

NorthWestern[®] Energy

Delivering a Bright Future

Thompson Falls Hydroelectric Project No. 1869

**Proposed Study Plan Meeting
January 6, 2021**



Thompson Falls Hydroelectric Project Relicensing Proposed Study Plan Meeting

- **Video and Audio:** Keep OFF, unless you are speaking as a presenter or called on to ask a question.
 - Phone controls for participants – *6 – to toggle mute/unmute.
- **Asking a Question:** During the Q&A – click on the “Chat” icon and type your question or click on the “Raise Your Hand” icon to be recognized; once recognized, please unmute yourself and ask your question.
 - Phone controls for participants – *9 – to raise hand.
- **Technical Difficulties:** If you are having technical issues, please contact Lydia Holland at 916.200.8233, lholland@geiconsultants.com, or use the “Chat” function.
- **Accurate Attendance:** If you are shown by a phone number or abbreviated name please send Lydia Holland a message via “Chat” to capture your attendance.
- **Agenda:** The time for each segment of the schedule will be maintained.

Daytime Meeting January 6, 2021	
Start Time	Topic
9:00 AM	Introduction and Zoom Tips, Overview of the FERC Process
9:25 AM	Operations Study
10:25 AM	BREAK (10 minutes)
10:35 AM	Tailrace Fish Behavior and Hydraulic Conditions Studies
11:35 AM	Downstream Transport of Bull Trout Study
12:05 PM	Westslope Cutthroat Trout Genetics Study
12:25 PM	BREAK (30 minutes)
12:55 PM	Water Quality and TDG Studies
1:25 PM	Visitor Use Survey
1:45 PM	Cultural Resource Study
2:00 PM	Adjourn

- Introductions
 - NorthWestern representatives and consultants representing engineering, operations, legal, and hydro license compliance (including biologists, water quality experts and cultural, land, and recreation specialists)
 - FERC representatives
- We will be recording attendance and providing copies of the slides at <https://www.northwesternenergy.com/environment/thompson-falls-project/thompson-falls-relicensing>

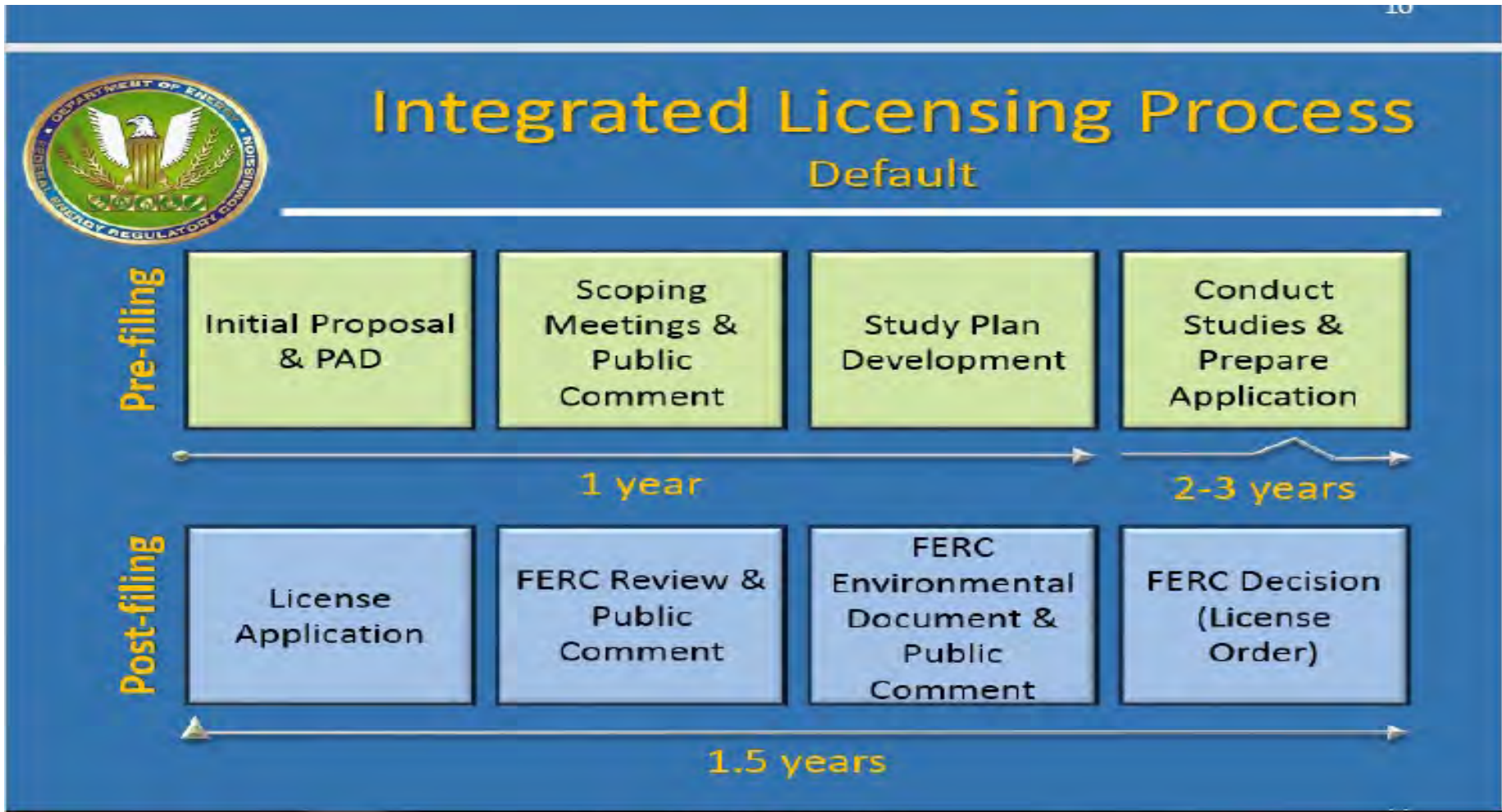


Thompson Falls Hydroelectric Project



Licensed by the Federal Energy Regulatory Commission (FERC)

- 1938 – Original License
- 1979 – License was renewed for 40 years
- 1990 – Major Modification to the License for additional powerhouse
- 2025 – License expires



Date	Completed Relicensing Steps
Jul 1, 2020	NorthWestern filed PAD/NOI
Aug 28, 2020	FERC issued notice the relicensing is commencing and SD1
Oct 27, 2020	Comments on the PAD/SD1 and study requests were due (*)
Dec 9, 2020	FERC issued SD2
Dec 11, 2020	NorthWestern filed Proposed Study Plan (PSP) (**)
Jan 6, 2020	NorthWestern holds PSP Meeting

* On site scoping meeting waived by FERC due to COVID-19

**PSP available at

- <https://www.northwesternenergy.com/environment/thompson-falls-project/thompson-falls-relicensing>
- FERC library at <https://elibrary.ferc.gov/eLibrary/search>

Date	Future Relicensing Steps
Mar 11, 2021	Comments on the PSP are due to FERC
Apr 12, 2021	NorthWestern files Revised Study Plan (RSP)
Apr 27, 2021	Comments on the RSP due to FERC
May 12, 2021	FERC Study Plan Determination (*) NorthWestern conducts first season studies
May 12, 2022	NorthWestern files Initial Study Report
May 27, 2022	Comments on Initial Study Report due to FERC

* Agencies and Tribes with mandatory conditioning authority may request a formal dispute resolution process regarding FERC’s Study Plan Determination within 20 days of the Study Plan Determination



NorthWestern Energy's Proposed Studies

Studies will provide the information on potential effects of the project which FERC needs to complete its Environmental Assessment and to make an informed decision on the License Application.



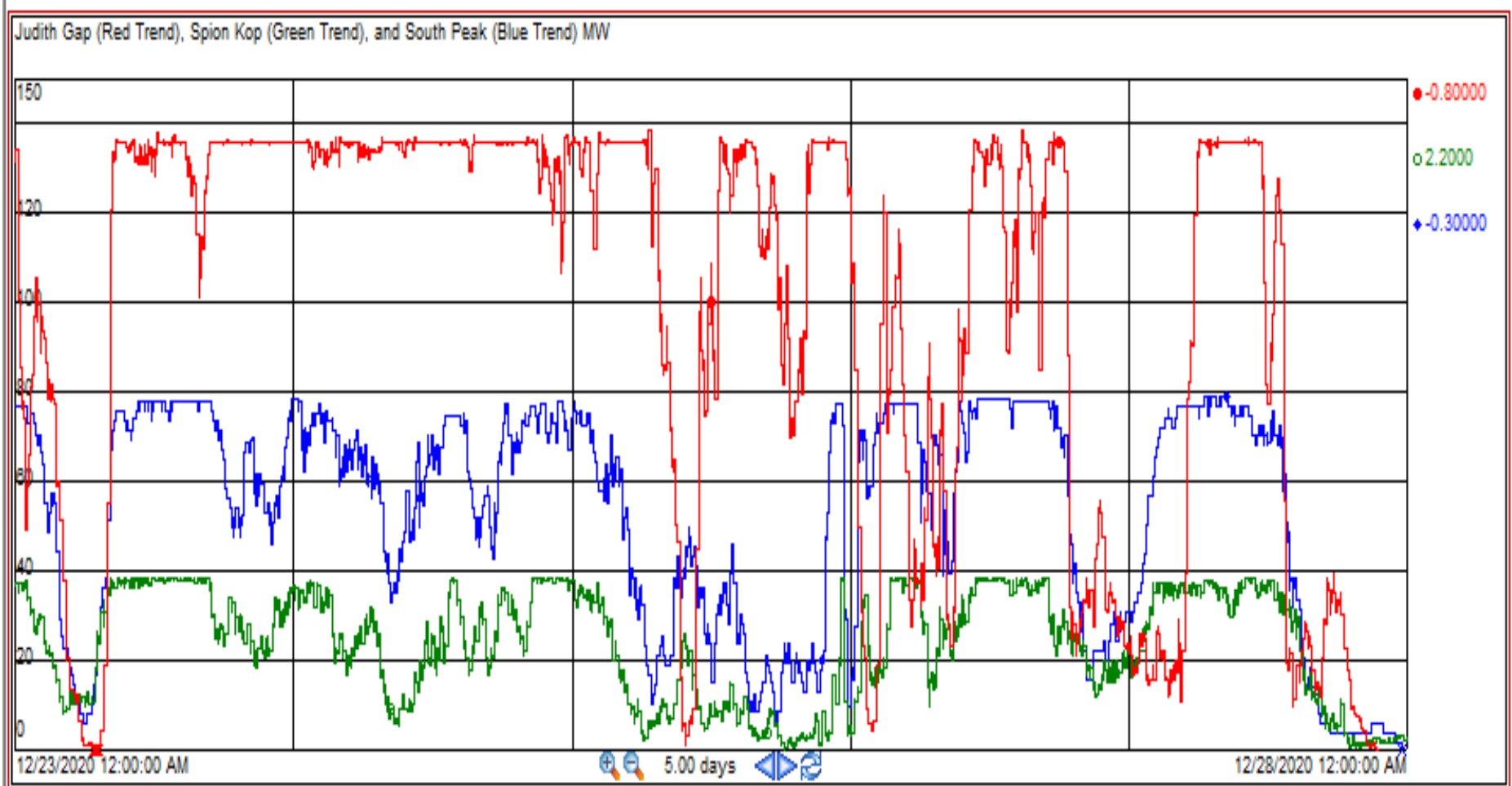


Proposed Study 1 – Operations Study

- Flexible Capacity

- Required to maintain grid stability by balancing electrical inputs and outputs on our system.
- Load (consumption) changes throughout the day and seasons.
- Generation changes dynamically due to intermittent resources and plant availability.
- Increased or decreased generation from the Thompson Falls plant supports grid stability by using available reservoir volume.

Proposed Study 1 – Operations Study Variable Generation



Operations Study Goals

1. Validate and quantify flexible capacity capability and benefits of the plant under multiple operational scenarios.
2. Evaluate the effects of flexible capacity operations and possible impacts on project resources.

- Operations Test was conducted in October of 2019.
- Test was a single operation event increasing generation to maximum plant output and maintaining maximum plant output until the top 4 feet of reservoir volume was utilized.
- Test was a snapshot of the maximum utilization of the reservoir elevation allowed by current FERC License.
- Resource impacts were observed during the test.
- Based on observed resource impacts and input from local residents, NorthWestern made the decision to propose that future operations only utilize the top 2.5 feet of reservoir rather than the 4 feet allowed under the current License.

- Study Objectives

- To simulate operational scenarios of flexible capacity at the project to determine plant generation outputs, rate, and degree of reservoir elevation changes.

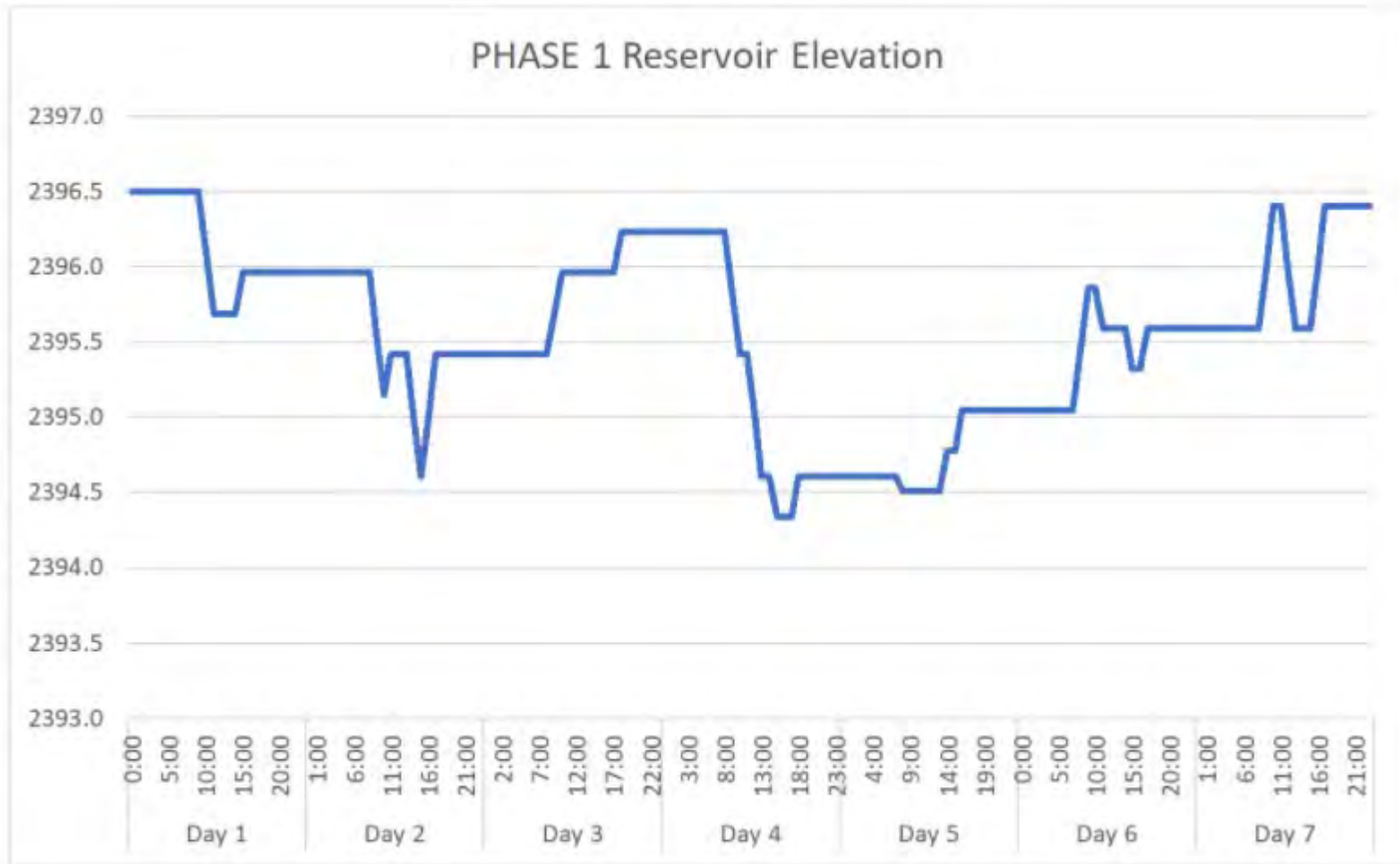
- Study Description

- This study will simulate operational scenarios of flexible capacity at the project.
- The study will be implemented in three phases with different levels of generation and corresponding reservoir elevation changes.
- Minimum downstream flow of 6000 cfs will be maintained throughout the study.
- The reservoir will be maintained between full pool and 2.5 feet below full pool throughout the study phases.

- Test will be conducted in three separate phases
 - Phase 1 – low flexible capacity (20 MW)
 - Phase 2 – moderate flexible capacity (40 MW)
 - Phase 3 – maximum flexible capacity (max available)
- Each phase will be 7 days long.
- Minimum of 2 weeks break will be implemented between phases.
- Minimum of two operations per day that would include an increase or decrease in flexible capacity for differing durations.
 - Flexible capacity “operations” are a prescribed increase or decrease in generation for a set duration (i.e., 20 MW increase for 90 minutes or 40 MW decrease for 30 minutes).
- A 4-hour static hold will be maintained at each 0.5 feet reservoir increment throughout the full study.
- The full study will be completed during recreation season from July 1 to September 30 and with inflows under 23,000 cfs and over 6,000 cfs.



Example of potential reservoir elevations during Phase 1



- Resource areas to be evaluated
 - Operations
 - Shoreline Stability
 - Fisheries
 - Recreation & Aesthetics
 - Public Safety
 - Water Quality
 - Wetland/Riparian Habitats
 - Cultural Resources

- Operations
 - Simulate flexible capacity scenarios to determine plant generation outputs, rate, and degree of reservoir elevation changes.
- Shoreline Stability
 - Determine effects of operations on shoreline stability around the reservoir.
- Fisheries
 - Determine the potential effects of operational scenarios on fish populations, fish access to tributaries, and operations of the fish passage facility.
- Recreation & Aesthetics
 - Evaluate potential effects of project operations on public and private boat launches and docks, and on the aesthetic qualities of the reservoir.

- Public Safety
 - Determine potential effects of project operations on public safety including changing water levels in the reservoir and below the powerhouse.
- Water Quality
 - Evaluate any potential changes in water quality related to the project operations.
- Wetland/Riparian Habitats
 - Determine potential effects of project operations on wetland and riparian areas within and adjacent to the project boundary.
- Cultural Resources
 - Determine potential effects of project operations on documented cultural properties located in the reservoir fluctuation zone.

Proposed Study 1 – Operations Study

Shoreline Stability Study Area

- Study includes shorelines extending from the dams upstream to the mouth of the Thompson River.
 - Includes the majority of developed lands in the project boundary.
 - Shorelines and embankments upstream of Thompson River and downstream of the dams are comprised of large substrate and bedrock where erosion is not a concern.



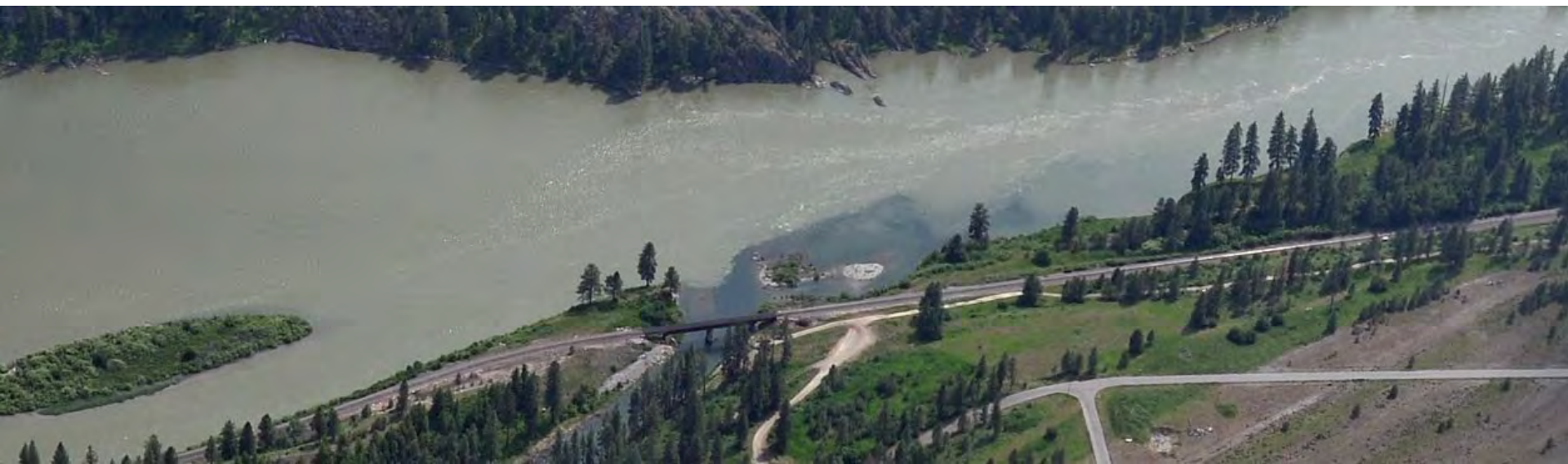
- Nine established reference points representing a diversity of soil types, slope, aspect, vegetation, and land use.
- Visual observations made on a 300-foot reach at each reference point during each site visit during the study.
- Document the presence of erosion, type and magnitude of erosion, soil type, land management activities, and existing erosion control measures.
- Photo documentation of each site visit.
- Reference Point Site Visits:
 - October 2020 – establish a baseline
 - Spring 2021
 - Summer 2021 after Phase 1
 - Summer 2021 after Phase 2
 - October 2021 final monitoring after Phase 3





Proposed Study 1 – Operations Study Fisheries Study Area

- Fish Stranding: Exposed islands and shoreline habitats in Thompson Falls Reservoir below Cherry Creek and near the islands above Thompson River.
- Habitat condition observations at the mouth of the Thompson River and Cherry Creek.
- Conditions within the fish ladder.



- Establish 200-foot transects in shallow habitats less than 2.5 feet deep at full pool (fluctuation zone).
 - Three transects on exposed mid-channel island areas and three transects along exposed shoreline habitats below Cherry Creek and near the islands above Thompson River.
 - Observers will walk the transect recording species, total length, and weight of any fish observed within 15 feet on either side of the transect line.
- Established photo points at tributary confluence and 500 feet upstream to visually capture any changes in habitats.
- Level loggers deployed at tributary confluences and cross-sectional area measured.
- Fish passage facility operated as normal and observations made of pool water levels and operation of workstation.



Proposed Study 1 – Operations Study Recreation & Aesthetics Study Area

Focus on shoreline facilities from the dam upstream to the mouth of the Thompson River and Sandy Beach dispersed recreation site.



- Reference points established at boat launches, docks, and public viewing areas.
- Reservoir divided into four sections to identify subset of 40 representative docks:
 - Boat barrier upstream to Steamboat Island
 - Steamboat Island upstream to Salish Shores boat launch
 - Salish Shores boat launch upstream to Cherry Creek boat launch
 - Cherry Creek boat launch upstream to Thompson River
- Documentation of any impact to docks or gangways, including photos, will be captured at each reference point at the lowest reservoir elevation.
- Depth of water, length of submerged ramp, impacts to dock use, and exposed shoreline at access points will be evaluated at boat launches.
- Elevation changes will be monitored for any impacts to public recreation at Sandy Beach.
- Any changes in aesthetics documented through photos and observations.

- Study Area
 - Sandy Beach dispersed recreation site below original powerhouse.
 - High traffic areas in Thompson Falls Reservoir.
- Methods
 - Monitoring and observation of shallow water areas during static hold times for each Phase.
 - Assess the public safety risk associated with changing water levels.



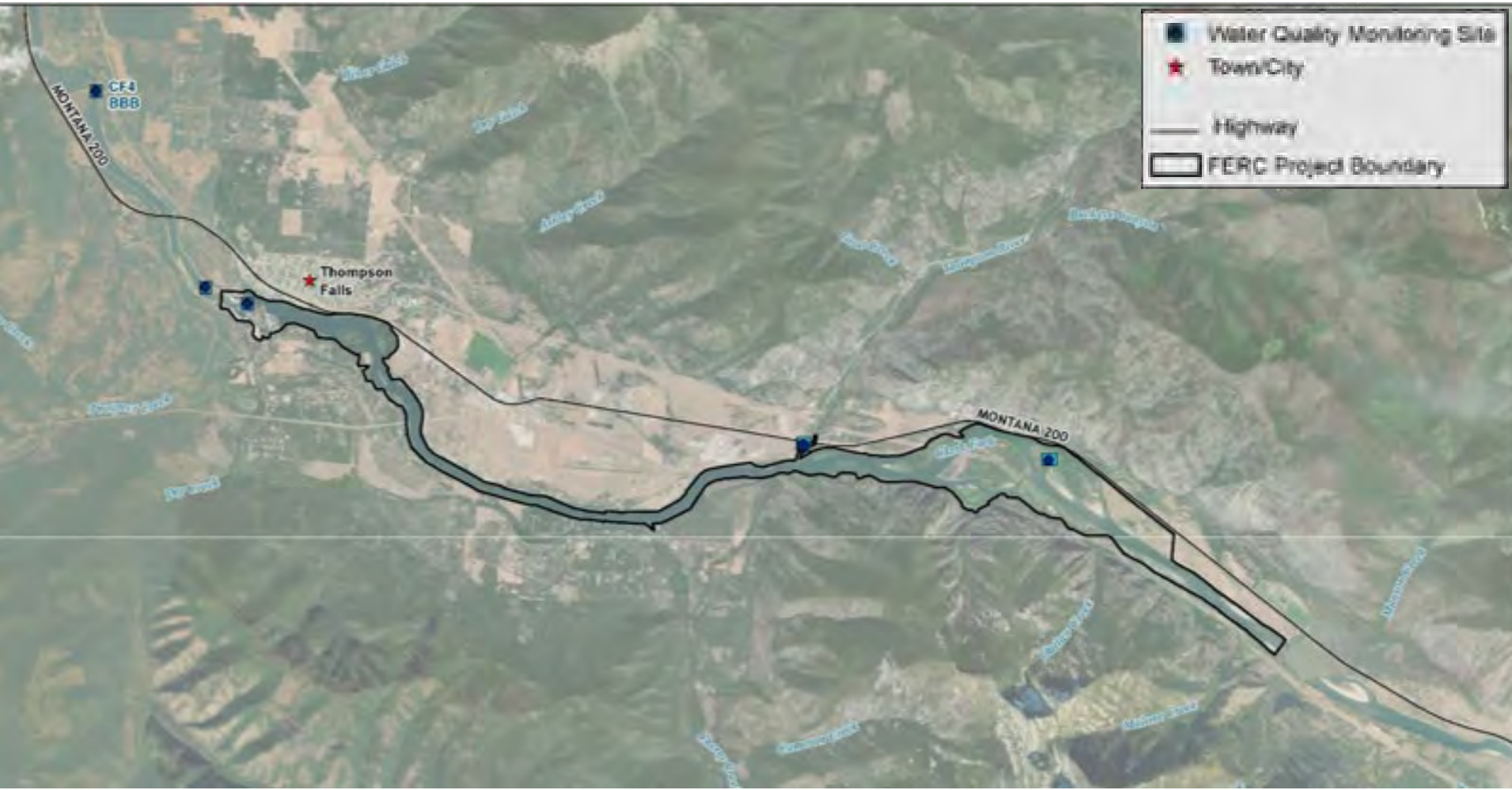
Proposed Study 1 – Operations Study Water Quality Study Area

• Water Quality Instruments

- Upstream of Dry Channel Dam
- Birdland Bay Bridge

• Water level (stage) recorders

- Islands above Thompson River
- Mouth of Thompson River
- Downstream of Powerhouses



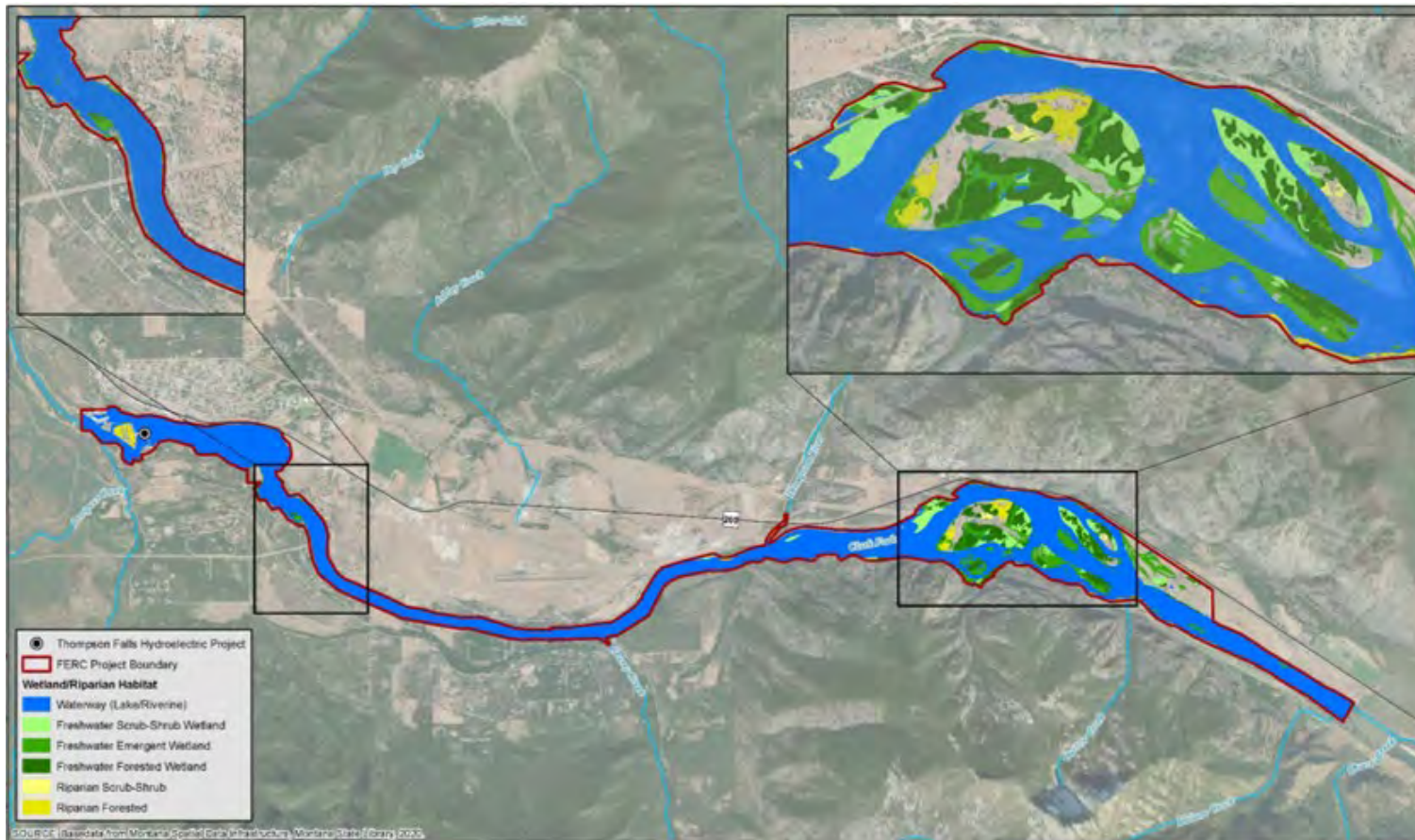


- Water level recorders will be set to record water stage on 5-minute intervals to evaluate reservoir elevation change throughout the project.
- Instruments will be deployed and programmed to record water quality parameters every 15 minutes.
- Parameters
 - Turbidity
 - pH
 - Specific conductivity
 - Dissolved oxygen
 - Temperature
 - Depth



Proposed Study 1 – Operations Study Wetland/Riparian Habitats Study Area

- In Thompson Falls Reservoir focusing on known wetland habitats near Steamboat Island and upstream of the Thompson River.
- Wetlands identified using Montana Spatial Data Infrastructure Wetlands Framework.





- Measurement of changes in water level with level loggers and/or piezometers.
- Visual observations of identified Wetland and Riparian areas.
- Risk to each wetland and riparian area ranked as high, medium, or low by evaluating:
 - Potential hydrologic connection alteration due to reservoir fluctuations
 - Soil type
 - Slope
 - Distance from ordinary high-water mark

- Study area consists of the locations of known archaeological properties at or near the reservoir high water line.
- 3 known properties
 - Salish House
 - Prehistoric and historic artifact scatter
 - Chinese railroad encampment
- Methods
 - Effects of reservoir elevation changes will be observed and recorded.
 - Observations documented on site monitoring forms based on Project Archaeology's Montana Site Stewardship Program Site Monitoring Form.

- Preparatory work prior to the FERC Study Plan Determination
 - Identifying baseline conditions
 - Establishing reference points
 - Identifying sampling sites
 - Preparing maps
- First Study Season
 - All three phases will be scheduled when inflows are below 23,000 cfs and above 6000 cfs and during the recreation season between July 1 and September 30.
 - Each phase will be implemented in coordination with the other seven proposed studies.

- NorthWestern will develop a Final Study Report which will include
 - Data summaries
 - Assessments of observations
 - Photo documentation
 - Conclusions from resource evaluations
- Data compilation, analysis, and drafting of report will take place after Phase 3 is completed.
- Operations Study Report will be included in the Initial Study Report be filed on or before May 12, 2022.

- **Guidelines for Asking a Question**

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Proposed Study 4 – Hydraulic Conditions



- Result of 2008 Biological Opinion requirement to conduct a scientific review of the passage facility.
- The scientific review panel recommended a hydraulics study in the near field downstream of the project and a fish behavior study.
- Flow modeling results will be compared to fish behavior data to provide information on effectiveness of passage facility and help describe fish behavior within the area.



- Combine a bathymetric survey and available LiDAR data to develop a digital elevation model from the Main Channel Dam downstream to the High Bridge.

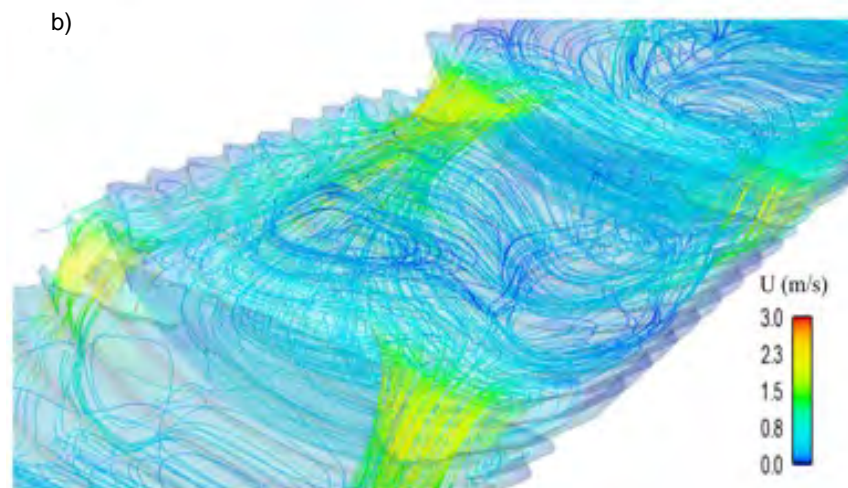
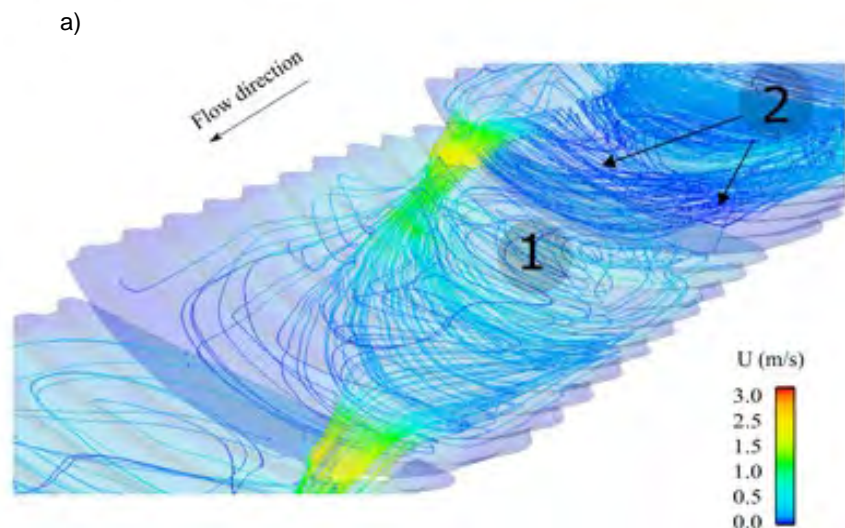




Phase 1:

2D simulation to provide overview of hydraulics and a wider range of flow rates.

- Overview of river channel hydraulics to identify areas to focus and refine modeling
- Up to 4 flow rate simulations
- Flow depth and depth average velocities with 2D
- Use Flow-3D software





Phase 2:

3D simulation at key identified flow rates and locations based on 2D findings.

- Further refine model in key areas such as fish passage entrance and falls area.
- 2 flow rate simulations.
- Flow depth, vertical velocities at different depths.



Proposed Study 4 – Hydraulic Conditions Schedule

Timing	Activity
July–Aug 2021	Bathymetric survey
Aug–Oct 2021	Phase 1 hydraulic modeling
Nov 30, 2021	Interim Report distributed to Relicensing Participants (2D)
Dec 30, 2021	Comments due to NorthWestern on Interim Report
Feb–April 2022	Phase 2 hydraulic modeling (3D)
May 12, 2022	Final Study Report distributed to Relicensing Participants



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Proposed Study 5 – Fish Behavior



- Evaluate fish movement through the Zone of Passage (ZOP).
- Assess the effectiveness of upstream fish passage and residual project influences.
- The scientific review panel recommended a fish behavior study using radio telemetry to evaluate fish interaction with the ZOP.

- The telemetry monitoring efforts will focus on assessing fish movement, including
 - Travel time from the far field to the near field.
 - Movement patterns (e.g., left bank, right bank) in the near field (Main Channel Dam area).
 - Travel time from the near field (the falls area) to the entrance of the fish passage facility.
 - Proportion of fish that enter the ZOP and locate the entrance of the fish passage facility entrance.
 - Locations where fish hold within the ZOP.

Proposed Study 5 – Fish Behavior Study Area



Proposed Study 5 – Fish Behavior Study Area (ZOP)



- | | |
|------------------|--|
| Far Field | Downstream of fishway/dam where powerhouse and spill serve as primary attraction to migrating fish |
| Near Field | In proximity to fishway where fishway attraction flow may lure fish to entrance |
| Entry | Immediately downstream of entrance channel/gate where fishway discharge dominates hydraulics/velocity field/fish behavior |
| Internal Passage | Hydraulics, structure, and fish movement with the ladder (i.e., entrance channel, pools, trap, exit channel) |
| Exit | Immediate upstream of the fishway exit gate/exit channel where inflow into fishway dominates hydraulics/velocity field/fish behavior |
| Upstream | Beyond the influence of the fishway into the reservoir/impoundment |

- Related to Bull Trout, surrogates are needed to make inferences where appropriate.
 - Size.
 - Swimming capability.
 - Migration timing.
- Radio and PIT tag 50 Brown Trout and 50 Rainbow Trout captured from Thompson River.
 - Depth and activity tag sensors.
 - Assumed some level of upstream motivation.



Release radio tagged fish at Flat Iron boat launch (4 miles downstream).



Proposed Study 5 – Fish Behavior Methods – Fixed Receiver System



- Combining the behavioral data and hydraulic modeling data to help identify potential project influences (e.g., velocity fields) in the near field that may affect conditions for upstream fish passage.
- Complete a literature review of the relative swimming capacities and behaviors of salmonids to gain further understanding of combining the behavioral and hydraulic modeling results and included as part of this fish behavior study.

Table 6-1: First Study Season Schedule. Brown Trout movement

Timing	Activity
Jun, Jul and/or Sep 2021	Sampling and tagging Brown Trout in the Thompson River and release downstream of study area
Jun–Oct/Nov 2021	Monitor Brown Trout movement
Dec–Apr 2022	Analyze data and prepare Initial Study Report
May 12, 2022	Initial Study Report for Fall 2021 Results

Table 6-2: Second Study Season Schedule. Rainbow Trout movement

Timing	Activity
Jan–Feb, 2022	Planning, acquiring equipment, testing equipment and procedures
Mar, April, and/or May, 2022	Sampling and tagging Rainbow Trout in the Thompson River and release downstream of study area
Mar–Jul, 2022	Monitoring Rainbow Trout movement
Aug 2021–April 2023	Analyze data and prepare Final Study Report
May 12, 2023	Final Study Report of 2021 and 2022 results

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Proposed Study 6 – Downstream Transport of Bull Trout

Proposed Study 6 – Downstream Transport of Bull Trout

Goals & Objectives

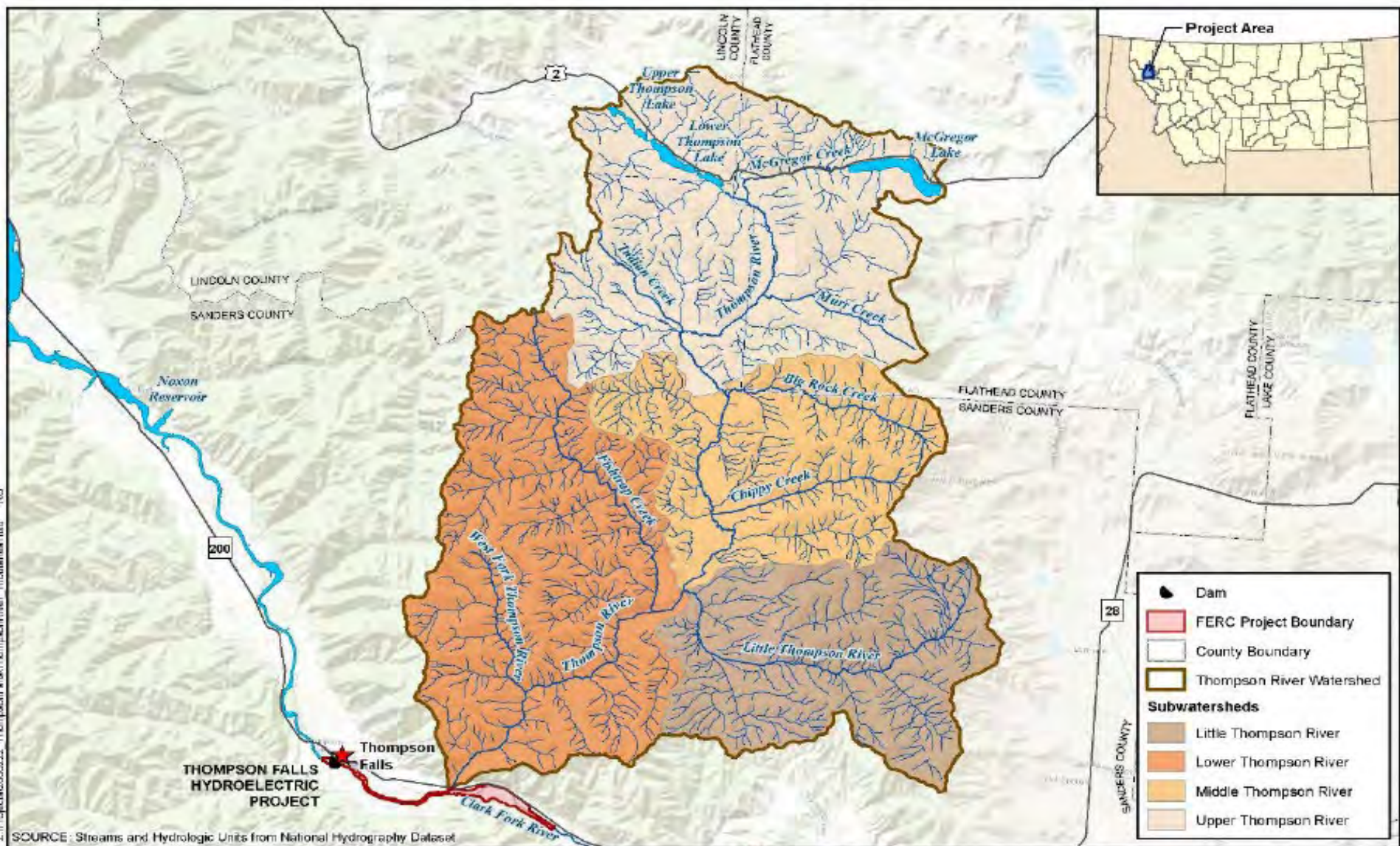
- Evaluate the feasibility of collecting and transporting juvenile Bull Trout from Thompson River tributaries to Lake Pend Oreille.
- Determine the most efficient and effective capture methods, location, and seasonal timing of juvenile Bull Trout in Fishtrap Creek and West Fork Thompson River.
- Assess downstream transport feasibility.
- Evaluate juvenile Bull Trout survival during transport.



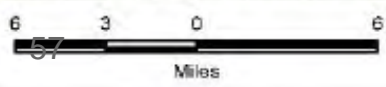
- Out-migrating juvenile Bull Trout from Thompson River may reside in Noxon Rapids Reservoir. As adults, they can migrate upstream to their natal stream using the fish passage facility at Thompson Falls Dam.
- Alternatively, they may continue their downstream movement to Cabinet Gorge Reservoir, or further to Lake Pend Oreille.
- Lake Pend Oreille represents the best available habitat for migratory Bull Trout in the Lower Clark Fork.
- NorthWestern proposes a study to collect and transport juvenile Bull Trout from the Thompson River to Lake Pend Oreille. The study would help evaluate the feasibility of collecting and transporting suitable numbers of juvenile Bull Trout downstream from the Thompson River drainage.

Proposed Study 6 – Downstream Transport of Bull Trout

Study Area



SOURCE: Streams and Hydrologic Units from National Hydrography Dataset



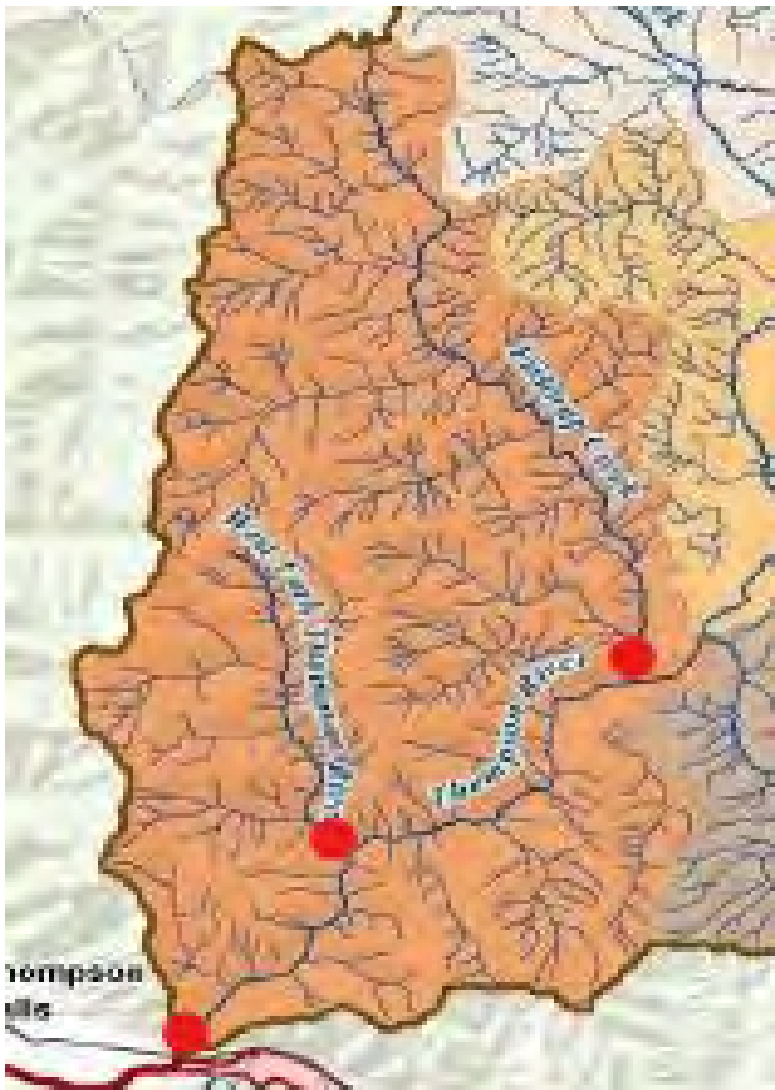
Thompson Falls Hydroelectric Project #1869
 Proposed Study Plan
 Sanders County, Montana



THOMPSON RIVER AND TRIBUTARIES
 DECEMBER 2020



Proposed Study 6 – Downstream Transport of Bull Trout Study Description



- 3 PIT antenna arrays.
- Weir operation near PIT arrays in West Fork Thompson River and Fishtrap Creek.

Proposed Study 6 – Downstream Transport of Bull Trout

Methods

- Electrofish and picket weir traps operated during October and November.
- Lower sections of Fishtrap and West Fork Thompson River.
- PIT tag up to 200 Bull Trout, 120-250mm and transport 75% downstream to Lake Pend Oreille, release 25% onsite.
- PIT tag Bull Trout during summer monitoring efforts.
- Minimum of 10 days electrofishing effort, weir traps operate Mon-Fri during Oct & Nov.
- Maintain & operate PIT antenna array in Thompson River, Fishtrap Creek, and West Fork Thompson River.





Proposed Study 6 – Downstream Transport of Bull Trout Schedule

Timing	Activity
2020–2023	Operate existing PIT-tag antenna arrays
July 15–August 31, 2021 and 2022	PIT-tag Bull Trout captured during abundance monitoring
Oct–Nov 2021 and 2022	Capture and transport juvenile Bull Trout from West Fork Thompson River and Fishtrap Creek
April 1, 2022 and 2023	Include data on PIT-tag detections in annual license compliance monitoring
May 12, 2022 and 2023	Initial and Final Study Reports

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**Proposed Study 9- Westslope Cutthroat
Trout Genetics Study**

Proposed Study 9 – Westslope Cutthroat Trout Genetics Study

Goals & Objectives



- Standardize approach to phenotypically identify Westslope Cutthroat Trout (WCT) and hybrids captured at passage facility.
- Take a genetic sample for WCT and hybrids to determine level of purity or hybridization of individuals ascending the passage facility.

- Main stem dams have fragmented habitats and WCT populations.
- Since 2011 over 2,000 WCT, Rainbow Trout, and hybrids have been passed at upstream fish passage facility.
- Can we correctly identify WCT or hybrids captured at the upstream fish passage facility?

Proposed Study 9 – Westslope Cutthroat Trout Genetics Study

Study Area





- Develop standardized phenotypic approach to identify WCT at the upstream passage facility.
- Use photographs of pure WCT as guides.
- Slash intensity, body spotting, anal fin spotting, and coloration as key characteristics.

- Genetic sample from WCT and hybrids to determine levels of hybridization and accuracy of observer identification.
- Range of 14 - 48 visually identified WCT captured at the facility per year.



- March-October 2021 - Collections at upstream fish passageway
- October 2021 - February 2022 - Laboratory analysis
- May 2022 - Final report

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Proposed Study 2 – Total Dissolved Gas

- Purpose of the Study:
 - Collect background (incoming) TDG concentrations in the Clark Fork River upstream of the dams.
 - Collect downstream (outgoing) TDG concentrations in the Clark Fork River below the main dam and at Birdland Bay Bridge.
- TDG Control Plan for Thompson Falls operations was approved by Montana DEQ in 2010.
- Since the approval of this Plan, two new radial gates have been installed on the main dam.
- More information is needed on TDG production with the new radial gates to update the TDG Control Plan.





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Proposed Study 2 – Total Dissolved Gas (TDG) Study Area & Description



- TDG is measured in three locations
 - Above the powerhouse
 - Below the main dam
 - Birdland Bay Bridge
- Hydrolab instruments provide TDG readings at 30-minute intervals.



Main Channel Dam

Dry Channel Dam

Above Dam

New Powerhouse

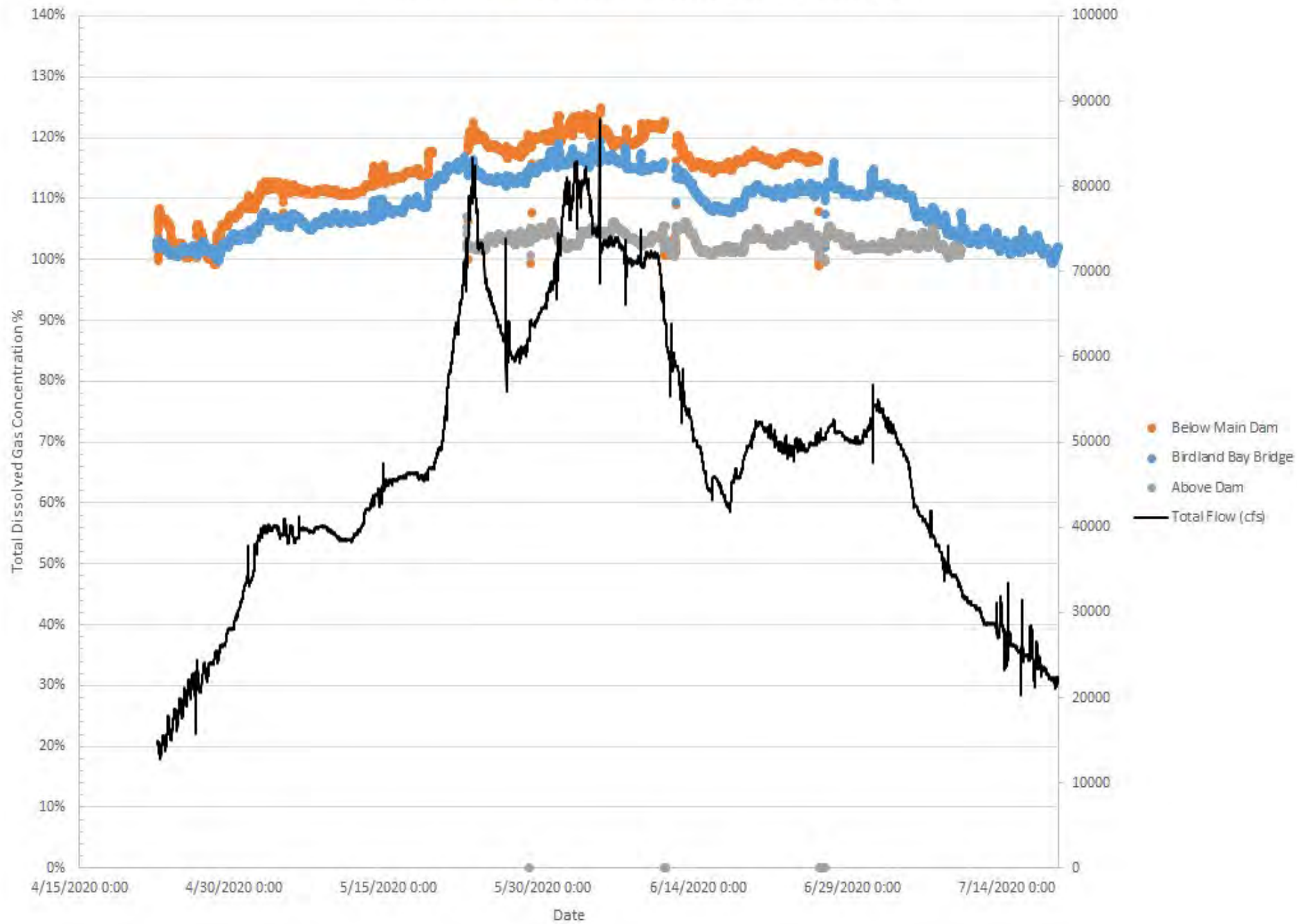
Old Powerhouse

Prospect Creek

High Bridge

Birdland Bay Bridge

Thompson Falls Total Dissolved Gas Concentrations (TDG)





- This study will use monitoring methodologies similar to past monitoring efforts.
- Data will be collected throughout the spill season in the spring to capture TDG concentrations at different river flows and gate configurations.



- Deploy monitoring equipment in April 2021.
- Conduct monitoring and bi-weekly maintenance on equipment through July 2021.
- Analyze data collected and prepare summary report for May 2022.
- Conduct additional monitoring in 2022 for a final report in May 2023.

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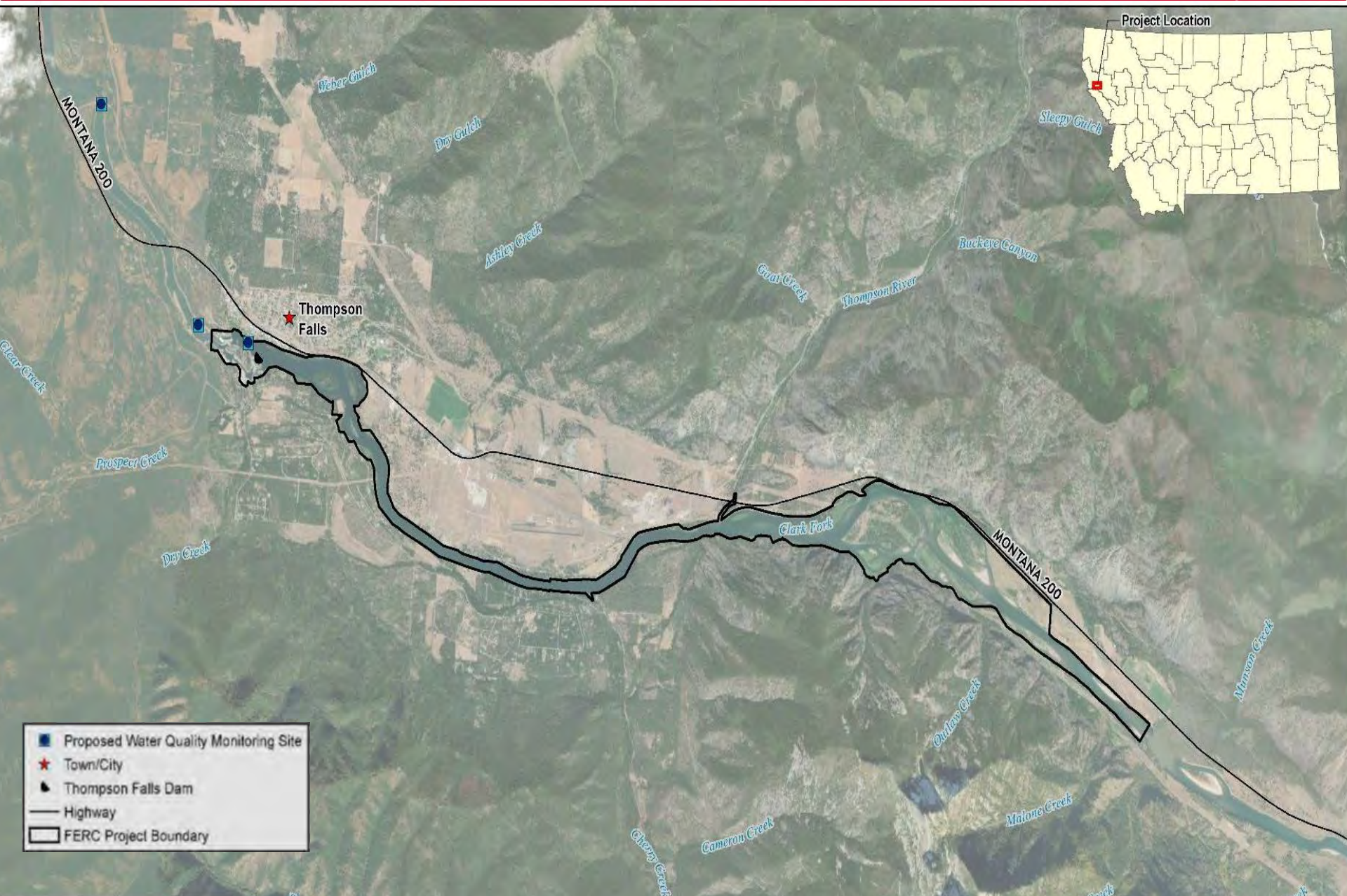
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Proposed Study 3 – Water Quality

- The purpose of this study is to collect water quality data to characterize the existing water quality conditions at the Thompson Falls Hydroelectric Project.
- Data from this study will supplement water quality data collected in 2019 and 2020.
- By collecting water quality data from multiple sites under differing conditions, we can gain a better understanding of the overall water quality conditions.
- Quarterly water chemistry samples will be collected upstream of the powerhouse, downstream of the powerhouse, and at Birdland Bay Bridge.



Proposed Study 3 – Water Quality Study Area



- Proposed Water Quality Monitoring Site
- ★ Town/City
- ▲ Thompson Falls Dam
- Highway
- ▭ FERC Project Boundary

- Water quality samples consist of a depth-integrated sample, and where possible, width-integrated sample.
- Several samples are collected at each site and composited into one representative sample for the site.
- Each sample is analyzed for nutrients, metals, total suspended solids, and common ions.
- Sampling methodologies are consistent with sampling conducted in 2019 and 2020 at the project and with water quality sampling at other NorthWestern hydro projects.







- Data collected will be compared to Montana's water quality standards.
- Numeric nutrient standards have not been developed for the Clark Fork River downstream of Missoula.
- Numeric metals standards are based on a potential harm to either aquatic life or human health (whichever is more protective).



- Conduct quarterly water chemistry monitoring in March, June, September, and December 2021.
- Analyze data collected and prepare summary report for May 2022.
- Conduct additional quarterly monitoring in 2022 for a final report in May 2023.

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Proposed Study 7 – Visitor Survey

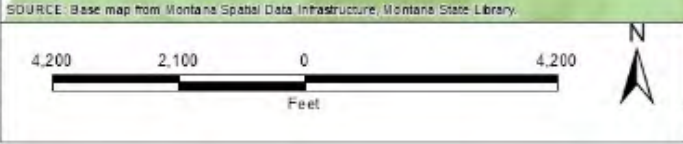
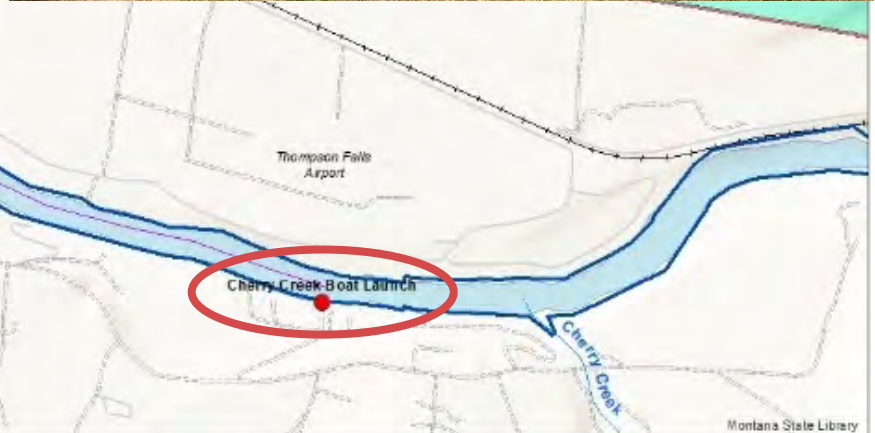
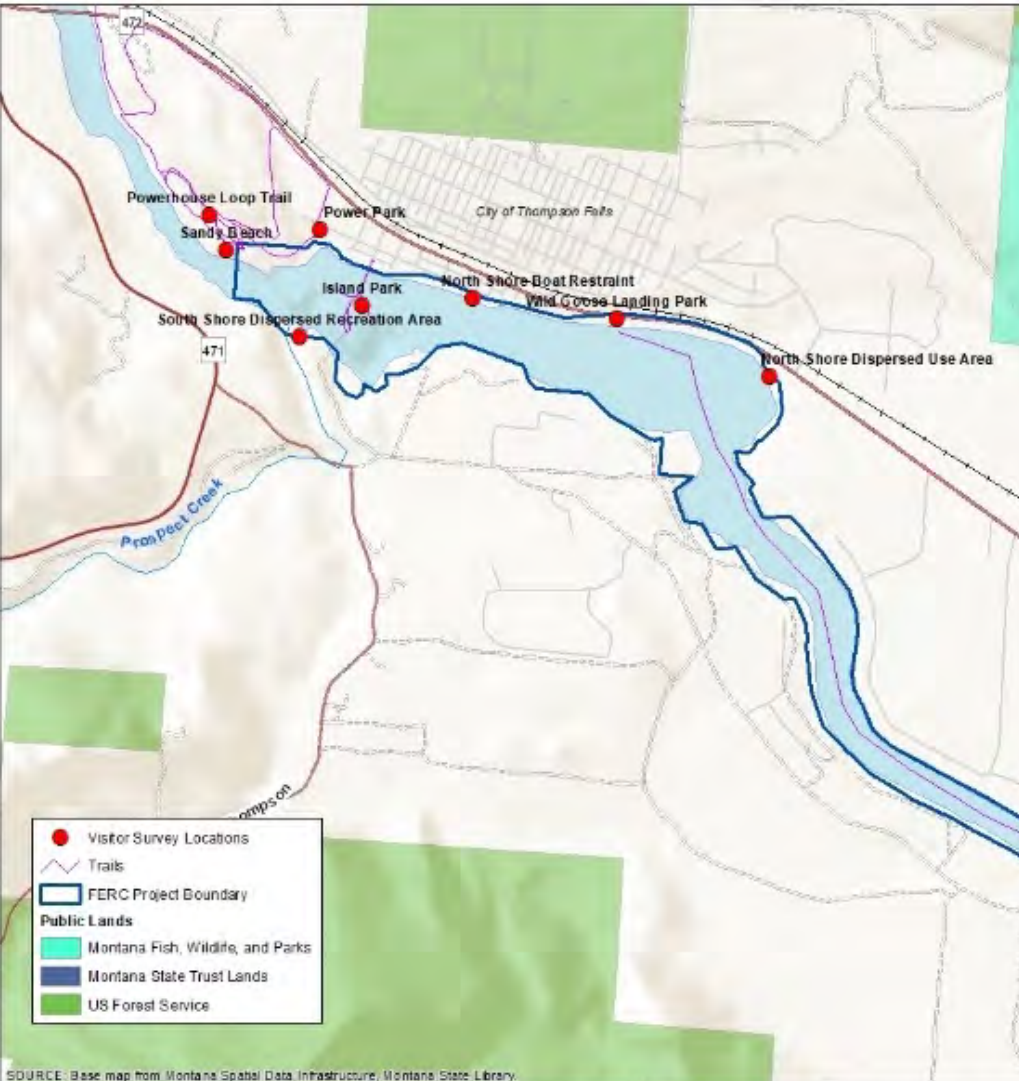
- A recreation visitor survey is proposed in the Project area from Memorial Day weekend through Labor Day weekend 2021 to obtain current information from recreationists about their use of recreation sites, facilities, and opportunities during the peak recreation season.
- The study will help determine whether project-induced recreation is being adequately accommodated at recreation sites associated with the Thompson Falls Reservoir and the Clark Fork River immediately upstream and downstream of the project.
- The survey will largely replicate previous studies conducted in the project area in 1999, 2003, 2008, 2014, and 2018. Previous surveys have demonstrated high satisfaction among recreationists.
- Replicating the study will provide a current and accurate reflection of visitor behavior and opinions.



Information will be sought regarding:

Previous Site Use	Recreation Activities at Site
Current Site Use	Problems Encountered at Site (if any)
Reasons for Visiting Site	Use of Trails and Satisfaction
Opinions about Site Facilities	Visitor Geographic Origin
Perceptions of Crowding	Socio-demographic Characteristics
Satisfaction with Site, Amenities, and Conditions	Awareness of Other Recreation Areas at the Thompson Falls Project

Proposed Study 7 – Visitor Survey Cherry Creek Boat Launch

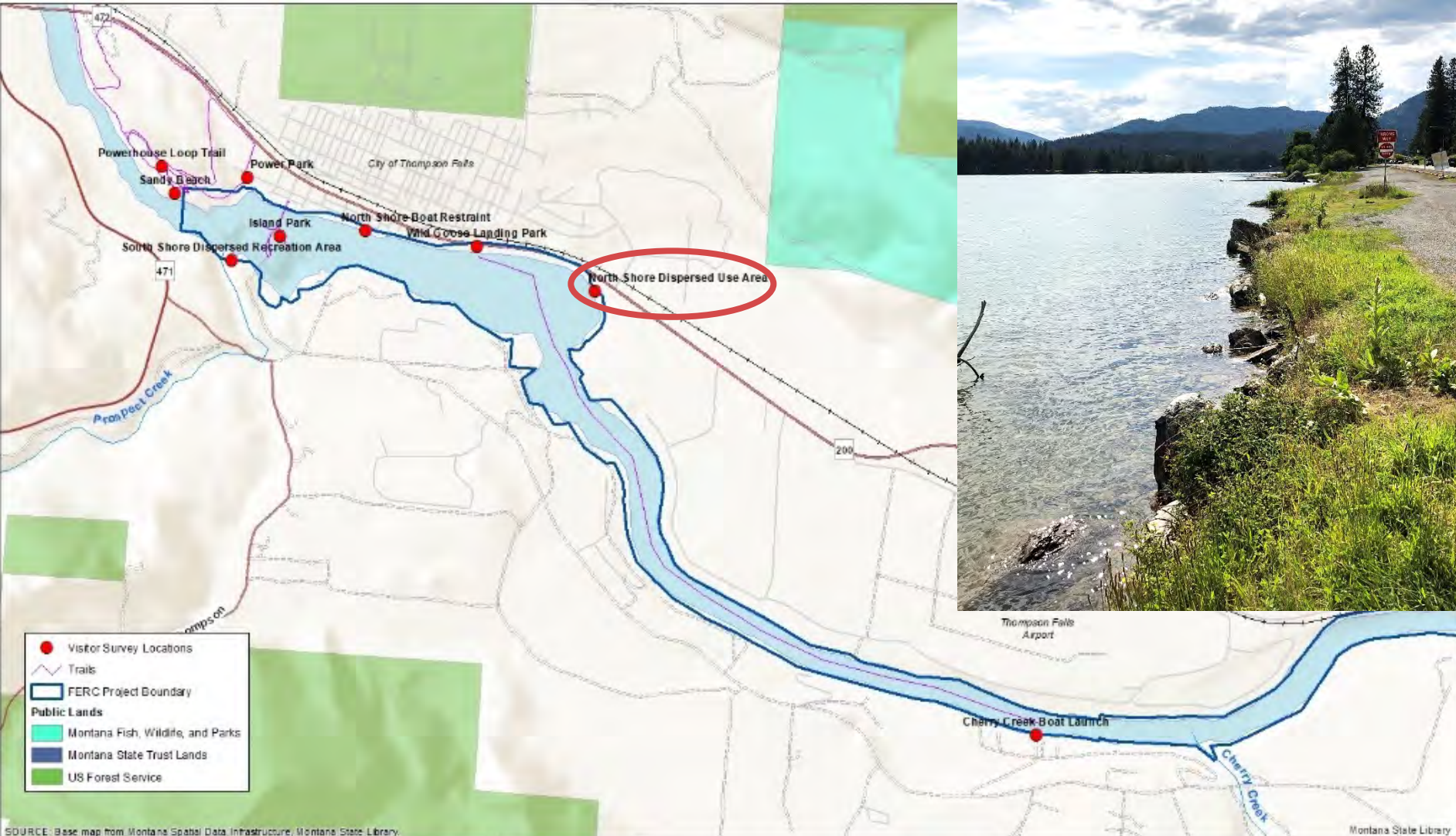


Thompson Falls Hydroelectric Project #1869
Visitor Use Survey Study Plan
Sanders County, MT

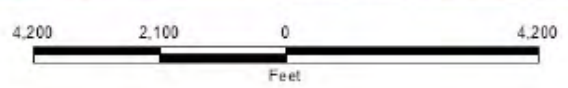


VISITOR SURVEY LOCATIONS
AUGUST 2020

Proposed Study 7 – Visitor Survey North Shore Dispersed Use Area



SOURCE: Base map from Montana Spatial Data Infrastructure, Montana State Library.



Thompson Falls Hydroelectric Project #1869
Visitor Use Survey Study Plan
Sanders County, MT

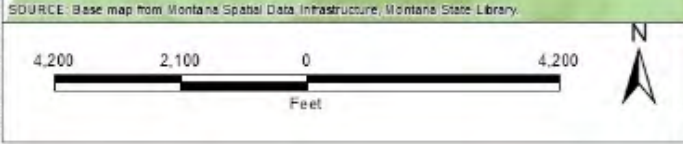
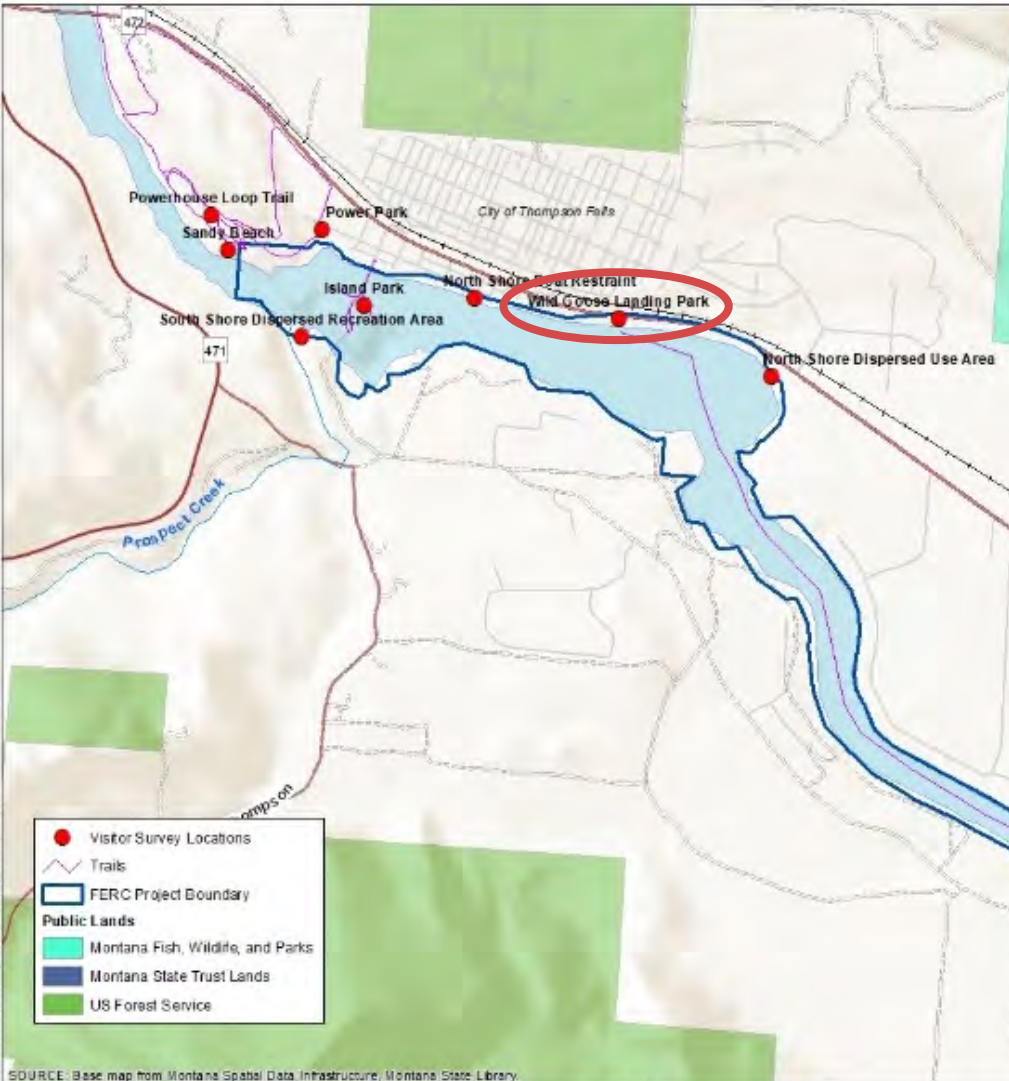


VISITOR SURVEY LOCATIONS

AUGUST 2020

Montana State Library

Proposed Study 7 – Visitor Survey Wild Goose Landing Park

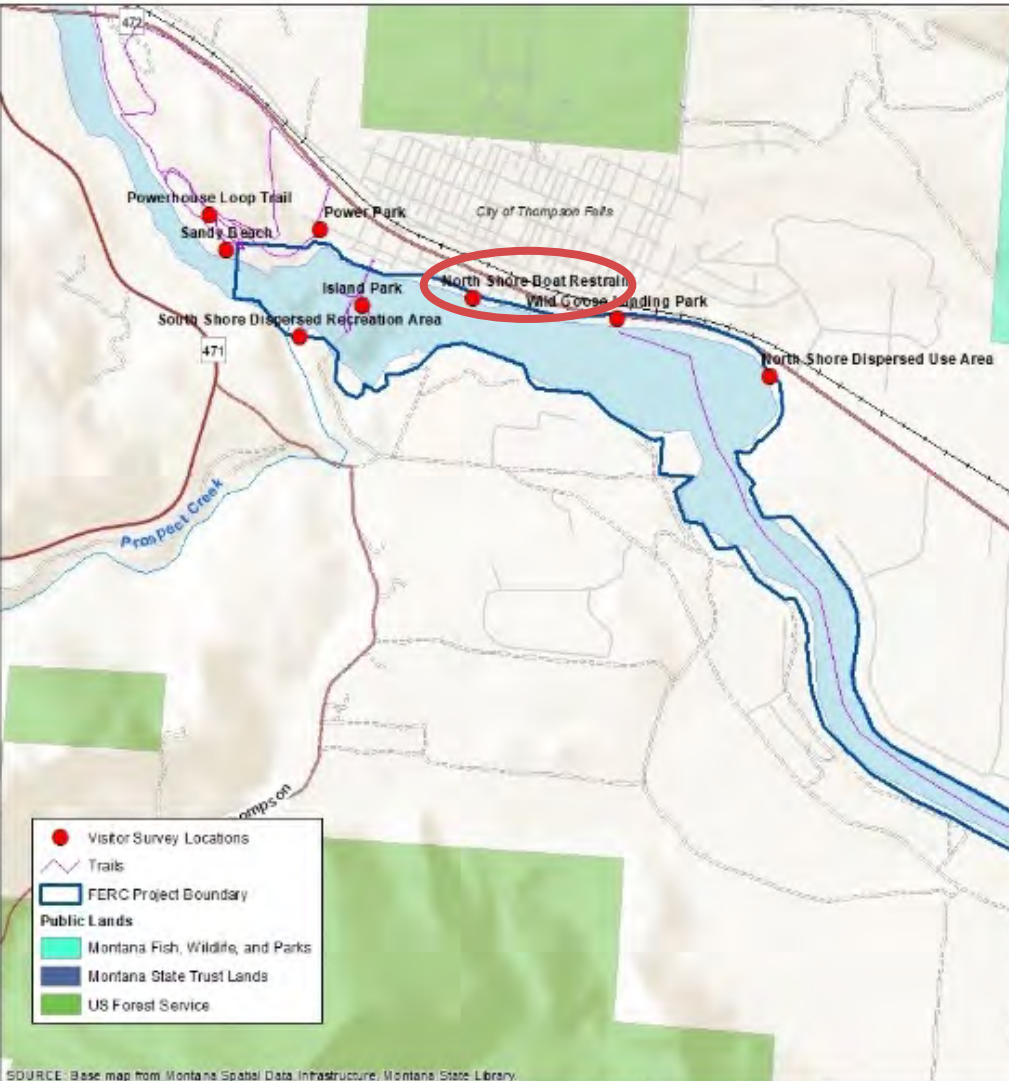


Thompson Falls Hydroelectric Project #1869
Visitor Use Survey Study Plan
Sanders County, MT

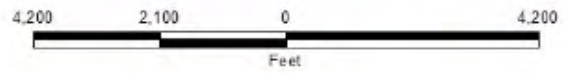


VISITOR SURVEY LOCATIONS
AUGUST 2020

Proposed Study 7 – Visitor Survey North Shore Boat Restraint



SOURCE: Base map from Montana Spatial Data Infrastructure, Montana State Library.



Thompson Falls Hydroelectric Project #1869
Visitor Use Survey Study Plan
Sanders County, MT

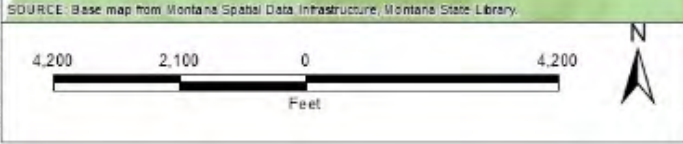
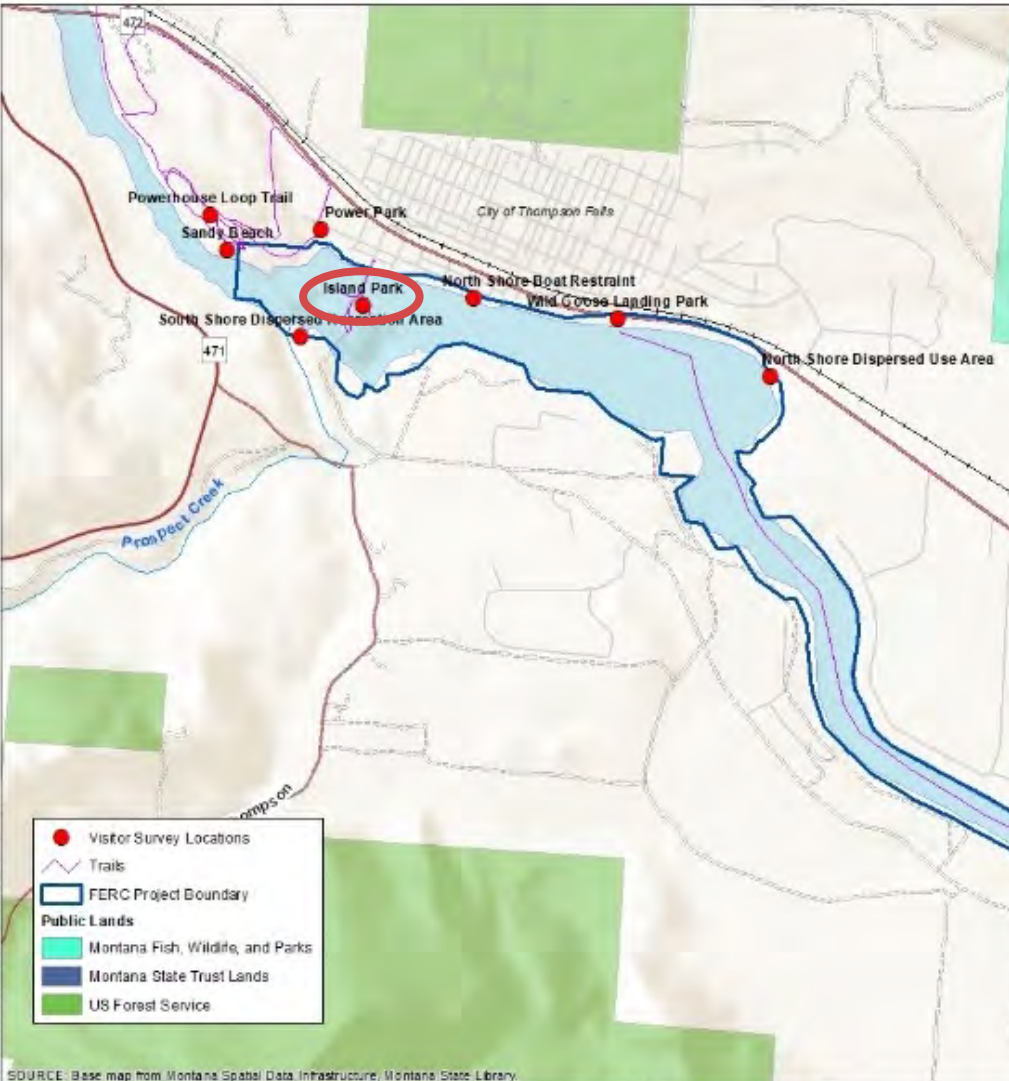


VISITOR SURVEY LOCATIONS

AUGUST 2020

Montana State Library

Proposed Study 7 – Visitor Survey Island Park



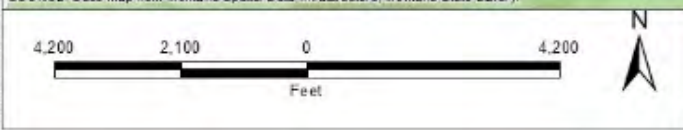
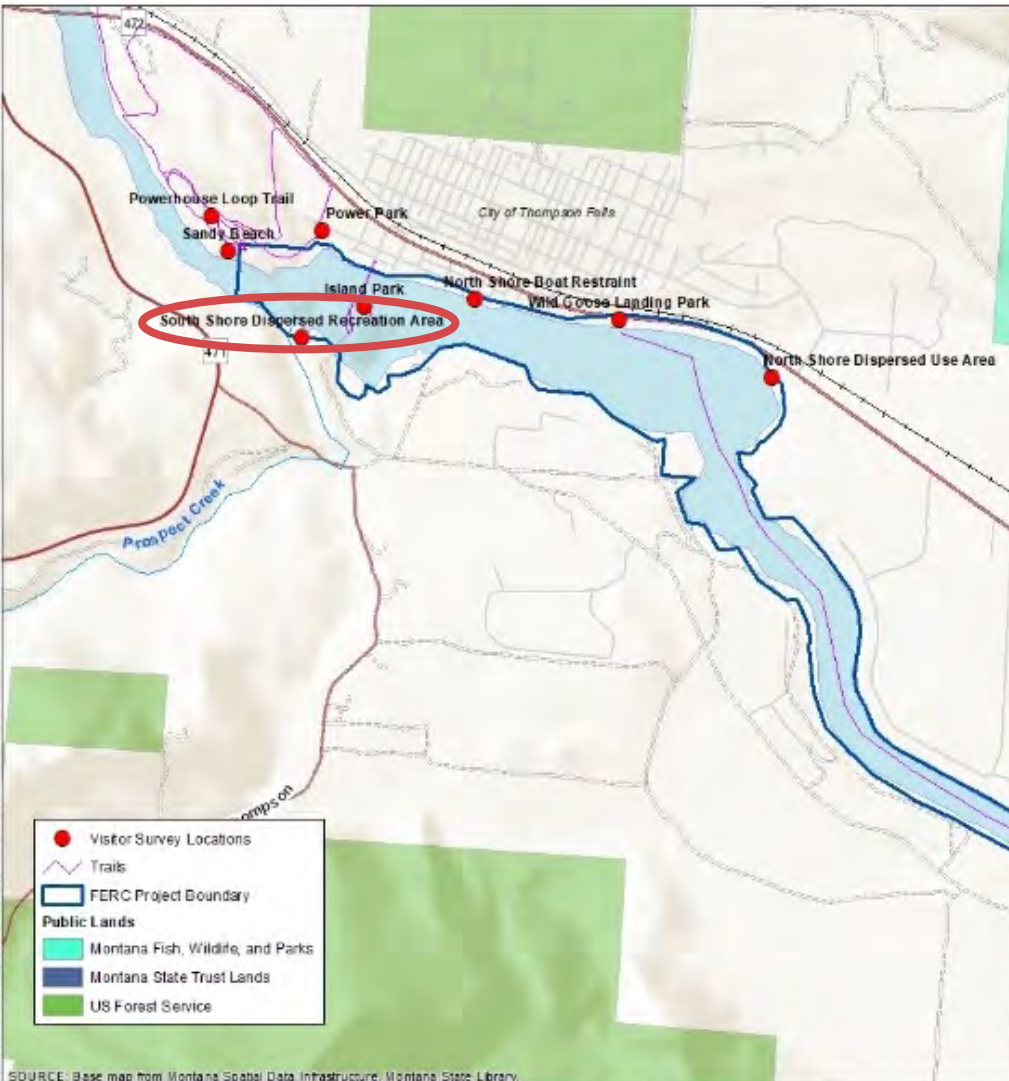
Thompson Falls Hydroelectric Project #1869
 Visitor Use Survey Study Plan
 Sanders County, MT



VISITOR SURVEY LOCATIONS
 AUGUST 2020

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Proposed Study 7 – Visitor Survey South Shore Dispersed Recreation Area



Thompson Falls Hydroelectric Project #1069
Visitor Use Survey Study Plan
Sanders County, MT

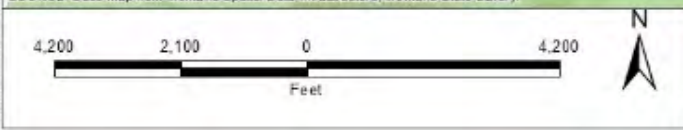
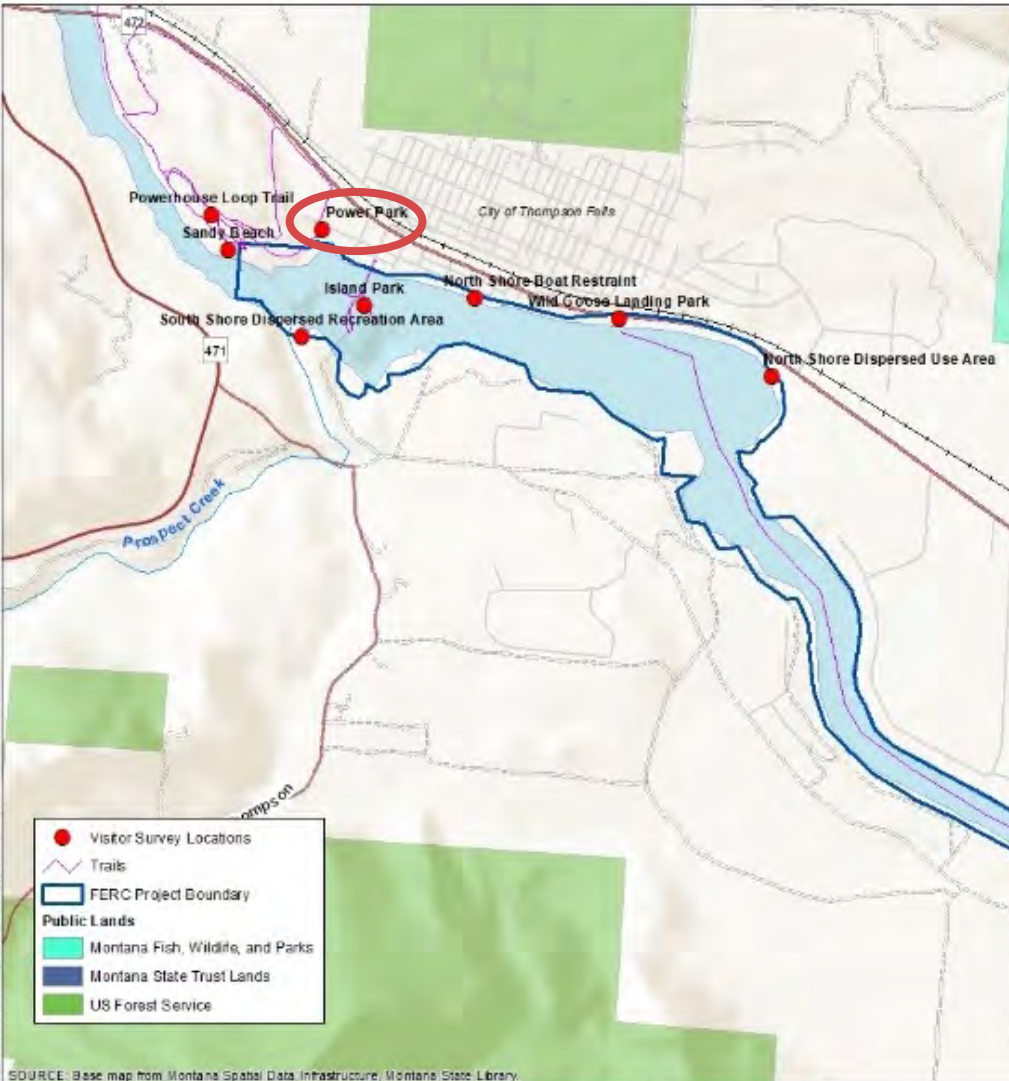


VISITOR SURVEY LOCATIONS
AUGUST 2020

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Montana State Library

Proposed Study 7 – Visitor Survey Power Park

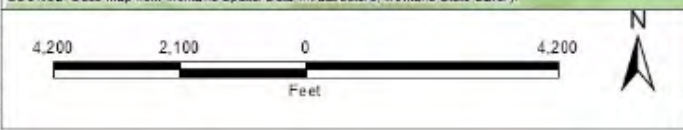
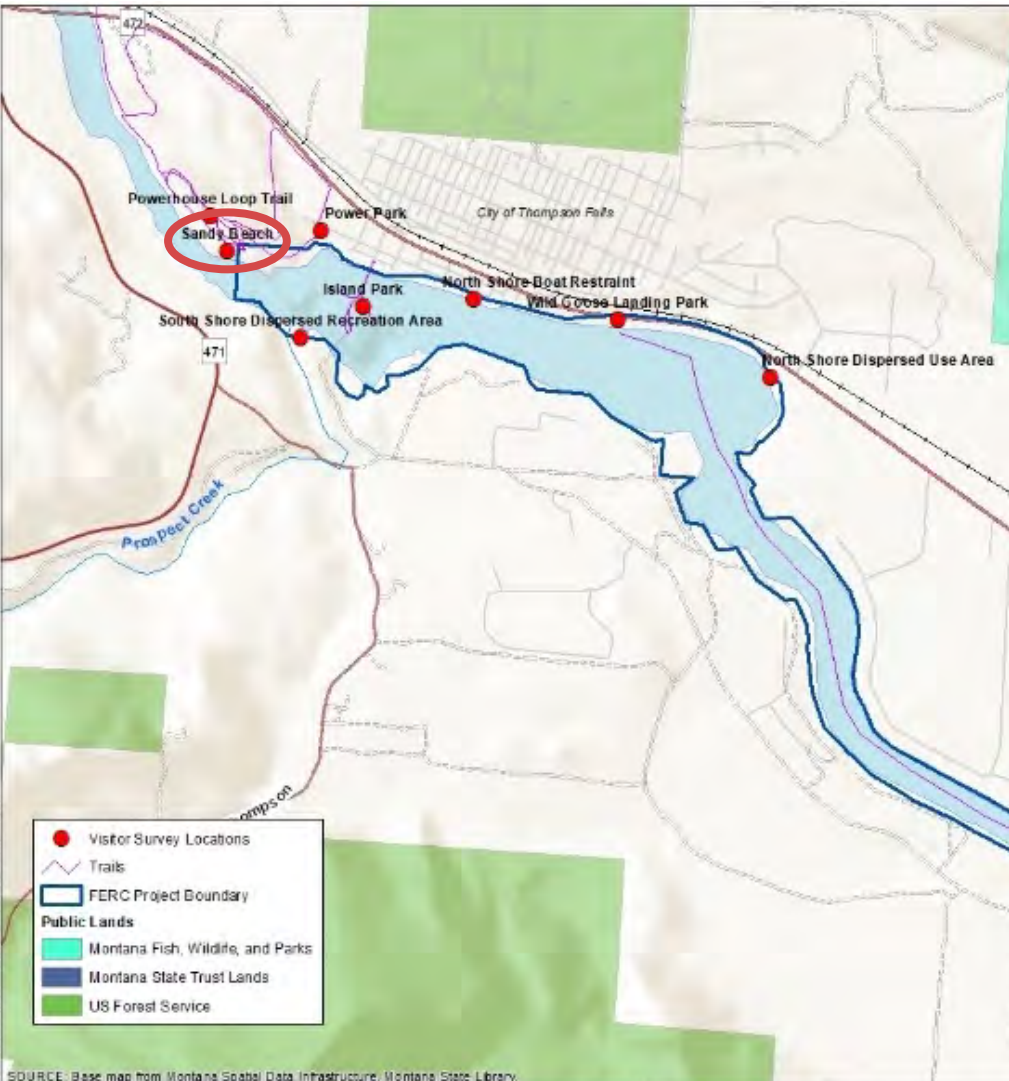


Thompson Falls Hydroelectric Project #1069
 Visitor Use Survey Study Plan
 Sanders County, MT



VISITOR SURVEY LOCATIONS
 AUGUST 2020

Proposed Study 7 – Visitor Survey Sandy Beach



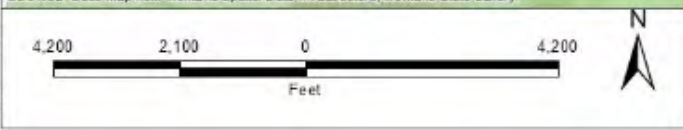
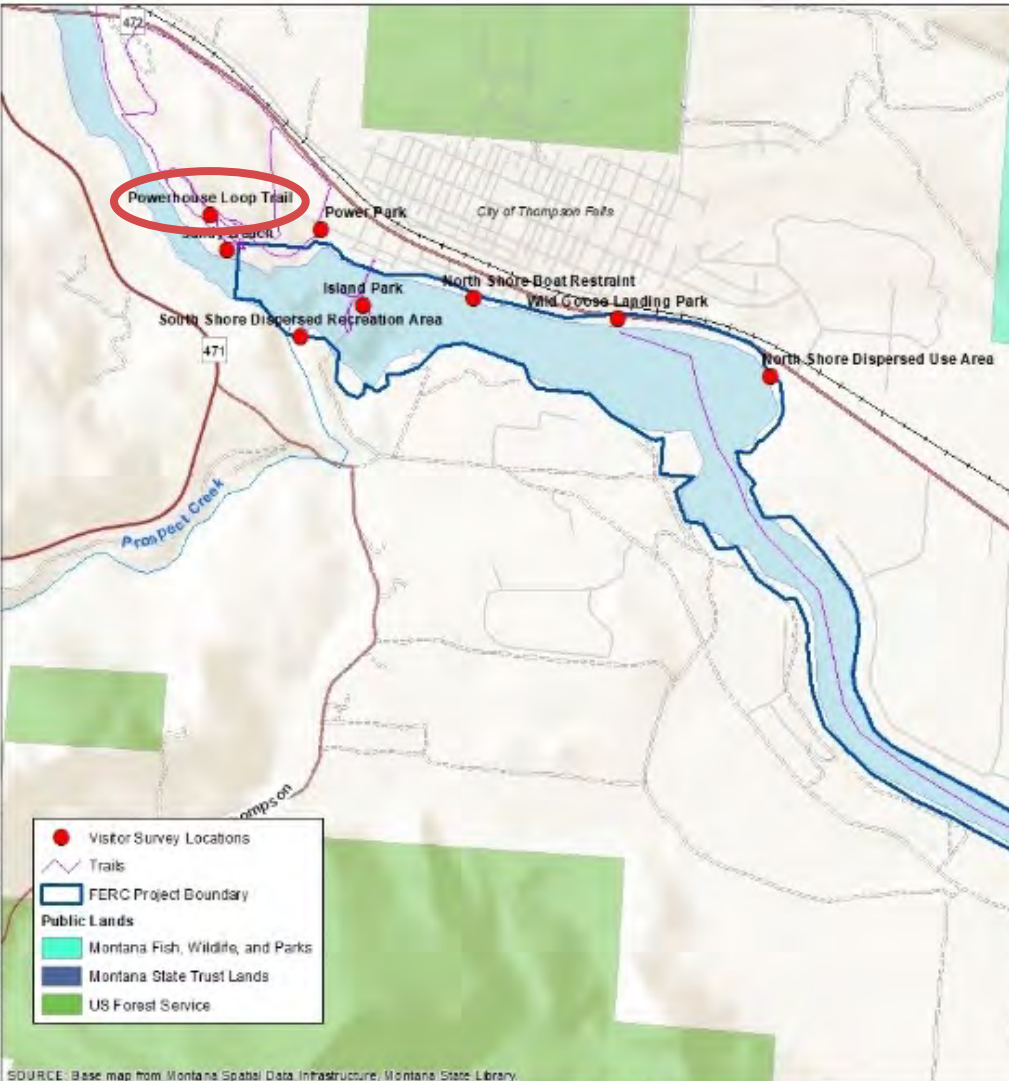
Thompson Falls Hydroelectric Project #1869
 Visitor Use Survey Study Plan
 Sanders County, MT



VISITOR SURVEY LOCATIONS
 AUGUST 2020

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Proposed Study 7 – Visitor Survey Powerhouse Loop Trail



Thompson Falls Hydroelectric Project #1869
Visitor Use Survey Study Plan
Sanders County, MT



VISITOR SURVEY LOCATIONS
AUGUST 2020

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Montana State Library



Recreation sites associated with the Thompson Falls Project offer facilities and opportunities to participate in a variety of activities:



- Picnic facilities
- Boat ramps and launching docks
- Facilities for visitor conveniences
- Shoreline access
- Trail-based recreation
- Education and interpretation
- Scenic viewing







Welcome to Island Park
**North Shore
Parking Area**
Open sunrise to sunset
No overnight parking.
Enjoy your visit!

NorthWestern
Energy









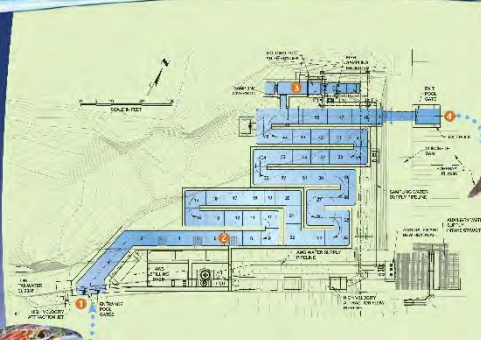


STAIRWAY UP THE DAM

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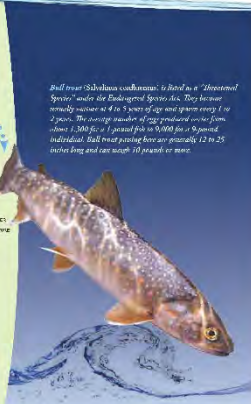
Although it is commonly called a fish ladder, the Thompson Falls fish passage facility is really an elaborate stairway. It consists of 48 pools or "steps" that allow fish to gradually climb about 50 feet from the river below the dam to the reservoir above.

Woolly acheron (Salvelinus columbianus) is a species of fish that is native to the mountains of Idaho. It is a cold-water fish that usually spawns in the fall or the year and female produce 100 to 2,000 eggs when they spawn every 2 to 3 years. Different spawning time are usually 6 to 12 inches in length.



Aerial plan view of Thompson Falls Fish Ladder

The ladder will see be opened when spring runoff creates high river flows and is kept to be closed for maintenance at times between mid-November and late February.



Bull trout (Salvelinus columbianus) is listed as a "threatened species" under the Endangered Species Act. They become sexually mature at 4 to 5 years of age and spawn every 1 or 2 years. The average number of eggs produced varies from about 1,000 to 10,000 eggs per female (depending on individual). Bull trout spawning time are generally 12 to 25 inches long and can weigh 10 pounds or more.

1 Designing and positioning a fish ladder

so fish can find and use it is a challenge — it's not like you can just up a sign pointing the way. Migrating fish are attracted by current and can be coaxed to certain areas by manipulating water flow. To lure fish to the ladder, flow up to 30 cubic feet per second (cfs) is discharged in front of its entrance pool.

2 Create inside the ladder

fish pools from pool-to-pool against a 6 cfs flow. Pools are about 5 feet wide and 6 to 10 feet long, and the total length of the ladder is 356 feet. The ladder was designed to assist fish migrating upstream — fish traveling downstream pass over the dam through the powerhouse.

3 Near the top of the ladder

is an area that can be used to trap and hold fish, so biologists can count, sort, tag, and measure them. Some fish may be selected for truck transport to upstream locations. But biologists don't need to be here to monitor fish as they — some fish using the ladder will be carrying tags that can be read by a nearby antenna, enabling biologists to automatically record their passage.

4 Fun exit the ladder

to the reservoir through a 3-foot-wide tunnel in the dam, near its crest. Many fish using the ladder are traveling to their natal spawning areas, which are upstream from here. I look for bull trout mostly in the spring and fall; cutthroat trout, rainbow trout, northern pike/minnow, peacock bass and suckers mainly in the spring; and brook trout and mountain whitefish mostly during late summer and the fall.





DAMMING THE RIVER

Three dams were needed to control the high water of the upper reaches of the river. The dam on the left is the highest, and the dam on the right is the lowest. The dam in the middle is the longest, and the dam on the right is the widest. The dam on the left is the most difficult to build, and the dam on the right is the most difficult to maintain.



LUMBER, CONCRETE, & HUNDREDS OF MEN

Building the Himmelfarb Dam was a massive task. It took over a decade to complete, and it cost millions of dollars. The dam was built by a team of men from all over the world, and it was a testament to the power of human ingenuity and hard work.









- 60 sampling days will be randomly selected during the sampling timeframe between May 28 and September 6, 2021. Sampling will be dispersed throughout the days of the week and hours of the day to arrive at a sampling schedule that is representative of the study period.
- A survey technician will begin the sampling timeframe at a randomly-selected recreation site on each sampling day then proceed to interview all groups recreating at that site at that time. Once all groups present have been contacted, the technician will move to the next site in rotation and continue in this manner until the end of the daily sampling timeframe is reached.
- Data collection between May 28 and September 6, 2021; analysis and final reporting will be included in ISR on or before May 12, 2022.

- **Guidelines for Asking a Question**

- Click on the “Chat” icon and type your question; once recognized, please unmute yourself, introduce yourself, and ask your question.
- Click on the “Raise Your Hand” icon to be recognized; once recognized, please unmute yourself, introduce yourself, and ask your question
 - Phone controls for participants – *9 – to raise hand.
 - Phone controls for participants – *6 – to toggle mute/unmute.

- **Video and Audio**

- Keep OFF, unless you are asking a question or responding to a question.

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Delivering a Bright Future

**Proposed Study 8 – Cultural Resources
Inventory, Evaluation, and Examination of
Potential Effects**

Cultural Resources Inventory and National Register Evaluation

- Update inventory of Historic Architectural and Engineering Properties.
- Develop high probability model for Prehistoric and Historic Archaeological Properties.
- Field inventory identified high probability areas.

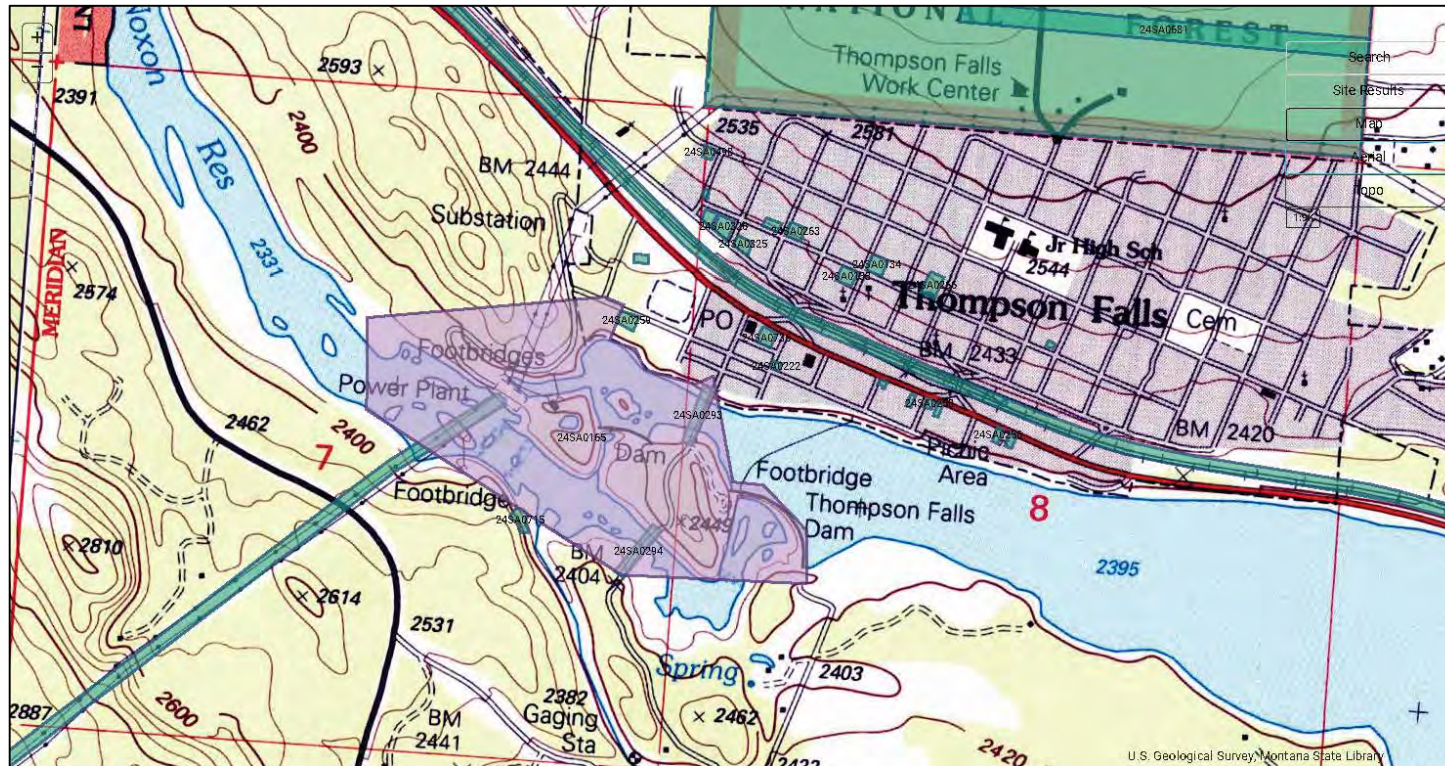


- Collect and analyze baseline resource data to gauge any current and anticipated Project effects on cultural properties.
- Develop Historic Properties Management Plan under new License.

- Update inventory and evaluation of historic architectural and engineering elements of Thompson Falls Hydroelectric Dam Historic District.
- Expand record of known prehistoric and historic archaeological properties through systematic inventory of previously unexamined high site probability areas.

For Historic Architectural and Engineering Properties

- Re-Inventory Thompson Falls Hydroelectric Dam Historic District and update 1986 National Register of Historic Places listing.



For Previously-unknown Prehistoric and Historic Archaeological Properties

- Develop and field test high probability model to predict where previously-unknown prehistoric and historic archaeological properties mostly likely exist within project.
- Inventory high site probability areas to determine locations, types, importance, and condition of currently undocumented properties.

Proposed Study 8 – Cultural Resources Schedule

Timing	Activity
May 2021–Feb 2022	Update inventory of Thompson Falls Hydroelectric Dam Historic District
May–Sept 2021	Develop and refine high prehistoric and historic archaeological properties probability model; submit to reviewers
Oct 2021	Review period for high probability model
Dec 2021	Model updated to incorporate review comments
May 12, 2022	Initial Study Report
Summer 2022	Inventory of prehistoric and historic archaeological properties
May 12, 2023	Final Study Report

- **Guidelines for Asking a Question**

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