

FEDERAL ENERGY REGULATORY COMMISSION
WASHINGTON, DC 20426
October 30, 2015

OFFICE OF ENERGY PROJECTS

Project No. 2669-085 - Massachusetts
Bear Swamp Project
Bear Swamp Power Company, LLC

Steven Murphy
Brookfield Renewable Energy Group, LLC
33 West 1st Street South
Fulton, NY 13069

Reference: Study Plan Determination for the Bear Swamp Project

Dear Mr. Murphy:

Pursuant to 18 C.F.R. § 5.13(c) of the Commission's regulations, this letter contains the study plan determination for the Bear Swamp Project No. 2669. 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 June 2, 2015, Bear Swamp Power Company, LLC (Bear Swamp) filed its proposed plan for studies on: water quality; fish assemblage; aquatic mesohabitat; terrestrial wildlife and botanical resources; wetland, riparian, and littoral habitat; recreational use; rare, threatened, and endangered species; cultural resources; project operation; instream flows; flow attenuation; and fish entrainment in support of its intent to relicense the Bear Swamp Project.

Bear Swamp held study plan meetings on June 29 and 30, 2015, and filed a revised study plan (RSP) on September 30, 2015. In the RSP, Bear Swamp proposes to replace its original study of rare, threatened, and endangered species with studies of rare plants, odonates (dragonflies and damselflies), freshwater mussels, and northern long-eared bats. American Whitewater and the Massachusetts Division of Fisheries and Wildlife (Massachusetts DFW) filed comments on the RSP on October 14, 2015. The U.S. Fish and Wildlife Service (FWS), Connecticut River Watershed Council (Watershed Council), and the Deerfield River Chapter of Trout Unlimited (Trout Unlimited) filed comments on October 15, 2015.

General Comments

A number of the comments received do not directly address study plan issues. These include editorial suggestions and comments on: requirements for other FERC-licensed projects, other aspects of the Integrated Licensing Process, measures to be included in a license, current license requirements, and the intent of previously filed comments. 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

Bear Swamp's RSP, filed on September 30, 2015, is approved, with the staff-recommended modifications discussed in Appendix B. As indicated in Appendix A, 5 studies are approved as filed, 10 are approved with modifications, and 4 additional studies requested by stakeholders are required. One study recommended by Massachusetts DFW, FWS, Trout Unlimited and the Watershed Council was not adopted. The specific modifications to the study plan and the basis for modifying Bear Swamp's 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 October 29, 2016.

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, Bear Swamp may choose to conduct any study not specifically required herein that it feels would add pertinent information to the record for this proceeding.

If you have any questions, please contact John Baummer at (202) 502-6837.

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

APPENDIX A
SUMMARY OF DETERMINATIONS ON PROPOSED STUDIES, REQUESTED
STUDY MODIFICATIONS, AND ADDITIONAL REQUESTED STUDIES

Study	Recommending Entity	Approved	Approved with Modifications	Not Required
1 -- Water Quality Study	Bear Swamp Power Company, LLC (Bear Swamp)		X	
2 -- Fish Assemblage Assessment Study	Bear Swamp		X	
3 -- Aquatic Mesohabitat Assessment and Mapping	Bear Swamp		X	
4 -- Baseline Study of Terrestrial Wildlife and Botanical Resources	Bear Swamp	X		
5 -- Wetland, Riparian, and Littoral Habitat Study	Bear Swamp	X		
6 -- Recreation Survey	Bear Swamp		X	
7 -- State-Listed Rare Plants Baseline Data Collection Study	Bear Swamp	X		
8 -- Cultural Resources Survey	Bear Swamp	X		
9 -- Operations Model	Bear Swamp		X	
10 -- Instream Flow Assessment	Bear Swamp		X	

Study	Recommending Entity	Approved	Approved with Modifications	Not Required
11 -- Fife Brook Flow Attenuation Study	Bear Swamp		X	
12 -- Entrainment Evaluation	Bear Swamp		X	
13 -- State-Listed Odonates Survey	Bear Swamp		X	
14 -- Freshwater Mussel Survey	Bear Swamp		X	
15 -- Northern Long-eared Bat Survey	Bear Swamp	X		
Trout Scale Study	Massachusetts Division of Fisheries and Wildlife; U.S. Fish and Wildlife Service; Deerfield River Chapter of Trout Unlimited; Connecticut River Watershed Council (Watershed Council)			X
Fife Brook Impoundment Access and Portage Feasibility Study	American Whitewater and Watershed Council	X		
Angler Wading Study	Watershed Council	X		

Study	Recommending Entity	Approved	Approved with Modifications	Not Required
Warning System Effectiveness Study	Watershed Council	X		
Whitewater Boating Flow Study	American Whitewater	X		

APPENDIX B

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

The following discusses staff recommendations on studies proposed by Bear Swamp Power Company, LLC (Bear Swamp), requests for study modifications, and requests for additional studies proposed in comments on the revised study plan (RSP). We base our recommendations on the study criteria outlined in the Commission's regulations [18 C.F.R. section 5.9(b)(1)-(7)].

I. Requests for Study Modifications

Study 1: Water Quality Study

Applicant's Proposal

Bear Swamp proposes to conduct a Water Quality Study to describe baseline water quality conditions within the project boundary. To do so, Bear Swamp proposes to continuously monitor dissolved oxygen and water temperature at four stations within the project boundary. Two stations would be located on the Fife Brook impoundment and two stations would be on the Deerfield River within the project boundary from Fife Brook dam to approximately 7.5 miles downstream.

Bear Swamp also proposes to collect water quality data at two stations downstream of the project, between the Deerfield River's confluence with the Cold River and the upstream extent of the impoundment for TransCanada's Deerfield River Project No.4 Development (Deerfield No. 4), which is approximately 17 miles downstream. Bear Swamp states that it is only collecting these downstream samples to supplement agency data collection activities.

Comments

Massachusetts Division of Fisheries and Wildlife (Massachusetts DFW) and the Connecticut River Watershed Council (Watershed Council) recommend that Bear Swamp monitor water quality in the Deerfield River downstream of the confluence with the Cold River to Deerfield No.4 as proposed and to additionally evaluate this data to assess project effects. The stakeholders indicate that peaking flows from the Fife Brook dam may negatively affect water quality throughout this reach.

Discussion and Staff Recommendations

The Pre-Application Document (PAD) summarized existing water quality data for the Deerfield River between Fife Brook Dam and Deerfield No. 4. These data indicate that water temperature generally increases downstream from Fife Brook Dam, with daily maximum temperatures approaching lethal levels for trout in the summer. Bear Swamp suggests that it should only be required to monitor water quality within the project boundary because daily peaking flows released from Fife Brook Dam originate from upstream projects and inflow to the Deerfield River downstream of the confluence with the Cold River masks the effects of the Bear Swamp Project on water quality.

Data from the United States Geologic Service (USGS) gage No. 01168500 on the Deerfield River at Charlemont, which is approximately 12 miles downstream of Fife Brook dam, indicates that fluctuating flow releases from Fife Brook dam do not significantly attenuate before reaching this location. Additionally, the morphological characteristics of the lower Deerfield River suggest that fluctuating flow releases from Fife Brook dam would not be expected to attenuate between the USGS gauge and the Deerfield No. 4 impoundment.

Staff's environmental analysis will need to assess the effects of continued operation of the Bear Swamp Project on water resources, including water quality, in the Deerfield River. Additionally, staff's analysis will consider potential modifications to project operation (e.g., alternative minimum flows) and any corresponding effects on water resources. Therefore, to the extent that project operation is potentially affecting resources outside of the project boundary, it is appropriate to extend the study area beyond the project boundary. Because flow information collected at the Charlemont gauge indicates that flows in the lower Deerfield River are influenced by releases from Fife Brook Dam and changes to project operation could affect water quality in this reach, Bear Swamp should collect water quality data from the Deerfield River between the project boundary and the upstream extent of the Deerfield No. 4 impoundment. Additionally, Bear Swamp should fully incorporate the results of this sampling into its discussion of project effects on water resources in the Initial Study Report.

Study 2: Fish Assemblage Assessment Study

Applicant's Proposal

Bear Swamp proposes to use a combination of electroshocking, netting, minnow traps and eel pots to describe the fish assemblage in the project vicinity.

Study Area

Bear Swamp proposes to sample for fish in the upper Bear Swamp impoundment, Fife Brook impoundment, and the reach of the Deerfield River from Fife Brook dam to confluence of the Cold River (i.e. 8.0 miles downstream of the dam). Bear Swamp proposes to sample in representative mesohabitat types defined in the aquatic mesohabitat assessment and mapping study.

Comments

Massachusetts DFW, U. S. Fish and Wildlife Service (FWS), the Watershed Council, and The Deerfield River Chapter of Trout Unlimited (Trout Unlimited) recommend that the study be modified to include the reach of the Deerfield River downstream of the project boundary to the upstream extent the Deerfield No. 4 impoundment. The stakeholders indicate that the downstream section of the Deerfield River is generally wider and shallow than the upstream section such that it could contain a different assemblage of fish and there is no available information regarding the fish assemblage in this reach. They suggest that because releases from the project can have an effect on this reach, it should be included in the fish assemblage assessment study.

Discussion and Staff Recommendation

As indicated above, releases from the Fife Brook Development affect the Deerfield River downstream to the Deerfield No. 4 impoundment and changes to project operation could affect this entire reach. Therefore, information on fish inhabiting this reach is needed to describe existing conditions and to evaluate potential project effects (section 5.9(b)(4) and (5)) and we recommend that the fish assemblage assessment study include sampling the entire reach of the Deerfield River from Fife Brook dam to the upstream extent of the Deerfield No. 4 impoundment. The level of sampling effort within the reach of the Deerfield River downstream of the project boundary should be commensurate with the level of effort proposed for the upstream section of the Deerfield River.

Length and Weight Measurements

At each sampling location, Bear Swamp proposes to identify and measure the length of the first 100 fish collected for all species. For gamefish species, Bear Swamp also proposes to measure the weight of the first 100 individuals of each species so that it can calculate fish condition.

Comments

The Watershed Council recommends that Bear Swamp record individual length and weight measurements for all fish species collected, not just gamefish.

Discussion and Staff Recommendation

The basis of the Watershed Council's request is unclear and no rationale has been provided for this recommendation. In the proposed study, length and weight will be used to estimate the condition of gamefish and this information will be used to assess the health of the fishery by comparing calculated fish condition indices to gamefish from other watersheds. This is a common practice for determining the health of a fishery. While condition indices could be estimated for non-gamefish species (i.e., darters, minnows, suckers, etc.), this additional information is not necessary to evaluate the health of the Deerfield River fishery. Therefore, we do not recommend that Bear Swamp collect weight data for non-game fish species.

Survey Period and Trout Redd Data

Bear Swamp proposes to sample the fishery from May 15 to September 30 and indicates that it will document and record any trout redds observed during sampling.

Comments

Trout Unlimited states that the proposed observation period for trout redds does not coincide with the trout spawning timeframe and recommends that Bear Swamp survey and document trout redds in the early spring and fall when trout actively spawn.

Discussion and Staff Recommendation

While the proposed study period for the fish assemblage assessment study would not coincide with the trout spawning period, it is possible that algae regrowth in trout spawning areas will be slow enough to allow some identification of redds during the early portion of the survey period (i.e., during May). In addition, even if Bear Swamp is unable to identify any redds, the contribution of wild spawning trout to the existing fishery can be assessed from young-of-year and yearling trout abundance data which will be obtained from the fish assemblage sampling (see discussion below of Trout Scale Study). Therefore, we do not recommend Trout Unlimited's proposed modification and we recommend that Bear Swamp conduct the study as proposed.

Study 3: Aquatic Mesohabitat Assessment and Mapping

Applicant's Proposal

Bear Swamp proposes to survey and map aquatic habitat in the upper Bear Swamp impoundment, the Fife Brook impoundment, and the reach of the Deerfield River from Fife Brook dam to the confluence of the Cold River (8 miles downstream of the dam).

Comments

The Watershed Council recommends that the study be modified to include the reach of the Deerfield River downstream of the confluence of the Cold River to the upstream extent the Deerfield No. 4 impoundment.

Discussion and Staff Recommendations

As indicated above, releases from the Fife Brook Development affect the Deerfield River from Fife Brook dam to the Deerfield No. 4 impoundment and changes to project operation that will be considered in staff's analysis could affect this entire reach. Therefore, because information on habitat in this reach is needed to describe existing conditions and to evaluate potential project effects (section 5.9(b)(4) and (5)), we recommend that the aquatic mesohabitat assessment and mapping study include the entire reach of the Deerfield River from Fife Brook dam to the upstream extent of the Deerfield No. 4 impoundment.

Study 5: Wetland, Riparian, and Littoral Habitat Study

Applicant's Proposal

Bear Swamp proposes to map and characterize existing floodplain, wetland, and riparian habitat in select areas within the project boundary as part of its proposed Wetland, Riparian, and Littoral Habitat Study. As part of the study, Bear Swamp proposes to document state- or federally-listed rare, threatened, or endangered species observed, including any active nest or roost trees used by bald eagles.

Comments

The Watershed Council requests that in addition to documenting active nest and roost trees, Bear Swamp should document any "potential" eagle nest or roost trees.

Discussion and Staff Recommendations

The proposed study would include documenting, assessing, photographing, and geo-referencing existing bald eagle nests and roost sites which should be adequate to describe the existing environment and support an analysis of project effects (section 5.9(b)(4) and (5)). Documenting “potential” nest and roost trees would require additional effort and increase the cost of the study. Additionally, any conclusions about project effects on eagles related to “potential” nest and roost trees would be speculative in comparison to an evaluation of effects on active sites. Because the proposed study is sufficient to describe existing bald eagle habitat in the project area and support staff’s environmental analysis, modifying the proposed study to include “potential” eagle nest or roost trees is not necessary.

Study 6: Recreation Survey

Applicant’s Proposal

Bear Swamp proposes to conduct an assessment of recreational use and existing facilities at the Bear Swamp Project. Study objectives include: describing existing recreation facilities, conditions, and recreational use of the project area; using visitor surveys and field cameras to quantify use of recreation facilities across the project; and evaluating the potential effects of continued project operation on recreational resources and activities. The recreation survey is meant to help determine whether project recreation facilities meet user needs and if improvements or additions are needed. Bear Swamp indicates that the study would include visitor use data, a survey questionnaire, industry and law enforcement interviews, and photo documentation.¹

Study Locations

Bear Swamp proposes to conduct in-person surveys at select formal and informal recreation access areas within the FERC boundary, which includes the 7.5-miles of the Deerfield River downstream of Fife Brook dam. Bear Swamp does not propose to conduct surveys at or upstream of the Fife Brook impoundment.

Comments

The Watershed Council recommends that Bear Swamp extend the study area to include areas along the Deerfield River between the project boundary and the Deerfield No. 4 impoundment, which would include what is known as the Shunpike put-in and take-out area (Shunpike area) which is owned and operated by the Massachusetts

¹ Industry refers to outdoor recreation professionals, including those who provide guided whitewater trips, guided fishing trips, busing for whitewater boaters, etc.

Department of Transportation. The Watershed Council additionally recommends that the proposed survey locations be expanded to include whitewater users at the upstream reaches of the Fife Brook impoundment.

Discussion and Staff Recommendations

Operation of the Fife Brook Development affects whitewater flows on the Deerfield River downstream to the Deerfield No. 4 impoundment, including whitewater flows at the Shunpike area. Because information on recreation at the Shunpike area relating to flows released from the Fife Brook Development is needed to describe existing conditions and project effects on recreation resources (section 5.9(b)(5)), we recommend that Bear Swamp increase its survey effort and include the Shunpike put-in and take-out area in its recreation field surveys.

In regard to recreation on the Fife Brook impoundment, whitewater boating occurs in the “Dryway” section of the Deerfield River which is between the dam for the upstream Deerfield No. 5 Development and the upstream end of the Fife Brook impoundment. There are two whitewater features located in this reach that are within the inundation zone of the Fife Brook impoundment, making these areas only intermittently available to whitewater users. To describe existing recreation conditions in the project vicinity and support staff’s analysis of project effects on recreation (section 5.9(b)(5)), we recommend that Bear Swamp increase its survey effort and include any take-out areas near the upper reaches of the Fife Brook impoundment in its recreation survey. We also recommend that these surveys take place during periods when recreational flows in the “Dryway” and the upstream end of the Fife Brook impoundment are favorable to whitewater use.

Hunting Area Survey

The Bear Swamp Public Hunting Area (hunting area) is a 900-acre tract, located near the upper Bear Swamp impoundment and within the project boundary, that is open to hunting. The hunting area is rustic and forested, and has several informal parking areas.

Comments

In comments on the proposed study plan, Commission staff requested that Bear Swamp include surveys of hunters that use the project’s hunting area in order to obtain baseline data on recreational use at the hunting area. In its RSP, Bear Swamp expressed concerns over the safety of interviewers working at the relatively remote hunting area near armed hunters, and over the effectiveness of conducting surveys at trailheads and in hunting areas and stated that it would only post signs in the hunting area referring users to its website-based survey.

Discussion and Staff Recommendations

Field surveys are a preferred method for obtaining information about hunting use (Nebraska Cooperative Fish and Wildlife Research Unit, 2014). To ensure that reliable information about recreational use at the hunting area is obtained, we recommend that Bear Swamp increase its survey effort and conduct in-person surveys at the parking areas for the sections of the project that are open to hunting. The surveys should be conducted on either the first day of Massachusetts's shotgun season for deer and one additional weekend day during that season, or on two weekend days during shotgun season for deer, as these days are likely to be some of the most popular days of the year for hunting. Conducting these additional surveys will ensure the collection of accurate hunter use information. This information is needed to describe baseline recreational use at the project and support an assessment of whether existing access facilities are adequate (section 5.9(b)(4) and (5)).

Recreation Questionnaire

Bear Swamp proposes a recreation questionnaire to be used in field interviews. The questionnaire has 18 questions for recreationists using lands and waters in the project vicinity and is designed to gather information on visitor use and satisfaction.

Comments

Watershed Council recommends the following specific changes to questions in the questionnaire:

<u>Questions</u>	<u>Comment</u>
7:	Question 7 asks if visitors stayed overnight during previous visits at a home other than their own. The Watershed Council recommends that the question take into account visitors staying at vacation or second homes that are not their primary residence.
8:	Question 8 asks at what type of accommodations visitors usually stay. The Watershed Council recommends that the question include an answer for visitors staying at vacation or second homes.
13:	Question 13 asks visitors to rate their satisfaction with different aspects of their boating, tubing, or fishing experience. The Watershed Council recommends that the question include river flows in the list of items for visitors to rank.

- 14: Question 14 asks how much visitors spent on their trip to the project. The Watershed Council recommends that this question either be deleted or re-worded to record money spent during the entire outing.
- 16: Question 16 asks visitors to rate the acceptability of different aspects of their visit, including parking and crowding. The Watershed Council requests that the question include river flows in the list of items to be rated.
- Map: The map included in the questionnaire shows the Bear Swamp Project, the project boundary, bodies of water, roads, and topography. The Watershed Council states that the label “Deerfield Station No. 5” on the map is confusing and recommends that it either be removed or clarified to state that it is not the dam. The Watershed Council also recommends that the label for “Fife Brook Impoundment” should be changed to “Fife Brook Dam”, and that the Deerfield River again be identified on the map.

Additionally, Watershed Council recommends that the questionnaire include questions for whitewater users in the upper reaches of the Fife Brook impoundment to: (1) record the time of the visit; (2) identify access points visitors have used to put-in and take-out of the water; (3) document user estimated flows and perceived level of difficulty; and (4) frequency of ideal flows for whitewater recreation .

Discussion and Staff Recommendations

A well-designed questionnaire is crucial to gathering appropriate information in recreation surveys. Watershed Council’s recommended revisions to questions 7, 8, 13, 14, and 16 would improve the questionnaire by obtaining more detailed and accurate information on recreational use in the project vicinity. Additionally, including a map would likely increase the ability of users to identify areas where they have recreated.

In addition to Watershed Council’s revisions, Commission staff recommend the following revisions to further improve the questionnaire and ensure it gathers useful and detailed information on recreational use:

<u>Questions</u>	<u>Comment</u>
1:	Question 1 asks for the zip code of the visitor’s primary residence. Commission staff recommend that the question also ask for the date, time, and location of the interview (to record when and where interviews were conducted).

- 3: Question 3 asks what seasons visitors came to the project in the last 12 months. Commission staff recommend that the question ask what ‘months’ rather than what ‘seasons’(to gather more specific information about visitor use).
- 4: Question 4 asks which Bear Swamp recreation areas visitors used, and lists recreation sites at the project. Commission staff recommend that the lists of sites include the Dunbar Brook take-out just north of the Fife Brook impoundment (to gather information from users upstream of the impoundment).
- 10: Question 10 asks visitors to best describe their group during their previous visits to the Bear Swamp area, and lists individual, adult group, youth group, and family. Commission staff recommend that the question add an option for a Mixed Group (to account for groups with children, adults and/or teens).
- 11: Question 11 ask visitors to indicate which of 32 recreational activities they have participated in during previous trips to the project. Commission staff recommend that the list of activities include “Commercial Tubing” as an option (because this is a known use within the project area).
- 15: Question 15 asks if visitors researched flow levels in the Deerfield River before their trip, and if so, asks if they used the WaterLine website, a USGS gage, or another source. Commission staff recommend that the list of possible answers include the Waterline’s Toll-Free Hotline (because this is a known source of information about flows in the Deerfield River).

We recommend including these revisions and Watershed Council’s revisions to the survey to ensure collection of useful and detailed recreation information that would be used to describe existing recreational use and is needed to develop future license requirements (section 5.9(b)(5)).

Field Cameras

Bear Swamp proposes to deploy automatic cameras at project recreation sites that provide access to the Deerfield River from April or May through October to collect data on recreational use at those sites.

Comments

The Watershed Council recommends that Bear Swamp deploy the trail cameras whenever recreational use is likely to occur; and not just during predetermined periods.

Discussion and Staff Recommendation

Recreational use on the Deerfield River likely occurs outside of the April to October period, especially if adequate whitewater flows are released from the Fife Brook Development. During these periods, recreational use may be more sporadic and less easily characterized by a recreational questionnaire. Not having cameras in place during these times could result in missed user data. Therefore, to ensure collection of useful information that can be used to describe existing recreational use, we recommend that Bear Swamp use automated trail cameras at river recreation sites throughout the period when whitewater flows may be potentially released from the Fife Brook Development.

Study 7: State-Listed Rare Plants Baseline Data Collection Study

Applicant's Proposal

Thirteen state-listed rare plant species have been identified by the Massachusetts Natural Heritage and Endangered Species Program (NHESP) as occurring or likely occurring within the project area. Bear Swamp proposes to conduct a State-Listed Rare Plants Baseline Data Collection Study to determine the occurrence of state-listed rare, threatened, and endangered plant species and watch-list species within the project boundary.

Study Area

The proposed study area includes the upper Bear Swamp impoundment, the upstream extent of the Fife Brook impoundment, and the reach of the Deerfield River extending downstream from Fife Brook dam to the project boundary (approximately 7.5 miles downstream of the dam).

Comments

Massachusetts DFW states that the study area should encompass the full extent of the area affected by project operation, including the entire reach of the Deerfield River from Fife Brook dam to the upstream extent of the Deerfield No. 4 impoundment.

Discussion and Staff Recommendation

The U.S. Fish and Wildlife's National Wetland Inventory maps² and the NHESP Bio2 maps³ suggest there are similar riparian habitat types in the upper and lower reaches of the Deerfield River. In addition, we expect that project effects on rare plants in this reach of the Deerfield River would be somewhat uniform from upstream to downstream. Therefore, we expect that Bear Swamp's proposed study would provide an adequate subsample of rare plant species that may be found in the reach between Fife Brook dam and the upper extent of the Deerfield No. 4 impoundment. Therefore, the proposed study design should be adequate for staff's environmental analysis and we do not recommend Massachusetts DFW's proposed modification.

Survey Period

Bear Swamp proposes to conduct the State-Listed Rare Plants Baseline Data Collection Study between July 15 and August 15, 2016.

Comments

Massachusetts DFW requests that the study occur during the appropriate phenological window,⁴ which may warrant multiple field survey efforts over the full growing season. In addition, because some species may not reliably flower annually, Massachusetts DFW notes that documentation of suitable habitat and field surveys during at least two growing seasons may be appropriate.

Discussion and Staff Recommendation

Bear Swamp's proposed survey dates were developed using the U.S. Environmental Protection Agency's (EPA) *National Wetland Condition Assessment: Field Operations Manual* (EPA, 2011). Using this methodology, survey dates are selected to target the peak of the growing season, when vegetation is in flower or fruit, to reduce phenological variability and aid in species identification.

Because the proposed study would follow EPA's standard procedure, the timing of the proposed surveys is appropriate and should provide sufficient information to describe the existing environment and support staff's environmental analysis (section 5.9(b)(5) and (6)). Therefore, Massachusetts DFW's proposed modification is not needed at this time. However, if there are numerous specimens that cannot be identified with

² <http://www.fws.gov/wetlands/data/mapper.HTML>

³ <http://maps.massgis.state.ma.us/dfg/biomap2.htm>

⁴ The phenological window refers to the time of year a plant is identifiable based on its physical characteristics (i.e., buds, leaves, flowers, or fruit).

confidence during the proposed survey period, additional surveys could be required during the second study season.

Study 9: Operations Model

Applicant's Proposal

Bear Swamp proposes to develop a project operation model to describe existing project operation at the Fife Brook and Bear Swamp Pumped Storage Developments and allow for the simulation of alternative operating scenarios.

Whitewater Recreation Flow Scenarios

As part of the Operations Model study, Bear Swamp proposes to model: (1) existing conditions; (2) alternative minimum flows from Fife Brook dam ranging from 125 cfs to 275 cfs in increments of 50 cfs; (3) alternative whitewater flows ranging from 800 cfs to 1,400 cfs in increments of 100 cfs; (4) operating scenarios that demonstrate the physical limitations of the Bear Swamp Project; and (5) operating scenarios based on the current and upgraded turbine-generator configuration for the Bear Swamp Project. Bear Swamp also proposes to establish a flow regime working group to identify and evaluate potential operating scenarios for further evaluation.

Comments

American Whitewater requests that Bear Swamp evaluate operational scenarios that would allow recreational use of the whitewater features in the upper reach of the Fife Brook impoundment (e.g., the “Labyrinth” and “Showtime” rapids). These whitewater features are located within the Fife Brook inundation zone and are inundated and exposed on a daily basis. When exposed, these features provide recreational opportunities for whitewater boaters.

Discussion and Staff Recommendations

Maintaining the water surface elevation of the Fife Brook impoundment at a level that would expose these whitewater features is within the operational capacity of the Bear Swamp project and could provide a recreational enhancement. Therefore, we recommend that Bear Swamp summarize information that describes the availability of these features during existing operation, including Fife Brook water levels, streamflow in the exposed reach, duration of exposure, and time of day of exposure.

In addition, Bear Swamp should model a scenario where scheduled whitewater releases from Fife Brook Dam and a drawdown of the Fife Brook impoundment are coordinated with the 32 scheduled whitewater releases from Deerfield No. 5.

Coordinating scheduled releases from Fife Brook dam with scheduled releases from Deerfield No.5 (either simultaneously or staggered) could allow boaters to use both reaches of the Deerfield River during a single day. A drawdown of the Fife Brook impoundment during scheduled releases from Deerfield No. 5 would allow use of the two whitewater features at the upstream end of the Fife Brook impoundment.

Study 10: Instream Flow Assessment

Applicant's Proposal

Bear Swamp proposes to perform a site-specific instream flow study in the Deerfield River downstream of the Fife Brook dam to quantify the relationship between flow and aquatic habitat affected by flow releases from Fife Brook dam.

Study Area

Bear Swamp proposes to evaluate the effect of flows on aquatic habitat in the reach of the Deerfield River between Fife Brook dam and the confluence of the Cold River (i.e. 8.0 miles downstream of the dam).

Comments

Massachusetts DFW, FWS, and the Watershed Council recommend that the study area be extended downstream from the Fife Brook Development to the upstream extent of the Deerfield No. 4 impoundment. The stakeholders indicate that flow releases from Fife Brook dam affect aquatic habitat throughout the 17-mile reach of the Deerfield River downstream of Fife Brook dam.

Discussion and Staff Recommendation

As indicated above, releases from the Fife Brook Development affect flow conditions in the Deerfield River from Fife Brook dam to the Deerfield No. 4 impoundment and changes to project operation that will be considered in staff's analysis could affect this entire reach. Information on how flow releases at Fife Brook dam affect aquatic habitat in this reach is needed to describe existing conditions and to evaluate potential project effects, including minimum flow releases (section 5.9(b)(4) and (5)). Therefore, we recommend that the study area for the instream flow study include the entire reach of the Deerfield River from Fife Brook dam to the upstream extent of the Deerfield No. 4 impoundment.

Number of Transects

Bear Swamp proposes to collect physical habitat measurements at five transects within representative mesohabitat locations along its proposed 7.5-mile-long study area on the Deerfield River.

Comments

Massachusetts DFW, FWS, and the Watershed Council recommend using the results of the Bear Swamp's proposed aquatic mesohabitat assessment and mapping study, in consultation with the stakeholders, to determine the number of transects for the instream flow study rather than assigning a pre-determined number of transects.

Discussion and Staff Recommendation

The number of transects required to produce valid habitat measurements or estimates of weighted usable area is directly dependent on habitat variability. In rivers that have a high degree of habitat complexity, more transects are generally required to accurately capture the hydraulic and physical variability of the stream segment. Because the habitat complexity of the study reach is unknown at this time, assigning a pre-determined number of transects may reduce the accuracy and reliability of the study results and fail to accurately describe all habitat types.

Using the results of the aquatic mesohabitat assessment and mapping study to identify suitable areas for transects along the 17-mile reach of the Deerfield River would increase effort and cost, but it would also increase the reliability of any predicted flow-habitat relationships. Because an accurate description of the flow-habitat relationship is needed to describe existing conditions and to evaluate potential project effects, including minimum flow releases (section 5.9(b)(4) and (5)), we recommend that Bear Swamp use the results of the aquatic mesohabitat assessment and mapping study, and consultation with the stakeholders, to determine the number and location of transects for the instream flow study along the 17-mile stretch of the Deerfield River.

Study 11: Fife Brook Flow Attenuation Study

Applicant's Proposal

Bear Swamp proposes to characterize the attenuation of peaking flows released from the Fife Brook Development using an existing Deerfield River Hydrologic Engineering Centers River Analysis System (HEC-RAS) model and river gauging data collected in 2014. Bear Swamp additionally proposes to evaluate the flow attenuation characteristics for potential improvements to public safety.

Study Area

Bear Swamp proposes a geographic scope for this study from the Fife Brook Development downstream to the USGS Deerfield River gauge at Charlemont, which is approximately 12 miles downstream of Fife Brook dam.

Comments

The Connecticut River Watershed Council (Watershed Council) recommends the study area extend downstream from the Fife Brook Development to the upstream extent of the Deerfield No. 4 impoundment.

Discussion and Staff Recommendation

As indicated above, releases from the Fife Brook Development affect the Deerfield River downstream to the Deerfield No. 4 impoundment and changes to project operation that will be considered in staff's analysis could affect this entire reach. Because information on these effects is needed to describe existing conditions and effects on aquatic resources (section 5.9(b)(4) and (5)), we recommend that the flow attenuation study include modeling the entire reach of the Deerfield River from Fife Brook dam to the upstream extent of the Deerfield No. 4 impoundment.

Water Level Recording Efforts

As part of the Fife Brook Flow Attenuation study, Bear Swamp proposes to use data from 8 water level loggers that continuously recorded water levels in Deerfield River between the Fife Brook dam and its confluence with the Cold River during a two-month period during 2014.

Comments

The Watershed Council suggests that monitoring water levels in the Deerfield River for only two months is not sufficient for quantifying flow attenuation characteristics. Additionally, the Watershed Council requests that the water level data be correlated with flows discharged from the Fife Brook dam and that the locations of the water level loggers be included in the study report.

Discussion and Staff Recommendations

Page 4-16 of the PAD includes outflow data from the Fife Brook dam for the period when water level loggers were deployed (i.e., August-September 2014) and discharge flows for this period ranged from approximately 125 cubic feet per second (cfs) to 1,000 cfs. Page 14-5 of the revised study plan (RSP) demonstrates that these water

levels represent typical operations, including peaking releases. Based on this information, the range of flows captured during 2014 field efforts are appropriate for evaluating flow attenuation characteristics in the Deerfield River. If necessary, additional flows can be extrapolated using the existing Deerfield River HEC-RAS model. We do not recommend collection of additional water level data at this time; however, we do recommend that Bear Swamp use the 2014 data to validate the HEC-RAS results over the measured flow ranges as suggested by the Watershed Council. Additionally, we recommend that Bear Swamp include a map in the Initial Study Report showing the locations of the 8 water levels loggers used in 2014.

Study 12: Entrainment Evaluation

Applicant's Proposal

Bear Swamp proposes to conduct a literature-based assessment of fish entrainment and turbine survival at the project. The study would characterize the physical and operational characteristics of the project's turbines and intake structure; summarize the fish species present in the Fife Brook impoundment based on existing data and the results of the fish assemblage assessment study; qualitatively evaluate which fish species and life stages have the potential to be entrained; review entrainment studies conducted at similar pumped-storage and conventional hydroelectric projects for relevance; and develop an estimate of entrainment at both the Bear Swamp and Fife Brook Developments. The study would be supplemented with empirical velocity data from the area of the Bear Swamp and the Fife Brook intakes.

Comments

FWS and Massachusetts DFW state that the Longnose sucker (*Catostomus catostomus*), a Massachusetts species of Special Concern, and other gamefish were documented in the Fife Brook impoundment when the project was constructed and ichthyoplankton sampling is necessary at the Bear Swamp Development to evaluate the effects of pumping on eggs and larvae.

Discussion and Staff Recommendation

Bear Swamp's proposed entrainment evaluation is primarily a desktop study designed to provide a qualitative analysis of fish entrainment and mortality at the project. The proposed methodology is consistent with generally accepted practices and is similar to a number of studies performed in support of other hydroelectric relicensing proceedings. In addition, the collection of water velocity data in the area of the Bear Swamp and Fife Brook intakes will provide information that can be used to assess the ability of fish to avoid entrainment. This information will also help identify similar hydroelectric projects

where field entrainment studies have been conducted and help to identify comparable results.

The results of the fish assemblage assessment study, combined with available information of fish species reproductive strategies and developmental stages, should allow Bear Swamp to estimate the likelihood of egg and larval entrainment at the Bear Swamp Project as part of its desktop entrainment study. There are no anadromous fish species present in the project area that could be substantially affected by significant entrainment mortality and until the results of the fish assemblage assessment study are available, it is unknown if there are any non-migratory species present that would be sensitive to significant egg or larval entrainment. Therefore, we do not recommend that Bear Swamp conduct ichthyoplankton sampling at this time. Instead, we recommend that Bear Swamp conduct the proposed desktop entrainment study and incorporate the results of the fish assemblage assessment study to identify any species that may be sensitive to egg or larval entrainment. If results of the desktop entrainment study identify any such species, it may be appropriate to conduct ichthyoplankton sampling during the second study season.

Study 13: State-Listed Odonates Study

Applicant's Proposal

Bear Swamp proposes to survey and document state-listed odonates (i.e., dragonflies and damselflies) and their habitat in the project area by visually surveying for exuviae (i.e., the exoskeletons cast from odonate nymphs when hatching into the flying adult form).

Study Area

Bear Swamp proposes a geographic scope for the study that includes the upstream extent of the Fife Brook impoundment, and the reach of the Deerfield River from Fife Brook dam to the confluence of the Cold River (i.e., 8.0 miles downstream of the dam).

Comments

Massachusetts DFW recommends that the study be modified to include the reach of the Deerfield River downstream of the project boundary to the upstream extent the Deerfield No. 4 impoundment. Massachusetts DFW indicates that the section of the Deerfield River downstream of the confluence with the Cold River is the known habitat for the Ocelated darner (*Boyeria grafiانا*) and releases from the project can have an effect on this reach.

Discussion and Staff Recommendation

As indicated above, releases from the Fife Brook Development affect the Deerfield River downstream to the Deerfield No. 4 impoundment and changes to project operation that will be considered in staff's analysis could affect this entire reach. Because information on rare odonate species is needed to describe existing conditions and to evaluate potential project effects (section 5.9(b)(4) and (5)), we recommend that Bear Swamp survey the entire reach of the Deerfield River from Fife Brook dam to the upstream extent of the Deerfield No. 4 impoundment. The level of sampling effort within this reach should be commensurate with the level of effort proposed for the upstream section of the Deerfield River.

Level of Effort

Bear Swamp proposes to visually survey for exuviae by walking the shoreline and wading in the river. Bear Swamp proposes to survey for state-listed odonates at five sites defined by results of the aquatic mesohabitat and mapping study and identified in consultation with resource agencies. Bear Swamp proposes to survey a 20-foot-wide transect for state-listed odonates that extends 10 feet towards the river and 10 feet upland.

Comments

Massachusetts DFW recommends that Bear Swamp use benthic surveys in addition to visual surveys for exuviae. Massachusetts DFW indicates that the absence of observed exuviae does not equate to the absence of state-listed odonates and that benthic surveys for nymphs could be completed with the mussel survey to reduce the cost of benthic surveys.

In addition, Massachusetts DFW states that some odonate species may only occur in limited areas that might be missed by constraining the study to a pre-determined number of study locations and transects. Massachusetts DFW recommends that Bear Swamp consult with resource agencies to determine the number of transects. Additionally Massachusetts DFW recommends surveying for odonates in 30-foot-wide transects that extend a minimum of 36 feet upland from the water's edge.

Discussion and Recommendation

The absence of exuviae does not necessarily equate to the absence of state-listed species; however, even with the additional effort recommended by Massachusetts DFW (i.e., benthic surveys, increased transect numbers, and larger survey areas), there would be no certainty that all odonate species present in the river would be identified. The proposed study, with staff's modification to sample the Deerfield River from Fife Brook dam to Deerfield No. 4, should be adequate to describe the existing environment and

support staff's analysis and development of license requirements (section 5.9(b)(4) and (5)). The additional effort recommended by Massachusetts DFW may provide more certainty regarding the presence of odonate species; however, it would not be worth the corresponding increase in cost which we estimate at \$18,000. Therefore, we do not recommend modifying the study to include benthic surveys, increased numbers of transects, or increased survey areas.

Project Effects Analysis

Bear Swamp does not propose to assess project effects as part of its odonate study.

Comments

Massachusetts DFW recommends that Bear Swamp include an analysis of project effects on state-listed odonates in the study. It indicates that an analysis of project effects is necessary to develop flow recommendations for the protection of state-listed odonates.

Discussion and Staff Recommendation

The proposed study will provide information on the presence or absence of state-listed odonates. This information, in combination with available information on habitat preference, can be used to evaluate effects of existing and proposed project operations on any state-listed odonate species that may be present. While this analysis could be carried out by Bear Swamp as part of the odonate study, it is not necessary because staff will need to conduct a similar analysis when it prepares its environmental document. Therefore, we do not recommend modifying the proposed study to require Bear Swamp to include an evaluation of project effects on state-listed odonates.

Study 14: Freshwater Mussel Survey

Applicant's Proposal

Bear Swamp proposes to survey and document freshwater mussels and their habitat in the project area using a combination of methods including wading with a view bucket and snorkeling or diving with SCUBA equipment.

Study Area

Bear Swamp proposes to survey for mussels in the Fife Brook impoundment and in the Deerfield River from Fife Brook Dam to the project boundary which is approximately 7.5 miles downstream of the dam.

Comments

Massachusetts DFW, FWS, and the Watershed Council recommend that the study be modified to include the reach of the Deerfield River downstream of the project boundary to the upstream extent the Deerfield No. 4 impoundment. The stakeholders indicate that this reach of the Deerfield River is generally wider and shallow than the upstream section and there is habitat suitable for mussels in this reach.

Discussion and Staff Recommendation

As indicated above, releases from the Fife Brook Development affect the Deerfield River downstream to the Deerfield No. 4 impoundment and changes to project operation that will be considered in staff's analysis could affect this entire reach. Therefore, information on mussels inhabiting this reach is needed to describe existing conditions and to evaluate potential project effects (section 5.9(b)(4) and (5)) and we recommend that the mussel survey include sampling the entire reach of the Deerfield River from Fife Brook dam to the upstream extent of the Deerfield No. 4 impoundment. The level of sampling effort within this reach should be commensurate with the level of effort proposed for the upstream section of the Deerfield River.

Survey Areas

Bear Swamp proposes to survey for mussels at nine sites (eight in the 7.5-mile-long reach downstream of the Fife Brook dam and one in the upstream end of the Fife Brook impoundment) in representative mesohabitat types that will be identified in the aquatic mesohabitat assessment and mapping study.

Comments

Massachusetts DFW and FWS recommend having a qualified biologist review the results of the aquatic mesohabitat assessment and mapping study to identify potential habitat and select survey sites.

Discussion and Staff Recommendation

Consulting with resource agency staff or a qualified biologist to identify the number and location of survey sites along the 17-mile reach of the Deerfield River may slightly increase effort and cost, but it would also increase the likelihood of identifying mussel habitat and documenting mussels during the survey. Because information on the occurrence of freshwater mussels inhabiting this reach is needed to describe existing conditions and to evaluate potential project effects (section 5.9(b)(4) and (5)) we recommend that Bear Swamp consult with resource agency staff or other qualified

biologists to determine the number and location of mussel survey sites along the 17-mile stretch of the Deerfield River.

Survey Effort

Bear Swamp proposes to search for mussels in 100-meter-long sections of the river (as measured parallel to the river bank) for an average of 2-person hours per site, depending on site-specific conditions. Bear Swamp proposes to search until no new species are collected in the previous 30-minute interval.

Comments

Massachusetts DFW recommends a minimum survey effort of 1 observer minute per 10 square meters and states that the search time of 2-person hours per 100-meter-long section would not be adequate in sites where the width of the Deerfield River exceeds 30 meters (i.e. 5-person hours per 1000-meter-long section).

Discussion and Staff Recommendation

Few protocols for the detection of rare mussel species have been reported (Smith 2001). Based on analysis by Smith (2001), effort (number of transects or area sampled) should be based on desired detection probability (e.g., 85% chance of detecting at least one rare mussel), the anticipated density of the rare mussels (number per square meter), and search efficiency or detectability (i.e., the probability of detecting an individual in the search area).

Bear Swamp's proposed search effort of approximately 2-person hours per 100-meter-long section would equate to one observer minute per 10 square meters where the river is less than or equal to 12 meters wide.⁵ However, the Deerfield River averages approximately 50-meters-wide and ranges from approximately 12- to 200-meters wide downstream of Fife Brook dam. To achieve Massachusetts DFW's targeted effort of 1 observer minute per 10 square meters, Bear Swamp would likely need to increase effort by at least 2 to 4 times (i.e., 4 to 8 hours per 100-meter-long transect). While this increased effort may increase the likelihood of documenting rare mussel species, it would also significantly increase the cost of the proposed study.

As proposed by Bear Swamp, the proposed study would provide staff with the information necessary to describe the existing environment and to evaluate project effects on freshwater mussels (section 5.9(b)(4) and (5)). In addition, because Bear Swamp

⁵ A 100-meter-long transect that is 12 meter wide would equal 1,200 square meters. When divided by 2-person hours or 120 minutes of total sampling, it equals 1 minute of sampling per 10 square meters.

proposes to search until no new species are collected during the previous 30-minute interval, it is reasonable to conclude that the study will document all mussel species present at each sample site. While additional effort may increase the likelihood that rare mussels would be documented, we conclude that it is not necessary for staff's analysis and would not be worth the additional cost. Therefore, we do not recommend modifying the study as recommended by Massachusetts DFW.

Survey Period

Bear Swamp proposes to survey for mussels between June 1 and September 30 during periods of minimum flow releases from Fife Brook dam. Bear Swamp also proposes to document river flow and measure water clarity during the survey.

Comments

Massachusetts DFW states that elevated river flows in June and September can limit or preclude the ability to locate mussels during surveys and recommends conducting the survey during July and August when river flows are low.

Discussion and Recommendation

Reduced visibility from high flows or elevated turbidity could limit the ability of observers to detect mussels in the riverbed. However, Bear Swamp proposes to sample during minimum flows, which would likely be the best conditions available for visibility and observing mussels. To verify that the surveys are conducted during good conditions for observing mussels, Bear Swamp proposes to measure visibility. Because Bear Swamp will survey for mussels during minimum flows and record visibility, we do not recommend restricting the survey period for Bear Swamp's proposed mussel survey to only the months of July and August.

II. Requested Studies

Trout Scale Study

Study Request

Massachusetts DFW, Trout Unlimited, and the Watershed Council request that Bear Swamp conduct a study of trout scales to characterize the population of naturally spawning trout in the Deerfield River downstream of Fife Brook dam. The stakeholders indicate that year-round daily peaking negatively affects wild trout spawning and abundance downstream of Fife Brook dam and they request that Bear Swamp collect information on trout origin (wild or hatchery) via scale analysis.

Discussion and Staff Recommendation

The Deerfield River downstream of Fife Brook dam is a high quality trout fishery that is sustained through a combination of natural reproduction and stocking. At this time, there is no information in the record to indicate that stocking will be discontinued in the future; therefore, we expect the fishery to continue to support a high quality trout fishery with any changes implemented through licensing maintaining or enhancing conditions for trout. As part of the Fish Assemblage Assessment Study, Bear Swamp proposes to collect abundance, length, and weight data for all collected trout, and using a length-frequency analysis, would separate trout into three age classes (i.e., adult, young-of-year (YOY), and yearling). This information, when compared to the known size of stocked trout, would provide an indication of the contribution of natural reproduction to the existing population. In addition, Bear Swamp proposes to document redds during the fish assemblage assessment study, which would also provide additional information about natural reproduction in the Deerfield River. While collecting and analyzing trout scales would provide more precise information about natural reproduction in the Deerfield River, the information that will be collected by Bear Swamp through the fish assemblage study will be adequate to describe existing conditions and support staff's analysis of project effects (section 5.9(b)(4) and (5)); therefore, we do not recommend requiring a Trout Scale Study.

Fife Brook Impoundment Access and Portage Feasibility Study

Study Request

The Watershed Council requests that Bear Swamp perform an assessment of potential a walkable portage routes around the Fife Brook impoundment.

American Whitewater, Appalachian Mountain Club, Crab Apple Whitewater, New England Flow and Zoar Outdoor, collectively request a study of alternatives to increase public access to the Fife Brook impoundment while still protecting public safety.

Discussion and Staff Recommendations

Section 5.9.4 of the PAD states that access to the Fife Brook impoundment is prohibited due to security and safety reasons and is restricted by a system of perimeter fencing, locked gates, and signage. These physical barriers prevent navigation through the Fife Brook impoundment to Fife Brook dam. Currently, the only route around the Fife Brook dam is from the Dunbar Brook take-out in the Fife Brook impoundment to the put-in downstream of the Fife Brook fishing and boat access area. That route is approximately 3.5 miles along River Road.

During scoping and in comments on the study plan, commenters requested access to the Fife Brook impoundment for hiking, shoreline fishing, and boating. To document

safety concerns and describe the feasibility of providing access to the Fife Brook impoundment and a portage at Fife Brook dam, we recommend that Bear Swamp conduct a study that includes: (1) identification of existing shoreline access within the Fife Brook impoundment and potential options for improving shoreline access, such as installation of floating or fixed docks, operational changes, or other measures; (2) a description of physical and operational measures that could be implemented to allow boating through or portaging around the Fife Brook impoundment; (3) description of options for portaging around Fife Brook dam; (4) identification and discussion of any public safety concerns associated with each portage, boating access, and shoreline access option; and (5) cost estimates for each of the portage, boating access, and shoreline access options. This study will help describe the existing conditions, including public safety issues resulting from existing and alternative project operations, and will provide information that is needed for staff's analysis of project effects (section 5.9(b)(4) and (5)).

Angler Wading Study

Study Request

The Watershed Council recommends that Bear Swamp conduct a study to evaluate angling in the Deerfield River downstream of Fife Brook dam over a range of flow conditions. The Watershed Council recommends evaluating the existing minimum flow and three additional flows throughout the 7.5-mile-long reach of the Deerfield River downstream of Fife Brook dam.

Discussion and Staff Recommendations

The Deerfield River downstream of Fife Brook dam is a popular area for wading anglers. During scoping, several commenters indicated that flows influence the ability of anglers to wade and fish in this section of the river and certain high flows can create challenging or even unsafe wading conditions. Bear Swamp proposes to conduct a Recreation Survey (Study 6) that will obtain information about angler use in the Deerfield River downstream of Fife Brook dam. The Recreation Survey may provide some information about angler satisfaction, but it will not provide sufficient information to determine adequate or optimum flows for angling and no other studies proposed by Bear Swamp would provide this information.

As part of relicensing, staff will consider changes to project operation, including changes to the 125-cfs minimum flow that is currently required. In addition to affecting aquatic resources, changing the minimum flow could have a significant effect on flow conditions that are available to anglers in the Deerfield River. Because no specific information is currently available that describes the relationship between flow and angling opportunities, we recommend that Bear Swamp conduct an Angler Wading Study.

The Angler Wading Study should be conducted at several commonly fished locations (i.e., 4 or 5) over the range of flows that are being evaluated in Study 10 - Instream Flow Study. At each location, 3 or more anglers should wade into the stream for 15-30 minutes to assess the ability to move freely about the streambed. After exiting the stream, anglers should be asked to categorize: (1) the flows (e.g. high, medium, low), (2) the safety of wading conditions (e.g. unsafe, challenging, safe), and (3) the overall angling experience (undesirable, adequate, optimum). Anglers should also be asked if higher or lower flows would be preferred. The angler wading study should be developed in consultation with the local fishing groups, primarily to identify common fishing locations and to recruit experienced anglers to test wading conditions. This information would be used to describe the existing environment and assess project effects on fishing opportunities; therefore, we recommend that Bear Swamp conduct an Angler Wading Study.

Warning System Effectiveness Study

Study Request

Currently, Bear Swamp uses a warning system (i.e., strobe light and horn) to notify anglers and boaters when releases from Fife Brook dam are increasing from the 125 cfs minimum flow to higher discharge flows. The Watershed Council recommends that Bear Swamp conduct a study to evaluate the adequacy of the warning system.

Discussion and Staff Recommendations

Rapid increases in flow can create unsafe conditions for wading anglers. The existing warning system likely provides adequate warning for anglers near Fife Brook dam; however, it is unknown how far downstream the system is effective. In addition, weather conditions, time of year, river flow, and ambient recreational user noise likely affects the effectiveness of the warning system. Therefore, we recommend that Bear Swamp conduct a study to measure the audibility (i.e., decibel levels) of the warning system. As part of this study, Bear Swamp should measure the decibel levels of the horn at half mile intervals downstream of Fife Brook dam to a point where it is no longer audible to the human ear. Because multiple horn tests could create confusion, staff recommend conducting the tests when the horn would be sounded during normal project operation, either using multiple decibel meters at multiple locations or using one meter moved downstream over a series of days. If one meter is used, Bear Swamp should select a series of days when weather conditions are forecasted to be relatively stable. During each test period, Bear Swamp should record weather conditions. To account for variation in weather conditions and foliage, Bear Swamp should measure the audibility of the horn once between June and August and once between November and April. This information will describe the existing environment and is necessary for staff's analysis of project

effects on recreational resources, including anglers and boaters (section 5.9(b)(4) and (5)).

Whitewater Boating Flow Study

Study Request

American Whitewater requests that Bear Swamp use accepted whitewater boating flow evaluation methods to assess a range of recreation flows downstream of the Fife Brook Development. American Whitewater suggests that the study include kayakers, canoers, stand up paddle boarders, and drift boats and that flows be assessed for safety, adequacy, and quality of experience at different flow levels.

Discussion and Staff Recommendations

The current license requires Bear Swamp to annually provide 106 scheduled whitewater flow releases at a minimum flow level of 700 cfs for a duration of at least three continuous hours. These scheduled releases were negotiated as part of the settlement agreement for the Deerfield Project (FERC No. P-2323) and were amended into the Bear Swamp Project license in 1997.⁶

In Section 3.4.2 of the RSP, Bear Swamp suggests the requested Whitewater Boating Flow Study is unnecessary because there is sufficient existing information to assess the effects of project flows on whitewater boating. They propose to use data collected through interviews with whitewater boaters as part of the Recreation Survey (Study 6) to identify preferred flows. Bear Swamp also proposed to examine the feasibility of providing alternative recreation flows as part of its Operations Model Study (Study 9). However, the existing scheduled whitewater flow releases were never evaluated with a field study and staff is not aware of any existing information that could be used to assess the adequacy of the existing releases. While the Recreation Survey will collect information about whitewater boating use and the satisfaction of users with existing flows, it will provide no information about the whitewater boating experience associated with higher and lower flows that could be released from the project.

To address the numerous flow-related issues raised during scoping, staff's environmental analysis will need to consider a range of project operational scenarios which will be addressed through the proposed Operation Model Study. However, staff's analysis will also require information regarding the adequacy of existing whitewater releases and the potential benefits to whitewater boaters of alternative scheduled releases. Therefore, we recommend that Bear Swamp conduct a Whitewater Boating Flow Study and assess a range of flows on whitewater recreational opportunities downstream of Fife

⁶ See 79 FERC ¶ 61,009.

Brook dam. Specifically, Bear Swamp should conduct a controlled whitewater boating flow study using the methods described in Whittaker et al. (2005). At a minimum, the flow study should assess four flows, including the existing 700 cfs flow, one lower flow, and two higher flows. The study should test the effects of these flows on the common types of boating that are known to occur downstream of Fife Brook dam, which would include (but not be limited to) kayaks, canoes, and inflatable rafts and inner tubes. We recommend that the study methodology and selection of specific flows and boat types be further developed in consultation with local whitewater boating groups.

The report for this study should: (1) summarize the whitewater boating attributes of each flow for each boat type (e.g., difficulty, unique features), (2) present the acceptable and optimal flow for each boat type, and (3) discuss results from other studies and identify any competing recreational uses (e.g., fishing) or other resource needs (e.g., aquatic habitat) that may be adversely affected by scheduled releases.

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