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February 1, 2016

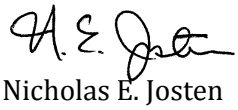
Secretary
Federal Energy Regulatory Commission
888 First Street NE
Washington, DC 20426

Subject: Revised Study Plan - County Line Road Hydroelectric Project – FERC No. P-14513

Dear Secretary:

Attached via electronic filing is the Revised Study Plan for the subject project. Please contact me at (208) 528-6152 if you have any questions.

Regards,



Nicholas E. Josten
Agent for Idaho and New Sweden Irrigation Districts

Attachments
County Line Road Hydroelectric Project Study Plan Rev 2

Copies
Alan Kelsch, Idaho Irrigation District
Louis Thiel, New Sweden Irrigation District

Study Plan – Rev 2

County Line Road Hydroelectric Project

FERC No. 14513

In accordance with 18 CFR §5.11

Prepared by:

GeoSense LLC
2742 Saint Charles Avenue
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January 2016

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INTRODUCTION

Idaho Irrigation District and New Sweden Irrigation District, as the Applicants for the County Line Road Hydroelectric Project (FERC No. 14513), present this Study Plan in response to study requests submitted by agencies and private parties having an interest in the project effects. Following the July 8-9, 2015 FERC Scoping Meeting study requests were received from 8 public agencies and non-government organizations (NGOs) and from 3 private individuals. A total of 31 study requests were received, many having duplicated or overlapping scope. Some of the requests did not meet FERC requirements for study request filing making it difficult to determine the specifics of the request. Nonetheless, with this Study Plan, it is the Applicant's intention to address all submitted requests that relate to project impacts.

The intent of this initial Study Plan proposal is to respond to the study requests according to our understanding of the agency submittals and to state the intent of the Applicant to conduct these studies using accepted scientific methods. This final Study Plan was prepared based on comments and discussion related to an original Study Plan issued in October 2015, a revised Study Plan issued in November 2015, and two Study Plan meetings (27-Oct-2015, 20-Jan-2016). Stakeholder consultation has focused on clarifying the potential resource impacts, developing clear study objectives, selecting appropriate scientific methods, and refining study details. The FERC Integrated Licensing Process includes provisions for consultation and comment on the Applicant submitted study Plan under §5.11 – 5.13 of its regulations.

PROJECT SUMMARY

The County Line Road Hydroelectric Project would be a new small hydroelectric facility located near Idaho Falls, ID with a generating capacity of 2,500 kW and an estimated annual power output of 18,300 MWH. The Project would utilize water diverted from the Snake River at an existing diversion dam located 10 miles upstream from the City of Idaho Falls. Currently this diversion dam directs summer irrigation water into the existing Idaho and Great Western Canals for distribution to farmers on both sides of the Snake River within Bonneville and Bingham Counties. Under the proposed project the Applicants would improve the canals to convey additional flow. Then, when Snake River flows are adequate, and only after allowing for a 1,000 cfs minimum flow past the diversion, up to 1,000 cfs of additional flow would be diverted year round into each canal and conveyed for 3.1/3.5 miles down the canals where two new powerhouses would be constructed (see Appendix A).

EAST SIDE SITE – IDAHO CANAL

The east side site would utilize the existing head gates on the Idaho Canal to divert additional water from the Snake River to be used for power generation. The head gates would be used to divert both irrigation and power generation flows. The combined flow would be conveyed downstream in the existing canal for 3.1 miles where two new sets of head gates would be constructed to segregate the flow. The portion of the flow designated for irrigation would pass through one set of gates and continue in the existing canal network. The portion of the flow designated for power production

would pass through into a new powerhouse and then be discharged back to the Snake River via a tailrace canal. The gates would be adjusted so that the correct amount of water flowed into the canal network and the remainder was returned to the Snake River through the power project.

The new powerhouse would be constructed on the west side of the canal between the canal and the Snake River. A gated overflow spillway would be provided to pass flows around the powerhouse in the event that the powerhouse tripped offline. The powerhouse would be equipped with a single new 1.2 MW Kaplan turbine/generator. The project would include a switchyard and 2,500 feet of 12.5 kV transmission line that would interconnect into the utility distribution system owned by Rocky Mountain Power. Existing roads would access the project. It is estimated that the east side site would generate 9.9 GWh annually.

WEST SIDE SITE – GREAT WESTERN CANAL

The west side site would utilize the existing head gates on the Great Western Canal to divert additional water from the Snake River to be used for power generation. The head gates would be used to divert both irrigation and power generation flows. The combined flow would be conveyed downstream in the existing canal for 3.5 miles where two new sets of head gates would be constructed to segregate the flow. The portion of the flow designated for irrigation would pass through one set of gates and continue in the existing canal network. The portion of the flow designated for power production would pass through into a new powerhouse and then be discharged back to the Snake River via a tailrace canal. The gates would be adjusted so that the correct amount of water flowed into the canal network and the remainder was returned to the Snake River through the power project.

The new powerhouse would be constructed on the east side of the canal between the canal and the Snake River. A gated overflow spillway would be provided to pass flows around the powerhouse in the event that the powerhouse tripped offline. The powerhouse would be equipped with a single new 1.3 MW Kaplan turbine/generator. The project would include a switchyard and 500 feet of 12.5 kV transmission line that would interconnect into the utility distribution system owned by Rocky Mountain Power. Existing roads would access the project. It is estimated that the west side site would generate 8.4 GWh annually.

A project map showing the project features and project boundary is presented in Appendix A.

STUDY APPROACH

The overarching purpose in developing (and eventually) executing this Study Plan is to begin adapting the hydroelectric project, as outlined in the project Pre-application Document (PAD), to accommodate the various resource related concerns expressed in public meetings and in comments submitted to FERC. The Applicant believes that the project can be accomplished in a manner that adequately mitigates negative resource impacts and can potentially be a positive factor in the evolution of the Osgood Reach into a popular recreation option for the local population. The challenge of this Study Plan is to focus data collection efforts, with agency guidance, on the project's critical resource issues. The data obtained from a properly focused Study Plan will form the basis

for modifying the project, if necessary, to address resource concerns while retaining the project's economic viability.

Four primary resource issues emerged based on study requests, comments filed with the Commission, and comments made at agency and public scoping meetings:

1. Project effects on fish and fishery habitat
2. Project effects on wildlife and wildlife habitat;
3. Project effects on recreation opportunities and recreation access;
4. Project effects on historic and/or archeological (cultural) resources.
5. Project effects on socio-economics, including impacts to local landowners and the agricultural community;

The Applicant proposes 8 studies, 6 studies to address fish and wildlife related issues and one study each to address recreation and cultural resources. A socio-economic study is not proposed.

During all studies that involve on-site work (Study 1, 3, 4, 5, 6, 7, 8) researchers will record any opportunistic observations of wildlife or recreation activities on the project reach including the following: date, time, location, wildlife or recreation details.

STUDY PROPOSAL

FISHERY STUDIES

The Osgood Reach of the Snake River upstream from Idaho Falls is bounded on the upstream end by an irrigation diversion dam that spans the river upstream of the County Line Road Bridge, and the Upper Idaho Falls Power Dam on the downstream end. The reach is a riverine, braided channel complex in the upper 5.8 km, while the lower 4.5 km is deeper with lower velocity due to the impoundment created by the dam. This reach provides angling opportunity that is being utilized by resident anglers and trophy brown trout are present. Idaho Fish and Game has speculated that limited quality spawning habitat and/or flows are impacting spawning success and recruitment. They also suggest that winter survival of juvenile trout and entrainment may be contributing to the lack of sufficient recruitment in the reach, although the entrainment contemplated actually takes place in the reach upstream of the Osgood Reach.

The purpose of the proposed fishery studies is to obtain a better understanding of the Osgood Reach fishery with emphasis on the potential impacts of hydropower operations. The Districts have already completed a major study of the Osgood Reach, using state-of-the-art modeling methods to investigate potential impacts of reduced flows on river channel morphology and fishery habitat. The extensive field measurements and hydraulic computations performed for these studies will contribute critical information to many elements of this Study Plan. The Districts have also completed a fish entrainment study. The entrainment study provides strong evidence that entrainment of trout into the Idaho and Great Western Canals is low. Some refinement of both the habitat modeling and entrainment study results is included in this Study Plan.

The fishery studies proposed in this Study Plan relate to the following potential project impacts:

1. Impacts to key aquatic habitats
    a. spawning habitat
    b. side-channel habitat
    c. juvenile wintering habitat
2. Impacts from fish entrainment
3. Impacts due to icing
4. Impacts due to water quality

STUDY 1 – SPECIAL AQUATIC HABITATS

This study was requested by the Idaho Department of Fish and Game (IDFG).

The project reach of the Snake River is characterized by a riverine braided channel complex that contains Brown, Rainbow, and Cutthroat trout (High et al. 2015). Trout growth in this area is very rapid, but population density remains low due to what appears to be inadequate recruitment (High et al. 2015). Flow modeling in the project portion of the river has shown that reducing flows to 1,000 cfs will cause 44 acres of the stream to go dry compared with conditions at 2,800 cfs. This will primarily occur within two major side-channels in the project reach, but will also occur along

portions of bank habitat and within some riffles (Figure 1). Lowering flows to this level, which would occur during the non-irrigation season, has the potential to reduce the availability of brown trout spawning habitat, will dry up side channels that may be important for wintering fish, and will expose fish in the project reach to reduced flows and potentially reduced temperatures, both of which can negatively affect survival (Smith and Griffith 1994, Mitro and Zale 2002). Therefore, this study is proposed to assess when, where, and in what conditions fall spawning brown trout build their redds; document use of side channels under existing conditions; and document juvenile trout use of predicted wintering areas under existing conditions.

Goals and objectives

The goal of this study is to assess potential impacts of reduced flows on brown trout redds, side-channel aquatic habitat, and to determine the number of juvenile trout that winter in the project reach and therefore may be affected by reduced flows.

The objectives of this study are to:

a) Locate brown trout spawning areas, evaluate microsite conditions at the redds;
b) Compare conditions at redd sites with conditions at model identified spawning habitat and adjust/revise brown trout spawning habitat estimates for both existing and proposed conditions;
c) Observe side channel ice development and determine presence/absence of fish habitat as a function of ice stage;
d) During winter periods when side channels contain suitable habitat, evaluate the amount and species of fish using side channel habitats;
e) Assess juvenile trout overwinter use of areas affected by flow reduction including side channels, stream margins, and dewatered riffles
f) Re-compute fishery habitat as necessary to account for new field observations and ice-modified hydraulics

Relevant agency/tribal management goals and/or public interest considerations

IDFG: The IDFG is a duly established executive department of the State of Idaho, Idaho Code §§ 36-101 and 67-2402(1). The statutory wildlife policy of the State of Idaho is to preserve, protect, perpetuate, and manage all fish and wildlife for continued supplies for hunting, fishing, and trapping, Idaho Code § 36-103(a). The IDFG, acting under the supervision of the Idaho Fish and Game Commission, has the responsibility to carry out Idaho's wildlife policy, Idaho Code §§ 36-102(a) and -103(b). The IDFG works with the hydroelectric project Applicants and the FERC to ensure that hydroelectric development is consistent with the wildlife policy of Idaho. The IDFG assists the hydroelectric industry and the FERC by providing technical information addressing potential effects to fish and wildlife resources and how any adverse effects might be avoided, minimized or mitigated

Background and existing information

Flow studies, completed by the Applicant during 2014, show that brown trout spawning habitat increases from 8.8 acres to 9.7 acres as flows decrease from 2,180 cfs to 1,010 cfs. Idaho Fish and

Game believes this is an overestimate of available spawning habitat and that the project reach is "spawning limited" under existing conditions. Spawning habitat was determined in the model using habitat suitability criteria for velocity, depth, and substrate size. However, because the reach is impacted from regulated flows and bedload recruitment of spawning sized gravel into the reach is minimal, much of the model identified spawning area appears to be too embedded to provide useable spawning habitat.

The Applicant's flow studies also indicate that a major side channel (see Figure 1) becomes dry during late fall and winter at predicted low flows of 1,000 cfs. There are no surveys that describe the biological use of this side-channel habitat. Additionally, it is unknown whether these areas currently freeze solid, and therefore become unusable by fish during the winter, or rather provide surface-ice refuge for fish during the winter.

Project/resource nexus

Flow records show that average low winter flow in the Osgood Reach is about 2,000 cfs. The proposed project includes lowering winter flow to 1,000 cfs in the upper 3.1 - 3.5 miles of the Osgood Reach. The onset of lower flows in the late fall coincides with the brown trout spawning period and could affect the availability of suitable spawning habitat, which may in turn affect spawning success and juvenile survival. Lower flows would also result in dewatering of some of the smaller side channels in the Osgood Reach compared with existing conditions. This dewatering would occur just prior to the onset of winter icing conditions with an unknown effect on fish and fish habitat.

Proposed methodology

TECHNICAL WORKING GROUP

A fisheries technical working group (TWG) will be created to provide advisory input and oversight throughout the fisheries studies, particularly in the review of new data pertaining to revision of winter habitat suitability criteria (HSCs). The TWG will be composed of three persons: one representative from the involved Federal agencies (BLM, FWS), one representative from the involved State of Idaho agencies (IDFG, IDEQ), and one representative from a local user group or involved NGO (landowners, TU). Representatives with experience in fisheries impact studies will be nominated by their respective agencies. The nominees will be reviewed and selected by the current stakeholders, FERC and the Districts.

At key stages in the process of developing revised HSCs for winter habitat, the TWG will be given an opportunity to review relevant information such as preliminary results. The fisheries TWG will also be invited to participate during development of revised HSCs. The TWG will provide the study team with written comments and suggestions. TWG members will be responsible for coordinating their

review and comments with their respective constituencies[1]. TWG comments and suggestions will be appended to the final report.

TASK 1 - BROWN TROUT SPAWNING HABITAT INVESTIGATION

Brown trout spawn in the fall, generally from October – December (Simpson and Wallace 1982). Spawning surveys in the project reach during 2015 confirm that brown trout spawning in this reach begins after the first of October. This is also after the end of the irrigation season, when flows recede due to irrigation water storage in upstream reservoirs. Brown trout spawning and egg incubation spans the period when project reach flows currently reach low flow. Modeling shows that the proposed hydroelectric project would alter conditions such that some existing spawning areas would become unavailable and other area would become newly available. Identifying redds and measuring site specific conditions at redd locations will allow verification or correction of habitat suitability criteria used in the model. Knowing redd locations and site specific conditions, such as water depth and velocity, also provides data that will assist in determining if egg/alevin/fry survival is potentially affected by ice. Therefore, the Districts propose to assess brown trout spawning by doing redd counts every two weeks within the project reach from October through mid-December and measuring site specific conditions at those locations.

Those spawning areas identified by the model or by fish biologist professional opinion will be searched by walking or from a boat. Redds in areas that are too deep to observe will be assumed to be un-impacted from flow reductions and therefore will not be searched. Identified redds will be georeferenced and photographed. Substrate at the redd location will be visually classified based on criteria listed in Table 1. Water depth will be measured immediately upstream from the redd pit, in the redd pit and on the redd pillow. Water velocity will also be measured 5 cm above the substrate and at 0.6 depth at these three locations.

Ice formation will be evaluated at two locations where redds are present in shallow water or in areas where redds are present but where modeling shows they would be dry at 1010 cfs. This will be done by installing a time-lapse camera near each redd and recording pictures throughout the winter. Additionally, during each month from December to March holes will be drilled in the ice and ice depth, water depth, water velocity, and water temperature will be recorded. Ice formation and thickness data will be used to assess how redds in shallow water are currently affected by ice.

The data outlined above will be summarized in a report which will also include an analysis of conditions expected at each redd location at flows from 1010 – 2800. Additionally, spawning habitat identified by the model will be subjectively classified based on the criteria in Table 1. Areas

[1] E.g., the state agency TWG member would circulate information and collect comments from all interested state agencies, the federal agency TWG member would manage consultation with all interested federal agencies, and the NGO/landowner TWG member would manage consultation with non-government stakeholders.

from classifications not used by spawning fish will be removed from the model identified suitable spawning areas, and spawning area will be re-tabulated for flows from 1010 – 2800 cfs.

Table 1. Substrate classification for redds and modeled spawning habitat.

SPAWNING HABITAT CLASSIFICATIONS
Clean surface substrate, loosely packed, easy to move by foot
Clean surface substrate, tightly packed, difficult to move by foot
Fine sediment (sand, silt) on riverbed surface
Macrophytes/periphyton/algae in high abundance on riverbed surface
Fine sediment and macrophytes/periphyton/algae on riverbed surface
Clean surface substrate, loosely packed, easy to move by foot
Clean surface substrate, tightly packed, difficult to move by foot

TASK 1 OUTLINE

A. Boat and/walking redd search twice/month October to mid-December 2015
    1. Search the project reach looking for redds
        a. Search areas the model identified as spawning habitat
        b. Search areas where spawning may occur based on professional judgement
        c. Search any additional areas IDFG believes spawning may occur not included above (IDFG to supply map).
B. Evaluate habitat conditions at redd sites
    1. GPS location and photograph
    2. Perform substrate analysis using the following field classifications:
        a. Clean surface substrate, loosely packed, easy to move by foot
        b. Clean surface substrate, tightly packed, difficult to move by foot
        c. Fine sediment (sand, silt) on riverbed surface
        d. Macrophytes/periphyton/algae in high abundance on riverbed surface
        e. Fine sediment and macrophytes/periphyton/algae on riverbed surface
    3. Measure water depth at pit and pillow.
    4. Measure average water velocity directly in front of the redd, in the pit, and on the pillow (at 5 cm above the substrate and at 0.6 depth at the three locations listed)
C. Evaluate Ice at two shallow redd locations where modeling shows redds would be dry at 1010 cfs.
    1. Install time-lapse cameras to record pictures throughout the day for one winter to evaluate ice cover (Figure 2)
    2. During each month from December to March at each of the camera locations above, drill holes in the ice and record ice depth, water depth, water velocity, and water temperature

D. Further evaluate areas identified as spawning habitat by the model but not containing active redds
    1. Classify substrate into the following field classifications:
        a. Clean surface substrate, loosely packed, easy to move by foot
        b. Clean surface substrate, tightly packed, difficult to move by foot
        c. Fine sediment (sand, silt) on riverbed surface
        d. Macrophytes/periphyton/algae in high abundance on riverbed surface
        e. Fine sediment and macrophytes/periphyton/algae on riverbed surface
E. Analyze data
    1. Summarize findings in a draft report to include:
        a. Number, date, depth, water velocity, substrate, GPS location of redds found
        b. Map of redd locations over aerial photo
        c. Map of redd location over modeled depths at flows < 3000 cfs
        d. Map and area table of predicted spawning habitat by classifications under C.1.
        e. Summary of ice conditions observed throughout winter
    2. Distribute draft analysis to TWG for comments
    3. Discuss potential for updating brown trout spawning HSCs
F. Write final spawning report

TASK 2 - SIDE CHANNEL FUNCTION

Modeling shows that two side-channels will go dry between flows of 2800 cfs and 1010 cfs (Figure 1). The downstream side channel is characterized by riffle and run habitat that does not contain cobble-boulder or small woody debris habitat selected by juvenile salmonids during the winter. However, the upstream side channel has numerous unembedded cobbles and boulders and appears adequate for juvenile trout winter habitat. Therefore, the Districts propose to assess juvenile trout use of this winter habitat by electrofishing three transects within the side channel at the beginning of winter (after water temperature drop to below 10°C) and at the end of winter (before water temperatures rise above 10°). The Districts also propose to assess ice formation and coverage within the portion of the side channel containing juvenile trout winter habitat.

Juvenile trout use of the side channel will be assessed by conducting electrofishing estimates of the side channel at designated areas (Figure 3). These areas were selected to maximize the probability of capturing juvenile trout by selecting the best available habitat within the side channel. Additionally, because the area of the side channel during typical winter flows is low, selected sampling areas cover most of the available habitat. Juvenile trout winter use of the side channel will be assumed to be represented by the number of fish collected during these efforts.

Ice formation will be evaluated at two locations within the side channel and within the juvenile trout sampling area by installing two time-lapse cameras in the side channel. Additionally, during each month from December to March holes will be drilled in the ice and ice depth, water depth, water velocity, and water temperature will be recorded. Two time-lapse cameras will also be installed adjacent to the side channel to record ice formation. Holes will be drilled adjacent to these

locations each month from December to March and ice depth, water depth, water velocity, and water temperature will be recorded. Ice formation and thickness data will be used to assess whether the side channel provides winter habitat under current flow conditions.

TASK 2 OUTLINE

A. Evaluate ice coverage at 4 locations (two within side channels that will be dewatered at 1000 cfs and 2 in adjacent areas that will not be dewatered)
    1. Install cameras at the following locations:
        a. Two within side channels that will be dewatered at 1000 cfs
        b. Two in adjacent areas that will not be dewatered at 1000 cfs
    2. Install time-lapse cameras to record pictures throughout the day for one winter to evaluate ice cover (Figure 2)
    3. Record advancement and recession of ice and connectivity to adjacent main channel
B. Evaluate ice depth in side channel
    1. During each month from December to March, drill holes in the ice and record ice depth, water depth, water velocity, and water temperature
    2. Locate drill holes in key locations as determined during pre-ice reconnaissance
        a. Known deep water pools
        b. Redd locations
        c. Locations where wintering juvenile fish were observed
C. Evaluate juvenile trout winter use of side channel.
    1. Conduct backpack electrofishing removal estimates at three designated sample sites (Figure 3).
        a. Electrofish a measured length of each site in early winter (water temp <10 °C)
        b. Electrofish the same length of each site in late winter (water temp <10 °C)
D. Analyze data
    1. Summarize findings in a draft report
        a. Ice coverage and thickness in side channels that go dry
        b. Juvenile fish winter use of side channels
    2. Distribute draft analysis to TWG for comments
G. Write final side channel report

TASK 3 - JUVENILE TROUT WINTER USE OF HABITAT WITHIN THE PROJECT REACH

Fisheries managers have often suggested that survival of trout during the winter is a major factor affecting population densities in many stream ecosystems in the Rocky Mountains (Annear et al. 2002). In the nearby Box Canyon section of the Henry's Fork, flow has been shown to be primary factor that affects winter survival of juvenile trout (Mitro and Zale 2002). As the proposed hydroelectric project would reduce winter flows, the Districts propose an assessment of the number of juvenile trout that winter in the project reach under pre-project conditions and a review of the literature to get an indication as to how that wintering population may be affected by lower winter flows.

The number of juvenile trout wintering within the project reach will be determined by sampling sites from within the area the model identified as winter habitat for juvenile rainbow trout or juvenile brown trout at flows of either 2800 or 2180 cfs. The sampling design will mirror the strategy Hillman and Platts (1993) developed to have a known probability of detection of bull trout at a given density. Their protocol was developed for linear stream systems, which we will apply to the linear arrangement of habitat along the river banks and island banks.

Sample sites were selected, based on the protocols of Hillman and Platts (1993), by creating a line through the modeled winter habitat predicted for juvenile brown or rainbow trout at flows of either 2180 or 2800 cfs. This habitat is located along the stream or island banks and resulted in a line 19,400 m long, or what Hillman and Platts (1993) defined as 2 reaches. The line was divided into 100 m segments and each segment was assigned a unique number. The statistical package R was used to randomly draw 12 of these numbers and the associated line endpoints were then designated as the linear extent of the sampling locations. The width of the sampling area is defined as the extent of modeled winter habitat for juvenile brown or rainbow trout at flows of either 2180 or 2800 cfs (Figure 4).

Since the density of juvenile trout in the project area is unknown, it is not possible to determine beforehand the number of sample sites that are needed to have a given probability of detection. However, lack of detection at a given number of sample sites can give a probability that the population is below a certain density. For example, Hillman and Platts (1993) developed their protocols at a scale of 10 km. The linear extent of juvenile trout habitat in the project reach is just less than 2 reaches or 20 km. Therefore, sampling twelve 100 m sites without detection yields a 78% probability that the mean juvenile trout density is less than 0.25 fish/100 m or 50 fish in the project area within the modeled habitat. If the actual fish density is higher or lower, the probability of detection varies also (Table 2).

Table 2. Mean density of fish that could be detected with a known probability of detection by sampling twelve 100 m sample sites in a 20 km area (Hillman and Platts 1993) and the number of fish that would be expected in the modeled habitat of the project reach at those densities.

MEAN DENSITY (FISH/100 M)	PROBABILITY OF DETECTION	NUMBER OF FISH IN THE PROJECT REACH
0.10	45.1%	20
0.25	77.6%	50
0.40	90.9%	80
0.55	96.3%	110
0.70	98.5%	140
0.85	99.3%	170
1.00	99.7%	200

The number of juvenile trout in each site will be assessed by electrofishing that portion of the site that is less than 2 ft deep. If any juvenile trout are collected during the first pass a second pass will be conducted. If fish are collected in the second pass, a third pass will be conducted. A population estimate in this portion of the site will be calculated using a depletion estimator. The portion of the site that is deeper than 2 ft will be snorkeled at night and fish in that portion of the site will be counted. The number of fish observed will be divided by 0.6, which is the portion of fish Griffith and Smith (1993) observed to emerge from concealment at night.

There is a possibility that this dual methodology (electrofishing and snorkeling) will result in double counting of some fish. Therefore, the resulting estimate may be viewed as a liberal estimate of the number of fish present in the site.

The population of juvenile trout within the modeled habitat of the project reach will be estimated based on the sample site population estimates using the methods of Meyer et al. (2006), but without the use of stratification, since all sites are within a single stratum. This method will result in a juvenile trout population estimate with confidence intervals.

Likely, some juvenile trout occur within the reach but are outside the modeled habitat. However, it is impossible to sample the entire reach. Additionally, the habitat parameters selected to model winter habitat were selected by the group of interested parties including IDFG to represent the very best of the available habitat. Therefore, we believe that most of the juvenile trout should be accounted for using this method.

Once a juvenile trout winter population is determined, the impact of the project due to reduced flows or reduced temperatures can be applied to that population. The impact of low flows and reduced temperatures will be determined by reviewing the literature to see what type of reductions in survival are expected at a given percentage reduction in flows or temperatures. Data from Study 4 will be used to assess the extent of temperature reductions and flow reductions will be determined for a series of minimum flows between 2800 and 1010 cfs.

TASK 3 OUTLINE

A. Select areas from within the modeled juvenile trout winter habitat in which to assess juvenile trout habitat use (12 areas will be randomly selected and will be 100 m long).
    1. Twelve areas will be randomly selected from within areas where predicted winter habitat for juvenile rainbow trout and juvenile brown trout overlap at flows of 2180 and 2800 cfs (typical winter flows) (Figure 4).
B. Collect juvenile trout abundance data at each selected wintering site
    1. Record basic conditions by photograph and GPS
    2. Electrofish that portion of each site that is less than 2 ft deep and snorkel the portion of the site that is more than 2 ft deep in early winter (night time water temp <10 °C)
    3. Electrofish that portion of each site that is less than 2 ft deep and snorkel the portion of the site that is more than 2 ft deep in late winter (night time water temp <10 °C)

4. If juvenile salmonids are encountered in the first pass, conduct a 3-pass removal estimate
5. The number of juvenile trout observed by snorkeling will be divided by 0.6 to obtain a population estimate.
6. Sum the electrofishing and snorkeling estimates for each site to obtain a population estimate for modeled winter habitat within each of the twelve sites.

C. Estimate the juvenile trout population in the modeled habitat by combining the population estimates from all sites and extrapolating to the modeled juvenile trout winter habitat.
D. Conduct literature review
    1. Summarize literature regarding effects of flow reduction on winter survival of juvenile trout
    2. Summarize literature regarding effects of temperature on winter survival of juvenile trout
E. Analyze data
    1. Summarize findings in a draft report
        a. Population estimate of juvenile trout at the beginning and end of winter in the modeled habitat of the project reach.
        b. Literature review of general effects of flow on winter survival
        c. Literature review of general effects of cold temperatures on winter survival
        d. Estimate of project effects to the juvenile trout population based on impacts of lower flows and temperature changes.
    2. Distribute draft analysis to TWG for comments
E. Write final juvenile wintering report

TASK 4 – UPDATE HABITAT ESTIMATES

This task would provide updates and additions to the habitat estimates developed by RiverFLO-2D. The HSC criteria developed for use in RiverFLO-2D were based on literature values and modified based on local fisheries management knowledge of fish preferences in the Osgood Reach. This was the best information available at time the modeling was performed and was agreed to by all participating stakeholders. With the additional information gathered in Tasks 1 – 3, the HSC criteria for brown trout spawning or juvenile wintering may be modified based on observed habitat use.

Field measurements of habitat values at observed spawning areas will be compared to modeled habitat values, graphed for visual examination, and statistical relationships presented. A meeting with the fishery TWG will be held to discuss the observed vs. modeled results. Based on this meeting and the data available, HSC criteria for "usable habitat"[2] in these two categories may be modified. If modifications are made, then model results will be re-computed.

[2] See Ecosystem Sciences reports for detailed explanation of the term "usable habitat".

The new HSCs (if any) will be input into RiverFLO-2D model to compute new estimates of usable acreages for brown trout spawning and juvenile wintering habitat representative of ice-free winter conditions. In addition, Study 3 estimates of peak ice river hydraulics will be input into River2D and estimates of usable brown trout spawning and juvenile wintering habitat during peak ice will be computed.

Finally, "marginal habitat"[3] will be computed for all species, all life stages (including selected life stages affected by ice).

TASK 4 OUTLINE

A. Modify spawning/wintering HSCs if indicated by field studies
B. Incorporate modified hydraulics based on ice study results
C. Re-compute usable habitat with updated information
D. Compute marginal habitat to supplement existing results
E. Prepare draft and final report

Level of effort and cost

TBD

References

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Hillman, T.W., and W.S. Platts. 1993. Survey plan to detect the presence of bull trout. Don Chapman Consultants Incorporated, Boise, ID. Technical Report.

[3] Previous winter habitat model results were based on the "usable habitat" approach, as requested by IDFG and agreed to by stakeholders who participated in the process. This approach established the range of habitat values (for depth, velocity and substrate) that were determined to fall between 0.5 and 1 on a scale of 0 to 1, which was then scored as "usable habitat". "Marginal habitat" is defined as corresponding to the range of habitat values (for depth, velocity and substrate) that fall between 0 and 0.5 on a scale of 0 to 1. "Marginal habitat" calculations would be based on the same habitat suitability curves that were used to compute "usable habitat".

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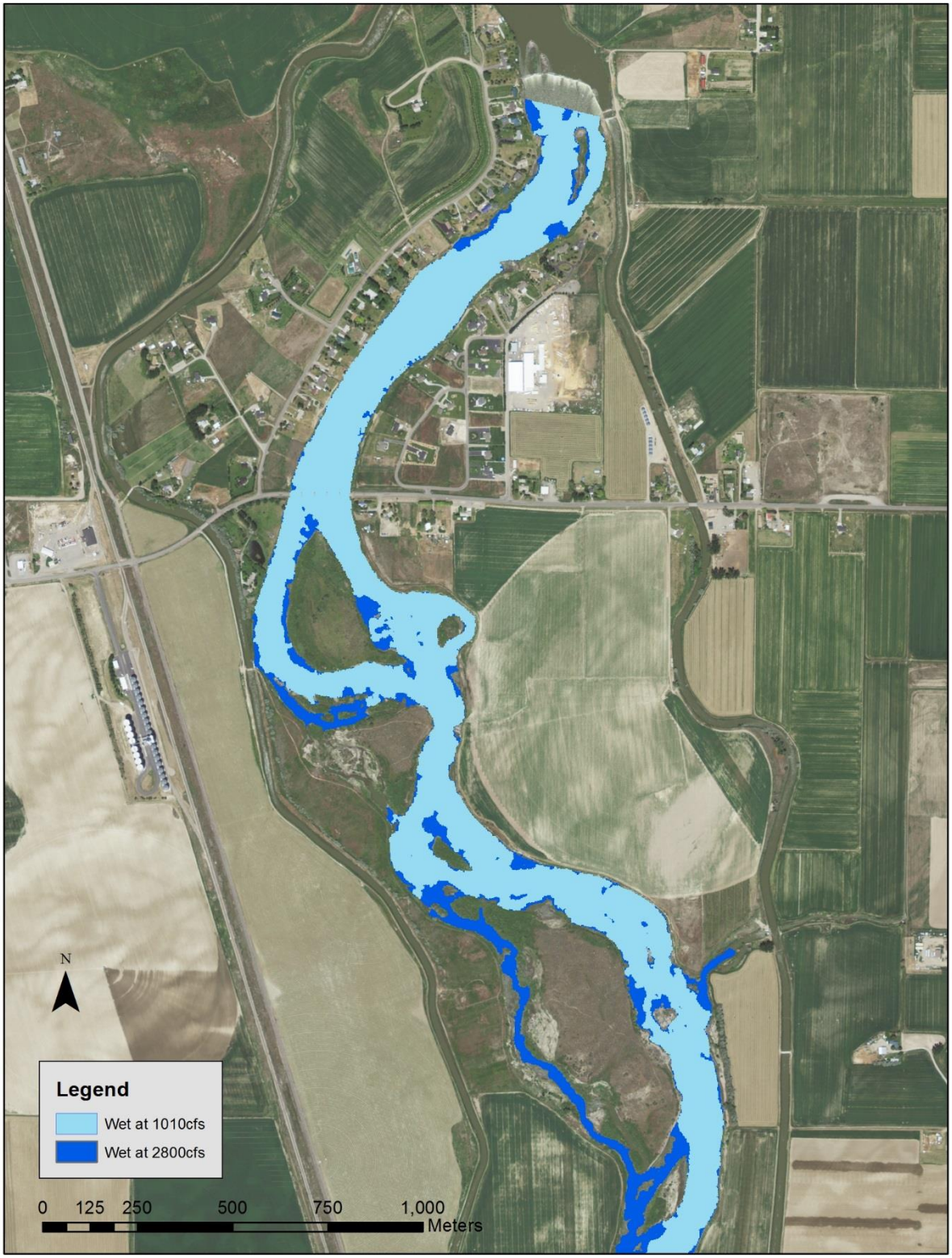

Figure 1a. Osgood Reach of the Snake River, north half, showing comparison between wetted perimeter at 1,010 and 2,800 cfs.

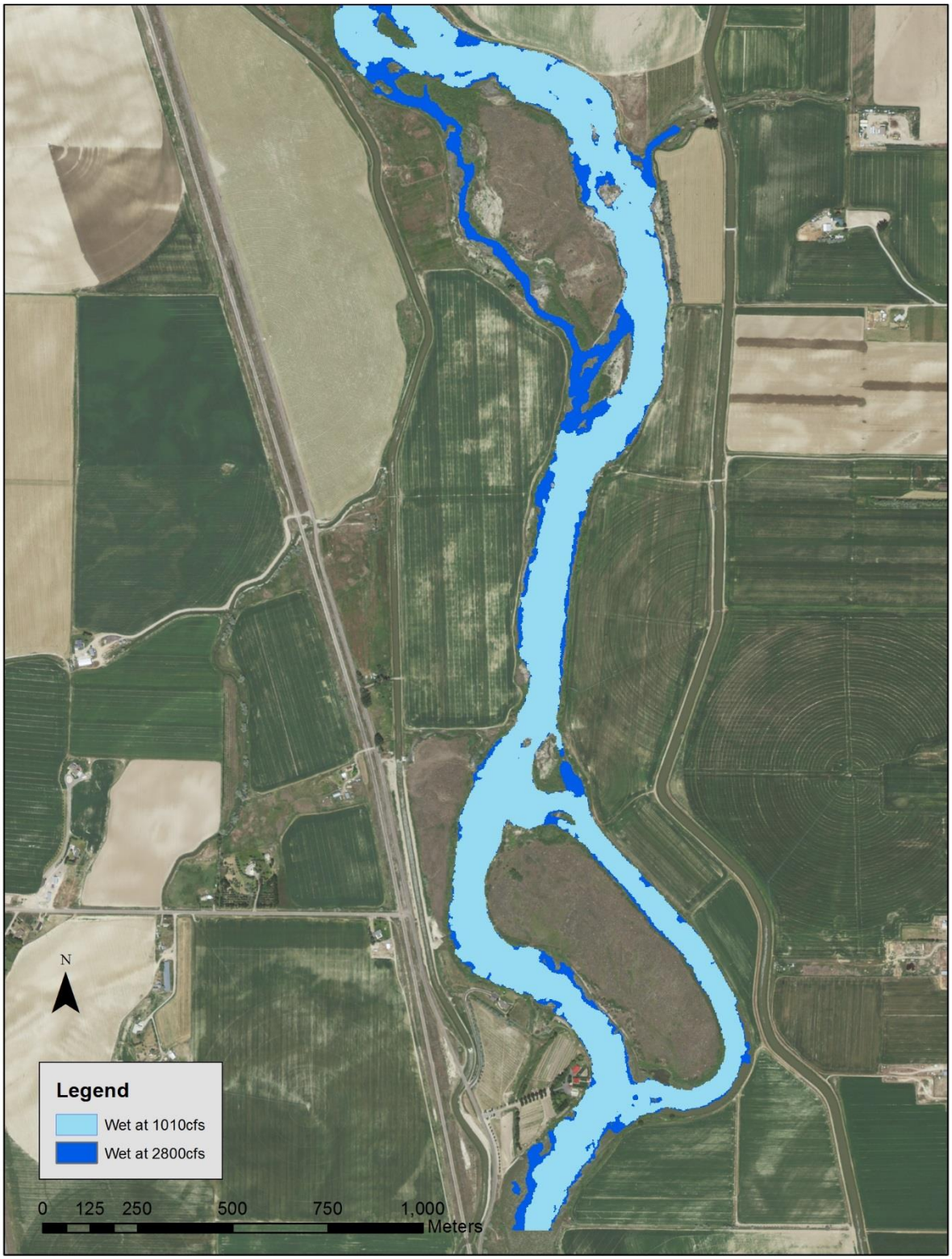

Figure 1b. Osgood Reach of the Snake River, south half, showing comparison between wetted perimeter at 1,010 and 2,800 cfs.

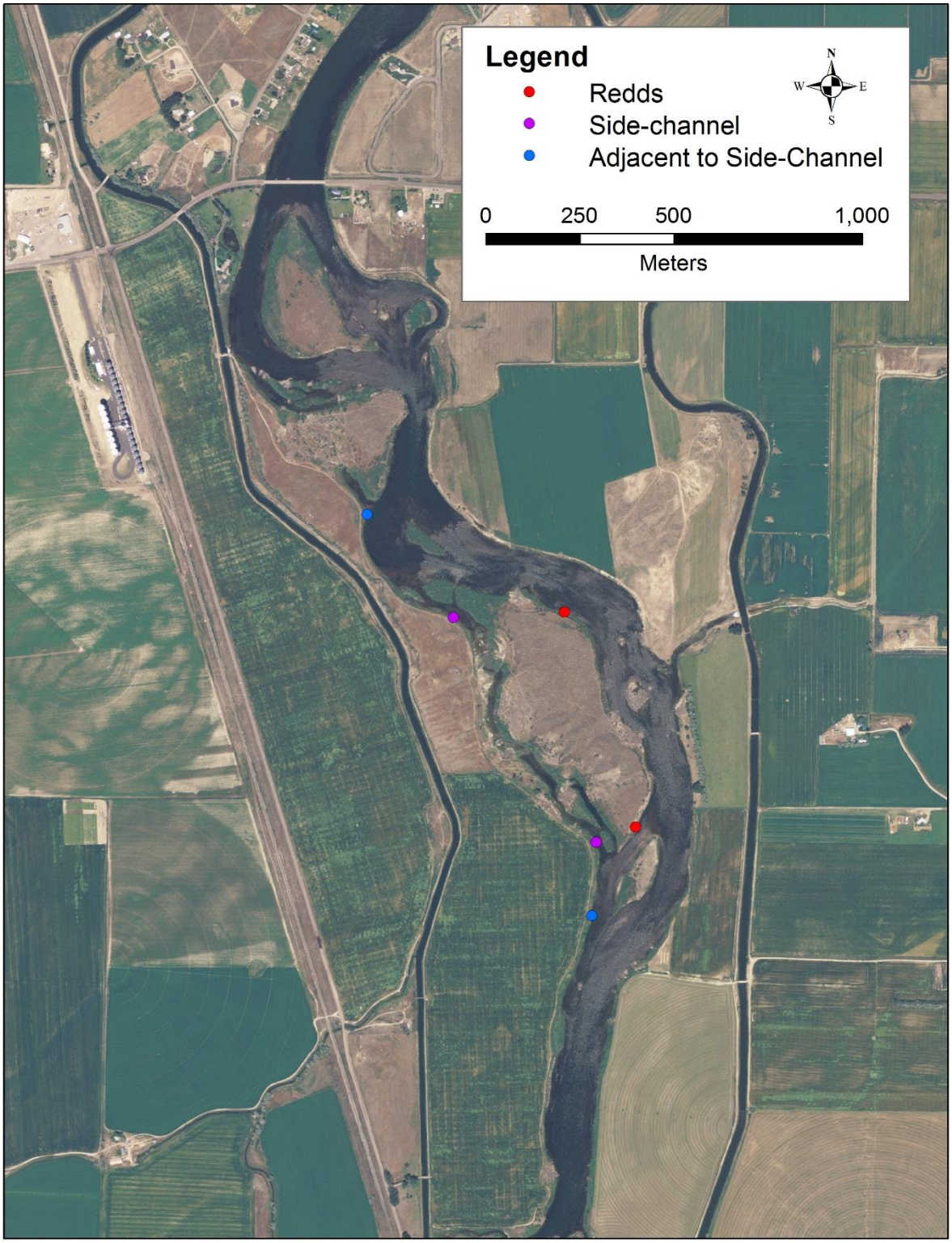

Figure 2. Task 1 and 2 camera locations.

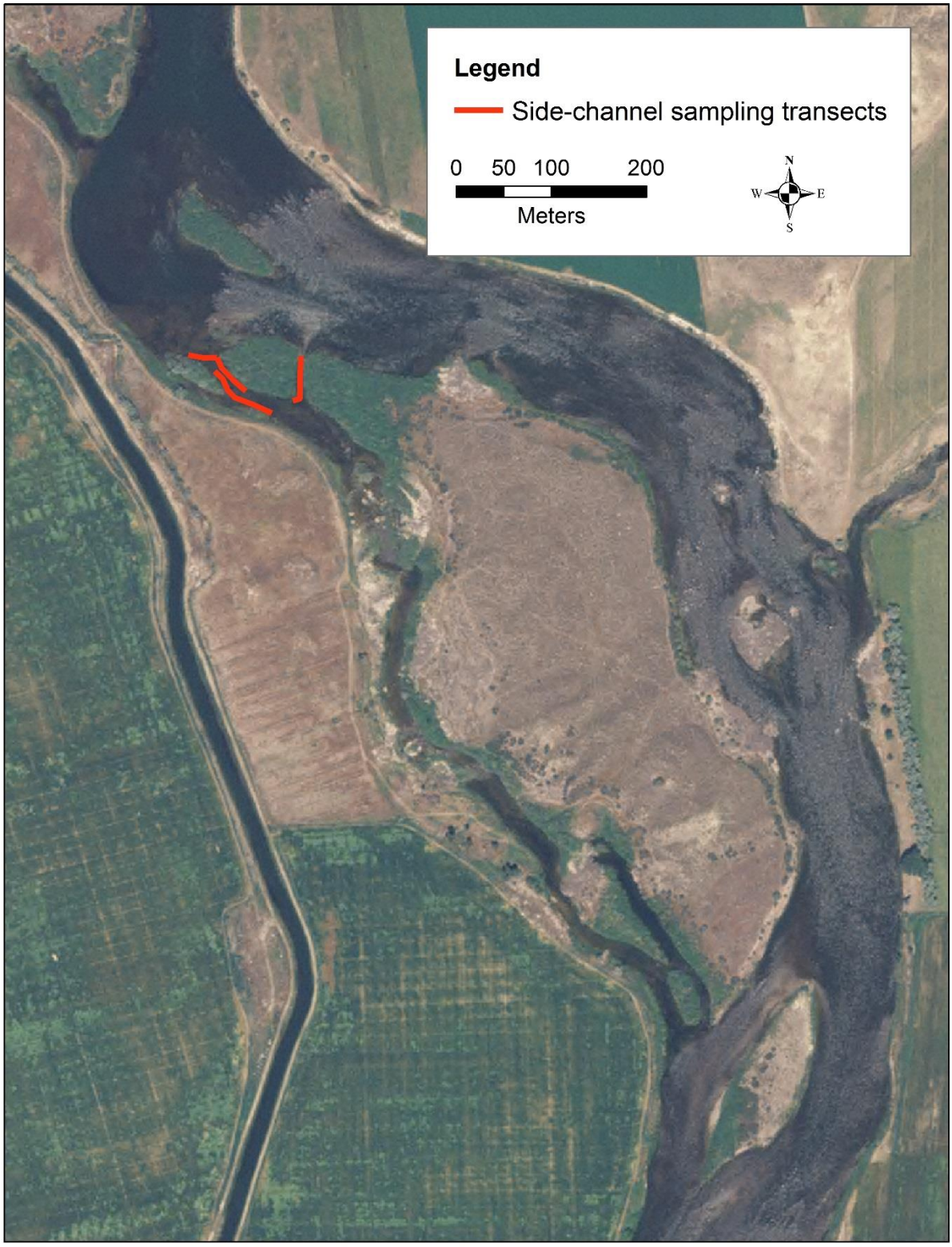

Figure 3. Map showing side channel electrofishing sites.

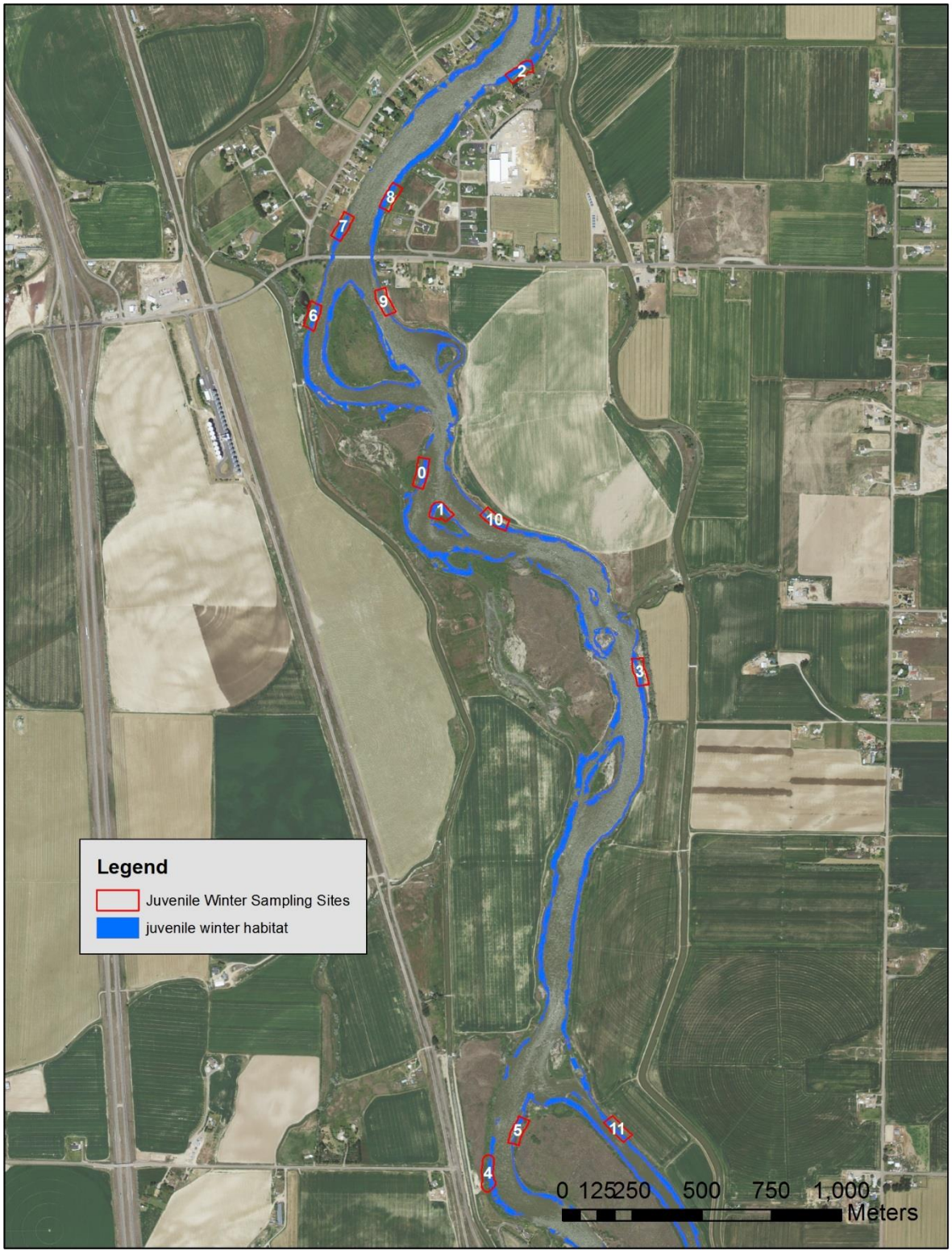

Figure 4. Map showing randomly selected juvenile sampling sites.

STUDY 2 – ENTRAINMENT

This study was requested by IDFG and BLM.

Goals

The goal of this study is to assess potential impact on fish entrainment caused by additional summer and new winter flow diversion into the Great Western and Idaho Canals.

The objectives of this study are to:

a) Develop a second independent estimate of irrigation season canal entrainment by means of existing population and fish movement data combined with known behavioral characteristics of Snake River species in both the Idaho and Great Western canals;
b) Develop estimate of potential winter canal entrainment by means of existing population and fish movement data combined with known behavioral characteristics of Snake River species in both the Idaho and Great Western canals.

Relevant agency/tribal management goals and/or public interest considerations

The IDFG is a duly established executive department of the State of Idaho, Idaho Code §§ 36-101 and 67-2402(1). The statutory wildlife policy of the State of Idaho is to preserve, protect, perpetuate, and manage all fish and wildlife for continued supplies for hunting, fishing, and trapping, Idaho Code § 36-103(a). The IDFG, acting under the supervision of the Idaho Fish and Game Commission, has the responsibility to carry out Idaho's wildlife policy, Idaho Code §§ 36-102(a) and -103(b). The IDFG works with the hydroelectric project Applicants and the FERC to ensure that hydroelectric development is consistent with the wildlife policy of Idaho. The IDFG assists the hydroelectric industry and the FERC by providing technical information addressing potential effects to fish and wildlife resources and how any adverse effects might be avoided, minimized or mitigated.

The Federal Lands Policy and Management Act, Sikes Act, numerous Executive Orders and Bureau policy require BLM to maintain the long term viability of native fish populations on the public lands administered by the BLM. Portions of the project area lie on BLM lands.

Background and existing information

The Applicant conducted an entrainment study on the Great Western and Idaho canals during the summer of 2013 and spring of 2014 (Gregory 2014). Netting was conducted for 24 to 48 net hours each month on each canal from May through October with the exception of August. Additionally, residual pools were sampled within the irrigation canal systems to assess whether large numbers of entrained fish may have been missed. Results showed that entrainment of trout was low:

- Fish entrainment into both canals consisted primarily of suckers (78%)
- Entrained fish were primarily non-game fish and included suckers, chubs, dace, shiners, and whitefish (95%)

- 152 juvenile brown trout were estimated to have become entrained (based on extrapolation of fish caught during netting)
- All cutthroat estimated to have become entrained (331) were based on capture of a single cutthroat that was nearly dead at the time of capture
- All rainbow trout estimated to have become entrained were based on two hatchery rainbow trout that were dead at the time of capture
- No cutthroat trout were observed during end-of-year residual pool sampling
- Few (28) brown trout were observed during end-of-year residual pool sampling
- Few (3) rainbow trout were observed during end-of-year residual pool sampling

Results of this study are consistent with observations of irrigation managers and ditch riders who have managed the canal systems for a number of years and who have seen entrained suckers occasionally but rarely observed trout.

Project/resource nexus

Diversion rates into the Idaho and Great Western Canals would increase during the irrigation season compared to existing conditions. Diversion would continue into the non-irrigation season to include a period of approximately six months (mid-October to mid-April) when no water has been diverted historically. The diversion of additional water has the potential to increase fish entrainment and affect the recruitment of fish into the Osgood Reach depending on the canal entrainment rate and the mortality rate for fish entering back into the project reach through the project turbines.

Proposed methodology

Evaluating entrainment into canals is difficult to undertake and estimating entrainment on canals the size of the Great Western and the Idaho canals is disproportionally more difficult. In fact, the Idaho Fish and Game estimated the cost for evaluating current entrainment at over a million dollars. From June 2013 through May 2014, the Districts conducted a scaled down entrainment study on both canals. While some have criticized the study for not being comprehensive enough, study results suggest trout entrainment is not high. However, even if the entrainment estimates were a complete census it would require extrapolation to infer the extent to which entrainment may change with the addition of the proposed hydroelectric project. Additionally, it is currently impossible to assess entrainment during the winter since no water is currently diverted during the non-irrigation season.

Unquestionably, entrainment is currently occurring in the irrigation canals and will continue in the canals whether the hydroelectric project is built or not. However, the effect of the project is not the current entrainment, or even the additional entrainment caused by additional water diversion related to project operation. Rather, the effect of the project is the additional entrainment minus the number of fish that survive passage through the power plant and back into the Osgood reach of the Snake River. Survival is likely to be in the range of 85% - 90% based on the type and size of turbines proposed.

Furthermore, the Districts anticipate that mitigation for fish lost due to entrainment and turbine mortality will consist of a replacement strategy, such as fish stocking or fish salvage from the canals. Therefore, the Districts will include as part of their final project proposal a plan for measuring turbine mortality directly. This study will be much less expensive and much more accurate at measuring actual effects of the power plant for the following reasons: 1) entrainment rates will not have to be extrapolated, 2) dedicated infrastructure can be installed in the plant tailrace that allows random net placement that will sample the entire water column, 3) sampling can be done during the non-irrigation season, 4) nets will not have to be checked often to avoid captured fish from leaving the nets or large wood from damaging the nets, 5) nets will not have to be watched continuously to ensure that recreational floaters are not impinged. Completion of this study will allow an assessment of actual power plant effects on entrained fish and will be the basis for calculating mitigation requirements.

Since direct estimate of the project effects on entrainment is not possible, the Districts propose to conduct a modeling exercise to estimate entrainment. The model would base entrainment on proportional division of water, fish movement data obtained during a telemetry study on the the South Fork Snake River upstream from the project, and fish population data for the Osgood and Menan reaches of the Snake River. This model assumes, as research studies have found (Kelso and Milburn 1979; Kimmerer 2008; Zeug and Cavallo 2014), that there is a strong positive relationship between diversion rate and fish entrainment. The Districts believe the modeling exercise proposed will give a good indication of project effects and would support FERC's environmental analysis.

Task 1 - Calculate expected entrainment of adult fish based on data from elsewhere in the Snake River system

A. Infer expected population density upstream from the Great Western/Idaho diversion using IDFG electrofishing data for Lorenzo and Osgood, representing an expected population density range
B. Assess the probability of a fish moving downstream during each month by evaluating salmonid telemetry data and determining the percentage of fish that make net downstream movements during each month
C. For fish that make net downstream movements, determine the distribution frequency as a function of total downstream distance moved
D. Apply probable downstream movement behavior to estimated population upstream of the Great Western/Idaho diversion by river km[4]

[4] All fish in a given river km would be assumed to be at the 0.5 km location such that x% of the population in the 1st river km above the diversion would be expected to move downstream. The entire proportion of those that moved more than 0.5 km would be expected to move past the diversion/headgates. In the 2nd river km above the diversion the same x% of the fish would be expected to move downstream and all of those that moved more than 1.5 km would be expected to move downstream past the diversion/headgates.

E. Determine entrainment based on the percentage of the water that is diverted vs. the percentage that goes over the diversion for each month under current and proposed conditions.
F. Determine return through the power plant into the Osgood reach based on the percentage of water that continues down the canal vs. the percentage that passed back through the power plant.
G. Apply a mortality factor, based on literature values of turbine mortality, for fish passing through the power plant.
H. Assess the difference in fish recruited to the Osgood reach under current and proposed conditions.
I. For fish smaller than those for which telemetry data are available (juvenile fish), estimate impacts assuming a range of downstream movement percentages and applying entrainment and mortality based on the percentage of split flows as above.
J. Prepare draft and final entrainment reports

Level of effort and cost

TBD

References

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STUDY 3 – ICING IMPACTS

This study was requested by IDFG, IDEQ, BLM, Lientz and Crandall.

Goals and objectives

The goal of this study is to determine the likely impacts of reduced river flow on the type, amount and duration of ice conditions in the project reach.

The objectives of this study are to:

a) Compile historic weather data, photographs and/or other relevant records and develop a statistical assessment of the timing and duration of ice conditions in the project reach;
b) Compile and review scientific literature describing conditions that promote formation of the various forms of ice found historically in the project reach;
c) Collect water temperature, photographs and physical ice measurements to record the development and decay of the river ice pack over the course of one winter;
d) Use a) – c) information as a basis for developing an "expert opinion" prediction of future ice conditions during project operations;
e) Use River2D to estimate river hydraulics associated with the predicted ice conditions;
f) Prepare report and provide results for use in other studies.

Relevant agency/tribal management goals and/or public interest considerations

DEQ is the delegated state agency tasked with assessing and restoring Idaho rivers and streams consistent with the Idaho WQS. In addition, DEQ is the state agency authorized to make Clean Water Act section 401 water quality certification decisions with respect to federal licenses and permits.

The IDFG is a duly established executive department of the State of Idaho, Idaho Code §§ 36-101 and 67-2402(1). The statutory wildlife policy of the State of Idaho is to preserve, protect, perpetuate, and manage all fish and wildlife for continued supplies for hunting, fishing, and trapping, Idaho Code § 36-103(a). The IDFG, acting under the supervision of the Idaho Fish and Game Commission, has the responsibility to carry out Idaho's wildlife policy, Idaho Code §§ 36-102(a) and -103(b). The IDFG works with the hydroelectric project Applicants and the FERC to ensure that hydroelectric development is consistent with the wildlife policy of Idaho. The IDFG assists the hydroelectric industry and the FERC by providing technical information addressing potential effects to fish and wildlife resources and how any adverse effects might be avoided, minimized or mitigated.

The Federal Lands Policy and Management Act, Sikes Act, numerous Executive Orders and Bureau policy require BLM to maintain the long term viability of native fish populations on the public lands administered by the BLM. Portions of the project area lie on BLM lands.

Ms. Lientz represents landowners with homes on the project reach. Evaluating recreation and aesthetic impacts and opportunities is in the public interest. If the proposed project was constructed, existing flow-dependent recreation opportunities including boating, fishing, waterfowl hunting, and swimming would be changed. It is important to the public to analyze impacts, trade-

offs, and provide mitigation to the impacts due to the project as well as evaluate opportunities for recreation in the future.

Mr. Crandall is a landowner located downstream of the project area. Hydroelectric projects, particularly those resulting in greatly reduced river flows, potentially affect the environment by disturbing habitats, and by altering basic hydrological and fluvial geomorphic processes. The alteration of chemical, biological, and physical processes can have negative effects on water quality, fish and other aquatic species, plants, terrestrial wildlife, recreation, and aesthetics resources. Many members of the public participate in hunting, fishing and boating, that could be impacted by reduced flow. All these are relevant public interest considerations in regard to the study. In addition, numerous local residents may suffer impacts to property values as a result of these same negative effects.

Background and existing information

Ice formation in the project reach is an annual occurrence due to local climate conditions. Ice conditions on the river have been documented intermittently through photographs, observations by irrigators and landowners, and in USGS gauging station records but no systematic record of ice conditions is known to exist. No known quantitative methods exist for comprehensive prediction of ice formation and its effect on aquatic resources. However, a significant body of literature exists on the conditions promoting ice formation, the physical attributes of ice and the effects of ice on fish and wildlife habitat. The most complete site specific analysis of ice formation was performed by the US Army Corps of Engineers, with a report published in 1990. In addition, the in-stream flow study completed by the Applicants contains information relevant to ice formation including water velocity and water depth information at a wide range of flows.

Project/resource nexus

Because the Project area is known to have cold temperatures and ice accumulation, it is expected that lowering the river's minimum flow to the proposed 1,000 cfs could alter the timing, duration and/or location of ice formation. Changes in ice distribution and intensity could adversely affect fish and wildlife habitat. In particular, IDFG is concerned that reduced river flows in winter could have negative effects on overwinter fish survival, brown trout egg survival, macro-invertebrate production, waterfowl use, raptor and eagle use, and furbearer use. BLM raises an additional concern with regard to icing of the canal headgates and canal channels, presumably related to the potential for property damage due to ice jams.

Proposed methodology

This purpose of this study is to forecast river ice conditions that would occur during project operations when flows are reduced for power generation. The possible range of ice conditions is clearly infinite; therefore, this study would focus on determining a plausible prediction of peak ice development during an average winter. The study would also provide statistical analysis permitting an assessment of the start, duration and end of the ice season. This study will produce information to support an assessment of ice effects on resources such as fisheries, waterfowl and recreation, which will be completed under other studies within this study plan.

A relationship between climate parameters and ice formation would be developed, using literature along with historic (2014, 2015, 2016) ice cover photographs. This relationship would be used to approximately predict ice onset, ice cap duration and relative ice season severity based on climate data. The relationship would be adjusted to provide a best fit of all relevant historic ice data. This initial relationship would be independent of flow, but could be cross correlated with historic flow data to examine any apparent relationships between flow and ice.

The scientific literature would be examined to obtain available information on the effects of flow on ice formation. Extensive measurements of the ice pack during one full winter season, including observations of climate conditions, water temperature, flow velocity and flow depth beneath and around ice, would provide site specific information to substantiate literature findings. The ice sampling plan would be presented to the fishery TWG (see Study 1) for review and comment and the final plan would be approved by FERC. This field effort would produce an ice pack baseline standard that would be used for projections to lower flow conditions. RiverFLO-2D modeling (completed in 2014) would provide information on the pre-ice flow characteristics in areas where ice first forms. This information would all be synthesized to develop a qualitative or semi-quantitative prediction model for the impact of lower flows on ice formation. The final step would be to forecast ice pack characteristics at lower flow using the baseline ice pack as a starting point.

The predicted low flow ice pack would then be input into a River2D model to calculate river hydraulics throughout the Osgood Reach during predicted ice conditions at a range of flows. The modeling would be performed for the “peak ice” condition only, representing the maximum impact to fish and wildlife habitat during the ice season. The timing and distribution of ice and associated river hydraulics would be output for use in other studies as needed and a draft and final report would be prepared.

Task 1 - Determine historic seasonal pattern of ice cover formation and duration

A. Obtain historic weather data (air temperature, dew point, wind speed, etc.) for a suitable time period
B. Establish criteria for the weather conditions that initiate ice cover formation and decay (use literature, available historic photos or other data)
C. Develop probabilistic model of the likelihood of ice presence during the course of the winter, if possible by month, and establish basis for categorizing winter ice as average, mild or severe
D. Cross correlate ice predictions with flow probabilities to determine likelihood of events such as "severe ice - low flow", "mild ice - low flow" etc., based on the period of record

Task 2 - Collect and summarize the scientific literature on the relation between ice formation and water flow

A. Possible factors include: water depth, water velocity, presence/absence of ice cap
B. Determine conditions promoting frazil ice, anchor ice, solid (surface to riverbed) ice, and surface ice

C. Determine conditions promoting formation of shore ice that could constrict flow and alter water depth or flow velocity

Task 3 – Monitor and measure ice characteristics during the course of one winter

A. Develop ice sampling plan for review by fishery TWG and submittal to FERC for approval
    1. Extent of ice cap based on periodic aerial photos
    2. Thickness of ice cap and water temperature at key locations
    3. Areas of solid ice formation
    4. Areas of anchor ice formation
    5. Hydraulic conditions associated with changing ice conditions and discharge
        i. Velocity profiles at fixed stations
        ii. Water surface elevation

Task 4 - Synthesize results to develop a plausible analysis of likely ice conditions during project operations

A. Integrate in-stream flow model results (e.g. water depth and flow velocity as a function of flow volume prior to ice formation)
B. Develop "expert opinion" on likely effects of project operation on ice formation
    1. Change in onset of ice cover
    2. Change in potential for frazil ice, anchor ice, solid ice and surface ice
    3. Change in acres of open water
C. Include both "possible" and "most likely" predictions

Task 5 – Compute river hydraulics consistent with predicted ice conditions

A. Input predicted peak ice cap into River2D for flows of 1000, 1250, 1500, 1750, 2000, 2250 and 2500 cfs
B. Run model to determine distribution of water depth and velocity around/beneath ice

Task 6 – Prepare study report and provide information for other studies

A. Report contents
    1. Summary of historic climate and ice analysis
    2. Summary of literature
    3. Summary of ice monitoring data
    4. Discussion of "expert opinion" analysis and basis for predictions
B. Information for other studies
    1. Study 1 – ice distribution and river hydraulics for predicted ice conditions
    2. Study 6 – ice cover for predicted ice conditions
    3. Study 7 – Periods of likely impact to recreation use

Level of effort and cost

TBD

STUDY 4 – WATER QUALITY

This study was requested by IDEQ.

Goals and objectives

The goal of this study is to accurately assess the current beneficial use status and water quality of the Project prior to construction and to predict the potential project impacts on water quality.

The objectives of this study are to:

a) Assess potential project impacts on water temperature (summer and winter) within and below the project bypass reach using site specific temperature monitoring data;
b) Compile information needed to assess the current beneficial use status of the project reach.

Relevant agency/tribal management goals and/or public interest considerations

DEQ is the state agency tasked under the Clean Water Act and state law with assessing and restoring Idaho's rivers and streams consistent with the Idaho WQS. Currently, the AU containing the project reach is "unassessed" on Idaho's 2012 Integrated Report. To properly assess the river reach within the project area, the biologic, chemical and fisheries data generated by this study are critical. An accurate assessment of the AU is also a critical component to any future 401 WQC activities, including the required anti-degradation analysis.

Background and existing information

No data exists which allows DEQ to assess the reach of the river consistent with approved methods. Thus, the existing information is inadequate to assess the AU's beneficial use status for an anti-degradation analysis that is required by the CWA and Idaho WQS. Additionally, this data will provide a baseline against which potential impacts of project's construction and operation can be gaged, assuming that this same information is collected regularly throughout the project's life. The Applicant has collected water temperature data along the project reach of the Snake River and within the project canals since June 2014. This data collection effort was initiated after discussions with IDEQ concerning the water quality parameters potentially affected by the project.

Project/resource nexus

The Project has the potential to affect water temperature in the bypass reach and in the river below the bypass reach due to the change water distribution between the canals and the river channel. In general, more water would be conveyed by the canals and less by the river channel. Solar flux intersecting the combined water surfaces would remain approximately the same. Depending on channel shapes, the solar input per unit volume of water may change slightly compared with existing conditions, resulting in a water temperature change.

Proposed methodology

The Districts contacted Chris Berger at Portland State University (as requested by IDEQ) about application of the CE-QUAL-W2 model for predicting project effects on winter water temperature.

Mr. Berger said that water temperature effects would be mainly related to travel time. Given the short length of the reach he felt that travel times would be short (see Table below) and that temperature effects would be small. Temperature effects during extreme cold would be moderated by the presence of an ice cap over much of the reach that that would insulate the water column from sub-zero air. On this basis the Districts feel that a full CE-QUAL-W2 model is unnecessary to assess project impacts on water temperature.

Table 3. Time (hours) for water to travel down the 3.5-mile bypass reach for the range of typical water velocities at flows between 800 cfs and 2,800 cfs.

VELOCITY (FPS)	TRAVEL TIME (HRS)
1.0	5.1
1.5	3.4
2.0	2.6
2.5	2.1
3.0	1.7

TASK 1 - WATER TEMPERATURE MONITORING AND ANALYSIS

The districts would evaluate summer and winter water temperature effects by modeling the partitioning of water between the canals and the river channel. Detailed topographic data is available for both the river channel (RiverFLO-2D) and the canals (from engineering studies). To a first order, heat exchange would be proportional to the surface area of the flowing water and water temperature change would be inversely proportional to the water depth and flow velocity. These relations would be formalized by standard engineering calculations or through a simple water quality model such as SSTEMP. The model would be calibrated and tested using the water quality monitoring data that has been collected since 2014. Calculations for project operations, i.e. summer heating and winter cooling within the river channel, would be based on re-partitioning the water between the river and channels according to various possible operating regimes.

TASK 1 OUTLINE

A. Obtain continuous temperature data in the river and canals for at least one year (Figure 5)
B. Analyze potential summer water temperature increases due to re-partitioned flow
    a. Calculations would be based on change in travel time, surface area and volume through the 3.5-mile reach at various flows
    b. Calculations would be based on water/air interactions and solar flux across surface area of river and canal (e.g. engineering calculations, SSTEMP or similar)
    c. Obtain results for both bypass reach and combined river below powerhouse
    d. Evaluate predictions for consistency with measured data
C. Analyze potential winter water temperature decreases due to re-partitioned flow
    a. Calculations would be based on change in travel time, surface area and volume through the 3.5-mile reach at various flows
    b. Calculations would be based on water/air interactions and solar flux across surface area of river and canal (e.g. engineering calculations, SSTEMP or similar)

c. Obtain results for both bypass reach and combined river below powerhouse
d. Evaluate predictions for consistency with measured data
e. Evaluate insulating effects of ice cover

D. Prepare study report

TASK 2 - DETERMINE BENEFICIAL USE STATUS

The District would work with IDEQ to identify and collect 6 BURP stations along the project reach to enable IDEQ to classify the existing water quality condition.

TASK 2 OUTLINE

A. Work with DEQ to identify 6 BURP stations on the project reach
B. Collect invertebrate and periphyton samples at each station
C. Other BURP data requirements with regard to channel morphology, substrate, fish populations and riparian vegetation would be reported in other studies
D. Compile and submit final BURP station reports

Level of effort and cost

TBD

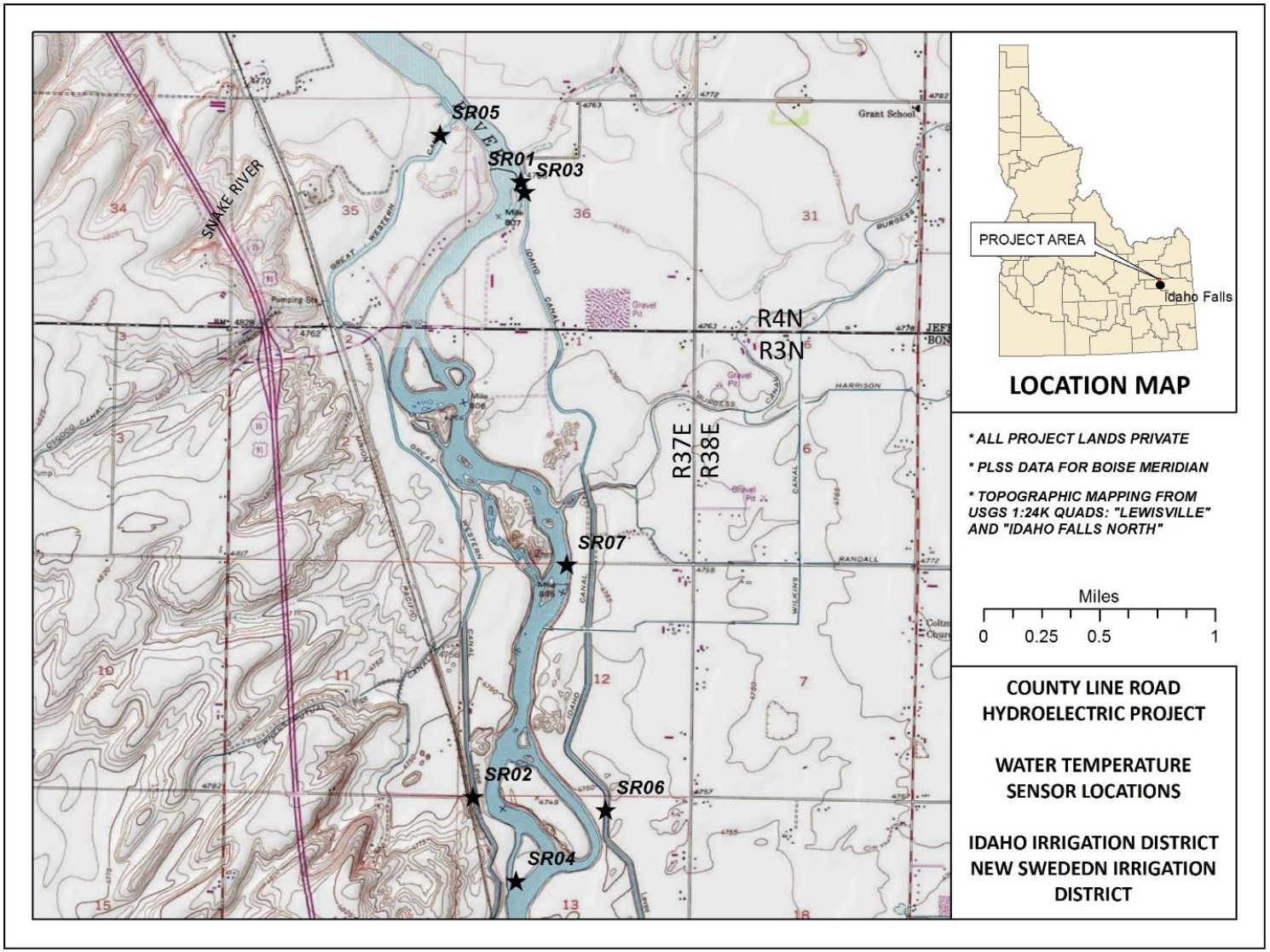


Figure 5. Location of water temperature sensors that have been operating continuously since June 2014.

WILDLIFE STUDIES

The Osgood Reach of the Snake River provides both aquatic and terrestrial habitat used by wildlife. The terrestrial habitat flanking the project section of the river and canals consists predominantly of agricultural land with a narrow, discontinuous riparian fringe. The largest tracts of non-agricultural vegetation occur on large river islands along the reach. Only a very small amount of land, primarily agricultural, would be directly disturbed by construction of the project. Project impacts on terrestrial wildlife habitat, and therefore to the wildlife that use it, are predicted to be minimal provided that (1) riparian and island vegetation would not be significantly reduced by changes in river flows, and (2) the project plan includes measures to replant disturbed vegetation and prevent incursion by invasive weeds. Study Plan elements have been included to investigate these potential impacts to terrestrial wildlife.

Wildlife, particularly waterfowl, also use open water habitat within the canals and Snake River channel. Reduced water flows in the river, increased water flow in the canals, and alterations to winter ice development have the potential to change the amount of open water available to waterfowl. The amount of available open water is believed to be important mainly in winter when ice cover greatly limits open water habitat on the project reach as well as elsewhere in the region. The Study Plan includes elements that will look at this specific potential impact to waterfowl.

STUDY 5 – LAND COVER MAPPING (TERRESTRIAL HABITAT INVENTORY)

This study was requested by FERC, IDFG and FWS.

Goals and objectives

The goal of this study is to gather additional information in an effort to evaluate the effects of project construction, operation and maintenance on vegetation types, abundance, and general distribution throughout the project area, and the potential spread of invasive species and noxious weeds in areas of ground-disturbance. Areas where ground disturbance would occur include the powerhouses, tailraces, access roads for project construction or operation, construction staging areas, transmission line corridors, and the banks of the canals. The location, extent, and dominant plant species in each cover type will be identified. The relationship between river water surface elevation and riparian and wetland communities will be examined and the possible effects of project operations on these communities will be assessed. The study will also identify potential special status species habitats including Ute ladies' tresses and Yellow-billed Cuckoo (YBC) and establish the presence/absence of these species within the project impact area.

Specific objectives include:

a) Map the land cover types of the entire project area (including the river channel and its associated floodplain surfaces, canals, roads, powerhouse and staging areas.
b) Identify wetland and riparian habitat locations.
c) Identify suitable habitat for the federally listed species Ute ladies'-tresses and YBC. If suitable habitat is located, area searches will be performed by qualified personnel at the appropriate time of year.
d) Identify the presence and areal extent of noxious weeds and invasive species in areas where ground disturbance is expected to occur.
e) Examine the role of habitat connectivity for wildlife and the relationship between water surface elevation, wetted edge location, and riparian and wetland habitats.

Relevant agency/tribal management goals and/or public interest considerations

Sections 4(e) and 10(a) of the Federal Power Act require that FERC (the Commission) give equal consideration to all uses of the waterway on which a project is located. When reviewing a proposed action, the Commission must consider the environmental, recreational, fish and wildlife, and other non-developmental values of the project, as well as power and developmental values. Vegetation communities, and the wildlife habitat they provide, are resources of particular interest for a variety of reasons, including their ecological functions. Describing the effects on these resources is necessary to fulfill the Commission's responsibilities under the NEPA. Ensuring that environmental measures pertaining to these resources are considered in a reasoned way is relevant to the Commission's public interest determination.

The IDFG is a duly established executive department of the State of Idaho, Idaho Code §§ 36-101 and 67-2402(1). The statutory wildlife policy of the State of Idaho is to preserve, protect, perpetuate, and manage all fish and wildlife for continued supplies for hunting, fishing, and

trapping, Idaho Code § 36-103(a). The IDFG, acting under the supervision of the Idaho Fish and Game Commission, has the responsibility to carry out Idaho's wildlife policy, Idaho Code §§ 36-102(a) and -103(b). The IDFG works with the hydroelectric project Applicants and the FERC to ensure that hydroelectric development is consistent with the wildlife policy of Idaho. The IDFG assists the hydroelectric industry and the FERC by providing technical information addressing potential effects to fish and wildlife resources and how any adverse effects might be avoided, minimized or mitigated.

Background and existing information

To our knowledge, no site-specific land cover mapping of the Osgood Reach exists. The National Land Cover Database currently contains the best known land cover mapping data for the reach. The National Wetland Inventory provides coarse-scale mapping of wetlands throughout the U.S. including the project reach. The National Cooperative Soil Survey from NRCS provides national soil mapping data. These resources will provide the background information for this study.

Project/resource nexus

Project construction, operation and maintenance activities could potentially affect the vegetation of the Osgood Reach, including riparian and wetland habitats through changes in hydrologic regime. Project construction could potentially influence the spread of noxious weeds within the area. Any change in the amount or distribution of vegetation has the potential to affect wildlife use of the project area.

Proposed methodology

Task 1 - Gather existing information.

Despite the lack of a detailed vegetation survey for the Osgood Reach, there is a significant amount of pertinent data. This includes existing coarse-scale vegetation, wetland and soils mapping (GIS layers). Lidar, aerial imagery and data generated as part of the flow studies is also available. A literature review would be conducted to document the habitat of Ute ladies'-tresses and YBC.

Task 2 - Create initial land cover map through remote sensing techniques and available data, using 5m x 5m pixels as a minimum mapping unit.

Utilize GIS to analyze high resolution color infrared, normalized difference vegetation index (NDVI), and true color NAIP imagery (or best available), combined with height above ground estimates of tree/shrub canopy derived from LiDAR, to map all habitats and land uses in the Project area at a fine-scale. Identify potential wetland and riparian habitats as well as potential special status species habitats.

Task 3 - Perform field surveys at locations that include all cover types.

Utilizing a high quality GPS device (Trimble Juno or superior), field-verify cover type and shape of polygons, record dominant species, verify wetland types (e.g., seasonally flooded, permanently flooded, not a formal wetland delineation) and invasive species populations. If special status species

habitat is located, perform visual surveys of such areas[5]. During the field surveys, technicians will record all incidental wildlife observations and signs of wildlife presence.

Task 4 - Revise land cover map based on field surveys.

Survey points will be used to perform an accuracy assessment on final map product.

Task 5 - Perform Height Above River (HAR) and horizontal distance analyses in GIS on selected riparian and wetland habitats to determine the possible influence of hydrologic modifications on these habitats.

HAR analyses can provide insight into groundwater regimes. Utilizing the Lidar bare earth layer, identify the elevation of each riparian and wetland cover type. Utilizing the bathymetric data, flow modeling results and field observed water surface elevations (WSE), determine the WSE for likely discharges under current and post-project conditions. Perform a HAR analysis by comparing the current HAR for selected wetland and riparian areas under monthly average flows scenarios to the HAR for these areas under proposed project conditions. Compare the changes in HAR as a result of the project and assess the potential impacts of project operations on these habitats. A horizontal distance analysis will be performed that establishes the change in horizontal distance between riparian habitat patches and the wetted edge. Metrics will include minimum and mean distances between riparian patches and the wetted edge. An additional analysis of habitat connectivity for wildlife migration and cover will be performed in GIS based on the distance between habitat patches and barriers to movement (e.g. the New Sweden tailrace).

Task 6 - If YBC or ULT habitat is located within the project area, species-specific surveys will be conducted. For the ULT, area searches will be conducted in all suitable habitats at the proper time of year for ULT identification (to be determined in consultation with agency personnel, usually mid- to late summer in the upper Snake region). It is important that surveys are conducted at the proper time of year to capture ULT flowers. YBC surveys will consist of point counts conducted in accordance with USFWS protocols (Halterman et al. 2015).

Task 7 - Prepare report

The report would detail the ground-truthed mapping effort and identifies, describes, and assesses the extent to which project-related actions and activities may affect the identified vegetation types, habitats, and wildlife species dependent on these habitats (to the extent possible), including the spread of invasive species and noxious weeds. The report will include the presence or absence of federally listed species or habitats in the surveyed area. The report maps will show the areas

[5] The presence/absence of suitable Ute ladies' tresses and yellow billed cuckoo habitat will be determined in consultation with FWS

surveyed and the location and areal extent of any wetlands, federally listed species or habitats, invasive species, and identified noxious weed infestations.

The report will include any proposed measures to reduce or mitigate identified effects on these habitats and associated wildlife, including a noxious weed control plan. The weed control plan will identify target weed species; methods to reduce the introduction of weed propagules into the project area during project construction, operation, and maintenance; species-specific method of control; types of any herbicides and their application rate and quantity if chemical control is proposed; any post-treatment site rehabilitation to re-establish native vegetation; schedule for periodic monitoring, report of monitoring results, and agency consultation over the term of any license issued; and a mechanism for revising the plan if necessary to address any introduction of new weed species in the future.

The report will summarize the HAR and horizontal distance calculations for riparian areas. Potential impacts of project operations on the health of riparian areas will be discussed as well as any impacts to connectivity of riparian areas, e.g. to provide movement corridors for wildlife.

The report will summarize the extent of suitable habitat for YBC and ULT and the results of any species-specific surveys.

Level of effort and cost

TBD

References

Halterman, M., M.J. Johnson, J.A. Holmes and S.A. Laymon. 2015. A Natural History Summary and Survey Protocol for the Western Distinct Population Segment of the Yellow-billed Cuckoo: U.S. Fish and Wildlife Techniques and Methods, 45 p.

STUDY 6 – WATERFOWL

This study was requested by FERC, IDFG, BLM and BIWA.

Goals and objectives

The goal of this study is to examine the project's possible impact on wintering waterfowl that currently utilize the Osgood Reach. This will be accomplished through an examination of the current waterfowl use of the study area and the habitat characteristics of the areas they currently utilize and an analysis of the availability alternative habitats within the region. The potential for waterfowl that use the reach to be displaced due to project implementation will be assessed. The amount of open water (among other habitat elements) available during winter months may be a limiting factor for waterfowl. Historical observations of waterfowl use of Snake River habitats will be synthesized and when combined with surveys of the surrounding area, the possible impacts of project operations on wintering waterfowl will be better understood.

The objectives of this study are to:

a) Determine the abundance of each waterfowl guild (dabblers, divers, geese and swans) that utilizes the study reach over winter months through a combination of aerial and ground surveys;
b) Identify potential wintering waterfowl habitat areas along the Snake River within 25 miles of the Osgood Reach and determine the abundance of each waterfowl guild within defined IDFG and USFWS reaches over winter months through aerial surveys;
c) Establish habitat relationships between guilds and habitat characteristics within the reach by utilizing data from aerial and ground surveys, the Icing Study (Study 3) and flow modeling of winter flows (with and without icing), aquatic macrophyte, substrate data, snow cover, weather, discharge, adjacent forage sources and any other pertinent habitat data identified through the study process;
d) Assess the likely change in wintering waterfowl habitat based on a 1000 cfs winter flow using the available data utilized to establish the habitat relationships.
e) Analyze the impact of project implementation on wintering waterfowl, including the potential to displace waterfowl from the study area and an analysis of available riverine habitats within 25 miles of the study area.

Relevant agency/tribal management goals and/or public interest considerations

Sections 4(e) and 10(a) of the Federal Power Act require that FERC (the Commission) give equal consideration to all uses of the waterway on which a project is located. When reviewing a proposed action, the Commission must consider the environmental, recreational, fish and wildlife, and other non-developmental values of the project, as well as power and developmental values. Vegetation communities, and the wildlife habitat they provide, are resources of particular interest for a variety of reasons, including their ecological functions. Describing the effects on these resources is necessary to fulfill the Commission's responsibilities under the NEPA. Ensuring that environmental measures pertaining to these resources are considered in a reasoned way is relevant to the Commission's public interest determination.

The IDFG is a duly established executive department of the State of Idaho, Idaho Code §§ 36-101 and 67-2402(1). The statutory wildlife policy of the State of Idaho is to preserve, protect, perpetuate, and manage all fish and wildlife for continued supplies for hunting, fishing, and trapping, Idaho Code § 36-103(a). The IDFG, acting under the supervision of the Idaho Fish and Game Commission, has the responsibility to carry out Idaho's wildlife policy, Idaho Code §§ 36-102(a) and -103(b). The IDFG works with the hydroelectric project Applicants and the FERC to ensure that hydroelectric development is consistent with the wildlife policy of Idaho. The IDFG assists the hydroelectric industry and the FERC by providing technical information addressing potential effects to fish and wildlife resources and how any adverse effects might be avoided, minimized or mitigated.

The Federal Lands Policy and Management Act, Sikes Act, numerous Executive Orders and Bureau policy require BLM to maintain the long term viability of native fish populations on the public lands administered by the BLM. Portions of the project area lie on BLM lands.

Bear Island Water Association represents landowners with homes on the project reach. The Osgood Reach north of County Line Road is a unique area in eastern Idaho where large numbers of waterfowl congregate next to established residential neighborhoods. Winter waterfowl and eagle viewing is highly valued by Bear Island Estate residents and is the reason why some residents purchased houses in this neighborhood. Bear Island residents invite guests to their homes to enjoy winter waterfowl viewing. Bear Island Estate residents are very concerned that reducing bypassed reach flow during the winter will adversely impact the superb winter waterfowl and eagle viewing next to Bear Island Estates.

Background and existing information

IDFG and the US Fish and Wildlife Service perform winter waterfowl aerial surveys in the region. The waterfowl numbers are recorded by sub-area. In 2010 the USFWS recorded 3905 total waterfowl in the area (Idaho Falls to Heise Measuring Cable). The survey recorded 1810 ducks, 1558 Geese and 537 swans. A 2013 Trumpeter swan survey identified 110 swans in the reach between Idaho Falls and Menan Buttes. These recent surveys establish wintering waterfowl use in the region, but do not provide any information specific to the Osgood Reach.

Project/resource nexus

Project construction, operation and maintenance activities could potentially affect the wintering waterfowl use of the Osgood Reach through possible changes in open water extent and depth. The influence of reduce flow magnitudes may change the amount of open water within the reach, which is a key habitat feature for wintering waterfowl.

Proposed methodology

Task 1. Gather existing information on regional waterfowl use and habitat information from the literature.

A. Identify regional habitat areas and their historic use. Based on consultation with IDFG, the key alternative winter habitats in the surrounding area are all associated with the Snake

River system. When the Osgood Reach has high ice cover, off-river areas are usually ice covered. Therefore, the available regional habitats are a shifting mosaic of open water sites along the Snake River. Therefore, the study region would include the Snake River within a 25 radius of the diversion dam at the upstream end of the project area. Gather any available historic information on waterfowl use of these areas (as well as the Osgood Reach). The reach designations within this regional area will be determined in consultation with IDFG.

B. Identify the possible key habitat characteristics of wintering waterfowl from the available literature and identify the habitat characteristics to be included in the winter waterfowl habitat model for each guild. This will be an exercise in literature review, expert input (from agency personnel) and available data. Possible independent variables may include but not be limited to open water, aquatic macrophyte cover, substrate type, discharge, velocity, depth, temperature, snow cover (terrestrial), adjacent forage availability (mainly agricultural fields), disturbance, and habitat diversity measures, among others.

Task 2. Map aquatic macrophyte cover during the summer. The presence of aquatic macrophytes may be an important habitat feature for wintering waterfowl. This is best mapped during the summer months when access is best. This aquatic vegetation will break down over the winter months, but has been shown to be an important habitat element for fish and wildlife. No current data exists regarding aquatic macrophyte cover within the project reach. Therefore, surveys will be performed in the summer of 2016. Using a boat and a survey grade GPS, data will be recorded on the dominant aquatic macrophyte guild and its relative cover (dense, moderate, sparse). The macrophyte guilds will be defined as:

- Rooted submerged aquatics
- Unrooted submerged aquatics
- Floating perennials
- Floating annuals

Notes on hard copy maps with lines drawn around the approximate edge of the macrophyte beds will be utilized in concert with the point data to digitize the bed extents and densities. The product will be a map of aquatic macrophyte guild cover and density for the reach. This will be utilized in the habitat assessment portion of the study.

Task 3. Perform aerial surveys from an aircraft and ground surveys from established ground observation points of open water and waterfowl use throughout the winter.

A. Aerial Surveys. Aerial surveys will be conducted by a qualified wildlife biologist at the project site and along the Snake River within the 25-mile radius (Snake River reaches will be defined in consultation with IDFG). A minimum of 5 flights will be be conducted between mid-November 2016 through early March 2017. Based on consultation with IDFG, the timing of the flights should be randomized throughout the day, as sampling at one time of day (morning, mid-day or evening) might fail to capture the waterfowl use completely. Due

to the nature of winter aviation safety concerns, this will be performed to the extent that is practical and safe. To the extent possible, surveys dates will be flexible so that cold periods can be monitored. Incidental observations of other wildlife will be recorded. Aerial survey data will include: photographs of ice conditions; notes on waterfowl taxa guilds and abundance; behavior; open water, etc. The final list of data to be recorded will be determined in consultation with IDFG and other agencies. Waterfowl will be grouped according to IDFG guilds (i.e. dabblers, divers, geese and swans). Field feeders will be recorded as well as open those using open water habitats. GPS points and digital audio recorders will be utilized to increase survey accuracy and utility.

B. Ground surveys will be conducted twice a month for the period beginning in mid-November 2016 through early March 2017. To the extent possible, surveys dates will be flexible so that cold periods can be monitored. Surveys will be conducted as point counts from the river bank at five locations within the reach. The points will be distributed within the reach and established in consultation with IDFG and dependent on access. Likely points include:

    1. The County Line Bridge
    2. Idaho Canal diversion
    3. A point to be determined between 1 and 2
    4. David Crandall's property (he has offered permission to view from his property)
    5. A point between Mr. Crandall's property and the County Line Bridge.

    Data collected at sampling points will include abundance of each wildlife guild, open water and ice cover, behavior (loafing, feeding, etc.), weather observations, incidental observations of other wildlife, raptors, and any other pertinent habitat metrics. The final list of data to be collected will be determined in consultation with IDFG prior to survey initiation.

    Based on consultation with IDFG, the timing of the point count observations should be randomized throughout the day, as sampling at one time of day (morning, mid-day or evening) might fail to capture the waterfowl use completely.

Task 4. Utilizing survey, remote sensing and habitat data, identify the key habitat criteria for wintering waterfowl in the Osgood Reach.

All waterfowl surveys will require GPS locations to be identified for each guild observation. The size of habitat locations (grain size) will be determined in consultation with IDFG. This likely entails river segments as opposed to smaller grained data. To identify the key habitat criteria for wintering waterfowl in the Osgood reach a regression model will be fit to the available data based on the Bayesian Information Criterion (BIC) for model selection (or other selection criterion if deemed more appropriate). The independent variables may include open water, depth, velocity, ice cover, aquatic macrophyte cover, substrate, snow cover, forage availability, water temperature, among others. The BIC is a criterion for model section among a finite set of models. The BIC is preferred because it performs well at preventing the overfitting of models. If there is little literature to inform

the modeling effort, BIC will help to reduce the chance of overfitting the model and including superfluous criteria.

Based on the model results, the reduction in habitat under a 1000 cfs flow scenario will be assessed. This will be done by utilizing the criteria contained within the selected model to quantify the habitat change associated with project implementation. The associated impact on wintering waterfowl will be analyzed. The availability and quality of riverine habitats within the 25-mile radius will be addressed, though habitat will be assessed from a remote sensing approach, rather than on the ground surveys for habitat value. Based on the habitat analysis, the likely effect on waterfowl habitat and their possible displacement will be addressed. The quality of possible alternate habitat areas within 25 miles of the project area will be assessed. An analysis of snow cover and ice-cover influence on waterfowl habitat use and behavior will also be performed.

Based on the results, the likelihood and magnitude of waterfowl displacement form the study area will be analyzed. The alternative habitats with 25 miles will be discussed and the potential for any displaced waterfowl to occupy these habitats will be analyzed, and viewed within the perspective of whether these habitats are fully occupied. The ability to determine the carrying capacity of each habitat may be beyond the scope of the effort, but the analysis will be presented within the appropriate context that considers the carrying capacity of habitats within the region.

Task 4. Prepare report

Write a report that details the survey and analysis results, model selection and results, likely changes in icing, location of alternative habitats, and possible impacts on wintering waterfowl of project implementation (including possible displacement). All of the existing data sources will be synthesized (including historical observation data and project survey data) to understand the likely impacts of project implementation wintering waterfowl.

Level of effort and cost

TBD

OTHER STUDIES

The Osgood Reach of the Snake River possesses fish, wildlife and scenic resources that provide recreation opportunity to the local population. However, there is almost no public access to the project reach of the Snake River. This characteristic of the reach is the major factor controlling recreation use. The primary public access point is a public boat ramp located downstream of the project reach; potential recreationists are limited to individuals possessing motorized water craft capable of navigating upstream into the project reach. Furthermore, the development of persistent ice cover at the boat ramp location completely eliminates boat access for long periods each winter. The recreation study would produce information on the types and amounts of existing recreation use by the general public as well as preferences for future recreation development. The study would also obtain information on recreation use by local landowners with private access to the river.

The final element of the Study Plan is a standard inventory of historical and archeological resources occurring within areas that could be affected by the project.

STUDY 7 – RECREATION

This study was requested by FERC, IDFG, BLM, IDPR, NPS and Lientz.

Goals and objectives

The goal of this study is to collect baseline recreation use and preference data to be used in evaluating the potential project impacts on recreation activity.

The study objectives are to:

a) Identify current public uses and users of the project reach of the Snake River, as well as the timing of those uses;
b) Develop, in cooperation with a technical working group composed of selected stakeholders, visitor intercept survey instruments appropriate for survey of the general public;
c) Using visitor intercept survey results, document the types and quantities of public recreation activities and public preferences for one non-irrigation season period;
d) Using boat water draft data and river depth data determine the flow level and locations where boat navigation becomes impaired within the project reach;
e) Project, using the data collected, the effects of project construction and operation on public recreation use;
f) Provide opportunity for qualitative input from the general public and from concerned user groups, especially landowners with homes located on the affected river reach, on recreation use and preferences for the project reach.

Relevant agency/tribal management goals and/or public interest considerations

Sections 4(e) and 10(a) of the Federal Power Act require that FERC (the Commission) give equal consideration to all uses of the waterway on which a project is located. When reviewing a proposed action, the Commission must consider the environmental, recreational, fish and wildlife, and other non-developmental values of the project, as well as power and developmental values. Vegetation communities, and the wildlife habitat they provide, are resources of particular interest for a variety of reasons, including their ecological functions. Describing the effects on these resources is necessary to fulfill the Commission's responsibilities under the NEPA. Ensuring that environmental measures pertaining to these resources are considered in a reasoned way is relevant to the Commission's public interest determination.

The IDFG is a duly established executive department of the State of Idaho, Idaho Code §§ 36-101 and 67-2402(1). The statutory wildlife policy of the State of Idaho is to preserve, protect, perpetuate, and manage all fish and wildlife for continued supplies for hunting, fishing, and trapping, Idaho Code § 36-103(a). The IDFG, acting under the supervision of the Idaho Fish and Game Commission, has the responsibility to carry out Idaho's wildlife policy, Idaho Code §§ 36-102(a) and -103(b). The IDFG works with the hydroelectric project Applicants and the FERC to ensure that hydroelectric development is consistent with the wildlife policy of Idaho. The IDFG assists the hydroelectric industry and the FERC by providing technical information addressing

potential effects to fish and wildlife resources and how any adverse effects might be avoided, minimized or mitigated.

The Federal Lands Policy and Management Act, Sikes Act, numerous Executive Orders and Bureau policy require BLM to maintain the long term viability of native fish populations on the public lands administered by the BLM. Portions of the project area lie on BLM lands.

IDPR, in consistency with the Idaho Statewide Comprehensive Outdoor Recreation and Tourism Plan, is dedicated to encouraging minimum stream flows for recreation, aesthetics and species protection and to expanding the availability of water recreation resources. This proposed study will assist the agency by clearly identifying the amount, type and patterns of recreational use on the project-affected bypass. This study will offer a better understanding of how this project impacts the relevant resource management goals of the agency.

The NPS has authority to consult with the FERC and Applicants concerning a proposed project's effects on outdoor recreation resources under the Federal Power Act (18 C.F.R. §§ 4.38(a), 5.41(f)(4)-(6), and 16.8(a)); the Outdoor Recreation Act (P.L. 88-29) and the NPS Organic Act (16 U.S.C. et seq.). It is the policy of the NPS to represent the national interest regarding recreation and to assure that hydroelectric projects subject to licensing recognize the full potential for meeting present and future public outdoor recreation demands, while maintaining and enhancing a quality environmental setting for those projects. FERC guidelines and the Federal Power Act, also provide direction to give equal consideration to other non-hydropower resources.

Ms. Lientz represents landowners with homes on the project reach. Evaluating recreation and aesthetic impacts and opportunities is in the public interest. If the proposed project was constructed, existing flow-dependent recreation opportunities including boating, fishing, waterfowl hunting, and swimming would be changed. It is important to the public to analyze impacts, trade-offs, and provide mitigation to the impacts due to the project as well as evaluate opportunities for recreation in the future.

Background and existing information

Vehicle counter data from the West River Road boat ramp and picnic area provides basic information on the level of use of the West River Road site. While the data shows trends in visitation to this site, without further study there is no way to accurately associate these vehicle counts to specific recreational activities. Vehicles may enter the site for any number of uses, and there is no quantitative understanding of whether boaters who launch at this point recreate in the project reach or remain in the reach downstream of the project reach.

The Idaho Department of Fish and Game (IDFG) has creel survey information (unpublished report) for 2013 between the months of May and October. The creel survey was done within and downstream of the bypass reach, but focused solely on angler use and catch rates.

An instream flow study has been completed by the Districts. This study provides detailed water depth information for the river at a wide range of flows and can be used to assess the ability for watercraft to pass up and downstream.

Results of an icing study (proposed in this Study Plan) will help establish the portion of the potential low flow period when the project reach is open and boat recreation access is possible.

Project/resource nexus

The proposed 1,000 cfs bypass flow will likely create persistent low flows in the fall and winter, which would reduce river depth and could impact recreational boating. This low flow would likely create sections of the river that are not navigable by boat during the period between the end of the irrigation season and the beginning of winter ice and again from ice out until spring high water. Information from this study would be used to assess the amount of public recreation use potentially affected, the likely timing and duration of boat access limitations. The study will also document potential impacts to recreation use by local landowners. Recreation preference data collected from users, landowners, and the general public could be used to develop appropriate mitigation measures to account for any loss of access or opportunities should the project be licensed.

Proposed methodology

The recreation study will have three components: a review of existing information, a visitor intercept survey, and an analysis of boat access as a function of river flow.

The existing information review will be crucial for framing survey instruments to adequately capture the full spectrum of recreation activities in the project area. Meaningful questionnaires and/or survey designs cannot be developed until the existing information has been thoroughly assessed.

The visitor intercept surveys will collect recreation activity, attitudes, preferences, and socioeconomic information from random samples of all of the various types of users at the sites discussed below. Sampling frames will be developed based on available information on types and timing of current use of the sites. These surveys will provide the distribution of origins of visitors to the area, as well as their recreation activity.

Recreation use and opportunities will be evaluated for two Snake River sites: West River Road picnic area and the Upper Power Plant east boat ramp. These sites will capture recreation activity below and within the project footprint area.

The length of the recreation study has been set as the non-irrigation season, which is taken to be from 15-Oct to 15-Apr. Natural variations in climate and water supply conditions will certainly influence recreation use to some extent, but the time frame of these natural variations is long term (on the order of decades, not years) and there is no basis for concluding that a two or three year study would be more likely to capture these variations than the proposed one season study. Instead, visitation and activity measures from earlier studies will be examined to evaluate the extent to which variation occurs with climate and hydrological changes.

TECHNICAL WORKING GROUP

A recreation technical working group (TWG) will be created to provide advisory input and oversight throughout the recreation study, particularly in identifying recreation uses and users, developing the survey instruments, and developing the survey implementation plans. The

recreation TWG will be composed of three persons: one representative from the involved Federal agencies (BLM, NPS), one representative from the involved State of Idaho agencies (IDPR, IDFG), and one representative from a local user group or involved NGO (landowners, TU). Representatives with experience in recreation impact studies will be nominated by their respective agencies. The nominees will be reviewed and selected by the current stakeholders, FERC and the Districts.

At each stage of the process of developing and implementing surveys, the TWG will be given an opportunity to review relevant information such as draft surveys, draft sampling design, and draft final report. The TWG will provide the study team with written comments and suggestions. TWG members will be responsible for coordinating their review and comments with their respective constituencies[6]. TWG comments and suggestions will be appended to the final report.

REVIEW OF EXISTING INFORMATION

Researchers will examine the existing recreation data and studies for the project area and for the region. IDFG. BLM and any other available recreation use and preference data will be carefully reviewed. The most recent data and analyses available from the USFS National Survey of Recreation and the Environment will also be identified and reviewed. In addition, other sources of qualitative and quantitative information regarding the uses of the Snake River, and particularly the specified reaches, will be obtained. Projected recreation demands will be obtained from the Idaho SCORTP, other available studies, and any local recreation plans.

It is clear that recreation uses depend on season, flow levels, and other aspects of existing river ecology and management. Past recreation use patterns will be documented as part of the existing information review, and will be considered during development of the survey program.

VISITOR INTERCEPT SURVEYS

Once researchers have a base understanding of the recreation uses and patterns for the two sites on the Snake River, and of the recreational opportunities in the larger region, a program of visitor intercept surveys will be developed. The visitor intercept surveys will involve on-site, face-to-face and/or mail-back surveys being distributed by representatives of the study team at specific sites identified with recreation activities. Sampling frames will be developed to assure a representation of all the current types of users and activities taking place in the relevant section of the river. At the same time, the enumerators will record all visiting vehicles and their origins, numbers in parties, and activities during sampling periods.

It is anticipated that the survey program will consist of a visitor intercept study for one period between 15-Oct of one year and 15-Apr of the following year, with random sampling of visitors

[6] E.g., the state agency TWG member would circulate information and collect comments from all interested state agencies, the federal agency TWG member would manage consultation with all interested federal agencies, and the NGO/landowner TWG member would manage consultation with non-government stakeholders.

stratified by type of recreators and seasons of use. TWG consultation will help determine how intensive this intercept surveying will be in order to assure a representative sample of each type of recreation use and location. The Level 2 (limited reconnaissance) study will include stratified randomized sampling of recreators on an appropriate time schedule (e.g., weekly, at high flow only, holidays, etc.), incorporating existing visitation data and recommendations of the TWG. No survey activities will occur on private lands so that special access permissions will not be required.

An initial draft survey instrument will be developed by the researchers. The draft visitor intercept survey questionnaire will be submitted to the TWG for review. The surveys will include origin, length of visit, and preference data collection, and will also include contingent behavior data based on construction and operation alternatives for the County Line Road Project. Contingent behavior questions will address concerns about the potential for lower flows during the non-irrigation season and public access to private lands. The TWG will provide written comments and, if necessary, researchers will meet with the TWG to review comments and suggestions. The final survey instrument would be submitted to FERC (along with TWG comments) for approval prior to beginning the field effort.

An initial draft sampling design will be developed by the researchers and submitted to the TWG for review. The draft sampling design will indicate the location, frequency and timing of sampling to ensure that sampling includes all the significant recreational activities and a representative sample of users participating in those activities. The final sampling plan (including TWG comments) would be submitted to FERC for approval prior to beginning the field effort.

BOAT ACCESS EVALUATION

To evaluate the potential boat access restrictions caused by project-induced low flows the researchers will first determine minimum water depth requirements for the types of water craft capable of accessing the project reach. This information will be compiled from manufacturers, open literature, and from information obtained directly from users of the project reach. Results from completed RiverFLO-2D and River2D hydraulic modeling will be used to establish river channel water depth under a range of possible project operation scenarios. A comparison of boat draft requirements and water depth will permit an assessment of boat access restrictions caused by lower flows.

DATA ANALYSIS

Appropriate statistical analyses will be performed on the collected data to determine the recreation uses and numbers of users. Boat access restriction analysis will focus on information regarding boat use obtained from the intercept survey.

QUALITATIVE INPUT

An effort to provide input by the general public and specific user groups will be made using a website for comments. The website will provide a questionnaire similar to the intercept survey instrument. It must be recognized that such input is not necessarily random or representative. Thus, this input will not be a part of the statistical analyses of recreation use. Nevertheless, these comments will be compiled and reported to give added information to decision-makers. In addition

to the general public the website will attempt to target specific use groups such as birders, fishermen, hunters, etc.

DELIVERABLES

The deliverables for this study will be a Draft Recreation Report and a Final Recreation Report.

Level of effort and cost

TBD

STUDY 8 – CULTURAL RESOURCES

This study was requested by FERC, BLM.

Goals and objectives

The goal of this study is to obtain a baseline assessment of the historic and cultural resources in the project area as a means of evaluating potential project impacts to these resources.

The objectives of this study are to:

a) Establish an Area of Potential Effects (APE) for the proposed project in consultation with the Idaho State Historic Preservation Office (Idaho SHPO) and Bureau of Land Management (BLM);
b) Identify and document any known archaeological and historic-era cultural properties within the APE;
c) Perform a field reconnaissance survey within the project APE according to standard practices;
d) Determine the potential project effects on any archaeological or historic-era properties found within the APE;
e) Evaluate the National Register of Historic Places (NRHP) eligibility of any heritage resources potentially affected by the project;
f) Produce a draft report including recommendations for protection of any archeological or historic-era properties, obtain stakeholder comments on the draft report, and produce a final report to be filed with FERC.

Relevant agency/tribal management goals and/or public interest considerations

Sections 4(e) and 10(a) of the Federal Power Act require that FERC (the Commission) give equal consideration to all uses of the waterway on which a project is located. When reviewing a proposed action, the Commission must consider the environmental, recreational, fish and wildlife, and other non-developmental values of the project, as well as power and developmental values. Vegetation communities, and the wildlife habitat they provide, are resources of particular interest for a variety of reasons, including their ecological functions. Describing the effects on these resources is necessary to fulfill the Commission's responsibilities under the NEPA. Ensuring that environmental measures pertaining to these resources are considered in a reasoned way is relevant to the Commission's public interest determination.

The Federal Lands Policy and Management Act, Sikes Act, numerous Executive Orders and Bureau policy require BLM to maintain the long term viability of native fish populations on the public lands administered by the BLM. Portions of the project area lie on BLM lands.

Background and existing information

In a letter to the Districts the Idaho SHPO identified the existing diversion dam and the two canals as potentially eligible for listing on the NRHP, while also noting that the Eagle Rock Ferry National

Historic District is located within the project area. Due to the presence of these properties and possibly other historic properties or archeological sites, a survey of the project's APE is needed.

Project/resource nexus

Project-related activities, especially ground-disturbing activities, related to construction, operation, and maintenance, could adversely affect archaeological and historic properties through disturbance or direct loss. The survey would provide information on historic and archeological sites located within the APE and the subsequent report would provide information on which sites are potentially eligible for the NRHP and any potential effects of the project on these sites. If there would be an adverse effect on Historic Properties, an Applicant-prepared Historic Properties Management Plan (HPMP), developed in consultation with the Commission, the SHPO, Tribes, and other interested parties, would likely be necessary to avoid or mitigate effects.

Proposed methodology

Task 1 - Develop APE

In consultation with Idaho SHPO, BLM and any interested Tribes the Applicants will develop an APE identifying areas that could potentially be disturbed by project construction or operation. In general the APE would consist of lands within the right-of-way for the Idaho and Great Western Canals, lands within proposed project boundary plus a 100 ft buffer surrounding the powerhouse sites, any construction staging areas, and 50 feet on either side of the proposed transmission line route. The Applicants will also outline proposed methods for a cultural resource inventory survey within the APE. The APE and survey methods would be finalized based on stakeholder comments.

Task 2 - Cultural Resource Inventory investigation

The Applicant would then conduct a literature review and reconnaissance inventory survey within the APE. A preliminary report identifying any discovered sites should be completed after the reconnaissance survey. For any cultural resources found within the APE this report would include: (1) a description of the resource resources, (2) an analysis of the NRHP eligibility of the resource, (3) an analysis of potential project effects (both construction and operation) on the resource, and (4) recommendations for protection of the resource. This report would be sent for review to the Districts, the SHPO, BLM, any interested Tribes, and the Commission. Any comments would be incorporated into a final Cultural Resources Report, which would include all the information necessary to satisfy the following purposes:

- identification and documentation of archaeological and historic-era properties within the area of potential effect (APE),
- determination of potential project effects on archeological and historic-era properties within the APE, and
- evaluation of National Register of Historic Places (NRHP) eligibility (as appropriate and necessary) for properties affected by the project.

If results of the inventory work and subsequent consultation indicate that there would be an adverse effect on Historic Properties, the Applicant would prepare a Historic Properties Management Plan (HPMP), developed in consultation with the Commission, the SHPO, Tribes, and other interested parties, to specify necessary actions to avoid or mitigate effects.

Level of effort and cost

TBD

OTHER STUDY PLAN DETAILS

STUDY SCHEDULE

The estimated schedule for conducting the proposed studies is depicted in the table below.

No.	STUDY DESCRIPTION	Duration (months)	2015			2016												2017								
			O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S
1	Special aquatic habitats	20	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x				
2	Entrainment	12						x	x	x	x	x	x	x	x	x	x	x	x							
3	Icing	18			x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		
4	Water quality	12						x	x	x	x	x	x	x	x	x	x	x	x							
5	Land cover	12						x	x	x	x	x	x	x	x	x	x	x	x							
6	Waterfowl	9											x	x	x	x	x	x	x	x	x	x				
7	Recreation	12						x	x	x	x	x	x	x	x	x	x	x	x	x	x	x				
8	Cultural resources	6									x	x	x	x	x	x										

PROVISIONS FOR PERIODIC STUDY REPORTS AND TECHNICAL REVIEW

A comprehensive progress report will be issued about November 2016. This report will present the status of each study and will include preliminary results from the 2016 field season. A meeting will be held about January 2017 to discuss progress of the studies.

For each study, a draft final report will be distributed to stakeholders for review and comment. A 30-day comment period will be provided. Any written comments received will be considered and addressed in the final report. The timeline depicted in proposed study schedule includes issuance of the draft report, comment incorporation and issuance of final report.

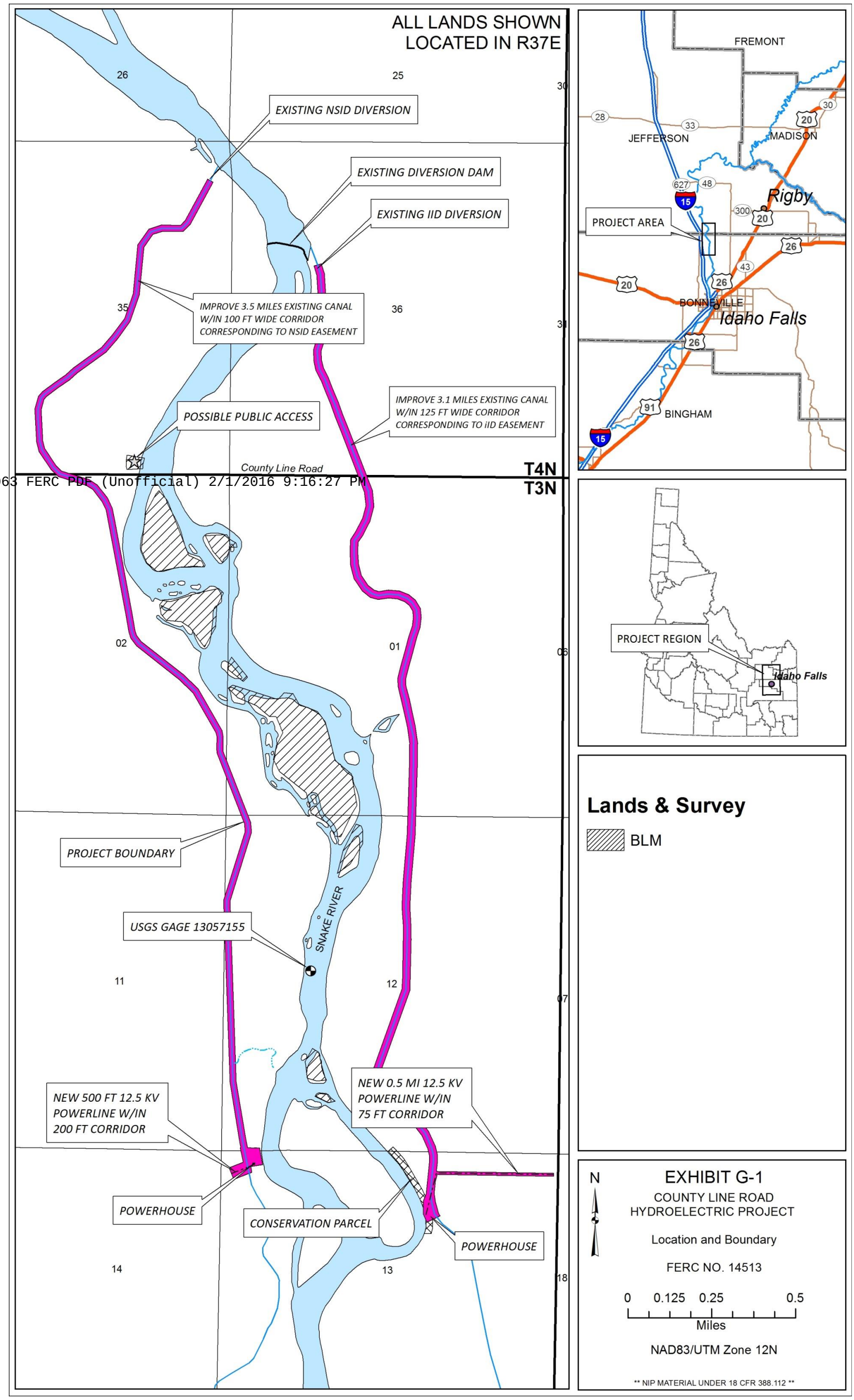
STUDIES REQUESTED BUT NOT PROPOSED

Appendix B gives a complete summary of the submitted study requests. Appendix C contains a list of studies requested but not proposed. This list includes study elements (i.e. specific details of proposed studies) that were requested but have not been incorporated into this revised study plan. An explanation is provided in each case.

CONSULTATION RECORD

Appendix D contains a record of the stakeholder meetings conducted during development of this Study Plan.

APPENDIX A – PROJECT FEATURES MAP



APPENDIX B - STUDY REQUEST SUMMARY

Summary of Agency and Private Party Submitted Study Requests

AGENCY PARTY	LETTER DATE	STUDY REQUEST NO.	STUDY REQUEST DESCRIPTION	CLR STUDY NO.
Amy Lientz	18-Aug-15	1	Recreation and aesthetics study	**7**
Amy Lientz	18-Aug-15	2	Relevant public interest study (socieconomics?)	**not proposed**
Amy Lientz	18-Aug-15	3	Icing related study	**3**
Amy Lientz	18-Aug-15	4	Project economics study	**not proposed**
BIWA	17-Aug-15	1	Project impact on waterfowl and raptors	**6**
BIWA	17-Aug-15	2	Socio-economic impact study (esp. on landowners)	**not proposed**
BLM	18-Aug-15	1	Bypass flow study	**1**
BLM	18-Aug-15	2	Cultural resources study	**8**
BLM	18-Aug-15	3	Wildlife use, abundance and productivity	**6**
BLM	18-Aug-15	4	Fish entrainment study	**2**
BLM	18-Aug-15	5	Icing related study	**3**
BLM	18-Aug-15	6	Recreation use study	**7**
David Crandall	13-Jul-15	1	Snake River flow study revisions	**1**
David Crandall	13-Jul-15	2	Icing related study	**3**
David Crandall	13-Jul-15	3	economic analysis of water use for aquifer recharge	**not proposed**
FERC	18-Aug-15	1	Cultural resources study	**8**
FERC	18-Aug-15	2	Land cover mapping and invasive weed study	**5**
FERC	18-Aug-15	3	Winter waterfowl survey	**6**
FERC	18-Aug-15	4	Flow related recreation resource assessment	**7**
IDEQ	18-Aug-15	1	Water quality and productivity assessment	**4**
IDEQ	18-Aug-15	2	Icing related study	**3**
IDFG	18-Aug-15	1	Icing related study	**3**
IDFG	18-Aug-15	2	Wildlife use survey	**6**
IDFG	18-Aug-15	3	Ecological role of side channel study	**1**
IDFG	18-Aug-15	4	Recreational use survey	**7**
IDFG	18-Aug-15	5	Trout spawning study	**1**
IDFG	18-Aug-15	6	Fish entrainment study	**2**
IDFG	18-Aug-15	7	Riparian and wetland assessment	**5**
IDPR	18-Aug-15	1	Recreation use and user preference	**7**
NPS	13-Aug-15	1	Recreation and aesthetic resource study	**7**
Richard Rice	12-Aug-15	1	Project economics study	**not proposed**

APPENDIX C – STUDIES NOT PROPOSED

SUMMARY OF STUDIES (OR STUDY ELEMENTS) REQUESTED BUT NOT PROPOSED

BASIS: 1. study not needed to address project effects; 2. study too costly; 3. sufficient existing information; 4. other

AGENCY	STUDY	BASIS	REQUEST	EXPLANATION
BLM	1	1	recommend 7-day interval between redd surveys	Redd counts conducted during the fall of 2015 show that redds are clearly visible 2-weeks after being first counted, which indicates that detection of redds will not be compromised by counting every 2-weeks. Exact timing of redd construction is not needed to evaluate effects. Rather, we need to know where the redds are and when spawning begins and ends. We believe this can be achieved by counting redds every two weeks.
IDFG	1	1,2	include all dewatered riffle and river margin habitats	We changed the proposal to include an estimate of the number of juvenile trout present throughout the modeled habitat of the project reach. We believe that this estimate, along with our literature review to determine potential effects to the population from lower flows, will allow evaluation of project effects more completely than evaluation of areas projected to go dry. Fish in these areas may, or may not, be lost, as they have the potential to move. However, the ability to move does not preclude mortality. Presumably, the impact of low flows in the literature also includes the effect of some areas going dry, as this commonly occurs at lower flows. Therefore, effects of low flows from the literature would be applied to the pre-project juvenile trout wintering population to determine effects.

AGENCY	STUDY	BASIS	REQUEST	EXPLANATION
IDFG	1	1	Evaluate juvenile trout winter use of non-margin areas	While juvenile trout are found in mid-channel areas in the summer, changes in behavior associated with winter cause them to select concealment habitat during the day, which is generally along stream margins. At night they exit from concealment areas but the literature indicates that they stay near the concealment habitat. The areas the model identified as winter habitat were all along the stream margins and were based on literature values and professional input from agency personnel. The revised study includes an assessment of all modeled winter habitat, whether stream margin, or further out in the channel.
IDFG	1	1	recommend measurement of upwelling as factor in spawning habitat	A cursory review of the literature indicated that brown trout spawn in areas of both upwelling and downwelling. The effect of the project on upwelling or downwelling is not apparent and does not seem to be a key factor in selection of spawning areas by brown trout.
IDFG	1	1	Perform both electrofishing and snorkeling to determine if one technique is more effective	Evaluating the effectiveness of fish collecting or observation techniques is beyond the scope of this study. Both are generally accepted techniques for evaluating fish populations.
IDFG	1	1	recommend underwater video to look for redds	If redds are so deep that they can only be seen by video then they would remain sufficiently deep at lower flows.
BLM	2	1	requested a more comprehensive entrainment analysis	Although a more comprehensive effort could reduce the uncertainty regarding existing entrainment, it is important to remember that existing entrainment is NOT a project effect. The project effects are related to additional withdrawals. Entrainment due to additional withdrawals cannot be measured by any entrainment study; thus the estimate of project effects would still be subject to significant uncertainty no matter how much additional entrainment sampling is done. We believe that our study will provide adequate information to address entrainment in NEPA analysis. The Districts acknowledge that they will be responsible to mitigate for fish mortality associated with entrainment and propose that the only reliable way to measure this is during operations with dedicated equipment installed in the powerhouse tailraces.

AGENCY	STUDY	BASIS	REQUEST	EXPLANATION
IDFG	2	1	requested a more comprehensive entrainment study	See above
BLM	3	1	requested more cameras	The new project proposal includes a variety of ice monitoring methods including an increased number of cameras, aerial photos, and thickness measurements. This proposal supersedes the previous proposal that relied almost exclusively on cameras.
Crandall	3	3	effects of ice on USGS gauge	The Districts acknowledge this as a valid concern but believe that this problem is not unique to the Osgood Reach and that engineering solutions are available. No project-specific study is needed to address this question.
FERC	3	2	address full range of climatic and streamflow conditions	The full range of climate and streamflow conditions is essentially infinite and beyond the scope of any icing study; however, the Districts' proposal would look at peak winter ice for the full range of streamflow conditions (1000 cfs - 2500 cfs) based on climate conditions during the study winter (2016 - 2017). Another Task within Study 3 would place the study winter into proper climate context and permit plausible extrapolation to more or less extreme conditions.
FWS	3	3	canal failure due to icing	The Districts acknowledge this as a valid concern but believe that this problem is not unique to the Osgood Reach and that engineering solutions are available. No project-specific study is needed to address this question.
IDEQ	3	1	recommend CE-QUAL-W2 for predicting ice	Discussions of CE-QUAL-W2 during study plan meetings suggested that CE-QUAL-W2 would not provide the level of ice information needed to assess resource impacts. The Districts have proposed an alternative based on detailed observations, expert opinion, and additional 2D hydraulic modeling.
TU	3	3	flood risk due to canal icing	The Districts acknowledge this as a valid concern but believe that this problem is not unique to the Osgood Reach and that engineering solutions are available. No project-specific study is needed to address this question.
IDEQ	4	2	recommend CE-QUAL-W2 for water temp effects	This would have made sense if CE-QUAL-W2 was selected as an ice prediction model but as a stand-alone model for predicting water temperature effects only it is too expensive and unnecessary. The Districts have proposed an alternative model for predicting temperature effects.

AGENCY	STUDY	BASIS	REQUEST	EXPLANATION
FWS	5	1	YBC surveys of study area	These surveys would be conducted only if habitat is found during Study 5.
FWS	5	1	ULT surveys needed	These surveys would be conducted only if habitat is found during Study 5.
BIWA	6	1	request macroinvert study	The potential effects on macroinvertebrates would be inferred from Study 3 results and from the macroinvertebrate data collected under Study 4 (BURP stations).
BLM	6	1	requested more cameras	The study has been changed to include ground observations and point counts of the study reach over the winter season. This has replaced the use of the cameras. The time required to process the cameras was deemed to be better spent by a qualified biologist observing the waterfowl of the reach. The analysis method and final utility of the camera data was unclear and therefore removed from the study plan.
Crandall	6	1	make waterfowl study correspond with SD2 geographic scope	The geographic scope is based on site specific knowledge, which the Districts believe is more efficient than simply defaulting to the overall geographic scope from SD2.
Crandall	6	2	5 flights not sufficient	The current study proposal supplements aerial surveys with ground based searches; together these methods provide adequate effort to achieve study goals.
Crandall	6	1	more cameras needed	The study has been changed to include ground observations and point counts of the study reach over the winter season. This has replaced the use of the cameras. The time required to process the cameras was deemed to be better spent by a qualified biologist observing the waterfowl of the reach. The analysis method and final utility of the camera data was unclear and therefore removed from the study plan.
IDFG	6	2	recommends two season of data collection with surveys every 2 weeks	Two seasons of data would not sample the variability in climate and waterfowl behavior and would not provide benefit consistent with the additional cost.

AGENCY	STUDY	BASIS	REQUEST	EXPLANATION
FWS, BIWA	6	1	Raptor studies would be included	Study 6 includes recording raptor observations during waterfowl point counts. The Districts believe that this information along with habitat related information from Study 3 (icing) and Study 5 (land cover) will be adequate to address potential impacts to raptors.
IDFG	7	2	recommend 2 years of recreation surveys	Two seasons of data would not substantially sample the variability in climate and recreation behavior and would not provide benefit consistent with the additional cost.
BIWA, Lientz	new	3	Socioeconomic impact on public and residents along the river	This objective does not require a site-specific study. Socioeconomic impact will be analyzed based on impacts to other resources.
DC	new	1	recharge vs hydro study	The request regarding evaluation of aquifer recharge as an economically favorable alternative to hydropower development relates to the business choices of the irrigation districts and is not relevant to the FERC licensing process. The Districts are aware of aquifer recharge activities in the Upper Snake River Plain region but have made the decision to seek development of hydropower.
RR, BIWA, Lientz	new	1	economic feasibility study	The districts have completed feasibility studies and their conclusion is that the projects are economically feasible. The feasibility studies contain confidential and proprietary information. The final license application will contain basic economic information for use by FERC to conduct its own economic analysis, which will be included in the final environmental documents.
TU	new	3	study of potential for unauthorized ATV use of canal banks	This analysis does not require a separate study but can be discussed based on results of other studies (e.g. Study 3, Study 7).

APPENDIX D – CONSULTATION RECORD

Summary of Study Plan Meetings

Summary of 27-Oct-2015 Study Plan Meeting

County Line Road Hydroelectric Project

ATTENDEES

Dan Kotansky	BLM
Monica Zimmerman	BLM
Deena Teel	BLM
Derek Risso	Ecosystem Sciences
Karen Sughrue	FERC
Ken Wilcox	FERC
Matt Cutlip	FERC
Tim Hanrahan	GeoEngineers
Nick Josten	GeoSense
Barry Christensen	Idaho Irrigation
Merrill Hanny	Idaho Irrigation
Alan Kelsch	Idaho Irrigation
Troy Saffle	IDEQ
Curtis Hendricks	IDFG
Dan Garren	IDFG
Tom Bassista	IDFG
David Crandall	Landowner
Chris Crandall	Landowner
Jim Gregory	Lost River Fish Ecology
Chet Adams	New Sweden Irrigation
Louis Thiel	New Sweden Irrigation
Delilian Reed	New Sweden Irrigation
Darold Bingham	Snake River Estates
Matt Woodard	Trout Unlimited
Ward Whitmore	BIWA
Ethan Morton	SHPO
Susan Rosebrough	NPS
Adam Straubinger	IDPR
Unknown caller	

NOTES

Study 1 Task 1 - special aquatic habitats – brown trout spawning

- Juvenile brown trout overwinter survival needs to be addressed
- Redd search sampling plan needs better definition
- Redd search should include: areas that should have spawning but not predicted, areas predicted to have spawning but are clearly not suitable
- IDFG: Consider other sampling methods such as electrofishing, radio tags
- Add opportunistic observations of recreation and wildlife
- IDFG: temperature plays a key role in overwinter survival
- IDFG needs to know about rearing, holding, overwinter survival for all species and life stages
- Districts: focused on looking at role of substrate

Study 1 Task 2 - special aquatic habitats – side channel habitat

- When we drill holes we should measure flow velocity and water temp
- drilling should be completed several times during the winter
- Side channel function in Oct, Nov, Mar probably most important
- Request electrofishing to assess juvenile trout use areas and apparent survival under current conditions in Oct, Nov, Mar, regardless of what is determined about icing
- IDFG has ice data from 2014 (time lapse footage?)
- Invertebrate sampling was discussed, but no clear nexus
- Add opportunistic observations of recreation and wildlife
- IDFG: says there is a relationship between winter water temperature and survival, but it is not a threshold

Study 2 – entrainment

- Use of incidental recreation use observations as indicator of presence/absence of fish would be qualitative only
- Add opportunistic observations of recreation and wildlife
- Need sampling plan for upstream reach habitat assessment
- IDFG says estimated annual entrainment represents a significant percentage of Osgood population
- suggestion made that entrainment should be based on partitioning of water volume, e.g. % over spillway, % down canal, % through powerhouse

Study 3 – icing

- Potential for icing of canals and headgates should be included, as possible safety hazard
- IDFG not just interested in ice impacts, also impacts on juvenile/adult survival due to cooling of water compared to existing conditions
- CE-Qual-W2 recommended by DEQ for ice prediction

- FERC not aware of successful use of modeling to predict ice for hydropower proposals
- FERC has guide to ice analysis

Study 4 – water quality

- If no use designation developed by applicant then DEQ has to assume the most stringent requirements
- Water temperature effects need to be looked at in winter as well as summer, because research shows cooler water has some effect on overwintering success
- DEQ okay with the BURP portion of plan
- Coordinate BURP stations with fishery studies to get best benefit from invertebrate data

Study 5 – land cover mapping

- IDFG wanted to see calculation of horizontal distance between riparian vegetation and water edge, and how this will change at different water levels
- Request for analysis of "connectivity", i.e. barriers to migration between riparian cover along river edge (New Sweden tailrace specified as a barrier)
- Add opportunistic observations of recreation and wildlife
- BLM: stated that the reach does not contain habitat for either of the federal special status species

Study 6 - waterfowl

- Add opportunistic observations of recreation and wildlife
- Time of day very important because waterfowl can disperse during the day, then re-congregate
- Much of the use is simply stopover habitat, although some waterfowl are winter resident
- Discuss availability of forage at each location; water depth and aquatic veg are important factors
- Provide flexibility to move monthly surveys to coincide with major freezing events (birds congregate)
- Bear Island homeowners care if birds displaced, even if they have other habitats to go to (this is more of a recreation issue)
- Using guilds is fine with the agencies, but dabbling ducks are important and we should consult with IDFG before determining the guilds we group birds into
- Four flights likely won't be enough
- Use time-lapse cameras to add to this effort; installing a time-lapse camera just below the dam would be a good approach to help with waterfowl sampling
- Snow cover vs. groundcover affects waterfowl behavior and forage availability

Study 7 - recreation

- Many points of view about whether recreation use survey needed
- BLM preferred an effort to obtain input on what the public would like to see as far as recreation opportunities on the reach (focus groups, internet surveys)

- General consensus was that use from October to freeze-up is the main season of interest for any recreation use survey
- IDFG was particularly interested in capturing the "opportunity lost", i.e. loss of boat access
- IDFG has information on water depth requirements for various types of boats
- Landowner recreation must be acknowledged
- Need to include any public easements when evaluating public access

Study 8 – cultural

- SHPO okay with study as proposed

Studies not proposed - instream flow

- Whitmore, Crandall stated they could show there was a bias introduced by the HSCs
- FERC acknowledged that HSCs were often a point of disagreement but that working out a consensus was the normal approach

Studies not proposed - socio-ecnomics

- FERC stated that this analysis was normally based on general information unless the project would have a major effect on infrastructure

Summary of 20-Jan-2016 Study Plan Meeting

County Line Road Hydroelectric Project

ATTENDEES	
Dan Kotansky	BLM
Ryan Beatty	BLM
Troy Saffle	IDEQ
Jon Flinders	IDFG
Dan Garren	IDFG
Tom Bassista	IDFG
David Crandall	Landowner
Darold Bingham	Snake River Estates
Tom O'Riley	Snake River Estates
Jim Gregory	Lost River Fish Ecology
Derek Risso	Ecosystem Sciences
Nick Josten	GeoSense
Wendy Sill	Idaho Irrigation
Richard Lockner	Idaho Irrigation
ON PHONE	
Matt Woodard	Trout Unlimited
Karen Sughrue	FERC
Julia Kolberg	FERC
Matt Cutlip	FERC
Paul Makowski?	FERC
Ward Whitmore	BIWA
Amy Lientz	SRE
Tim Hanrahan	GeoEngineers

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