.

Some visitors suggested improvements during the 2018 recreation visitor survey. Generally, improvements to site management or addition of basic amenities, typically pertaining to addition of picnic tables and trash cans as well as improvements to restroom facilities, were suggested by visitors. Desired changes at the Cherry Creek Boat Launch Site include repairs to picnic tables, removal of debris piles, upkeep and improvements to the bathroom facility, and more signage, information, benches, and garbage cans. In addition, bathroom conditions at Wild Goose Landing Park seem to be of concern to some visitors (Pinnacle Research 2019).

The volume of use at five of the 10 project-related recreation sites was monitored during the peak recreation season of 2019 using automatic traffic and trail counters. These sites included Island Park, the Powerhouse Loop Trail, Wild Goose Landing Park, South Shore Dispersed Use Area, and Cherry Creek Boat Launch. Counts were successfully collected for four sites; the counter at Wild Goose Landing Park was stolen and no data was recovered. Counts for Sandy Beach were included with the Powerhouse Loop Trail since the access to the beach originates on the trail and counts for the Historic High Bridge are included as a portion of the Island Park counts. Estimating use of Power Park, the North Shore Boat Restraint, and the North Shore Dispersed Use Area is very difficult due to the varied nature of access to these sites.

A total of 17,139 visitors were counted at the four recreation sites in 2019. Of that total, 8,584 visitors were at Island Park; 1,663 were on the Powerhouse Loop Trail; 3,180 were at the Cherry Creek Boat Launch; and 3,712 were at the South Shore Dispersed Recreation Area (Table 9-2). Considering that Island Park was only counted for two-thirds of the peak recreation season, it is likely that actual use of that site totals 12,000 to 13,000 visitors. It is also likely that Wild Goose Landing Park hosted about the same number of visitors as Island Park, which further increases the total visitation to close to 35,000 individuals not including visitors to Power Park, the North Shore Boat Restraint, or the North Shore Dispersed Use Area.

**Table 9-2: Visitation estimates of Project-related recreation sites, peak season 2019.**

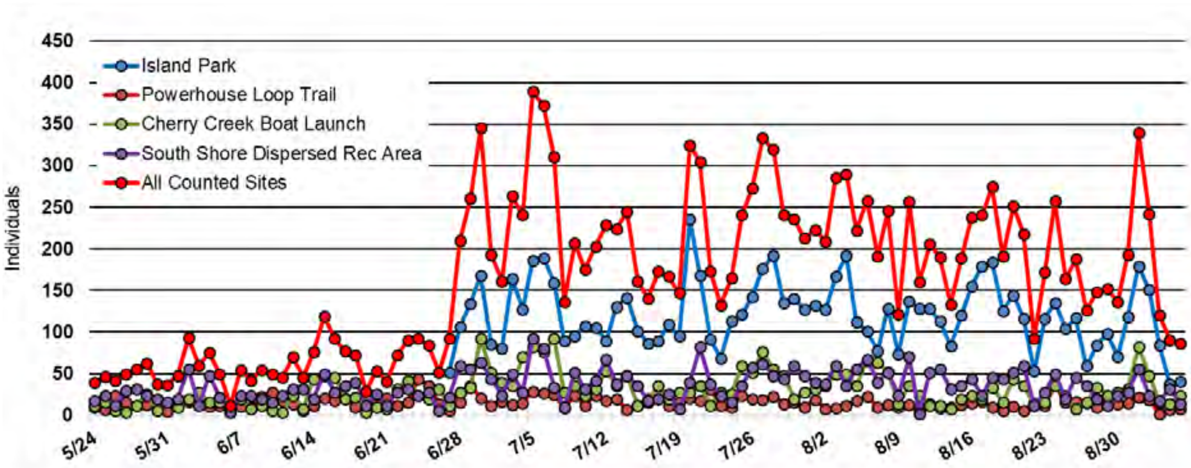
| Recreation Area | 2019 Peak Season Visitors (individuals) | Count Interval |
|---|---|---|
| Island Park | 8,584 | 6/27 - 9/5 |
| Historic High Bridge | *Included with Island Park* | |
| Cherry Creek Boat Launch | 3,180 | 5/24 – 9/5 |
| South Shore Dispersed Recreation Area | 3,712 | 5/24 – 9/5 |
| Wild Goose Landing Park | * | |
| Power Park | ** | |
| Powerhouse Loop Trail | 1,663 | 5/24 – 9/5 |
| Sandy Beach (dispersed) | *Included with Powerhouse Loop Trail* | |
| North Shore Boat Restraint | ** | |
| North Shore Dispersed Use Area | ** | |
| | | |
| **Total** | **17,139 Visitors** | |

* The automatic traffic counter was stolen so no data was recovered.

** Unable to count or estimate use of this site.

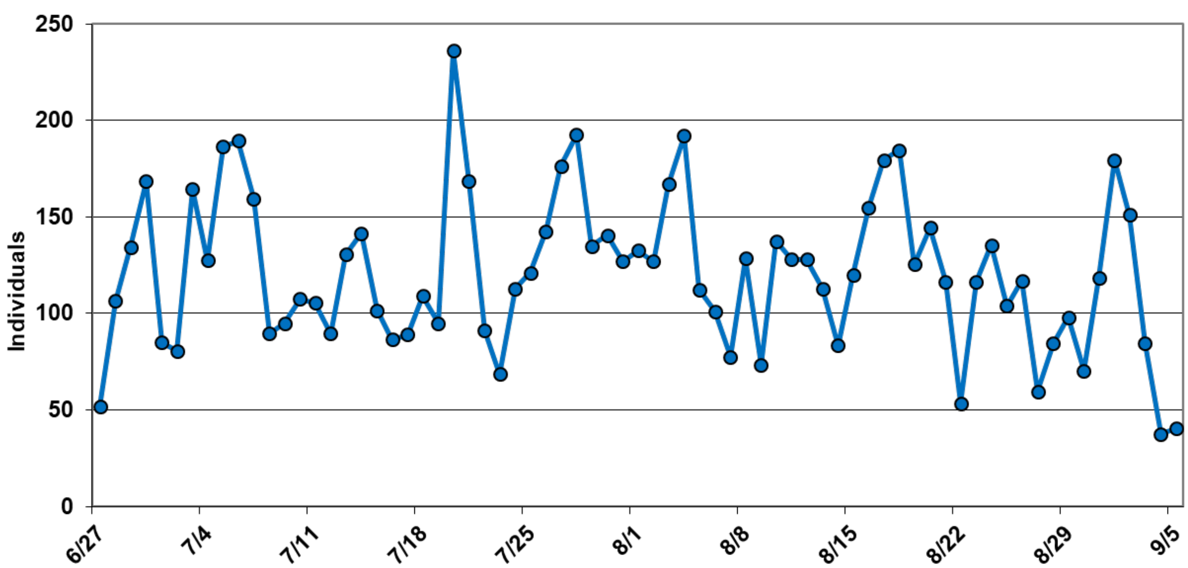
The highest visitation to all counted sites combined occurred on July 5, 2019, when 390 visitors accessed the 4 counted sites (Figure 9-12). The lowest use occurred on June 6, 2019 when 12 visitors utilized the sites. Together, the four counted sites hosted an average of 163 recreationists per day.

**Figure 9-12: 2019 daily visitors to selected project-related recreation sites.**



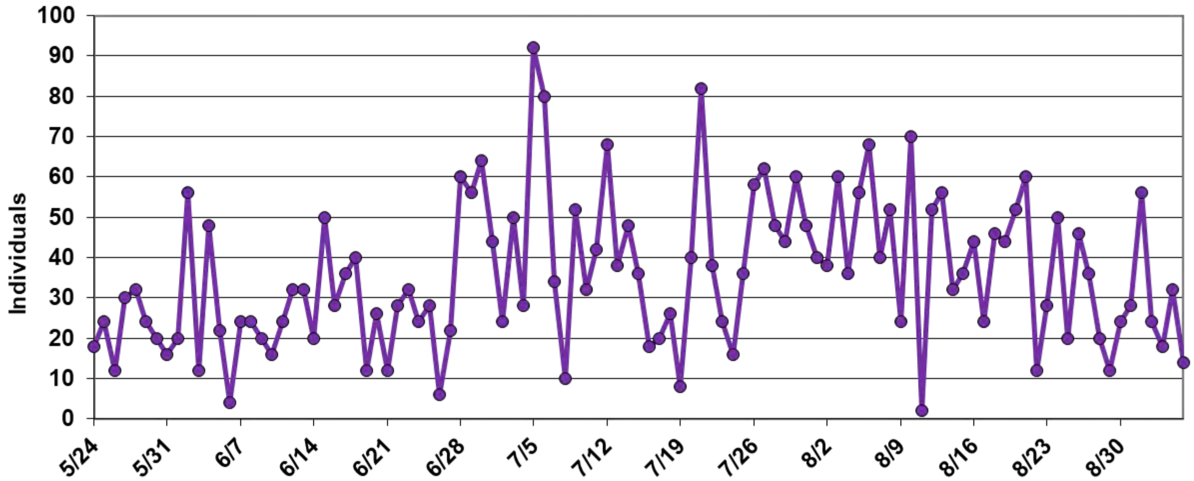

Between June 27 and September 5, 2019, Island Park hosted 8,584 visitors. The highest use of the site was recorded on July 20 with 236 people, while the lowest was on September 4 with 38 people (Figure 9-13). On average Island Park hosted 121 people per day between June 27 and September 5, 2019.

**Figure 9-13: 2019 daily visitors to Island Park, June 27 – September 5, 2019.**



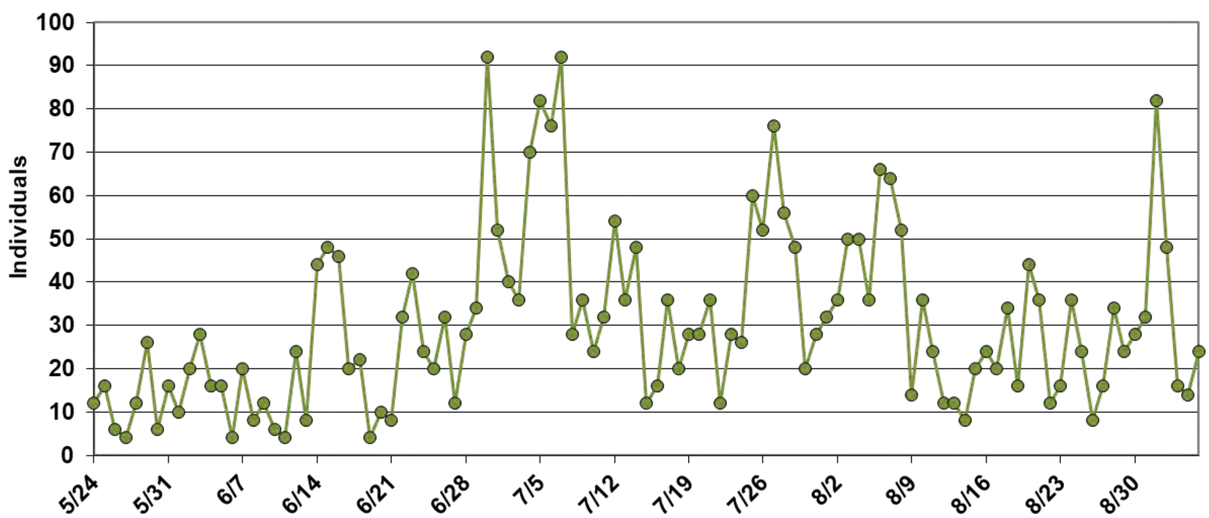

During the peak recreation season the South Shore Dispersed Recreation Area hosted 3,712 people, an average of 35 people per day. Peak use occurred on July 5 with 92 people while the lowest use was recorded on August 11 with just 2 people (Figure 9-14). Use of the dispersed recreation area from July through the end of the peak season was, on average, 42 percent higher than use of the area from Memorial Day weekend through June.

**Figure 9-14: 2019 daily visitors to South Shore dispersed recreation area, May 24 – September 5, 2019.**



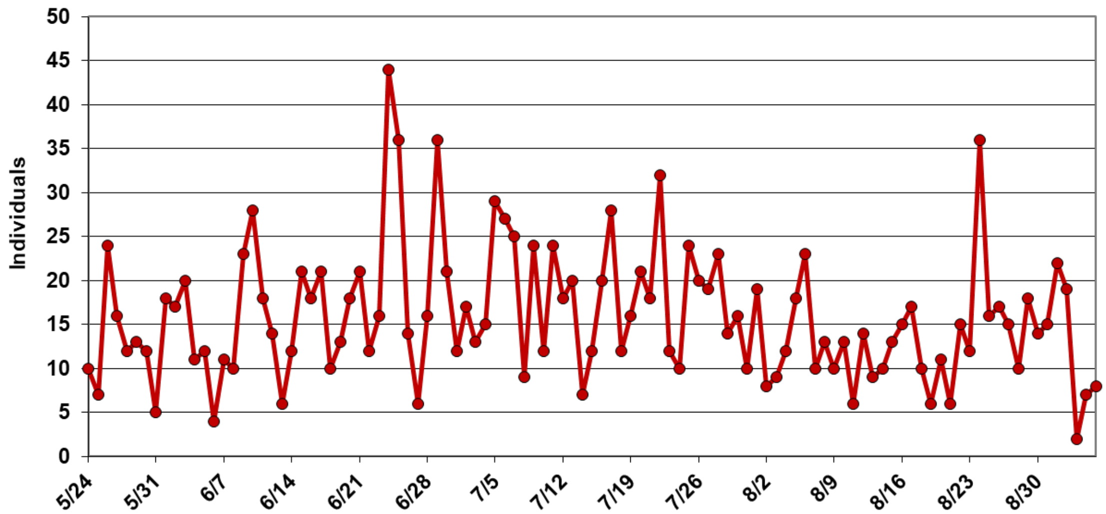

Cherry Creek Boat Launch hosted a total of 3,180 visitors during the peak recreation season of 2019. Highest use was recorded on June 30 and July 7, when 92 visitors accessed the site each day (Figure 9-15). Total daily use of fewer than 10 people was recorded on a number of days during the very early season. The site hosted 30 people per day, on average throughout the entire season, but average daily visitation increased 71 percent after July 1 compared to average daily visitation Memorial Day weekend through June (increasing from 21 people per day through June 30 to 36 people per day from July 1 through the end of the season, on average).

**Figure 9-15: 2019 daily visitors to Cherry Creek Boat Launch Site, May 24 – September 5, 2019.**




The Powerhouse Loop Trail hosted a total of 1,663 people during the peak recreation season of 2019. Peak use was recorded on June 24 with 44 people, and the lowest day of site use was September 2 (Figure 9-16). On average, the site hosted 16 people per day throughout the use season. Unlike other sites where early season use (through June 30) was, on average, lower that use in July and August, use of the trail was consistent over the course of the entire season.

**Figure 9-16: 2019 daily visitors to Cherry Creek Boat Launch Site, May 24 – September 5, 2019.**




### 9.3.2 *Angling Pressure*

Montana FWP conducts annual surveys that provide estimates of angling pressure (Selby, 2019). In 2017, Thompson Falls Reservoir supported 3,895 angler days. While 2017 angler data report 100 percent of anglers were Montana residents, 2015 data report 70 percent were Montana residents and 30 percent were nonresidents, and 2013 data report 93 percent were residents and 7 percent were nonresidents. Although the result of 100 percent resident anglers in 2017 may be due to sampling limitations, it is likely that the majority of anglers on Thompson Falls Reservoir were Montana residents in 2017, which is consistent with past data and the profile of visitors to recreation sites. By comparison, neighboring Noxon Reservoir supported 27,550 angler days and Flathead Lake supported 42,196 angler days, which indicates that there is significantly more angling pressure on Noxon Reservoir and Flathead Lake than there is on Thompson Falls Reservoir.

## 9.4 Other Recreation Sites and Facilities

The Thompson Falls area has an abundance of recreation opportunities unrelated to the Project (Table 9-3).

**Table 9-3: Property ownership and managing entity of recreation areas in the vicinity of the Project.**

| Recreation Area | Property Ownership and Managing Entity |
|---|---|
| Ainsworth Park | Located on city property. Managed by city of Thompson Falls. |
| Railway Park | Located on city property. Managed by city of Thompson Falls. |
| Rose Garden Park and Fort Thompson Playground | Located on city property. Managed by city of Thompson Falls. |
| Swimming Pool and Park | Located on city property. Managed by city of Thompson Falls. |
| Community Center, Softball Field, and Dog Park | Located on city property. Managed by city of Thompson Falls. |
| Babe Ruth Field | Located on city property. Managed by city of Thompson Falls. |
| Bighorn and Grizzly Parks | Located on city property. Managed by city of Thompson Falls. |
| Thompson Falls State Park | Located on DNRC property, under perpetual easement. Managed by FWP with assistance by Avista. |
| State Park Trail | Located on Avista property. Managed by Avista, FWP, and Thompson Falls Community Trails Group. |
| River's Bend Golf Course | Located on Avista and other private property. Managed by private entity. |
| Flat Iron FAS | Located on Avista property. Managed by FWP with assistance by Avista. |
| US Forest Service Trails | Located on USFS property. Managed by USFS. |
| Mount Silcox Wildlife Management Area | Located on FWP property. Managed by FWP. |

Ainsworth Park lies northeast of Power Park. Historically, baseball games were hosted on the field, but deterioration of the covered grandstands and lack of room for expansion of the field resulted in plans to renovate it. Irrigation and a VFW monument were recently erected, and renovation plans include a pavilion, restrooms, gravel parking area, and amphitheater.

Railway Park lies along Main Street of Thompson Falls, between the railroad and Highway 200, across from the west end of the downtown area. Benches, a VFW monument, and landscaping offer a pleasant view for passersby.

The Rose Garden Park and Fort Thompson Playground are situated along Main Street, between the railroad and Highway 200, roughly a half mile east of Railway Park. The park contains rose bushes and mature trees, along with picnic tables, a playground, and a seasonal portable restroom.

The swimming pool and adjacent park are located on city property next to the high school complex on Golf Street, about a half mile north of Highway 200. The park provides a playground, picnic tables, pavilion, and swimming pool.

The softball field, Community Center, and dog park are managed by the city as a unit. The facilities are on city property across from the high school complex on Golf Street, about a half mile north of Highway 200. The softball field and dog park are managed by volunteers. The Community Center offers space for social gatherings and community meetings.

The Babe Ruth Field was constructed in 2018 on city property behind the Search and Rescue building, about a quarter mile off Highway 200 on Golf Street. The site hosts baseball games and is operated by volunteers.

Bighorn and Grizzly parks were dedicated to the city as part of the Ashley Creek subdivision. The park areas are undeveloped but offer open space for surrounding residents.

Thompson Falls State Park offers day use and overnight use. Managed by Montana State Parks, the site is located approximately 2 miles downstream of the Thompson Falls Powerhouse. In addition to overnight camping, the site contains day use picnic facilities, group use facilities, a boat launch, and a recently expanded fishing pond with ADA-accessible fishing pier and pavilion. The site can be accessed by vehicles from Blue Slide Road or by non-motorized means from the State Park Trail. Compared to visitors to Project-related sites, whom are typically day use recreationists from Sanders County or nearby areas, visitors to Thompson Falls State Park are twice as likely to be from outside of Montana and are primarily visiting for 2 nights. The State Park is an important draw for the Thompson Falls area as a whole, but it serves a population of visitors that largely makes use of Noxon Reservoir and differs from those that frequent the Project-related recreation sites (REC Resources, 2013).

The State Park Trail provides a non-motorized link between the Powerhouse Loop Trail and Thompson Falls State Park from a junction slightly upstream of the Rimrock Lodge property and Highway 200 bridge. The trail segment is aligned along shoreline property owned by Avista and terminates at the State Park.

The River's Bend Golf Course and Birdland Bay RV Resort provide a privately managed golf course and RV resort just downstream of Thompson Falls State Park on the northeast shoreline of the Clark Fork River.

Across from River's Bend Golf Course, the Flat Iron Fishing Access Site on the west shoreline (approximately 3 miles downstream from the Thompson Falls Powerhouse) is a boat launch site that also offers ADA-accessible fishing. The launch area provides parking for 14 vehicles with trailers including one ADA-designated spot. A picnic table and seasonal portable restroom are provided in the launch area. Other areas of the site offer two fishing platforms (one of which is ADA-accessible), picnic tables, a vault toilet, and space to park about 20 vehicles along the access road. The site is managed by FWP.

In areas further removed from the Project, the USFS provides a network of fitness trails at the Mule Pasture a half mile north of downtown Thompson Falls, as well as trails that provide access to Weber Gulch, Sqaylth-kwum Creek, and Ashely Creek.

The Mount Silcox WMA, managed by FWP, is open to public access April 1 through November 30 and lies approximately 2 miles to the east of Thompson Falls. A parking area is provided just north of Highway 200. The WMA is more than 1,500 acres (6.1 $km^2$) in size and provides winter and spring range for bighorn sheep, recreational access to adjacent public lands, and winter range for elk.

## 9.5 Overview of Area Recreation Assessments or Management Plans

The Licensee, often in partnership with other entities, has significantly improved recreation facilities and enhanced recreation opportunities associated with the Project over the past 10 to 20 years. Results of the most recent survey suggest users are generally satisfied with the Project's recreation attributes. However, some areas for improvement were identified during NorthWestern's early outreach with the Relicensing Participants. Additionally, planning efforts by local entities and/or federal and state agencies include observations and needs assessments for the area that may relate to the Project.

### 9.5.1 *Comments Received During Relicensing Participant Workshops*

Visitors expressed concern over conditions of some site amenities, such as bathrooms, through the visitor survey. During a December 2018 Relicensing Participants work session, City and county managers expressed the challenge they face in keeping up the facilities at Wild Goose Landing Park and Cherry Creek Boat Launch.

During the December 2018 Relicensing Participants workshop, it was suggested by the Trails Group that there is a desire for coordinated signage and wayfinding for recreation and historical amenities in the Thompson Falls area, as well as a planning document to help guide future signage and wayfinding. The Trails Group has expanded signage and wayfinding for the trail system in and around Thompson Falls, and NorthWestern partnered with the group to fund construction for information kiosks at Power Park, Wild Goose Landing Park, at the North Shore parking area adjacent to Island Park and at the Powerhouse Loop Trail gate. These kiosks identify recreation sites and amenities as well as wayfinding tools and regulatory or informational signs. The Trails Group recommended that these types of signage and wayfinding efforts be continued.

The other recreation enhancement identified through the December 2018 Relicensing Participant workshop was the desire for a boat launch and water access on the north shoreline upstream of the immediate Project area. While publicly-available developed access points exist along the south shoreline 27 miles upstream, in Plains, 13 miles upstream (at McKay's Landing FAS) and 3 miles upstream (at the Cherry Creek Boat Launch), the only developed public access on the north shoreline upstream of the Project area exists at Paradise, 34 miles upstream. The addition of an access site on the north shore above Thompson Falls Reservoir is desired by some Relicensing Participants to provide better access to river stretches between Plains and Thompson Falls.

### 9.5.2 ***Management Plans***

The Thompson Falls Community Trails Group developed a plan that identified existing trail and linking segments, then prioritized segments for future development (TFCT, 2018). The Powerhouse Loop Trail was the first major trail segment to be completed, followed by a segment linking the loop trail to Thompson Falls State Park. A feasibility study was conducted for the next priority segment, which would link Wild Goose Landing Park to the commercial district east of Thompson Falls Reservoir near Harvest Foods (Reynolds, 2018).

The city of Thompson Falls conducted a public parks inventory and assessment that documents existing city parks, facilities, and maintenance requirements, and provides planning for future maintenance needs and improvements. One of the highest priority projects identified in the assessment includes the addition of irrigation, ADA-accessibility, and parking lot improvements at Wild Goose Landing Park (WGM Group, 2018).

Property on the lower Thompson River, about a quarter mile upstream from its confluence with the Clark Fork River, outside the FERC Project boundary, was acquired in 2020 by FWP through partnership funding from FWP, Avista's Clark Fork Settlement Agreement, and NorthWestern. The site will provide fishing access into the future and is in keeping with the Montana Fish, Wildlife and Parks.

From a statewide perspective, the 2020-2024 Montana Statewide Comprehensive Outdoor Recreation Plan (SCORP) identified the need to expand or ensure access to outdoor recreation opportunities for mobility-impaired or otherwise disabled visitors, encouraging participation in outdoor recreation for its physical and mental benefits, and maintaining recreation facilities and infrastructure along with access to public lands and waters as priorities moving ahead. Initiation of data collection efforts and mapping to increase awareness and evaluate management actions was also identified, as well as balancing recreational use of Montana's natural resources with protection of those resources into the future while planning for adaptations driven by factors such as natural climate change.

## 9.6 Shoreline Management

Shoreline management is guided by NorthWestern's "*Shoreline Standards - Standards for the Design, Construction, Maintenance and Operation of Shoreline Facilities on NorthWestern Hydroelectric Projects*" which was adopted by the Licensee in January 2020 (NorthWestern, 2020). The purpose of this document is to provide general standards such that shoreline facilities are designed, constructed, maintained and operated in a safe, effective and environmentally friendly manner that protects and/or enhances adjacent recreation, natural and aesthetic resources. Following are some highlights of these standards:

- Standards are required to be implemented on NorthWestern-owned lands and are voluntary on lands not owned by NorthWestern.

- Standards require that on NorthWestern-owned lands that a land use license be entered into for permissible improvements.
- Establishes the number, size, design, materials and other parameters for the construction of docks.
- Establishes design and shoreline vegetation requirements for bank stabilization projects. These design standards discourage rock rip-rap and encourage bio-engineering methods.
- Requires projects to comply with local, state and federal permitting requirements.
- Implemented in coordination with the Green Mountain Conservation District, the entity with jurisdiction to administer Montana's Natural Streambed and Land Preservation Act (also known as the "310 Law"). The purpose of this law is that natural rivers and streams and the lands and property immediately adjacent to them are to be protected and preserved to be available in their natural or existing state and to prohibit unauthorized projects and in so doing to keep soil erosion and sedimentation to a minimum.

## 9.7 Regionally or Nationally Important Recreation Areas

The region serves as a secondary access corridor to Glacier and Yellowstone National Parks. The primary eastbound access corridor for both Glacier and Yellowstone National Parks is Interstate 90. Other than Interstate 90, the primary access corridors for Glacier National Park are Highway 2 and Highway 93. Accessing these parks through Thompson Falls adds approximately 200 miles to the eastward route.

As described in Section 8.2, the LNF covers over 2 million acres of western Montana, with about 103.78 acres of federal lands within the FERC Project boundary. The KNF borders the LNF and is located downstream of the Project. The KNF covers about 2.2 million acres of the northwestern section of Montana bordering Canada. There are no KNF lands in the FERC Project boundary. Other nationally important recreation areas in the region, within a 200-mile radius, include the Cabinet Wilderness, Great Bear Wilderness, Bob Marshall Wilderness, Mission Mountain Wilderness, and the Scapegoat Wilderness.

The National Bison Range is approximately 60 miles east of Thompson Falls.

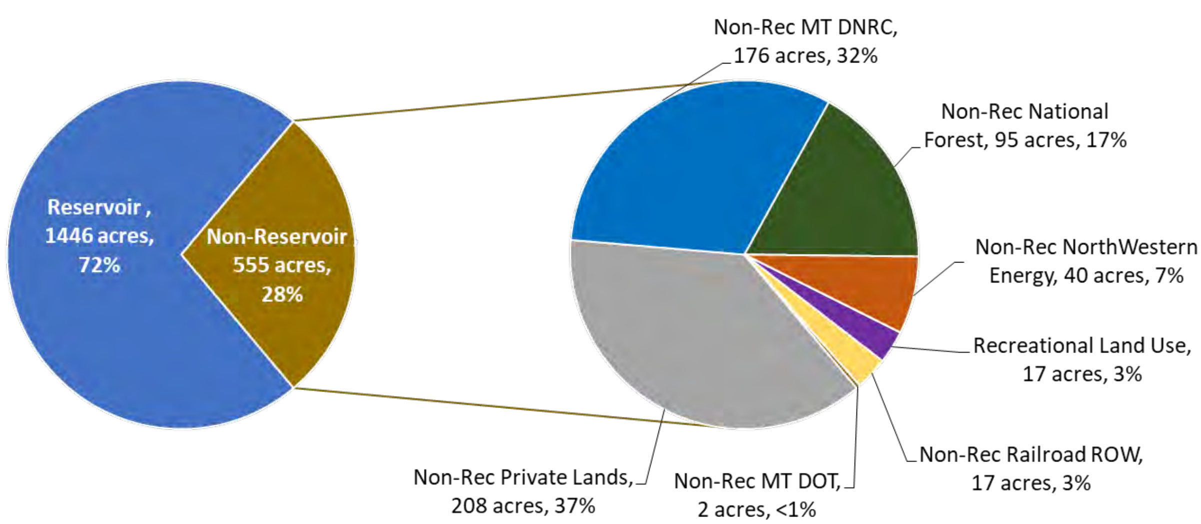
## 9.8 Non-recreational Land Use and Management Within the Project

The Project encompasses 2,001 acres (8.1 $km^2$). The Project extends about 0.3 miles downstream from the two Thompson Falls dams, and about 12 miles upstream. Thompson River, a major tributary to the Clark Fork River, enters the Thompson Falls Reservoir about 6.2 miles upstream of the dam, and the lower 0.3 miles of the Thompson River is included within the Project. The Project incorporates some uplands in the area around the dams and powerhouses, and all of the island between the dams (Island Park).

The 2,001-acre Project boundary consists of 1,446 acres of reservoir, and 555 acres of non-reservoir. Of the 555 acres that are non-reservoir, about 17 acres are associated with recreational land uses, and the remaining 538 acres are associated with non-recreational land use.

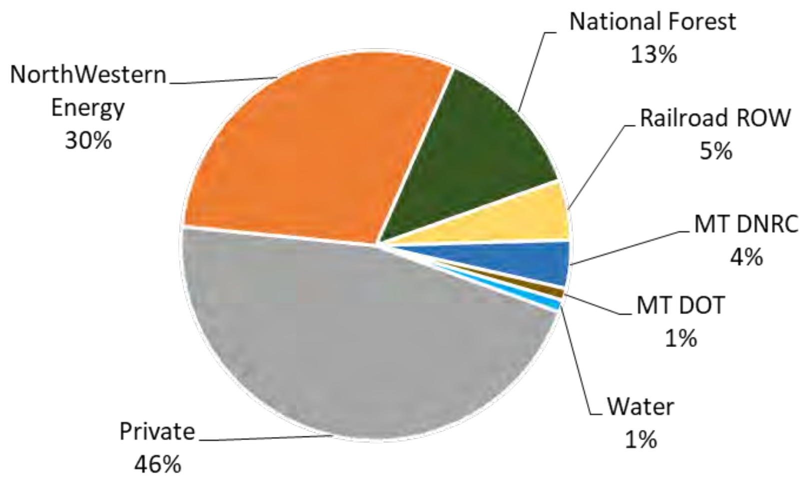
Of the 538 non-recreational acres, NorthWestern owns about 40 acres, with the majority under and adjacent to the dams and powerhouse used for Project operations, as well as narrow slivers on the edge of the reservoir in various locations. Private lands consisting of a mix of large parcels, subdivision lots, and city lots comprise about 208 acres of non-recreational lands. Many private lands contain residential buildings. The state of Montana's Department of Natural Resources and Conservation manages about 176 acres, which are largely open space. National Forest System lands including 103.78 acres which are largely open space forest lands. Railroad right-of-way and state of Montana lands managed by the Montana Department of Transportation as Montana Highway 200 right-of-way comprise the approximate remaining 17 acres and 2 acres, respectively (Figure 9-3).

**Figure 9-17: Use and ownership of lands within Project.**



The Project has a perimeter length of about 27 miles. About 45 percent of the perimeter is privately-owned land (1% is within the city limits), 30 percent is owned by NorthWestern, 13 percent is National Forest System land managed by the USFS, 5 percent is railroad right-of-way, 4 percent is state of Montana land managed by the Montana Department of Natural Resources and Conservation, 1 percent is State Highway 200 right-of-way, and 1 percent is water (where the Project boundary intersects the river/reservoir at the upstream and downstream ends) (Figure 9-4).

**Figure 9-18: Land use and ownership of Project perimeter.**




## 9.9 Recreational and Non-Recreational Land Use and Management Adjacent to the Project

Lands within a half-mile of the Project encompass an area of 8,589 acres (34.7 $km^2$). The largest land use category is privately-owned, large rural lots, comprising 3,728 acres (15.1 $km^2$) (43%). Some of these lots have homes on them and others are vacant. LNF lands comprise the second largest land use category, accounting for 2,000 acres (8.1 $km^2$) (23%). One specific LNF area – the Mule Pasture – is situated at the north edge of Thompson Falls and is specifically managed for trail-related recreation (walking, day hiking, exercising, etc.).

The third largest land use category is privately-owned, small rural lots, comprising 1,204 acres (4.8 $km^2$) (14%). Many of these lots exist as reservoir-frontage and reservoir-view lots since much of the private shoreline on the Thompson Falls Reservoir has been subdivided and developed. The Cherry Creek Access Site, a public access site located amidst a shoreline subdivision on the south shoreline and managed by Sanders County, offers small watercraft launching and day use facilities.

The fourth largest land use category is a mixed-use area to the east of the Thompson Falls city limits. This mixed-use includes a grocery store, hardware store, commercial buildings, residences, and other uses on large lots. Areas along the north shoreline east of Wild Goose

Landing Park (included in the “city” land use category) offer dispersed public access for shoreline fishing.

The fifth largest land use category is the city of Thompson Falls, consisting of 474 acres (1.9 $km^2$) (6%). Thompson Falls, county seat of Sanders County, is typical of a town its size having restaurants, hotels/motels, municipal buildings, various stores, residences, professional service offices and so forth. Developed recreation opportunities within this land use category include public parking for access to Island Park, day use of Power Park and the picnic pavilion facilities, as well as access to the Powerhouse Loop Trail near the original powerhouse, and the community’s Rose Garden Park, which offers playground equipment, benches, and picnic facilities.

The sixth largest land use category is land owned by NorthWestern near the dams and powerhouses, as well as other Project facilities that are set back at distances such that these lands are not included within the Project. Public recreation amenities exist as non-motorized trails that provide opportunities for loop trail walking, jogging, and biking, as well as benches at scenic overlooks, in addition to shoreline access for fishing and a dispersed swimming beach.

The seventh largest land use category includes Montana School Trust Lands managed by the Montana Department of Natural Resources and Conservation for open space and public access.

The eighth largest land use category contains lands managed by FWP, including the Mount Silcox Wildlife Management Area and a Rocky Mountain bighorn sheep wildlife viewing turnout along Highway 200.

The last three land use categories are an active sawmill comprising 105 acres, the Thompson Falls Airport consisting of 86 acres (0.3 $km^2$), and the Clark Fork River downstream of the Project, consisting of 35 acres (0.1 $km^2$).

While not broken out as separate acreages, there are other important land uses within the half-mile buffer. These include the Burlington Northern Railroad, State Highway 200, the Yellowstone Pipeline, and NorthWestern transmission lines.

## 9.10 Potential Impacts Related to Operation or Maintenance

As required by 18 CFR § 5.6(3)(i)(C), NorthWestern has identified the following known or potential adverse impacts of the Project as related to recreation and land use.

### 9.10.1 *Current Operations*

The Project is operated to provide baseload and flexible generation within the reservoir elevation and minimum flow requirements of the License. During flexible generation operations, the Licensee may use the top 4 feet of the reservoir from full pond while maintaining minimum flows. For several reasons, the full 4 feet typically have not been used over the past 20 years of operation.

Under current operations, public and private boat docks, launches, and shoreline access areas provide adequate access to desired on-water and shoreline recreation opportunities, and based on the most recent recreation survey, users are generally very satisfied with the recreation attributes at the Project.

### 9.10.2 *Proposed Future Operations*

NorthWestern proposes that the Thompson Falls Project will continue to provide baseflow generation and meet flexible capacity needs. Under normal operations, NorthWestern will maintain the reservoir between El. 2396.5 and 2394 feet (2.5 feet below normal full operating level) and maintain a minimum flow downstream of the lesser of 6,000 cfs or inflow.

Proposed future operations are not expected to effect public use of the High Bridge, Cherry Creek boat launch, Power Park, Island Park, Powerhouse Loop Trail, or the South Shore dispersed recreation area. Changes in reservoir level will continue to have the potential to influence the other Project recreation sites.

## 9.11 Resource Protection and Mitigation Measures

This section describes protection, mitigation, and enhancement measures that have been undertaken at the Project or that are currently ongoing.

As described above and summarized in Table 9-2, NorthWestern has developed extensive recreational amenities in the project area. Some of these developments were License requirements, others voluntary. The most current recreation survey found a high level of satisfaction among recreational users in the Project area.

As described in Section 9.6, NorthWestern maintains *Standards for the Design, Construction, Maintenance and Operation of Shoreline Facilities* (Standards) on NorthWestern Hydroelectric Projects. A copy of the Standards is included in Appendix F. The purpose of the Standards is to provide general standards such that shoreline facilities are designed, constructed, maintained and operated in a safe, effective and environmentally friendly manner that protects and/or enhances adjacent recreation, natural and aesthetic resources. Compliance with these standards and entry into a land use license is required for shoreline facilities located on NorthWestern-owned lands.

# 10. Aesthetic Resources

This section provides a description of the aesthetics of the Thompson Falls Project, including views of NorthWestern facilities, lands, and operations related to the Project as well as adjacent and surrounding lands that are experienced from points within the FERC Project area. Additionally, sounds and odors related to or surrounding the Project area are considered, as appropriate, part of the Project’s aesthetic quality.

The Project lies in the Lower Clark Fork River valley between the Bitterroot and Cabinet Mountain ranges, adjacent to the Town of Thompson Falls. Distant views are comprised of forested hillsides with occasional towering rock outcrops and grassy meadows. The Clark Fork River is not visible in distant views due to its meandering channel and forested banks (Photographs 10-1–10-12).

Near ground views within the Project area include high levels of development related to the city of Thompson Falls, rural subdivision and residential development along the shoreline, river crossings of the Yellowstone Pipeline, electric transmission lines, and the existing dams and powerhouses. Trees (predominately ponderosa pine and Douglas fir) and shrubs buffer views of Project facilities from the north and south shorelines as well as from Island Park, central to the existing generating facilities. Tree-lined edges at Island Park screen some views of north shore residential development for island visitors; only one privately-owned residence is visible on the south shoreline from Island Park. Waterway views from various locations at Island Park and along the north and south shorelines include the reservoir upstream of the Main and Dry Channel dams, spillways and tailraces in downstream river sections of both dams, and the powerhouse.

Middle ground views include hillside residences within a mile of the north shoreline and the Montana Rail Link railroad. Other middle ground areas have limited visibility from the Project area (or vice versa) due to the natural timber screening and topography of the valley floor.

Forested areas surround the Project and provide a backdrop for views. These areas are largely managed by the LNF with some private timber ownership and management. The LNF Plan (USDA 1986) defines Visual Quality Objectives (VQO) for each management unit on the Forest as part of the LNF’s recreation plan and timber plan. VQO prescribe desired levels of scenic quality and diversity of natural features on National Forest System Lands.

VQO classifications refer to the degree of acceptable alterations of the characteristic landscape and are noted here as supporting information, as they are not applicable to the immediate Project area. In the vicinity of the Thompson Falls Project, the LNF Plan establishes the following VQO on National Forest System Lands:

North of the Project: Forest areas to the north are prescribed for management following guidelines for Retention or Partial Retention from sensitive viewpoints. In areas managed for retention and partial retention, human activities are not evident to the casual Forest visitor or may be evident but must remain subordinate to the characteristic landscape.

East of the Project: The predominant VQO in Forest areas south of the Clark Fork River and east of the hydroelectric project is Retention, so human activities should not be evident to the casual Forest visitor. The predominant VQO north of the river and east of the hydroelectric project is Modification, where human activity may dominate the characteristic landscape but must, at the same time, utilize naturally established form, line, color, and texture. It should appear as a natural occurrence when viewed in middle-ground or background.

South of the Project: These Forest areas will be managed to meet VQO of Partial Retention, where human activities may be evident but must remain subordinate to the characteristic landscape.

West of the Project: Forest areas to the west are managed for Modification or Maximum Modification VQO. Under these classifications, human activity may dominate the characteristic landscape but should utilize naturally established form, line, color, and texture so that modifications appear as a natural occurrence when viewed in middle-ground or background.

Aesthetic conditions in the Project are affected by loud sounds from the surrounding area. Railroad traffic and horn blasts at railroad crossings adjacent to the downtown area can be heard from all points in the Project. Highway 200 traffic, including passenger vehicles, large semi-trucks, and emergency vehicles with sirens, can be heard from most places in the project. The sound of rushing water masks these sounds to some degree near the spillways and some areas are somewhat sheltered from the sounds of the area's surroundings, such as internal areas of Island Park, shoreline areas along the low water route of the Powerhouse Loop Trail along the north shoreline downstream of the powerhouse, sheltered areas at the South Shore Dispersed Recreation Area, and at the Cherry Creek Boat Launch.

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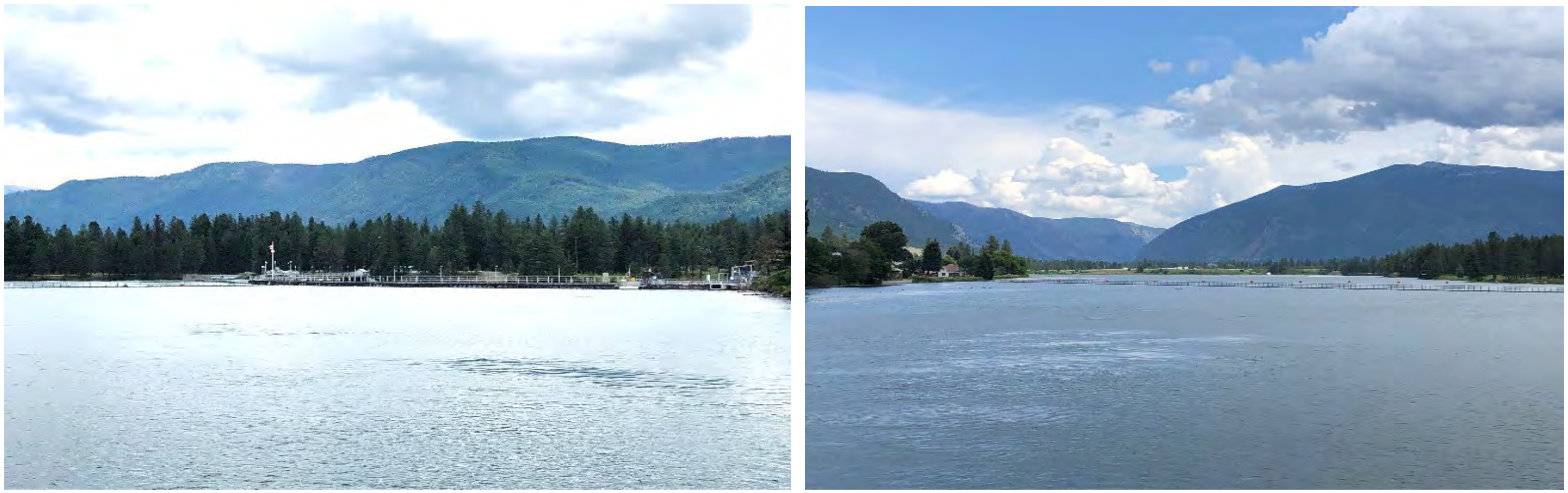
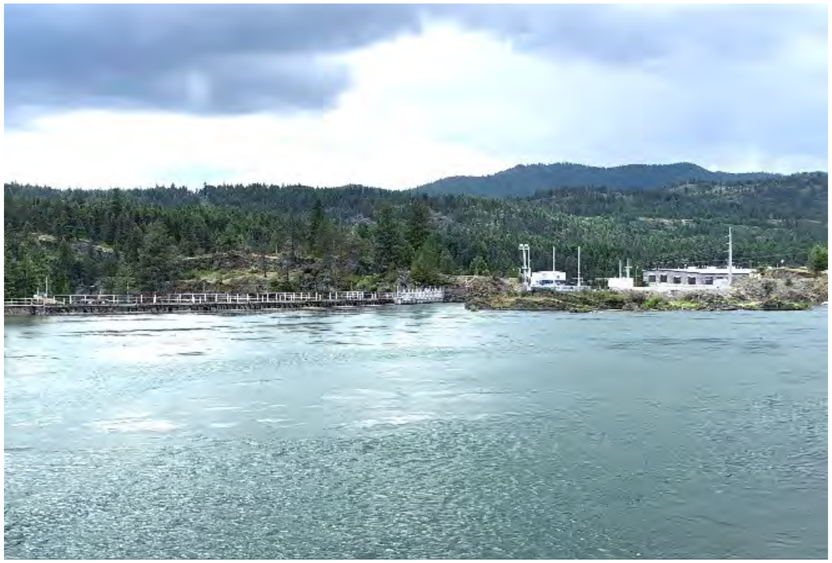
**Photographs 10-1: Views from South Shore Dispersed Recreation Area. Downstream area with powerhouse (left) and Dry Channel Dam across the river channel (right).**

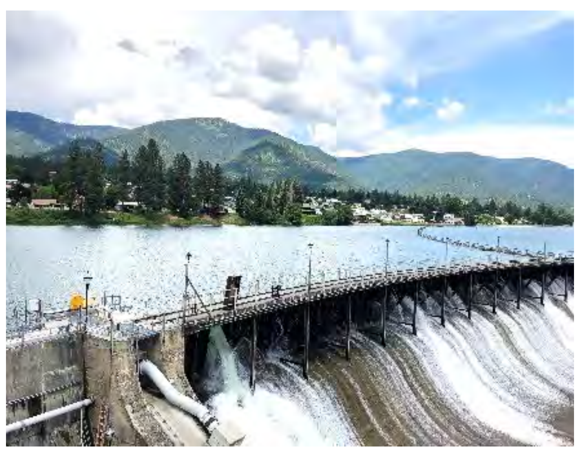
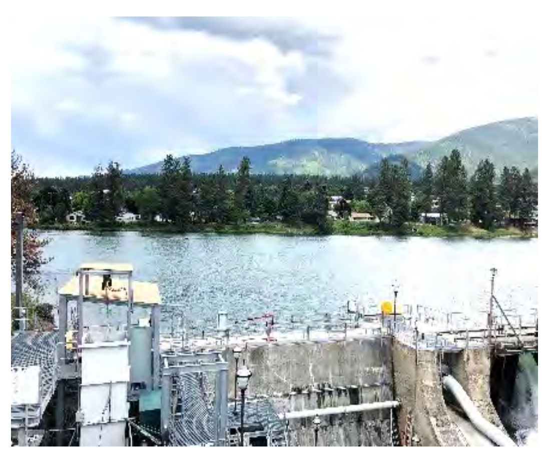
**Photographs 10-2: View of downstream area and powerhouse from Historic High Bridge (left) upstream view from Cherry Creek Boat Launch (right).**



**Photographs 10-3: Upstream view of Project facilities and reservoir from Gallatin Street Bridge.**

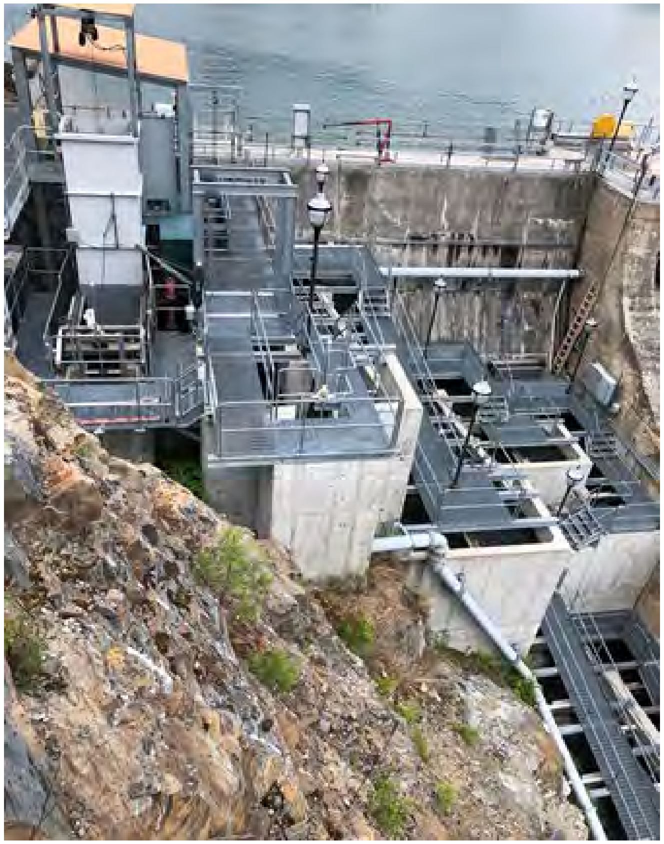



**Photographs 10-4: Downstream view of Project facilities from Gallatin Street Bridge (left); view of north shoreline residential development from Island Park (right).**

**Photographs 10-5: Views of residential development on north shoreline from Island Park and Fish Ladder Viewing Platform.**

**Photograph 10-6: Panorama view of Main Channel Dam from Island Park.**




**Photograph 10-7: View of upstream fish passage facility and processing station from viewing platform (left); view of Main Dam and reservoir from upstream fish passage facility viewing platform (right).**


**Photograph 10-8: View of South Shore Dispersed Recreation Area from Island Park (left); view of Historic High Bridge from Island Park (right).**

**Photographs 10-9: Overlooking Sandy Beach and south shoreline from high water route of Powerhouse Loop Trail (top left); project facilities from Power Park (top right); Gallatin Street Bridge and Island Park from Power Park (bottom left).**

**Photographs 10-10: View of Highway 200 from Wild Goose Landing Park.**

**Photographs 10-11: View of the reservoir from Wild Goose Landing Park (left); view of the reservoir from North Shore Dispersed Use Area and former sawmill site (right).**

**Photographs 10-12: Views of shorelines from various points along the waterway within the Project boundary.**

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## 10.1 Potential Adverse Impacts and Issues Related to Operation or Maintenance

As required by 18 CFR § 5.6(3)(i)(C), NorthWestern has identified the following known or potential adverse impacts of the Project as related to aesthetic resources.

### 10.1.1 *Current Operations*

The Project is operated to provide baseload and flexible generation within the reservoir elevation and minimum flow requirements of the License. During flexible generation operations, the Licensee may use the top 4 feet of the reservoir from full pond while maintaining minimum flows. For several reasons, the full 4 feet typically have not been used over the past 20 years of operation.

Prior to the installation of the new radial gates, high flows and debris required tripping of stanchions and spill bays approximately every 7 to 10 years. After the stanchions are released, and once inflows and debris diminish, the reservoir elevation is lowered to crest to allow for repairs. These deep drawdowns reduce the watered area of the reservoir to the deepest channels, resulting in exposure of mud flats throughout much of the reservoir and along shorelines affecting the aesthetic quality of the area.

With the installation of the new radial gates NorthWestern estimates that stanchion tripping will only be needed every 20 to 25 years, based on river flows and debris, thus reducing the frequency of adverse impacts to aesthetic quality of the reservoir from deep drawdowns.

### 10.1.2 *Proposed Future Operations*

NorthWestern proposes that the Thompson Falls Project will continue to provide baseflow generation and meet flexible capacity needs. Under normal operations, NorthWestern will maintain the reservoir between El. 2396.5 and 2394 feet (2.5 feet below normal full operating level) and maintain a minimum flow downstream of the lesser of 6,000 cfs or inflow.

Proposed future operations have the potential to affect the aesthetics of the Project. However, no new impacts are anticipated. Proposed future operations are not likely to impact Forest Service VQO's near the Project since the VQOs are prescribed for Forest System Lands that serve primarily as a backdrop to near-ground areas.

## 10.2 Resource Protection and Mitigation Measures

This section describes protection, mitigation, and enhancement measures that have been undertaken at the Project or that are currently ongoing.

Requirements of Article 403 of the 1990 license amendment (FERC, 1990) stipulated conditions for construction of the new powerhouse to reduce contrast with the surrounding landscape. Specifically, these measures included constructing a low-profile structure with a flat-formed, gray concrete exterior as well as using nonreflective conductors, insulators, and supporting structures on the new transmission line. These requirements were fully implemented in construction of the new powerhouse and will continue to be implemented as any additional structures and improvements are planned for the Project; no new structures are improvements are planned at this time.

Since the 2018 drawdown, two new 18 feet high radial gates have been brought into service on the Main Dam Spillway. These gates provide a discharge capacity of 20,000 cfs (10,000 cfs each). The addition of the gates add substantial reservoir operational control by reducing the frequency of tripping stanchions to pass high flows, resulting in less frequent deep drawdowns of the reservoir. Therefore, aesthetic impacts from deep drawdowns, needed to execute repairs following tripping of the stanchions, will be less frequent.

# 11. Cultural Resources

## 11.1 Cultural Resources Background Information

Cultural resources (often referred to as historic properties) are evidence of past human use of an area. Management of historic properties involves the long-term preservation of historic values of historic properties and consideration of the effect of a licensee’s action on historic properties. Historic properties may include the project facilities; other kinds of buildings and structures; prehistoric and historic archeological sites; and properties of traditional religious and cultural significance to Indian tribes (FERC, 2002).

Pre-contact aboriginal sites perhaps as old as 10,000 years span the shores of the Clark Fork River and extend to the surrounding lands. Hunter-gatherer land use resulted in numerous occupational sites, lithic scatters, rock cairns, burials, game drives/traps, and culturally modified trees. Comparatively large occupational sites are usually limited to major river drainages, but Native peoples frequented higher elevation mountainous areas during the summer months as well. They developed travel routes usually restricted to major creek drainages and saddle and ridge systems. These higher elevation areas provided hunter-gatherers with a wide range of resources, from roots, seeds and berries, to deer, elk and mountain sheep (Bacon, 2013).

The Thompson Falls area is located within the traditional territory of an Interior Salish group called the Kalispel Indians. Interior Salish-speaking people inhabited much of the larger Canadian and eastern areas of the Interior Plateau, which includes the Clark Fork Valley. The Kalispel were closely related culturally and linguistically with the Pend Oreille. Their territory offered abundant resources and was shared with groups that included the Coeur d’Alene, Spokane, and Colville (Krigbaum, 2016). In addition, the territories of the Bitterroot Salish, Upper Pend d’Oreille, and the Kootenai tribes covered all of western Montana and extended into parts of Idaho, British Columbia and Wyoming (CSKT, 2020).

Thompson Falls was named after British explorer, geographer and fur trader David Thompson who founded a North West Company fur trading post called Salish House in 1809. The community is located next to natural waterfalls on the Clark Fork River. The arrival of the railroad in 1881 brought the first real Euro-American activity to the area. Two years later, when the gold rush hit nearby Coeur d'Alene, Idaho the town grew to accommodate the men going over the Murray Trail to the mines. It is estimated that up to 5,000 men passed through the nearby settlement of Belknap, drinking in the saloons and sleeping in tents or one of the hotels. When the settlement of Thompson Falls forced the train to stop short of Belknap, another more popular trail developed up Prospect Creek over the route known now as Thompson Pass. The original townsite of Thompson Falls was surveyed in 1893, with the first substantial period of expansion and development occurring between 1905 and 1917. The

Thompson Falls Dam, in operation since 1915, was constructed atop the original falls (SHPO, 1986). For a general history of the Project, *see* Section 2.2.

## 11.2 Previously Recorded Cultural Properties

A search of files maintained by the office of the Montana State Historic Preservation Officer (SHPO) was conducted. The study area search included lands within the Thompson Falls Project boundary and the vicinity of the Project[17]. The objective of the search was to identify previously recorded Cultural Properties. A summary of the Cultural Properties identified in that file search is included as Table 11-1, which includes the record property number and property name.

**Table 11-1: Recorded cultural properties in the vicinity of the Project.**

| Number | Name | Number | Name |
|---|---|---|---|
| 24MO1646/ 24SA674 | Yellowstone Pipeline | 24SA294 | Main Channel Bridge |
| 24SA130 | Salish House[18] | 24SA348 | No. Pac. RR. Eddy Siding |
| 24SA131 | Thompson Falls (townsite) Multiple Properties | 24SA352 | Plains-Thompson Falls pre-1924 road bed |
| 24SA164 | Flathead Post/Salish House #2 | 24SA371 | Turnout Cave (rock art) |
| 24SA165 | Thompson Falls Hydroelectric Dam Historic District | 24SA372 | Turnout Panel (rock art) |
| 24SA199 | Northern Pacific Railroad | 24SA406 | Eddy-arc |
| 24SA222 | Old Sanders County Jail | 24SA407 | Munson/Stobie Farm |
| 24SA224 | Thompson Falls Trail/Historic Wagon Road | 24SA408 | Black Residential Complex |
| 24SA260 | Smith House | 24SA411 | Fire-cracked rock |
| 24SA262 | Browne Residence | 24SA497 | 210 Wood St. |
| 24SA267 | St. Luke's Hospital | 24SA498 | 217 Wood St. |
| 24SA268 | Dr. Everett Peek House | 24SA561 | Thompson Flat Irrigation Project |
| 24SA269 | Chief Operators' Houses | 24SA593 | Thompson R. RR Chinese Camp |
| 24SA291 | multi-component prehistoric and historic artifact scatter | 24SA690[3] | Livestock corral and storage area |
| 24SA293 | Dry Channel Bridge | 24SA0715[19] | Prospect Creek Power Plant ruins |

Table 11-2 identifies the recorded Cultural Properties that are known to be located within the Project boundary and includes the recorded property number; any Property Name assigned; ownership; the current status of any NRHP evaluations, and any notes specific to the property.

[17] Vicinity defined as within one-half mile of the Project boundary.
[18] The exact locations of these cultural properties are unknown. It is believed they are either adjacent to or at least partially within the Project boundary. However, without knowing with certainty, they are included in Table 11-1 rather than 11-2.
[19] A portion of the Prospect Creek Plant ruins is located inside the Project boundary. The remainder and other possible elements may be located outside the boundary.

**Table 11-2: Cultural properties within the Thompson Falls Project boundary.**

| Number | Name | National Register status | Ownership | Comments |
|---|---|---|---|---|
| 24MO1646/24SA0674 | Yellowstone Pipeline | Ineligible | Public and Private | A 1600-foot segment of this 644-mile-long feature is within the Project. |
| 24SA0165 | Thompson Falls Hydroelectric Dam Historic District | Eligible | NorthWestern | Six buildings/structures and five historic archaeological features are within the Project. |
| 24SA0199 | Northern Pacific Railroad | Eligible | Private | The railroad crosses the Project at the Thompson River mouth. It continues within/ adjacent to the Project for 4.1 miles. |
| 24SA0291 | Prehistoric/ Historic artifact scatter | Undetermined | Private | A 1000-square-meter portion of the prehistoric artifact scatter and an historic feature lay within the Project. |
| 24SA0293 | Dry Channel Bridge | Eligible | Public | Within the Project. |
| 24SA0294 | Main Channel Bridge | Eligible | NorthWestern | Within the Project. |
| 24SA0352 | Plains-Thompson Falls pre-1924 road bed | Ineligible | Public and Private | Road segments 1 and 2 only are within the Project. |
| 24SA0593 | Railroad Chinese Camp | Undetermined | Private | Approximately half of the historic property's 74,000 square meter area is within the Project. |
| 24SA0715 | Prospect Creek Hydroelectric Plant | Eligible | NorthWestern | A portion of the Prospect Creek powerhouse is within the Project boundary. |

| Number | Name | National Register status | Ownership | Comments |
|---|---|---|---|---|
| No Number | Historic Resources of Thompson Falls Historic District | Eligible | Private | The southern margin of the Historic District abuts the Project, but no associated historic properties lay within the Project. |

Of the properties reported in the file search, eighteen are outside the Project boundary. A total of 10 properties are within the Project boundary. Based on cultural property records, six properties within the Project boundary have been determined eligible for NRHP listing. Two properties are recorded as ineligible for listing. Two are recorded as undetermined as to eligibility status.

Based on 2017 field inspections, certain known Cultural Properties within the Project are National Register eligible and are located mainly or wholly on NorthWestern owned lands. A part of the inspections included preparing updated state cultural property record forms. Eliminated from re-visitation were Historic Architectural-Engineering (H-A&E) properties on the Project, including the Main Channel and Dry Channel bridges. The properties revisited were historic archaeological features at the Project and the ruins of the Prospect Creek Powerhouse. For each of these properties the study checked current condition, re-photographed, re-mapped, and collected all other data necessary to complete updated Property record forms. The status of these properties remains unchanged from that originally reported. For example, the ruins of the Prospect Creek Powerhouse had been determined as contributing to the National Register eligibility of the plant.

Also, several of the H-A&E properties previously identified on the Project have been recorded to *Historic American Engineering Record* (HAER) standards. These include the Main Channel Dam, Superintendent's Residence (prior to demolition), Main Bridge and Dry Channel Bridge. In addition, a project to rehabilitate the Main Channel Bridge (also referred to as the Historic High Bridge in other sections of the PAD) was successfully completed in 2011. The bridge that links the south side of Island Park to the south shoreline of the Clark Fork River, is a 588-foot Parker/Pratt Deck-Truss designed bridge originally built in 1911 to support construction of the Thompson Falls Project. It was included on the NRHP in 1986 as part of the Thompson Falls Hydroelectric Dam Historic District. The design is unique as the deck is built atop the trusses. It has eight spans, a wood deck and stringer spans. The trusses are constructed of steel connected by pins and supported on concrete piers. The bridge was used as a direct transportation route, linking the Prospect Creek and Cherry Creek areas to Thompson Falls until the early 1970s, when it was closed to vehicular use due to deterioration of the decking. It remained open as a foot and bicycle bridge until 1979, when it was closed to all use due to safety concerns. In 2010, the historic structure was reconstructed by the Sanders County Commission and project partners, including the Licensee, as a foot and bicycle bridge.

The project won a 2011 award from the National Trust for Historic Preservation and Engineering Excellence Award from the American Council of Engineering Companies.

## 11.3 Existing Discovery Measures for Locating, Identifying, and Assessing the Significance of Resources

Article 409 of the FERC license requires that before starting any land-clearing, land disturbing, or spoil-producing activities within the Project boundaries, other than those specifically authorized in the license amendment, the licensee (1) shall consult with the Montana SHPO, (2) shall conduct a cultural resources survey of these areas, and (3) shall file for FERC approval a report documenting the survey and a cultural resources management plan for avoiding or mitigating impacts to any significant archeological or historic sites. The survey and plan shall be based on the recommendations of the SHPO and shall be conducted and prepared by a qualified cultural resources specialist. The Licensee has complied with the requirements of Article 409 and filed cultural resources surveys and plans prior to ground disturbing projects during the term of the License.

Multiple cultural resource inventories have been undertaken both within the Project and the vicinity of the Project. A list of the reports or other documents on those inventories is included hereinafter in Table 11-3. These inventories have identified Prehistoric and Historic Archaeological Properties and H-A&E.

**Table 11--3: Cultural resource inventories within the Thompson Falls Project.**

| SHPO Reference Number | Date | Author(s) | Title |
|---|---|---|---|
| SA 6 09493 | 1982 | Bowers and Hanchette | An Evaluation of the Historic and Prehistoric Cultural Resources in the Thompson Falls, Ryan, and Hauser Dam Areas |
| SA 6 09495 | 1983 | Greiser | Cultural Resource Inventory Thompson Falls Canada Goose Brood Rearing Project Area |
| none | 1984 | Murphy | Historic American Engineering Record, Thompson Falls Project, Dry Channel Bridge |
| none | 1984 | Murphy | Historic American Engineering Record, Thompson Falls Project, Main Channel Bridge |
| SA 4 12809 | 1991 | Wyss and Axline | Cultural Resource Inventory and Assessment of F 6-1(48)52 Thompson Falls East |
| none | 1993 | Johnson | Historic American Engineering Record, Thompson Falls Project, Original Powerhouse, Forman’s Bungalow |
| none | 1993 | Johnson | Historic American Engineering Record, Thompson Falls Project, Garage |
| none | 1993 | Johnson | Historic American Engineering Record, Thompson Falls Project, Chicken House |
| SA 6 16983 | 1995 | Rossillon | Thompson Falls Island Thompson Falls Project (FERC No. 1869) Cultural Resource Inventory and Evaluation |

| SHPO Reference Number | Date | Author(s) | Title |
|---|---|---|---|
| SA 4 19312 | 1997 | Thompson, Schneid, and Hubber | Report of a Cultural Resources Inventory of the Eddy Flats Project Corridor |
| SA 4 22921 | 2000 | Rossillon | Thompson River – East Highway Reconstruction and Bridge Replacement |
| SA 6 30347 | 2008 | Dickerson | Thompson Falls Development Proposed Fish Ladder Project |
| none | 2008 | Renewable Technologies, Inc | Historic American Engineering Record, Thompson Falls Project, Main Channel Dam |
| none | 2008 | Hager | Historic American Engineering Record, Thompson Falls Project, Main Channel Dam, Index to Photographs |
| none | 2008 | Renewable Technologies, Inc | Historic American Engineering Record, Thompson Falls Project, Warming Hut |
| SA 1 33411 | 2012 | Bacon, Karuzas, and DeCleva | LNF Heritage Program Inventory Report, Clark Fork Corridor Fuels Reduction |
| MN 1 36645 | 2014 | Bacon | LNF Heritage Program Inventory Report, Yellowstone Pipeline Abandonment on Lolo NF Lands |
| SA 6 38498 | 2016 | Krigbaum | Class III Cultural Resource Investigations of Taft-Hot Springs No. 1 Access Roads |
| none | 2018 | Dickerson | Thompson Falls-Kerr 115kV A-Line Structure Relocations, Sanders County |
| none | 2019 | Dickerson | Thompson Falls Shoreline Stabilization |

## 11.4 Indian Tribes that May Attach Religious and Cultural Significance to Historic Properties

NorthWestern has made initial contacts with the Tribal Nations recommended by the SHPO of Montana and Idaho as potentially interested in the relicensing. The Tribal Nations recommended by the SHPO in Montana were the Chippewa-Cree of the Rocky Boy's Indian Reservation, Blackfeet, and the Confederated Salish and Kootenai. Those recommended by the Idaho SHPO were the Kootenai, Kalispell, and Coeur d'Alene Tribes. NorthWestern knows of no Traditional Cultural Properties located within the Project boundary or in the immediate vicinity of the Project.

## 11.5 Potential Adverse Impacts and Issues Related to Operation or Maintenance

As required by 18 CFR § 5.6(3)(i)(C), NorthWestern has identified the following known or potential adverse impacts of the Project as related to cultural resources.

### 11.5.1 *Current Operations*

The Project is operated to provide baseload and flexible generation within the reservoir elevation and minimum flow requirements of the License. During flexible generation operations, the Licensee may use the top 4 feet of the reservoir from full pond while maintaining minimum flows. For several reasons, the full 4 feet typically have not been used over the past 20 years of operation.

Current project operations have the potential to effect cultural resources. Any such effects attributable to ground disturbing activities by NorthWestern are addressed by the terms of the current license (Article 409), as described in Section 11.5.

### 11.5.2 *Proposed Future Operations*

NorthWestern proposes that the Thompson Falls Project will continue to provide baseflow generation and meet flexible capacity needs. Under normal operations, NorthWestern will maintain the reservoir between El. 2396.5 and 2394 feet (2.5 feet below normal full operating level) and maintain a minimum flow downstream of the lesser of 6,000 cfs or inflow.

#### 11.5.2.1 Archaeological Properties

Proposed operations, maintenance, and compliance activities could have direct or indirect effects on archaeological resources. NorthWestern is proposing an evaluation of cultural properties in the Project area to address these potential effects (*see* Section 14.6). The following types of actions could affect prehistoric and/or historic archaeological properties:

1. Land development, reservoir shoreline erosion, natural resource conservation actions, fisheries and wildlife habitat actions and other environmental resource protection, mitigation or enhancement measures, both inside and outside of the Project boundary, undertaken, permitted or assisted by NorthWestern;
2. Development or improvement of public recreation facilities developments, such as day- or term-use recreation areas, trails and roads development, building construction, modifications or removals, boat ramps and all other such development and associated activities undertaken, permitted or assisted by NorthWestern;
3. Actions proposed for permits, easements, agreements, rights-of-way, transfers or exchanges of lands owned by NorthWestern, and similar actions on Project or non-Project lands but associated with the Project, either approved by or entered into by NorthWestern or the transfer, sale or lease of lands; and
4. Development of other facilities determined necessary for the FERC-licensed operations of the Project

#### 11.5.2.2 Historic Architectural & Engineering Properties

Adverse effects to H-A&E would occur if historic architectural or engineering (including equipment) elements of such properties were to be significantly altered, modified or demolished, which NorthWestern does not anticipate occurring the term of the new license.

## 11.6 Resource Protection and Mitigation Measures

This section describes protection, mitigation, and enhancement measures that have been undertaken at the Project or that are currently ongoing.

The current FERC License includes provisions requiring that NorthWestern undertake various measures to address potential effects to known cultural properties as a result of developments on the Project. They include provisions addressing new land-clearing or land disturbing or spoil-producing activities within the Project boundary. The License requires NorthWestern to conduct cultural resource inventories, consult with the Montana SHPO and file a report with FERC on such inventories and a resource management plan for the avoidance or mitigation of adverse effects to any properties listed in or eligible for listing in the National Register of Historic Places. The License also includes requirements for management of the historic values of Historic Architectural-Engineering properties on the Project.

# 12. Tribal Resources

## 12.1 Tribal Cultural and Economic Interests

NorthWestern made initial contacts with the Tribal Nations recommended as potentially interested in the Thompson Falls Project relicensing by the SHPOs of Montana and Idaho in April 2018. The Tribal Nations recommended by the SHPO in Montana were the Chippewa-Cree of the Rocky Boy's Indian Reservation, Blackfeet, and the Confederated Salish and Kootenai. Those recommended by the Idaho SHPO were the Kootenai, Kalispell, and Coeur d'Alene Tribes. No Tribal responses have been received to date.

FERC's Policy Statement on Consultation with Indian Tribes in Commission Proceedings (Order 6-35, dated July 23, 2003, amended October 17, 2019) commits FERC to promoting a government-to-government relationship with federally recognized tribes potentially affected by a licensing proceeding. The policy statement recognizes the sovereignty of tribal nations and FERC's trust responsibility to Indian tribes. The policy statement also establishes a tribal liaison position with FERC and establishes certain actions specific to the hydroelectric program.

The ILP provides for a meeting, to be held no later than 30 days following the filing of the NOI, between FERC staff and each Indian tribe likely to be affected by a licensing action, if the Indian tribe agrees to such a meeting. The purpose of the meeting is to assure tribal issues and interests are known and considered by the FERC in its licensing decision, and to facilitate the Indian tribe's participation in the ILP.

## 12.2 Potential Adverse Impacts and Issues Related to Operation or Maintenance

As required by 18 CFR § 5.6(3)(i)(C), NorthWestern has identified the following known or potential adverse impacts of the Project as related to Tribal resources.

### 12.2.1 *Current Operations*

The Project is operated to provide baseload and flexible generation within the reservoir elevation and minimum flow requirements of the License. During flexible generation operations, the Licensee may use the top 4 feet of the reservoir from full pond while maintaining minimum flows. For several reasons, the full 4 feet typically have not been used over the past 20 years of operation.

Currently NorthWestern knows of no impacts to Tribal cultural or economic interests that occur from current operations of the Thompson Falls Project.

### 12.2.2 *Proposed Future Operations*

NorthWestern proposes that the Thompson Falls Project will continue to provide baseflow generation and meet flexible capacity needs. Under normal operations, NorthWestern will maintain the reservoir between El. 2396.5 and 2394 feet (2.5 feet below normal full operating level) and maintain a minimum flow downstream of the lesser of 6,000 cfs or inflow.

NorthWestern knows of no impacts to Tribal interests that would occur from future operations of the Thompson Falls Project.

# 13. Socio-Economic Resources

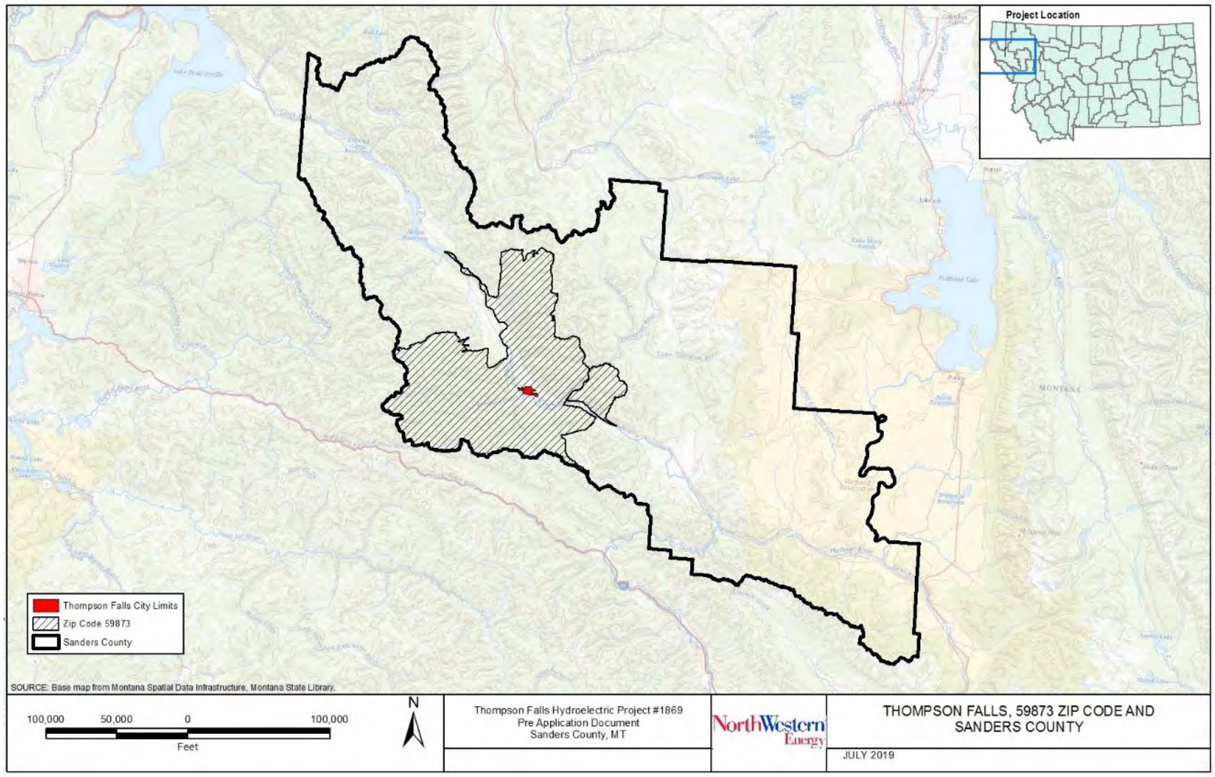
## 13.1 Socio-Economic Conditions in the Project Vicinity

Sanders County in northwestern Montana borders the state of Idaho to the west and is defined by the Bitterroot Mountain Range along the southwesterly side and the Cabinet Mountains on the northeasterly side. The Clark Fork River is joined by the Flathead River in the eastern portion of the county and the two rivers – along with Highway 200 and the railroad corridor – divide the county along a northwest-southeast axis. The river valley topography facilitates primary highway access (Highway 200), railroad, residential development, limited cultivated agriculture, and Clark Fork River reservoirs impounded by three dams, of which the Thompson Falls Project is the most upriver hydro facility. The western two-thirds of the 1,733,000-acre county is characterized by steep forested mountain slopes divided by tributaries of the river and are predominantly public lands managed by the USFS or corporate timberlands owned and managed by Weyerhaeuser Company. The eastern third is more open prairie and cultivated agricultural land.

Sanders County is the 18th most populated of Montana's 56 counties with a 2010 population of 11,413 (U.S. Census Bureau 2010). The Flathead Indian Reservation encompasses approximately the eastern third of the county. The county as a whole has experienced stable, slow growth over the last 20 years, though most of that growth has occurred in outlying areas while populations within municipal boundaries have remained fairly stable. Rural residential development is distributed along the valley floor with concentrations at the county seat of Thompson Falls (1,378 residents), Plains (1,093 residents) and smaller communities such as Trout Creek (242 residents) and Noxon (218 residents) (U.S. Census Bureau, 2010).

Thompson Falls, located on Highway 200, is approximately in the middle of the county, about 100 miles northwest of Missoula, Montana, and 125 miles east of Spokane, Washington. Sandpoint, Idaho, is about 80 miles to the west. Highway 200 and a major rail corridor divide Thompson Falls. The downtown area of Thompson Falls is located along Main Street/Highway 200 and borders the Project's reservoir. The residential development that is most closely related to the Project area is the city of Thompson Falls as well as those outside of the city limits but within the same zip code (Figure 13-1), totaling 3,085 people (U.S. Census Bureau, 2010) and accounting for 27 percent of the county's population.

**Figure 13-1: Boundaries of Thompson Falls, zip code 59873, and Sanders County, MT.**




The county economy historically has been based on timber harvest and processing. That industry has been in decline. Transition away from this industry amidst the recession of 2008-2010 was slow. The economic state that resulted is reflected in Sanders County's Distressed Communities Index[20] rating. The county ranked last in the state, accumulating 91 out of 100 possible points (distressed), as averaged, from 2007-2011. However, that ranking improved for the timeframe 2012-2016, when the index fell 28.6 points to 62.4 (at risk), reflecting improved economic conditions. Overall, Sanders County's ranking significantly improved between 2007-2011 and 2012-2016, from 56th in the state to 41st (Economic Innovation Group, 2019).

In Sanders County, average earnings per job increased 14.2 percent and per capita income increased 35.9 percent from 2000-2016. During this timeframe, the number of jobs in non-service related industries and government decreased 10 percent and 6 percent, respectively, while jobs in service related industries grew by 21 percent. Earnings increased in all three industries from 2001-2016, though, with a 45 percent increase in non-service industries, 20 percent increase in service industries, and a 21 percent increase in government jobs. The three industry sectors that added the most earnings from 2001 to 2016 were construction ($13.2 million), retail trade ($4.8 million), and health care and social assistance ($4.5 million) (Headwaters Economics, 2018).

[20] The Distressed Communities Index (DCI) combines seven complementary economic indicators into a single measure of community well-being, ranging from 0 to 100. Scores over 80 are considered distressed.

The 2016 median property value was $205,000 county-wide and $253,300 in the local zip code. There were 6,754 households in the county in 2016 and 30 percent of those were in the local zip code. The median household income was $36,445 for Sanders County and $31,895 in the zip code, compared to the statewide average of $50,801. Sanders County ranked 52nd out of Montana's 56 counties related to the ratio of home price to median household income in 2016 (BBER, 2019).

County-wide, 21 percent of residents live below the poverty level and 23 percent of residents in the 59873-zip code live below that level, compared to the statewide average of 14 percent (U.S. Census Bureau, 2010).

There are close to 60 businesses in the city of Thompson Falls and 147 in the zip code, most of which are locally owned. Primary employment classes are office and professional services (41%, including health care, social assistance, construction, retail trade, and utilities), restaurants (24%), financial (18%), medical (15%) and entertainment (3%) (Land Solutions, 2015; US Census Bureau, 2010).

The local economy is based on a variety of sources including agriculture, fishing, hunting, forestry, and mining. Thompson Falls had been a logging community for many years, but reductions in timber harvest coupled with decreased lumber production have reduced logging projects (BBER, 2019).

According to 2017 Census of Agriculture data, Sanders County encompasses 642,640 acres of farmland, accounting for 36.4 percent of land area in the county. These lands include nearly 400,000 acres of large-tract woodlands for timber production, while the remaining 240,000 acres (approximately) can be considered true farms (USDA National Agricultural Statistics Service, 2019). These smaller farm operations are typically not self-sustaining and use off-farm employment to support them.

The area is popular among Montana residents and nonresident visitors for fishing and hunting. In 2018, the Montana Office of Outdoor Recreation reported that outdoor recreation in Montana generated $7.1 billion in consumer spending in 2018 and supported 71,000 jobs in Montana. Similarly, residents of Montana spent $3.61 billion on outdoor recreation in Montana in 2018 (Montana Office of Outdoor Recreation, 2018). Sanders County is no exception to these spending patterns and positive impacts. The FWP &angling pressure survey in 2017 estimated 3,895 angler use days (of Montana residents) on Thompson Falls Reservoir (FWP, 2017), a significant contribution to the local economy.

Travel-related spending in Sanders County in 2018 is estimated at $54 million. Expenditures by out-of-state visitors are estimated at $17.9 million (ITRR, 2018), while Montana resident travel spending totaled $36.1 million in the county (65% on day trips, 35% on overnight trips; Grau, 2018). Hunting, fishing, and outdoor recreation are large components of these spending behaviors. Big game hunters spent $12.7 million in Sanders County in 2016; $6.2 million by nonresidents and $6.5 million by Montana residents. Elk hunters accounted for 52 percent of these expenditures, while deer hunters accounted for 48 percent (FWP RMU, 2017).

Thompson Falls has one public school system and churches to serve most denominations common to the area.

There is a lighted and surfaced airport approximately 4 miles east of Thompson Falls with a 2,200-foot runway. Regional service centers with commercial air services are located in Missoula and Kalispell (101 and 107 miles, respectively, from Thompson Falls) and Spokane, Washington (125 miles from Thompson Falls). There is no public transportation available. Highway 200 is a secondary travel corridor to Glacier National Park, 141 miles to the northeast.

## 13.2 Economic Benefits of the Thompson Falls Project

Sanders County and the Thompson Falls area benefit directly and indirectly from the Project. Property taxes that support county budgets are paid annually by the NorthWestern and totaled $1,428,411 in 2019. Salaries for 5 permanent staff are paid and filter through the local economy, as well as out-of-area staff, contractors, and supporting positions such as fisheries biologists with FWP that work at the Thompson Falls Project periodically and provide an economic benefit through their travel and accommodation expenses.

The Project's reservoir draws landowners who desire water frontage more so than inland properties, a feature that increases property values and property taxes paid by private owners.

Finally, providing high-quality, well-managed recreation sites free of charge to the public allows personal disposable income to support recreation trips (food, drinks, boat gas, fishing supplies, etc.) rather than site use fees. Included in this are the annual operation and maintenance funds that NorthWestern pays to the city of Thompson Falls for managing Wild Goose Landing Park ($10,000 in 2019) and the multitudes of recreation improvements (trail building, facility repairs, etc.) that NorthWestern funds in addition to the in-kind contribution of staff time to support operation and maintenance efforts.

## 13.3 Potential Adverse Impacts and Issues Related to Operation or Maintenance

As required by 18 CFR § 5.6(3)(i)(C), NorthWestern has identified the following known or potential adverse impacts of the Project as related to socio-economic resources.

### 13.3.1 *Current Operations*

The Project is operated to provide baseload and flexible generation within the reservoir elevation and minimum flow requirements of the License. During flexible generation operations, the Licensee may use the top 4 feet of the reservoir from full pond while maintaining minimum flows. For several reasons, the full 4 feet typically have not been used over the past 20 years of operation.

NorthWestern has identified no adverse impacts to socioeconomic resources related to operation or maintenance of the Thompson Falls Project. Continuing operation of the Project will provide continued economic benefit to the project area, as described in Section 13.2.

### 13.3.2 ***Proposed Future Operations***

NorthWestern proposes that the Thompson Falls Project will continue to provide baseflow generation and meet flexible capacity needs. Under normal operations, NorthWestern will maintain the reservoir between El. 2396.5 and 2394 feet (2.5 feet below normal full operating level) and maintain a minimum flow downstream of the lesser of 6,000 cfs or inflow.

Future operation of the Project will continue to provide economic benefits to the Project area, as described in Section 13.2

## 13.4 Resource Protection and Mitigation Measures

Because NorthWestern has identified no adverse impacts to socioeconomic resources related to operation or maintenance of the Thompson Falls Project, no protection and mitigation measures are currently being implemented or proposed.

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# 14. Preliminary Issues and Studies List

NorthWestern has identified preliminary issues and studies for each resource based on current and proposed future operations and existing baseline environmental conditions.

## 14.1 Future Operations

### 14.1.1 *Issues*

As described in Section 2.10.2, the Project is operated to provide baseload and flexible generation within the reservoir elevation and minimum flow requirements of the License. During flexible generation operations, the Licensee may use the top 4 feet of the reservoir from full pond while maintaining minimum flows. For several reasons, the full 4 feet typically have not been used over the past 20 years of operation.

In October 2019, NorthWestern conducted an operations test to assess the potential impacts of operating the Project within the 4-foot range authorized by the License. During the test, the reservoir elevation was lowered from normal full operating level down 4 feet, then raised in 1-foot increments. The plant was increased to full generation output to lower the reservoir. Stage loggers were deployed in multiple locations to record water elevation changes. A time-lapse camera was deployed at a key location to capture visual changes at the mouth of the Thompson River. Resource professionals visited different locations to photograph conditions and make visual observations during active drawdown and at each elevation stage for the test. Observations were made on:

- Operations – quantify the flexible capacity available with the reservoir volume
- Shoreline Erosion – bank stability and erosion
- Fisheries – fish stranding, migration corridors to tributaries, and fish passage facility operations
- Recreation – effects to recreation site amenities including boat launches, boat docks and aesthetic conditions
- Public Safety – navigation hazards in the reservoir, rate of water elevation changes
- Water Quality – changes in water chemistry and/or physical properties
- Wetland/Riparian Habitats – available habitat relative to water level changes, duration of dewatering

Reservoir level fluctuations during the test were relatively consistent throughout the reservoir. The location at the upstream islands was the only exception where change in water level was reduced relative to downstream sites above the dam. During the test, reservoir levels observed at the dam and upstream to the Thompson River area were close to 4 feet, whereas the water level at the upstream islands was only reduced about 3 feet.

During refill of the reservoir, all the sites upstream of the dam showed a very similar rise during the 4-foot test and little difference in elevation was observed between the sites.

Below the dam, the difference observed between the two monitored locations was larger than upstream. During the drawdown portion of the test, the difference between the locations was approximately one and a half feet. This is most likely due to the site where the tailrace elevation was monitored having a channel that is confined from the rest of the river by a retaining wall. The channel volume in this location is much reduced compared to the entire Clark Fork River channel. The magnitude and rate of change at this location would be expected to be greater due to this difference. During reservoir refill, the difference in elevation between the two sites was minimal.

Water surface elevation rates of change during the test were evaluated both above and below the dam. The rate of change upstream of the dam was the greatest at the dam location and was attenuated upstream at Thompson River and the islands. Maximum observed elevation rates of change were similar throughout the test and ranged from 1.2 feet per hour (ft/hr) at the dam, 1 ft/hr at the Thompson River, and 0.85 ft/hr at the islands.

Rate of change below the dam was very quick at the start of the test but was significantly reduced after approximately an hour. This is most likely a function of filling the channel capacity with the increased discharge through the powerhouse during the test. Once the channel capacity and elevation reached an inflection point, the water spilled over and was conveyed down river. Differences in rates observed between the two monitoring locations were observed during the initial hour then were very similar during the remainder of the test.

Baseflow generation prior to the test was 49 MW. Maximum full head output of the plant is rated at 92.6 MW and decreases as the elevation of the reservoir drops. The differential between the maximum capacity and the baseload generation dictates the flexible generation capacity of the plant and the rate of reservoir elevation change. The test showed a total opportunity of 147 MW-hours of flexible capacity provided with the full 4 feet of reservoir elevation. Additionally, no operational issues were found with any of the units that would prevent future normal operations in this manner.

Observations concerning fishery resources during the October 2019 operations testing included observations of the upstream fish passage facility, reservoir habitats, and tributary connections. Little influence was seen on operation of the fish passage facility when pool elevations were within 0.5’ of normal full operating level. As forebay elevations decreased below 0.5’, the fish passage facility was still operating and functioning to some degree, but outside of flow design standards. As forebay elevation neared 2 feet below normal full operating level the fish passage facility sampling loop became inoperable, pool to pool flow lacked sufficient water for effective capture, and the High Velocity Jet flow diminished considerably.

A variety of reservoir fish species were stranded during the operations test and included largemouth bass, smallmouth bass, northern pike, pumpkinseed, yellow perch, redside shiner, northern pikeminnow, black bullhead, yellow bullhead, and largescale sucker. Most fish were less than 3 inches in total length but did include a few northern pike up to 10 inches.

Water quality impacts were assessed from the October 2019 reservoir operations tests and categorized into two main categories: shoreline erosion and water chemistry. When the elevation of the reservoir was lowered 4 feet from normal full operating level, some erosion occurred in areas of exposed un-vegetated reservoir sediment deposits and shoreline areas that became unstable due to previous manual removal of native vegetation. This operational regime did not result in significant changes in water chemistry at the downstream end of the reservoir, however at a pond elevation of 4 feet below normal full operating level, there was a slight increase in turbidity, TSS, and TP.

Observations of recreation, aesthetic and land use impacts found that El. 3 and 4 feet below normal full operating level may limit or prevent some uses of public and private recreation facilities (i.e., docks) and waterway access. In addition, there was an odor associated with the exposed mud flats and gravel bars when the reservoir was drafted 4 feet.

Observations of the two sites impacted by the 2018 drawdown were made in order to quantify if the locations experienced movement in response to a 4 feet drawdown. No slope movement in response to the operational test was observed, but evidence of previous slope movement at the respective sites was noted.

Impacts to shoreline areas and recreation facilities were not uniform throughout the Project, since north shoreline tends to be a steep bank with rocky substrate, while the south shoreline tends to be more gradual slopes of looser, more erodible soil.

The observations of this one-time rapid lowering of the reservoir are valuable, but most likely do not reflect actual long-term (attenuated) effects of flexible operations. It is anticipated that some of the erosion of near-shore sediment deposits and shorelines would, over time, resolve into stabilized shorelines with less impact during elevation changes. However, to accurately measure this would require many operational tests over an extended period of time.

The Thompson Falls Project is currently operated to frequently utilize a portion of the 4 feet of the reservoir allowed in the current license to meet generation needs. NorthWestern concludes that drafting Thompson Falls Reservoir the full 4 feet as described by the current License on a regular and frequent basis will have an unacceptable level of impact to resources including recreation, shoreline residents, fisheries and the community. Consequently, NorthWestern is proposing that Thompson Falls will continue to provide baseflow generation and flexible capacity needs using 2.5 feet of the reservoir. During normal operations, the reservoir would be maintained between 2396.5 feet and 2394.0 feet.

### 14.1.2 *Proposed Studies*

NorthWestern is proposing an additional study of project operations. The goal of the study will be to test potential operational scenarios to provide flexible capacity and to evaluate possible impacts on project resources. The study plan would include evaluating generation changes at multiple reservoir elevations for multiple durations, allowing the resulting reservoir fluctuations to be observed and studied for potential impacts. Operational scenarios for the study would be within the proposed 2.5 feet of flexible reservoir elevation and the minimum instream flows.

The following would be evaluated throughout each operational phase of the study:

- Operations – amount of flexible capacity available with the reservoir volume
- Shoreline Stability – bank stability and erosion
- Fisheries – fish stranding, migration corridors to tributaries, and upstream fish passage facility operations
- Recreation and Aesthetics – effects to recreation site amenities including boat docks, boat launches, and shoreline access, and general aesthetic qualities
- Public Safety – rate of water elevation changes including those below the dam and any public safety risk
- Water Quality – changes in water chemistry and/or physical properties
- Wetland/Riparian Habitats – available habitat relative to water level changes, duration of dewatering
- Cultural - effects on cultural resources exposed in the reservoir backslope

Details of the proposed methodology will be developed and included in the Thompson Falls Relicensing Proposed Study Plan, to be filed with FERC in December 2020. NorthWestern will notify the public prior to the study via email, postcards or similar hard copy, and a notice published in the Sanders County Ledger.

## 14.2 Water Resources

### 14.2.1 *Issues*

Total dissolved gas (TDG) levels downstream of the Project are affected by water passing over the spillway during high flow events.

Water quality sampling in 2019 resulted in two samples downstream of the Project area that had detections of lead above water quality standards, although no lead was detected above the Project. NorthWestern suspects that the source of the lead is Prospect Creek. Both detections were collected during low flow conditions. Follow-up synoptic sampling in October of that year showed non-detectable levels of lead at all sites. While the source of the lead in the two samples has not been definitively determined, no evidence suggests that the source is the Project.

### 14.2.2 *Proposed Studies*

NorthWestern has studied TDG in the Project area for many years, and those studies will be continued. The addition of new radial gates along the Main Dam may influence TDG concentrations downstream of the Thompson Falls Dam. The type and level of potential impacts are unknown until the radial gates are fully tested during high flow events. NorthWestern will continue to evaluate the operation of the Main Dam Spillway to assess the preferred operation to minimize TDG for freshwater aquatic life and maximize operational safety and fish passage.

In addition, NorthWestern is proposing to continue to collect temperature, water chemistry, and turbidity data as part of the relicensing studies. Water chemistry evaluations will include additional sampling aimed at determining the source of any lead in water samples taken downstream of the Project.

The operational study (Section 14.1.2) will also evaluate potential future routine operational impacts to water quality resources.

## 14.3 Fish and Aquatic Resources

### 14.3.1 *Issues*

As described in Section 5.6, in 2019 an independent scientific review panel (Panel) was established, in consultation with the TAC, and tasked with review of the Comprehensive Phase 2 Fish Passage Report (NorthWestern, 2019), along with other publicly available reports, to evaluate whether the upstream fish passage facility is functioning as intended and whether operational or structural modifications of the upstream fish passage facility are needed. The 2008 BO stated that the Panel should develop a set of recommendations to be submitted to the FWS for evaluation, modification, and approval. The Panel submitted its report to NorthWestern and the TAC on March 27, 2020. The FWS reviewed and approved the Panel's report on April 20, 2020.

The Panel recommended adopting the 3-component efficiency framework (attraction, entry, internal[21]) to describe fish passage facility effectiveness using the proportion-time-effect metrics. Its review of the available information suggests that internal passage efficiency, while unknown, is often dependent on sufficient numbers of fish entering the fish passage facility. They therefore recommended focusing on quantifying attraction and entrance efficiency.

[21] 'Attraction' includes the far field area which is downstream of the upstream fish passage facility and dams where powerhouse discharge and spill serves as the primary attraction to migrating fish and near field which is in proximity to the upstream fish passage facility where attraction flow may lure fish to entrance. 'Entry' refers to the area immediately downstream of the entrance channel/gate where upstream fish passage facility discharge dominates hydraulics/velocity field/fish behavior. Internal passage refers to hydraulics, structures and fish movement within the ladder (i.e., entrance channel, pools, trap, exit channel)

### 14.3.2 *Proposed Studies*

NorthWestern intends to continue the ongoing suite of fisheries studies and mitigation activities through the end of the present licensing period (2025). These activities include baseline fisheries surveys upstream of the dam, handling and recording all fish at the upstream fish passage facility work station, monitoring fish movements via remote arrays in the Thompson River and Prospect Creek, and funding off-site mitigation projects to improve downstream Bull Trout fish passage through the TAC. These activities are summarized in the annual reports (2009–2018). These and the 2019 Comprehensive Scientific Review Report are available on the Project website.

NorthWestern proposes to study various spill configurations utilizing the new radial gates to assess TDG, as well as upstream fish passage implications.

The operational study of the reservoir (*refer to* Section 14.1.2) will also evaluate potential future routine operational impacts to fish and aquatic resources.

The Panel suggested NorthWestern initiate two parallel studies to assist in the determination of the fish passage facility's attraction and entrance efficiency:

- two-dimensional hydraulics study that incorporates measured or approximated bathymetry to resolve, at a minimum, a depth-averaged velocity field and water depths in the near field downstream of the dam/project.
- telemetry (radio-tag) study using sufficient sample sizes of surrogates to posit movement paths/rates and behavior in response to hydraulic conditions in the near field; the telemetry should be augmented by a literature review of the relative swimming capacities and behaviors of Rainbow, Westslope Cutthroat, Brown and Bull Trout.

NorthWestern proposes to undertake these two Panel-recommended studies during the relicensing process.

## 14.4 Rare, Threatened and Endangered Species

### 14.4.1 *Issues*

NorthWestern operates the upstream fish passage facility to mitigate for upstream fish passage and provides funding for off-site projects to mitigate for downstream Bull Trout passage. NorthWestern has operated the fish passage facility for 9 seasons (2011–2019) and recently completed a comprehensive review of fish passage mitigation efforts (NorthWestern, 2019). In January 2020, as noted, the Panel reviewed the comprehensive report and provided recommendations on additional actions/studies to improve upstream adult fish passage at the project.

Historically, adfluvial and fluvial juvenile Bull Trout in the lower Clark Fork River basin would hatch and rear in Clark Fork River tributaries before emigrating downstream to the mainstem Clark Fork River (fluvial migrants) or Lake Pend Oreille (adfluvial migrants) for growth and maturation (DeHaan and Bernall, 2013). The Thompson River, upstream of the Project, is critical habitat for Bull Trout and is spawning and rearing habitat for fluvial and adfluvial Bull Trout. The construction of Thompson Falls Project, Noxon Rapids Hydroelectric Project, and Cabinet Gorge Hydroelectric Project created impediments to the downstream migration of juvenile adfluvial Bull Trout on their journey to Lake Pend Oreille. Genetic studies of adult Bull Trout collected below Cabinet Gorge Dam have found Bull Trout in Lake Pend Oreille with genetic markers indicating that the Thompson River is their natal stream. This is evidence that Bull Trout do successfully migrate downstream through the three hydroelectric projects (DeHaan et al., 2011). However, the number of Bull Trout able to complete their life cycle with current passage impediments is small.

### 14.4.2 *Proposed Studies*

The operational study (*refer to* Section 14.1.2) will evaluate potential future routine operational impacts to rare, threatened and endangered species (e.g., Bull Trout and Westslope Cutthroat Trout).

Testing of the new radial gates will evaluate potential impacts to upstream movement of fish into the tailrace during high spring flows. Test of the spill configuration of the radial gates will assess TDG levels and upstream fish access to the fish passage facility entrance.

Avista transports juvenile Bull Trout from tributary streams to Lake Pend Oreille. This program has had some success in increasing the numbers of returning migratory Bull Trout in some tributaries. NorthWestern proposes to test a similar program of collecting and transporting juvenile Bull Trout from Thompson River to Lake Pend Oreille. The study would test if downstream transport of juvenile Bull Trout from the Thompson River drainage results in increased populations of adfluvial Bull Trout in that watershed.

As described in Section 14.3.2, NorthWestern also intends to propose to conduct the studies recommended by the Panel and evaluate downstream transport of Bull Trout, as well as continue the ongoing suite of fisheries studies and mitigation activities through the end of the current license term (2025).

## 14.5 Recreation Use

### 14.5.1 *Issues*

The 2018 Project recreational visitor survey revealed that 97 percent of all visitors indicated they were very or extremely satisfied with the recreation site(s) they used. Water conditions during the 2018 study were not typical, because a deep drawdown left areas of the reservoir – including those normally used for water access – dry until early August. While results of the 2018 visitor study were as expected based on past survey results, an updated survey conducted during normal water conditions will capture visitor opinions under typical reservoir operations.

### 14.5.2 *Proposed Studies*

In order to ensure that visitor survey results reflect visitor use characteristics and opinions under more normal conditions, NorthWestern proposes to repeat the visitor survey effort during the study phase of the ILP.

## 14.6 Cultural Resources

### 14.6.1 *Issues*

Section 11.4 identifies the potential adverse effects to currently recorded Cultural Properties that could be associated with operation of the Project.

### 14.6.2 *Proposed Studies*

NorthWestern proposes to update the existing (1982) inventory of the H-A&E of the Thompson Falls Project. The original inventory of this type of cultural property on the Project was undertaken in 1982 by MPC (Bowers and Hancette, 1982). NorthWestern will re-inventory the H-A&E properties on the Project. The study will evaluate the current National Register status of those properties and make recommendations for their future management.

NorthWestern proposes to identify high probability areas for the occurrence of both prehistoric and historic archaeological properties at the Thompson Falls Project. The focus of the effort will be to predict where the properties are likely to occur in relation to lands affected by operation of the Project. The results of the analysis will guide field inventory needed to support NorthWestern's license application.

# 15. Contacts

## 15.1 Relicensing Participants Outreach

NorthWestern has maintained a public website with information about the Thompson Falls Project since 2011, http://www.northwesternenergy.com/environment/thompson-falls-project. Meeting notices and presentations, reports, and up-to-date fish passage information are available on the website, in addition to relicensing information.

NorthWestern proactively and voluntarily initiated relicensing consultation with stakeholders in 2018 (Table 1 1). The goals of this early effort were to gather information, identify issues and inform local, state and federal agencies, Native American Tribes, local landowners and recreationists, and non-governmental organizations on the relicensing process, the project operations and environmental considerations. The description of NorthWestern's stakeholder outreach conducted to date is found in Section 1.2.1.

## 15.2 Comments Received

Comments on the BED were received from FWP, DEQ, and one private citizen. The comment letters and NorthWestern's responses are in Section 15.3.1.

After the public meetings in October 2019, comments were received from the Sanders County Community Development Corporation and Thompson Falls Community Trails. The comment letters and NorthWestern's responses are in Section 15.3.2.

### 15.1.1 *Comments and Responses to Comments on the BED*

NorthWestern received comments on the BED from four Relicensing Participants. The letters are reprinted below. NorthWestern's responses to comments are in Table 15-1.

**FWP Wildlife Division**

Comments to Thompson Falls Hydroelectric Project Baseline Environmental Document (BED)

**Section 6. Wildlife and Botanical Resources**

The BED references the Wildlife Impact Assessment and Mitigation Summary – Volume IIA –
Thompson Falls Dam (Wood and Olsen 1984), but it does not mention that the document
identified impacts to wildlife and their habitat due to construction of the Thompson Falls Dam
nor does it mention any mitigation undertaken to address these impacts. The 1984 Wildlife
Impact Assessment identifies that construction of the Thompson Falls Dam inundated
approximately 347 acres of wildlife habitat including conifer forests, deciduous bottoms, mixed
conifer-deciduous forests and grassland/hay meadows along with at least one island and
several gravel bars. The document also assessed impacts for select target species including 1
white-tailed deer, mule deer, grizzly and black bears, mountain lions, river otters, beavers, bald
eagles, and ruffed grouse. The document mentions that "[n]o projects have been undertaken at
the Thompson Falls reservoir in order to mitigate the impacts to wildlife due to the construction
of the original dam" (p. 39). It explains that in about 1982 or 83, Montana Power Company
constructed six rock-pillar type nesting structures for geese and also cleared nearly 5 acres of
land adjacent to the reservoir and planted it with grass and legume species to increase gosling
rearing. The current BED does not mention these or any additional mitigation measures that
have occurred for wildlife.

FWP expects NorthWestern to update the BED to document any wildlife mitigation that has
been completed since the early 1980s. We also expect the FERC relicensing process to include
requirements to complete wildlife mitigation for all remaining unmitigated losses. The losses 2
identified in the 1984 assessment were just the direct losses caused by dam construction and
reservoir inundation and did not include any secondary or cumulative wildlife impacts from the
dam nor any impacts caused by ongoing dam operations. FWP would like FERC to include
actions for mitigating all remaining wildlife impacts through the relicensing process and are 3
willing to work with NorthWestern and FERC to help complete that work.

## 5. Fisheries and Aquatic Resources

NorthWestern conducts fisheries surveys annually to understand the impact of salmonids passed upstream of the dams. This includes fall gillnetting in Thompson Falls Reservoir, electrofishing the Thompson Falls Reservoir in the spring (upper and lower sections) and fall electrofishing in two reaches in the Clark Fork River (above the islands and between Paradise and Plains, Montana). Gillnetting in Thompson Falls Reservoir has occurred annually each October since 2004. Monitoring by electrofishing began in 2010.

The objective for these monitoring efforts is to help track annual and long-term changes to the fish community, including species composition and relative abundance within and upstream of the Thompson Falls Reservoir. This information is especially important in consideration of the full-height fish ladder which began operations in spring 2011. In addition to monitoring fish that reside full-time upstream of the dams, monitoring activities allow fisheries managers to track potential system-wide changes that may result from fish passing into Thompson Falls Reservoir via passage through the fish ladder.

NorthWestern collects and reports the following data annually:

- Water temperature in the ladder
- Total number of fish and species ascending the ladder and passed upstream
- Fish metrics (length, weight)
- Number of fish returning to the ladder
- Number of "fallback" fish after release upstream of the dams
- Timing/duration for fish to ascend the ladder
- Timing/movement patterns of ladder fish moving upstream into the Thompson River
- Weir operations (notch vs. orifice)
- Attractant flow operations

These data are collected at the ladder to 1) qualitatively evaluate the effectiveness of upstream fish passage at the ladder, 2) evaluate operational procedures (e.g., weir mode and attractant flow), 3) assess the potential for fish passage delay, and 4) assess fish fallback.

A report is prepared with the results of these studies annually, distributed to TAC agencies, and posted on the public Thompson Falls Project website http://thompsonfallsfishpassage.com/ This BED contains a summary of the fisheries information collected in the Project area to date. For more detailed information, please see the annual reports posted on the website.

NorthWestern is implementing a Five-Year Reservoir Monitoring Plan with two key objectives: 1) characterization of bull trout in the Thompson River drainage (drainage), and



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Have yet to see methods/results/discussion on attractant flow.

mainstem river following general morphologic characteristics of the valley wall or terraces. Where the valley is narrower, such as the lower 17 miles of the drainage, the roads hug both the valley walls and the banks of the river. The roads leave the banks of the river only when the valley widens in the upper portion of the drainage.

The Thompson River has several major tributaries including the West Fork Thompson River, Fishtrap Creek, the Little Thompson River, Chippy Creek, and Big Rock Creek (Figure 5-7). The confluence of the Little Thompson River is near the 17-Mile Bridge, and both Fishtrap Creek and the West Fork Thompson River join the Thompson River downstream of the mouth of the Little Thompson River. Contrary to most systems in the region, the warmest water temperatures in the Thompson River occur just downstream from the confluence of the Little Thompson River and above the confluence of Fishtrap Creek. In most rivers and streams the warmest water temperatures occur near their mouths, but in the Thompson River, the coolest water temperatures occur near its mouth.

The distribution of fish species found in the Thompson River vary due to the temperature gradient in the drainage. The lower portion of the river contains primarily a rainbow trout (*Oncorhynchus mykiss)* fishery, which is most popular with anglers (Copenhaver et al. 2006). Brown trout (*Salmo trutta*), which also provide an important recreational fishery, tend to dominate the upper portion of the river where water temperatures are warmer (Copenhaver et al. 2006). Westslope cutthroat trout (*Oncorhynchus clarkii lewisi*) are also captured by anglers in the Thompson River, but are more common in the tributaries to the river. Mountain whitefish (*Prosopium williamsoni*) are abundant in the mainstem. Based on radio telemetry data and monitoring of bull trout, the area between the mouth of the Thompson River and the confluence of Fishtrap Creek appears to provide important foraging, migration, and overwintering habitat for bull trout (Glaid 2017; GEI Consultants, Inc. and Steigers Corporation 2013). Other species known to inhabit the drainage include brook trout (*Salvelinus fontinalis*), and other game fish and non-game fish such as suckers (*Catostomus* spp.) and sculpin (*Cottus* spp.) (Katzman 2006; NorthWestern 2015–2018; FWP unpublished data).



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The 2017 Thompson River Comprehensive report may help here.

## 5.3 Upstream Fish Passage

### 5.3.1 *Fish Passage Planning at the Thompson Falls Project*

The federal listing of bull trout under the Endangered Species Act in 1998 (63 FR 31647) (Federal Register 1998) led to studying, planning, designing, constructing, and operating the fish ladder. Critical habitat was designated in 2005 (70 FR 29998) and revised in 2010 (75 FR 63898) (Federal Register 2005, 2010). The Project is within the designated critical habitat for bull trout. Westslope cutthroat trout are listed as a sensitive species by the USFS (2011) and Species of Concern (SOC) in Montana (Montana Natural Heritage Program [MNHP] 2018) but are not federally-listed.

In 2001, upstream movement (upstream of Thompson Falls Dam) was studied using radio telemetry of 21 salmonids (GEI Consultants, Inc., 2003). The salmonids in the study included two bull trout, six rainbow trout, and 13 westslope cutthroat trout. All 21 fish were captured downstream of Thompson Falls Project, radio-tagged, and transported upstream of Thompson Falls Project. The upstream movement demonstrated by the two bull trout varied little and averaged 16.5 miles (26.5 km), while rainbow trout and westslope cutthroat trout showed a wide range of movements and diverse utilization of habitat. Rainbow trout upstream movements ranged from 2.2 miles (3.5 km) to 56.8 miles (91.4 km) and westslope cutthroat trout movements ranged from 0.1 mile (0.2 km) to 82 miles (132.2 km). Several upstream tributaries were utilized by the tagged fish. Bull trout entered the Thompson River. Rainbow trout migrated upstream into the Thompson, Flathead, and Jocko rivers. Westslope cutthroat trout migrated upstream and were recorded in Combest Creek, Cherry Creek, Thompson River, St. Regis River, and Cedar Creek (GEI Consultants, Inc., 2007a; GEI Consultants, Inc. 2003). The 2001 study was the first to look at the potential of upstream fish passage and where fish might migrate once released upstream of Thompson Falls Dam.

Fish movement and behavior were studied via radio telemetry between 2004 and 2006. These studies primarily focused on fish captured, tagged, and released downstream of the Thompson Falls Project and their movement upstream to the Project and Thompson Falls tailrace (GEI Consultants, Inc. 2005; 2006; 2007). However, there were some fish captured downstream of Thompson Falls Dam in 2004 that were released upstream of Thompson Falls Dam and monitored for upstream fish migration patterns (GEI Consultants, Inc. 2005). In 2004, a total of 10 fish (3 bull trout and 7 rainbow trout) were captured below Thompson Falls Dam, radio-tagged, transported and released about 3.3 miles (5.3 km) upstream of the dam. Two of the three bull trout migrated into the Thompson River with upstream migrations as far as 31 miles (49.96 km) and 24.2 miles (39 km), respectively, while one bull trout was detected downstream of Thompson Falls Dam shortly after its release (GEI Consultants, Inc. 2005). Four of the seven rainbow trout were also detected in the Thompson River, one rainbow trout was detected further upstream in the St. Regis River, one rainbow trout was detected in the Flathead River, and one rainbow trout was captured by an angler in the Thompson Falls Reservoir (GEI



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In general fish seemed drawn to the river left side of the main channel, and were able to get up closer to the dam prior to, or post the peak of the run-off. In 2005, the authors determined that fish could be moved to the river right side of the channel with attractant flow out of the dam. However, the fish's proximity to the dam was determined by the magnitude of the run-off. For a species such as bull trout which moves primarily during high water, ladder access at the main dam may always be difficult.

Consultants, Inc. 2005). These upstream movement patterns were similar to observations made in the 2001 study (GEI Consultants, Inc. 2003).

The primary focus of the 2004-2006 radio telemetry studies was to identify where and when fish moved into the tailrace at the Thompson Falls Project, evaluate whether fish movement could be directed by management of spill at the dam, and determine a potential location for a fish ladder at the Project. Between 2004 and 2006 approximately 30 to 40 salmonids, including bull trout, westslope cutthroat trout, rainbow trout, westslope cutthroat x rainbow trout hybrids, and brown trout were captured, radio-tagged, and released downstream of the Thompson Falls Project and monitored annually. Although timing varied slightly by species, most fish were documented entering the Thompson Falls Dam tailrace in early spring, beginning in March and April (GEI Consultants, Inc. 2007). Rainbow trout were typically the first species to be observed near the dam in March, followed by westslope cutthroat trout, bull trout, and brown trout. Bull trout were recorded near Thompson Falls Dam in the spring (April-June) and fall (October/November). The greatest activity of fish movement in the Project area was prior to peak of the spring runoff between April and June (GEI Consultants, Inc. 2007). It was also noted that fish entering the Project area did not remain in one location for extended periods of time. In 2005 and 2006 over half of the fish detected in the Project area made forays to the Main Channel Dam (GEI Consultants, Inc. 2007). Results from the 2006 radio telemetry studies concluded spill at the Main Channel Dam could be manipulated to attract fish over to the right abutment (river right). Thus, it was concluded the fish ladder would be most effectively designed for the right bank of the Main Channel Dam (GEI Consultants, Inc. 2007).

After several years of studies, a Biological Evaluation (PPL Montana 2008) was developed and identified factors directly related to Project operation that negatively impact bull trout in the Clark Fork River. Inhibition of upstream migration and subsequent access to spawning habitat by the Project was identified as a major concern. Consequently, the Licensee proposed to install a full-height fishway along the right bank of the Main Channel Dam at the Project and pursue upstream spawning and rearing habitat enhancement.

On October 8, 2008, the FWS issued a Biological Opinion (BO) regarding the Thompson Falls Project. The BO describes the effects of the Project on bull trout. The BO concluded that the Project is adversely effecting bull trout but would not likely jeopardize the continued existence of bull trout. The BO included an Incidental Take Statement, which includes reasonable and prudent measures, Terms and Conditions (TCs), and conservation recommendations to minimize incidental take of bull trout.

On February 12, 2009 FERC issued an Order Approving Construction and Operation of Fish Passage Facilities for the Project (FERC 2009). This Order included the reasonable and prudent measures, TCs (including the construction of a full-height fishway at the right abutment of the Main Channel Dam), and conservation recommendations from the FWS BO.



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But in this same study the fish were primarily river left and had to be manipulated to move river right.

**Table 5-3: Summary of the ladder season, weir mode operations, and annual peak streamflow in the Clark Fork River (USGS gage #12389000) near Plains, 2011-2017.**

| Year | Ladder Season (date opened and closed) | # of Days Ladder Closed | # of Days Ladder was Checked | Weir Mode (notch and/or orifice) | Peak Streamflow (Date) |
|---|---|---|---|---|---|
| **2011** | Mar 17–Oct 17 | 84 | 114 | Alternating Weekly Notch and Orifice | 104,000 June 10 |
| **2012** | Mar 13–Oct 15 | 22 | 164 | Alternating Weekly Notch and Orifice | 75,300 June 20 |
| **2013** | Mar 13–Oct 15 | 14 | 147 | Orifice | 63,700 May 15 |
| **2014** | Mar 28–Oct 21 | 16 | 132 | Orifice | 82,800 May 29 |
| **2015** | Mar 16–Nov 9 | 8 | 141 | Orifice | 36,600 June 11 |
| **2016** | Mar 13–Oct 31 | None | 144 | Orifice Except for 2 weeks in Notch (June 30–July 6 and July 13–20) | 44,100 May 27 |
| **2017** | Mar21-Oct 31 | 14 | 131 | Notch | 82,100 June 3 |

Since 2011, the ladder has operated under a broad range of river conditions, including low-flow years (2015, 2016), average-flow years (2012, 2013, 2014, 2017), and a high-flow year (2011). The data collected over the last 7 years provides a representation of the number of fish and species expected to utilize the ladder under variable conditions and also under variable weir modes (orifice and notch). To-date, the most effective ladder operating mode for the passage of native fish and all fish is the orifice mode (NorthWestern 2018). Notch mode appears to inhibit upstream passage of native non-salmonids such as largescale sucker and northern pikeminnow (NorthWestern 2018).

During the first 7 years of operation, a total of 30,845 fish (24,512 fish representing native species) ascended the ladder and 30,687 fish were released upstream[4]. Fish ascending the ladder represent 14 species and three hybrids (Table 5-4). Of the 3,011 salmonids recorded at the ladder (9.7% of all fish recorded), 78 percent of the fish were implanted with a unique PIT tag. Just over 650 (27%) of the uniquely-tagged salmonids have been detected in variable time frames in the Thompson River after their release upstream of the Thompson Falls dams.

Fish species composition at the ladder is dominated by native largescale sucker and northern pikeminnow. These two species are the most common fish recorded at the ladder when the ladder operates in orifice mode. The abundance of smallmouth bass, a nonnative game-species, has varied over the years and low numbers recorded at the ladder in 2011-2013 and 2017 may be related to a combination of low fish recruitment and/or notch weir mode operations.

[4] At the request of FWP, lake trout, brook trout, and walleye are not passed upstream of the Thompson Falls dams.



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What is best for Bull Trout

A few mountain whitefish have been recorded upstream in the Thompson River drainage and a small number have been documented remaining upstream of the dam for several years after their release (NorthWestern, unpublished data).

#### 5.3.5.2 Westslope Cutthroat Trout

Since the ladder opened in 2011, between 14 and 48 westslope cutthroat trout (westslope) ascend the ladder each year (NorthWestern 2018). A total of 213 westslope were released upstream of Thompson Falls Dam between 2011 and 2017. Since a remote tag array station was installed in the Thompson River in autumn of 2014, a total of 33 tagged westslope were detected in the Thompson River following their release upstream of the dam. These fish represent 32 percent of the tagged westslope released upstream in 2015; 46 percent of westslope released in 2016; and 38 percent of westslope in 2017 (NorthWestern 2018).

#### 5.3.5.3 Bull Trout

During the last 7 years of operations, a total of 16 bull trout (representing 15 unique individuals) ascended the ladder with one to five bull trout ascending the ladder annually (NorthWestern 2018). All bull trout except two were "new" fish receiving a unique PIT tag at the ladder work station prior to being released upstream. One bull trout recorded at the ladder in 2011 returned and ascended in 2012. Another bull trout was initially tagged electrofishing downstream of Thompson Falls Dam approximately 1-year prior to its ascent of the ladder.

Although the numbers of bull trout recorded at the ladder appear low compared to other fish species, the number recorded are representative of the rare occurrence in the system (FWS 2008; GEI Consultants, Inc. 2005; 2006; 2007). Between 1999 and 2006, the Project was sampled using various methods (a seasonal Denil trap in the tailrace, night electrofishing, angling) targeting bull trout and focused on the assumed upstream migratory season between April and July (FWS 2008). These efforts resulted in a total of 27 bull trout captured over an 8-year period with annual sampling varying from one to seven bull trout per year (FWS 2008). The most successful sampling year was in 2004 when a total of eight bull trout were captured (3 in the Denil trap; 4 via electrofishing; 1 via angling) (GEI Consultants, Inc. 2005). Most of the bull trout were sampled during April. However, sampling methods were limited during spring months (May–June) by spill and summer months by water temperature. The Denil trap was operated in the tailrace seasonally for 5 years (2001–2006) trapping a total of seven bull trout, one to two bull trout per year. The operations of the Denil trap were limited to non-spill periods (less than 23,000 cfs or 651 $m^3/s$) and water temperatures below 16 °C. The bull trout and general fish data collected from 1999 to 2006 (FWS 2008) and 2011 to 2017 (NorthWestern 2018) show bull trout are not comm ~~the number of bull trout observed ascending the ladder over the last 7 years is likely representative of their relative abundance.~~

Most bull trout (14 of 16 ascents) ascended the ladder between April and June, while one bull trout was recorded ascending in August 2013 (PPL Montana 2014) and another bull trout was recorded ascending in September 2017 (NorthWestern 2018). Based on data collected between



Page: 76 Comments 6 and 7
Author: cf2199
Subject: Sticky Note
Date: 2/20/2019 10:20:31 AM -08'00'

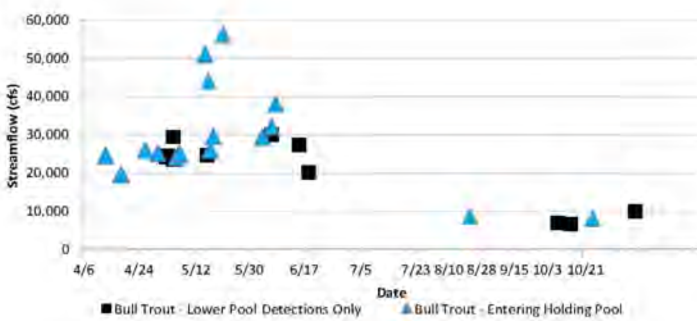
I will agree that Bull Trout are not common but there is no way of knowing if we are representatively sampling them at the ladder.

Author: cf2199
Subject: Cross-Out
Date: 2/20/2019 10:19:48 AM -08'00'

2011 and 2017, the peak ladder uses for bull trout (7 of 16 ascents) occurs in May. Bull trout were recorded during the month of May in the ladder when streamflow ranged from approximately 22,000 to 56,100 cfs (623-1[illegible] m³/s) and water temperatures ranged from 11.1 to 13.8 °C (52–57 °F). The only months bull trout were not recorded ascending the ladder were March, July, October, and November. However, one bull trout that ascended the ladder and was released upstream of Thompson Falls Dam in April 2016, returned to the ladder in October 2016 and was detected entering the lower pools, but did not fully ascend the ladder (NorthWestern 2017).

Between 2011 and 2017, bull trout were documented entering the ladder with streamflows ranging from 6,600 to 56,100 cfs (187–1589 m³/s) (Figure 5-9) and water temperatures ranging from approximately 44.4–73 °F (6.9–22.7 °C) (Figure 5-10).

**Figure 5-9: Clark Fork River streamflow (USGS gage #12389000) corresponding to when bull trout were detected either entering the lower pools and did not ascend (some bull trout display multiply entries) or ascended to the holding pool between 2011 and 2017.**

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Baseline Environmental Document

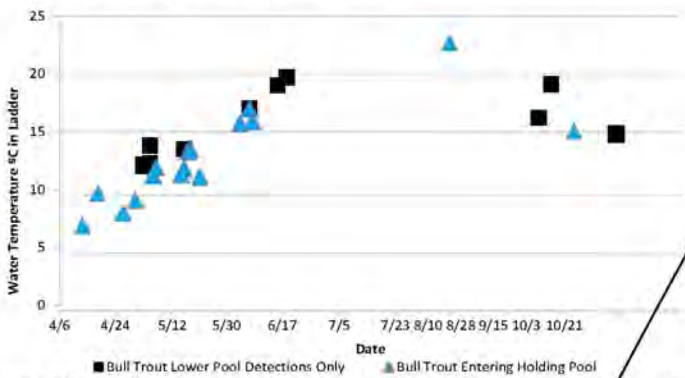
Page: 77 Comment 8 and 9
Author: cf2199
Subject: Sticky Note
Date: 2/20/2019 10:22:13 AM -08'00'

A time of high water making ladder entry difficult and closure likely.

Author: CF4005
Subject: Sticky Note
Date: 2/20/2019 11:39:57 AM -08'00'

Two Thompson River Bull Trout (not juveniles) were detected entering Prospect Creek in 2018. These fish either could not ascend the ladder because it was closed due to high flows, or could not navigate the falls and find the entrance at high water.

Figure 5-10: Water temperature in the ladder (based on single daily measurement) corresponding to the date when bull trout were detected either entering the lower pools and did not ascend (some bull trout display multiply entries) or ascended to the holding pool between 2011 and 2017.




Between 2011 and 2016, all 15 bull trout ascents and entry detections at the ladder occurred while the ladder operated in orifice mode. In 2011, one bull trout, presumably ascending the ladder, was captured in Pool 23 during a mode switch from orifice to notch mode (H. Carlsmith, FWP, personal communication, August 20, 2017). The bull trout recorded in 2017 represented the first bull trout to ascend the ladder in September and in notch mode.

In addition to the 16 bull trout that ascended the ladder, eight previously-tagged bull trout were documented entering the ladder via remote tag arrays located in the lower pools of the ladder. There were five bull trout detected in 2015 and three bull trout detected in 2016 entering the lower pools of the ladder but did not ascend to the top of the ladder. Of the eight individual bull trout detected entering the ladder, two fish were initially tagged at the ladder (thus had ascended to the top once prior) and were returning fish. The other six fish were previously captured downstream of Thompson Falls Dam by Avista and were visiting the ladder for the first time (NorthWestern 2018). Many of the bull trout detected only in the lower pools entered the ladder multiple times at various intervals and some were detected multiple times in the same month while others visited in different months. This type of fish behavior and movement patterns in the ladder were also observed for other salmonids (e.g., brown and rainbow trout) (NorthWestern, unpublished data). There were no detections of previously tagged bull trout entering the ladder in 2011, 2013, 2014, or 2017. Only in 2012 were two tagged bull trout detected entering the ladder and subsequently ascended to the top of the ladder.



**Page: 78 Comment 10**
Author: cf2199
Subject: Sticky NoteDate: 2/20/2019 10:24:33 AM -08'00'
6/8 fish had genetic assignments above Thompson Falls dam.

#### 5.3.6 *Monitoring the Clark Fork River for Ladder Fish*

Baseline fisheries surveys have been conducted to monitor salmonids that ascended the ladder and were passed upstream of Thompson Falls Dam. The objective was also to establish baseline information on species composition and relative abundance within and upstream of Thompson Falls Reservoir to track annual and long-term changes to the fish community. Monitoring fish counts at the ladder and fisheries surveys upstream provide the Licensee and resource managers the ability to track potential system-wide changes with fish passing into the Thompson Falls Reservoir from downstream.

Between 2011 and 2017, there were 2,352 uniquely-tagged salmonids and 1,178 uniquely-tagged non-salmonids released upstream of the Thompson Falls Dam. Baseline fisheries surveys have recaptured about 1 percent of the tagged-salmonids released upstream of the dam in the Clark Fork River. Tagged-non-salmonids released upstream of the dam have not been recaptured during the baseline fisheries surveys. However, anglers caught 33 of the 1,107 tagged smallmouth bass, both upstream and downstream of the Thompson Falls Project (NorthWestern 2018).

The furthest upstream angler reports have been from the Lower Flathead River. One rainbow trout was caught about 77 miles upstream of the Thompson Falls Project, and two smallmouth bass were caught about 100 miles upstream near SKQ Project (NorthWestern 2018).

#### 5.3.7 *Ladder Fish in the Thompson River*

On September 26, 2014, a remote PIT-tag antenna array was installed in the mainstem of the Thompson River. A detailed summary of detection of ladder fish in the Thompson River is provided in the 2017 annual report (NorthWestern 2018).

The tag array in the mainstem Thompson River operated for the majority of 2015 to 2017 (the array was operational for just 3 months in 2014). During these 3 years, about one-third of the tagged-salmonids released upstream of Thompson Falls Dam were detected in the Thompson River in the same year (Table 5-5). Eight different fish species have been recorded entering the Thompson River after being released upstream of the Thompson Falls Project. These data indicate that the Thompson River is important habitat for fish in the Project vicinity.



**Page: 79 Comment 11 and 12**

Author: CF4005
Subject: Sticky Note
Date: 2/20/2019 3:05:23 PM -08'00'

The point is not to look for ladder fish. It is to document potential changes in the fish community.

Author: CF4005
Subject: Sticky Note
Date: 2/20/2019 3:04:22 PM -08'00'

Many fish were detected on remote arrays after being released. What is the point of saying we released them upstream and didn't recapture them again? We did catch at least one tagged bull trout in the Thompson, and many other tagged fish were caught up and downstream on arrays, or in gill nets, or by anglers.

downstream to Thompson Falls Reservoir (McGuire 2002). The Thompson Falls Reservoir was the furthest downstream station on the Clark Fork River and the only site in the Project.

As a part of the 1987-2001 biomonitoring study, McGuire developed numerical criteria for the assessment of biologically-significant environmental degradation that continues to be used and referenced today (McGuire 2002; Respec 2014). McGuire (2002) refers to Karr and Dudley (1981) to define biointegrity as

> …the capacity of supporting and maintaining a balanced, integrated, adaptive community having species composition diversity and functional organization comparable to that of natural habitat of the region" and Meyer (1997) that further defines biointegrity as "an ecosystem that is sustainable and resilient, maintaining its ecological structure and function over time while continuing to meet societal needs and expectations."

Biointegrity in the Clark Fork River may be categorized as nonimpaired (90-100%), slightly impaired (70-90%), moderately impaired (50-70%), or severely impaired (<50%) (McGuire 2002).

McGuire (2002) indicated that the sampling technique and analyses used for the upstream were only "marginally" applicable to the Thompson Falls Reservoir Site (Station 27) due to the large river habitat, high discharge, and unique benthic community. However, McGuire did state the data could be used to monitor trends. The biointegrity score averaged 72 percent during the 15 years of monitoring and was well-above the average score in the last 3 years of monitoring (1999–2001). Overall, the macroinvertebrate assemblage between 1987 and 2001 at the Thompson Falls site was relatively healthy throughout the duration of the annual sampling with signs of improvement during the last 3 years of monitoring. No additional macroinvertebrate sampling or analysis was completed in the Project since 2001.

### 5.6 Fish Consumption Guidelines

Dioxins, furans, and polychlorinated biphenyls (PCBs) contaminants were found elevated in northern pike sampled in the middle Clark Fork River downstream of the Smurfit-Stone Mill, resulting in a fish consumption advisory in 2013 (Schmetterling and Selch 2013). In 2014, Selch (2015) analyzed fish tissue samples for dioxins, furans, and PCBs from samples taken from Thompson Falls and Noxon Reservoir. Northern pike, walleye, smallmouth bass, and yellow perch were sampled in Noxon Reservoir in 2014 and results were compared to 2013 samples taken from fish upstream in the Clark Fork River (Selch 2015; Schmetterling and Selch 2013). The results found that 13 of the 17 dioxins and furans detected in northern pike and rainbow trout in the middle Clark Fork River in 2013 were also found in fish in the Noxon Reservoir in 2014. Noxon Reservoir already contained fish with some of the highest concentrations of Hg (mercury) in Montana, thus the results from the 2014 study did not result in changes to most of the existing fish consumption advisories (Selch 2015).



**Page: 85 Comment 13**
Author: CF4005
Subject: Sticky Note
Date: 2/20/2019 3:31:38 PM -08'00'

One major finding in Noxon Reservoir was that large Northern Pike (>30") had levels of PCBs which warranted a "Do Not Eat" advisory. In TF Reservoir, no large pike were captured, and therefore no advisory exists there. However, a different report found that Hg levels did differ between reservoirs and may have been the result of the more run-of-the-river nature of TF Reservoir.

**FWP Wildlife Division**

Comments to Thompson Falls Hydroelectric Project Baseline Environmental Document (BED)

**Section 6. Wildlife and Botanical Resources**

The BED references the Wildlife Impact Assessment and Mitigation Summary – Volume IIA – Thompson Falls Dam (Wood and Olsen 1984), but it does not mention that the document identified impacts to wildlife and their habitat due to construction of the Thompson Falls Dam nor does it mention any mitigation undertaken to address these impacts. The 1984 Wildlife Impact Assessment identifies that construction of the Thompson Falls Dam inundated approximately 347 acres of wildlife habitat including conifer forests, deciduous bottoms, mixed conifer-deciduous forests and grassland/hay meadows along with at least one island and several gravel bars. The document also assessed impacts for select target species including white-tailed deer, mule deer, grizzly and black bears, mountain lions, river otters, beavers, bald eagles, and ruffed grouse. The document mentions that "[n]o projects have been undertaken at the Thompson Falls reservoir in order to mitigate the impacts to wildlife due to the construction of the original dam" (p. 39). It explains that in about 1982 or 83, Montana Power Company constructed six rock-pillar type nesting structures for geese and also cleared nearly 5 acres of land adjacent to the reservoir and planted it with grass and legume species to increase gosling rearing. The current BED does not mention these or any additional mitigation measures that have occurred for wildlife. 1

FWP expects NorthWestern to update the BED to document any wildlife mitigation that has been completed since the early 1980s. We also expect the FERC relicensing process to include requirements to complete wildlife mitigation for all remaining unmitigated losses. The losses identified in the 1984 assessment were just the direct losses caused by dam construction and reservoir inundation and did not include any secondary or cumulative wildlife impacts from the dam nor any impacts caused by ongoing dam operations. 2 FWP would like FERC to include actions for mitigating all remaining wildlife impacts through the relicensing process and are willing to work with NorthWestern and FERC to help complete that work. 3

**From:** Kron, Darrin <dkron@mt.gov>
**Sent:** Tuesday, January 08, 2019 12:29 PM
**To:** Tollefson, Jordan <Jordan.Tollefson@northwestern.com>
**Cc:** Garber, Jason <JGarber2@mt.gov>; Apfelbeck, Randall <rapfelbeck@mt.gov>
**Subject:** BED water quality section comments

NOTICE: This message has been sent by an EXTERNAL sender outside of NorthWestern Energy. Please use caution when clicking on links, opening attachments, or replying to this email.

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Hi Jordan,

I do have a couple comments about the WQ section of the BED document and follow up thoughts from the meeting today. These are general thoughts and meant for NWE consideration during future project scoping.

1. Please fix the summary language about the Montana's applicable temperature standard. Refer to Montana ARM 17.30.623e. The language in the document discusses rates of increase above naturally occurring condition in context to the standard but the standard contains reference to absolute (not rate) increase above naturally occurring conditions. It misrepresents the standard. 1
2. Does the reservoir have potential to shift nutrient fractions? Grow algae? Probably not as much as some other reservoirs due to low retention time but you may want some data to get toward the question. We discussed some nutrient monitoring at the meeting today but the objective you would have might relate to this particular question. 2
3. If you are interested in the results of a draft CFR nutrient trends analysis please contact Randy Apfelbeck. Additionally, yearly nutrient data summary reports are available on the CF Coalition website that are more up to date than the information provided in the WQ summary of the BED. Contact Randy Apfelbeck at DEQ or potentially the CFC for nutrient monitoring program QAPPs/SAPs. All data from the program is in National WQ Portal. 3
4. Include tributary nutrient data that is available? Older Thomson River data? 4
5. Is there any turbidity/TSS data available above/below reservoir? There could be a future need for a baseline for long term questions if future turbidity questions arise but are unforeseen at this time. I don't know if there is much fine sediment near the dam face that could be entrained and cause increases to turbidity but I'm thinking about Clark Canyon example in my mind. You might want to know what it was behaving like with turbidity during this timeframe sometime in the future. I didn't mention this at the meeting today when discussing temperature and nutrients. 5
6. Does the reservoir stratify at all or not? Can you confidently say one way or the other? It's not likely but would be good to have a resolution to this question for future use. I read the discussion about in reservoir transects but it didn't talk about depths of monitoring or have the detail needed to address this question. What is baseflow(ish) retention time of this reservoir in context with stratification topic? This info might be elsewhere in the document but could lead credence to the stratification topic. 6

Thanks for talking today,

Darrin Kron
Water Quality Monitoring and Assessment Section Supervisor
Montana Department of Environmental Quality
Phone: 406-444-4765

---

**From:** irventures@blackfoot.net
**To:** irventures@blackfoot.net
**Subject:** Fish Ladder - Thompson Falls Dam
**Date:** Monday, April 01, 2019 1:32:58 PM

RE: Fish Ladder at Thompson Falls Dam in Sanders County.

This ladder cost almost $8 million to build and the maintenance and personal costs are who knows how much ($200,000 or more a year?? I don't know). I am told a fisheries biologist must identify and count every fish that goes through. I think there is a holding tank at top where they get trapped until counted each day. This dam was built solely because of the Bull Trout, with huge pressure from the Tribes, and was supposed to help the Bull Trout move up river. The sad part is that in the 8+ years it has been there, an average of TWO Bull Trout PER YEAR have went through. What is that?? About $600,000 per Bull Trout when you factor in ALL the costs. On their website they have logs where you can see a spreadsheet showing the fish that pass through every day. Most days none, but when there are fish using it, it is almost all trash fish. I talked to one fisheries biologist and he told me this was the costliest boondoggle in Montana fisheries history. I am sure 99.9% of Montanans know nothing about this failure. Maybe someone should speak up about this complete failure. And maybe power companies, government agencies, etc. shouldn't bow down so easily to Tribal pressure time and time again.

Thanks J. R. – Flathead Reservation, Montana

**Table 15-1: Responses to comments on BED**

| Commenter | Comment Number | Response |
|---|---|---|
| FWP Wildlife Division | 1 | Section 6.4 of the PAD describes the Wildlife Management Plan that was developed by FWP in 1985. On September 6, 1989, MPC entered into an agreement with FWP to carry out the Wildlife Management Plan for the wildlife and wildlife habitat mitigation, pursuant to which the Licensee deposited $123,000 in a trust fund with FWP to finance implementation of the Plan. |
| | 2 | The fish and wildlife measures developed by MPC and FWP in 1989 addressed mitigation tor original Project impacts. In this relicensing, FERC will evaluate the Project's impacts using current environmental conditions as the baseline for the environmental analysis. |
| | 3 | We look forward to working with FWP during the relicensing process. |
| FWP Fisheries Division | 1 | As described in Section 5.6.2 of the PAD, in the Panel's evaluation of upstream fish passage at the Project, it recommended focusing future studies on quantifying attraction and entrance efficiency. NorthWestern is proposing studies as recommended by the Panel, see Section 14.3.2 of the PAD. |
| | 2 | Reference to the Thompson River Comprehensive Report was included in Section 5.9 of the PAD. |
| | 3 | NorthWestern is proposing studies as recommended by the Panel to further investigate fish movement in the tailrace, see Section 14.3.2 of the PAD. |
| | 4 | Section 5.6.1 of the PAD provides clarifying information to address this comment. |
| | 5 | NorthWestern proposes, with TAC agreement, to operate the upstream fish passage facility in orifice mode for the remainder of the current License term. |
| | 6 | This passage was not included in the PAD. |
| | 7 | This passage was not included in the PAD. |
| | 8 | Section 2.5 of the PAD describes the seasonal operations of the upstream fish passage facility and the scientific rationale for those operations. |
| | 9 | These details are included in Section 2.3.2 of the Comprehensive Phase 2 Fish Passage Report. |
| | 10 | These details are included in Section 2.3.2 the Comprehensive Phase 2 Fish Passage Report. |
| | 11 | Section 5.3 of the PAD includes this information. |
| | 12 | This passage was not included in the PAD. |
| | 13 | The current Montana sport fish consumption guidelines are described in Section 5.10 of the PAD. |
| DEQ | 1 | An accurate description of water quality standards is included in Section 4.8 of the PAD. |
| | 2 | Nutrients are discussed in Section 4.9.1.2.1 of the PAD, and are generally found to be low. New data on periphyton were collected in 2019; information is in Section 4.11.2.2 of the PAD. Retention time is discussed in Section 4.4 of the PAD. Retention time in Thompson Falls |

| | | |
|---|---|---|
| | | Reservoir is very short, ranging from less than 4 hours (June) to approximately 17 hours (September). |
| | 3 | Additional information on nutrient monitoring has been included in Section 4.9.1.2.1 of the PAD. |
| | 4 | Nutrients in the Project area were sampled in 2019, including in the Thompson River, see Table 4-5 of the PAD. |
| | 5 | Turbidity measurements were collected in 2019, see Section 14.1.1 of the PAD. |
| | 6 | NorthWestern is not aware of data showing that the reservoir stratifies. Water temperature is discussed in Section 4.9.2 of the PAD. |
| JR (individual) | 1 | Comment noted. |

### 15.1.2 *Comments and Responses to Comments October 2019 Relicensing Participant Outreach*

NorthWestern received comments from two Relicensing Participants at the October 2019 public meeting in Thompson Falls. The letters are reprinted below, NorthWestern's responses to comments are in Table 15-2.

**SCCDC**

Sanders County Community Development Corporation

October 15, 2019

NorthWestern Energy
Mary Gail Sullivan
Director, Environmental & Lands Permitting & Compliance

Re: FERC Relicensing Community Meeting, Thompson Falls

Dear Mary Gail:

Sanders County Community Development Corporation (SCCDC) is an active supporter of many community efforts in Sanders County and specifically in Thompson Falls. From Main Street and Community Trails activities, to the local governments, SCCDC provides technical assistance to increase these entities' capacity and participate in reaching set goals.

SCCDC is is a small non-profit organization dedicated to the improvement of community services, facilities and the development of an economic climate that encourages business expansion and job creation within Sanders County, MT. Activities undertaken to achieve its mission include business services, community project facilitation, and tourism promotion.

Progress toward short and long-term goals in the downtown master plan is moving forward to embrace Thompson Falls as a recreation-based economy. Projects contribute to a more vibrant community that is vital to both retaining and attracting businesses and visitors to the area.

The Western Rural Development Region highlights revitalization of our communities' Main Streets as a key economic development strategy, outlined in our regional Community Economic Development Strategy (CEDS) on file with the Department of Commerce. The communities of Sanders County struggle with high unemployment and poverty. Recognizing the inherent resources in the area and promoting rural Montana through the tourism industry has potential to be a major economic stimulus.

Sanders County has limited resources, and the network dedicated to community and economic development is currently inadequate. Relationships are a cornerstone of that network. Partnerships create a shared success. Positive impacts derive from local and invested people. This letter is a formal request that NorthWestern Energy, a major corporate asset in the community, 1) increase their presence as a partner; 2) contribute to project development for recreation infrastructure, and 3) prioritize community relations with the public and private sector in Thompson Falls.

Thank you for your consideration.
Sincerely,

Jen Kreiner, Executive Director

SUPPORTING BUSINESSES
STRENGTHENING COMMUNITIES

[illegible]
[illegible]
[illegible]
www.SandersCounty.org

**FERC RELICENSING**
Mary Gail Sullivan
Director, Environmental & Lands Permitting & Compliance
NorthWestern Energy

October 15, 2019

Thompson Falls Community Trails is organized exclusively with a not for profit purpose to enhance public recreation opportunities in the Thompson Falls area of Sanders County, Montana, by building, maintaining, and improving recreational trails that provide transportation ways and connectivity, enhancing quality of life.

The Trails Committee is grateful to have this opportunity to make suggestions concerning the recreational areas in our immediate vicinity that fall within the FERC boundaries. Our group has worked with Northwestern
Energy on a variety of recreational projects, and would like to thank Noel Jacobsen and Kim Bergstrom for 1
their strong support and contributions toward community trails and events. We very much appreciate their input and assistance, and have found them to be strong partners within our community.

Our committee would like to give input regarding the following recreational areas that fall within the FERC Relicensing boundary:

- **Island Park/Thompson Falls Historic High Bridge-**This beautiful area is central to the history of Thompson Falls, and therefore the upkeep and general appearance of walkways and signage is vital. Particular ownership must continue to be given to this area.

- **Powerhouse Loop-**We request that strong partnership with Thompson Falls Community Trails continue for this scenic trail in maintenance, signage, recreational events, and upgrading.

- **Wild Goose Landing-**This fishing and swimming area is in great need of an additional dock, general upgrading, and the traffic flow desperately needs to be addressed. It is an important recreational area at
the gateway to Thompson Falls, as well as a key spot for tourists to stop, but is currently very congested 2
in design. It is a safety concern for all visitors, but specifically the youth who use the swim dock daily in the summer months.

- **Proposed Eastward Extension Community Trail-**TFCT contracted a preliminary planning evaluation for the proposed Eastward Extension Community Trail, a one mile proposed trail connecting Wild Goose Landing out to Harvest Foods. The evaluation was used to help determine the feasibility of permitting this project through the different regulatory agencies involved and meeting their specific regulatory requirements. This preliminary planning evaluation focused only on the 0.5-mile section immediately adjacent to the Reservoir. We also received a cost estimate on the one-mile trail section. TFCT would like to see NWe participate in a public- private partnership to see this trail section become a reality for our community. Community benefits include increased access to recreation, encouragement of alternative transportation to goods and services, increased social welfare, additional community trail infrastructure and connectivity, providing another resident and visitor asset.

- **Ice-fishing area at Reservoir by deserted pump house (east side of reservoir)-**This site has heavy use in the winter months and is a great spot for local ice-fishing, but it is in disrepair. For safety reasons, this area needs accessed and upgraded.

- **Mouth of Prospect Creek Access/Parking Area, east side of High Bridge-**This area needs further development and administrative oversight, limiting it to day-use only. One suggestion would be to have walk-in traffic-only from the primitive parking area and regular monitoring and maintenance to address the issue of litter and vandalism.

- **Thompson River-**We encourage partnership with Thompson River activities such as the annual clean-up led by the local angler club.

- **Representation-**TFCT is an all-volunteer committee that values the skillsets, experience and resource connections of its members. Prior to the transfer of the hydro-facility from PPL, active representation was encouraged by the corporation on the trails committee. We would like to see that as a renewed priority through the relicensing.

Thank you very much for allowing us to comment! ~Thompson Falls Community Trails

Thompson Falls Community Trails
P.O. Box 424
Thompson Falls, MT 59873
tfallstrails@gmail.com

**Table 15-2: Responses to comments received October 2019**

| Commenter | Comment Number | Response |
|---|---|---|
| Sanders County Community Development Corporation | 1 | NorthWestern is committed to continuing to be a strong partner in the community of Thompson Falls. Please refer to Section 9 for a detailed description of recreation amenities at the Project and the results of the 2018 Recreation Visitor Survey |
| Thompson Falls Community Trails | 1 | We appreciate your feedback regarding recreational needs in the Thompson Falls Project area |
| | 2 | NorthWestern is committed to continuing to be a strong partner in the community of Thompson Falls. |

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# 16. Literature Cited

## 16.1 Citations for Introduction.

No Citations for Section 1.

## 16.2 Citations for Project Location, Facilities, and Operations (Section 2)


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# Appendix A – FERC Approved Federal and State Comprehensive Plans

**FERC Approved Comprehensive Plans Reviewed**

| Document Name: | Updates, if any: |
|---|---|
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| Document Name: | Updates, if any: |
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| | Montana Fish, Wildlife and Parks. Available: http://fwp.mt.gov/fishAndWildlife/management/fisheries/statewidePlan/2013-2018.html |
| Montana State Legislature. 1997. House Bill Number 546. Total Maximum Daily Load. Helena, Montana. | Updated list is here: http://deq.mt.gov/Water/WQPB/tmdl/finalreports |
| National Park Service. The Nationwide Rivers Inventory. Department of the Interior, Washington, D.C. 1993. | List of Montana Rivers: https://www.nps.gov/ncrc/programs/rtca/nri/states/mt.html<br><br>In 1993 a 17-mile reach of the middle Clark Fork River (mouth of Tamarack Creek to mouth of Seigel Creek) was included in the Nationwide Rivers Inventory (NRI) for cultural and recreational outstanding remarkable values (ORVs). No updates or recent changes documented. Source: https://www.nps.gov/subjects/rivers/montana.htm |
| Northwest Power and Conservation Council. 2014. Columbia River Basin Fish and Wildlife Program. Portland, Oregon. Council Document 2014-12. October 2014. https://www.nwcouncil.org/media/7148624/2014-12.pdf | Nothing new. |
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**FERC Approved Comprehensive Plans for areas of Montana not in the Thompson Falls Hydroelectric Project area**

These plans do not apply to the Thompson Falls Project as they address other areas of Montana, or species or habitats not present in the Thompson Falls Project area

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|---|
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| Montana Department of Natural Resources and Conservation. 1977. Yellowstone River Basin final environmental impact statement for water reservation applications. Helena, Montana. February 1977. 194 pp and draft addendum, dated June 1977. |
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# Appendix B – FERC License Order December 28, 1979

UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

The Montana Power Company ) Project No. 1869

ORDER ISSUING NEW LICENSE

(Issued December 28. 1979)

On January 20, 1972, The Montana Power Company (MPC) filed an application under Part I of the Federal Power Act (Act) for a new license for its existing Thompson Falls Project No. 1869. 1/ The project is located on a navigable waterway of the United States, the Clark Fork River, in Sanders County, Montana, and affects lands of the United States in the Lolo National Forest. 2/

Public notice of the filing of the application for new license was issued, but no protests or petitions to intervene were received. A number of Federal, State and local agencies offered comments on the application. These comments are discussed below.

Project Description and History

The Thompson Falls Project has an installed capacity of 30,000 kilowatts and basically consists of a 1,016-foot-long and 54-foot-high (maximum) concrete gravity main dam; a 449-foot-long and 45-foot-high concrete gravity auxilary dam, located to the right of the main dam in a dry channel; a 12-mile-long reservoir with a usable storage capacity of 15,000 acre-feet; a 450-foot-long and 80-foot-wide power canal cut through rock; six 6.67-foot diameter steel penstocks; and a steel-framed and masonry powerhouse containing six 5,000-kW generating units. Preliminary development of the Thompson Falls Project was begun in June 1912, by the Thompson Falls Power Company.

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1/ The application was supplemented by filings on June 30, July 20, and November 19, 1973.

2/ This order is issued by delegation of authority under Section 3.5(g) of the Commission's Regulations, 18 CFR 3.5(g), as amended in Docket No. RM78-19 (August 14, 1978) and Docket No. RM79-59 (July 23, 1979).

Construction commenced in May, 1913, and the first generating unit was placed in service on July 1, 1915. The sixth generating unit was placed in service in May, 1917. MPC acquired the Thompson Falls Project in 1929 and has been operating it continuously since that time as a part of its integrated electric system.

The original license for the Thompson Falls Project was issued effective January 1, 1938, and expired on December 31, 1975. The project has been operating under successive annual licenses since that time.

Safety

All project structures, machinery, and appurtenant facilities have been inspected by the Commission's staff and found to be adequately maintained and in good operating condition. Stability studies performed by the staff show that the stresses under normal hydrostatic plus earthquake loadings and maximum hydrostatic loading are within acceptable limits and the dams are safe against sliding and overturning. The spillway discharge capacity of the project is 459,600 cfs and the probable maximum flood is estimated to be 450,000 cfs. Thus, the spillway capacity is adequate. It is concluded that the project works are safe and adequate.

Project Operation and Proposed Modifications

The project is an integral part of the Montana Power Company system and is used to serve base loads. It is considered a run-of-the-river plant, and the generation at any time depends upon the natural flow available. The 15,000 acre-feet of storage at the site would not normally be utilized since the resultant large drawdown of the reservoir would decrease the effective head available and therefore reduce the capacity of the plant. Currently, reservoir level and spill are controlled by adding and removing flashboards at the main and dry channel dams. These boards cannot be removed under more than four feet of water. Therefore, each spring before the flood season, it is necessary to remove all of the boards down to the crest of the main dam. These boards cannot be replaced until the river returns to its normal summer flow. Because of this, up to 13 feet of head are lost at this project for two to three months each year. Furthermore, the river flow at Thompson Falls is highly variable. Without gates at Thompson Falls, it is usually necessary to operate the reservoir from one to two feet below full pool elevation to allow for this variable flow. This condition results in some loss of head for most of the other nine to ten months of the year.

MPC has proposed to modify the project works by installing two 40-foot by 18-foot remotely operated taintor gates in the space presently occupied by bays 16, 17, 18, and 19 on the main dam. MPC has also proposed to replace the top eight feet of the existing flashboard systems on both dams with timber drop panels and to convert the existing flashboard stanchions to a trippable type. The proposed modifications would allow MPC to hold the reservoir at its normal full level during a greater portion of the year than is presently possible with the existing flashboard arrangement and, as a result, to increase power production by an estimated 32 million kWh annually.

Staff analyses shows that the cost of the modifications would be less than the cost of obtaining the equivalent amount of power from a thermal-electric generating plant. The estimated 32 million-kWh increase in average annual generation to be provided by the modifications represents an average annual fuel savings of 18,000 tons of coal. 3/ It is concluded that the proposed modification is economically feasible and in the public interest and it is approved subject to the terms and conditions of this order.

Comprehensive Development

Thompson Falls Project, which is operated on a run-of-the-river mode, is not hydraulically connected to the Kerr Project No. 5 or the Milltown Project No. 2543, located 125 river-miles and 165 river-miles upstream, respectively. It is, however, electrically connected to the Kerr Plant and supplies power to the MPC's integrated system.

The Commission staff's review of water discharge records for a period of 67 years starting on October of 1910 has revealed that the average flow of the Clark Fork River near Plains, Montana, is about 20,010 cfs, which exceeds the current hydraulic capacity of the project.

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3/ With the modification, average annual generation for the project would be about 321 million kWh, using a renewable resource to save the equivalent of approximately 527,000 barrels of oil or 149,000 tons of coal per year.

MPC considered two options for the ultimate scheme of development of the Thompson Falls Project in addition to the previously discussed proposal to install taintor gates and replace existing flashboards with drop panels: increasing the height of the dam by 2 feet; and installing two additional 17,000 kW generators. MPC's studies of these two options, conducted before 1972, concluded that these two options were not then economically feasible, since the cost of additional power to be produced would be 19 percent and 80 percent, respectively, more than the cost of equivalent steam generation. The staff's review of MPC's studies concluded that the findings were correct, given the economic conditions at the time of the studies. In light of the significant changes in economic conditions since MPC's previous feasibility study, particularly the escalating costs of non-renewable fuels, raising the dam or installing additional capacity may now be economically feasible. Article 45 requires MPC to restudy the possibility of making these changes to the project and, if feasible, to submit a schedule for filing an application for amendment of license. Article 9 of this license reserves the Commission's authority to require installation of additional capacity or other modifications that may prove economically feasible.

A review of the Planning Status Report for the Pend Oreille-Clark Fork River basin indicates that the Thompson Falls Project is not in conflict with any planned or potential development in the river basin. Subject to the terms and conditions included in the license, it is concluded that the Thompson Falls Project will be best adapted to a plan for the comprehensive development of the Clark Fork River for beneficial public uses.

Federal Takeover

Section 14 of the Federal Power Act reserves to the United States the right to take over a non-publicly owned project upon expiration of the license, after paying to the licensee the net investment in the project, not to exceed the fair value of the property taken, plus severance damages, if any. No Federal agency, State, or municipality recommended takeover or redevelopment of the project by the United States or any other entity. The project is not in conflict with any project authorized or under study by the United States. None of the above governmental units has objected to the licensing of the project. There is no apparent reason why Federal takeover of the project would better serve the public interest than issuance of this license. Therefore, Federal takeover will not be recommended to the Congress.

Fish and Wildlife

The fishery in the Clark Fork River is reported as being poor in the vicinity of the project. There are no migratory fish within the section of the Clark Fork River that the project occupies. The U.S. Department of the Interior and the State of Montana Department of Fish and Game (Fish and Game) commented that there is no justification for a fish ladder at Thompson Falls as long as Noxon and Cabinet Gorge Dams, downstream from the project, remain unladdered. Salmonids now inhabit Lake Pend Oreille and at sometime in the future it may be desirable to accommodate migratory spawning upstream of Lake Pend Oreille. Both Interior and Fish and Game recommended making provisions for future fish passage facilities at the project. Articles 15 and 16 of this license reserve the Commission's authority to require fish passage facilities in the future.

Recreation

MPC has developed two recreational areas in connection with the Thompson Falls Project: (1) a park equipped with a picnic shelter, picnic tables, kitchen facilities, running water and restrooms; and, (2) an area containing a boat launch site, boat pier, and a swimming area. There has been no significant increase in annual visitations at the project, primarily because of the accessibility of extensive recreational facilities at Kaniksu and Lolo National Forests.

Interior recommended that the existing boat launch area be improved and consideration be given to the development of a second boat ramp in the future. The U.S. Department of Agriculture, Forest Service, also commented that the improvement of boat launching facilities at the project was needed. MPC responded that the boat launch has been improved under a lease arrangement with a local service organization. The agencies' concern for future recreational development is covered by Article 17, which reserves the Commission's authority to require additional recreational facilities that may become needed. Additionally, the Commission's regulations require the licensee to file FERC Form No. 80 every two years, reporting data regarding recreational use and development of public recreational opportunities in the project area. This form allows Commission staff and other interested agencies to monitor developing recreational demand at the project.

Other Environmental Impacts

The existing facilities at the project have been in operation for over 62 years. Continued operation of the project under the attached license conditions would have no significant adverse effect on the quality of the human environment. The Montana Power Company plans no construction of additional power facilities. The proposed modification of facilities to install taintor gates and replace existing flashboards with drop panels can be accomplished with no lasting effects to the surrounding environment. No excavation would be required. The reservoir elevation may have to be lowered for a short period of time during the construction period, but adverse environmental effects would be short term and minimal. Upon completion of the proposed modification, the reservoir level would be maintained near full pond during a greater portion of the year than is currently possible, complementing existing land use patterns and aesthetic qualities. On the basis of the entire record, including agency comments and the staff's independent analysis, it is concluded that the issuance of this license, as conditioned, is not a major Federal action significantly affecting the quality of the human environment. 4/

Historical and Archeological Resources

MPC consulted with the Montana State Historic Preservation Officer, who reported that the project would have no known effect on any recognized or potential National Register historical, archeological, or cultural sites. Article 39 has, however, been included in the license to provide procedures for protecting any such sites that may be discovered at the project. The licensee will be required to consult with the State Historic Preservation Officer prior to any construction at the project and shall also provide funds in a reasonable amount for any surveys or mitigative measures that may be necessary.

Term of License

The original license for the project expired December 31, 1975. MPC has requested that a new license be issued for a term of fifty years. MPC's proposed modification of project

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4/ The Montana Department of Health and Environmental Sciences has issued a water quality certificate for the project in accordance with the provision of §401 of the Federal Water Pollution Control Act.

works, involving the installation of taintor gates and the replacement of existing flashboards with drop panels, is a significant modification of the project. It does not, however, constitute the kind of extensive redevelopment of a project that would warrant the Commission's issuing a new license for a full fifty year period. In accord with the Commission policy as stated in The Montana Power Company, Project No. 2301, "Order Issuing New License (Major)" (October 5, 1976), MPC's proposed modification of project works constitute substantial new construction for which a forty year license period is appropriate.

It is ordered that:

(A) This license is issued to The Montana Power Company (Licensee) of Butte, Montana, under Part I of the Federal Power Act (Act), for a period effective the first day of the month in which this order is issued and terminating December 31, 2015, for the continued operation and maintenance of the Thompson Falls Project, FERC No. 1869, located on the Clark Fork River in Sanders County, Montana. This license is subject to the terms and conditions of the Act, which is incorporated by reference as part of this license, and subject to the regulations the Commission issues under the provisions of the Act.

(B) The project consists of:

(1) all lands to the extent of the Licensee's interest in those lands, constituting the project area and enclosed by the project boundary. The project area and boundary being shown and described by certain exhibits which form part of the application for license and are designated and described as:

| EXHIBIT | FERC DRAWING NO. 1869- | TITLED |
|---|---|---|
| J-1 | 26 | Gen. Map of Project Area |
| K-1 of 3 | 31 | Detail Map of Project Area |
| K-2 of 3 | 32 | " " " " |
| K-3 of 3 | 33 | " " " " |

(2) project works consisting of (a) a main dam, a concrete gravity structure about 1,016 feet long and 54 feet high with an overflow section about 913 feet

long, surmounted by 16-foot-high flashboards; (b) a smaller dam of the same type about 449 feet long and 45 feet high with an overflow section about 289 feet long surmounted by 12-foot-high flashboards, and located west of the main dam in a dry channel of the river; (c) a reservoir extending 12 miles upstream having a usable storage capacity of 15,000 acre-feet at a drawdown of 16 feet below normal full pond elevation 2396.0 feet U.S.G.S.; (d) a rock cut canal about 450 feet long and 80 feet wide; (e) six main steel penstocks 6.67 feet in diameter; (f) a steel frame and masonry powerhouse containing six generating units, each rated at 5,000 kW; (g) nine transformers; (h) 6.6-kV generator leads; and (i) appurtenant facilities.

The location, nature, and character of these project works are generally shown and described by the exhibits cited above and more specifically shown and described by certain other exhibits which also form a part of the application for license and which are designated and described as:

| EXHIBIT | FERC DRAWING NO. 1869 - | TITLED |
|---|---|---|
| L-1 of 6 | 18 | Main dam plan and elevations |
| L-2 of 6 | 19 | Main dam section and details |
| L-3 of 6 | 20 | Details of proposed taintor gates and drops panels |
| L-4 of 6 | 21 | Dry channel dam plan and elevations |
| L-5 of 6 | 22 | Forebay and intake plan and elevations |
| L-6 of 6 | 23 | Powerhouse plan and elevations |

Exhibit M: Consisting of two (2) pages entitled "General Description of Equipment" filed on January 20, 1972.

Exhibit R: Filed January 20, 1972 and as supplemented on June 30, July 20, and November 16, 1972 and superseded on November 19, 1973, consisting of 6 pages of text and the Exhibit R (amended) map, FERC No. 1869-30.

Exhibit S: Filed January 20, 1972 and as supplemented on June 30, July 20, and November 16, 1972 and superseded on November 19, 1973, consisting of 5 pages of text titled, "Report on Effect of Project on Fish and Wildlife Resources".

(C) Exhibits J, K, L, M, R and S designated and described in ordering paragraph (B), are approved and made part of the license.

(D) This license is also subject to Articles 1 through 37 set forth in FERC Form L-5 (revised October, 1975) entitled, "Terms and Conditions of License for Constructed Major Project Affecting Navigable Waters and Lands of the United States", attached to and made a part of the license. This license is also subject to the following special conditions set forth as additional articles:

Article 38: Licensee shall, in consultation with Montana Department of Fish and Game, U.S. Forest Service, U.S. Fish and Wildlife Service, and any other appropriate state and local agencies, take such actions found necessary for the protection and enhancement of the natural resources and values of the project. The Commission reserves the right to require any changes in the project works or operations that may be necessary to protect and enhance those resources and values.

Article 39: Prior to the commencement of any construction or development of any project works or other facilities at the project, the Licensee shall consult and cooperate with the State Historic Preservation Officer (SHPO) to determine the need for, and extent of, any archeological or historic resource surveys and any mitigative measures that may be necessary. The Licensee shall provide funds in a reasonable amount for such activity. If any previously unrecorded archeological or historic sites are discovered during the course of construction, construction activity in the vicinity shall be halted, a qualified archeologist shall be consulted to determine the significance of the sites, and the Licensee shall consult with the SHPO to develop a mitigation plan for the protection of significant archeological or historic resources. If the Licensee and the SHPO cannot agree on the amount of money to be expended on archeological or historic work related to the project, the Commission reserves the right to require the Licensee to conduct, at its own expense, any such work found necessary.

Article 40: In the interests of protecting and enhancing the scenic, recreational, and other environmental values of the project, Licensee: (1) shall supervise and control the use and occupancy of project lands and waters; (2) shall prohibit, without further Commission approval, the further use and occupancy of project lands and waters other than as specifically authorized by this license; (3) may authorize, without further Commission approval, the use and occupancy of project lands and waters for landscape plantings and the construction, operation, and maintenance of access roads, power and telephone distribution lines, piers, landings, boat docks, or similar structures and facilities, and embankments, bulkheads, retaining walls, or other similar structures for erosion control to protect the existing shoreline; (4) shall require, where feasible and desirable, the multiple use and occupancy of facilities for access to project lands and waters; and (5) shall ensure to the satisfaction of the Commission's authorized representative that all authorized uses and occupancies of project lands and waters: (a) are consistent with shoreline aesthetic values, (b) are maintained in a good state of repair, and (c) comply with State and local health and safety regulations. Under item (3) of this article, Licensee may, among other things, institute a program for issuing permits to a reasonable extent for the authorized types of use and occupancy of project lands and waters. Under appropriate circumstances, permits may be subject to the payment of a fee in a reasonable amount. Before authorizing the construction of bulkheads or retaining walls, the Licensee shall: (a) inspect the site of the proposed construction, (b) consider whether the planting of vegetation or the use of riprap would be adequate to control erosion at the site, and (c) determine that the proposed construction is needed. If an authorized use or occupancy fails to comply with the conditions of this article or with any reasonable conditions imposed by the Licensee for the protection of the environmental quality of project lands and waters, the Licensee shall take appropriate action to correct the violations, including, if necessary, cancellation of the authorization and removal of any non-complying structures or facilities. The Licensee's consent to an authorized use or occupancy of project lands and waters shall not, without its express agreement, place upon the Licensee any obligation to construct or maintain any associated facilities. Within one year from the date of issuance of this order, Licensee shall furnish a copy of its guidelines and procedures used to implement the provisions of this article to the Commission's authorized representative and its Director, Office of Electric Power Regulation. Whenever the Licensee makes any modification to these guidelines and procedures, it shall promptly furnish a copy to each of those persons. The Commission reserves the right to require modifications to these guidelines and procedures.

Article 41: Licensee shall implement, and modify when appropriate, the emergency action plan on file with the Commission designed to provide an early warning to upstream and downstream inhabitants and property owners if there should be an impending or actual sudden release of water caused by an accident to, or failure of, project works. That plan shall include: instructions to be provided on a continuing basis to operators and attendants for actions they are to take in the event of an emergency; detailed and documented plans for notifying law enforcement agents, appropriate Federal, State, and local agencies, operators of water-related facilities, and those residents and owners of properties that could be endangered; actions that would be taken to reduce the inflow to the reservoir, if possible, by limiting the outflow from upstream dams or control structures; and actions to reduce downstream flows by controlling the outflow from dams located on tributaries to the stream on which the project is located. Licensee shall also maintain on file with the Commission a summary of the study used as a basis for determining the areas that may be affected by an emergency, including criteria and assumptions used. Licensee shall monitor any changes in upstream or downstream conditions which may influence possible flows or affect areas susceptible to damage, and shall promptly make and file with the Commission appropriate changes in the emergency action plan. The Commission reserves the right to require modifications to the plan.

Article 42: The Licensee shall, to the satisfaction of the Commission's authorized representative, install and operate any signs, lights, sirens, barriers, or other safety devices that may reasonably be needed to warn the public of fluctuations in flow from the project and protect the public in its recreational use of project lands and waters.

Article 43: The Licensee shall pay the United States the following annual charge, effective the first day of the month in which this license is issued:

(i) For the purpose of reimbursing the United States for the cost of administration of Part I of the Act, a reasonable annual charge as determined by the Commission in accordance with the provisions of its regulations in effect from time to time. The authorized installed capacity for that purpose is 40,000 horsepower.

(ii) For the purpose of recompensing the United States for the use, occupancy, and enjoyment of 103.78 acres of its land, an amount determined pursuant to the Commission's regulations in effect from time to time.

Article 44: Pursuant to Section 10(d) of the Act, the rate as computed below shall be the specified rate of return on the net investment in the project for determining surplus earnings of the project for the establishment and maintenance of amortization reserves. One-half of the project surplus earnings, if any, accumulated under the license, in excess of the specified rate of return per annum on the net investment, shall be set aside in a project amortization reserve account as of the end of each fiscal year: Provided, that, if and to the extent that there is a deficiency of project earnings below the specified rate of return per annum for any fiscal year under the license, the amount of such deficiency shall be deducted from the amount of any surplus earnings accumulated thereafter until absorbed, and one-half of the remaining surplus earnings, if any, thus cumulatively computed, shall be set aside in the project amortization reserve account; and the amounts thus established in the project amortization reserve account shall be maintained until further order of the Commission.

The annual specified reasonable rate of return shall be the sum of the weighted cost components of long-term debt, preferred stock, and the cost of common equity, as defined herein. The weighted cost component for each element of the reasonable rate of return is the product of its capital ratios and cost rate. The current capital ratios for each of the above elements of the rate of return shall be calculated annually based on an average of 13 monthly balances of amounts properly includable in the Licensee's long-term debt and proprietary capital accounts as listed in the Commission's Uniform System of Accounts. The cost rates 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).

Article 45: The Licensee shall, within six months from the date of issuance of the license, prepare and file with the Commission a feasibility analysis of installing additional generating capacity at the Thompson Falls Project, taking into account, to the extent reasonable, all benefits that would be derived from the installation, including any contribution to the conservation of non-renewable natural resources. If the study shows additional capacity to be economically feasible, the Licensee shall simultaneously file a schedule for filing an application to amend its license to install that capacity.

(E) This order is final unless a petition appealing it to the Commission is filed within 30 days from the date of its issuance, as provided in §1.7(d) of the Commission's regulations, 18 CFR 1.7(d) [as amended in Docket No. RM78-19 (August 14, 1978) and Docket No. RM79-59 (July 23, 1979)]. The filing of a petition appealing this order to the Commission or an application for rehearing as provided in Section 313(a) of the Act does not operate as a stay of the effective date of this license or of any other date specified in this order, except as specifically ordered by the Commission. Failure of the Licensee to file a petition appealing this order to the Commission shall constitute acceptance of this license. In acknowledgment of acceptance of this license, the license shall be signed for the Licensee and returned to the Commission within 60 days from the date of issuance of this order.

(S E A L)

William W. Lindsay
Director, Office of
Electric Power Regulation

Form L-5
(Revised October, 1975)

FEDERAL ENERGY REGULATORY COMMISSION

# TERMS AND CONDITIONS OF LICENSE FOR CONSTRUCTED MAJOR PROJECT AFFECTING NAVIGABLE WATERS AND LANDS OF THE UNITED STATES

Article 1. The entire project, as described in this order of the Commission, shall be subject to all of the provisions, terms, and conditions of the license.

Article 2. No substantial change shall be made in the maps, plans, specifications, and statements described and designated as exhibits and approved by the Commission in its order as a part of the license until such change shall have been approved by the Commission: Provided, however, That if the Licensee or the Commission deems it necessary or desirable that said approved exhibits, or any of them, be changed, there shall be submitted to the Commission for approval a revised, or additional exhibit or exhibits covering the proposed changes which, upon approval by the Commission, shall become a part of the license and shall supersede, in whole or in part, such exhibit or exhibits theretofore made a part of the license as may be specified by the Commission.

Article 3. The project area and project works shall be in substantial conformity with the approved exhibits referred to in Article 2 herein or as changed in accordance with the provisions of said article. Except when emergency shall require for the protection of navigation, life, health, or property, there shall not be made without prior approval of the Commission any substantial alteration or addition not in conformity with the approved plans to any dam or other project works under the license or any substantial use of project lands and waters not authorized herein; and any emergency alteration, addition, or use so made shall thereafter be subject to such modification and change as the Commission may direct. Minor changes in project works, or in uses of project lands and waters, or divergence from such approved exhibits may be made if such changes will not result in a decrease in efficiency, in a material increase in cost, in an adverse environmental impact, or in impairment of the general scheme of development; but any of such minor changes made without the prior approval of the Commission, which in its judgment have produced or will produce any of such results, shall be subject to such alteration as the Commission may direct.

Article 4. The project, including its operation and maintenance and any work incidental to additions or alterations authorized by the Commission, whether or not conducted upon lands of the United States, shall be subject to the inspection and supervision of the Regional Engineer, Federal Power Commission, in the region wherein the project is located, or of such other officer or agent as the Commission may designate, who shall be the authorized representative of the Commission for such purposes. The Licensee shall cooperate fully with said representative and shall furnish him such information as he may require concerning the operation and maintenance of the project, and any such alterations thereto, and shall notify him of the date upon which work with respect to any alteration will begin, as far in advance thereof as said representative may reasonably specify, and shall notify him promptly in writing of any suspension of work for a period of more than one week, and of its resumption and completion. The Licensee shall submit to said representative a detailed program of inspection by the Licensee that will provide for an adequate and qualified inspection force for construction of any such alterations to the project. Construction of said alterations or any feature thereof shall not be initiated until the program of inspection for the alterations or any feature thereof has been approved by said representative. The Licensee shall allow said representative and other officers or employees of the United States, showing proper credentials, free and unrestricted access to, through, and across the project lands and project works in the performance of their official duties. The Licensee shall comply with such rules and regulations of general or special applicability as the Commission may prescribe from time to time for the protection of life, health, or property.

Article 5. The Licensee, within five years from the date of issuance of the license, shall acquire title in fee or the right to use in perpetuity all lands, other than lands of the United States, necessary or appropriate for the construction, maintenance, and operation of the project. The Licensee or its successors and assigns shall, during the period of the license, retain the possession of all project property covered by the license as issued or as later amended, including the project area, the project works, and all franchises, easements, water rights, and rights of occupancy and use; and none of such properties shall be voluntarily sold, leased, transferred, abandoned, or otherwise disposed of without the prior written approval of the Commission, except that the Licensee may lease or otherwise dispose of interests in project lands or property without specific written approval of the Commission pursuant to the then current regulations of the Commission. The provisions of this article are not intended to prevent the abandonment or the retirement from service of structures, equipment, or other project works in connection with replacements thereof when they become obsolete, inadequate, or inefficient for further service due to wear and tear; and mortgage or trust deeds or judicial sales made thereunder, or tax sales, shall not be deemed voluntary transfers within the meaning of this article.

Article 6. In the event the project is taken over by the United States upon the termination of the license as provided in Section 14 of the Federal Power Act, or is transferred to a new licensee or to a non-power licensee under the provisions of Section 15 of said Act, the Licensee, its successors and assigns shall be responsible for, and shall make good any defect of title to, or of right of occupancy and use in, any of such project property that is necessary or appropriate or valuable and serviceable in the maintenance and operation of the project, and shall pay and discharge, or shall assume responsibility for payment and discharge of, all liens or encumbrances upon the project or project property created by the Licensee or created or incurred after the issuance of the license: Provided, That the provisions of this article are not intended to require the Licensee, for the purpose of transferring the project to the United States or to a new licensee, to acquire any different title to, or right of occupancy and use in, any of such project property than was necessary to acquire for its own purposes as the Licensee.

Article 7. The actual legitimate original cost of the project, and of any addition thereto or betterment thereof, shall be determined by the Commission in accordance with the Federal Power Act and the Commission's Rules and Regulations thereunder.

Article 8. The Licensee shall install and thereafter maintain gages and stream-gaging stations for the purpose of determining the stage and flow of the stream or streams on which the project is located, the amount of water held in and withdrawn from storage, and the effective head on the turbines; shall provide for the required reading of such gages and for the adequate rating of such stations; and shall install and maintain standard meters adequate for the determination of the amount of electric energy generated by the project works. The number, character, and location of gages, meters, or other measuring devices, and the method of operation thereof, shall at all times be satisfactory to the Commission or its authorized representative. The Commission reserves the right, after notice and opportunity for hearing, to require such alterations in the number, character, and location of gages, meters, or other measuring devices, and the method of operation thereof, as are necessary to secure adequate determinations. The installation of gages, the rating of said stream or streams, and the determination of the flow thereof, shall be under the supervision of, or in cooperation with, the District Engineer of the United States Geological Survey having charge of stream-gaging operations in the region of the project, and the Licensee shall advance to the United States Geological Survey the amount of funds estimated to be necessary for such supervision, or cooperation for such periods as may be mutually agreed upon. The Licensee shall keep accurate and sufficient records of the foregoing determinations to the satisfaction of the Commission, and shall make return of such records annually at such time and in such form as the Commission may prescribe.

Article 9. The Licensee shall, after notice and opportunity for hearing, install additional capacity or make other changes in the project as directed by the Commission, to the extent that it is economically sound and in the public interest to do so.

Article 10. The Licensee shall, after notice and opportunity for hearing, coordinate the operation of the project, electrically and hydraulically, with such other projects or power systems and in such manner as the Commission may direct in the interest of power and other beneficial public uses of water resources, and on such conditions concerning the equitable sharing of benefits by the Licensee as the Commission may order.

Article 11. Whenever the Licensee is directly benefited by the construction work of another licensee, a permittee, or the United States on a storage reservoir or other headwater improvement, the Licensee shall reimburse the owner of the headwater improvement for such part of the annual charges for interest, maintenance, and depreciation thereof as the Commission shall determine to be equitable, and shall pay to the United States the cost of making such determination as fixed by the Commission. For benefits provided by a storage reservoir or other headwater improvement of the United States, the Licensee shall pay to the Commission the amounts for which it is billed from time to time for such headwater benefits and for the cost of making the determinations pursuant to the then current regulations of the Commission under the Federal Power Act.

Article 12. The United States specifically retains and safeguards the right to use water in such amount, to be determined by the Secretary of the Army, as may be necessary for the purposes of navigation on the navigable waterway affected; and the operations of the Licensee, so far as they affect the use, storage and discharge from storage of waters affected by the license, shall at all times be controlled by such reasonable rules and regulations as the Secretary of the Army may prescribe in the interest of navigation, and as the Commission may prescribe for the protection of life, health, and property, and in the interest of the fullest practicable conservation and utilization of such waters for power purposes and for other beneficial public uses, including recreational purposes, and the Licensee shall release water from the project reservoir at such rate in cubic feet per second, or such volume in acre-feet per specified period of time, as the Secretary of the Army may prescribe in the interest of navigation, or as the Commission may prescribe for the other purposes hereinbefore mentioned.

Article 13. On the application of any person, association, corporation, Federal agency, State or municipality, the Licensee shall permit such reasonable use of its reservoir or other project properties, including works, lands and water rights, or parts thereof, as may be ordered by the Commission, after notice and opportunity for hearing, in the interests of comprehensive development of the waterway or waterways involved and the conservation and utilization of the water resources of the region for water supply or for the purposes of steam-electric, irrigation, industrial, municipal or similar uses. The Licensee shall receive reasonable compensation for use of its reservoir or other project properties or parts thereof for such purposes, to include at least full reimbursement for any damages or expenses which the joint use causes the Licensee to incur. Any such compensation shall be fixed by the Commission either by approval of an agreement between the Licensee and the party or parties benefiting or after notice and opportunity for hearing. Applications shall contain information in sufficient detail to afford a full understanding of the proposed use, including satisfactory evidence that the applicant possesses necessary water rights pursuant to applicable State law, or a showing of cause why such evidence cannot concurrently be submitted, and a statement as to the relationship of the proposed use to any State or municipal plans or orders which may have been adopted with respect to the use of such waters.

Article 14. In the construction or maintenance of the project works, the Licensee shall place and maintain suitable structures and devices to reduce to a reasonable degree the liability of contact between its transmission lines and telegraph, telephone and other signal wires or power transmission lines constructed prior to its transmission lines and not owned by the Licensee, and shall also place and maintain suitable structures and devices to reduce to a reasonable degree the liability of any structures or wires falling or obstructing traffic or endangering life. None of the provisions of this article are intended to relieve the Licensee from any responsibility or requirement which may be imposed by any other lawful authority for avoiding or eliminating inductive interference.

Article 15. The Licensee shall, for the conservation and development of fish and wildlife resources, construct, maintain, and operate, or arrange for the construction, maintenance, and operation of such reasonable facilities, and comply with such reasonable modifications of the project structures and operation, as may be ordered by the Commission upon its own motion or upon the recommendation of the Secretary of the Interior or the fish and wildlife agency or agencies of any State in which the project or a part thereof is located, after notice and opportunity for hearing.

Article 16. Whenever the United States shall desire, in connection with the project, to construct fish and wildlife facilities or to improve the existing fish and wildlife facilities at its own expense, the Licensee shall permit the United States or its designated agency to use, free of cost, such of the Licensee's lands and interests in lands, reservoirs, waterways and project works as may be reasonably required to complete such facilities or such improvements thereof. In addition, after notice and opportunity for hearing, the Licensee shall modify the project operation as may be reasonably prescribed by the Commission in order to permit the maintenance and operation of the fish and wildlife facilities constructed or improved by the United States under the provisions of this article. This article shall not be interpreted to place any obligation on the United States to construct or improve fish and wildlife facilities or to relieve the Licensee of any obligation under this license.

Article 17. The Licensee shall construct, maintain, and operate, or shall arrange for the construction, maintenance, and operation of such reasonable recreational facilities, including modifications thereto, such as access roads, wharves, launching ramps, beaches, picnic and camping areas, sanitary facilities, and utilities, giving consideration to the needs of the physically handicapped, and shall comply with such reasonable modifications of the project, as may be prescribed hereafter by the Commission during the term of this license upon its own motion or upon the recommendation of the Secretary of the Interior or other interested Federal or State agencies, after notice and opportunity for hearing.

Article 18. So far as is consistent with proper operation of the project, the Licensee shall allow the public free access, to a reasonable extent, to project waters and adjacent project lands owned by the Licensee for the purpose of full public utilization of such lands and waters for navigation and for outdoor recreational purposes, including fishing and hunting: Provided, That the Licensee may reserve from public access such portions of the project waters, adjacent lands, and project facilities as may be necessary for the protection of life, health, and property.

Article 19. In the construction, maintenance, or operation of the project, the Licensee shall be responsible for, and shall take reasonable measures to prevent, soil erosion on lands adjacent to streams or other waters, stream sedimentation, and any form of water or air pollution. The Commission, upon request or upon its own motion, may order the Licensee to take such measures as the Commission finds to be necessary for these purposes, after notice and opportunity for hearing.

Article 20. The Licensee shall clear and keep clear to an adequate width lands along open conduits and shall dispose of all temporary structures, unused timber, brush, refuse, or other material unnecessary for the purposes of the project which results from the clearing of lands or from the maintenance or alteration of the project works. In addition, all trees along the periphery of project reservoirs which may die during operations of the project shall be removed. All clearing of the lands and disposal of the unnecessary material shall be done with due diligence and to the satisfaction of the authorized representative of the Commission and in accordance with appropriate Federal, State, and local statutes and regulations.

Article 21. Material may be dredged or excavated from, or placed as fill in, project lands and/or waters only in the prosecution of work specifically authorized under the license; in the maintenance of the project; or after obtaining Commission approval, as appropriate. Any such material shall be removed and/or deposited in such manner as to reasonably preserve the environmental values of the project and so as not to interfere with traffic on land or water. Dredging and filling in a navigable water of the United States shall also be done to the satisfaction of the District Engineer, Department of the Army, in charge of the locality.

Article 22. Whenever the United States shall desire to construct, complete, or improve navigation facilities in connection with the project, the Licensee shall convey to the United States, free of cost, such of its lands and rights-of-way and such rights of passage through its dams or other structures, and shall permit such control of its pools, as may be required to complete and maintain such navigation facilities.

Article 23. The operation of any navigation facilities which may be constructed as a part of, or in connection with, any dam or diversion structure constituting a part of the project works shall at all times be controlled by such reasonable rules and regulations in the interest of navigation, including control of the level of the pool caused by such dam or diversion structure, as may be made from time to time by the Secretary of the Army.

<u>Article 24</u>. The Licensee shall furnish power free of cost to the United States for the operation and maintenance of navigation facilities in the vicinity of the project at the voltage and frequency required by such facilities and at a point adjacent thereto, whether said facilities are constructed by the Licensee or by the United States.

<u>Article 25</u>. The Licensee shall construct, maintain, and operate at its own expense such lights and other signals for the protection of navigation as may be directed by the Secretary of the Department in which the Coast Guard is operating.

<u>Article 26</u>. Timber on lands of the United States cut, used, or destroyed in the construction and maintenance of the project works, or in the clearing of said lands, shall be paid for, and the resulting slash and debris disposed of, in accordance with the requirements of the agency of the United States having jurisdiction over said lands. Payment for merchantable timber shall be at current stumpage rates, and payment for young growth timber below merchantable size shall be at current damage appraisal values. However, the agency of the United States having jurisdiction may sell or dispose of the merchantable timber to others than the Licensee: <u>Provided</u>, That timber so sold or disposed of shall be cut and removed from the area prior to, or without undue interference with, clearing operations of the Licensee and in coordination with the Licensee's project construction schedules. Such sale or disposal to others shall not relieve the Licensee of responsibility for the clearing and disposal of all slash and debris from project lands.

<u>Article 27</u>. The Licensee shall do everything reasonably within its power, and shall require its employees, contractors, and employees of contractors to do everything reasonably within their power, both independently and upon the request of officers of the agency concerned, to prevent, to make advance preparations for suppression of, and to suppress fires on the lands to be occupied or used under the license. The Licensee shall be liable for and shall pay the costs incurred by the United States in suppressing fires caused from the construction, operation, or maintenance of the project works or of the works appurtenant or accessory thereto under the license.

Article 28. The Licensee shall interpose no objection to, and shall in no way prevent, the use by the agency of the United States having jurisdiction over the lands of the United States affected, or by persons or corporations occupying lands of the United States under permit, of water for fire suppression from any stream, conduit, or body of water, natural or artificial, used by the Licensee in the operation of the project works covered by the license, or the use by said parties of water for sanitary and domestic purposes from any stream, conduit, or body of water, natural or artificial, used by the Licensee in the operation of the project works covered by the license.

Article 29. The Licensee shall be liable for injury to, or destruction of, any buildings, bridges, roads, trails, lands, or other property of the United States, occasioned by the construction, maintenance, or operation of the project works or of the works appurtenant or accessory thereto under the license. Arrangements to meet such liability, either by compensation for such injury or destruction, or by reconstruction or repair of damaged property, or otherwise, shall be made with the appropriate department or agency of the United States.

Article 30. The Licensee shall allow any agency of the United States, without charge, to construct or permit to be constructed on, through, and across those project lands which are lands of the United States such conduits, chutes, ditches, railroads, roads, trails, telephone and power lines, and other routes or means of transportation and communication as are not inconsistent with the enjoyment of said lands by the Licensee for the purposes of the license. This license shall not be construed as conferring upon the Licensee any right of use, occupancy, or enjoyment of the lands of the United States other than for the construction, operation, and maintenance of the project as stated in the license.

Article 31. In the construction and maintenance of the project, the location and standards of roads and trails on lands of the United States and other uses of lands of the United States, including the location and condition of quarries, borrow pits, and spoil disposal areas, shall be subject to the approval of the department or agency of the United States having supervision over the lands involved.

# Appendix C – Referenced FERC Approvals and Orders Amending License

**Contents**

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5: FERC ¶ 62,089

UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

Montana Power Company | Project No. 1869-003
Montana

ORDER AMENDING LICENSE
(MAJOR)
(April 30, 1990)

The Montana Power Company, (licensee) has filed an application under Part I of the Federal Power Act (Act) to amend its license for the Thompson Falls Project. The licensed project is located on the Clark Fork River, in Sanders County, Montana.

The licensee proposes to amend the project by constructing an intake canal, a new powerhouse containing a 50-MW generating unit, a tailrace, an access road, a bridge, and miscellaneous appurtenant facilities. A more detailed project description is contained in ordering paragraph (B).

Notice of the application has been published. No protests were filed. A motion to intervene was filed jointly by the Montana Department of Natural Resources and Conservation (DNRC) and the Montana Department of Fish, Wildlife and Parks (DFWP). On April 4, 1990, DNRC filed recommendations that address their concerns raised in the Motion to Intervene. One recommendation was to hold a hearing to discuss issues of need, economics and alternatives for the project. The need and alternatives are addressed in the resource development section of this order and the economics is addressed in the attached Safety and Design Assessment (S&DA) for this project. These issues are fully evaluated and there is no need for a hearing. The other concerns raised in the intervention are discussed below.

Resource Development 1/

Need For Power

Based on the Northwest Power Planning Council's (Council) area needs and on MPC's internal power needs, MPC will need new resources to meet both projected energy and capacity needs in the early to mid-1990's.

1/ The resource development section supersedes the sections on need for power, project purpose, and alternatives in the Environmental Assessment attached to this order, dated November 30, 1984.



The Council area is entering a period when it needs more resources. The 1988 Supplement to the Council's 1986 Power Plan shows that power resource deficits in the Council area could occur any time from the early to the late 1990's.

The Pacific Northwest Utilities Conference Committee (PNUCC) forecasts that (1) under medium load conditions the Council area surplus will not exist by 1993 and that (2) the Council area surplus may not last until 1991.

The Bonneville Power Administration (BPA) says that the power resource surplus on the federal system in the Council area is nonexistent and that under medium load conditions, the federal system is in resource balance.

MPC's internal least-cost power resource expansion plans show the need for additional power resources as early as 1991; MPC's resource development options show the Thompson Falls expansion in service by 1996.

The Thompson Falls expansion would allow MPC to operate the Thompson Falls Project as a load-following or a peaking facility and to operate MPC system thermal units at increased thermal efficiency levels. Improved efficiency of operation would conserve fossil fuels and reduce the emission of pollutants into the atmosphere.

Purpose

The amended project would provide an estimated additional 197.3 gigawatthours (GWh) of power annually with an installed capacity of 50 megawatts (MW). The dependable capacity of the project would increase by 18 MW. Project power would be used to meet projected increased power demands for Montana Power Company (MPC).

Alternatives

The alternative to the proposed action is denial of the amendment of license.

If the Commission denies the amendment, MPC would need to provide capacity and energy equal to what the amendment to the Thompson Falls Project would have provided. In looking at possible alternative sources of capacity and energy, MPC considered (1) purchases and exchanges with other utilities in the Pacific Northwest, and (2) developing more of its own generation.

Because the Northwest is moving into a period of need for more resources, MPC says the availability and assumed prices for purchases and exchanges with other power producers in the

Northwest is questionable and future purchases and exchanges aren't reasonable alternatives.

As for developing more of its own generation, MPC reviewed a wide assortment of alternative technologies and found them to be (1) either less cost effective, (2) less acceptable environmentally, or (3) commercially unavailable, and therefore unacceptable as alternatives.

MPC concludes that increased generation from existing and planned thermal generation would be the most reasonable alternative to the amendment. MPC finds the increased thermal generation to be less cost effective and more environmentally damaging than the project expansion. We agree with MPC's findings.

Environmental Issues

On November 30, 1984, our staff issued the attached environmental assessment (EA) of MPC's application to amend its license. By letter dated January 5, 1990, MPC filed a substantial amount of supplemental information. The following discussions supplement certain sections of the environmental analysis prepared in 1984 as indicated below. The sections of the 1984 EA addressing Water Resourecs, Fishery Resources, and Terrestrial Resources were not supplemented. Therefore, those sections are not supplemented here.

Geology and Soils

a. Erosion, Sedimentation, and Slope Stability

Land-disturbing construction activities would cause localized erosion and sedimentation and would generate spoil materials consisting of rock and soils. Additional reservoir surface fluctuations, up to 4 feet daily, would contribute to increased reservoir shoreline erosion in areas with sandy soils that are highly erodible--land facet sandy variant 10(1).

General erosion control measures, including cofferdams, riprap, temporary ditches, and sediment ponds, are proposed by MPC, which are appropriate control measures for this site. Details regarding the specific types and locations of control measures are needed, however, to ensure appropriate implementation of the erosion control plan. Article 401 approves the erosion control plan filed by letter dated January 5, 1990, with a requirement to expand the plan to provide the specific types and locations of control measures including details on rock slope reinforcement, drainage along the access road, sediment ponds, and riprap to protect developed or agricultural land on land facet sandy variant 10(1) from shoreline erosion.



b. Revegetation of Disturbed Areas and Spoil Disposal Areas

Soils disturbed by construction, fill slopes, and spoil disposal areas, unless stabilized with vegetation, would be subject to long-term erosion. MPC filed a plan to revegetate spoil disposal areas only, including contouring the spoil material, covering it with a geotextile fabric, topsoiling, and revegetating with native vegetation, which are appropriate measures. This plan, however, does not include other soil areas that would be disturbed by construction activities.

In a letter dated December 29, 1989, DNRC states the following: (1) some portions of the spoil disposal area have such a steep grade, steeper than 56 degrees from the horizontal, that erosion would occur; (2) using heavy grading equipment would cause excessive soil compaction; (3) the grass seed mixture should contain more than one species to increase survival and vigor; and (4) the plan should address what type of measurement would be used to monitor plant growth and what criteria would be used to identify success on areas that require additional reclamation measures.

Article 402 approves the revegetation plan for spoil disposal areas filed by letter dated January 5, 1990, with a requirement to expand the plan to include other areas of soils disturbed by construction activities and fill slopes, to require mulching to stabilize soils while vegetation is becoming established, and to address the concerns of DNRC.

Visual Resources

The proposed construction and presence of the new facilities would adversely affect the visual resources of the project area by introducing contrasting forms, colors, and textures. In a filing by letter dated January 5, 1990, MPC described measures to mitigate the effects of the proposed construction on visual resources. These measures include the following: (1) building the new powerhouse as a low-profile, semi-outdoor structure; (2) making the exterior surface of the powerhouse a flat-formed, grey concrete; (3) revegetating the spoil disposal area on the island to blend with the proposed island park; (4) submerging the tailrace; and (5) using a dark, galvanized finish on the gate hoist stacks and crane. This plan would substantially reduce the contrast of the new facilities with the surrounding landscape, thereby mitigating adverse effects on visual resources.

Article 403 approves MPC's visual resources mitigative plan and adds one requirement. To reduce the contrast with the the surrounding landscape, MPC must use nonreflective conductors, insulators, and supporting structures on the new, 200-foot-long transmission line extending from the new powerhouse to the roof of the existing powerhouse.

Recreation and Other Land and Water Uses

a. Island Park Development

Limited access to the project reservoir restricts recreational opportunities in the project area.

To enhance recreational opportunities, MPC proposes to construct a park on the island between the main dam and the dry channel dam. The park would have interpretive displays, picnicking facilities, restrooms, garbage receptacles, and a trail system to accommodate the handicapped. The existing bridge on the north side of the island would provide pedestrian and bicycle access to the park. Public parking would be provided at a museum and county parking lot approximately 2 blocks northeast of the bridge. Constructing these facilities would provide needed recreational access to the project reservoir and therefore would enhance recreational opportunities. Article 404 approves MPC's proposed island park development.

b. South Shore Day-Use Development

To further enhance recreational access, MPC proposes to construct day-use facilities on the south shore of the Clark Fork River, below the dam, next to the county's abandoned High Bridge. MPC would construct a parking area, interpretive-informational signs, restroom facilities, and garbage facilities. MPC is pursuing an agreement with the Forest Service to manage the south shore lands. Providing these day-use facilities would enhance access to the Clark Fork River from the south shore. Article 405 requires MPC to construct, operate, and maintain, or arrange for the construction, operation, and maintenance of the above facilities.

c. Monitoring of Project-induced Recreational Use

The island park and south shore development, in addition to other recreational development in the project area proposed by other agencies, may attract additional recreationists to the project site, thus creating a demand for more recreational facilities.

MPC, the city of Thompson Falls, the Lions Club, the Wild Goose Landing Park Committee, the Montana Department of Fish, Wildlife, and Parks (DFWP), the Montana Department of Highways, and the Sanders County Economic Development Corporation are studying ways to provide more recreational opportunities. The city of Thompson Falls is considering substantially improving the existing Lions Club boat launch area on the reservoir by



providing day-use facilities in cooperation with these agencies and groups. These agencies and groups have made no final plans for the development. The Sanders County Economic Development Corporation recommends that MPC become involved in the development of these facilities or improvements.

The relatively low level of use at the project doesn't now support the need to require MPC to provide facilities in addition to those proposed for the island park and the south shore, but in time these facilities may attract additional use.

Article 406 requires MPC, after consultation with the appropriate agencies, to monitor recreational use over the first 5 years after completing the island park facilities and to file (1) monitoring results and (2) for Commission approval a plan, prepared in consultation with the agencies, for providing additional recreational improvements or developments to accommodate project-induced use.

d. Effects of Peaking Operation on Recreation

Operating the amended project could cause daily fluctuations of up to 4 feet in the reservoir and 8.4 feet immediately downstream of the tailrace, adversely affecting water-based recreational use. Exposed mud flats from drawdown of the reservoir would hinder boat access to the reservoir at the proposed Wild Goose Landing Park. In addition, exposed sandbars may create a hazard for motorboaters and waterskiers. Further, project-induced downstream water level fluctuations would adversely affect Washington Water Power's (WWP) Flat Iron Ridge Fishing Access Site's boat ramp, which is about 3.6 miles downstream from the Thompson Falls dam, on Noxon reservoir (Noxon Rapids Project, FERC Project No. 2075).

To mitigate impacts to the project reservoir, MPC proposes these measures: (1) to consult with the Wild Goose Landing Park Committee during the planning and construction process to make sure that the proposed Wild Goose Landing Park's boat ramp would be long enough to accommodate boats when the reservoir is drawn down 4 feet; (2) to design and install a floating dock at Wild Goose Landing Park for boaters and swimmers to continue using; and (3) to install interpretive-information signs, placed at recreational-use areas above and below the dam, explaining the hazards associated with the project's water-level fluctuations.

In the April 4, 1990, filing DNRC recommends that MPC post warning signs to alert recreationists of the magnitude and suddenness of changes in the river's flow.

MPC says the fluctuations the proposed peaking operation would cause in the water levels of the downstream Noxon reservoir would have little effect on downstream recreational facilities.

MPC's reasoning is (1) WWP's operations already make the Noxon reservoir fluctuate, and (2) within the next 2 to 3 years, DFWP plans to extend and redesign the existing Flat Iron Ridge Fishing Access Site's boat ramp to offset effects from the fluctuations.

Article 407 requires MPC to carry out its proposed mitigative measures. MPC would be responsible for mitigating impacts to the Flat Iron Ridge boat ramp because water level fluctuations from the proposed peaking operation of the Thompson Falls Project could adversely affect recreational use. MPC also should fund the design and installation of the boat ramp and boat dock at the Wild Goose Landing Park, because project operation would affect these proposed facilities.

In addition to MPC's proposed mitigative measures, article 407 requires MPC, after consultation with the appropriate agencies, to be responsible for the following: (1) funding the design and installation of the proposed boat ramp at Wild Goose Landing Park so that it is long enough to accommodate boats during the 4-foot drawdown; (2) funding the design and installation of a floating dock at the Wild Goose Landing Park for boaters and swimmers to use during the drawdown; (3) rehabilitating the Flat Iron Ridge boat launch so that it can be used effectively during downstream water level fluctuations caused by project operation; and (4) installing signs at various recreational sites to warn visitors of fluctuating water levels caused by operation of the Thompson Falls Project. Item 4 addresses the concern of DNRC.

Cultural Resources

In a letter dated December 29, 1989, DNRC requested that the Commission enter into a memorandum of agreement requiring MPC to implement a cultural resources management plan, amended by the Montana State Historic Preservation Officer, to mitigate and avoid impacts to the Thompson Falls Historic District, as recommended by the Advisory Council on Historic Preservation in a letter to the Commission dated November 7, 1983. A memorandum of agreement is not necessary. The staff recommended in the EA that the amended plan, with additional measures to further ensure mitigation of impacts, be implemented. Article 408 requires MPC to implement the amended plan with additional mitigative measures.

## Compliance

Water Quality Certification

On March 2, 1982, MPC asked the Montana Department of Health and Environmental Science for a water quality certificate under section 401 of the Clean Water Act. Since the state took no



action within 1 year, we consider the certificate waived under Order 464.

Pacific Northwest Power Planning and Conservation Act

Under section 4(h) of the Pacific Northwest Power Planning and Conservation Act, the Council developed the Columbia River Basin Fish and Wildlife Program to protect, mitigate, and enhance fish and wildlife resources associated with development and operation of hydroelectric projects within the Columbia River Basin.

Section 4(h) states that responsible federal agencies should provide equitable treatment for fish and wildlife resources, in addition to other purposes for which hydropower is developed, and that these agencies shall take into account, to the fullest extent practicable, the program adopted under the Act.

The program directs agencies to consult with federal and state fish and wildlife agencies, appropriate Indian tribes, and the Council during the study, design, construction, and operation of any hydroelectric development in the basin [section 1103(a)(1)(A) and (2)(A)]. When MPC's application was filed, we required applicants to begin prefiling consultation with the appropriate federal and state fish and wildlife agencies, the Tribes, and after filing, to provide these groups with opportunities to review and to comment on the application. MPC followed this consultation process.

The program says authorization for new hydropower projects should include conditions for development that would mitigate the impacts of the project on fish and wildlife resources [section 1103(a)]. Federal and state fish and wildlife agencies reviewed and commented on the application.

Specific provisions of section 1103(a) directly applicable to the proposed amendment of license direct the Commission to provide for (1) flows of sufficient quantity and quality to protect fish, and (2) artificial nest structures where appropriate. This order requires MPC to implement mitigative measures to protect fish and wildlife resources consistent with section 1103 of the program. Further, article 410 reserves to the Commission the authority to require future alterations in project structures and operation in order to take into account, to the fullest extent practicable, the applicable provisions of the program.

Section 903(e)(6) of the 1987 program directs the Commission to "require Montana Power Company to provide permanent funding to purchase 10,000 acre-feet of water from Painted Rocks Reservoir to maintain summer and fall flows for resident fish in the Bitterroot River. These flows are intended as mitigation for the impacts of the Thompson Falls project on resident fish." Painted Rocks reservoir is a multipurpose reservoir, owned by the state and operated by DNRC, located on the Bitterroot River (tributary of the Clark Fork).

On February 23, 1988, MPC and DFWP entered into an agreement whereby MPC deposited $250,000 in a trust fund for the annual purchase of 10,000 acre-feet of water from Painted Rocks reservoir. DFWP would determine the timing and quantity of the flows. In the April 4, 1990, filing, DNRC recommends that any amendment of the license require MPC to comply with the provisions of this fisheries mitigative agreement.

The Bitterroot River is heavily used for irrigation, which dewaters many sections. The release of 10,000 acre-feet from Painted Rocks reservoir, in combination with 5,000 acre-feet already allocated for low-flow augmentation, would allow a target flow of 400 cfs to be met in a dewatered reach at Bell Crossing, about 55 miles downstream of the Painted Rocks dam, 94 percent of the time in late July, 47 percent of the time in August, and 45 percent of the time in September. Increased flows would improve recruitment, juvenile rearing habitat, and young-of-year survival of brown and rainbow trout and mountain whitefish 2/.

The agreement between MPC and DFWP is generally consistent with section 903(e)(6) of the program. Since MPC has already completed with the agreement by depositing $250,000 in a trust fund, no license requirement, as requested by DNRC is necessary.

Section 1003(b) of the program directs states or other entities to assess the probable wildlife and wildlife habitat losses at hydroelectric projects in the Columbia River Basin and then to develop mitigative and enhancement plans for specific projects. DFWP has done this for the Thompson Falls Project.

DFWP prepared a wildlife management plan for the project that included the following measures: (1) improving white-tailed deer winter range; (2) using prescribed fire to maintain grasslands; (3) developing a brood rearing area for Canada geese; (4) cutting vegetation to improve forage quantity and quality; (5) putting up signs to restrict access during the waterfowl nesting and brood rearing seasons; (6) establishing conservation easements to protect private lands for wildlife; (7) placing 19 goose nesting structures, 10 osprey nesting platforms, 12 wood duck boxes, 9 bluebird boxes, and 21 bat houses; and (8) monitoring bird nesting and hatching success.

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2/ R.L. Spoon, 1987, Evaluation of management of water releases from Painted Rocks reservoir, Bitterroot River, Montana, DOE BP-13076-2, Montana Department of Fish, Wildlife, and Parks, Missoula, Montana, August 1987.



On September 6, 1989, MPC entered into an agreement with DFWP to carry out the management plan for the wildlife and wildlife habitat mitigation required under section 1003(b) of the program. MPC deposited $123,000 in a trust fund to finance implementation of the plan. In the April 4, 1990, filing DNRC recommends that any amendment of the license require MPC to comply with the provisions of this agreement.

Section 1403(8.15) of the 1989 amendments to the program (the wildlife mitigation rule) requires the Commission "when and where feasible, (to) implement on a voluntary basis, management plans designed to protect wildlife and wildlife habitat identified in Section 1003." The agreement between MPC and DFWP is consistent with section 1403(8.15). Since MPC has already complied with the agreement by depositing $123,000 in a trust fund, no license requirement, as requested by DNRC is necessary.

The fish and wildlife measures developed by MPC and DFWP are primarily designed to provide mitigation for original project impacts and not necessarily to correct continuing impacts of the project. Agreements implementing the measures were voluntarily negotiated between MPC and DFWP. Although we conclude that these measures are consistent with the Council's program, we make no finding as to whether these measures are appropriate.

<u>Comprehensive Development</u>

Section 4(e) of the Federal Power Act states that in deciding whether to issue a license, the Commission, in addition to considering the power and development purposes of the project, shall give equal consideration to (1) the purposes of energy conservation, (2) the protection, mitigation of damage to, and enhancement of fish and wildlife, (3) the protection of recreational opportunities, and (4) the preservation of other aspects of environmental quality.

Further, in section 10(a), the Federal Power Act says the Commission shall adopt a project that in its judgment will be best adapted to a comprehensive plan for (1) the use or benefit of interstate or foreign commerce, (2) the improvement and utilization of water power development, (3) the adequate protection, mitigation, and enhancement of fish and wildlife (including related spawning grounds and habitat), and (4) other beneficial public uses, including irrigation, flood control, water supply, and recreation, and other purposes discussed in section 4(e).

In the EA, we evaluate the effects of project expansion and peaking operation on the environmental resources of the project area and discuss the mitigative measures that should be implemented to protect and enhance these environmental resources.

These mitigative measures include (1) an erosion and sedimentation control plan, (2) a revegetation plan, (3) minimum flows below the project, (4) measures to protect and enhance the project's visual values, (5) a cultural resource management plan, and (6) additional recreational development at the project.

In the section on resource development, we also evaluate the need for power in the general project vicinity and determine energy deficits may exist as early as 1991. We find (1) the project could be useful in conserving fossil fuels and reducing noxious by-product emissions and (2) it would be in the long-term public interest to let MPC construct and operate the expanded project.

The available alternatives are to construct or not to construct the expanded project. The proposed expansion is the recommended alternative. The project, if expanded, would generate an additional estimated average 197.3 GWh of electrical energy per year without significantly affecting environmental resources. Under section 10(a) of the Federal Power Act, this project would be best adapted to a comprehensive plan for improving a waterway and under section 10(j) of the Act, would provide for adequate protection, mitigation, and enhancement of fish and wildlife.

Section 10(a)(2) of the Federal Power Act also requires the Commission to consider the extent to which a project is consistent with federal or state comprehensive plans for improving, developing, or conserving a waterway or waterways affected by the project.

Under section 10(a)(2), federal and state agencies filed 30 plans that address various resources in Montana. Of these, the staff identified eight plans relevant to this project.3/ No conflicts were found.

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3/ (1) Lolo National Forest land and resource management plan, 1986, Forest Service; (2) Final environmental impact statement for the Lolo National Forest land and resource management plan, 1986, Forest Service; (3) Order of the Board of Natural Resources establishing water reservations, undated, Montana Board of Natural Resources and Conservation; (4) Montana statewide comprehensive outdoor recreation plan, 1983, Montana Department of Fish, Wildlife, and Parks; (5) Northwest conservation and electric power plan, 1986, Northwest Power Planning Council; (6) Columbia River Basin fish and wildlife program, 1987, Northwest Power Planning Council; (7) Protected areas amendments and response to comments, 1988, Northwest Power Planning Council; (8) Wildlife mitigation rule and response to comments, 1989, Northwest Power Planning Council.



Based on a review of agency and public comments filed in this proceeding and on our independent analysis, the expanded Thompson Falls Project is best adapted to a comprehensive plan for the water resources of the Clark Fork River.

In the April 4, 1990, filing, DNRC recommended inclusion of the following in any order issued:

> The Montana Power Company, prior to construction and operation of Project No. 1869-003, shall comply with the requirements of the laws of the State of Montana with respect to the appropriation, diversion, and use of water for the purposes for which the license amendment is issued.

Inclusion of this article would run counter to the Commission's responsibilities under § 10(a) of the Act. It would give the state an opportunity to tamper with Commission determinations under the Act 4/. The Commission, as discussed above, has decided on the amount of additional diversion for the Thompson Falls Project in the context of its balancing responsibilities under the Act. The only matter left to be resolved is whether the licensee could obtain the additional diversion rights by negotiations or by utilizing the condemnation proceeding under § 21 of the Act. For the above reasons the recommended article is not included in the license.

<u>Recommendations of Federal and State Fish and Wildlife Agencies</u>

Section 10(j) of the Federal Power Act requires the Commission to include license conditions, based on recommendations of federal and state fish and wildlife agencies, for the protection, mitigation, and enhancement of fish and wildlife.

FWS (letter dated January 28, 1983) and DFWP (letters dated January 31 and May 31, 1983) recommend that MPC implement a Canada goose brood rearing enhancement plan. In 1983, MPC implemented the plan. Article 413 requires MPC to continue to manage or fund the management of the goose brood rearing area as part of the approved wildlife management plan. Therefore, the license conditions are consistent with the fish and wildlife recommendations.

<u>Summary of Findings</u>

This order and the attached EA contain background information, analysis of impacts, support for related license articles, and the basis for a finding of no significant impact on

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4/ See Order denying request for rehearing of the Horseshoe Bend project license (42 FERC, 61,072).

the environment. Issuance of this amendment is not a major federal action significantly affecting the quality of the human environment.

The amended project will be safe if constructed, operated and maintained in accordance with the requirements of this order. The design of the amended project will be consistent with the engineering standards governing dam safety. Analysis of related issues is provided in the Safety and Design Assessment (S&DA), also attached to this order.

The Director, Office of Hydropower Licensing, concludes that the Thompson Falls Project as modified by this order would not conflict with any planned or authorized development and would be best adapted to comprehensive development of the waterway for beneficial public uses.

Term of License

On December 29, 1979, a new forty-year license was issued to MPC for this project. The term of this license commenced on January 1, 1976, after the expiration date of the original license. MPC has requested that the term be extended to fifty years. The Commission cannot amend the term of a license past a total of fifty years. The extensive redevelopment of the project does though warrant extending the license's term to the maximum of fifty years.

The Director orders:

(A) The license for the Thompson Falls Project No. 1869 is amended, effective the first day of the month in which this order is issued. The term of the license is increased to 50 years. The license will now terminate on December 31, 2025.

(B) Ordering paragraph (B)(2) of the license issued December 29, 1979, (9 FERC ¶ 62,223) is amended to include the following description:

Project works for the secondary development include: (1) a 78-foot-wide, 300-foot-long intake channel; (2) a 78-foot-wide, 200-foot-long powerhouse containing one 50 MW generating unit; (3) a 100-foot-wide, 1,000-foot-long tailrace channel; (4) a 1,000-foot-long access road with a 360-foot-long bridge over the reservoir and a 135-foot-long bridge over Dry Creek; (5) a short primary transmission line running from the new generator, through voltage transformation, to the existing switchyard; and (6) appurtenant facilities.

(C) The exhibit A and the exhibit F drawings described in the attached S&DA are approved and made part of the license.



(D) The authorized installed capacity for the Thompson Falls project, as stated in subparagraph (i) of article 43 of the license is revised to 120,000 horsepower.

(E) The license is also subject to the following additional articles:

Article 301. The licensee shall begin construction of the amended project works within 2 years from the issuance date of this order and shall complete construction of the project within 4 years after the issuance date of this order.

Article 302. Before starting construction, the licensee shall review and approve the design of contractor-designed cofferdams and deep excavations and shall make sure construction of the cofferdams and deep excavations is consistent with the approved design. At least 30 days before starting to build the cofferdam, the licensee shall give to the Commission's Regional Director and to the Director, Division of Dam Safety and Inspections, one copy of the approved cofferdam construction drawings and specifications and copies of the letters of approval.

Article 303. At least 60 days before starting construction, the licensee shall give one copy to the Commission's Regional Director and two copies to the Director, Division of Dam Safety and Inspections, of the final contract drawings and specifications for such pertinent features of the project as (1) water-retention structures, (2) all necessary transmission facilities, (3) the powerhouse, and (4) water conveyance structures. The final contract drawings and specifications shall be accompanied by a final supporting design report. To assure a safe and adequate project, the Director, Division of Dam Safety and Inspections, may require changes in the plans and specifications and in the final supporting design report.

Article 304. Within 90 days after finishing construction, the licensee shall file for the Commission approval revised exhibits A, F, and G to describe and show the project as-built, including all facilities the Commission finds necessary and convenient for transmitting all the project power to the interconnected system, and described in Articles 405 and 407 of this order.

Article 401. The erosion control plan included in additional information filed by letter dated January 5, 1990, consisting of pages 4-1 to 4-9 and 5-1 to 5-2 in section 1, and including use of cofferdams, riprap, temporary ditches, and sediment ponds, is approved and made part of this license. This plan shall be expanded and implemented with the following modifications.

When the licensee files the final project drawings and specifications required by article 302, it shall file a final plan showing drawings and specifications for controlling erosion, sediment, and slope stability.

In the plan, the licensee shall include detailed descriptions, design drawings, and specific topographic map locations of each type of control measures including: (1) rock slope reinforcement; (2) drainage control along the access road; (3) sediment ponds for collecting and filtering runoff from spoil disposal areas and from access roads which must be cleaned when half full; and (4) riprap to be placed to protect developed or agricultural land from shoreline erosion on riverbanks within the reservoir with land facet sandy variant 10(1) (figures 13, 14, 15, and 16 show land facet sandy variant 10(1) in Montana Power Company's filing by letter dated January 5, 1990).

The Commission may require changes to the plans and specifications to ensure adequate protection of the environmental, visual, and cultural values of the project area.

Article 402. The revegetation plan filed by letter dated January 5, 1990, consisting of pages 9 and 10 in section 2, and including contouring the spoil material, covering it with a geotextile fabric, topsoiling, and revegetating with native vegetation, is approved and made part of this license. This plan shall be expanded and implemented with the following modifications. Along with the erosion control plan required by article 401, the licensee shall file final specifications for the revegetation plan, including the following: (1) measures to revegetate soils disturbed by project construction and fill slopes; (2) mulch to be used to stabilize soils while vegetation is becoming established; (3) details of geotextile materials to be used to cover spoil materials before placing soil materials; (4) specifications on a seeding mix and rates of seed application that includes a variety of grass species; (5) measures to minimize soil compaction; (6) measurements to be used to monitor plant growth; and (7) criteria for identifying revegetation success and areas requiring additional reclamation measures.

Gradings of spoil materials and topsoil shall have slopes no steeper than 56 degrees from the horizontal to maintain slope stability. The licensee shall be responsible for ensuring successful revegetation of disturbed soils and spoil materials. The Commission reserves the right to require changes to the final specifications of the revegetation plan.

Article 403. The licensee shall implement the visual resource mitigative measures described on page 11 of section 2 of the licensee's response to a request for additional information, filed with the Commission by letter dated January 5, 1990.



These measures include (1) building the powerhouse as a low-profile, semi-outdoor structure; (2) making the exterior surface of the powerhouse a flat-formed, gray concrete; (3) revegetating the spoils on the island to blend with the proposed island park; (4) submerging the tailrace; and (5) using a dark, galvanized finish on the gate hoist stacks and crane. The licensee also shall use nonreflective conductors, insulators, and support structures in the new transmission line extending between the new powerhouse and the existing powerhouse.

Article 404. The licensee's proposed plan for recreational development of Island Park, filed by letter dated January 5, 1990, consisting of five pages of text and five drawings and providing for the development of picnic facilities, interpretive facilities, restrooms, a trail system, pedestrian and bicycle access, and parking facilities, is approved and made part of this license.

Article 405. The licensee, after consultation with the Forest Service, the National Park Service, the Montana Department of Fish, Wildlife, and Parks, and Sanders County, and within 1 year from the issuance date of this amendment of license, shall construct, operate, and maintain, or arrange for the construction, operation, and maintenance of the following facilities on the south shore of the Clark Fork River, below the dam and next to the county's abandoned High Bridge: (1) a parking area; (2) interpretive-informational signs; (3) restroom facilities; and (4) garbage facilities.

Within 3 months from the completion of the above facilities, the licensee shall file with the Commission an agreement with the Forest Service providing for the management of the facilities, and documentation of consultation with the agencies. The above facilities shall be included within the project boundary and must be shown in the revised exhibit G drawing required by article 301.

Article 406. The licensee, after consultation with the Forest Service, City of Thompson Falls, the Lion's Club, the Wild Goose Landing Park Committee, the Montana Division of Fish, Wildlife, and Parks, Sanders County, and the National Park Service, shall monitor recreational use in the project area during the first five seasons after completion of the island park and south shore facilities (article 404). The monitoring shall be conducted to determine whether project-induced recreation is being adequately accommodated.

Within 6 months of completion of the monitoring, the licensee shall file (1) the monitoring results, (2) a description of the methodology used for monitoring recreational use, and for Commission approval (3) a plan for developing any additional recreational facilities to accommodate project-induced recreational use. The plan shall discuss any cooperative efforts between the licensee and other agencies for providing additional facilities at the Wild Goose Landing Park. Documentation of consultation with the agencies shall be included in the filing. The Commission reserves the right to require changes to the plan.

Article 407. The licensee, after consultation with the Forest Service, the National Park Service, the Montana Department of Fish, Wildlife, and Parks, the Wild Goose Landing Park Committee, the Lion's Club, the City of Thompson Falls, Sanders County, and Washington Water Power, and 90 days before starting to operate the amended project, shall do the following: (1) design and install or arrange for the design and installation of the proposed boat ramp at Wild Goose Landing Park so that it is long enough to accommodate boats at a maximum 4-foot drawdown of the reservoir; (2) design and install or arrange for the design and installation of a floating dock at the Wild Goose Landing Park that boaters and swimmers can effectively use during drawdown of the reservoir; (3) rehabilitate the Flat Iron Ridge boat launch so that it can be effectively used during downstream water fluctuations caused by the project; and (4) install and maintain signs that inform visitors of the project's peaking operation and the hazards associated with fluctuating water levels at Wild Goose Landing Park, Island Park, Thompson Falls State Recreation Area, Flat Iron Ridge Fishing Access Site, and the undeveloped day use areas below the powerhouse and on the south bank of the Clark Fork River between Prospect Creek and High Bridge.

Documentation of agency consultation shall be included in the filing for compliance with article 301.

Article 408. The licensee, after consultation with the Montana State Historic Preservation Officer (SHPO) and the Historic American Engineering Record (HAER), and before beginning any land-disturbing, land-clearing, or spoil-producing activities associated with construction or continued operation of the project that will affect the Thompson Falls Historic District (District), shall carry out a cultural resources management plan. In the plan, the licensee shall do the following: (1) record the Dry Channel Bridge according to the standards of the HAER, as proposed in the licensee's application for amendment of license filed August 27, 1982; (2) determine modifications to the existing powerhouse and any design changes for the new powerhouse that would alter the currently approved plans, so that any construction work at these structures is consistent with the Secretary of the Interior's Standards for Historic Preservation Projects; (3) design new access roads, bridge construction, and power intake construction (as it pertains to excavation waste), to avoid impacts, as far as possible, to the existing transformer house and landscaping; and (4) if it is determined during construction that the significant properties would be affected to a greater extent than is currently agreed upon, then the licensee shall document the structures, buildings, and objects according to the standards of the HAER and of the Secretary of the Interior's Standards for Historic Preservation Projects.



Reports documenting mitigation to the Dry Channel Bridge or other structures included within the District, and their acceptance in writing by the SHPO and the HAER respectively, shall be filed with the Commission for approval within 2 years of the date of this order and at least 60 days before any construction at the project that will impact the significant archeological and historical attributes of the District.

The licensee shall make funds available in a reasonable amount for (1) preparing and implementing the cultural resources management plan, (2) conducting avoidance and any necessary mitigative work, and (3) documenting these activities in reports. If the licensee, the SHPO, and the HAER cannot agree on the amount of money to be spent for these activities, the Commission reserves the right to require the licensee to conduct the necessary work at the licensee's own expense.

Article 409. Before starting any land-clearing, land-disturbing, or spoil-producing activities within the project boundaries, other than those specifically authorized in this amendment of license, the licensee (1) shall consult with the Montana State Historic Preservation Officer (SHPO), (2) shall conduct a cultural resources survey of these areas, and (3) shall file for Commission approval a report documenting the survey and a cultural resources management plan for avoiding or mitigating impacts to any significant archeological or historic sites. The survey and plan shall be based on the recommendations of the SHPO, and shall be conducted and prepared by a qualified cultural resources specialist.

If the licensee discovers any previously unidentified archeological or historic sites during the course of constructing or developing project works or other facilities at the project, the licensee shall stop all land-clearing, land-disturbing, or spoil-producing activities in the vicinity of the sites, shall again consult with the SHPO and shall file for Commission approval another report prepared by a cultural resource specialist, documenting the significance of discovered sites and containing a cultural resources management plan to avoid or to mitigate impacts to significant resources.

The reports shall include (1) a description of each discovered site, including whether it is listed or eligible to be listed on the National Register of Historic Places, (2) a description of the potential effect on each discovered site, (3) proposed measures for avoiding or mitigating the effects, (4) documentation of the nature and extent of consultation, and (5) a

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schedule for mitigating effects and conducting additional studies. The Commission reserves the right to require changes to the plans or the reports.

The licensee shall not begin land-clearing, land-disturbing, or spoil-producing activities, other than those specifically authorized in this amendment of license, or resume such activities in the vicinity of a site discovered during construction, until informed by the Commission that the requirements of this article have been fulfilled.

Article 410. To take into account, to the fullest extent practicable, the Columbia River Basin Fish and Wildlife Program (developed and amended in accordance with the Pacific Northwest Electric Power Planning and Conservation Act), the Commission, upon its own motion or upon the recommendation of federal or state fish and wildlife agencies or affected Indian Tribes, reserves the authority to order alterations of project structures and operations.

Article 411. To protect and enhance the aquatic resources of the Clark Fork River, the licensee shall discharge from the Thompson Falls Project a continuous minimum flow of 6,000 cubic feet per second or inflow to the project reservoir, whichever is less. These flows may be temporarily modified if required by operating emergencies beyond the control of the licensee and for short periods on mutual agreement between the licensee and the Montana Department of Fish, Wildlife, and Parks.

(H) The licensee shall serve copies of any Commission filing required by this order on any entity specified in this order to be consulted on matters related to the Commission filing. Proof of service on these entities must accompany the filing with the Commission.

(I) This order is issued under authority delegated to the Director and is final unless appealed to the Commission by any party within 30 days from the date of this order. Filing an appeal does not stay the effective day of this order or any date specified in this order. The licensee's failure to appeal this order shall constitute acceptance of the terms of this amendment of license.

Fred E. Springer
Director, Division of
Hydropower Licensing

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UNITED STATES OF AMERICA 62,130
FEDERAL ENERGY REGULATORY COMMISSION

Montana Power Company Project No. 1869-008
Montana

ORDER AMENDING LICENSE

(Issued May 10, 1991)

On January 7, 1991, Montana Power Company (licensee) filed an application to amend its license for the Thompson Falls Project. The licensee identifies changes that are needed to the approved, but unconstructed, recreation facilities at the Wild Goose Landing Park and south shore site of the Clark Fork River.

The licensee proposes to expand its commitment to develop the Wild Goose Landing Park, rather than construct a new recreation site on the south shore. Article 405 requires the licensee to provide certain recreation facilities on the south shore site and to arrange for the United States Forest Service to manage the facilities. Article 407 requires the licensee to provide a boat launch and dock at Wild Goose Landing Park suitable for use at maximum four-foot drawdown. The four-foot drawdown would occur upon initiation of the peaking operations in 1996.

By letter dated May 2, 1991, the licensee proposes to further modify the amendment to construct the dock and boat launch suitable to accommodate recreationists for the fluctuations in the reservoir associated with current operating conditions. The facilities would be expanded to allow for the four-foot drawdown prior to initiation of the peaking operations in 1990.

After the issuance of the amended license, the Plains/Thompson Falls Ranger District of the Lolo National Forest, by letter dated July 24, 1990, indicated that since it does not manage any other recreational sites in this area, it would not be prudent to assume management of the south shore land. As a result, the licensee is proposing to enhance and expand Wild Goose Landing Park, instead of developing the south shore site.

The County of Sanders, by letter dated October 24, 1990, the National Park Service, by letter dated October 5, 1990, and the Thompson Falls Lions Club, by letter dated September 20, 1990, supported the licensee's proposal. By letter dated December 14, 1990, the State Historic Preservation Officer determined that no survey or other actions were required regarding cultural resources at the Wild Goose Landing Park site.



By letter dated October 31, 1990, the Montana Department of Fish, Wildlife and Parks supported the licensee's proposal and by letter dated April 9, 1991, supported the modification of the dock and boat launch. The City of Thompson Falls (City), by letter dated September 12, 1990, supported the licensee's proposal. The City also stated that it would be maintaining the park after the licensee constructs it and requested the opportunity to review the park plans. By letter dated May 2, 1991, the City concurred with shortening the dock and boat launch, with the understanding that those facilities will be lengthened when daily fluctuations of the reservoir are instituted.

The amendment proposal meets the intent of mitigating the project's effects on recreation. It will facilitate better management of the recreation areas, and allow the Wild Goose Landing Park to be available for public use in 1991. The environmental effects associated with the construction of the amendment proposal are consistent with what were anticipated in the Environmental Analysis and would be minor and of short duration.

The Director orders:

(A) The amendment of license to provide recreational facilities at the project, filed on January 7, 1991 and as supplemented by the May 2, 1991 filing, is approved.

(B) This order constitutes final agency action. Requests for rehearing by the Commission may be filed within 30 days of the date of issuance of this order, pursuant to 18 C.F.R. 385.713.

J. Mark Robinson
Director, Division of Project
Compliance and Administration

APR 28 1994

FEDERAL ENERGY REGULATORY COMMISSION
WASHINGTON, D.C. 20426

DOCKETS (2)

9620538

Project No. 1869-017--Montana
MPC Thompson Falls Hydroelectric Project
Montana Power Company

R. A. Periman, Director
Hydro Engineering
Montana Power Company
40 East Broadway
Butte, MT 59701

Dear Mr. Periman:

This is in reference to the material you filed January 14, 1994, to comply with Article 407 of the license for the MPC Thompson Falls Hydroelectric Project. The filing included a letter from the Montana Department of Fish, Wildlife and Parks, indicating their acceptance of part (3) of the article, the rehabilitation of the Flat Iron Ridge boat launch so that it could be used during the expanded plant operations.

The filed material adequately fulfills the filing requirements of part (3) of Article 407. If you have any questions concerning this matter, please call Hank Ecton at (202) 219-2678.

Sincerely,

J. Mark Robinson

J. Mark Robinson
Director, Division of Project
Compliance and Administration

cc: G. Howard Van Noy
Senior Vice President
Montana Power Company
40 East Broadway
Butte, MT 59701

Arthur K. Neill
Montana Power Company
40 East Broadway
Butte, MT 59701



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UNITED STATES OF AMERICA 68 FERC 62, 244
FEDERAL ENERGY REGULATORY COMMISSION

Montana Power Company Project No. 1869-019
Montana

ORDER APPROVING REVISED REPORT ON RECREATION RESOURCES
(ISSUED SEPTEMBER 14, 1994)

On March 28, 1994, Montana Power Company, licensee for the Thompson Falls Project, FERC No. 1869, filed a revised report on recreation resources pursuant to amended Article 404 of the Order Approving Access Road Relocation Plan and Amending License, issued by the Commission on May 21, 1993.1

Amended Article 404 requires the licensee to file, for Commission approval, a revised report on recreation resources that details recreational development(s) to be completed in lieu of the previous Island Park development proposal. Article 404 further requires the filing to include documentation of consultation with the United States Forest Service (FS), the City of Thompson Falls, the Montana Department of Fish, Wildlife and Parks (MDFWP), Sanders County, the Sanders County Economic Development Corporation, and the National Park Service.

The Proposal

The material filed on March 28, 1994, states that the consensus of three public meetings regarding the development of the island, between the Main dam and the Dry Channel dam, was to emphasize the island's natural setting. The revised report on recreation resources proposes to construct foot trails and walkways on the island in place of the access road, eliminating public motorized travel on the island. The revised recreation report further proposes parking areas near the island's two bridges, with travel onto the island being by foot or bicycle. Provisions for recreators with disabilities are addressed. Handicapped users will have access to parking directly abutting the Gallatin Street Bridge, and on the island will have access to 1350 linear feet of concrete walkways (5 feet wide), a vault toilet, picnic area, and an overlook site with interpretive displays.

In developing the revised recreation plan there was also a consensus to contribute funds to the rehabilitation of the abandoned High Bridge. The licensee proposes a $20,000 contribution toward the rehabilitation of the structure, but in the instance that the rehabilitation is not begun by December 31, 1998 (by the local governments), the licensee proposes to

1 See 63 FERC 62,185 (1993).

allocate said funds to the development of the South Shore area. Rehabilitation of the High Bridge would provide additional access to the island and would also allow access to the south side of the Clark Fork River. Development of the South Shore area would further increase access to the south side of the river, and would consist of a designated parking area, picnic tables, and a restroom.

Agency Comments

The filed material includes comments from all agencies designated in amended Article 404. The FS supplied comments on design aesthetics that may further improve the quality of the plan, as well as a disagreement to the annual operations and maintenance costs designated in the report. The FS states a higher annual operations and maintenance cost for the island development would be more appropriate, benches would improve the level of enjoyment at the overlook sites, and non-handicap parking areas near the Gallatin Street bridge should be more clearly identified. The MDFWP recommended the use of steel fencing, rather than wood fencing, around the overlook sites, as steel fencing is more vandal-resistant, durable, and cost-effective. MDFWP also recommended that interpretive signs for tree and plant species be installed on the island. No comments were supplied by the other agencies.

Discussion

The FS recommendations to include benches at the overlook sites and increase operating and maintenance costs for island development have been incorporated into the revised report on recreation resources and are reasonable. In addition, the report states that parking for the general public at the Gallatin Street bridge entrance will be identified by directional signs and located two blocks to the northeast of the Gallatin Street bridge.

With regard to interpretive signs, the revised report does not specify the exact material to be included on interpretive displays, but acknowledges the installation of approximately nine such displays on the island. The Commission staff finds that the specification of the type of information to be provided on the interpretive signs is unnecessary, as the interpretive material being presented could, and should, change over time. Therefore, interpretive material that references tree and plant information could be implemented in the future.

The comments supplied by the MDFWP regarding the use of steel fencing are valid, but the choice by the licensee to use



wood instead of steel is also valid. The Commission staff agrees with the licensee that the aesthetic/naturalistic qualities of wood may be more appropriate for the site, and further acknowledges that, for development purposes, wood will provide an equal level of safety when properly maintained. The licensee is responsible for selecting

wood materials that properly meet the structural, strength, and design requirements of the areas in which such fences are to be installed, and is responsible for the proper maintenance of such fences.

In addition to the above, the Commission staff recognizes that implementation of the revised report on recreation resources will involve land-clearing and/or land-disturbing activities within the project boundary. An environmental assessment will not be required for the proposed construction, as the implementation of the revised report on recreation resources will involve a significantly less amount of land-disturbing activity on the island than the spoils and access road previously approved by the Order Amending License (Major) would have involved.2

Because there are a number of cultural/historic resources on the island and within the project boundary the licensee, pursuant to Article 409 of the Thompson Falls Project license, is still required to consult with the Montana State Historic Preservation Officer in the development of a cultural resources management plan. On June 30, 1994, the licensee did file such a plan with the Commission, but it is reminded that, also pursuant to Article 409, construction of the facilities proposed in the revised recreation report should not begin until such a time that the cultural resources plan is approved by the Commission.

After review of the revised report on recreation resources, the Commission staff concludes that the island is a unique feature of the Thompson Falls Project and minimal development of the island should make for a more enjoyable recreation experience. As such, the recreational development proposed in lieu of the previously approved Island Park development is appropriate for the area and should be approved.

The Director orders:

(A) The revised report on recreation resources filed on March 28, 1994, pursuant to Article 404 of the Order Approving Access Road Relocation Plan and Amending License issued on May 21, 1993, is approved.



(B) This order constitutes final agency action. Requests for rehearing by the Commission may be filed within 30 days of the date of issuance of this order, pursuant to 18 CFR 385.713.

J. Mark Robinson
Director, Division of Project
Compliance and Administration

2 See 51 FERC 62,089 (1990).

OHL/DPCA:PAKKALA:nm:9/9/94:PC:K01
cc: DPCA D2SI

# Appendix D – FERC Order Approving Construction and Operation of Fish Passage Facilities, February 12, 2009

126 FERC ¶ 62,105
UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

PPL Montana, LLC | Project No. 1869-048

# ORDER APPROVING CONSTRUCTION AND OPERATION OF FISH PASSAGE FACILITIES

(Issued February 12, 2009)

On April 7, 2008 PPL Montana, LLC (licensee) filed a Biological Evaluation (BE) for the Thompson Falls Project and 90-percent construction drawings for upstream fish passage at the Thompson Falls Dam. The BE discussed impacts of project operation and possible impacts of proposed upstream fish passage on federally listed as threatened bull trout (*Salvelinus confluentus*). The Thompson Falls Project is located on the Clark Fork River in Sanders County, Montana.

## BACKGROUND AND CONSULTATION

On July 6, 2001 the Commission received a letter from the U.S. Fish and Wildlife Service (FWS) stating it believes that some of the activities related to the Thompson Falls Project may be incidentally taking federally listed as threatened bull trout. In the July 6 letter the FWS recommended that the Commission prepare a Biological Assessment (BA) to evaluate the effects of project operation on bull trout and other federally listed threatened and endangered species, and to determine if formal consultation under Section 7 of the Endangered Species Act (ESA) was necessary. The Commission received another letter from the FWS, pertaining to threatened bull trout at the Thompson Falls Project, on January 30, 2002. The letter stated that studies 50 miles downstream of the Thompson Falls Dam at the Clark Fork Project (FERC No. 2058) showed adverse impacts occurring to bull trout from habitat degradation behind the Noxon Reservoir Dam as well as incidental take due to fish passage barriers. The FWS also stated that it believes similar impacts are likely occurring at the Thompson Falls Project. Additionally, the FWS stated that non-native northern pike (*Esox lucius*) likely prey on juvenile bull trout in the impoundment created by the Thompson Falls Dam.

In a response dated March 13, 2002, to the FWS, the Commission stated that a definitive federal action is needed to trigger ESA consultation and it believed that there was no federal nexus to begin consultation. However, in a letter dated March 13, 2002, the Commission asked the licensee to respond to the FWS's letters. In the Commission's letter to the licensee, the FWS's recommendation to prepare a BA because the Thompson Falls Project operation may affect threatened bull trout was discussed. The Commission stated that it is their position to investigate the situation to determine what effects to bull trout if any, may be occurring, and what changes, if any, should be considered to avoid or mitigate those effects or to benefit the species. Additionally, the Commission also stated that if changes are necessary the Commission can institute a reopener proceeding to require changes or can entertain a voluntary amendment application from the licensee.

The licensee responded to the Commission's March 13, 2002 letter in a letter dated April 1, 2002. The licensee stated that it was their understanding that there was no federal action at the Thompson Falls Project that would require Section 7 consultation pursuant to the ESA. However, the licensee also stated that in the spirit of cooperation and under the guidelines of the Interagency Task Force Report (ITFR)[1] they requested to be designated as the Commission's non-federal representative for the purposes of initiating informal consultation on the potential effects of project operation on bull trout. In a letter dated May 3, 2002, the Commission designated the licensee as its non-federal representative for the purpose of conducting informal consultation with the FWS.

The licensee filed a BE for threatened and endangered species with the Commission on April 7, 2003. The Commission adopted the licensee's BE without modification and submitted it to the FWS as a final BA on May 5, 2003. In the May 5 letter, based on our analysis and the BE's findings, we concluded that operation of the Thompson Falls project likely adversely affects bull trout. Consequently, the Commission requested initiation of formal consultation with the FWS. The FWS responded to the Commissions BA in a letter dated March 8, 2004. The FWS stated they agreed to proceed as recommended in the ITFR. The FWS also stated that data gaps needed addressed in order to move forward with the process. Consequently, FWS stated it would work collaboratively with the licensee and other members of the Technical Advisory Committee (TAC)[2,3] to develop and conduct studies needed to gather the

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[1] Interagency Task Force Report on Improving Coordination of ESA Section 7 Consultation with the FERC Licensing Process, December 12, 2000. The report can be found on the Commission website (http://www.ferc.gov/industries/hydropower/indus-act/itf/esa_final.pdf).

[2] The Interagency TAC was formed in 2003 to clarify regulatory issues, plan research activities, and develop conservation measures to address bull trout issues at the Thompson Falls Project. The committee consists of PPL Montana, U.S. Fish and Wildlife Service (FWS), Montana Fish Wildlife and Parks (FWP), Avista Corporation, Montana Department of Environmental Quality (DEQ) and Confederated Salish and Kootenai Tribes (CSKT).

[3] The January 15, 2008 Memorandum of Understanding created a new TAC and outlined its responsibilities. The new TAC consists of: PPL Montana, U.S. Forest Service, FWP, DEQ, and CSKT.

necessary data. The FWS stated that they would proceed with formal consultation once the necessary data was attained.

After five years of studies the licensee filed a new BE discussing the effects of the Thompson Falls Project on bull trout and proposed conservation measures with the Commission on April 7, 2008. The licensee's BE identified several factors directly related to project operation that negatively impact bull trout in the Clark Fork River. Inhibition of upstream migration and access to spawning habitat by the Thompson Falls Dam was identified as a major concern. Consequently, the licensee proposed to install a full height fishway at the project and filed 90-percent drawings for the structure on April 7, 2008 as well. The licensee's April 7 filing also contained a Memorandum of Understanding (MOU) signed by PPL Montana, the Confederated Salish and Kootenai Tribes of the Flathead Nation (CSKT), Montana Department of Fish Wildlife and Parks (FWP) and FWS.[4] Based on the our review and findings in the BE we concluded that the Thompson Falls Project is adversely affecting bull trout and the proposed conservation measures will reduce but not totally eliminate the Project's adverse effects on bull trout. The BE was adopted as the Commission's final Biological Assessment (BA) and submitted to the U.S. Fish and Wildlife Service on May 1, 2008. At this time the Commission requested initiation of formal consultation under Section 7 of the ESA.

On November 4, 2008 the FWS filed, with the Commission, a Biological Opinion (BO) and associated Incidental Take Statement (Appendix A), which includes reasonable and prudent measures and terms and conditions to minimize incidental take. The FWS stated that the BO is primarily based on the licensee's April 7, 2008 BE, which was adopted as the Commission's BA. The BO describes the effects of the Project on threatened bull trout and its designated critical habitat. Additionally, the BO also evaluates the effects of the licensee's proposed conservation measures. The FWS concluded in its BO that the Thompson Falls Project is currently adversely affecting bull trout and the licensee's proposed conservation measures will reduce, but not totally eliminate, adverse impacts of the Project.

LICENSEE'S PLAN

The Thompson Falls Project is a migratory barrier for bull trout in the Clark Fork River. In order to provide bull trout access to important habitat upstream of the Project the licensee proposes to build, operate, and maintain upstream fish passage. The licensee

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[4] Facilitation and Funding of FERC License based Consultation Process and Implementation of Minimization Measures for Bull Trout. Signed January 15, 2008. The MOU provides terms and conditions regarding the collaboration between the licensee and the FWS, MFWP, and CSKT and the implementation of minimization measures for bull trout.

plans to construct a full height pool and weir fishway on the right abutment of the main dam, as shown in the design drawings. The proposed design incorporates a sequence of 48 concrete pools. The proposed pools would be 6-feet long by 5-feet wide by 4-feet deep and consist of a 2-foot wide notch that would pass approximately 6 cubic feet per second (cfs). There would be the option to convert the notches to orifices if this would benefit upstream fish passage. The licensee proposes to install an auxiliary water system (AWS) to increase flow in the downstream ladder pools and create a total discharge of 60 cfs at the entrance pool. Additionally, the licensee's plans include a 20 cfs high velocity attraction jet AWS to assist in attracting fish to the ladder entrance. The licensee proposes to operate the fishway during non-spill periods (flows < 23,000 cfs), approximately from July 1 to May 15 annually. The licensee also proposes that any fishway dewatering or maintenance would occur from December 1 to February 28 because bull trout are not typically migrating in the mainstem of the Clark Fork River at this time.

The licensee proposes to install a sampling loop at the upstream end of the fish ladder. The fish sampling plans include a fish trapping mechanism, fish holding pool, fish crowder, fish lock, fish sorting table, anesthetic tank, recovery tank, fish return flume to the ladder, and fish return pipe to the tailwater (to prevent upstream escape of non-intended fish i.e. invasive species). The licensee proposes to collect and record species, numbers, condition, and other pertinent data for fish passed at the Project. Additionally, the licensee plans to tag all collected bull trout with passive integrated transponders (PIT tags) to gather project passage data.

The licensee proposes to begin construction of the facility in spring 2009 and complete construction by fall 2010.

DISCUSSION AND CONCLUSION

Despite the loss of connectivity and bull trout habitat the Clark Fork River Basin still has the potential for recovery. Although low in numbers compared to historical populations bull trout are still widely distributed throughout the watershed. Additionally, the FWS has designated 1,136 miles of stream and 49,755 acres of bull trout critical habitat in the Clark Fork Basin, indicating that a substantial amount of quality habitat still exists.[5] Reestablishing bull trout access to spawning grounds is also increasing in the basin. As part of its new license for the Cabinet Gorge and Noxon Rapids hydroelectric

[5] See: Department of the Interior, Fish and Wildlife Service. September 26, 2005. 50 CFR Part 17. Endangered and Threatened Wildlife Plants; Designation of Critical Habitat for the Bull Trout; Final Rule.

developments[6] (located downstream of Thompson Falls) Avista Corporation implemented a trap and transport program for passing bull trout. Depending on the results of genetic testing to determine the captured fishes' natal streams, the fish are released either above Cabinet Gorge Dam, Noxon Rapids Dam, or Thompson Falls Dam. Additionally, the removal of Milltown Dam, located 157 miles upstream from the Thompson Falls Dam, began in 2008. Upon completion of the dam removal bull trout will have access to 274 miles of the Clark Fork River upstream of the Thompson Falls Dam.

Although implementing effective fish passage at Thompson Falls will not eliminate the impacts of dams, hydroelectric project operation, and habitat degradation it would be a vital part of the cumulative effort to restore connectivity in the Clark River Basin and meet the recovery goals. Combined with the trap and transport program at Cabinet Gorge and Noxon Rapids dams and removal of Milltown Dam, fish passage at Thompson Falls would provide migratory bull trout access to critical habitat that has been restricted for nearly 100 years. Construction of the Thompson Falls Dam eliminated access for bull trout in the lower Clark Fork River and Lake Pend Oreille to 90 percent of the Clark Fork watershed. Reconnecting waterways in the basin will increase access to spawning grounds, thermal refugia, and complex habitat necessary for all bull trout life stages, and also facilitate flow of genetic material between populations.

In order to gather more data concerning bull trout biology and their migratory behavior the licensee proposes to incorporate a sampling loop in the passage facility. The sampling loop would provide a means for safely collecting data to increase the knowledge of bull trout. Passage of bull trout is a relatively new endeavor and the sampling effort may provide data to enhance conservation measures for the species.

The FWS's incidental take statement concluded that some take of bull trout is anticipated due to construction of the proposed fishway. However, the construction related take would likely be non-lethal and be considered harassment under the ESA. The incidental take statement also concluded that some take is likely due to sampling efforts, but except in rare cases it is expected to be non-lethal. Additionally, the licensee is taking the appropriate precautions to prevent sedimentation and erosion stemming from construction. As a result, impacts to downstream water quality and habitat should be minor and temporary. Although some take will likely occur, the proposed action will be a net benefit for bull trout and other aquatic organisms in the Clark Fork system and should be approved.

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[6] Order Issuing New License. Issued February 23, 2000. 90 FERC ¶ 61,167. The Cabinet Gorge and Noxon Rapids Developments are part of Avista Corporations' Clark Fork Project (FERC No. 2058).

In order for the Commission to ensure compliance with the Terms and Conditions of the Incidental Take Statement filed by the FWS and attached to this order as Appendix A, the licensee should file with the Commission, for approval, study and operational plans referenced in the FWS's Terms and Conditions numbers 1 through 7, after development and approval by the FWS and Technical Advisory Committee. In addition, the results of studies referenced, including the 5 and 10-year comprehensive reports referred to in the FWS's Terms and Conditions, should also be filed with the Commission at the same time that they are submitted to the FWS and TAC. Any proposed structural or operational modifications or additional conservation measures that are deemed necessary after scientific review of the referenced studies should be filed for Commission approval.

The licensee must follow the FWS's Terms and Conditions numbers 1 through 7 in order to be exempt from the take prohibitions of Section 9 of the ESA. In order for the Commission to ensure compliance with the FWS's Terms and Conditions the licensee should file with the Commission, by April 1 of each year through the remainder of the license, the annual report referenced in 7a of the FWS's Terms and Conditions. In addition to the requirements stipulated in 7a the report should also address the licensee's compliance with the FWS's Terms and Conditions. The Commission reserves the right to extend the expiration date for report filing.

In addition to the mandatory Terms and Conditions the FWS also filed conservation recommendations in its BO. These recommendations are meant to further the purposes of the ESA by carrying out conservation measures for the benefit of threatened and endangered species. To further minimize or avoid adverse effects of the Thompson Falls Project the licensee should continue to cooperate with FWP, CSKT, Avista Corporation and other entities to promote recovery of bull trout and to survey and monitor bull trout populations and habitat in the lower Clark Fork River core area and the greater Clark Fork basin. Additionally, during the fishway construction, the licensee should retrieve and remove all loose steel beams and other trash from the stilling basin that can be reasonably accessed from the construction roadway. The conservation recommendations are reasonable actions that will help protect bull trout and therefore, should be implemented by the licensee.

Pursuant to paragraphs 12.4, 12.11, and 12.40 of the Commission's regulations, a plans and specifications package and a quality control and inspection program should be submitted to the Regional Engineer at least 60 days prior to any construction of upstream fish passage facilities. Authorization to start construction activities will be given by the Regional Engineer after all preconstruction requirements are satisfied. In order to insure that the required facilities are constructed the licensee should file within 90 days of completion of the upstream fish passage facilities, for Commission approval, revised exhibit F drawings describing and showing the facilities, as built. Additionally, the Commission reserves the right to require changes to project structures, fish passage facilities, or operation, based on the studies and reports required by this order, to ensure effective passage of threatened bull trout.

<u>The Director Orders:</u>

(A) PPL Montana's (licensee), Upstream Fish Passage Design and Construction Plans, for the Thompson Falls Project, as proposed in its April 7, 2008 Biological Evaluation, are approved and shall be implemented pursuant to the approved schedules.

(B) The licensee shall comply with the Terms and Conditions numbers 1 through 7 included in the U.S. Fish and Wildlife Service's November 4, 2008 Incidental Take Statement, and attached to this order as Appendix A.

(C) Study and operational plans referenced in the U.S. Fish and Wildlife Service's (FWS) Terms and Conditions numbers 1 through 7, after development and approval by the FWS and Technical Advisory Committee (TAC), shall be filed with the Commission, for approval, and shall summarize the status of any extensions that may be necessary. In addition, the results of studies referenced, including the five and ten-year comprehensive reports referred to in the FWS's Terms and Conditions, shall also be filed with the Commission at the same time that they are submitted to the FWS and TAC. Any proposed structural or operational modifications or additional conservation measures that are deemed necessary after scientific review of the referenced studies shall be filed for Commission approval.

(D) In order for the Commission to ensure compliance with the U.S. Fish and Wildlife Service's (FWS) Terms and Conditions the licensee shall file with the Commission, by April 1 of each year through the remainder of the license, the annual report referenced in 7a of the FWS's Terms and Conditions. In addition to the requirements stipulated in 7a the report shall also address the licensee's compliance with the FWS's Terms and Conditions. The Commission reserves the right to extend the expiration date for report filing.

(E) To further minimize or avoid adverse effects of the Thompson Falls Project the licensee shall continue to cooperate with U.S. Fish and Wildlife Service, Confederated Salish and Kootenai Tribes, Avista Corporation and other entities to promote recovery of bull trout and to survey and monitor bull trout populations and habitat in the lower Clark Fork River core area and the greater Clark Fork basin. Additionally, during the fishway construction, the licensee should retrieve and remove all loose steel beams and other trash that may be hazardous to bull trout.

(F) Pursuant to paragraphs 12.4, 12.11, and 12.40 of the Commission's regulations, a plans and specifications package and a quality control and inspection program shall be submitted to the Regional Engineer at least 60 days prior to any construction of upstream fish passage facilities. Authorization to start construction activities will be given by the Regional Engineer after all preconstruction requirements are satisfied.

(G) Within 90 days of completion of the upstream fish passage facilities the licensee shall file, for Commission approval, revised exhibit F drawings describing and showing the facilities, as built.

(H) The Commission reserves the right to require changes to project structures, fish passage facilities, or operation, based on the studies and reports required by this order, to ensure effective passage of threatened bull trout.

(I) This order constitutes final agency action. Request for rehearing by the Commission may be filed within 30 days from the date of the issuance of this order, pursuant to 18 CFR § 385.713.

George H. Taylor
Chief, Biological Resources Branch
Division of Hydropower Administration
and Compliance

Appendix A

Reasonable and Prudent Measures,

Terms and Conditions,

and

Conservation Recommendations from the

Biological Opinion filed November 4, 2008

by the U.S. Fish and Wildlife Service

**Reasonable and Prudent Measures**

The Service believes that the following reasonable and prudent measures are necessary and appropriate to minimize take:

**1. PROVIDE SAFE AND EFFECTIVE UPSTREAM FISH PASSAGE**: Identify adult bull trout attempting to travel upstream of Thompson Falls Dam from Lake Pend Oreille, Cabinet Gorge Reservoir, or Noxon Reservoir and in a timely manner, agreed to by the Service and coordinated with the Avista projects, facilitate upstream fish passage, operated in accordance with an approved Operational Plan, to enhance spawning migrations. Successful upstream passage will reduce or eliminate incidental take from blockage of migrants by the dam, including delayed/deferred spawning, restriction of access to thermal refugia, and migratory delay or interruption.

**2. PROVIDE SAFE AND EFFECTIVE DOWNSTREAM FISH PASSAGE**: Identify juvenile bull trout attempting to travel downstream from Thompson River, Flathead River, and upstream core areas and provide safe, timely and efficient downstream fish passage to facilitate bull trout migration to Noxon Rapids and Cabinet Gorge Reservoirs or Lake Pend Oreille. Successful downstream passage will reduce or minimize incidental take related to dam effects on juvenile fish, including intermittent effects from any gas supersaturation and chronic effects from blocked access to thermal refugia and migratory delay or interruption.

**3. REDUCE EFFECTS OF GAS SUPERSATURATION ON BULL TROUT IN PROJECT AREA**: Further evaluate the mechanism and impacts of dissolved gas supersaturation on bull trout at Thompson Falls Dam; first establishing the degree to which the Thompson Falls Project contributes to the systemic problem and secondly with an objective of participating in control, mitigation, and monitoring programs to reduce incidental take of bull trout by effects of gas bubble disease at the Thompson Falls Project.

**4. DEVELOP IMPLEMENTATION STRATEGIES FOR THE MOU AND TAC**: Implement provisions of the Thompson Falls Project MOU under the guidance of an interagency Technical Advisory Committee (TAC) that call for enhancing, acquiring or protecting sensitive upstream habitat that is used by migratory bull trout for spawning or rearing.

**5. REDUCE OR MITIGATE ADVERSE EFFECTS TO BULL TROUT FROM OPERATIONS OF THOMPSON FALLS RESERVOIR**: Initiate a comprehensive evaluation of bull trout use of Thompson Falls Reservoir and determine the primary migratory pathway through the reservoir and interaction of bull trout with predatory and competing nonnative species in Thompson Falls Reservoir. These investigations should be carried out over a 10-year period as a prelude to further evaluation of downstream passage concerns associated with future relicensing discussions.

**6. PROVIDE PERIODIC MONITORING AND EVALUATION ACROSS THE CORE AREA**: Contribute to coordinated genetic assessment and monitoring of bull trout populations in the Lower Clark Fork Core Area and, to a lesser extent, connected upstream core areas as related to impacts of Thompson Falls Dam.

**7. REPORTING**: Implement reporting and consultation requirements as outlined in the terms and conditions in order to minimize take of bull trout related to implementation of the Plan and other fisheries monitoring activities.

**TERMS AND CONDITIONS**

To be exempt from the prohibitions of section 9 of the Act, the FERC must comply with the following terms and conditions which implement the reasonable and prudent measures described above. These terms and conditions are non-discretionary.

It is the intent of Service and the FERC, as agreed to with the licensee, that implementation of fish passage at Thompson Falls will occur in systematic phased steps:

**Phase 1 – Fishway Preconstruction and Construction Phase**; (through 2010) includes the planned development and construction of a full-height fishway.

**Phase 2 – Fishway Post-Construction Monitoring and Evaluation**; (mid-2010 through 2020) includes a comprehensive assessment and iterative enhancement of the safe, timely and efficient passage of bull trout (and other species) both upstream and downstream through the facility as well as examination of other bull trout limiting factors in the Project action area.

**Phase 3 - Pre-Licensing and Ongoing Fishway Operations**; (2021 and beyond) is currently not described, but will involve optimal operation of the fishway and become preparatory to FERC relicensing of the Thompson Falls Dam, scheduled to be in process up to five years before the license expires at the end of 2025.

TC1. The following terms and conditions are established to implement reasonable and prudent measure #1. UPSTREAM PASSAGE:

a. During 2009 and 2010, PPL Montana will construct a fish passage facility (permanent fishway) to provide timely and efficient upstream passage at the right abutment of the main dam, as agreed to by the Service and through oversight of the TAC (as provided for in the interagency Thompson Falls MOU).

b. During construction and cleanup, PPL Montana will follow permit procedures as required by the Service, the State of Montana, and U.S. Army Corps of Engineers so that minimal impacts to downstream aquatic resources occur during construction.

c. PPL Montana will determine operational procedures for the passage facility and develop a written operation and procedure manual (SOP) by the end of 2010, with input from the TAC and approval by the Service, updated as needed.

d. For the remaining term of the license (expiring December 31, 2025), PPL

Montana will ensure that operation of the fish passage facility is adequately funded and conducted in compliance with the approved SOP; including activities such as biological studies, transport of bull trout (as needed), and assessment of ladder efficiency.

e. During the Phase 2 evaluation period (2010 through 2020), PPL Montana will provide adequate funding for genetic testing to determine the likely natal tributary of origin of all adult bull trout which ascend the fishway and enter the sample loop, as well as those otherwise captured at the base of Thompson Falls Dam. In order to positively identify natal origin of bull trout at the project, PPL Montana will institute a permanent fish tagging system for all bull trout handled during monitoring and for other fisheries investigation activities in the Project area.

f. During the Phase 2 evaluation period (2010 through 2020), PPL Montana will make a fish transport vehicle available, and provide staff to transport any adult bull trout that is captured at Thompson Falls Dam and determined by the SOP to require transport to upstream waters.

g. In consultation with the TAC, PPL Montana will prepare by January 1, 2011, for Service approval, an action plan for Phase 2 of the evaluation period (2010 through 2020) to evaluate efficiency of the upstream passage facility. The goal will be to assess how effective the ladder is at passing bull trout, the potential length of any delay, the amount of fallback, and the optimal operational procedures to achieve the highest efficiency. During this Phase 2 evaluation period (2010 through 2020) a routine feedback loop will be established and used, as agreed to by the Service, to fine tune operations and will be combined with a variety of experimental and evaluative studies. It may be necessary to conduct research on surrogate species (e.g., rainbow trout) at the discretion of the TAC, in order to facilitate certain of these evaluations. At a minimum, for the remaining term of the license (through 2025), PPL Montana will support a sampling method to annually estimate the total numbers of all species passing through the ladder and adequately characterize the timing of such movements.

h. During the entire Phase 2 evaluation period (2010-2020), the TAC, subject to approval of the Service and with PPL Montana support, will provide adequate oversight of scientific aspects, surveys, studies, and protocols associated with the fish passage aspects of the Project. At the end of the Phase 2 evaluation period (2010-2020), and upon completion and adequate distribution and consideration of a comprehensive ten-year report (due December 31, 2020), PPL Montana will convene a structured scientific review of the project, guided by the TAC. This scientific review will be completed by April 1, 2021 and will develop a set of recommendations to be submitted to the Service for evaluation, modification, and approval; including specific conclusions as to whether the fishway is functioning as intended and whether major operational or structural modifications of the fishway are needed. The review process will culminate, by December 31, 2021, in a revised operating plan for the fishway during the remainder of the existing term of the FERC license (2022 through 2025).

TC2. The following terms and conditions are established to implement reasonable and prudent measure #2. DOWNSTREAM PASSAGE:

a. PPL Montana will provide annual funding to the TAC, as approved by the Service and specified in the Thompson Falls MOU, to conduct offsite habitat restoration or acquisition in important upstream bull trout spawning and rearing tributaries. The purpose is to boost recruitment of juvenile bull trout. This funding is provided to partially mitigate for incidental take of bull trout caused by downstream passage through the turbines and spillways. The annual $100,000 contribution specified for the first term of the MOU (2009-2013) is subject to renegotiation during succeeding terms of the MOU to run from 2014-2020.

TC3. The following terms and conditions are established to implement reasonable and prudent measure #3. GAS SUPERSATURATION:

a. For the remainder of the license (through 2025), in consultation with the TAC and subject to Service approval, PPL Montana will develop and implement operational procedures to reduce or minimize the total dissolved gas production at Thompson Falls Dams during periods of spill. Future modifications to prescribed operations may be determined from ongoing evaluations, as necessary and determined appropriate by Montana Department of Environmental Quality.

b. For the remainder of the license (through 2025), in consultation with the TAC and subject to Service approval, PPL Montana will continue to collaborate with MDEQ, Avista, MFWP, and other entities toward reducing the overall systemic gas supersaturation levels in the Clark Fork River, occurring from a point downstream of Thompson Falls Dam to below Albeni Falls Dam.

c. For the remainder of the license (through 2025), all bull trout detained through the sampling loop at the Thompson Falls Fish Ladder will routinely be examined for signs of gas bubble trauma; with results of such observations permanently recorded. Should GBT symptoms be discovered, then PPL Montana will consult the TAC on the need for immediate corrective actions and subsequently implement any new studies or potential operational changes (to the ladder or the dam) which may be required by the Service and DEQ, in order to mitigate GBT concerns.

TC4. The following term and condition is established to implement reasonable and prudent measure #4. MOU and TAC:

a. Upon completion of construction of the Thompson Falls Fish Ladder (currently scheduled for 2010) and concurrent with initiation of the Phase 2 review period (mid-2010 through 2020) PPL Montana will review the Thompson Falls MOU and collaborate with the signatory agencies as to the need to revise and restructure the MOU. Any such revision should be developed around the 2010-2020 Phase 2 evaluation period and may include appropriate changes to the TAC and its operation. Subsequent revision may occur again in 2021, or as needed based on adaptive principles and subject to approval of the Service and PPL Montana.

TC5. The following terms and conditions are established to implement reasonable and prudent measure #5. THOMPSON FALLS RESERVOIR:

a. During the first five years of the Phase 2 evaluation (2010 through 2015) PPL Montana, with TAC involvement and Service approval, will conduct a prioritized 5-year evaluation of factors contributing to the potential loss or enhancement of migratory bull trout passage through Thompson Falls Reservoir. Goals and objectives for this assessment and scientifically-based methodology will be developed through the TAC and approved by the Service no later than the end of 2010 and will focus at a minimum on better understanding temperature and water current gradients through the reservoir; travel time, residence time, and pathways that juvenile and subadult bull trout select in moving through the reservoir; and an assessment of impacts of predatory nonnative fish species on juvenile and subadult bull trout residing in or passing through the reservoir. The initial findings will be summarized and supported with scientifically based conclusions, no later than the end of 2015, with a goal of adaptively improving survival of juvenile bull trout in Thompson Falls Reservoir as they pass downstream or reside in the system. A second, more comprehensive summary of conclusions and recommendations regarding reservoir impacts will be submitted as part of the scientific review package by the end of 2020 (see TC1h).

b. Based on the interim Thompson Falls Reservoir Assessment (a., above), a timely evaluation of the site specific need for a nonnative species control program in Thompson Falls Reservoir will be conducted by PPL Montana, in collaboration with the TAC agencies (see TC7b., below), no later than the end of 2015, with final recommendations to be approved by the Service.

TC6. The following terms and conditions are established to implement reasonable and prudent measure #6 SYSTEMWIDE MONITORING:

a. For the remainder of the license (through 2025), PPL Montana will ensure that actions at the Thompson Falls Fish Ladder, including tagging, transport, and any tracking of fish movement, are adequately funded and fully coordinated with the Avista project and the management agencies MFWP, CSKT, and the Service. This coordination will include routine communications through the TAC and may require participation in special meetings or discussions to ensure that there is a single seamless fish passage effort for the lower Clark Fork projects.

b. For the remainder of the license (through 2025) PPL Montana will contribute a proportional amount of funding to ensure that fish sampled at the Thompson Falls Fish Passage Facility are processed, analyzed, and integrated into annual updates of the systemwide Clark Fork River genetic database.

c. In consultation with the TAC and with approval of the Service, for the remainder of the license (through 2025), PPL Montana will fund the technology required to track transmittered fish that pass the project as they move through the system. This may include an integrated PIT-Tag scanner at the fishway, mobile PIT-Tag scanning capabilities (wand(s) for use in the field), and radio implantation and tracking of bull trout that move through the sample loop in the ladder. Obligations for tracking transmittered fish by PPL Montana will include at a minimum the portions of the Lower Clark Fork Core Area upstream of Thompson Falls Dam (i.e., mainstem Clark Fork River from Thompson Falls Dam to the confluence of the Flathead River, including tributaries such as the Thompson River) Note: in the lower Flathead River, Jocko River, and other Flathead Reservation waters primary responsibility for tracking is assumed by the CSKT, but close coordination with the Tribes will be maintained by PPL Montana. Broader tracking needs upstream will be determined through cooperation with other entities in the basin (as in TC6a., above).

TC7. The following terms and conditions are established to implement reasonable and prudent measure #7 REPORTING:

a. Annually, by April 1 of each year for the remainder of the license (expires 2025), PPL Montana will prepare and submit to the Service for approval a report of the previous years activities, fish passage totals, and next year's proposed activities and other fisheries monitoring that may result in intentional as well as incidental take of bull trout. The report will quantify the number of bull trout proposed to be incidentally taken by each activity and summarize the cumulative extent of incidental take from all previous year activities.

b. By December 31, 2015, after the first five years of the Phase 2 evaluation period (as described per TC1g., above), PPL Montana will present to the TAC and the Service a comprehensive written assessment of the first five years of fishway operation. This report is partially for the purpose of assessing the need for major mid-Phase 2 modifications to the facility and its operations as well as for consideration of the need for supporting additional bull trout passage or transport above the dam.

c. Annually, by April 1 of each year beginning in 2010 and for the remainder of the license (expires 2025), PPL Montana will archive electronic versions of all biological progress reports (described in TC 1 through TC 7 and dating back to 2005) generated through the Thompson Falls Project. PPL Montana will provide to TAC agencies at no cost, upon request, updated CDs or web-based access to those reports

d. For the remainder of the license (expires 2025), upon locating dead, injured, or sick bull trout, or upon observing destruction of redds, notification must be made within 24 hours to the Service's Division of Law Enforcement Special Agent (Richard Branzell, P.O. Box 7488, Missoula, MT, 59807-7488; (406) 329-3000). Instructions for proper handling and disposition of such specimens will be issued by the Division of Law Enforcement. Dead, injured, or sick bull trout should also be reported to the Service's Kalispell Field Office (406-758-6882).

e. For the remainder of the license (expires 2025), during project implementation the FERC or applicant shall promptly notify the Service of any emergency or unanticipated situations arising that may be detrimental for bull trout relative to the proposed activity.

The reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize incidental take that might otherwise result from the proposed action. With implementation of these measures the Service believes that the likelihood of incidental take will be minimized. If, during the course of the action, the level of incidental take is exceeded, such incidental take represents new information requiring review of the reasonable and prudent measures provided. The FERC must immediately provide an explanation of the causes of the taking and review with the Service the need for possible modification of the reasonable and prudent measures.

For convenience, these Terms and Conditions are summarized in Table 12. Refer to the wording of the Terms and Conditions (above) for more specificity and fuller guidance.

Table 12. Terms and Conditions for Implementing the Reasonable and Prudent Measures Described in the Bull Trout Consultation for the Thompson Falls Hydroelectric Project.

| **T&C** | **Phase 1<br>2008 - 2010<br><br>Fishway Preconstruction and Construction** | **Phase 2<br>Late 2010 - 2020<br><br>Fishway Post-Construction Monitoring & Eval.** | **Phase 3<br>2021 - 2025<br><br>Pre-Licensing and Ongoing Fishway Operations** |
|---|---|---|---|
| 1a | Construct Fishway | | |
| 1b | Comply with Construction Permits | | |
| 1c | | Develop Fishway Operations Manual (SOP) by 12/31/10 | |
| 1d | | Oversee and Fund Fishway Operations | Oversee and Fund Fishway Operations |
| 1e | | Conduct Bull Trout Genetic Testing and Permanent Tagging | |
| 1f | | Transport Tank, Staff As Needed | |
| 1g | Plan Efficiency Studies | Passage Efficiency Action Plan by 1/1/11;<br>Implement Action Plan and Generate Annual Passage Estimates | Implement Action Plan and Generate Annual Passage Estimates |
| 1h | | Support Scientific Oversight by TAC;<br>Comprehensive Phase 2 Scientific Report by end of 2020;<br>Begin Development of Revised 5-year Fishway Operations Plan; | Conduct Scientific Review by 4/1/2021;<br>Adopt and Implement Revised 5-Year Fishway Operations Plan 2021-2025; |

| T&C | Phase 1<br>2008 - 2010<br><br>Fishway Preconstruction and Construction | Phase 2<br>Late 2010 - 2020<br><br>Fishway Post-Construction Monitoring & Eval. | Phase 3<br>2021 - 2025<br><br>Pre-Licensing and Ongoing Fishway Operations |
|---|---|---|---|
| 2a | Implement and Fund Adaptive Management Funding Account (AMFA) | Continue Annual AMFA and Conduct Upstream Offsite Mitigation thru 2013;<br>Renegotiate MOU and Renew AMFA for 2014-2020 | |
| 3a | Implement TDG Minimization Measures | Implement TDG Minimization Measures | Implement TDG Minimization Measures |
| 3b | Collaborate With Systemwide Gas Abatement Effort | Collaborate With Systemwide Gas Abatement Effort | Collaborate With Systemwide Gas Abatement Effort |
| 3c. | | Systematic GBT Exam; Corrective Measures as Required | Systematic GBT Exam; Corrective Measures as Required |
| 4a. | | Revise MOU and TAC, as Needed (2010) | Revise MOU and TAC, as Needed (2021) |
| 5a. | Develop goals, objectives, and methodology for T Falls reservoir Assessment by end of 2010. | Implement T Falls Reservoir Assessment and Submit Interim Report by 12/31/2015;<br>Submit Final T Falls Reservoir Assessment for TC1h Science Review | |
| 5b. | | Recommendation on Need For T Falls Reservoir Predator Control by 12/31/2015 | |
| 6a. | Participate in Seamless Systemwide Fish Passage Coordination | Participate in Seamless Systemwide Fish Passage Coordination | Participate in Seamless Systemwide Fish Passage Coordination |
| 6b. | Contribute Proportionally to Genetic Database | Contribute Proportionally to Genetic Database | Contribute Proportionally to Genetic Database |
| 6c. | Support Tracking of Transmittered Bull Trout Through Lower Clark Fork Core Area | Support Tracking of Transmittered Bull Trout Through Lower Clark Fork Core Area | Support Tracking of Transmittered Bull Trout Through Lower Clark Fork Core Area |

| T&C | Phase 1<br>2008 - 2010<br><br>Fishway Preconstruction and Construction | Phase 2<br>Late 2010 - 2020<br><br>Fishway Post-Construction Monitoring & Eval. | Phase 3<br>2021 - 2025<br><br>Pre-Licensing and Ongoing Fishway Operations |
|---|---|---|---|
| 7a. | Annual Activity, Fish Passage and Take Report by March 1. | Annual Activity, Fish Passage and Take Report by March 1. | Annual Activity, Fish Passage and Take Report by March 1. |
| 7b. | | 5-year ladder assessment report due 12/31/2015 | |
| 7c. | | Annually, by April 1, Update Archived Reports | Annually, by April 1, Update Archived Reports |
| 7d. | Report Dead or Injured Bull Trout | Report Dead or Injured Bull Trout | Report Dead or Injured Bull Trout |
| 7e. | Notification of Emergencies | Notification of Emergencies | Notification of Emergencies |

## Conservation Recommendations

Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information.

Continue to cooperate with MFWP, CSKT, Avista and other entities to promote recovery of bull trout, and to survey and monitor bull trout populations and habitat in the lower Clark Fork River core area and the greater Clark Fork basin.

During the fishway construction, retrieve and remove all loose steel beams and other “junk” from the stilling basin that can be reasonably accessed from the construction roadway.

## Appendix E – One Line Diagram Thompson Falls Hydroelectric Project - CEII to be filed separately

# Appendix F – NorthWestern Shoreline Standards

# NorthWestern Energy Shoreline Standards

Standards for the Design, Construction, Maintenance, and Operation of Shoreline Facilities on NorthWestern Energy Hydroelectric Projects

January 2020

NorthWestern Energy

Delivering a Bright Future

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# Table of Contents

# Introduction

NorthWestern Energy (NWE) owns and operates ten Hydroelectric Dams and one storage reservoir (Hebgen) under licenses issued by the Federal Energy Regulatory Commission (FERC). The general standards described below apply to six of these hydro developments (Madison, Hauser, Holter, Black Eagle and Rainbow on the Missouri-Madison River system, and Thompson Falls on the Clark Fork River).

Compliance with these standards is required for shoreline facilities located on NWE-owned lands. In addition, formal permission for facilities is required from NWE. Compliance with these standards is voluntary when shoreline facilities are not located on NWE-owned lands. Permission to construct shoreline facilities may be required from the landowner and/or local, state, and federal agencies who may require the same or similar standards. Depending on the size and scope of proposed shoreline facilities, formal approval may be required from NWE, resource agencies, and FERC for facilities within a reservoir's FERC Project Boundary.

# Purpose

The purpose of this document is to provide general standards such that shoreline facilities are designed, constructed, maintained, and operated in a safe, effective, and environmentally friendly manner to protect and/or enhance adjacent recreation and natural aesthetic resources. These standards can be used to help prevent haphazard and inconsistent development that could negatively impact the very public and private resources that shoreline landowners appreciate about the reservoirs. Protecting these important resources can also preserve and enhance landowner property values.

Another purpose of this document is to provide information to landowners on NWE, local, state, and federal permit requirements for the construction of shoreline facilities or other activities that affect the shoreline, such as excavation or filling.

# Section 1.0 – Design and Construction Standards for Shoreline Facilities and Bank Stabilization

NorthWestern Energy supports construction and maintenance of shoreline infrastructure and facilities to support recreation use along the reservoirs. Such facilities should be designed to minimize overall size and footprint and shall not impact the biological integrity, natural aesthetic quality, or the overall stability of the shoreline.

The following standards must be followed on NWE owned lands.

## Section 1.1 – Boat Docks

1. **Number**

    a. Noncommercial situations - maximum of one dock for each:
        i. House or cabin on land adjoining the reservoir.
        ii. Private landowner who owns a parcel of land adjoining the reservoir without a house/cabin on their land

    b. Community docks - a single dock having one or more slips that serve several houses or cabin owners is recommended for multi-family type dwellings. Larger docks with multiple slips within the FERC Project Boundary may require NWE, agency, and FERC approval.

    c. Commercial operations may need more than one dock. Commercial operations must consult with NWE on issues such as congestion and impacts to the natural shoreline when reviewing any plans for their operations. Commercial facilities within the FERC Project Boundary also require NWE, agency, and FERC approval.

2. **Design**

    a. All new docks and replacement docks should be floating and removable.

    b. Non-floating docks that are removable and not anchored to the substrate (such as Roll-a-Dock) will be permitted.

    c. Docks must be designed to allow water (caused by waves and boat wakes) to flow under, through, and around them. Solid docks that do not allow water movement must not be used.

3. **Size**

    a. To minimize visual and other impacts to other shoreline uses, docks must be held to minimum functional dimensions. Community docks may require larger dimensions.

b. Docks must not exceed 30 feet in total length if there is 10 feet of water depth at the end farthest from shore. When the depth is less than 10 feet at that point, additional dock length must only be used to the point of reaching the 10-foot depth level. Longer docks may be allowed if they are used by more than one boat owner.

c. Maximum width of a dock is 10 feet.

d. On a T- or C-shaped dock, the maximum width across the head of the T or C must not exceed 40 feet.

e. On an L-shaped dock, the maximum length of the wing section must not exceed 30 feet. This creates a maximum of 40 feet across the head of the L.

f. Under no circumstance can docks impede safe public navigation in the reservoir.

**4. Materials**

a. Docks must be constructed of wood, metal, plastic, fiberglass, or other material standard to the industry.

b. All field-applied preservatives, wood treatments, carpet, glue, paint, varnish, and other such materials must meet local, state, and federal standards for marine applications.

c. Approved preservatives must be brushed, sprayed, dipped, or soaked in such a manner that the preservative is not allowed to drip, spill, or otherwise enter the water.

d. Molded foam or other floating material must be enclosed or sealed to avoid breakup and/or scattering of loose material. If breakup and/or scattering of loose material occurs, the source must be repaired immediately and the loose material must be removed from the reservoir by the owner.

e. Skids made of a durable material such as wood or metal must be used when removing and installing docks to prevent shoreline and/or dock damage unless the dock is lifted in and out of the water.

f. Natural, non-contrasting exterior finishes or colors such as natural wood, earth tones, or other colors found in the area must be used for all visible surfaces. An exception is reflective markers used for safety reasons.

g. Anchor materials must be of pre-formed concrete, rock, steel block, or driven pipe with adequate nylon or polypropylene rope or non-corrosive metal cable.

**5. Dock Removal and Installation**

a. Docks should be removed before ice-up in order to prevent ice damage.

b. Docks may be installed anytime the owner wishes to install them after ice-melt. Delayed installation until after spring runoff is highly recommended.

**6. Timeframes for Implementation of Dock Standards**

a. If existing docks do not meet the above standards, dock owners must consider taking steps to meet these standards when docks are replaced or with dock maintenance or upgrade involving more than 20% in-place/in-kind reconstruction.

## Section 1.2 – Bank Stabilization

There are many techniques and designs currently implemented with the best of intentions to stabilize actively eroding banks. Each approach requires a different level of excavation, disturbance, and associated risk of failure. Therefore, the need to complete bank stabilization activities is, at times, questionable. To some extent, erosion and other processes associated with an unstable bank can be natural, and construction of a bank stabilization project may cause more environmental harm than good to that shoreline and adjacent properties. Thus, bank stabilization projects need to be reviewed on a case-by-case basis by NWE.

If active bank restoration is deemed necessary, NWE promotes the development of a design relying on the use of natural materials and deep-rooting native vegetation to create a resilient, stable bank.

When developing a bank stabilization project design, the project must incorporate the following general standards. These standards may be adjusted in consultation with NWE on a case-by-case basis.

**1. Design**

a. Mimic nearby functioning, stable banks where possible. As seen from plan and elevation views, bank shape and angle should fit with existing stable banks up/down stream/shore.

b. Preferred design alternatives are: sloping back a vertical bank to an angle of ≥ 2:1 and planting native, woody vegetation, creating a profiled wetland bench, or using suitable sized gravel or cobble on the toe of the bank to mimic natural conditions that would be found at that site. These are preferred alternatives to using armored rock riprap on the toe of a steep reservoir or riverine bank.

c. Retaining walls have a variety of negative impacts. Therefore, they are the least desirable method of bank stabilization and will likely not be approved by NWE.

d. Disturbance of existing vegetation should be minimized as much as practical during construction. Any disturbed areas should be re-seeded and planted with native vegetation to provide soil and bank stability.

e. Landscape fabric made of natural fiber such as coir may be used in a design for short-term stability and soil retention as long the material will naturally break down over time.

**2. Shoreline Revegetation**

a. The desired finished bank slope for revegetation is 2H:1V (60%) or less.

b. Apply at least eight inches topsoil if needed to create suitable growing conditions.

c. Deep-rooted native vegetation such as shrubs and trees are preferred to provide soil stability. Grasses, while generally shallow-rooted, can provide short-term protection and moderate site conditions to aid in the establishment of more permanent vegetation. Note shrubs and trees growing in nearby stable areas to determine what may work best to revegetate your project.

d. If landscape fabric is used, seed grass before the erosion blanket is placed down. Planting of woody shrubs or sprigging dormant willow cuttings through the fabric is encouraged.

Refer to local professionals or technical guides to determine what plants and methods of propagation are suitable.

**3. Limited Shoreline Excavation**

a. Shoreline excavation should only be utilized when banks are very steep and no other means is available to provide access to the water (e.g. boat dock). Excavation for things such as a daylight basement or to facilitate landscaping must be avoided.

b. The magnitude of excavation must be limited and match the need. Excavating a landowner's entire frontage on the reservoir will only be considered for bank stabilization projects. Excavation for access to the water should be minimized as much as practical, such as a narrow foot path, and will only be considered when no other access is feasible.

c. The shoreline must be preserved in its natural condition to the greatest extent possible to protect fish and wildlife habitat, scenic quality, and water quality.

d. Erosion must be minimized to the greatest extent possible to protect fish habitat and water quality.

e. Material excavated from the streambed or banks shall be removed entirely from the stream and floodplain and deposited in such a manner to prohibit re-entry of the material into the stream during high water. Temporary stockpiling of excavated material anywhere in the floodplain must not occur except during active construction.

f. Excavation must leave the slope at a ratio of 2:1 or less.

**4. Shoreline Walkways and Stairways**

a. Structures allowed will be constructed so as not to concentrate runoff into the reservoir.

b. Structures shall be constructed on the existing terrain. Stones, gravel and wood are recommended travel surfaces as opposed to concrete.

**5. Other Shoreline Projects**

Other shoreline development projects not specifically covered by the described shoreline standards must be reviewed on a case-by-case basis.

# Section 2.0 – NWE, Local, State and Federal Permit Requirements

Individuals planning to construct a dock or other shoreline facility are responsible for obtaining all applicable local, state, and federal permits before beginning construction. Following is a list of NWE, local, state, and federal permits that may be required.

## Section 2.1 – Zoning Regulations and Floodplain Permit

Zoning regulations and/or a floodplain permit may be applicable. Contact the county planning office.

## Section 2.2 – 310 Permit

Montana's Natural Streambed and Land Preservation Act, also known as the 310 Law, is a state law which requires a 310 Permit from the local conservation district prior to any work in or near a year-round (perennial) stream or river on private or public land. Contact the local conservation district.

## Section 2.3 – Army Corps of Engineers 404 Permit

This permit is required for any activity that will result in dredging and/or the discharge or placement of dredged or fill material into waters of the United States. Waters of the US include lakes, rivers, streams, wetlands, and other aquatic sites. Contact the Army Corps of Engineers.

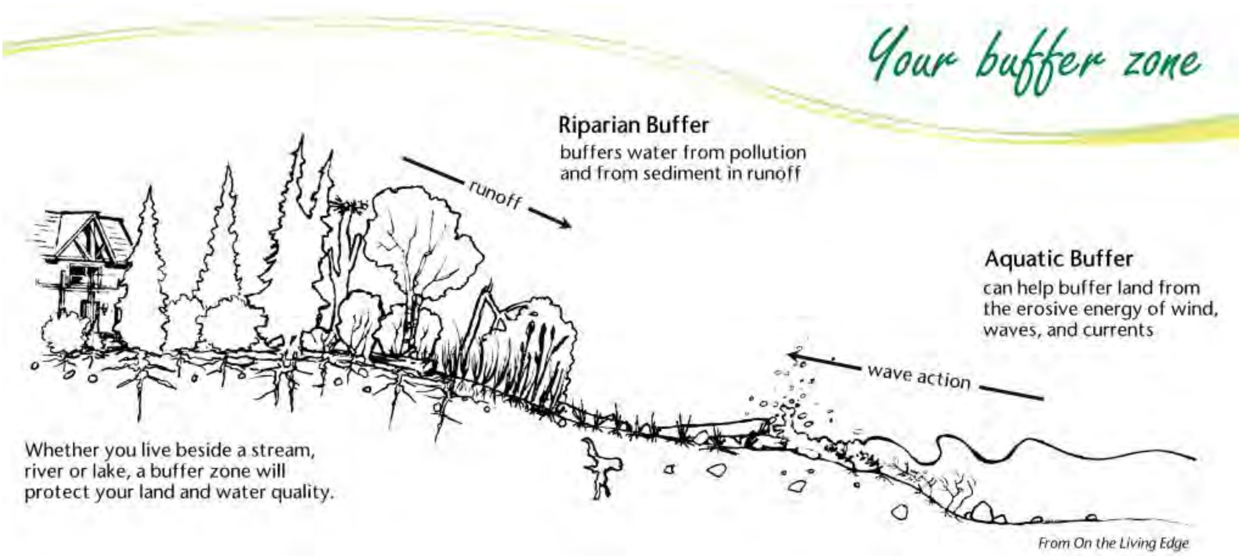
**Army Corps of Engineers**
10 West 15th Street, Suite 2200
Helena, MT 59626
Phone: 406-441-1375

## Section 2.4 – NWE

NWE owns land in a number of places along reservoirs shorelines. Written permission is required from NWE before any shoreline development occurs on these lands. Since any activity along the shoreline also requires a 310 Permit from the local conservation district, NWE and the conservation districts coordinate review and approval of 310 Permit applications. When NWE does not own the land, 310 Permit applications will be handled through the local conservation district's normal process.

# Section 3.0 – Maintenance of Shorelines and Facilities

Shorelines covered by robust vegetation benefit shoreline property owners by minimizing bank erosion, requiring little maintenance, and providing attractive green space to people and wildlife alike. Vegetation also provides shade to the adjacent waterbody, reducing solar influences on water temperatures. An intact shoreline with robust vegetation benefits the environment by slowing down runoff, filtering water, buffering floods, reducing soil erosion, storing carbon, and providing habitats for insects, fish, and wildlife.




**Source:** https://mla.on.ca/web/default/files/Storage/Pictures/your%20buffer%20zone%20waterfront.JPG

NWE provides the following recommendations for shoreline and facility maintenance to support a living shoreline.

1. A riparian buffer should be maintained for a minimum distance from the water to the top of the bank or six feet, whichever is greater. Within this buffer strip, vegetation should be allowed to grow unaltered. Pruning vegetation should be limited to along walkways and should only be done to the extent necessary to allow unimpeded travel.

2. Pesticides, herbicides, and fertilizers shall not be applied near the water, bank, or in proximity to the shoreline whereas runoff from application of such may enter the water.

3. Vehicle use below the high bank is prohibited.

**4.** Recreational fires for the purpose of cooking, warming, and pleasure are permitted within the confines of a manufactured fire pit. Fuel must be clean wood or lumber with no paints or treatments, paper, cardboard, or charcoal. No burning of man-made materials is allowed. All recreation fires must be limited to three feet wide and three feet tall. All other burning of any or all material below the high bank is prohibited.

**5.** Shoreline infrastructure shall be maintained in a functional, intact condition.

# Section 4.0 – Contacts

For more information, please contact:

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# Appendix G – CONFIDENTIAL – Cultural Resources Report - to be filed separately