Lewis River Hydroelectric Projects Relicensing

Merwin Hydroelectric Project (FERC No. 935)
Yale Hydroelectric Project (FERC No. 2071)
Swift No. 1 Hydroelectric Project (FERC No. 2111)
Swift No. 2 Hydroelectric Project (FERC No. 2213)

USDA Forest Service
Gifford Pinchot National Forest

EXISTING INFORMATION ANALYSIS

3. In-stream Large Wood Recruitment, Routing, and Function

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I. Existing Situation

The four Lewis River hydroelectric projects block all downstream movement of large wood (LW). Large wood typically accumulates behind all three, mainstem dams in the basin, particularly Swift Dam which is the furthest most upstream dam located just downstream of the Gifford Pinchot National Forest boundary. The current management practice is to either salvage the large wood or burn it (Dave Leonhardt, PacifiCorp, personal communication). Some salvaged wood has been made available to Forest Service and conservation groups for restoration projects. Other is sold to recover the cost of the collection effort.

Much of the large wood captured behind the dams is recruited from rivers and streams located in the upper basin on National Forest System lands. It has been well researched that LW plays a critical role in providing channel structure and necessary aquatic habitat elements. Loss of coniferous riparian vegetation due to stream inundation from the reservoirs and the curtailment of LW movement through the river system created an adverse impact on downstream fish habitat and channel structure.

Mount St. Helens fishery personnel compiled and summarized all habitat data available and summarized the information in the document titled *Summary of Gifford Pinchot National Forest Aquatic Habitat Surveys on the Tributaries of the Lewis River Watershed Between Lower Falls and Swift Reservoir, including Drift and Siouxon Creeks (2002).* A brief summary of documented tributary aquatic habitat was presented in the Aquatic Habitat and Productivity EIA, as updated (2002).

[1] 360-449-7869

II. Management Direction

Forest Plan Direction

The Gifford Pinchot National Forest Land and Resource Management Plan (1990), as amended by the Northwest Forest Plan in 1994, provides the management direction for all National Forest System lands and their associated resources directly affected by or within the project vicinity of the four hydroelectric projects in the Lewis River system. This plan was developed and enacted consistent with the requirements of the Forest and Rangeland Renewable Planning Act, as amended by the National Forest Management Act. The Aquatic Conservation Strategy (ACS), a core component of the Northwest Forest Plan, provides management direction aimed at maintaining or restoring the ecological health and functioning of watersheds and the aquatic ecosystems contained within them. ACS objectives that most apply to the recruitment, routing and function of in-stream large wood include:

> *Objective 1 – Maintain and restore the distribution, diversity, and complexity of watershed and landscape-scale features to ensure protection of the aquatic systems to which species, populations, and communities are uniquely adapted.*
>
> *Objective 2 – Maintain and restore spatial and temporal connectivity within and between watersheds. Lateral, longitudinal, and drainage network connections include floodplains, wetlands, upslope areas, headwater tributaries, and intact refugia. These network connections must provide chemically and physically unobstructed routes to areas critical for fulfilling life history requirements of aquatic and riparian-dependent species.*
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> *Objective 6 – Maintain and restore in-stream flows sufficient to create and sustain riparian, aquatic and wetland habitats and to retain patterns of sediment, nutrient, and wood routing. The timing, magnitude, duration, and spatial distribution of peak, high, and low flows must be protected.*
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> *Objective 8 – Maintain and restore the species composition and structural diversity of plant communities in riparian areas and wetlands to provide adequate summer and winter thermal regulation, nutrient filtering, appropriate rates of surface erosion, bank erosion, and channel migration and to supply amounts and distributions of coarse woody debris sufficient to sustain physical complexity and stability.*
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> *Objective 9 – Maintain and restore habitat to support well-distributed populations of native plant, invertebrate, and vertebrate riparian-dependent species.*

Additionally, Northwest Forest Plan Standard and Guideline LH-2 states: "…During the relicensing of hydroelectric projects, (the Forest Service shall) provide written and timely license conditions to FERC that emphasize in-stream flows and habitat conditions that maintain or restore riparian resources and channel integrity."

Forest Service Manual Direction
Forest Service Manual (FSM) 2670.12 directs the Forest Service to:

- *Manage habitats for all existing native and desired nonnative plants, fish, and wildlife species in order to maintain at least viable populations of such species,*

- *Conduct activities and programs to assist in the identification and recovery of threatened and endangered plant and animal species, and*

- *Avoid actions that may cause a species to become threatened or endangered.*

Forest Service Manual (FSM) 2670.22 directs the Forest Service to:

- *Maintain viable populations of all native and desired nonnative wildlife, fish, and plant species in habitats distributed throughout their geographic range on National Forest System lands*. A viable population is further defined by FSM 2670.5 as *one that has the estimated numbers and distribution of reproductive individuals to ensure the continued existence of the species throughout its existing range (or range required to meet recovery for listed species) within the planning area.*

Federal Power Act (FPA)
Section 4(e) of the FPA provides the USDA Forest Service, as administrators of reserved lands affected within the project area, authority to attach mandatory terms and conditions to Project licenses. This section of the FPA states, "that licenses shall be subject to and contain such conditions as the Secretary of the department under whose supervision such reservation falls shall deem necessary for the adequate protection and utilization of such reservation." Section 4(e) also states that "…the Commission (FERC), in addition to the equal power and development purposes for which licenses are issued, shall give equal consideration to the purposes of enhancement of, fish and wildlife (including related spawning grounds and habitat)…". Forest Service terms and conditions are based upon management direction contained in amended Forest Plans. If the project being relicensed is not located on Forest Service land but affects resources managed by the agency (i.e. migratory fish that historically used NFSL), the Forest Service can make recommendations regarding fish passage to FERC.

Executive Order 12962
Under the Recreational Fisheries Executive Order (Executive Order 12962 of June 7, 1995, Federal Register Notice 60(111): 30769-30770), the President of the United States directs federal agencies to cooperate with state and tribal governments to improve aquatic resources for increased recreational fishing opportunities by:

- Identifying recreational fishing opportunities limited by degraded habitat and water quality,
- Restoring habitat and water quality,
- Providing access and promote awareness of recreational fishing opportunities,

- Stimulating angler participation in conservation and restoration,
- Using cost-share programs and implementing laws to conserve, restore, and enhance aquatic systems to support recreational fisheries,
- Evaluate effects of federally funded, permitted, or authorized actions on aquatic systems and recreational fisheries and document those effects relative to the purpose of this order, and
- Assisting private landowners to conserve and enhance aquatic resources.

Master Memorandum of Understanding, Washington Department of Fish and Wildlife and USDA Forest Service Region Six
Signatory parties agreed under this MOU to consult on fish and wildlife actions that occur or may affect USDA Forest Service Region Six Forests. Listed below are four key elements of this MOU.

Section A #2. The Forest Service agrees to recognize WDFW as being responsible for the protection, perpetuation, and management of all game fish and wildlife in the State of Washington.

Section B #2. WDFW agrees to solicit Forest Service participation in establishing the desired level of fish and wildlife populations on the National Forests…

Section B #4. WDFW agrees to consider Forest Service's goals and objectives (*aquatic habitat enhancement and/or restoration*) in the development of Fish and Wildlife plans.

Section B #6. WDFW agrees to cooperate with the Forest Service in preparation and conduct of research plans of mutual interest.

III. Information Analysis

Large Wood
The Clean Water Act of 1972 directs land managers to maintain the physical, chemical, and biological integrity of all surface waters. Large wood is an integral component of stream channels, influencing their physical form (Bilby, 1984; Swanson et al., 1984; Andrus et al., 1988; Bilby and Ward, 1989; Carlson et al., 1990; Richmond and Fausch, 1995), movement of sediment (Beschta, 1979; Megahan, 1982; Bilby, 1984; Malanson and Butler, 1990; Ruediger and Ward, 1996), retention of organic matter (Swanson et al., 1976; Bilby and Likens, 1980; Bilby, 1981; Bilby, 1984; Trotter, 1990), and composition of the biological community (Bilby and Likens, 1980; Bryant, 1983; Sedell et al., 1984; Harmon et al., 1986; Bisson et al., 1987). From this large body of research, it is clear that maintaining adequate levels of LW is important to meeting the provisions of the Clean Water Act, as well as the Northwest Forest Plan's Aquatic Conservation Strategy.

The four hydroelectric projects in the Lewis River Basin have significantly affected the location and distribution of LW in the basin, therefore negatively affecting the physical and

biological integrity of the Lewis River system. These effects include the; (1) elimination of a large portion of the lower basin's large wood source area; (2) disruption of the transport of LW through the system; (3) alteration of the size and species mix of the large wood; and (4) inundation of a large section of the main river where LW accumulation and associated habitat formation would have existed; and 5) contribution of woody material to the Columbia River and the marine coast line. The first three of these elements have resulted in a reduction of large wood from the lower watershed. Studies on debris removal have shown significant effects on sediment transport and channel stability (Beschta, 1979; Bilby, 1984; Smith et al., 1993; Lisle, 1995). These physical effects have the potential to adversely affect anadromous migration success (both up and down stream) by reducing holding habitat, hiding cover, and a portion of the aquatic food base. The cumulative effects of these impacts could place a great deal of stress on migrating species adversely affecting their ability to complete their life cycles. This could ultimately affect one of the missions of the Forest Service, which is to maintain viable populations of all native species as required by the National Forest Management Act (NFMA 1976) and the Endangered Species Act (ESA 1974).

Habitat

The increased stress imposed on fish (due to loss of habitat complexity, which provides hiding cover) as they migrate through the lower Lewis River system (i.e., below Merwin Dam) makes it imperative that once they are re-introduced into the upper basin they can find quality habitat. Several USDA Forest Service watershed analyses [Middle Lewis River (1995), Lower Lewis River (1996), Muddy River (1997), and Upper Lewis River (1998)] have found that riparian development has removed a considerable amount of potential woody debris from various sub-basins, contributing to the degradation of aquatic habitat. Available habitat quantity and quality are likely to be factors limiting fish production in the Lewis River system. This is particularly true for the mainstem Lewis River between Merwin Dam and the upper lobe of Swift Reservoir where there has been a drastic conversion from lotic (free-flowing, stream-like) to lentic (lake-like) habitats due to inundation and dewatering of the main river channel. The historic Lewis River valley was broad and lower gradient, offering a variety of habitat types and off-channel refugia to a diverse assemblage of aquatic species. It is within this broad, lower gradient stream and floodplain where a large portion of LW would accumulate (Bisson 1987). This woody material would have created various habitat features essential to aquatic and riparian dependent communities. Continued inundation and dewatering of the Lewis River and its tributaries will maintain this shortfall of critical, diverse habitats and thereby increase the importance of similar areas on National Forest System lands and other areas within the basin. These effects when considered cumulatively may have a substantial impact on species viability and recovery success, as well as the overall ecological health of the watershed.

Input and Export Processes

Since the existing quantity of large wood (LW) in the areas affected by the four hydroelectric projects in the Lewis River system is a reflection of all input and export processes, eliminating inputs from the upper watershed has resulted in a reduction in the total amount of LW in the lower system. This is especially true during large floods, which

are generally responsible for large wood recruitment and transport. Large runoff events (50 years events) incorporate LW through bank erosion, mass wasting, and the delivery of wood from tributary streams. Under the existing situation, the final location for much of this wood is Swift Reservoir, Yale Lake, and Merwin Lake. This has led to an overall decrease in the amount of LW in this system.

Size and Species Composition
The streamside riparian area is being prevented from reestablishing LW due to the continued presence of the reservoirs. In order to recover federally listed fish species and restore aquatic ecosystem functioning within the Lewis River Basin, it will be critical to reestablish connectivity between the upper and lower basin. Much of the future LW (>36 inch diameter) recruited to the aquatic system is expected to be derived from National Forest System lands in the upper basin. Implementation of the Northwest Forest Plan on federally managed lands in the upper basin mandates the protection and restoration of Riparian Reserves that protect the entire LW recruitment zone. In those Riparian Reserves lacking sufficient LW recruitment potential, silvicultural prescriptions are being designed and implemented to accelerate the development of larger riparian trees. The Forest Service maintains that those large, coniferous trees recruited from National Forest System lands should remain in the aquatic system, providing necessary functions and benefits for the river network in the lower basin. Additionally, a portion (to be determined through integration of EDT and Forest Service goals and objectives) of trees salvaged at project facilities should be allocated for aquatic restoration activities throughout the Lewis River basin.

IV. Preliminary Forest Service Objectives

In order for the Forest Service to fully accomplish its mission, it is essential to establish and maintain the connectivity of the river system and all it's physical and biological processes. In general, the Forest Service view is that when large wood accumulates behind the Lewis River dams, it should be re-introduced back into the river system. This material would be valuable both in the upper watershed, to improve habitat where it is found to be sub-optimal, and downstream to maintain the physical, chemical, and biological integrity of the lower river.

This would require that a large wood management plan be developed to include:

1) Describe the sources of LW to be made available (e.g., all wood which collects against the face of a dam)
2) Measures for transporting and delivering LW within the Lewis River basin
3) Guidelines for the use and disbursement of LW for restoration projects, giving first priority to projects within the lower basin, second priority to upper basin projects, and third priority to projects outside the basin
4) Provisions for storage of LWand for disposal of unused LW.
5) Monitoring the effectiveness of implemented projects using LW.

V. Information Needs

1) Evaluate the historic and current source areas, transport reaches, and depositional areas for LW.
2) Evaluate the historic and current quantities and function of LW within the upper and lower basin.
3) Identify streams and reaches where LW enhancement would benefit aquatic organisms.
4) Identification of source areas, transport reaches, and depositional zones for LW.
5) Identification of desired quantities and function of LW in the upper and lower basin.
6) Description of the size and species of LW desired in the system;

From the 2001 Technical Report, it is apparent that items 1 through 6 were not adequately addressed. These questions need to be answered through another means, such as the AQU-18 proposal.

In order to develop a comprehensive LW management plan, the following information is needed.

1) **Project Inventory of LW.** Conduct an inventory of LW in the Lewis River system below Swift Dam. All pieces of LW would be enumerated by particular size category. Size categories should be compatible with Forest Service standards for ease of data sharing and consistency. This is currently being done under WTS 3-4 Stream Channel Morphology and Aquatic Habitat Study.

   Current situation relative to this proposal- Located in WTS-3 (2001 Technical Report p. 3-3) under Large Woody Debris was a statement about Project Operators being contacted to determine how much and what size wood was being removed at project facilities. Frank Shrier (personal communication 2002) indicated that large wood data was not collected and that the operators could not answer the question found in WTS-3.

2) **Identification of LW Recruitment Areas, Transport Reaches, and Depositional Zones.** An analysis of riparian stand conditions (both present and pre-project) will be necessary to determine LW recruitment areas and their potential. The pre-project analysis will provide a sense of the interdiction of LW by the dams. Additionally, stream reaches serving as "transport" reaches for LW and those serving as "depositional" reaches downstream of Swift Dam need to be identified.

   Current situation relative to this proposal- To our knowledge this analysis was not conducted.

3) **Integration of LW Results with Aquatic Habitat Evaluations.** The results from the first two studies, above, will need to be integrated with the results from aquatic habitat evaluations and other relevant studies to determine areas where LW enhancement would benefit aquatic resources. The results of the LW studies will aid in an overall evaluation of habitat quality, and will lend to the prioritization of

habitat restoration needs as related to Protection, Mitigation, and Enhancement (PM&E) requirements.

Current situation relative to this proposal- Since LW information was not collected and a complete analysis of aquatic habitat was not conducted it would be impossible to address integration of LW and aquatic habitat. A current proposal (AQU-18) has presented the Ecosystem Diagnostics and Treatment methodologies, as an element to a larger proposal, to help answer aquatic habitat restoration and fish population questions.

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