

FISH PASSAGE FOR RESIDENT FISH?

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Canaan Dam Spillway



ABSTRACT

Public Service Company of New Hampshire (PSNH) is a vertically integrated public utility that owns and operates nine hydroelectric projects in New Hampshire totaling approximately 70 MW. PSNH's 1.1 MW Canaan Project is located on the upper Connecticut River in the states of New Hampshire and Vermont. The relicensing of this project was one of seven "pioneer" projects electing to utilize the Federal Energy Regulatory Commission's (FERC or Commission) new Integrated Licensing Process (ILP) during the initial transition period.

During the ILP scoping process, resource agencies and intervenors requested that PSNH study the feasibility of upstream fish passage at the Canaan Project. There are no Atlantic salmon or other migratory fish in the project area: upstream fish passage was proposed for indigenous brook, and non-native brown and rainbow trout and other non-migratory resident fish. A standard Denil fishway and an Alaska Steeppass were determined to be technically feasible options and were evaluated for economic feasibility by PSNH's consultant, Kleinschmidt Associates.

Waters in New Hampshire generally do not support large numbers of trout because of poor nutrient soils, low fertility and little food. For almost a hundred years, the New Hampshire Department of Fish and Game (NHFG) has managed the fishery in the Canaan Project area as a recreational "put and take" trout fishery featuring brook, brown and rainbow trout. Large numbers of stocked brook, brown and rainbow trout support daily bag limits of five fish or five pounds. There is no broad based public support for and no concrete proposal to change this management strategy at the present time.

PSNH is supportive of fish passage and has installed upstream and downstream fish passage at other projects. However, PSNH did not propose installation of upstream fish passage for stocked trout in its Preliminary Licensing Proposal or License Application for the Canaan Project.

The 401 water quality certificate issued for the Canaan Project by the Vermont Agency of Natural Resources (ANR) required that upstream passage be installed in the future, but only after a request by the ANR and a change in fisheries management which would emphasize self-sustaining trout populations. PSNH has appealed the 401 water quality certificate to the Vermont Environmental Court and is hopeful that it will be able to clarify the certificate language to require a meaningful change in area fisheries management as a condition to the installation of upstream fish passage.

In the subsequent license issued for the Canaan Project on January 16, 2009 the FERC did not independently require upstream fish passage. The license order concluded that the Department of the Interior's United States Fish and Wildlife Service (USFW) reservation of authority to prescribe fishways in the future and the ANR's 401 water quality certificate upstream fish passage condition provided adequate protection for the resource.

Project Description

PSNH's Canaan Hydroelectric Project, FERC Project No. 7528, is located on the Connecticut River on the border between New Hampshire and Vermont in the towns of West Stewartstown, New Hampshire and Canaan, Vermont. The project is a run-of-river hydroelectric facility operated automatically, on-site via pond level control, utilizing one S. Morgan Smith 1,550 hp, 164 rpm vertical Francis water wheel with a maximum hydraulic turbine capacity of 466 cfs, and a General Electric vertical generating unit with a rated capacity of 1,100 KW. The dam is primarily located in New Hampshire, and the penstock, two surge tanks, powerhouse and tailrace are located in Vermont.

The project's concrete gravity dam is approximately 275 feet long with an average spillway crest height of 15 feet. The concrete gravity dam consists of four principal components: (1) A waste gate located to the right of the main spillway consisting of a 20 foot wide concrete sluiceway equipped with an electrically operated 15 foot high steel tainter gate; (2) A 150 foot long ogee-shaped principal spillway section with a crest elevation of 1051.5 feet, topped with 3.5 foot wooden, pipe supported flashboards (elevation 1055.0 at top of flashboards); (3) A 56 foot wide concrete section located at the south abutment with stoplogs supported by steel stanchions. The crest of the sluiceway is at elevation 1046.0 (USGS) and the stoplogs extend up to elevation 1055.7 (USGS) and (4) An intake structure located at the north abutment of the dam with an electrically operated steel gate measuring 12 ½ feet wide by 12 feet high which leads to a wood stave penstock. The invert of the penstock at its upstream end is at elevation 1040.0 (USGS).

A 1,360 foot long, 9.5 foot exterior/9.0 foot interior diameter, wood stave penstock transports water from the dam to the powerhouse. Two steel surge tanks are 15' 4" in diameter and 21' 4" in height. The two tanks are supported by a reinforced concrete substructure. The powerhouse, located on the north bank of the river approximately 200 feet downstream of the surge tanks, has a substructure of reinforced concrete with a brick superstructure supported by steel framing. The superstructure is approximately 31 feet long by 29 feet wide.

Canaan Dam Tailrace and Bypass Reach



The estimated average generating head is 35 feet. The estimated average annual generation is 7,300,000 kilowatt-hours. The impoundment is approximately 4,000 feet long with a surface area of about 20 acres and a gross storage capacity of approximately 200 acre feet.

Project Relicensing

The relicensing of PSNH's Canaan Project was one of seven "pioneer" projects electing to utilize the FERC's new ILP during the initial transition period. PSNH filed its Notice of Intent to file an application for a license, its two volume Preliminary Application Document and proposed process plan and schedule on August 2, 2004. The Commission published notice of the application on August 20, 2004.

As part of the ILP, PSNH conducted a public scoping process during which various resource issues were identified. The Connecticut River Watershed Council (CRWC) recommended that there be a study of the value of upstream passage for resident fish species at the project in their comment letter dated October 13, 2004. Trout Unlimited (TU) also requested an upstream fish passage study. During the January 24, 2005 study plan meeting, the ANR verbally requested that an upstream fish passage plan for trout be added to their list of previously identified study requests. Also, during this meeting the resource agencies from New Hampshire and Vermont decided the management objectives for the bypass reach at the project should be to foster the health of the resident fish population and to promote the coldwater fishery for resident trout species.

In response to these requests, PSNH engaged Kleinschmidt Associates to evaluate the technical and economic feasibility of upstream fish passage. An Initial Study Report was completed and circulated to the parties in April, 2006. Several different upstream passage systems were evaluated for the Canaan dam. They included fish ladders, a nature-like bypass channel, a fish ramp, a fish lift and a fish lock.

Some of these systems were eliminated from further consideration during preliminary review. Fish lifts and locks have similar efficiency for passing fish at relatively low head barriers, such as the project dam, but are typically more complex and costly than other systems because of their various mechanical components, which also require relatively high maintenance. For this reason they are typically only utilized for projects where relatively high head differential causes excessive length and reduced fish passage efficiency in systems such as ladders and bypass channels. Thus, they were not considered for the Canaan dam.

A fish ramp consists of a portion of the river channel that is built up into a roughened slope (usually 1:20 or shallower) that passes over or around the dam. For the Canaan site, a fish ramp with a length of 360 feet or more would be required. In order to prevent the only ramp entrance from being at its downstream end, 360 feet away from the dam, a slope up along the face of the dam to the top of the ramp would also be desired. This would cause the width of the ramp to be similar to its length. Because of the significant footprint required, there is no room for this type of structure to be built around either end of the dam due to adjacent roads, railroad, penstock, maintenance building and intake access road. A ramp could be placed over the spillway, but this would reduce the spillway discharge capacity. Fish ramps also have a tendency to dry out at low river flows and are typically not used for head differentials greater than 10 feet. Thus, a fish ramp was not considered for the project dam.

Similarly, special constraints and interferences around the dam and the need for a flow control gate at the upstream end of the bypass channel made the construction of a nature-like bypass channel uneconomic. Kleinschmidt Associates estimated that the cost of a nature-like bypass channel would be two to three times greater than the cost of installing a fish ladder. Due to the constraints on available area, the likely layout and the resulting excessive construction costs, a nature-like bypass channel was eliminated as a viable option at the project.

A pool pass, vertical slot pass and Denil passes were also considered as possible fish passage options. A Denil pass was considered to be the most appropriate because it requires the least amount of space, is the least expensive and can tolerate the amount of head pond fluctuation seen at the site.

At the Canaan project, a standard Denil fishway would have a minimum length of 110 feet, including two resting pools, to ascend the 18 foot head differential at the dam. If the fishway was laid out as a straight channel the entrance would be located approximately 80 feet downstream of the apron of the dam. In most cases it is preferable to keep the fishway entrance as far upstream as possible, which in this case is the downstream edge of the dam apron. This could be done by installing two 180 degree turnpools in the fishway. Adding turnpools increases the width and complexity of the structure, the construction costs, and its exposure to river flow, debris and ice.

Two locations for placement of an upstream passage facility were identified at the Canaan project. The first is along the concrete abutment at the south end of the dam. One or two stoplog stanchion sections would be removed allow the fishway to exit into the head pond. The disadvantage of this location is that it is on the opposite side of the dam from the potential location for downstream passage. Downstream passage flow could potentially attract fish that are trying to pass upstream away from the upstream fishway entrance.

The other feasible location identified is at the north end of the spillway adjacent to the waste gate. The advantage of this location is that it is also the most practical location for downstream fish passage. Both the standard Denil fishway and the Alaska Steeppass could also be used as a downstream fish passage channel at this location. An arrangement similar to this is used at the South Berwick Hydroelectric Project, located on the Salmon Falls River in the towns of South Berwick, Maine and Rollingsford, New Hampshire. At the South Berwick facility, the upstream and downstream fish passage seasons do not overlap, so the baffles are removed from the Denil fishway during the downstream passage season to create an open channel.

At the Canaan project, there would be concern for potential damage if an Alaska Steeppass were chosen for this location. Locating the fishway in the spillway makes it more susceptible to damage caused by high flows, debris and ice. A sturdy concrete structure like a standard Denil fishway would be required to withstand this loading at the Canaan project.

Based on the technical feasibility, installation of a standard Denil fishway and an Alaska Steeppass were evaluated for economic feasibility. Installation of a standard Denil fishway was estimated to cost \$686,000 and an Alaska Steeppass was estimated to cost \$550,000. Based on recent construction cost escalation, PSNH estimates that today these costs would be higher. To put these estimated costs in perspective, the un-depreciated net investment of the 1.1 MW Canaan project was approximately \$330,000 at the time the Canaan license application was filed.

The fish passage initial evaluation results were discussed during two teleconferences in May, 2006. In June, 2006 the parties provided comments on the Initial Study Results. TU recommended installation of a standard Denil as opposed to an Alaska Steeppass, expressed a preference that the water exiting the fishway should be exiting in the same direction as the water spilling over the dam and as close as possible to it. TU also raised the potential issue that fish may be attracted to the tailrace, rather than the bypass reach and not locate the fishway.

Convergence of Tailrace and Bypass Reach



The CRWC shared TU's concerns and noted that any final plan should call for agency and intervenor review of the type and design of the fishway selected and resolution of attraction water concerns before installation. CRWC also called for monitoring of fishway effectiveness for three years with PSNH making any necessary adjustments to improve effectiveness. Additionally, CRWC suggested PSNH consider use of the fishway for both upstream and downstream passage. FERC Staff determined that these comments did not require study modification, but rather addressed mitigation measures to be addressed post-application filing.

PSNH submitted its Final Study Reports in September, 2006.

In March, 2007 PSNH filed its Preliminary Licensing Proposal (PLP). PSNH did not propose installation of upstream passage for non-anadromous, stocked, resident fish.

In April, 2007 at a meeting held to discuss the PLP, the agencies and intervenors provided a "Justification for Fish Passage at the Canaan Hydropower Project" (Justification). The principal argument of the Justification in support of fish passage was that the Canaan Dam disconnects two critical types of habitat needed by resident brook, brown and rainbow trout: upstream, steep gradient, coarse substrate spawning habitat and downstream, low gradient, slow water, finer substrate overwintering habitat. The Justification also alleged that macroinvertebrate life in the upper section of the Connecticut River is more diverse, providing increased feeding opportunities upstream of the dam.

In the Justification the agencies took the position that the ability of trout to migrate within their environment is important to their success and may be essential to survival. Several studies identifying local and more extensive movement were cited in support of this proposition. The Justification concluded by indicating that the fish and wildlife agencies believe that fish passage facilities at the dam, by restoring the ability of fish to move up and downstream past the dam, will substantially improve the abundance of trout populations and their ability to sustain themselves naturally.

In comments filed May 30, 2007, the Connecticut River Joint Commissions of New Hampshire and Vermont (CRJC) expressed hope that the “the excellent coldwater fishery in the region be maintained and improved if possible....should be more self-sustaining...”. Citing NHFG research that habitat connectivity is important to survivorship, as well as the Justification, the CRJC requested upstream and downstream fish passage.

The ANR also commented on the filing. Citing the 1999 draft “Upper Connecticut River Strategic Fisheries Management Plan” prepared by the NHFG, the ANR noted that while trout are currently stocked in this part of the Connecticut River, the goal is to restore self sustaining populations. ANR observed that given the high angler interest and heavy angling pressure this reach receives, the existing population is not adequate to provide an acceptable level of angler satisfaction without a stocking supplement. ANR also noted that naturally reproducing populations of brook, brown and rainbow trout are currently sustaining themselves, but are not considered to be at normal, healthy levels. Noting that the PLP provides that populations of trout are “supported” by stocking, and that it is more correct to state that the trout population is “supplemented” by stocking, ANR suggested that the final license application be drafted to more accurately describe the fisheries management.

In comments dated June, 2007, TU supported upstream and downstream fish passage at the project, based on the conclusion that the Canaan Dam severely fragments a long section of the upper Connecticut River into two very different environments: a lower section which provides winter and summer refuge, and an upper section that offers spawning habitat lacking below the dam. TU noted that for a wild healthy population of trout there has to be fish passage in both directions, upstream and downstream. TU also stated that they do not support the illusion of a healthy fishery with the use of hatcheries and a “put and take” management policy.

USFW also noted that unimpounded coldwater habitat is rare on the mainstem of the Connecticut River, and Canaan Dam disconnects two of the longest reaches of that type of habitat on the Connecticut River and argued that the upper Connecticut River supports substantial fishery resources that would benefit from passage measures. USFW noted the Justification and that both the Vermont Department of Fish and Wildlife (VDFW) and the NHFG have provided study reports and technical papers in support of the need for passage. USFW supported their call for fish passage, and observed that a downstream facility could be operated year round without affecting project generation, given the proposal for bypass reach habitat flows. USFW also noted that an upstream passage facility would need to operate from September 1 through December 15 and April 1 through June 30, with some potential adjustment based on experience or specific conditions during a given year.

The CRWC supported the comments of the ANR and others.

PSNH filed its license application on July 30, 2007. In its application, PSNH did not proposed fish passage for the Canaan project. PSNH disputed the Justification allegation that the goal of agencies is to restore wild populations of trout to this reach of the Connecticut River based on a variety of public documents. PSNH also noted a number of factors that limit the sustainability of wild trout populations in New Hampshire, as well as the high fishing pressure in the area. As the Justification expressed general

concern that the Canaan Dam disconnects critical spawning habitat upstream of the dam from overwintering habitat downstream of the dam, PSNH's consultant, Kleinschmidt Associates conducted, and PSNH filed, a study to determine if the distribution of upstream and downstream habitat was more complex than described.

The results of this study confirmed the relationships between reach slope and habitat type; identified suitable spawning habitat downstream of the dam; and identified overwintering habitat upstream of the dam. Furthermore, this study successfully identified a range of habitat types that would potentially support a number of life history strategies associated with the species of interest (apart from spawning and overwintering) including feeding, resting and breeding. The results suggested that a simple demarcation of spawning habitat upstream of the dam and overwintering habitat downstream of the dam is not appropriate.

PSNH's license application also noted the continuing debate in the literature regarding the causes and degree of trout movement and refuted the contention in the Justification that trout need to migrate. PSNH cited studies indicating that a high percentage of trout remain in the same area throughout the year.

Notice that PSNH's license application had been tendered for filing was published on August 10, 2007, and notice that the application was accepted for filing, soliciting motions to intervene and protests, and notice that the application was ready for environmental analysis and soliciting comments, recommendations and preliminary terms and conditions and preliminary fishway prescriptions was published on September 25, 2007.

Motions to Intervene in the relicensing were filed by the CRWC, the UFWS, and the ANR. Comments were filed by the CRWC Council, the UFWS, the ANR, TU and NHFG.

The CRWC noted its concern that PSNH rejected the installation of fish passage facilities despite resource agency recommendations and again noted that long reaches of flowing water are rare on the mainstem of the Connecticut River and that the Canaan dam fractures two of the biggest reaches of that type of habitat in the Connecticut River. The CRWC recommended that FERC include a license condition establishing upstream and downstream fish passage, based on the Justification as well as a new study that found that fragmentation, independent of habitat loss, increased extinction risk of brook trout in a stream network in a tributary to the Connecticut River located in Massachusetts.

In its comments, the ANR observed that that the reach of the Connecticut River upstream of the dam contains abundant, high quality habitat for trout spawning and incubation, as well as for early life stages such as fry and juveniles; that the reach downstream of the dam contains very limited habitat of this type and almost all of it is found about 12 miles downstream of the dam; and that while spawning habitat is limited, the downstream reach provides abundant adult habitat and adult overwintering habitat. ANR criticized PSNH's habitat study, arguing that the study confirms that the habitat upstream is very different from that which exists downstream. ANR noted that the upstream reach is predominantly riffle habitat with few deep pools, while the downstream reach included deep-slow habitat used for both feeding and overwintering. ANR concluded that the Canaan dam fragments different necessary habitat types needed by the trout and other fish in the Connecticut River, reducing the success and abundance of

the naturally reproducing trout populations, impacting their ability to sustain themselves and contributing to the need for supplemental stocking.

The ANR recommended that PSNH institute upstream fish passage within two years of license issuance, subject to consultation with ANR, VFW, NHFG and USFW during plan development, and subject to plan approval by the ANR. ANR recommended fish passage operation during the period April 1 through June 30 and September 1 through December 15, with adjustment based on experience or specific conditions during a given year, either at PSNH's request and subject to fisheries agencies' approval or pursuant to a mutual request by the fisheries resource agencies.

TU also criticized PSNH's habitat study, arguing that it confirms that the respective reaches of the river upstream and downstream of the dam vary substantially in character, with the channel slope approximately six times steeper upstream of the dam than downstream. TU concludes that "clearly the failure of the wild fisheries is because of the dam dividing two distinctly different environments, each necessary for wild trout to survive. The viable spawning habitat is above the dam with clean gravel, while the best feed and winter survival refuge is below with deeper pools and slower currents. To develop a wild and self-sustaining trout population the trout must be able to move back and forth between both these critical habitats."

The NHFG concurred that the habitats upstream and downstream of the project are physically different, thereby supporting the need for fish passage in both directions to provide access to various habitats to support them throughout their life history. NHFG noted that during spawning, salmonids (especially brook trout) seek areas of upwelling, searching for areas with high levels of groundwater influence, and observed that it is unknown whether the area above or below the project has a better groundwater influence.

NHFG also argued that normal behavior of salmonids is to travel upstream to spawn and that at the Canaan project, the fish downstream traveling upstream in search of spawning gravel potentially won't spawn at all because they are unable to navigate the dam. Unable to spawn, the fish reabsorb their eggs, which have a direct detrimental effect on wild trout recruitment. NHFG also argued that the fish may prefer the alternative habitat (upstream or downstream) at various times throughout the year beyond spawning but they currently can't access it. The agency took the position that when habitat fragmentation increases, fish populations decrease, and alleged that the decline in brook trout range-wide is in large part a result of habitat fragmentation.

NHFG postulated that differences in migratory behavior stem from the amount of suitable habitat present in the study area, noting that it has been documented in various research articles that fish migration is dependent upon habitat suitability and fish migrate to seek various parameters, including but not limited to coldwater refuge, forage, spawning substrate, overwintering grounds, and flow refuge. NHFG also observed that some reports note that fish have to move only a little to acquire what they are looking for and some need to venture further.

Citing an ongoing radio telemetry study in the Dead Diamond River watershed (Second College Grant, NH; Wentworth Location, NH; Errol, NH), NHFG argued the study demonstrated an increase in migration when conditions in the river became stressful (e.g., high temperatures, low flows, high flows, etc.) or when the fish seek

spawning or overwintering grounds, and that the highest level of movement occurred during their pursuit for overwintering grounds.

In this study, in 2005, the summer was hot and dry, flows were down and temperatures were up. The tagged fish left the Dead Diamond River in the early summer and didn't return until the following spring, traveling distances greater than 50 miles. These fish were observed spawning in an entirely different river. The tagged fish from the 2007 study demonstrated less movement in the summer when water levels remained stable and cool. The fish remained in the river until the end of spawning and migrated downstream to their overwintering grounds (>20 miles).

Citing the Justification and the overall benefits of and need for connectivity, USFW supported the position taken by the ANR, VDFW and NHFG that installation of upstream and downstream passage facilities at Canaan are warranted. However, rather than prescribe fishways, USFW reserved its authority to do so. In accordance with the ILP process and recent rule changes, prescription of fishways at the Canaan project would have required USFW to defend its prescription in a trial type hearing. By recommending, but declining to prescribe fishways, USFW avoided the trial type hearing process.

Instead, as a Section 10(j) recommendation, USFW recommended that "the licensee shall, for the protection and enhancement of fish resources, install and operate upstream and downstream fishways at the project dam. The fishways shall be designed in consultation with the USFW, NHFG and the VDFW and the plans shall subsequently be approved by the Commission. The fishways shall be installed according to a schedule developed in consultation with the above agencies and approved by the Commission. Design plans and installation schedules shall be filed with the Commission within one year of license issuance."

USFW also recommended that "the licensee shall conduct evaluations of the upstream and downstream fishways. Within one year of license issuance, the licensee shall file with the Commission plans and a schedule for the effectiveness evaluations. These plans and schedules shall be developed in consultation with the USFW, NHFG and the Vermont Department of Fish and Wildlife, and the agencies shall be given a minimum of thirty days to review and comments on the plans before their submittal to the Commission".

In January, 2008 PSNH replied to the agency and intervenor comments. PSNH observed that a number of NHFG public policy documents and published scientific literature, including those cited in the Justification, do not support the agencies recommendation to provide resident fish passage for this recreational "put and take" trout fishery. The NHFG Wildlife Action Plan indicates wild trout populations are monitored to ensure that they support angling pressure without the addition of cultured fish, which strongly suggests that areas supplemented with stocked fish are not considered wild trout populations. A 1996 NHFG survey indicated that there was support for wild trout in selected waters only. NHFG's Inland Fisheries 2005 Operational Master Plan designated three ponds and twelve streams in the state as wild trout waters. The Canaan Project area is not included as an area proposed for wild trout management.

PSNH noted that a 2004 NHFG Creel Survey report states that stocking of trout should continue as the management strategy for this area. The report indicates that

creel surveys support the continuation of the long standing management strategy (*stocking*) for this section of the upper Connecticut River. The lack of wild (non-stocked) trout contributing to the recreational fishery suggests that the stocked component is vital for sustaining this significant recreational fishery and should be continued at current levels. Angler contribution to local businesses is an integral boost to the northern economy and warrants current management strategies (*stocking*) for this destination fishery.

PSNH also argued that the practice of stocking brown and rainbow trout is a larger risk to wild brook trout than the lack of fish passage at the Canaan dam. In addition to genetic implications, interactions between brook (native), brown (non-native, stocked) and rainbow (non-native, stocked) trout result in negative consequences for brook trout for reproductive interactions, redd superimposition, diet and resting habitats. Furthermore, continuous introduction of hatchery-raised brook trout can wipe out unique adaptations to local conditions. Wild brook trout can not compete with stocked rainbow and brown trout and once these cultured fish are stocked the genetic diversity of the wild brook trout populations is diluted. While, there has been recent interest in identifying and protecting native strains of brook trout that have not experienced genetic introgression by hatchery-raised fish, with almost a hundred years of stocking history, such strains are not likely to be found in the Canaan Project area.

The Justification also suggested upstream and downstream fish passage is needed because there are no overwintering areas upstream and no spawning habitat downstream of the Canaan Dam. As noted above, PSNH conducted a survey of both areas, and while the gradient upstream of the dam is steeper, suitable habitat for overwintering and spawning were identified both upstream and downstream of the Canaan Project. There are abundant tributaries and seven rivers between Canaan and Gilman Dam that provide habitat below the dam suitable for spawning. Furthermore, PSNH's consultant Normandeau Associates sampled representative tributaries both above and below the dam and found brook trout are spawning in tributaries.

In March, 2008, FERC issued the Environmental Assessment for the Canaan Project. The EA notes that upstream passage is not required for Atlantic salmon. Regarding habitat in the project area, citing the Kleinschmidt Associates study the EA observes that "although habitats upstream of the project and downstream of the project are generally quite different, both spawning and overwintering habitat are present in both reaches of the river." The EA goes on to note that "there is not enough information in the record to assess whether limited access to spawning habitat is adversely affecting trout populations. This information could potentially be gathered with a multi-year study, but it would require a study design that could determine which, if any, of the many potential factors are limiting trout populations. Such factors could include, but would not be limited to, the amount and quality of spawning habitat, the distribution and quality of other required habitat types for different life stages, predation, angler harvest, disease, siltation, other water quality issues and invertebrate and other prey populations. Such a study would be beyond the scope of this licensing proceeding. Therefore, all that can be said based on the current information is that if upstream passage is provided and operated effectively at the Canaan project, then trout populations below the project would have access to more spawning habitat than they have access to now. If access to spawning habitat is currently limiting trout populations, then upstream passage may result in more trout production and larger populations, assuming some other factor is not preventing

population growth.”. The EA also notes that USFW has reserved the authority to require fish passage and could require fish passage in the future.

In concluding not to recommend upstream fish passage for the Canaan project at this time, the EA notes that the existing fish community consists of resident trout species and a typical New England assemblage of other resident fish species, some which are known to migrate seasonally in some rivers depending on the need to find suitable habitat for spawning or wintering. The EA also observes that successful reproduction of brown and brook trout is documented both upstream and downstream of the project, is known to occur in the tributaries and may also occur in the Connecticut River. However, the most critical factor in the determination not to require fish passage is while upstream passage may provide access to additional habitat, which may result in higher survival and growth, there is nothing in the record to indicate whether access to additional habitat is currently a limiting factor for fish populations.

Comments regarding the EA were filed by NHDES, USFW, ANR and the CRWC. NHDES noted that ANR will issue a single 401 certification for Vermont and New Hampshire and that it will consult with ANR to ensure compliance with New Hampshire surface water quality standards.

The ANR notes that it will be processing a 401 water quality certification for the project and that all FERC Staff recommendations that differ from the ANR’s preliminary terms and conditions are within the scope of the 401 water quality certification. The ANR further notes that it will be working with NHDES, NHFG and USFW in drafting the 401 water quality certificate.

The CRWC disagreed with the upstream fish passage recommendation and argued that because PSNH realizes income from the free use of a public trust resource it should be required to invest in the river, the health of the river and the aquatic species in the river including improving spawning potential for fish.

USFW indicated that it had received FERC Staff’s notice of preliminary finding of inconsistency between their 10(j) recommendation for fish passage and other applicable law, and that it was responding to the request for comments on the EA and potential for a meeting re: the identified dispute. USFW expressed the opinion that the disagreement over fishway construction was not an actual dispute under Section 10(j), but was the insertion of the technical opinions of the Commission Staff over those of the resource agencies with the expertise, jurisdiction and a mandate for fish resource protection and enhancement. Because the fish passage issue in this case is either to construct fishways or not and there is no middle ground between these positions, USFW observed that conducting a meeting is likely to be unproductive and not a wise use of limited resources. Instead, the USFW indicated it would continue to support the need for fishways in the state 401 process.

Subsequent License

The Order Issuing Subsequent License for the Canaan hydroelectric project was entered on January 16, 2009, prior to resolution of PSNH’s 401 water quality certificate appeal. In issuing the license, the Commission reserved its authority to revise those conditions as necessary upon disposition of the appeal as well as to modify the license as necessary to ensure consistency with those conditions.

License Article 402 reserves the Commission's authority to require fishways that may be prescribed by Interior (USFW) for the project.

As noted above, USFW recommended upstream fish passage at the Canaan project as a Section 10(j) condition, rather than prescribing fish passage at this time. If the Commission believes that any Section 10(j) recommendation may be inconsistent with the purposes and requirements of Part I of the Federal Power Act (FPA) or other applicable law, Section 10(j) requires the Commission and the agencies to attempt to resolve any such inconsistency, giving due weight to the recommendation, expertise and statutory responsibilities of such agencies. USFW declined to meet concerning the dispute over upstream fish passage, stating that a meeting would be unproductive because USFW Staff recommend construction of fishways and FERC Staff do not, and there is no compromise between these recommendations.

If the Commission still does not adopt a recommendation, it must explain how the recommendation is inconsistent with Part I of the FPA or other applicable laws and how the conditions imposed by the Commission adequately and equitably protect, mitigate damages to, and enhance fish and wildlife resources. In discussing the rationale for not requiring upstream fish passage at the Canaan Project, the license order notes that USFW requested a reservation of authority to prescribe fishways in the future and that USFW's 10(j) recommendation, NHFG, TU and the CRWC all recommend passage immediately without a change in management strategy. In contrast, ANR's 401 water quality certificate requires that upstream passage be installed in the future, but only after a request by the ANR and a change in fisheries management which would emphasize self-sustaining trout populations and reducing or eliminating stocking programs.

As in the EA, the license order observes that the existing fish community in the project area consists of resident trout species and a typical New England assemblage of other resident fish species, including sunfish, suckers and minnows, and that some of the species are known to migrate varying distances seasonally in some rivers, depending on the need to find suitable habitat for spawning or overwintering. The license order also notes that successful reproduction of brown and brook trout is documented both upstream and downstream of the project in tributaries and may also occur in the Connecticut River, and that if upstream passage is provided, trout and other species may have access to additional habitat and their populations may exhibit higher survival and growth. The order goes on to observe that there is nothing in the record to indicate that existing growth and survival are deficient, nor is there any information to indicate whether access to additional habitat is currently a limiting factor for fish populations.

Finally, the license order concludes that the license conditions implementing USFW's reservation of authority to require fish passage in the future if conditions change and ANR's 401 water quality certificate condition requiring upstream fish passage in the case of future changes in fisheries management will adequately and equitably protect, mitigate damages to and enhance the existing fish community at this project.

401 Water Quality Certification

On November 20, 2007 PSNH applied to the ANR and to the NHDES for water quality certification for the project under Section 401 of the Clean Water Act. NHDES stated in a letter filed April 23, 2008 that the NHDES and the Vermont ANR agree that Vermont will issue a single certification for Vermont and New Hampshire.

On October 1, 2008, ANR issued a Draft 401 Water Quality Certificate for the Canaan project for public comment. The draft certification provided that:

“Within two years of a request by the Department, the licensee shall institute upstream fish passage, subject to plan approval by the Department. Any requests shall be made based on a written evaluation by the Vermont Department of Fish and Wildlife of the need for upstream fish passage, said evaluation to be done in consultation with the N.H. Department of Environmental Services, the N.H. Department of Fish and Game, and the U.S. Fish and Wildlife Service. The Department, the Vermont Department of Fish and Wildlife, the N.H. Department of Environmental Services, the N.H. Department of Fish and Game, and the U.S. Fish and Wildlife Service shall be consulted during plan development. The plan shall include an erosion control and water management plan designed to assure compliance with water quality standards during construction. The facility shall be operated from April 1 through June 30 and September 1 through December 15, with adjustment based on experience or specific conditions during a given year, either at the licensee’s request and subject to fisheries resource agency approval or pursuant to a mutual request by the fisheries resource agencies. PSNH shall notify the Department of these temporary or permanent schedule changes by providing the supporting documentation.”

A public hearing was held on October 31, 2008 in St. Johnsbury, Vermont. The hearing was attended by agency representatives, PSNH, and a single representative for TU and the CRWC. At the hearing the TU/CRWC representative provided citations to several additional references, including a July, 2006 Upper Connecticut river watershed coldwater habitat assessment. The habitat assessment arguably supports PSNH’s contention that there is a sufficient variety of habitat to support all trout life stages both upstream and downstream of the Canaan project.

Written comments on the draft 401 water quality certificate were filed by PSNH, the CRJC and public hearing notes were furnished by the TU/CRWC representative.

PSNH requested a meeting with ANR and other interested parties to discuss the draft certification, and a meeting was held on October 17, 2008. The meeting was attended by representatives from ANR, VDFG, NHDES, NHFG, TU, CRWC and PSNH.

On November 20, 2008 the ANR issued a final certification for the project. Vermont’s 401 water quality certification provides that:

“Within two years of a request by the Department, the licensee shall institute upstream fish passage, subject to plan approval by the Department. Said request shall only occur after the N.H. Department of Fish and Game adopts a management plan emphasizing self-sustaining wild trout populations and provides the Department with a plan for reducing or eliminating stocking and/or harvest in the towns of Stewartstown, Colebrook and Columbia after implementation of passage. Any request shall be made based on a written evaluation by the Vermont Department of Fish and Wildlife of the need for upstream fish passage, said evaluation to be done in consultation with the New Hampshire Department of Environmental Services, the N.H. Department of Fish and Game, the U.S. Fish and Wildlife Service, the Connecticut River Watershed Council, Connecticut River Joint Commissions, Trout Unlimited and PSNH. The applicant shall consult the Department, the Vermont Department of Fish and Wildlife, the N.H.

Department of Environmental Services, the N.H. Department of Fish and Game, and the U.S. Fish and Wildlife Service during plan development. The plan shall include an erosion control and water management plan designed to assure compliance with water quality standards during construction. The facility shall be operated from April 1 through June 30 and September 1 through December 15. The Department may authorize or order an adjustment of the operating schedule based on experience or specific conditions during a given year, either at PSNH's request, after consultation with the state fisheries resource departments, or pursuant to a mutual request by the state fisheries resource departments."

The 401 water quality certificate also requires that:

"Upon a request by the Vermont Agency of Natural Resources, the applicant shall complete a passage effectiveness study, or studies based on a study plan(s) and schedule(s) approved by the Department after consultation with the U.S. Fish and Wildlife Service, the Vermont Department of Fish and Wildlife, the N.H. Department of Environmental Services and the N.H. Department of Fish and Game. Any study shall be limited to monitoring utilization of the fishway(s) during applicable operating periods and shall not include studies of fish behavior and movement." The results of such effectiveness studies may serve as the basis for the Department to require modifications of the upstream and downstream passage facilities.

On December 19, 2008, PSNH filed an appeal of the November 20, 2008 water quality certification with the Vermont Environmental Court. .

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