FEDERAL ENERGY REGULATORY COMMISSION
WASHINGTON, D. C. 20426
May 10, 2021

OFFICE OF ENERGY PROJECTS

Project No. 1869-060—Montana
Thompson Falls Hydroelectric Project
NorthWestern Energy

**VIA FERC SERVICE**

Mary Gail Sullivan
Director, Environmental & Lands Permitting & Compliance
NorthWestern Energy
11 East Park Street
Butte, Montana 59701

**Reference: Study Plan Determination for the Thompson Falls (P-1869-060) Hydroelectric Project**

Dear Ms. Sullivan:

Pursuant to 18 C.F.R. § 5.13(c) of the Commission's regulations, this letter contains the study plan determination for NorthWestern Energy's (NorthWestern) Thompson Falls Hydroelectric Project (Thompson Falls Project or project) located on the Clark Fork River in Sanders County, Montana. The determination is based on the study criteria set forth in 18 C.F.R. § 5.9(b) of the Commission's regulations, applicable law, Commission policy and practice, and the record of information.

Background

On December 11, 2020, NorthWestern filed its Proposed Study Plan (PSP) for nine studies related to water quality, fishery resources, terrestrial resources, recreation resources, and cultural resources in support of its intent to relicense the project.

NorthWestern held study plan meetings on January 6, 2021, to discuss the PSP. Comments on the PSP were submitted by the U.S. Fish and Wildlife Service, the U.S. Forest Service (Forest Service), the Montana Department of Fish, Wildlife, and Parks (Montana FWP), the Montana Department of Environmental Quality, the Montana Department of Transportation, the Montana State Historic Preservation Office, Susan LaMont, Robin Hagedorn, and Commission staff.

NorthWestern filed a Revised Study Plan (RSP) on April 12, 2021, that included the nine studies filed in the PSP and one additional study related to fisheries. Comments on the RSP were filed by the Forest Service and Montana FWP on April 27, 2021.

General Comments

Some comments on the RSP do not directly address study plans. For example, some comments provide additional information, request additional information or clarification from NorthWestern, or address ongoing and future consultation. This determination does not address such comments, but only addresses comments specific to the merits of the proposed studies submitted pursuant to section 5.13 of the Commission's regulations and received thereon.

Study Plan Determination

Of the ten studies proposed by NorthWestern, six are approved as filed, one is approved with staff modifications, and three are not required (Appendix A). Two additional studies requested by Montana FWP are not required. The bases for modifying or rejecting the requested or proposed studies are explained in Appendix B. Although Commission staff considered all study plan criteria in section 5.9 of the Commission's regulations, staff only reference the specific study criteria that are particularly relevant to the determination.

Study issues raised in comments on the PSP but not again in comments on the RSP are considered to be resolved, and therefore, those issues are not discussed in this determination. Unless otherwise indicated, NorthWestern must complete all components of the approved studies not modified by this determination as described in the RSP. Pursuant to section 5.15(c)(1) of the Commission's regulations, the Initial Study Report for all studies in the approved study plan must be filed by May 10, 2022.

Nothing in this study plan determination is intended, in any way, to limit any agency's proper exercise of its independent statutory authority to require additional studies. In addition, NorthWestern may choose to conduct any study not specifically required herein that it feels would add pertinent information to the record.

If you have any questions, please contact Mike Tust at michael.tust@ferc.gov or (202) 502-6522.

Sincerely,

Terry L. Turpin
Director
Office of Energy Projects

Enclosures: Appendix A – Summary of Determinations on Proposed and Requested Studies
Appendix B – Staff Recommendations on Proposed and Requested Studies

# APPENDIX A

## SUMMARY OF DETERMINATIONS ON PROPOSED AND REQUESTED STUDIES

| Study | Recommending Entity | Approved | Approved with Modifications | Not Required |
|---|---|---|---|---|
| 1. Operations Study | NorthWestern | X | | |
| 2. Total Dissolved Gas | NorthWestern | X | | |
| 3. Water Quality | NorthWestern | | | X |
| 4. Hydraulic Conditions | NorthWestern; Montana FWP; Forest Service; FWS | X | | |
| 5. Fish Behavior | NorthWestern; Montana FWP; Forest Service; FWS | | X | |
| 6. Downstream Transport of Bull Trout | NorthWestern; Montana FWP; FWS | | | X |
| 7. Visitor Use Survey | NorthWestern | X | | |
| 8. Cultural Resources Inventory, Evaluation, and Examination of Potential Effects | NorthWestern | X | | |
| 9. Westslope Cutthroat Trout Genetics Study | NorthWestern | | | X |
| 10. Updated Literature Review of Downstream Fish Passage | NorthWestern | X | | |
| 11. Distribution and Genetic Status of Westslope Cutthroat Trout | Montana FWP | | | X |
| 12. Heavy Metals and Organic Compounds Assessment of Fish in Thompson Falls Reservoir | Montana FWP | | | X |

# APPENDIX B

# STAFF RECOMMENDATIONS ON PROPOSED AND REQUESTED STUDIES

The following discussion includes staff's recommendations on studies proposed by NorthWestern Energy (NorthWestern), requests for study modifications, and requests for additional studies. We base our recommendations on the study criteria outlined in the Commission's regulations at 18 C.F.R. section 5.9(b)(1)-(7). Except as explained below, the revised study plan (RSP) filed on April 12, 2021, adequately addresses all study needs at this time.

## I. Required Studies

### Study 4 – Hydraulic Conditions

Applicant's Proposed Study

To assess whether there are seasonal or site-specific velocity barriers to upstream fish passage for bull trout, westslope cutthroat trout, rainbow trout, brown trout, largescale sucker, northern pikeminnow, and mountain whitefish, NorthWestern proposes to model hydraulic conditions in the area extending from the Main Channel Dam spillway and upstream fish passage facility entrance to 1,500 feet downstream of the dam. NorthWestern proposes to develop a Computational Fluid Dynamics (CFD) model of the study area (utilizing 2D and 3D simulations) and compare swimming capabilities of Bull Trout and the other species with the velocity fields through the zone of passage and at or near the fish passage facility entrance to determine passage effectiveness. The results of the hydraulic study would be combined with NorthWestern's fish tagging study (i.e., *Study 5 – Fish Behavior*) to assess upstream fish passage effectiveness at the project.

Comments on the Study

The Forest Service requests that NorthWestern extend the proposed hydraulic modeling to include the project reservoir rather than limiting the modeling to the area around the dam and fish passage structures and a short distance downstream. The Forest Service states that this additional modeling data would provide baseline hydraulic data that currently is not available and could be advantageously acquired during the modeling effort already proposed.

In reply, NorthWestern states that hydraulic modeling in the project reservoir beyond the area immediately upstream (i.e., within 100 feet) of the Main Channel Dam is unnecessary because previous fish tagging studies (Gillin and Pizzimenti, 2003), recent Passive Integrated Transponder (PIT) tag monitoring (NorthWestern, 2019), and angler tag returns show that multiple species of fish (including westslope cutthroat trout,

rainbow trout, brown trout, and bull trout) pass through the project fish ladder, and migrate long distances and disperse widely upstream of the dam and reservoir, demonstrating that the reservoir does not impede upstream migrating fish. Therefore, NorthWestern believes that modeling the 12-mile-long reservoir would not provide information that cannot already be obtained from existing studies and would not inform the development of license conditions.

Discussion and Staff Recommendation

As noted above, information exists [18 CFR § 5.9(b)(4)] that shows that tagged fish released upstream of the dam can travel several miles upstream of the dam and reservoir to access the Clark Fork River, Thompson River, Petty Creek, St. Regis River, Rattlesnake Creek, and the lower Flathead River. For example, Gillin and Pizzimenti, (2003) summarized a fish radio tracking study conducted by PPL Montana and Montana FWP which monitored a total of 21 radio-tagged fish in the Thompson Falls Reservoir in the spring of 2001 (13 westslope cutthroat, 6 rainbow trout, and 2 bull trout) and into the fall of 2002. The bull trout moved an average of 16.5 miles upstream at a rate of 0.19 mile per day and were detected in Thompson River. Rainbow trout movements ranged from 2 to 57 miles upstream. Westslope cutthroat trout movements ranged from 0.1 mile to 82 miles upstream (Gillin and Pizzimenti, 2003). More recent montoring of Passive Integrated Transponder (PIT)-tagged fish show the speed in which brown, bull, and rainbow trout move through the reservoir. PIT-tagged fish have been recorded moving upstream 6 miles from Thompson Falls Dam to the Thompson River in 5.5 hours, and generally move into the Thompson River within 1 to 5 days following an individual's release upstream of the dam (NorthWestern, 2019). Thus, we have no reason to suspect that project operation adversely affects upstream fish migration through the reservoir [18 CFR § 5.9(b)(5)].

NorthWestern's proposal to compare the swimming capabilities of bull trout and other fish species with the estimated velocity fields at or near the fish ladder entrance along with the results of its proposed radio tagging study to evaluate movement rates and behavior in response to hydraulic conditions should provide sufficient data for us to assess upstream fish passage effectiveness and inform potential license conditions [18 CFR § 5.9(b)(5)]. Therefore, we do not recommend modifying the proposed study to include hydraulic modeling of the entire reservoir.

**Study 5 – Fish Behavior**

Applicant's Proposed Study

NorthWestern proposes to conduct a two-year telemetry study to evaluate movements of fish as they travel through the project bypassed reach and approach the Main Channel Dam and fish ladder entrance and to quantify upstream fish passage

effectiveness at the project. NorthWestern proposes to tag rainbow and brown trout (as surrogates for bull trout) and largescale sucker (to represent native non-salmonid fish that also utilize the upstream fish ladder). Fish collected for the study will be anesthetized, tagged (PIT and radio-tagged), and then released approximately four miles downstream of the dam.

Radio telemetry monitoring will focus on assessing fish movements in the far field (downstream of the fish ladder and Main Channel Dam in the project bypassed reach where powerhouse and spill flows serve as the primary attraction flows), near field (in proximity to the upstream fish ladder where fish passage attraction flows lure fish to the entrance), and the fish ladder entrance channel/gate. NorthWestern will track and record the travel time for fish moving from the far field to the near field, travel time from the near field to the fish ladder entrance, proportion of fish that locate and enter the ladder entrance, movement patterns (e.g., left bank and right bank movements) in the area just downstream of the Main Channel Dam, and fish holding locations within the study zones. Movements will be continuously monitored during the study seasons (i.e., June through October 2021 and March through October 2022) via fixed stationary receivers to be located near the powerhouse tailraces (far field station), in the project bypassed reach upstream of the Historic High Bridge (near field station) near the fish ladder entrance, and in the Main Channel Dam area opposite the fish ladder as well as via manual tracking. Upstream fish movements will also be monitored using remote PIT tag array stations that are already established and operating in: Prospect Creek, a tributary located immediately downstream of the Main Channel Dam; the two fish passage facility entrances; the lower pools and the top holding pool of the fish ladder; and the mainstem of the Thompson River, a tributary located about six miles upstream of the dam. The results of the study will be reviewed in tandem with NorthWestern's hydraulic modeling study to assess upstream fish passage effectiveness for bull trout and other native fish at the project.

*Number of Fish to be Collected and Tagged*

NorthWestern proposes to collect (in 2021) a maximum of 50 salmonids (30 rainbow trout and 20 brown trout). In 2022, a maximum of 70 fish would be collected, replicating the 2021 numbers for trout and adding 20 largescale sucker.

Comments on the Study

Montana FWP suggests that the numbers of trout and largescale sucker to be collected as part of the study should be specified as fish to be "tagged" rather than merely "caught" and that tagging numbers for trout should not be equally split between field seasons 2021 and 2022 given the expected truncated 2021 season and the anticipated need for NorthWestern to test and calibrate tag and receiver equipment in the first tagging year. Montana FWP instead suggests that no maximum number for tags be specified for

the second field season so that NorthWestern can be in position to deploy more than the 70 tags proposed for that year, if additional tags are available. Montana FWP further states that prior concerns over "code collision"[1] could be alleviated by either adding another frequency associated with the proposed Lotek tagging equipment or by extending the study timeframe to better stagger the number of fish tagged each year.

Discussion and Staff Recommendations

Contrary to Montana FWP's assertion, NorthWestern's study plan is clear that NorthWestern intends to catch and tag (PIT and radio tag) a total of 60 rainbow trout, 40 brown trout, and 20 largescale sucker over the course of the two-year study. Therefore, the study plan does not need to be modified to specify that fish will be "tagged."

If all tags can not be deployed during 2021, NorthWestern would need to report and explain the reason for the variance in the initial study report. Based on the study results, resource agencies could recommend additional tagging in 2022. Any unused tags would be available for use in 2023. Therefore, there is no need to modify the study plan to remove the stipulations for tagging a set number of fish each year.

In regard to Montana FWP's suggested measures that could be implemented to reduce "code collision", NorthWestern states in the RSP that is has considered signal/code collision concerns as part of its sampling design and proposes to coordinate with the tagging company (Lotek) to minimize the occurrence of code collision. Therefore, we have no reason to believe that code collision would be a concern and no modification to the study plan is needed to that end.

*Timing of Fish Collection for Tagging*

NorthWestern states fish collection for the first field season will begin in June 2021 and fish collection for the second field season will occur from March through June of 2022. To minimize stress of tagged fish, NorthWestern proposes to collect and tag fish when river temperatures are less than or equal to 16 °C (60.8 °F).

Comments on the Study

Montana FWP states that because fish collection for the study is both temperature- and flow-dependent, NorthWestern should delay the start of the two-year study to the spring of 2022.

[1] Code collision can occur when too many tagged fish are released and move together such that too many signals are being reflected back to the receiver at the same time. This can confuse the tag reader and reduce tag detection efficiency.

Discussion and Staff Recommendations

While the proposed collecting and tagging restrictions based on month and water temperature could prevent collecting and tagging 30 rainbow trout in 2021, there's no basis for completely ruling out the possibility that 30 rainbow trout can be collected and tagged this June (2021). Relicensing stakeholders, after review of the initial study report, could recommend modifying the study plan if the initial study report indicates an insufficient number of fish were collected in 2021. Delaying the start of the study at the outset until 2022 could needlessly delay the relicensing proceeding. For these reasons, we do not recommend delaying the start of the proposed fish tagging and telemetry study.

*Prioritization of Fish Collection Sites*

NorthWestern proposes to collect rainbow and brown trout from the following locations: the Clark Fork River upstream of the dam, at the fish passage facility workstation, and within the lower seven miles of the Thompson River. Largescale sucker will be collected in the mainstem Clark Fork River upstream of the dam.

Comments on the Study

Montana FWP states that while it agrees to remain flexible, it recommends that NorthWestern prioritize the collection sites in the following order: mainstem Clark Fork River upstream of Thompson Falls Dam and the upstream fish passage facility work station first, then collect fish in the lower seven miles of the Thompson River.

NorthWestern explains that considering the time constraints for fish collection, study seasons, reporting timelines, cost of potential tag loss, and sampling challenges, it will focus fish collection and tagging efforts upstream of the dam in the spring, but needs flexibility to sample cumulatively from the mainstem Clark Fork River, the lower Thompson River, and the upstream fish passage workstation to collect a sufficient number of fish for the study.

Discussion and Staff Recommendations

Fish count data from the upstream fish ladder from 2011-2020 suggest that NorthWestern would likely need to sample fish from multiple locations in order to collect the targeted numbers of fish for tagging. For example, an average of 61 rainbow trout and 9 brown trout (of all sizes) were recorded at the upstream fish ladder workstation for the months of March through May each year, suggesting that brown trout would likely need to be collected elsewhere. Prioritizing fish collection as recommended by Montana FWP is generally consistent with NorthWestern's study approach to "focus fish collection and tagging efforts upstream of the dam in the spring" [18 CFR § 5.9(b)(1)].

However, we agree that NorthWestern needs some flexibility in its collection effort to achieve the study objectives. Therefore, we do not recommend modifying the study plan to require that NorthWestern prioritize its collection efforts as recommended by Montana FWP.

*Telemetry Monitoring in the Reservoir*

NorthWestern proposes to focus on assessing fish movements in the far field (downstream of the fish ladder and Main Channel Dam where powerhouse and spill flows serve as the primary attraction flows), near field (in proximity to the upstream fish ladder where fish passage attraction flows lure fish to the entrance), and fish ladder entrance channel/gate.

Comments on the Study

The Forest Service requests that the proposed telemetry monitoring study be expanded to monitor fish movements through the project reservoir. The Forest Service believes this data would provide baseline data on fish behavior in the reservoir that is not currently available and would take advantage of the fish tagging/monitoring already proposed.

As stated previously, NorthWestern believes that data from prior tagging studies provide evidence that the reservoir is easily passable by upstream migrating fish. Therefore, NorthWestern believes that monitoring fish movements through the entire reservoir would not provide any new information. NorthWestern further states that it has no operational ability to influence how or where fish travel upstream of the project dam and reservoir once they migrate upstream.

Discussion and Staff Recommendations

For the reasons stated previously (*Study 4 – Hydraulic Conditions*), sufficient information exists to show that the reservoir is easily passable for fish [18 CFR § 5.9(b)(4)] and we have no reason to suspect that project operations are adversely affecting upstream fish migration through the reservoir [18 CFR § 5.9(b)(5)]. Thus, we find no basis for requiring telemetry monitoring through the project reservoir and therefore do not recommend it.

*Species to be Studied and Radio-Tagged*

Comments on the Study

Montana FWP recommends collecting and tagging 20 mountain whitefish and 20 northern pikeminnow in addition to the largescale sucker and trout proposed to be tagged

by NorthWestern in 2022. Montana FWP states that NorthWestern's concerns about sensitivity of these species to tagging is overstated and that its review of the literature found numerous studies demonstrating that mountain whitefish and northern pikeminnow can be successfully radio-tagged in spring and early summer in low temperatures with good success (citing Peterson et al. 2001; Baxter 2001; Pribyl et al. 2005; Pierce et al. 2012; Boyer, 2016; Brandt et al., 2016). The Forest Service also recommends collecting and tagging mountain whitefish but does not specify target numbers of fish to be tagged.

NorthWestern states that it would be difficult to collect sufficient numbers of mountain whitefish in the appropriate size range for tagging because this species is often not observed at the upstream fish ladder until later in the fall around the time the passage facility is shut down and are not expected to be present in adequate numbers in the reservoir to reliably collect them through electrofishing. In addition, NorthWestern is concerned that both mountain whitefish and northern pikeminnow are more sensitive to fish mortality from tagging and that this, coupled with the additional cost to collect, tag, and analyze the data is not justifiable. Instead, NorthWestern proposes to tag largescale sucker to assess passage of native non-salmonids in addition to tagging rainbow and brown trout. Further, NorthWestern proposes to complete a literature review of swimming capabilities of mountain whitefish and northern pikeminnow and that this information combined with its proposed hydraulic modeling results would be sufficient to identify potential velocity barriers within the zone of passage that may affect movements for these species as they approach the dam and fish passage facility entrance.

Discussion and Staff Recommendation

Largescale sucker comprise over half the total number of fish recorded at the fish ladder (18,124 of 34,622 total fish) over the last 10 years averaging about 1,813 individuals recorded each year (NorthWestern, 2021). Northern pikeminnow are the next most common (7,676 or 22 percent of the total fish recorded at an average of 768 recorded each year). Mountain whitefish are less common than either largescale sucker or northern pikeminnow (378 or less than one percent of the total fish recorded at an average of 38 recorded each year) (NorthWestern, 2021). These numbers show that largescale sucker, northern pikeminnow, and at least some mountain whitefish are consistently navigating the fish ladder and migrating upstream of the dam each year in greater numbers compared to bull trout (18 or 0.05 percent of the total fish at an average of two individuals recorded per year) which is the priority species targeted for upstream passage (NorthWestern, 2021). The available information suggests that the project and project operation are not impeding upstream passage for largescale sucker, northern pikeminnow, or mountain whitefish; therefore, we see little benefit to tagging and tracking movements of these species as part of the telemetry study. Further, NorthWestern estimates that its proposal to tag 20 largescale sucker would add $8,520 in additional equipment costs. Tagging an additional 20 mountain whitefish and 20

northern pikeminnow as recommended by Montana FWP would add an additional $17,000 to the costs of the study.

NorthWestern's proposal to compare the swimming capabilities for largescale sucker, northern pikeminnow, and mountain whitefish to the expected velocity fields determined through *Study 4 – Hydraulic Conditions* should provide sufficient information to assess impediments to fish passage for these species [18 CFR § 5.9(b)(7)]. For these reasons, we do not recommend requiring NorthWestern to collect and tag largescale sucker, northern pikeminnow, or mountain whitefish as part of the proposed telemetry study.

## II. Studies Not Required

### Study 3 – Water Quality

Applicant's Proposed Study

NorthWestern proposes to conduct a two-year study to characterize water quality at the project. NorthWestern proposes to monitor water quality in the Clark Fork River upstream of the project reservoir, in the reservoir upstream of the powerhouses, in the Clark Fork River a short distance downstream of the powerhouses, and in the Clark Fork River further downstream of the project at Birdland Bay Bridge approximately 0.84 river miles from the powerhouse tailraces. Water chemistry samples would be collected at each site on a quarterly basis (March, June, September, and December) and tested for the following parameters: nutrients, metals, inorganics, pH, total dissolved solids, total suspended solids, alkalinity, and anions by ion chromatography. Water sampling would consist of collecting incremental volumes of water at different depths as the sampling equipment is lowered from the surface to the bottom. Grab samples would be collected from the bank in a well-mixed portion of the river, or from a bridge at equal width increments and composites. In addition to collecting water chemistry samples, NorthWestern proposes to measure physical properties (i.e., pH, turbidity, dissolved oxygen, temperature, specific conductance, and depth) in-situ at each of the monitoring sites. Continuous water temperature monitoring would also occur at the monitoring site upstream of the project and at the monitoring site downstream of the project at Birdland Bay Bridge throughout the study period.

NorthWestern does not propose to collect and analyze sediment samples as part of its proposed water quality monitoring study. NorthWestern previously collected and analyzed sediment core samples collected from the lower portion of Thompson Falls Reservoir in July 2020 which did not detect toxic concentrations of heavy metals or organic compounds.

Comments on the Study

Montana FWP recommends that any future sediment sampling in the project reservoir include a "total constituent analysis" for heavy metals. Montana FWP contends that a total constituent analysis for heavy metals is needed for accurate results.

Montana FWP also recommends that the analyses for organic compounds, particularly for polybicarbonated biphenyls (PCBs), in reservoir sediment samples should use the Environmental Protection Agency's (EPA) "method 8082A" which is a congener specific analysis that detects PCB concentrations at the nanogram per kilogram level rather than utilizing EPA "method 8082" which only detects concentrations at the milligram per kilogram level.

Discussion and Staff Recommendation

*Quarterly and Continuous Water Quality Monitoring in 2021 and 2022*

NorthWestern collected data on nutrients, metals, inorganics, dissolved oxygen, and water temperature in the project reservoir, below the powerhouse, and downstream of the project in 2019 and 2020. NorthWestern summarized the data in the Pre Application Document (PAD). The data show that dissolved oxygen concentrations generally meet or exceed the minimum levels specified by the water quality standards, water temperatures appear to be consistent upstream to downstream of the project, and nutrient levels and heavy metal concentrations in and around the project are generally low (although NorthWestern did find elevated levels of lead in samples taken in the Clark Fork River downstream of the project during low flows). While additional water quality monitoring data could provide some information on trends, sufficient information exists to characterize water quality at the project and assess project effects on these water quality parameters. Therefore we do not recommend monitoring water chemistry on a quarterly basis or continuously monitoring water temperature at the project for another two years as proposed by NorthWestern [18 CFR § 5.9(b)(5)].

*Additional Reservoir Sediment Analyses*

Montana FWP's comments on the water quality study are not entirely clear. Montana FWP seems to suggest that sediment sampling for heavy metals and PCBs should be added to the proposed water quality study because NorthWestern's sediment sampling in the lower reservoir in July 2020 did not use methods that were sensitive enough to detect metals and organic compounds that are likely accumulating in the reservoir and may not have been collected in the ideal habitat to detect legacy contamination releases upstream of the project (e.g., from the Milltown Dam removal and the Smurfitt-Stone contamination site located several miles upstream).

NorthWestern's sediment analysis followed generally accepted practices [18 CFR § 5.9(b)(6)] and the analysis did not detect toxic concentrations of heavy metals or organic compounds. We disagree that a higher level of precision is needed to characterize overall water quality in the project reservoir. Any ongoing or future release of metals into the Clark Fork River upstream of the project is speculative and would be unrelated to the project's operation. NorthWestern has no plans for construction (e.g. dredging) and the potential changes in project operation[2] that NorthWestern is exploring through its *Operation Study* are not expected to cause large shifts or prolonged mobilization of sediments in Thompson Falls Reservoir. Therefore, a study assessing heavy metals and organic compounds in reservoir sediments lacks a sufficient nexus to current and proposed project operation [18 CFR § 5.9(b)(5)]. For these reasons, we do not recommend the additional sediment analyses requested by Montana FWP.

**Study 6: Downstream Transport of Bull Trout**

Applicant's Proposed Study

NorthWestern proposes to evaluate the feasibility of collecting juvenile bull trout from Thompson River spawning tributaries, located approximately five miles upstream of the project, and transporting them to Lake Pend Oreille, located approximately 65 river miles downstream of the project. As part of the study, NorthWestern would attempt to determine the most efficient and effective capture methods, locations, and timing of juvenile bull trout, determine methods of transport, and evaluate juvenile bull trout survival during transport. NorthWestern states that the long-term goal (beyond the timeframe of the study) is to assess whether downstream transport of juvenile bull trout from the Thompson River to Lake Pend Oreille would improve juvenile trout survival enough to result in an increase in the spawning population of adfluvial (i.e., rear in lakes and migrate to tributary streams to spawn) bull trout in the Thompson Falls drainage.

The study would involve capturing 100 juvenile bull trout (measuring between 120-250 millimeters total length) from Fishtrap Creek and another 100 juvenile bull trout (measuring between 120-200 millimeters) from the West Fork Thompson River upstream of the project dam using backpack electrofishing and picket weir traps for a minimum of 10 days between October and mid-November of 2021 and repeated again in 2022. The collected fish would have PIT tags inserted into their dorsal sinus cavity and a tissue sample taken for genetic analyses. Of the fish collected, 75 percent would be transported

[2] NorthWestern operates the project to maintain the reservoir within 1.5 feet from the full operating level (even though its authorized under its existing license to lower the reservoir as much as four feet from full operating level). NorthWestern is considering how it might increase its operational flexibility by using the top 2.5 feet of the reservoir while maintaining a 6,000-cfs minimum flow downstream of the project.

downstream to a release site in Lake Pend Oreille while the remaining 25 percent would be released at the location of capture and tagging. NorthWestern would operate existing PIT tag antenna stations located at the mouths of Fishtrap Creek, West Fork Thompson River, and the Thompson River mainstem throughout the study season to provide information on bull trout movement in and out of the tributaries over the course of the two-year study.

Comments on the Study

Montana FWP states that the maximum effort for electrofishing for juvenile bull trout in Fishtrap Creek and the West Fork Thompson River each year should be five days per stream and that the temporary weir traps should be operated a maximum of 45 days to catch the remainder of the bull trout consistent with the agreements reached between NorthWestern, Montana FWP, and the FWS.

Discussion and Staff Recommendation

Sufficient information exists to show that bull trout are currently able to pass the project [18 CFR § 5.9(b)(4)]. A desktop analysis of downstream fish passage completed in 2007 showed that, based on combined survival estimates for passage through the Francis turbines in the old powerhouse, the Kaplan turbine in the newer powerhouse, and the spillways, the average downstream passage survival at the project for trout measuring greater than 100 millimeters is likely 91 to 94 percent (GEI, 2007). Juveniles passing the project can then either take up residence in the Noxon Rapids Reservoir immediately downstream of the Thompson Falls Project or continue downstream to Cabinet Gorge Reservoir or to Lake Pend Oreille. After maturing, adult Bull Trout can return to the Thompson River to spawn via the trap and truck program currently being implemented at Cabinet Gorge Dam or via the upstream fish passage facility at the Thompson Falls Project. There is currently no upstream fish passage provided at the middle dam (Noxon Rapids) so bull trout that take residence between Cabinet Gorge Dam and Noxon Rapids Dam cannot currently migrate upstream.

Further, available data indicates that adult bull trout can pass upstream and downstream of the project. NorthWestern (2021) reports that since the ladder opened in 2011, 18 bull trout have ascended the ladder and an additional eight were detected entering the ladder (5 in 2015 and 3 in 2016). Of the 18 bull trout that ascended the fish ladder during this period, one individual ascended the ladder twice while five (including the one that initially migrated upstream to the Thompson River) were detected within one to two years downstream of the project dam in either Prospect Creek, Graves Creek, Noxon Reservoir, and/or were detected re-entering the lower ladder pools (NorthWestern, 2021). Also, NorthWestern proposes to review the scientific literature published since 2007 as part of its *Study 10 – Updated Literature Review of Downstream Fish Passage* which will provide updated estimates of downstream passage survival of various size

classes of fish (including juvenile bull trout) with respect to current project configuration and operations. This information would be sufficient for conducting an analysis of downstream passage at the project for bull trout and to inform potential license conditions [18 CFR § 5.9(b)(5)]. For these reasons, we do not recommend requiring NorthWestern to conduct a study to assess the feasibility of transporting juvenile bull trout downstream via trap and haul.

**Study 13: Distribution and Genetic Status of Westslope Cutthroat Trout**

Requested Study

Montana FWP contends that although the project's fish ladder passes westslope cutthroat trout upstream of the dam, it does so with varying degrees of success depending upon, among other things, flow conditions in the Clark Fork River. Montana FWP asserts that an adverse effect of ineffectively passing westlope cutthroat trout upstream includes non-replenishment of genetically pure westslope cutthroat trout from downstream with the result that upstream westslope cutthroat trout have increasing potential for hybridization with non-native rainbow trout.

Montana FWP requests that NorthWestern gather baseline genetic and distribution data on westslope cutthroat trout from 24 stream reaches located upstream and downstream of the project (i.e., within Prospect Creek and associated tributaries downstream of the dam, Thompson River and associated tributaries upstream of the dam, and tributaries to the Clark Fork River between the Thompson Falls Project and the Flathead River).

The objectives of the study are to identify the presence and distribution of genetically pure populations of westslope cutthroat trout in tributary streams above and below the project, identify hybridization zones, and understand community composition in select streams where westslope cutthroat trout still occur or are believed to occur. The information would be used to prioritize future protection, mitigation, and enhancement measures for the species. Montana FWP states that westslope cutthroat trout is a designated Species of Special Concern in Montana. Montana FWP would assist NorthWestern in gathering data from prior studies and conducting additional genetic sampling in stream reaches where information is lacking. Montana FWP recommends that up to 730 total westslope cutthroat trout genetic samples be collected from stream reaches over the summer and fall sampling seasons over the course of the two years. Montana FWP estimates that the cost of the study would be $29,200 (i.e., $40 per sample to be analyzed)

Comments on the Study

In its reply, NorthWestern does not propose sampling westslope cutthroat trout in tributaries upstream and downstream of the project. NorthWestern contends that Montana FWP's assumptions regarding the project's effects on upstream passage of westslope cutthroat trout are premature and are not supported by the existing information. NorthWestern states that conclusions regarding passage efficiency cannot reasonably be made until it completes its *Study 4 –Hydraulic Conditions* and *Study 5 – Fish Behavior*. Further, NorthWestern contends that potential hybridization of westslope cutthroat trout with non-native rainbow trout occurring in the basin has mostly been due to decades of rainbow trout stocking in the Clark Fork River (occurring from 1931-1988) that has led to rainbow trout being the most abundant trout species within the section of the Clark Fork River between Thompson Falls and Missoula (citing Peters and Schmetterling, 1996; Montana FWP, 2019). Also, NorthWestern states that the requested study would require sampling in tributaries several miles from the project waters, including in some locations believed to be "above seasonal or potentially permanent fish passage barriers" which would have no nexus to the project. NorthWestern also believes Montana FWP's cost estimate is "understated by orders of magnitude" and that assumptions about NorthWestern not incurring additional costs for collecting and transporting samples and the suggestion that Avista and the Forest Service may contribute to the study for free is either incorrect or pure conjecture. NorthWestern instead proposes to collect and analyze genetic samples from all westslope cutthroat trout and hybrids collected at the upstream fish ladder workstation as part of its proposed *Study 9 – Westslope Cutthroat Trout Genetics Study* rather than adopting the study requested by Montana FWP. The cost of Northwestern's alternative study proposal would be $1,500.

In its comments on the RSP, Montana FWP reiterates its concerns that the project may be adversely affecting migratory westslope cutthroat trout by blocking and/or delaying passage during the spring migration season and by altering river habitat conditions. Montana FWP contends that the ladder is inoperable due to high flows (i.e., over 60,000 cfs) during the spring months when westslope cutthroat trout are expected to migrate. Further, Montana FWP states that recent genetic analyses of 22 westslope cutthroat trout collected at the fish ladder workstation in 2020 found that 17 of the 22 fish sampled were genetically pure (citing Kovach et al., 2021) demonstrating that some genetically pure westslope cutthroat trout are seeking to migrate upstream of the dam. As a result, Montana FWP asserts that the "nexus is clear between project operations and impacts on Westslope Cutthroat Trout" and that the information would be useful in establishing license conditions, such as requiring measures to isolate genetically pure populations and/or translocate fish captured in the fish ladder to areas where they could be protected from hybridization or displacement by non-native species, etc.. Montana FWP also defends its projected cost estimate for the study stating that the only costs would be for analyzing up to 730 samples at a project cost of $29,200. Montana FWP suggests that one biologist funded by Montana FWP and two fulltime Montana FWP technicians (one fully funded by NorthWestern and the other "half funded") would be able to collect the additional samples at no additional cost to the project. Montana FWP

also continues to believe that the Forest Service and/or Avista (who operates the next two dams downstream of the Thompson Falls Project) may have interest in providing "technical assistance" or even funding the study.

Discussion and Staff Recommendation

NorthWestern operates the project fish ladder from mid-March to mid-October. The fish ladder is designed to pass fish with flows up to 48,000 cfs and operation generally stops when flows exceed 60,000 cfs. Figure 4-2 in the PAD includes a graph showing minimum, maximum, and mean streamflow at the Thompson Falls Project from April 1, 1956 to present. The data suggest that flows consistently remain elevated (i.e., above 40,000 cfs) during the months of May, June, and July and can exceed 60,000 cfs at times which would cause the ladder to shut down but that mean flows during this period generally remain under 60,000 cfs. This suggests that the fish ladder is fully or partially functional during the spring migration period in some but not all years. Further, while the numbers of westslope cutthroat trout recorded using the fish ladder are low relative to other fish species (i.e., 282 total westslope cutthroat trout or 0.8 percent of the total fish recorded from 2011-2020 with an average of 29 fish passed per year), the data nonetheless show that some westslope cutthroat trout (including some genetically pure individuals) are successfully navigating the fish ladder and migrating upstream of the dam each year (NorthWestern, 2021). Sufficient information exists to assess the duration of time that the ladder is expected to be shut down during the westslope cutthroat trout migration period.

Montana FWP has not demonstrated that the fish ladder affects westslope cutthroat trout hybridization with rainbow trout upstream of the project. As noted above, the fish ladder currently passes genetically pure westslope cutthroat yet hybridization still occurs, presumably due to a substantially greater abundance of rainbow trout relative to westslope cutthroat trout. Further, while the requested genetic information may be useful for agency management purposes in terms of determining the degree hybridization may have occurred upstream and downstream of the project, genetic information is not needed to assess project effects on passage of westslope cutthroat trout at the project or to inform license conditions [18 CFR § 5.9(b)(5)]. Data collected from the hydraulic study and fish behavior study would provide sufficient information to assess fish passage effectiveness for westslope cutthroat trout at the project and inform whether improvements to the fish ladder are needed. For these reasons, we do not recommend requiring Montana FWP's requested genetics study. Also, even though the cost is relatively low ($1,500), we do not recommend that NorthWestern be required to conduct genetic analyses of westslope cutthroat trout collected at the ladder workstation for the same reasons as for Montana FWP's requested genetics study.

**Study 14: Metals and Organic Compounds Assessment of Fish in Thompson Falls Reservoir**

Requested Study

Montana FWP requests that NorthWestern evaluate heavy metals (e.g., mercury, selenium, lead and arsenic) and organic compounds (i.e., dioxins, furans, and PCBs) in fish tissue samples in the project reservoir. Montana FWP requests that NorthWestern collect a total of 18 fish tissue samples for analysis from different composite size classes of northern pike, rainbow trout, smallmouth bass, and yellow perch. Montana FWP states that the data would inform an evaluation of project operations on contaminant accumulation and impacts to fisheries as well as inform fish consumption guidelines for recreational and tribal consumers.

Comments on the Study

In its reply, NorthWestern opposes this study. NorthWestern believes existing data do not support the contention that Thompson Falls Reservoir likely serves as a catchment basin for contaminants. NorthWestern states that fish tissue sampling conducted in 2005, 2010, and 2015 by Montana FWP found that mercury concentrations in fish sampled in Thompson Falls Reservoir are consistently lower than levels found in the two downstream reservoirs (i.e., Noxon Rapids Reservoir and Cabinet Gorge Reservoir) (Selch, 2017) and that two northern pike sampled in the project reservoir in 2014 were found to contain low levels of organic compounds (dioxins and furans) (Selch, 2015). NorthWestern also states that its recent analysis of sediment core samples taken from the lower portion of Thompson Falls Reservoir were below detectable levels for metals and organic compounds. Further, NorthWestern states that it does not have any plans for construction (e.g., dredging) or other project-related activities that could disturb sediments in the project reservoir and that it is not responsible for the presence of heavy metals and other compounds originating from upstream contamination sources; therefore, NorthWestern believes the requested study lacks a connection to the effects of project operation. NorthWestern also believes it would be difficult to collect the target numbers and size classes of the fish species that Montana FWP requests and that NorthWestern would instead prefer to prioritize its efforts at collecting fish for its tagging study over tissue sampling for the purposes of additional contaminant analyses.

In its comments on the RSP, Montana FWP states that without seeing the full lab reports for the reservoir sediment samples already collected and analyzed by NorthWestern, it is difficult to assess if the results are representative of the conditions in the reservoir or a "function of high laboratory reporting and detection limits or quality assurance and quality control issues." Montana FWP also expressed concern with the location of the sampling and analytical methods used to detect metals and organic compounds in the collected sediment samples and thus does not consider the "non-detection" results reported by NorthWestern in the RSP as reason to not conduct the fish tissue contaminant study. Further, Montana FWP states that mercury concentrations

found in the reservoir downstream of Thompson Falls (at Noxon Rapids Dam) has been shown to fluctuate between sampling years, that fish in the project reservoir have not been tested for "co-planer PCBs", and that recent fish sampling in the upper watershed recently warranted an "avoid" recommendation for fish consumption for PCBs. Therefore, Montana FWP believes more study is needed on contaminants in the Thompson Falls Reservoir to better inform fish consumption guidance. In regard to NorthWestern's concerns about the feasibility of collecting enough fish at the appropriate species and sizes sufficient for sampling, Montana FWP notes that the sample sizes included in its study request are simply a goal for the analysis and that less numbers of samples could be used for the analysis.

Discussion and Staff Recommendation

As discussed previously, NorthWestern followed generally accepted practices [18 CFR § 5.9(b)(6)] when it collected and analyzed sediment core samples from the lower portion of Thompson Falls Reservoir in July 2020 and a higher level of precision is therefore not needed to characterize overall water quality and contaminant levels in the the project reservoir. Regardless, sufficient information exists [18 CFR § 5.9(b)(4)] to show that the reservoir does not contain toxic concentrations of heavy metals or organic compounds or that fish communities in the reservoir are experiencing adverse effects from toxicity as a result of project operation. Any ongoing or future potential release of metals in the Clark Fork River upstream of the project is speculative and would be unrelated to project operation and other proposed relicensing activities. NorthWestern has no plans for construction (e.g. dredging) and the potential changes in project operation are not expected to cause large shifts or prolonged mobilization of sediments in Thompson Falls Reservoir. Therefore, we do not recommend additional analyses of heavy metals and organic compounds in fish tissues.

## Literature Cited

Baxter, J. 2001. Assessment of a Constructed Non-Sportfish Migration Barrier on the Salmo River Using Radio Telemetry and Floy Tagging. Baxter Environmental, Nelson B.C. Prepared for B.C. Hydro.

Boyer, K. 2016. Spawning and Early Life History of Mountain Whitefish in te Madison River, Montana. Thesis. Montana State University, Bozeman, Montana.

Brandt, J., Monzyk, F., Romer, J. and R. Emig. 2016. Status and Trends of Predator Species in Lookout Point Reservoir. Oregon Department of Fish and Wildlife, Upper Willamette Research, Monitoring and Evaluation Program, Corvallis Research Lab, Corvallis, Oregon.

GEI. 2007. Literature Review of Downstream Fish Passage Issues at Thompson Falls Hydroelectric Project. Submitted to PPL Montana January 2007. Project 060080. Accessible online at: https://northwesternenergy.com/docs/default-source/thompson-falls/thompson-falls-other-reference-material/thompson_falls_literature_review_of_downstream_fish_passage_issues_2007.pdf.

Gillin G. and J. Pizzimenti. 2003. Biological Assessment of the Thompson Falls Hydroelectric Development, Thompson Falls, Montana. Submitted to PPL Montana, Butte, Montana.

Kovach, R., Painter, S. and A. Lodmell. 2021. March 30, 2021 genetics letter to J. Blakney. University of Montana Conservation Genetics Laboratory, College of Forestry and Conservation, Missoula, Montana.

Montana FWP. 2019. Lower Clark Fork River Tributary Sampling Including: Fishway Exploitation Summary Thompson Falls Field Station. Prepared by Marc Terrazas and Ryan Kreiner, Montana Fish, Wildlife and Parks, Thompson Falls, MT.

NorthWestern. 2019. Thompson Falls Hydroelectric Project FERC Project No. 1869, Comprehensive Phase 2 Final Fish Passage Report. Filed December 23, 2019.

NorthWestern. 2021. 2020 Fish Passage Annual Report for the Thompson Falls Hydroelectric Project FERC Project No. 1869. Filed March , 2021.

Peters, D. and D. Schmetterling. 1996. Clark Fork River creel census: Rock Creek to Flathead River. Statewide Fisheries Investigation, F-78-R-2. Montana Fish, Wildlife & Parks, Missoula, Montana. 23 pp

Pierce, R., Davidson, M. and C. Podner. 2012. Spawning behavior of Mountain Whitefish and cooccurrence of *Myxobolus cerebra/is* in the Blackfoot River Basin, Montana. *Transactions of the American Fisheries Society, 141(3},* pp. 720-730.

Pribyl, A.L., Vile, J.S. and T.A. Friesen. 2005. Population structure, movement, habitat use, and diet of resident piscivorous fishes in the lower Willamette River. Biology, behavior, and resources of resident and anadromous fish in the lower Willamette River. Oregon Department of Fish and Wildlife, Columbia River Investigations, Clackamas, Oregon.

Selch, T. 2015. Noxon Rapids Reservoir Fish Contaminant Study. Prepared for Avista, Natural Resources Field Office, Noxon, Montana.

Selch. T. 2017. Mercury and Selenium Assessment in Fish from Noxon Rapids and Cabinet Gorge Reservoirs. Project Completion Report, Aquatic Organism Tissue Analysis Appendix F3. Prepared for Avista, Noxon, Montana and Montana Fish, Wildlife and Parks, Helena, Montana.