

FEDERAL ENERGY REGULATORY COMMISSION

WASHINGTON, DC 20426

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OFFICE OF ENERGY PROJECTS

Project No. 14513-001 - Idaho
County Line Road Hydroelectric Project
Idaho Irrigation District
New Sweden Irrigation District

Nicholas Josten
2742 Saint Charles Ave
Idaho Falls, ID 83404

Reference: Study Plan Determination for the County Line Road Hydroelectric Project

Dear Mr. Josten:

Pursuant to 18 C.F.R. § 5.13(c) of the Commission's regulations, this letter contains the study plan determination for the County Line Road Hydroelectric Project (project). The determination is based on the study criteria set forth in section 5.9(b) of the Commission's regulations, applicable law, Commission policy and practice, and the record of information.

Background

On October 5, 2015, Idaho Irrigation District and New Sweden Irrigation District (Districts) filed their proposed plan for studies on: special aquatic habitats, fish entrainment, icing impacts, water quality, terrestrial habitat, waterfowl, recreation, and cultural resources in support of their intent to apply for a license to construct and operate the County Line Project.

The Districts held study plan meetings on October 27, 2015, and January 21, 2016, updated the proposed study plan on November 16, 2015, and filed a revised study plan (RSP) on February 2, 2016. Bear Island Water Association Inc., David and Christine Crandall, Idaho Department of Environmental Quality, and Idaho Department of Parks and Recreation filed comments on the RSP on February 16, 2016. The Idaho Department of Fish and Game and U.S. Bureau of Land Management filed comments on the RSP on February 17, 2016.

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General Comments

A number of the comments received do not directly address study plan issues. These include: editorial suggestions; requests to update and refile certain aspects of the RSP for clarity or to improve accuracy; and comments on protection, mitigation, and enhancement measures such as recommendations for minimum flows. This determination does not address such comments, but rather addresses only the merits of the study plan submitted pursuant to section 5.13 of the Commission's regulations and comments received thereon.

Study Plan Determination

The Districts' RSP, filed on February 2, 2016, is approved, with the staff - recommended modifications discussed in Appendix B. As indicated in Appendix A, three studies are approved as filed, and five are approved with modifications. No additional studies requested by stakeholders are being required. The specific modifications to the study plan and the basis for modifying the Districts' study plan are explained in Appendix B. Studies for which no issues were raised are not discussed in Appendix B.

Commission staff reviewed all comments and considered all study plan criteria in section 5.9 of the Commission's regulations; however, only the specific study criteria particularly relevant to the determination are referenced in Appendix B. Staff's analysis does not address suggestions for minor changes to proposed studies that would not have a significant effect on the amount, quality, or type of data collected.

Pursuant to section 5.15(c)(1) of the Commission's regulations, the Initial Study Report for all studies in the approved study plan must be filed by February 28, 2017.

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

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If you have any questions, please contact Matt Cutlip at (503) 552-2762.

Sincerely,

Ann F. Miles
Director
Office of Energy Projects

Enclosures: Appendix A-- Approved and modified studies
Appendix B-- Staff's recommendations on proposed and requested studies

cc: Mailing List
Public Files

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APPENDIX A
SUMMARY OF DETERMINATIONS ON PROPOSED AND RECOMMENDED
STUDIES

Study	Recommending Entity	Approved	Approved with Modifications	Not Required
1 – Special Aquatic Habitats Study	Idaho Irrigation District, New Sweden Irrigation District (Districts)		X	
2 – Entrainment Study	Districts	X		
3 – Icing Impacts Study	Districts		X	
4 – Water Quality Study	Districts	X		
5 – Terrestrial Habitat Inventory	Districts	X		
6 – Waterfowl Study	Districts		X	
7 – Recreation Study	Districts		X	
8 – Cultural Resources Study	Districts		X	
Instream Flow Study	Bear Island Water Association Inc. (Bear Island), David and Christine Crandall			X
Economic Analysis of Groundwater Recharge Study	David and Christine Crandall			X
Socioeconomics Study	Bear Island, Richard Rice			X

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APPENDIX B

STAFF RECOMMENDATIONS ON PROPOSED STUDIES, REQUESTS FOR STUDY MODIFICATIONS, AND REQUESTS FOR ADDITIONAL STUDIES

The following discusses an administrative matter pertaining to the establishment of and consultation with technical working groups (TWG), staff recommendations on studies proposed by the Idaho Irrigation District and New Sweden Irrigation District (Districts), requests for study modifications, and requests for additional studies. We base our recommendations on the study criteria outlined in the Commission's regulations [18 C.F.R. section 5.9(b)(1)-(7)].

Technical Working Groups

Applicant's Proposal

The Districts propose to create a Recreation TWG and a Fisheries TWG to provide advisory input and oversight during implementation of the recreation and fisheries studies. The TWGs would assist in developing and finalizing the details for several proposed plans (e.g., recreation survey instrument and sampling plan, and the ice sampling plan). Each TWG would include one federal agency representative, one state agency representative, and one representative from either a non-governmental organization or a landowner user group. Each member would communicate information with their respective constituency.

Comments

Idaho Department of Fish and Game (Idaho DFG) states that if the TWGs are approved, they should include representatives from both the Idaho DFG and Idaho Department of Environmental Quality (Idaho DEQ). Idaho DFG also states that any state agency should be able to participate in the TWG due to differing mandates and expertise.

Idaho Department of Parks and Recreation (Idaho DPR) requests that the TWGs include representatives from both Idaho DPR and Idaho DFG.

The U.S. Bureau of Land Management (BLM) recommends the TWGs comprise any willing person that has time to participate. BLM also recommends that the federal agency member of the TWGs not be responsible for managing consultation with all other interested federal agencies.

David and Christine Crandall state that the proposal to limit TWG participation to three stakeholders is insufficient, considering the diverse interests and responsibilities

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held by stakeholders. The Crandalls state that, if TWGs are required, they must consist of sufficient members to represent each stakeholder entity with standing as an intervener.

Discussion and Recommendations

TWGs are not a requirement of the ILP, so we are reluctant to recommend their formation. They can, however, be an efficient means of collaborating with parties, especially those interested in specific resource areas. Our experience with TWGs is that they work best when all interests are given the opportunity to participate. This can mean the group forms with a relatively large number of initial participants, but over time these groups tend to narrow to a smaller number. Whether or not the Districts form TWGs in this case is their decision. However, we note that the required ILP commenting stages found in the Commission's regulations will be open to all interested parties. Regardless of whether the Districts use the TWGs, we recommend that they consult with all stakeholders that have been active in the ILP study plan development to ensure that their interests are addressed in finalizing the details of the fisheries and recreation plans.

I. Requests for Study Modifications

Study 1: Special Aquatic Habitats Study

Proposed project operation has the potential to affect streamflows within a 3.5-mile-long bypassed reach of the Snake River. To evaluate the potential effects of altered streamflows on fish habitat in the bypassed reach, the Districts conducted an instream flow study using a two-dimensional (2-D) fish habitat model (RiverFlo-2D) under open-water (i.e., non-ice cover) conditions and habitat suitability preference curves for depth, velocity, and substrate for multiple life stages of rainbow trout and brown trout. The model results estimated fish habitat availability for these species within the bypassed reach for thirteen minimum flow scenarios ranging from 800 to 8,310 cubic feet per second (cfs). This study was conducted from 2013 through 2015, and the results were filed on September 2, 2014, and supplemented on April 1, 2015.

Considerable debate over the appropriateness of the studies under winter low flow and icing conditions occurred during the development of the aquatic study plans. To address these concerns and assess the potential effects of project operation on bypassed reach streamflows in the winter during ice cover conditions on brown trout redds, side-channel aquatic habitat, and over-wintering juvenile trout, the Districts propose to conduct a Special Aquatic Habitat Study. The study would consist of four tasks: (1) a brown trout spawning habitat investigation, (2) a side-channel function assessment; (3) a

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juvenile trout winter habitat assessment; and (4) a new fish habitat model using River2D¹ to estimate fish habitat during the winter under ice-cover conditions.

*Yellowstone Cutthroat Trout*Applicant's proposal

The Districts' proposed studies do not specifically mention Yellowstone cutthroat trout.

Comments

BLM recommends that Yellowstone cutthroat trout be included in the data collection efforts for habitat availability, side channel utilization, and juvenile trout distribution. BLM states that Yellowstone cutthroat trout are designated as a BLM sensitive species and an Idaho species of concern for which environmental effects will need to be assessed.

Discussion and Staff Recommendations

With the exception of the brown trout spawning habitat investigation, the District's do not specifically identify which trout species would be targeted in the proposed side channel and winter habitat studies for juvenile trout. Although the District's proposed data collection methods for assessing juvenile trout winter habitat use are based on model-identified suitable winter habitat for juvenile rainbow trout and brown trout, Yellowstone cutthroat trout could be present in these habitat areas. Collecting data on habitat utilization and the distribution of juvenile Yellowstone cutthroat trout would not increase the level of effort for this aspect of the study and would provide additional information to describe the fisheries resources in the project area (section 5.9(b)(4)) and is needed for an analysis of project effects (section 5.9(b)(5)). Therefore, we recommend that all juvenile trout species, including Yellowstone cutthroat trout, that are collected or observed as part of the side channel and juvenile trout winter habitat studies be recorded and reported in the Initial Study Report.

Task 1: Brown Trout Spawning Habitat InvestigationApplicant's proposal

¹ River2D is a two-dimensional depth averaged finite element hydrodynamic model that can predict changes in river hydraulics under ice-cover conditions and has been customized for fish habitat evaluation studies.

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The Districts propose to investigate brown trout spawning habitat in the proposed bypassed reach twice a month from October through mid-December by conducting redd surveys and evaluating site-specific habitat conditions (water depth, water velocity, and substrate embeddedness) at redd locations identified during the surveys as well as in existing model-predicted spawning areas. The Districts also propose to evaluate ice formation at two shallow-water redd locations in the main channel of the Snake River within the project reach that the completed 2-D fish habitat model for the open-water period predicted would be dry at flows of 1,010 cfs. Ice formation would be monitored at both locations from December to March using time-lapse cameras and through monthly physical data collection of ice depth, as well as water depth, water velocity, and water temperature under the ice cover. This information would be used to verify the habitat suitability criteria used in the modeling analysis for brown trout spawning and to assist in determining if survival of trout eggs, alevin, and fry would be affected by ice.

Effects on Brown Trout Spawning and Early Life Stages

Comments

Idaho DFG recommends that the Districts include in the final report an analysis of potential impacts to brown trout eggs, alevin, and fry. Idaho DFG states that reduction in river flows, changes in temperature, and ice thickness can affect these brown trout life stages. Idaho DFG also states that the study does not address effects of lower flows on current brown trout spawning conditions. Therefore, it recommends that the study analyze the project's flows effects on existing spawning habitat.

Discussion and Staff Recommendations

Idaho DFG did not provide any specific recommendations for how the Districts' study should be modified to incorporate its recommended analysis. The Districts' proposal to investigate brown trout spawning habitat during the late fall and winter, develop a prediction of icing conditions under project operation, and use this prediction to develop a 2-D fish habitat model under the predicted icing conditions would provide sufficient information to evaluate the effects of project operation on brown trout early life histories. Therefore, we conclude the Districts' proposed studies would provide sufficient information for staff's analysis of project effects on brown trout eggs, alevin, and fry (section 5.9(b)(5)).

Regarding Idaho DFG's recommendation that the study include an evaluation of the effects of lower flows on brown trout spawning habitat, the Districts already developed a 2-D fish habitat model that evaluated the effect of various flows, including lower flows under project operation, on spawning areas within the bypassed reach during the open water (non-winter) period. The Districts' proposed additional spawning habitat evaluations should be sufficient (section 5.9(b)(4)) to verify the model-predicted

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spawning areas and habitat suitability criteria used in identifying suitable spawning habitat and whether any updates to the modeled results are needed. Therefore, no modifications to the study plan are recommended.

Redd Survey Effort

Comments

BLM recommends that the Districts modify the brown trout spawning habitat investigation to include weekly redd surveys. BLM states that two weeks between surveys may decrease the likelihood of redd detection because algal growth and the accumulation of detritus could reduce the contrast between redds and surrounding substrates. BLM also recommends that the study include a provision to concentrate effort during the peak of spawning activity to increase the likelihood of detecting as many redds as possible.

Discussion and Staff Recommendations

Salmonid redds remain discernable for a period of days to weeks, depending on periphyton accumulation and streamflow scour which can make it difficult to detect redds (Gallagher et al., 2008). Increasing search effort to weekly surveys and concentrating survey efforts during the peak spawning period would likely increase the total number of redds identified. However, quantifying total redd abundance is not an objective of the proposed study. The study is simply meant to ground truth prior modeling efforts. Moreover, water temperatures and streamflows in the Snake River in the fall are nearing their lowest levels of the year; therefore, we do not expect significant algal growth or scouring of redds to occur under normal environmental conditions during this time period. For these reasons, the Districts' proposal to conduct redd searches every 14 days throughout the October to mid-December brown trout spawning period should be sufficient to meet the study objectives (section 5.9(b)(1)).

Substrate Classification

Comment

BLM states that the proposed methods do not specifically identify if substrates would be classified in the areas selected for spawning or only within the perimeter of the redd. Therefore, BLM recommends that the District not only classify substrate within the redd, but also in the spawning habitat patch.

Discussion and Staff Recommendations

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The Districts study plan does not explicitly identify the areas where substrate would be classified. Evaluating substrate within the redd and surrounding habitat patch as recommended by BLM would allow characterization of potential spawning substrates selected by brown trout prior to disturbance from redd construction and would aid in developing an understanding of spawning substrate preferences. It would also enable the Districts to ground truth the model results by providing more information on the actual substrate composition within model-predicted spawning areas (not just within identified redds), which is one of the study objectives (section 5.9(b)(1)). Therefore, we recommend the Districts classify substrate in undisturbed areas (outside of the redd perimeter) adjacent to identified redds.

Evaluation of Ice Formation

Comments

Idaho DFG recommends that the proposed ice formation evaluation not be approved without additional details and consultation with stakeholders. Idaho DFG states the Districts did not provide a description of the purpose or intent of the sampling efforts or how the information would be used in the final analysis.

Discussion and Staff Recommendations

The Districts' flow modeling analysis indicated that a minimum flow of 1,000 cfs in the bypassed reach would dry up important brown trout spawning habitat and wintering habitat. However, the extent of ice formation in these shallow water spawning areas is unknown. The Districts' proposal to install time-lapse cameras at shallow water redd locations to document ice formation as well as to collect field measurements of ice depth, water depth, water velocity, and water temperature would help characterize under-ice winter habitat conditions within these habitat areas, which would be necessary to describe the existing environment for icing conditions in the bypassed reach and inform staff's analysis of project effects on these habitats (section 5.9(b)(4) and (5)). Therefore, no modifications to the study plan are recommended.

Task 2: Side Channel Function Assessment

Applicant's proposal

The Districts propose to assess juvenile trout use and ice formation in the 1,000-meter-long side channel in the bypass reach to determine whether the side channel provides winter habitat under existing flow conditions. The objective of this study component is to observe side-channel ice development and determine the presence or absence of fish as a function of ice stage.

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To evaluate juvenile trout use within this side channel, the Districts would conduct backpack electrofishing to collect fish along three transects in the upstream portion of the side channel during the late fall and early winter, immediately before and after ice cover develops and decays, and when night-time water temperatures fall below 10 degrees Celsius. The Districts state that juvenile trout winter use of the side channel would be assumed to be represented by the number of fish collected during these efforts.

To assess the extent of icing within the side channel, the Districts would: (1) install four time-lapse cameras at two locations within the side channels and two locations in areas of the main channel that are adjacent to the side channels to record pictures of icing conditions throughout the day for one complete winter; (2) record advancement and recession of the ice cover and connectivity of the ice cover to adjacent main channel areas (using the time-lapse cameras specified in item (1)); collect physical ice measurements by drilling holes in the ice at these locations during each month from December to March to record ice depth as well as water depth, water velocity, and water temperature beneath the ice cover.

Sample Locations

Comments

Idaho DFG recommends that the study be modified to include sampling the downstream portion of the side channel. Idaho DFG states that juvenile habitat for rainbow trout and brown trout was identified in the downstream portion of the side channel at modeled flows of 2,180 cfs and 2,800 cfs. Idaho DFG also states that the Districts' proposed methods to evaluate trout use of side channels needs more detail to determine whether the sampling strategy would be effective and if there is an appropriate number of sampling sites. Idaho DFG states that the Districts' study plan does not provide the proposed lengths or widths of sampling sites within the side channel or how the number and locations of sample sites were selected. Further, Idaho DFG recommends that the Districts conduct a statistical power analysis to determine the number of sample sites.

BLM recommends that the study be modified to provide greater spatial dispersion between the three sample sites or to include more than three sample sites in the side channel proposed for sampling.

Discussion and Staff Recommendations

The Districts used their existing fish habitat modeling results to evaluate areas within the side channel that provide suitable winter juvenile trout habitat. The existing model results suggest that suitable habitat exists in both the upstream areas of the side channel where the Districts propose to conduct all of the sampling, as well as in areas of

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the downstream portion of the side channel where the Districts don't propose any sampling. Although the Districts now indicate that the habitat at the downstream end of the side channel is not suitable for winter trout habitat because it does not contain cover typically associated with juvenile winter trout habitat, it's unclear how they arrived at this conclusion.

The side channel to be evaluated is about 1,000 meters long, and flow into the channel would be cut off during the winter when the proposed project is operating; therefore, insufficient sampling could result in an under-representation of the fish use of this habitat. The Districts do not explain the basis for their proposed side-channel sampling size; thus, it's difficult to conclude that the level of effort they propose is adequate. Therefore, we agree with Idaho DFG that more sampling is needed to determine its relative importance in providing juvenile trout winter habitat. We recommend that the proposed side-channel juvenile trout sampling be expanded to include all areas within the side channel depicted on Figure 3 of the RSP (page 19) that the model predicted would provide suitable juvenile trout winter habitat between flows of 2,180 and 2,800 cfs.

Expanding the side-channel sampling could double the effort for this portion of the Districts' proposed study. Although the Districts do not provide a cost estimate for the proposed side-channel sampling, we estimate the cost to sample the entire area would be \$20,000 (section 5.9(b)(7)). Although the Districts propose to use backpack electrofishing techniques for sampling the side channel, we would have no objection to the Districts using other more efficient methods for sampling a larger area (e.g., boat electrofishing, snorkeling) if they are preferred.

Regardless of the methods used, the results should be reported as a density of fish per unit area of habitat or catch per unit effort. For trout species, the sampling results should also identify, to the extent possible, the species (i.e., brown, rainbow, cutthroat), life stage, and size of any fish sampled. To gain an understanding of fish distribution within the side channel, the study results should also include a map that identifies the locations of all areas sampled and a general description of areas where fish were observed. This information is needed for staff's analysis of the relative importance of the side channel in providing over-wintering juvenile trout habitat and whether license requirements to protect such habitat would be needed (section 5.9(b)(5)).

Evaluation of Ice Formation

Comments

Similar to its concerns for evaluating ice formation associated with brown trout redds, Idaho DFG recommends that the Districts provide more justification and detail in

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the final study plan for evaluating ice formation, including a definition of “ice stage” and how it relates to the presence or absence of fish habitat.

Discussion and Staff Recommendations

As discussed above, the objective of this study task is to determine the extent to which ice formation affects side channel habitats under existing flow conditions and the extent to which the side channel habitats are used by juvenile trout for overwintering habitat. Because the Districts do not propose to sample fish use of the habitats under the ice cover (presumably because of difficulties in fish sampling under an ice cover), they would need to assume that the sampling results for the period immediately before and after the ice cover forms represent fish use of these habitats under the ice cover. Although the Districts don't explicitly define what is meant by the term “ice stage” as pointed out by Idaho DFG, elsewhere in the study they indicate that they intend to characterize icing conditions in the side channels by collecting data on ice depth and the extent of ice formation, which we assume is what they mean by this terminology. Given our understanding of the proposed study methods (i.e., evaluate icing conditions at select locations in side channels and collecting fish use data during the winter to assess the relative importance and availability of these habitats under existing icing conditions), the study description in the RSP is sufficient to explain the study objectives and methods and the information to be obtained by the study (section 5.9(b)(1)). Therefore, we do not recommend requiring the Districts to provide more information about the study objectives at this time.

Task 3: Juvenile Trout Winter Habitat Assessment

Applicant's proposal

The Districts propose to determine the number of juvenile trout wintering in the stream margins and riffles in the proposed bypassed reach to determine the effect of reduced flows on these winter habitats. A total of 19,400 meters of juvenile trout habitat was identified in the main channel of the bypassed reach during the Districts' earlier modeling efforts. Using protocols described by Hillman and Platts (1993) to estimate an appropriate number of sample sites, the Districts propose to sample a total of 12, 100-meter-long sampling sites within the main channel of the bypassed reach. Juvenile trout sampling would be conducted by backpack electrofishing in the portion of the sites with depths less than 2 feet and snorkeling the portion of the sites with depths greater than 2 feet. The data collected would be used to develop a population estimate for juvenile trout overwintering in the bypassed reach using the population estimate calculations described in Meyer et. al. (2006). The results of the juvenile trout collection or observations would also be used to verify or update the habitat suitability criteria for juvenile trout winter habitat used in the fish habitat models.

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*Sample Methods*Comments

Idaho DFG states that it is concerned about using the methods described by Hillman and Platts (1993) to estimate the probability of detecting juvenile trout in the project reach since the method was developed for sampling bull trout in small streams using bank to bank snorkeling and electrofishing techniques. Idaho DFG states that the proposed methods were not mentioned in prior versions of the study plan, and the methods were designed for presence/absence surveys and not developing population estimates. Idaho DFG also states that it does not believe the information collected from these efforts can produce an accurate population estimate for juvenile trout and assess how the proposed winter flow operation will affect the juvenile trout population. Idaho DFG states that, at best, the information will describe potential use of juvenile trout in select habitat types. Idaho DFG recommends that a literature review be conducted to help the applicants to identify additional techniques for assessing the effects on fish populations resulting from the project-reduced flows, and then developing appropriate survey techniques.

Discussion and Staff Recommendations

A winter population estimate for juvenile trout in main channel habitats in the bypassed reach is not needed for staff's analysis because sufficient information exists (section 5.9(b)(4)) to describe the overall trout population in the project reach (High et. al., 2015). We recommend that the Districts complete the winter juvenile trout sampling as proposed and use the results to describe the relative abundance (i.e., fish density per meter of stream sampled) and distribution of juvenile trout within model-predicted winter habitat areas and update or verify the winter juvenile trout habitat suitability criteria (HSC).

In regard to Idaho DFG's recommended literature review to identify additional techniques for assessing the effects of stream flows on fish populations, we see no reason to require the Districts to complete such an assessment. The Districts' proposed studies will provide sufficient information (section 5.9(b)(4)) to evaluate the relationship between streamflows and fish habitat under existing conditions and during the proposed project's operation.

*Fish Marking*Comments

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Idaho DFG recommends that the Districts mark fish using methods such as fin clips to help differentiate fish captured during electrofishing and observed during snorkeling surveys.

Discussion and Staff Recommendations

Marking fish as recommended by Idaho DFG could help to reduce double-counting of fish collected via electrofishing and then observed by snorkeling in deeper water areas. This would be especially important if the data were being used to develop a population estimate. However, we are not recommending the data be used for such a purpose. Instead, we are recommending that the data be used to describe the relative abundance and distribution of juvenile trout within main channel habitats in the project area. The Districts' proposed methods would be sufficient for this purpose (section 5.9(b)(4)). Therefore, no modification to the study plan is recommended.

Effects of Ice Breakup

Comments

David and Christine Crandall indicate that the reduced flows resulting from project operation would increase the extent and thickness of ice formed and could also result in the loss of backwaters that are often used by fish for refuge during ice breakup events. Therefore, they recommend that the study be modified to evaluate the effects of ice breakup on fish mortality.

Discussion and Staff Recommendations

David and Christine Crandall did not provide any specific recommended methods or level of effort and cost for how the requested analysis could be completed (section 5.9(b)(7)), and we are not aware of any accepted scientific methods or predictive models (section 5.9(b)(6)) that could accurately assess the effects of ice breakup events on fish mortality. Therefore, we do not recommend any modifications to the study plan for this purpose.

Task 4: Update Habitat Estimates

Applicant's Proposal

The Districts completed a 2-D fish habitat model for the open-water (i.e., non-ice cover) period using habitat suitability preference curves for depth, velocity, and substrate for the different life stages of rainbow and brown trout. Although the existing model was also run using preference curves for the winter, the Districts no longer propose to use these existing model results for evaluating the relationship between fish habitat and flows

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during the winter. This is because the hydraulic models used in the existing analysis were designed for open-water conditions and do not account for the presence of an ice cover or other types of ice formation (i.e., anchor ice) along the stream channel. Instead, the Districts propose to use the prediction of ice cover conditions under project operation (to be developed as part of the Icing Impacts Study) to develop a 2-D fish habitat model under ice-cover conditions using the River2D model, which was designed to account for stream channel icing. As part of this winter fish habitat modeling effort, the Districts propose to update or verify the existing habitat suitability preference curves for depth, velocity, and substrate for brown trout spawning and juvenile trout habitat during the winter by obtaining site-specific values for these variables during redd surveys and juvenile trout winter studies.

Marginal Habitat

Comments

Idaho DFG states that additional detail is needed on the study results that would be included in the final report. For example, Idaho DFG states that the applicants should explain if model-identified areas of “marginal habitat” will be recalculated for all fish species, and that the study report should provide additional information on how the data will be used and what information is newly acquired (versus already collected by the Districts in prior years).

Discussion and Staff Recommendations

It is our understanding from the RSP that the Districts propose to update all existing model results for any species and life stages that require updates to the HSC based on site-specific observations. This would include areas identified by the model as providing “marginal habitat” as this was a model output of the existing fish habitat model and thus would be obsolete if the HSC data are updated. The level of detail in the RSP is sufficient to describe the goals and objectives of the study, and the information to be obtained and included in the study reports (section 5.9(b)(1)). Idaho DFG will have the opportunity to review and provide comments on the preliminary study results contained in the Initial Study Report as well as any subsequent updates provided in the Updated Study Report. In addition, the Districts propose to provide drafts of the completed study reports for stakeholder review and comment prior to filing final reports with the Commission. Therefore, there should be ample opportunity for Idaho DFG to review the study results and provide comments on the adequacy of the study reports. Therefore, no modification to the study plan is recommended for this purpose.

Winter Habitat Estimates

Comments

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Bear Island Water Association, Inc. (Bear Island) recommends that the study be modified to include modeling of suitable habitat areas for all species and life stages subject to winter ice-cover conditions at flows from 1,010 cfs through at least 2,800 cfs, except for rainbow trout spawning habitat.

Discussion and Staff Recommendations

The proposed project could alter flows and affect river ice conditions during winter. These changes in ice conditions could reduce the amount of available habitat during the winter for trout in the bypassed reach. As noted above, the Districts are proposing to evaluate brown trout spawning and juvenile rainbow and brown trout winter habitat under ice-cover conditions using the River2D model. However, they do not propose to develop new winter habitat estimates for either brown or rainbow trout adult habitat under ice-cover conditions using River2D. Because there is no existing information (section 5.9(b)(4)) in the project record to describe adult rainbow and brown trout habitat under ice-cover conditions, we agree with Bear Island that adult winter habitat for these two species should be incorporated into the River2D ice-cover model. This information is necessary to assess project effects. Therefore, we recommend the study be modified to incorporate an analysis of adult brown trout and rainbow trout habitat into the River2D model under ice-cover conditions.

Use of Minimum Velocity Estimates

Comments

Idaho DFG recommends that the Districts update their 2-D fish habitat model to use minimum water column velocities rather than average water column velocities. Idaho DFG states using average water column velocities would unrealistically reduce the calculation of suitable habitat.

Discussion and Staff Recommendations

The use of mean water column velocity as a parameter in the development of habitat suitability criteria for instream flow studies is an accepted practice (section 5.9(b)(6)) for incorporating velocity preferences for fish into instream flow models (Raleigh et al., 1986; Nestler et al., 1988; Allen, 2004; Wollabaek et al., 2008; R2 Resource Consultants, 2009), and we are not aware of any instances where minimum water column velocity, instead of average velocity, was used for such a purpose within the context of a hydroelectric licensing flow study (section 5.9(b)(6)). Idaho DFG did not explain why it is unrealistic to use mean water column velocities or provide an explanation for how minimum water column velocities could reasonably be applied to the hydraulic or fish habitat models. Because the hydraulic models used in the fish habitat

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modeling analysis are depth averaged within a given cell, and the available habitat suitability criteria are developed using mean water column velocity, it is unclear how minimum velocities could reasonably be incorporated into the analysis or why this methodology would be preferred over the scientifically accepted approach proposed by the Districts. In addition, we are not aware of any existing velocity preference curves that were developed using the minimum velocity approach recommended by Idaho DFG. For these reasons, we do not recommend Idaho DFG's requested modification to the study plan.

Habitat Suitability Criteria

Comments

Idaho DFG states that the Districts' 2-D fish habitat model results for the open-water period repeatedly shows that a decreased winter flow will provide more trout habitat than current conditions. Idaho DFG states that this result be viewed with caution because the assessment of winter habitat was based solely on three variables, (i.e., average water column velocity, water depth, and substrate). Idaho DFG contends that the final report for the fish habitat model states that other authors (e.g., Calkins, 1989) identified ice thickness, flow velocity, depth, and temperature as common winter habitat criteria measured by researchers, while Cunjak and Power (1986) concluded that low water velocities and abundant cover were key habitat characteristics for over-wintering brown trout. Idaho DFG states that, because the habitat modeling results did not address or include those variables (i.e., ice thickness, temperature, and cover), the proposed study and its results should only be relied on after fully addressing that limit.

Idaho DFG further states that it is concerned that the Districts have not verified the fish habitat model, and therefore, it is unknown whether the model can accurately predict juvenile rainbow and brown trout habitat. Idaho DFG recommends that the Districts revise the study plan to include verifying the model before it is used to assess project effects.

Discussion and Staff Recommendations

As noted above, the Districts are no longer proposing to use the existing 2-D fish habitat model results for the open-water period to assess project effects on trout habitat during the winter. Instead, they propose to develop a new fish habitat model using River2D that can predict changes in fish habitat as a function of streamflow with an ice cover. The proposed model would be able to account for ice thickness, flow velocity, and depth in its calculation of fish habitat as recommended by Idaho DFG. However, to our knowledge, there is no way to incorporate water temperatures into the River 2D winter fish habitat model and Idaho DFG does not provide any specific information on how this could be accomplished. Instead, we expect the Districts' water temperature data

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collected as part of the Water Quality Study (Study 4) during the winter to be used to document existing conditions for water temperatures and these data could be used in staff's analysis of project effects on winter trout habitat (section 5.9(b)(5)).

In regard to cover, the Districts' study report for the completed 2-D fish habitat model results suggests that cover may be an important factor for overwintering juvenile trout habitat selection; however, the study report also indicates that the availability of cover is limited in the project reach and thus was not an important factor in determining habitat suitability for trout during the open-water period. To determine whether juvenile trout in the project reach are associated with cover during the winter (even if available cover is limited), additional information on juvenile fish abundance and proximity to cover within the project area would be needed. This information could be used to determine whether there is a need to develop preference curves for cover and incorporate them into the winter fish habitat modeling analysis. The initial analysis of any potential fish-habitat associations for cover during the winter period could be done at a relatively low-cost (section 5.9(b)(7)) because the Districts are already proposing an extensive sampling effort for collecting juvenile trout distribution and abundance data throughout the project reach in the winter for side channel habitats as well as in other model-predicted areas that provide juvenile trout habitat.

We recommend that the Districts include in the Initial Study Report, a detailed comparison of juvenile fish abundance measures (e.g., number of individuals by species and age class) and the distance to cover to determine whether a relationship between fish abundance and cover is evident. If the results from this initial comparison indicate strong relationships may exist between cover and fish abundance for juvenile trout, cover may need to be incorporated into the River2D modeling analysis for juvenile trout overwintering habitat suitability. Accordingly, we recommend the Districts include in the evaluation to be filed with the Initial Study Report, any proposals to develop habitat suitability preference curves for cover and incorporate them into the River2D winter fish habitat modeling analysis.

Regarding model verification, Idaho DFG did not provide any specific information or methods for how the Districts should verify the model results for juvenile trout habitat. Because Idaho DFG did not specify how this would be accomplished, we assume they are recommending that the Districts verify the habitat suitability criteria used in the model. As noted above, the Districts are already proposing to update or verify the habitat suitability curves based on the site-specific observations of juvenile trout during the proposed juvenile trout sampling (section 5.9(b)(4)). We therefore see no reason to modify the study plan to include additional requirements for instream flow model verification.

Study 2: Entrainment Study

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Applicant's Proposal

The Districts' conducted field studies to evaluate canal entrainment under existing conditions during June through October 2013, and in May 2014 using netting techniques, and by collecting fish in residual pools in the canals after the canals were dewatered. The Districts propose to supplement this data with a literature review and desktop study to estimate canal entrainment under existing conditions and to predict the effects of the project on canal entrainment and turbine mortality due to project operation.

The Districts' proposed study would consist of the following: (1) infer expected population density in the reach upstream of the project diversion (upstream reach) using existing fish population data for other reaches of the Snake River; (2) assess the probability of a fish moving downstream during each month by evaluating salmonid telemetry data from the South Fork Snake River and determining the percentage of fish that make net downstream movements during each month; (3) for fish that make net downstream movements, determine the distribution frequency as a function of total downstream distance moved; (4) apply probable downstream movement behavior to the estimated population of the upstream reach; (5) estimate total fish entrainment into the canals based on the percentage of the total water diverted versus the percentage that goes over the diversion for each month under current diversion levels and proposed diversion levels under project operation; (6) of the estimated total for fish entrained into the canals, estimate how many enter the powerhouse turbines and return back into the Snake River based on the percentage of water that continues down the canals versus the percentage that passes back through the powerhouses; (7) apply a mortality factor, based on literature values of turbine mortality, for fish passing through the powerhouses; and (8) assess the difference in numbers of fish recruited to the project reach under existing conditions and proposed operation (i.e., calculate fish losses due to entrainment under project operation).

Comments

Idaho DFG states that the data the applicants propose to use will not accurately predict entrainment impacts because no fish population or fish movement data exists for the Snake River immediately upstream of the project reach (upstream reach), and the study should not rely on data for fish populations located elsewhere in the Snake River. Idaho DFG states that the entrainment study plan does not analyze the potential statistical errors associated with the methods or how to deal with the statistical error in the final analysis. Idaho DFG states it is likely these errors will exist and affect the study's usefulness in predicting impacts. Therefore, Idaho DFG recommends a more thorough and statistically valid entrainment field study in the canal systems. Specifically, Idaho DFG recommends a field study with more frequent sampling in different areas of the water column than the Districts' prior field study, as well as applying a statistically valid sampling strategy.

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Discussion and Staff Recommendations

Idaho DFG did not specify any sampling methods or number of field seasons for its recommended study in its comments on the RSP, but in its study requests and comments submitted on earlier versions of the Districts' study plan suggested that a statistically valid study would require multiple years of study and cost about \$1,000,000. A multi-year field study of canal entrainment would likely provide a more precise estimate of canal entrainment under existing canal operations than the estimates derived from the District's prior field study and its proposed desktop study. However, the results would not provide an estimate of fish entrainment under project operation because the Districts do not currently have the water rights or sufficient canal capacity to divert additional flows into the canals during the irrigation season or during the winter. Therefore, even if the Districts completed a multi-year entrainment field study and obtained a precise estimate of canal entrainment under existing conditions, the entrainment estimates would still require extrapolation to estimate the extent to which entrainment would change with the addition of higher flow diversions during the irrigation season and during the winter due to project operation.

The Districts' proposed desktop study would estimate fish entrainment under existing conditions, and provide a reasonable estimate of the likely entrainment and mortality rates for fish under proposed operation. We estimate the cost of the desktop study to be about \$25,000. Although there are no fisheries data available for the upstream reach, it's reasonable to use existing data from nearby in the Snake River for the desktop study because these data were obtained from reaches near the project² that contain similar riverine habitat and support the same trout species. Using existing data to perform a desktop analysis of entrainment is consistent with generally accepted practices and is similar to a number of entrainment studies performed in support of other hydroelectric licensing proceedings (section 5.9(b)(6)). The results of the proposed desktop study coupled with the Districts' prior field study of canal entrainment would provide the necessary information to conduct staff's analysis of fish entrainment at the project (section 5.9(b) (5)), at a lower cost than the study recommended by Idaho DFG (section 5.9(b)(7)). Therefore, we do not recommend any modifications to the study plan.

Study 3: Icing Impacts Study

² Data used in this study would come from the Osgood reach of the Snake River, the Menan reach of the Snake River, and the South Fork Snake River. The Osgood reach begins at the diversion dam and extends downstream to include all of the bypassed reach. The upstream reach where the diversions are located is adjacent to the Osgood reach. Approximate distances from the upstream reach to the Menan reach and South Fork Snake River, are 18 miles and 25 miles, respectively.

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Project operation would reduce flows in the 3.5-mile-long bypassed reach from an average of about 2,700 cfs under existing conditions to 1,000 cfs during the winter ice-cover period, which could affect ice formation in the bypassed reach. The Districts propose to conduct an Icing Impacts Study to determine the anticipated effects of reduced river flow on the type, amount, and duration of ice formation in the project's bypassed reach. The study results would also be used in combination with other studies (e.g., Study 1, Special Aquatic Habitats and Study 6, Waterfowl) to support an assessment of altered ice conditions on fishery resources and wintering waterfowl in the bypassed reach.

Sequence of Study Components

Applicant's Proposal

The Districts' proposed study would include the following components to be completed in the following sequence: compile historic weather data, photographs and/or other relevant records and develop a probabilistic model (i.e., statistical assessment) of the time and duration of ice conditions in the project reach; compile and review scientific literature describing conditions that promote formation of the various forms of ice found historically in the project reach; 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; use the information collected above as a basis for developing an "expert opinion" prediction of future ice conditions during project operation; input the predicted future ice conditions into the River2D model to estimate river hydraulics under project operation; and prepare a report and provide results for use in other studies (e.g., Special Aquatic Habitat Study, Waterfowl Study).

Comments

Bear Island and David and Christine Crandall state that fish habitat and waterfowl and raptor studies cannot be completed without understanding winter physical properties, including icing conditions under proposed project operation. Bear Island and David and Christine Crandall state that they're not convinced the Districts proposed Icing Impacts Study or any other icing study will produce credible results for input into other studies. Therefore, Bear Island and David and Christine Crandall recommend the RSP be revised to first require the completion of the Icing Impacts Study before conducting the other studies.

Discussion and Staff Recommendation

Under the Districts' proposed study approach, the Districts' Icing Impacts Study would first produce an "expert opinion" prediction of physical changes in icing

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conditions due to the project, and then use that prediction to evaluate project effects on the other environmental resources of the project area during the winter. For those portions of the other studies that rely on the Icing Impacts Study results (e.g., two-dimensional (2-D) fish habitat modeling analysis as part of the Special Aquatics Habitat Study), the Districts' schedule already proposes to delay implementing those portions of the studies until the Icing Impacts Study is complete. This proposed study sequence and approach is consistent with similar studies completed within the context of hydroelectric licensing (section 5.9(b)(6)) and we see no reason to require delaying the Districts' proposed implementation of all other aspects of its study plan until the Icing Impacts Study is complete. All stakeholders will be given the opportunity to review the icing study results when they are filed in the Initial and Updated Study Reports. If the Icing Impacts Study results are inadequate or the study was not completed as required by the study plan determination, the Commission can require the Districts to redo or refine the study, including any other studies that may have relied upon the icing study results. Therefore, we do not recommend any modifications to the study plan.

Icing Event Categories

Applicant's Proposal

As part of their model of the time and duration of ice conditions in the project reach, the Districts propose to cross-correlate ice predictions with flow probabilities to determine the likelihood of events such as "severe ice-low flow" and "mild ice-low flow".

Comments

Idaho DEQ states that ice predictions require more than these proposed event categories. Idaho DEQ states that this element of the study requires more specificity and the Districts should better define the events studied, such as canal-blocking ice conditions and predictions of solid river freezing.

Discussion and Staff Recommendations

At this time, it is unclear whether the entirety of the bypassed reach or the irrigation canals will freeze solid during project operation. However, as discussed below in our analysis and recommendations for the *Ice Sampling Plan and Expert Opinion on Predicted Ice Conditions During Project Operation*, the Districts' proposed study will evaluate whether either scenario is likely to occur through the development of an expert opinion prediction of icing conditions under the worst-case scenario for maximum ice formation under project operation. Because the potential for these events to occur under project operation would be addressed by the Districts' study plan (section 5.9(b)(4)), we do not recommend any modifications to the study.

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Icing Effects on Flow Monitoring

Applicant's Proposal

The Districts do not propose to study the effects of icing on potential flow monitoring equipment to be used for compliance monitoring of minimum flows during project operation in the winter.

Comments

David and Christine Crandall recommend studying the impacts of icing on equipment to be used for monitoring stage-discharge measurements during project operation.

Discussion and Staff Recommendation

The Corps (2006) describes techniques for measuring stage and discharge under icing conditions. These include: pressure transducers or radar measurements (provided a small area surrounding the measurement site can be kept free of ice); or a modified yoke Price-type winter meter for measurement of discharge through an ice cover. Therefore, the procedures for measuring stage and discharge in a channel under icing conditions are guided by regularly accepted engineering practices, and do not require further study to inform staff's analysis or develop license requirements (section 5.9(b)(5)).

Use of Hydrodynamic Modeling to Predict Changes in Icing Conditions

Applicant's Proposal

The Districts do not propose to develop a hydrodynamic model such as CE-QUAL-W2, to predict changes in icing conditions in the bypassed reach due to project operation. The Districts state that there would be too much uncertainty in the model results if icing parameters were incorporated into hydrodynamic modeling. They also state that to include icing parameters in a hydrodynamic model would require additional programming including the writing of new model code to adapt available hydrodynamic modeling programs to include icing parameters.

Comments

Bear Island and David and Christine Crandall, recommend using a hydrodynamic model such as CE-QUAL-W2 to predict changes in icing conditions in the bypassed reach due to project operation. David and Christine Crandall and Idaho DEQ state that a

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hydrodynamic model would be required for the Districts to support their stated goal of predicting impacts to key aquatic habitats under ice cover conditions.

Discussion and Staff Recommendation

CE-QUAL-W2 is a longitudinal and vertical hydrodynamic and water quality modeling program that has historically been applied mainly to the study of large reservoirs and lakes (Cole and Wells, 2015). While the CE-QUAL-W2 model could theoretically be modified to fit the physical habitat conditions in the proposed bypassed reach, we are not aware of any instances where it or any other hydrodynamic model has been used to predict changes in ice formation over a 3.5-mile river reach with a complex riverine channel such as the Snake River in the project area (section 5.9(b)(6)). In addition, because the recommended modeling approach would be experimental in nature, it's likely that multiple years of physical data collection would be necessary to develop the model, which would require additional effort and increase the cost of the study (section 5.9(b)(7)).

The Districts' proposal to compile and review available information and literature and collect physical observations of icing conditions to predict project effects is a reasonable approach that should provide the information necessary to describe the existing environment and inform staff's analysis (section 5.9(b)(4) and (5)). Therefore, no modifications to the study plan are recommended.

Anchor and Frazil Ice Formation

Applicant's Proposal

The Districts propose to evaluate the relationship between ice formation and water flow, and determine conditions promoting frazil ice, anchor ice, solid (surface to riverbed) ice, and surface ice formation. This information would be used to develop a prediction of project effects on these different types of ice formation in the bypassed reach.

Comments

Bear Island states that the Districts' proposed study does not address anchor or frazil ice accumulation as a function of flow and recommends examining the likelihood of anchor and frazil ice formation due to project operation.

Discussion and Staff Recommendations

As noted above, the Districts do propose to evaluate and develop a prediction of changes in anchor and frazil ice formation as a function of reduced bypassed reach flows

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during project operation. Therefore, the District's proposed study would address these types of ice formation (section 5.9(b)(4)). No modifications to the study plan are necessary.

*Collection of Historic Weather Data*Applicant's Proposal

The Districts' study proposes to compile historic weather data (i.e., air temperature, dew point, wind speed, etc.) for a period of time that it refers to as "suitable." This information would be compared to other literature or available information (e.g., aerial photos collected in 2014, 2015, and 2016) to develop an understanding of the conditions that promote ice formation and decay in the bypassed reach.

Comments

Idaho DEQ recommends that the Districts define what is meant by the term "suitable time," and states that is unclear whether this data will be collected on site or gathered from nearby weather stations. If the data is collected on site, Idaho DEQ suggests three years of data collection in order to capture some of the variability of meteorological data. If the data is gathered from existing historic sources, Idaho DEQ states the Districts should use all available data for the entire period of record available at each meteorological station used in the study.

Discussion and Staff Recommendations

Because the Districts use the term "historic" when referring to compiling meteorological data, we interpret this to mean that they will not be collecting meteorological data on site. Instead, it appears they will be compiling the data and comparing the known meteorological conditions to other available information on ice formation (e.g., aerial photos) for at least the same period of record to determine the conditions promoting the various types of ice formation and decay in the bypassed reach.

Although the Districts do not specify the time period for which they will compile the historic meteorological data to be used in the analysis, we expect it to include a minimum of three years to enable a comparison of meteorological data to known ice formation during the 3-year period for which they will have aerial photographs (i.e., 2014, 2015, 2016) documenting ice formation. In addition, we expect the Districts to use meteorological data from other years outside of this 3-year period if the results of the proposed literature review suggest that other information exists to describe ice formation during prior years. However, it would be premature to require the Districts to compile historic weather data for the entire period of record that may be available for any

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meteorological station used in the study until it completes its literature review and compiles historic documentation of known icing conditions. The period of record for any meteorological station could go back many years or many decades and we see no reason to utilize data for the entire period of record if there is no other information available to correlate known icing conditions to the meteorological data (section 5.9(b)(4)).

However, to provide a better understanding of what historical meteorological data are available for the project area, we recommend the Districts include in the Initial Study Report: (1) specific information on the names and locations of any meteorological stations used in the study, (2) a description of the period of record available for each station, and (3) a description and the basis of the period of record used by the Districts for each station evaluated in the study.

Ice Sampling Plan and Expert Opinion on Predicted Ice Conditions During Project Operation

Applicant's Proposal

The Districts propose to develop an expert opinion of predicted ice cover conditions during project operation based on the compilation and review of historic photos, historic weather data, scientific literature, and field measurements of ice thickness and hydraulic conditions collected in the study area during the winter of 2016-2017. They propose to develop their sampling protocol by developing an Ice Sampling Plan in consultation with the Fishery TWG. The sampling plan would be provided to the TWG for review and comment, prior to filing the final plan with the Commission for approval prior to implementation.

Comments

Idaho DEQ states that the Districts' proposal for how it would develop its prediction of future ice conditions during project operation lacks specificity and provides Idaho DEQ no assurance the Districts will implement a technically or scientifically valid study. Idaho DEQ, Idaho DFG, and Bear Island state that the study plan does not define what is meant by the term "expert opinion" of predicted ice cover conditions, and the agencies and Bear Island recommend requiring further definition of this term.

Discussion and Staff Recommendations

The Districts do not provide much specificity on the sampling methods, frequency, or locations of the proposed ice thickness or hydraulic measurements or the type of information they will include in the expert opinion in their RSP, other than indicating that it would consist of a worst-case scenario for the potential peak ice conditions during project operation. The prediction of worst-case scenario icing conditions is an important element of the overall study approach as it is an assumption that would be input into the

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River2D model and would ultimately affect the winter fish habitat analysis, which we envision would be one of the primary decision making tools for evaluating winter minimum-flow alternatives. Because of the overall importance of this study element in assessing project effects, additional information is needed to ensure the Districts' proposal results in the development of a reliable model that is consistent with accepted practices (section 5.9(b)(6)). According to Waddle (2007), the River2D model input for ice cover requires a maximum ice thickness and roughness of the ice cover across the entire study area. Therefore, we recommend that, at a minimum, the Districts' proposed expert opinion provide values for these inputs under a predicted worst-case, maximum ice-formation flow scenario under project operation. To accomplish this, we recommend that the Districts' proposed Ice Sampling Plan include the following:

- (1) a description of the specific methods, sampling locations and frequency, and schedule for collecting ice thickness and hydraulic measurements during the winter of 2016-2017;
- (2) a specific description of the process that will be used to collaborate with the Fishery TWG to develop the expert opinion of predicted ice cover conditions that will be used as a model input for the River2D hydraulic and winter fish habitat model; and
- (3) a specific schedule for implementing the process described in item (2), including the approximate dates of any proposed meetings to collaborate with stakeholders on developing the expert opinion of predicted ice cover conditions, and an approximate date for when the expert opinion would be finalized and reported to all stakeholders and the Commission.

However, we do not see the need for Commission approval of the Ice Sampling Plan prior to implementation. The Districts' proposal to consult with the TWG while developing the plan should be sufficient to ensure stakeholder concerns are addressed. Instead, we recommend that the Districts file the plan with the Commission by August 31, 2016, for informational purposes only, and include with the plan documentation of consultation with the Fishery TWG, including how the TWG's comments were addressed by the plan. Staff will evaluate the Ice Sampling Plan, comments thereon, and the preliminary study results when they are filed as part of the Initial Study Report.

Third-Party Peer Review of Expert Opinion

Applicant's Proposal

The Districts do not propose to have a third-party conduct a peer review of the expert opinion of predicted ice cover conditions during project operation.

Comments

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Idaho DFG and Bear Island recommend requiring a third-party to conduct a peer review of the expert opinion once it is finalized.

Discussion and Staff Recommendations

There is no need to have a third-party conduct a peer review of the expert opinion of predicted ice cover conditions that would be used in the River2D model. The Districts' proposed modeling approach is consistent with accepted practices (section 5.9(b)(6)). Stakeholders and Commission staff will have the opportunity to review the River2D model, including model inputs such as the predicted ice cover that will be used in the hydraulic model and fish habitat analysis, and decide if they were completed as required by the study plan determination and provide the information necessary to inform a decision on issuing a license for the project. Therefore, no modification to the study plan to address this recommendation is recommended.

Icing Safety Assessment

Comments

Snake River Cutthroats is concerned that project operation may increase the formation of ice jams and frazil ice in the canals, which could result in canal or gate failures and flooding of adjoining properties. Snake River Cutthroats is also concerned that surface ice may represent a drowning hazard for the public, pets, livestock, and wildlife attempting to cross the canals. Snake River Cutthroats recommends a comprehensive assessment of safety risks to persons and animals from project operation during the winter.

The Districts do not propose to study the project's potential to create a public or wildlife safety hazard through ice-related effects, including canal or gate failure. 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, thus, no project-specific study is needed to address this question.

Discussion and Staff Recommendations

Snake River Cutthroats does not explain how such an assessment would be conducted. Regardless, section 5.18(a)(5)(iii) of the Commission's regulations³ require the Districts to file a supporting design report with their license application that demonstrates that all existing and proposed structures are safe and adequate to fulfill their stated functions. In addition, Commission licenses typically include requirements for

³ See section 4.51(g) and 4.41(g).

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licensees to prepare a public safety plan prior to starting construction that includes evaluating public safety concerns at the project and assessing the need for installing safety devices or other safety measures.

As for wildlife hazards, the Districts' proposal to record wildlife observations and signs of wildlife during the Terrestrial Habitat Inventory (Study 5) and Waterfowl Study (Study 6) would provide information on wildlife that might be attempting to cross the canals during winter. Any further study of wildlife responses to watered canals and icing during winter would not be possible because the Districts do not have the rights to divert water into the canals during the winter. Therefore, the Districts approach would be sufficient to inform staff's analysis of project effects on wildlife (section 5.9(b)(4) and (5)), including the potential for additional mortality in the winter due to crossing ice-covered canals. Staff does not recommend any additional assessment be conducted.

Study 4: Water Quality

Water Quality Modeling

Applicant's Proposal

The Districts propose to collect one year of continuous water temperature data at seven total locations in the Snake River, Great Western Canal, and Idaho Canal. These data would be used to calculate potential changes in water temperatures under project operation based on changes in travel time, surface area, and flow volume. The Districts propose to conduct the water temperature analysis using engineering calculations or a simple water quality model such as Stream Segment Temperature (SSTEMP).

Comments

Idaho DEQ states that the proposed water temperature modeling analysis is not adequate for analyzing water temperature under alternative water quantity scenarios because the factors included in the proposed study plan do not consider all processes and parameters that can affect water temperature. Idaho DEQ states that heat exchange processes can affect stream temperature, including: solar shortwave, longwave radiation, air convection/conduction, evaporation, sediment conduction, and hyporheic storage. Idaho DEQ contends that all of these processes, except for solar shortwave, will affect stream temperature when volume and streamflow are altered. Idaho DEQ states that the proposed project has the potential to affect stream temperature by altering the stream width and depth and other channel parameters such as roughness. Idaho DEQ concludes that the Districts must use a different model that can simulate changes in these channel parameters under different minimum flow scenarios.

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Idaho DEQ also contends that SSTEMP is inadequate because it does not predict the timing of varying streamflow and only handles a single time period, such as one month, week, or day; therefore, it is best used for simple case studies, as a screening tool, or for initial sensitivity analyses. Idaho DEQ states that a hydrodynamic model that can be calibrated to existing conditions can identify error statistics in its predictions, resulting in model calibration which improves predictive power. Idaho DEQ suggests examining how River2D can be modified rather than using the inappropriate SSTEMP model.

Discussion and Staff Recommendations

The PAD summarized existing water quality data for the Snake River and the canals based on monitoring conducted in 2014. These data indicate that water temperatures in the Snake River in the project area peaked during the month of August at about 65 degrees Fahrenheit (F), and appeared to show a similar warming trend of about 0.3 degrees F between monitoring locations at the upstream and downstream ends of both canals and the bypassed reach during the summer when temperatures are highest. Because the rates of warming between the canals and the river are similar over the 3.5-mile length of the bypassed reach, these data suggest that the effects of diverting more flow into the canals would have only a minor effect on Snake River water temperatures during the summer, and thus it's reasonable to use a simple water quality model for the water temperature analysis. In addition, the project would not store and release flows, and the project affected reach is relatively short (3.5 river miles). Therefore, we expect water to travel fairly quickly through the project reach and the canals, and thus there would be limited opportunity for the factors described by Idaho DEQ to substantially affect water temperatures to the extent that they need to be specifically incorporated into a water temperature model. Further, because the project would operate in a run-of-river mode, flow fluctuations under project operation would not likely occur on a more frequent interval than a daily time step, which is a time step that can be accommodated by the SSTEMP model (Bartholow, 2010). For these reasons, a water quality model such as SSTEMP should be sufficient for staff's analysis of project effects on water temperatures (section 5.9(b)(5)), and we do not recommend requiring the Districts to use a different model.

Water Temperatures in Canals

Applicant's Proposal

Four of the Districts' water quality sampling stations would be located within the canal system. The sampling sites include one location at the upstream end of each canal near the existing headgates and one location at the downstream end of each canal near the proposed powerhouse locations.

Comment

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BLM recommends that the proposed study be modified to include the deployment of a systematically distributed array of water temperature probes in the project canals to evaluate the potential for fish mortality resulting from water temperature extremes.

Discussion and Staff Recommendations

As explained above, the maximum summer water temperature in the canals and the Snake River is about 65 degrees F during the summer and the rate of warming in the canals is similar over the 3.5-mile project bypassed reach. This suggests that any fish entrained in the canals would not be subject to temperature-induced mortality and there is no need to systematically deploy temperature probes throughout the canals. The Districts' proposed water temperature monitoring in the canals would provide sufficient information to analyze any potential temperature effects on fish in the canals (section 5.9(b)(5)).

Macroinvertebrates

Applicant's Proposal

The Districts propose to collect benthic macroinvertebrate data at six Beneficial Use Reconnaissance Program (BURP)⁴ stations to be located within the proposed bypassed reach.

Comments

Bear Island states that lowering river flows to 1,000 cfs will increase ice formation, causing portions of the river to freeze solid to the river bottom and exposing areas of river bed that will be both frozen and desiccated. Bear Island states that lowering flows and increasing ice will adversely affect macroinvertebrates which are an important food source for the fishery and waterfowl resources highly valued by the public.

Bear Island states that a survey should be completed to determine the variety and location of existing macroinvertebrates within the bypassed reach, and the macroinvertebrate study results should be integrated into the fish habitat modeling analysis using macroinvertebrate criteria curves to assess the effects of minimum flow alternatives on macroinvertebrate populations.

⁴ BURP is a biological monitoring and habitat assessment program used by Idaho DEQ to determine the quality of Idaho's waters and aid in meeting the requirements of the Clean Water Act.

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Discussion and Staff Recommendations

Bear Island does not specify how its recommended macroinvertebrate survey should be conducted or why the Districts' proposed methodology is insufficient to characterize macroinvertebrates in the project area. The Districts' proposal to collect benthic macroinvertebrate data at six sites within the bypassed reach should be sufficient to enable staff to describe the existing environment for macroinvertebrates (section 5.9(b)(4)).

In regard to Bear Island's request to incorporate macroinvertebrates into the aquatic habitat modeling analysis, we see no reason to require this. There are simpler and more cost effective methods (section 5.9(b)(7)) for evaluating project effects on macroinvertebrates than incorporating them into the aquatic habitat modeling analysis. This would include methods such as evaluating the wetted area of the stream at different minimum flow levels, with the assumption that areas that remain wetted throughout the year would be productive for macroinvertebrates. This could be accomplished by using the Districts' 2-D fish habitat modeling results which already quantify the wetted area of the stream channel over a range of minimum flows during the open-water period. To assess the winter period when icing may occur and cause freezing of the stream bed as pointed out by Bear Island, the Districts' proposed Icing Impacts Study and Special Aquatic Habitats Study will enable it to quantify areas of the stream channel that remain wetted and ice free during the winter period under existing conditions. The Icing Impacts Study will also provide information to predict project effects on icing conditions at lower flows under project operation. This information could be synthesized to quantify the areas of the channel that remain productive (i.e., wetted and ice free) year round for macroinvertebrates at different minimum flow levels. The Districts proposed studies will provide sufficient information for staff's analysis of project effects on macroinvertebrates (section 5.9(b)(5)), so we do not recommend any modifications to the study plan to address macroinvertebrates.

Study 6: Waterfowl Study

The Districts propose to evaluate the project's effects on wintering waterfowl by examining the presence and abundance of waterfowl and the availability of wintering waterfowl habitat throughout the proposed 3.5-mile-long bypassed reach of the Snake River as well as in the project vicinity. The study will utilize both ground and aerial surveys over one winter season. The Districts also propose to supplement the data from this study by using the results from the Icing Impacts Study (Study 3) to analyze the project's potential to alter winter ice cover on the bypassed reach, and therefore, affect the availability of open water habitat for use by wintering waterfowl within the project reach.

Study Area and Regional Waterfowl Use

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Applicant's Proposal

The Districts propose to conduct aerial flights to gather information on regional waterfowl use at open water habitats, identified in consultation with Idaho DFG, within a 25-mile radius of the project's northern boundary.

Comments

David and Christine Crandall recommend that the proposed study area be expanded to incorporate the entire geographic scope of cumulative effects analysis for wintering waterfowl identified in the Commission's Scoping Document 2 (i.e., the Snake River from the American Falls Dam to the confluence of the Henry's Fork and the South Fork Snake River). They recommend that the study determine the amount of waterfowl habitat provided within the project reach as a percentage of the total habitat available within the cumulative effects geographic scope. They also recommend that the Districts evaluate the current level of usage of any alternate areas by waterfowl and the amount of excess capacity that is available.

The Districts do not propose to change the study boundary as suggested by the Crandalls because they believe that their site-specific knowledge of the smaller, currently proposed boundary will allow for a more efficient study of project effects.

Discussion and Staff Recommendations

Available information in the project record suggests that the Snake River immediately downstream of the Districts' diversion dam provides winter open-water habitat for waterfowl that may be especially important during periods of very cold weather when other non-riverine (e.g., lakes, ponds) habitats in the project vicinity are covered in ice. The proposed study boundary includes the project features and nearby areas both upstream and downstream in the Snake River. It also incorporates a survey reach of the Snake River that Idaho DFG and U. S. Fish and Wildlife Service have flown in prior mid-winter aerial surveys for waterfowl (the 25 miles from Idaho Falls to the confluence with Henry's Fork). The study's aerial survey data would be combined with prior flight survey data and other historic information to evaluate the relative importance of the bypassed reach in providing winter open water habitat for waterfowl in the project vicinity. This evaluation, in addition to the data collected within the bypassed reach, should be adequate for staff's analysis of the direct and indirect effects of the project (section 5.9(b)(5)). Therefore, there is no need for the applicant to broaden the study boundary.

As the study intends to identify available habitat within a 25-mile radius, a determination of the percent of habitat within the project reach as compared to the total

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amount within the 25-mile radius could easily be done using the data collected by the Districts (section 5.9(b)(4)). Also, since the study proposes to use waterfowl observation data (both historic and current) to evaluate the availability of alternative habitat sites, the study would provide sufficient information (section 5.9(b)(4)) to address the Crandalls' recommendation and no modification to the study is necessary.

Survey Methods

Applicant's Proposal

The study proposes aerial surveys once a month and ground surveys twice a month throughout the winter season, from mid-November to early March. The study plan proposes ground surveys within the project reach and suggests the following five observation points: the County Line Bridge, the Idaho Canal diversion, a point between the County Line Bridge and the Idaho Canal diversion, a point at the Crandalls' property, and a point between the Crandalls' property and the County Line Bridge. However, final locations would be determined in consultation with Idaho DFG.

Comments

David and Christine Crandall recommend that more aerial surveys be conducted throughout the winter season. Bear Island commented that more aerial and ground surveys are needed to document waterfowl presence and estimate abundance, given the diurnal variations in bird activity patterns (e.g., movement in and out of the project area for foraging or roosting). The Districts do not propose to amend the study to include more aerial surveys, stating that the aerial surveys supplemented by ground surveys will provide adequate effort to achieve the study's goal.

David and Christine Crandall also recommend that the study continue to use time-lapse photography as a method for recording waterfowl use and icing conditions as proposed in earlier versions of the study plan. The Districts do not propose to alter the currently proposed study methods, stating that they had retracted the use of time-lapse photography because "the analysis method and final utility of the camera data was unclear" and that the time required for processing the camera data would be better spent in conducting actual observations. In place of the time-lapse photography, they propose to use bi-monthly ground surveys.

Idaho DFG recommended that the study be modified to include a minimum of five observation points within the stretch from the County Line Road Bridge to the Crandalls'

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property,⁵ given that this area is approximately 2 miles long and has the majority of the island and side channel habitats.

Discussion and Staff Recommendations

Although Bear Island and David and Christine Crandall indicated that more surveys are needed to provide waterfowl abundance estimates, neither provided an estimate of how many more surveys would be sufficient. Monthly or semi-monthly waterfowl survey schedules are routinely used during the non-breeding season to monitor trends in relative waterfowl abundance and distribution (Petrie et al., 2011; Anderson et al., 2015). Therefore, the proposed survey schedules are consistent with accepted practices (section 5.9(b)(6)) and should be adequate to provide baseline information on waterfowl presence and abundance and support an analysis of project effects (section 5.9(b)(4) and (5)). We do not recommend an increase in the number of surveys as requested by Bear Island and the Crandalls.

David and Christine Crandall did not explain why time-lapse photography should continue to be used. While time-lapse photography would provide a constant recording of waterfowl presence and icing conditions at designated locations in the bypassed reach, deploying cameras at multiple locations in the project area throughout the entire winter season would generate an enormous amount of data and would require a significant amount of effort and cost (section 5.9(b)(7)) to review the videos and compile the results into any kind of meaningful summary that could be used in the analysis of project effects. Also, this is not a commonly used and accepted practice for monitoring and estimating waterfowl abundance. Ground surveys, however, are commonly used for monitoring and estimating distribution and abundance of waterfowl (Andersson et al., 2015) (section 5.9(b)(6)). The ground survey results coupled with the aerial flight data should provide sufficient information of waterfowl presence and abundance to support an analysis of project effects (section 5.9(b)(4) and (5)). Therefore, we do not recommend the use of time-lapse photography as requested by the Crandalls.

Idaho DFG's request for more observational coverage in the 2-mile river segment downstream from the County Line Road Bridge has biological validity. As compared to the river segment upstream from the bridge, the habitat in the downstream segment is more diverse, containing the majority of the forested/shrub wetlands. And as mentioned by Idaho DFG, the downstream segment is much longer and contains more side channels. Side channels provide areas with slower moving waters that are important to waterfowl because they allow for greater forage efficiency (due to decreased turbidity) and require less energy expenditure than faster river currents for foraging and loafing. Adding

⁵ The County Line Road Bridge is approximately 0.7 mile downstream from the Districts' diversion dam. The Crandalls' property is just south of the proposed West Side Powerhouse.

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additional observation points (3 more in addition to the 2 already proposed) would provide more observational coverage and data without a significant increase in effort and cost (section 5.9(b)(7)). Therefore, we recommend establishing at least five observation points in the segment between the County Line Road Bridge and the Crandalls' property.

Opportunistic Observations of Wildlife and Recreational Activities

Applicant's Proposal

The Districts propose to record any opportunistic observations of wildlife (including signs of wildlife presence) and recreational activities within the project reach during all studies that involve on-site work (Studies 1, 3, 4, 5, 6, 7, and 8). Information that would be recorded for these observations includes: date, time, location, and wildlife or recreation details.

Comments

Idaho DFG commented that, while it agrees with the proposed study task, it requests that the Districts provide more details about how these observations will be collected and reported. It recommends that the Districts provide a plan for this work, outlining goals and objectives.

Discussion and Staff Recommendations

The Districts have provided no details regarding the opportunistic observation work except the type of information that would be recorded. However, by their nature, "opportunistic" observations would not have rigorous survey protocols or large time or effort expenditures. Similarly, the observational data would be used as supplemental observations of presence, abundance, and habitat use. To be most useful, we recommend that field crews record, in addition to the proposed information above, the following data: species detected, detections type (sight, sound, sign), number of individuals, age or development stage, and sex (if possible). This information is routinely gathered in many hydroelectric studies (section 5.9(b)(6)) and when coupled with the habitat mapping survey data to be collected as part of Study 5 would provide useful information for the Commission's environmental analysis (section 5.9(b)(5)). No further modification of the study plan is warranted.

Key Habitat Criteria Model

Applicant's Proposal

The Districts propose to create a habitat regression model for each of the four waterfowl guilds for the purpose of identifying the key habitat characteristics of

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wintering waterfowl. Data from this study and the Icing Study would be used as possible model inputs. Bayesian Information Criterion (BIC) (or other selection criterion) would be used to select the regression model. Once the habitat models have been created for each guild, the Districts would assess the likely change in wintering waterfowl habitat based on a 1,000-cfs winter flow.

Comments

Idaho DFG questions the reliability of a model based on such few observations, and states that the study does not provide sufficient details regarding data collection and model creation. Furthermore, Idaho DFG states that this task is a new addition to the study plan (i.e, it was not proposed in prior versions) and should not be approved without additional consultation with stakeholders and more details about how the model will be developed and utilized. Bear Island also questions whether the proposed observation sample size is even large enough for valid BIC analysis. In addition, it recommends that macroinvertebrates be included in the waterfowl habitat criteria.

Discussion and Staff Recommendations

The comments expressed by Idaho DFG and Bear Island are valid concerns. Data collected for only one winter season would likely not be sufficient to create a reliable winter habitat model for each of the four waterfowl guilds. Rather, it's likely that multiple years of data collection would be necessary to develop these models, which would require additional effort and increase the cost of the study (section 5.9(b)(7)). However, the Districts do not need models to identify key winter waterfowl habitat characteristics. Information gathered from literature sources, expert opinion, historic data, and data collected for this study (and other studies for this proposed project) should be sufficient to characterize and identify usable habitat within the project reach. Therefore, we recommend that the study plan not include the requirement to create a key habitat criteria model.

However, macroinvertebrates provide an important food source for waterfowl and could be one of the factors driving habitat use, thus important in meeting the study goals and objectives (section 5.9(b)(1)). Therefore, for identifying the potential key habitat characteristics for wintering waterfowl specified in Task 1.B and evaluating the quality of habitats found in the bypassed reach, we recommend that the Districts include macroinvertebrates as one of the variables evaluated in the initial literature review as well as macroinvertebrate data collected from the Water Quality Study (Study 4). Including macroinvertebrates in this portion of the study could be done at a relatively low-cost (section 5.9(b)(7)) because it would be a minor addition to the literature review and the Districts are already proposing to collect macroinvertebrate data as part of Study 4.

Threshold for Displacement of Waterfowl

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Applicant's Proposal

One of the study plan's objectives is to assess the potential for waterfowl to be displaced due to project operation.

Comments

Bear Island comments that the plan is not clear regarding how it will achieve this proposed objective; more specifically, it does not provide any thresholds for determining whether displacement will occur.

Discussion and Staff Recommendations

The potential for waterfowl to be displaced from the project reach would be evaluated in the Commission staff's environmental analysis. However, defining specific threshold conditions that would result in the displacement of waterfowl is not likely feasible because of the various factors that could confound the study results (e.g., available forage and snow cover, temperatures, etc.); therefore, Bear Island's requested study modification is not necessary to inform staff's analysis (section 5.9(b)(5)). No modifications to the study plan for this purpose are recommended.

Study 7: Recreation Study

Applicant's Proposal

To identify existing recreational use at the project and assess potential effects of project construction and operation on recreation, the Districts propose to: collect and review existing recreation information to identify current public uses and recreation activities within the project's bypassed reach; develop and conduct random-sample visitor intercept surveys during the non-irrigation season (October 15 through April 15) at the two public boat launch areas downstream of the project (i.e., West River Road and Upper Power Plant); and conduct a hydraulic analysis of flows and water depth to determine the flow level and locations where boating could be impaired by project operation.

The Districts describe their methodologies for three principal study components as: review of existing information, conducting a visitor survey of recreation use and preferences, and an analysis of boat access as a function of river flow. Icing effects on boating (e.g., changes in the timing or persistence of ice cover at the downstream boat launches) would be derived primarily from analysis of the icing study results. The Districts propose to address aesthetic resources only to the extent they relate to recreational use.

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Existing Information Review

Comments

The National Park Service (NPS) states that a review of existing information would not be sufficient to characterize recreation resources, use, and needs in the project area, and that the Districts need to conduct a more comprehensive recreation study. In addition to what is proposed by the Districts, the NPS recommends that the Districts identify projected recreation visitor use, assess recreation needs and carrying capacity, and evaluate future recreation opportunities in the project area.

The Districts did not adopt these elements of the NPS's proposed study, and do not believe the additional information is necessary to develop an adequate understanding of boating and other recreational use occurring in the bypassed reach.

Discussion and Staff Recommendation

Information in the record suggests that the project reach currently experiences low, or possibly moderate, recreational use, which includes boating and other activities enjoyed by both residents and visitors. While a more comprehensive recreation resource study as requested by NPS could provide additional information, a more limited scope of analysis is appropriate in this instance, due to the following circumstances: developed public access and recreation facilities are essentially absent within the project reach; most access occurs either by boat from points downstream, or through adjoining private properties, which limits recreational use by the general public; and the proposed study would focus on determining the types and extent of recreational use that occur in the area during low-flow periods, when project effects are more likely to occur. A much greater effort would be required to gather the recreation data sought by the NPS; however, it is not clear what specific objectives would be achieved by projecting future recreational use, needs, and opportunities, or evaluating carrying capacity in a location where current use appears to be relatively low overall.

The Districts' approach is consistent with generally accepted practices (section 5.9(b)(6)). The level of effort and cost to implement the additional study elements requested by NPS are not commensurate with the level of information needed to assess project effects per section 5.9(b)(7). Therefore, the additional study elements requested by NPS (as noted above) are not recommended.

Visitor Intercept Survey

The Districts propose to develop a survey instrument and sampling plan with the assistance of a three-person Recreation TWG to be established by the Districts. The

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TWG would guide the overall study and the survey component specifically. The draft survey and sampling plan would be submitted to Commission staff for approval prior to initiating the survey. Survey results would be documented, including types and quantities of recreational use, user socioeconomic information, and public preferences.

A modified version of the intercept survey would also be made available online to gather additional public input. Survey results would be supplemented by informal observations of recreational use (e.g., date, time, location, activity), as recorded by researchers conducting other field studies for the project.

Comments

The Idaho DPR recommends that the applicant modify the recreation study to clarify the “random” survey schedule, including the number of days on-site intercept surveys will occur, and the length of each survey session. Idaho DPR recommends that the intercept survey be conducted on one-third of the total number of days in October, November, December, and March, or approximately 41 days. Each survey session should last 6 hours and follow a randomized schedule of morning and afternoon sessions. Idaho DPR states its recommended survey method is an acceptable practice because it is based on the Recreation Use and Preference Study for the Bear River Narrows FERC Project No. 12486. Idaho DPR states that with these modifications, the survey would be more likely to intercept all types of recreation uses. Idaho DPR also recommends that in order to achieve optimal response rates, the surveys should be conducted face-to-face as much as possible, as opposed to mail-back surveys.

Idaho DFG also requests that a Recreational Use Survey be conducted from October through March on a random schedule, but with an emphasis on weekends. Idaho DFG states that more clarity should be provided on the timing and frequency of the survey. Idaho DFG also recommends that the intercept survey include user expenditures related to hunting, trapping, fishing, and boating, all of which could be affected by lower flows during project operation. Idaho DFG notes that expenditure information would help to determine levels of impacts on recreational users and appropriate mitigation measures. It also requests the opportunity to review the draft survey instrument in advance of the survey.

BLM recommends that, in addition to conducting the survey, the Districts hold focus group meetings to identify and understand public preferences for recreation opportunities in the project area. BLM argues that recreation use in the Idaho Falls area is increasing and recreation users are looking for new opportunities. Focus group meetings could help identify desired opportunities and experiences, and should be conducted after the survey data has been collected.

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The Districts state that public preferences for recreation will be addressed through the survey instrument which will be developed in consultation with the Recreation TWG. The Districts do not propose to convene focus groups and would rely on members of the TWG to share information with their constituencies.

Discussion and Staff Recommendation

To produce sufficient and reliable data, the frequency and duration of the intercept survey and the sampling plan need to be defined as recommended by Idaho DFG and Idaho DPR. The plan should also provide for a balance of weekday and weekend data. This information should be included in the sampling plan developed in consultation with the Recreation TWG. This approach is consistent with generally accepted practices (section 5.9(b)(6)). Expenditure information may be included in the survey, but is not required in order to quantify the types and levels of recreational use occurring in the bypassed reach.

However, given the low-to-moderate recreational use likely to be occurring in the bypassed reach, the Idaho DPR's suggestion for 41 days of onsite surveys is more than is necessary to produce useful data (section 5.9(b)(7)). The survey design used at the proposed Bear River Narrows project is not directly applicable to the County Line Road Project. The Bear River Narrows survey design was for a much larger project with a new dam, a 362-acre reservoir, four times the generation capacity, and 243 acres of federally owned land that would be affected, compared to the County Line Road Project where there would be no new dam or reservoir and no federally owned land affected.⁶ A sampling plan for the County Line Road Project should be developed that is commensurate with more limited boat access, and the low to moderate level of recreational use likely to be occurring in the reach during the non-irrigation season.

The Districts neither indicate what would specifically be included in the sampling plan, nor provide a schedule for when Recreation TWG meetings would occur, or when the plan would be completed and filed with the Commission. The survey should be conducted in late 2016 and early 2017 and the results included in the Initial Study Report.

Therefore, we recommend that the survey and sampling plan be developed as proposed by the Districts; however, we see no reason to require Commission approval of the plan prior to implementation. The Districts' proposal to consult with the TWG while developing the plan should be sufficient to ensure stakeholder concerns are addressed. Instead, we recommend the Districts file the plan with the Commission by August 31, 2016, for informational purposes only, and include with the plan documentation of

⁶ The BLM does not own any land affected by the project. However, it manages for recreation use 1.4 miles of river bank easements, 100-feet wide, on each side of the river within the bypassed reach

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consultation with the Recreation TWG, including a list of TWG participants and discussion of how the TWG's comments were addressed by the plan. Staff will evaluate the survey and sampling plan, comments thereon, and the preliminary study results when they are filed as part of the Initial Study Report.

The Districts state that preference data derived from the survey could be used to develop mitigation measures. To help ensure that proposed measures adequately address potential project effects and the specific concerns of stakeholders and the public with regard to boating and other recreational use, we also recommend at least one focus group meeting be held at the conclusion of the survey and after the results have been documented. The meeting should be scheduled in coordination with the Recreation TWG and should include discussion of the preliminary results of the recreation study, including the survey and any proposed measures. Participation in the focus group should be open to recreation users, area residents, resource agency staff, and other stakeholders. A summary of the focus group discussion(s) should be included in the Initial Study Report. This would provide a cost-effective means of evaluating preferences and identifying appropriate measures (section 5.9(b)(7)).

Analysis of Boat Access

To determine the flows needed to provide boating access in the bypassed reach, the Districts propose to determine the water depth requirements for various types of watercraft through the intercept surveys and review of existing information, and then perform a hydraulic modeling analysis of a range of flows to predict water depths in the project reach. This information would support an evaluation of the extent and duration of potentially impaired boat access during low-flow, ice-free periods.

Comments

NPS recommends that a recreation instream flow study be conducted to evaluate potential effects, consistent with 'Flows and Recreation: A Guide to Studies for River Professionals' by Whittaker, Shelby and Gangemi (2005).

Bear Island states that at a flow of 1,000 cfs, dry river bed or shallow water areas could pose navigational hazards to boats, or expose private irrigation lines which could be damaged by, or interfere with, boat traffic, fishing lines, and anchors. Bear Island believes that these concerns should be addressed in the study.

Discussion and Staff Recommendation

A recreation instream flow study that follows Whittaker, Shelby and Gangemi (2005) can take many forms, with varying levels of intensity (desktop, limited reconnaissance, and intensive study). The District's approach to defining boat access

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would provides a mid-level analysis of existing flow information, which when combined with the preference information gathered from users and stakeholders is consistent with one of the Whittaker, Shelby and Gangemi (2005) methodologies. The boat access analysis is expected to determine a general range of lower flows where boatability, including navigation safety, could be affected by project operation. The Districts' proposed study is consistent with accepted practices (section 5.9(b)(6)).

Icing Effects on Boat Access

Comments

The RSP omits the following study objective that was included in the updated PSP: "d) Using Study 3 icing information to determine the likely period each year during which boat access limitations would be prevented by icing." The icing component of the methodology, which was included in both the PSP and updated PSP, was also omitted from the RSP. The Districts, however, do not explain why the study objective and methodology were omitted from the RSP, and icing effects on boating are not specifically addressed in the icing study.

Discussion and Staff Recommendation

The Districts acknowledge in the RSP that the icing study results "will help establish the portion of the potential low flow period when the project reach is open and boat recreation access is possible." That study is expected to provide useful data for a boating analysis. However, to ensure that potential icing effects on boating are adequately evaluated and the study goals achieved (section 5.9(b)(1), staff recommends that study objective d) above be reinstated, and that the results of the icing study and boating analysis specifically describe, to the extent practical, the timing, persistence, and extent of ice cover that is likely to be project-related and which may impair boat access within the bypassed reach and downstream to the two nearby boat launches. Results of the analysis should be discussed with the focus group as described above, and a summary of the discussion(s) should be included with the Initial Study Report. These recommended modifications are necessary to ensure the study approach is consistent with accepted practices (section 5.9(b)(6)).

Visual Effects

Comments

NPS states that an analysis of visual and auditory effects from project facilities and operation should be included as part of the recreation study. To assess project effects on visual resources, NPS recommends that the Districts utilize the Bureau of Land

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Management's Visual Resource Management (VRM) system or similar methodology, as well as visual simulations and focus group discussions.

The Districts do not specifically address NPS's request to use the VRM, visual simulations, or focus group discussions. The Districts indicate that aesthetic resources will be considered in the context of recreation, but provide no further details.

Discussion and Staff Recommendation

NPS does not specifically identify any potential visual or auditory effects that should be addressed in a more focused aesthetic resources study. Other than minor construction effects, staff has not identified any auditory effects that would require a focused noise study. Some long-term visual effects can be expected (e.g., altered or obstructed views due to construction of powerhouses, transmission lines, and raised canals, and potential dewatering of a portion of the river bed), but these effects are generally site-specific and do not rise to the level of requiring a VRM analysis to evaluate broader effects on the surrounding landscape. However, a more limited visual assessment of the raised canals and the new west side powerhouse is warranted because they would be located adjacent to public roads or areas used by the public for recreation (e.g., BLM recreation easements). Visual effects of other structures (e.g., transmission lines, diversion structures, east side powerhouse, and some portions of the canals) would be more limited because they are existing or commonly occur in the area, will not be highly visible, or will not be substantially altered.

Therefore, we recommend at least one Key Observation Point (KOP) be established near the west side powerhouse, and at least two KOPs be established along each canal in areas where the canals are proposed to be substantially raised. All KOPs should be at locations that are reasonably accessible and/or visible to the general public. Visual resources should be described at each KOP and photo simulations should be developed to generally illustrate the effect on visual resources at each KOP. Results and photos should be included in the Initial Study Report.

If the results of the KOP analysis indicate that additional mitigating measures are needed, such measures should be discussed with the recreation focus group as described above to help ensure that proposed measures address the specific concerns of stakeholders and the public. This approach is consistent with accepted practices (section 5.9(b)(6)).

Study 8: Cultural Resources Study

Comment

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The BLM recommends two minor wording changes to the Districts' proposed Cultural Resources study to be consistent with accepted practices and terminology. On pages 50 and 51 of the RSP, the term "field reconnaissance survey" should be replaced with "Class III cultural resource inventory," and the term "heritage resources" should be replaced with "cultural resources." BLM, which manages federal land and recreation easements within the project area, also requests that the agency be included as a consulted entity in the development of any Historic Properties Management Plan (i.e., add BLM to the consulted entities on pages 51 and 52).

Discussion and Staff Recommendation

The requested edits do not materially change the proposed Cultural Resources study and are consistent with accepted practices (section 5.9(b)(6)). Therefore, these changes are recommended by staff.

II. Requested Studies

Instream Flow Study

Study Request

Bear Island and David and Christine Crandall recommend the Districts use the Tennant Method or wetted perimeter method to establish a minimally acceptable instream flow for the project.

Discussion and Staff Recommendations

The Districts have already completed an incremental two-dimensional (2-D) fish habitat modeling analysis for the proposed bypassed reach that assesses habitat availability for brown trout and rainbow trout over a range of minimum flow alternatives.⁷

The Districts' 2-D fish habitat model is a scientifically accepted methodology for evaluating flow and fish habitat relationships at a hydropower project (section 5.9(b)(6)), and provides the information necessary to inform staff's analysis and develop license requirements (section 5.9(b)(5)). We therefore see no reason to recommend the additional minimum flow analyses recommended by Bear Island and David and Christine Crandall.

⁷ The District's filed the final fish habitat modeling results on September 26, 2014. As discussed above, we are recommending that the Districts expand this analysis to include an assessment of trout habitat availability at different flows specifically during winter ice-cover.

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Economic Analysis of Groundwater Recharge Study

Study Request

David and Christine Crandall request a study of the opportunity costs and benefits of using Great Western Canal to generate hydropower versus using the canal for groundwater recharge of the Eastern Snake River Plain Aquifer (ESPA). David and Christine Crandall argue that recharge of the ESPA is a high priority for the state and that the development of this portion of the Great Western Canal for hydropower would commit all available water resources to producing hydropower, thus precluding the use of the canal for aquifer recharge efforts. In support, the Crandalls cite a 1999 study completed for the Idaho Department of Water Resources and BLM entitled “Feasibility of Large-Scale Managed Recharge of the Eastern Snake Plain Aquifer System,” that considered options for using the Great Western Canal to fill several potential aquifer recharge sites. The Crandalls state that sufficient information likely exists to complete the analysis and the analysis could be done at a reasonable cost (\$50,000). Apparently using economic information from a study of the economic importance of spring flows dependent on ESPA-recharge on the economy of Idaho (Joel R. Hamilton, 2004), the Crandalls provide a detailed discussion of potential costs and benefits and conclude that the economic value of diverting flows for ESPA recharge exceeds that of using the same water for hydropower. They believe that a more thorough analysis of the benefits of using Snake River flows for groundwater recharge would assure that the best value for the public is obtained and that the opportunity to use the canal for ESPA recharge in the future is not precluded.

Comments

The Districts did not adopt the requested study. The Districts state that the requested evaluation of aquifer recharge as an economically favorable alternative to hydropower development relates to the business choices of the Districts and is not relevant to the FERC licensing process. The Districts state that they are aware of aquifer recharge activities in the upper Snake River Plain region, but have made the decision to seek hydropower development.

Discussion and Staff Recommendation

While the use of the Western Canal may have been considered at one time for providing recharge to the ESPA, the Districts are not proposing to utilize the canal for this purpose, and we are not aware of any reasonably foreseeable plans for doing so. Therefore, there is no nexus between proposed project operation and the recharge of the ESPA (section 5.9(b)(4)), so we do not recommend the Districts complete the requested analysis.

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Socioeconomics Study

Study Request

Bear Island requests a study of the project's socioeconomic effects on the public, including residents along the project-affected reach. Bear Island states that property owners value scenic views and river access and market these qualities when selling their homes. Bear Island believes that residential property values could be adversely affected if scenic quality and recreational opportunities are diminished by project operation during the fall and winter months. Bear Island states that project benefits and harm will be inequitably distributed between District patrons and the public, thus the Commission's environmental analysis must contain a socioeconomic assessment to address this alleged disparity. Further, in order to complete that assessment, Bear Island states that the Commission's analysis must "quantify project impacts on quality of life and finances of the public and specific segments of the public that are particularly impacted such as property owners along the Osgood Reach."

Bear Island is also concerned that private irrigation intake lines in the bypassed reach may need to be extended or modified to access deeper water due to reduced flows during project operation. Bear Island states that the cost to install and maintain new or modified irrigation infrastructure is unknown. Bear Island recommends that the Districts assess these effects.

Bear Island states that the study should also consider the economic viability of the project at higher minimum flows of 2,000 and 2,400 cfs. Bear Island believes that a socioeconomic study would provide the data and analysis needed to evaluate and quantify these potential effects. Bear Island estimates the cost of the study at \$15,000.

Richard Rice also requests a similar study of socioeconomic effects of the proposed project on surrounding communities using standard accounting practices, available data, and comparative cost information for other small hydro projects.

Comments

The Districts did not adopt the recommended socioeconomics study. They state that the information gained from other resource studies (e.g., fisheries, wildlife, recreation) would likely provide sufficient data to support an analysis of socioeconomic effects, including effects on property values. Also, project economic and cost information required by the Commission's regulations would be included in the license application. The Districts further state that detailed information concerning project costs, revenues, loans, cash flow, and costs to District patrons relates more directly to the business operations of the Districts and is not relevant to the licensing process.

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Discussion and Staff Recommendation

The Commission's environmental analysis will assess the effects of project construction and operation on recreation and aesthetic resources and on the demands project construction would place on public infrastructure and services. That assessment will be based on existing information, planned recreation and flow studies, and expectations for labor and housing needed to construct and operate the project. However, the analysis will not assess changes in specific property values or adverse effects of reduced flows on the operation of irrigation intakes, because the Commission does not have the authority to adjudicate claims for, or to require through license requirements or any other means, payment of damages for project-induced adverse effects to private property (section 5.9(b)(5)).⁸

The Commission's regulations already require the District's to provide an economic analysis of the cost of constructing, operating, and maintaining the project and an estimate of the cost of each proposed or recommended protection, mitigation, and enhancement measure, including minimum instream flows (section 5.18(b)(5)(ii)(E)). However, it is premature to target specific flows for analysis until other instream resource studies (e.g., aquatic, icing, recreation, etc.) are completed and potential effects at various flows are better understood.

While other financial data pertaining to the internal business operations of the Districts may be of interest to District patrons, it is not relevant to the licensing process and is not needed for staff's analysis (section 5.9(b)(5)). For the reasons stated above, we do not recommend the requested socioeconomic study.

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⁸ See, e.g., *Ohio Power Co.*, 71 FERC ¶ 61,092, at 61,312 (1995) (citing to *South Carolina Public Service Authority v. FERC*, 850 F.2d 788, 795 (D.C. Cir. 1988)). Such property owners would need to seek redress with the Districts. See *PacifiCorp*, 133 FERC ¶ 61,232, at P 163 (2010), order on reh'g, 135 FERC ¶ 61,064 (2011); *Portland General Electric Company*, 107 FERC ¶ 61,158, at PP 27-33 (2004); *FPL Energy Maine Hydro, LLC*, 106 FERC ¶ 61,038, at PP 53-55 (2004). Moreover, section 10(c) of the FPA makes clear that a licensee of a hydropower project "shall be liable for all damages occasioned to the property of others by the construction, maintenance, or operation of the project works...16 U.S.C. § 803 (2012)."

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