CHAPTER 3: LAKE CHELAN LARGE WOODY DEBRIS MANAGEMENT PLAN

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SECTION 1: INTRODUCTION

The USDA Forest Service, the National Park Service (NPS), the Washington Department of Fish and Wildlife (WDFW), and Chelan PUD have agreed to use large woody debris (LWD) in the implementation of the erosion control and fishery plans contained in Chapters 1, 2 and 6 of the Comprehensive Plan. This Chapter describes how the LWD is to be managed in order to achieve those purposes. Funding only for the collection and transportation of LWD by WDFW is described in this Chapter. Funding for the use of LWD to achieve erosion control is described in Chapters 1 and 2, and potential sources of funding for the use of LWD for fishery management are described in Chapter 6.

The benefits of LWD are summarized in the Lake Chelan Fisheries Investigation (Chelan PUD 2000). Potential benefits include increased habitat for fish, substrate for invertebrate production, and shoreline stabilization. Use of LWD in the lake carries with it some risk and uncertainty with respect to effects on native versus non-native species of fish. The impact of LWD placement on fish may be monitored under the Lake Chelan Comprehensive Fishery Management Plan (Chapter 6).

This plan is not meant to address the removal of all LWD that comes into the lake, nor to address all safety issues that might arise due to the presence of LWD on the lake.

SECTION 2: GEOGRAPHICAL AND HISTORICAL CONTEXT

Lake Chelan is surrounded by an extremely rugged landscape, with steep slopes and cliffs along much of the west end of the lake and rolling hillsides with shrub-steppe habitat around the east end of the lake. Most of the LWD comes into the system from the western tributaries, which are larger and have more heavily wooded drainage areas. Some LWD is also contributed by shoreline erosion. The most significant source streams are the Stehekin River, Railroad Creek, Fish Creek and Prince Creek.

The primary source of LWD is floods. The Project has experienced three large floods that have carried massive amounts of LWD into the lake. These floods and their effects can be summarized as follows:

- Floods that delivered significant amounts of LWD to the lake occurred in 1949, 1972, and 1995.
- The cleanup effort after the 1995 flood removed an estimated 690 tons of LWD from the lake, including more than 900 large logs.
- The average log size was 12 to 14 inches in diameter and 60 feet long.
- Two to three percent of the material was fresh, with root wads attached.
- The cleanup after the 1995 flood cost approximately $500,000.

Historically, most of the incoming LWD has been removed from the lake and chipped, burned, or salvaged for logs. Some wood from the 1995 flood was used to enhance fish habitat at tributaries.

SECTION 3: PROJECT RELATIONSHIP

There is no reason to believe that Project operations significantly influence how much LWD enters the lake, or the timing of its arrival. Opinions differ as to whether management of the lake level in accordance with Project licenses has any effect on LWD in the lake. No change in the behavior of LWD in the lake has been observed or documented since prior to Project development. Partly due to the length of the lake, LWD typically does not reach the dam at the lake's lower end. Instead, it typically becomes waterlogged and sinks, is stranded along the shoreline, or is removed from the lake. However, the use of LWD in the erosion control and fishery management plans is strongly desired by the USDA Forest Service, NPS, and WDFW, and Chelan PUD has acceded to those desires in order to facilitate settlement among the parties to this relicensing proceeding.

SECTION 4: IMPLEMENTATION

4.1 Protection of Naturally Stable LWD Accumulations

The current NPS Management Plan for the Lake Chelan NRA generally does not allow for manipulation or removal of LWD on the Stehekin River, because of its ecological importance. Similarly, USDA Forest Service policy generally does not allow removal or manipulation of LWD; however, it is known that large individual pieces are occasionally removed for firewood or for shoreline protection on private lands. These agency policies reflect a desire on the part of the agencies to act so that stable LWD is not removed. According to these policies, stable pieces may be moved temporarily during erosion control work, but should be placed back in a manner that preserves cover and ecological values. Where unstable or potentially hazardous pieces of LWD are to be used, they should be anchored in such a way that they have fisheries, riparian, and/or shoreline erosion benefits.

The number of sites around Lake Chelan with naturally stable accumulations of LWD is limited. The few shallow bays with gently sloping shorelines, such as Driftwood Bay at Lucerne, are examples. Due to differences in overall topography, there are more small bays and coves along the NPS portion of the lake than exist farther downlake on USDA Forest Service lands.

4.2 Beneficial Use of LWD

The beneficial use of LWD in the lake will take one of two forms under this plan. In some instances, LWD will be placed on site and will become an integral part of erosion control work. In other instances, it will be used not as part of erosion repairs, but will be placed off site to satisfy requirements of permits necessary to perform the erosion control work.

Examples of the first category are sites at which LWD is used to protect the shoreline from waves. The second category consists of off site placement where LWD is placed not primarily to provide erosion control, but to improve aquatic habitat, in accordance with permit requirements. This will occur, for example, at recreation sites where boating and swimming are expected. LWD will not be placed on site in such cases because it would create a safety hazard. The placement of LWD related to erosion control efforts during the New License is addressed in Chapter 1, regarding USDA Forest Service lands, and in Chapter 2, regarding NPS lands.

Under the existing WDFW mitigation policy, one-to-one mitigation is an acceptable standard. This standard allows the mitigation to be calculated based on an area formula. In accordance with this policy, the quantity of LWD included in erosion control work and/or placed as mitigation required by permits shall not exceed the amount required using the one-to-one ratio between the area of disturbed soil and the area of LWD used as mitigation.

The typical disturbed area is expected to be three feet wide (i.e. from the lake edge toward the uplands). Therefore, each linear foot along the shoreline that is disturbed would require mitigation with three feet of a log one foot in diameter. For techniques that disturb a narrower area, proportionately less mitigation would be required. If a log includes a rootwad, the area covered by the rootwad when placed shall be counted in addition to the area of the log.

4.3 Collecting Usable LWD on Lake Chelan

Collection of LWD under this plan will not be comprehensive and is not done with the intent of assuring safe boating conditions on the lake or managing all LWD that enters the lake. Collection of LWD under this plan will be limited to material needed by the USDA Forest Service, NPS, or Chelan PUD to support erosion control work around the lake, dust control on Stehekin Flats, or for tributary enhancement work.

Not all the woody debris entering the lake is expected to be suitable for the uses mentioned above. Ideal characteristics of pieces considered suitable for collection and use include:

- At least 10 feet long
- At least 1.0 to 1.5 feet in diameter
- Pieces with root wads attached
- Pieces with some remaining branch structure

LWD needed to support projects will be collected by the individual agencies carrying out those projects. Final selection criteria will be determined by those entities.

4.4 Banking of Required LWD Structures

As explained above, required LWD will be placed to satisfy the conditions of permits needed for erosion control work. The basic concept of "banking" of required LWD structures is included so

that placement of required LWD does not have to be done concurrently with the erosion control work for which the permit is issued. Instead, placement of required LWD can be performed as suitable LWD becomes available, either before or within a reasonable time after the permitted erosion control work with which it is associated. This flexibility in timing will encourage timely and efficient placement of desirable LWD pieces, and coincidentally should help reduce risks associated with free-floating LWD.

As discussed above, the supply of LWD to the lake is sporadic. As a result, LWD may not be readily available when it is needed. To address this problem, LWD will be used, to the extent feasible, as it becomes available. Required LWD placement in off site structures or along the shoreline may run ahead of or lag behind the progress of projects for which it is required without adjustment in the amount of LWD required. This will be acceptable to WDFW and shall not affect the level of mitigation required as long as placement of required LWD does not lag behind the associated projects by more than five years unless this period is extended by renewal of the hydraulic permit authorization. In any event, 25 percent of the required mitigation shall be performed within 5 years, 50 percent shall be performed within 10 years, and 100 percent shall be performed within 15 years of completion of other erosion control work on each group of sites.

4.5 Identification of Potential Storage Sites

LWD that is collected by Chelan PUD for use on USDA Forest Service land, but which cannot be used or transported immediately, will be stored by Chelan PUD at locations and by means as agreed upon by Chelan PUD and the USDA Forest Service. LWD that is collected by the NPS, but which cannot be used immediately, will be stored by the NPS. Storage sites may be used to hold material for either the short or long term. Holding the LWD for a long period of time increases associated risks, and may entail some added cost to those agencies. Long-term storage techniques may include having logs drilled and cabled (lead-line) to a main shoreline (high-line) anchor. Short-term storage may take the form of a containment boom, without securing individual logs. Some of the material may be lost due to sinking, which may be desirable if the storage site is a small tributary cove such as those at Coyote Creek or Little Goat Creek. Alternatively, if the LWD is to be used at a specific site, temporary beaching and cabling at that site could be used. Details of storage will be chosen by the agencies responsible for collecting and storing the LWD. Responsibility for collecting and storing the LWD is defined in Chapters 1 and 2.

Potential storage locations include:

- West of Weaver Point (erosion site 71)
- USDA Forest Service land in section 28 below Hunts Bluff Bay (erosion site 40)
- A portion of Driftwood Bay at Lucerne (boat traffic is a concern at this site so that LWD will have to be carefully controled or another site selected)
- Small bay north of Prince Creek (uplake of erosion site 54)
- Behind booms at tributary mouths at Rattlesnake Creek, Deep Harbor Creek, Coyote Creek

4.6 Funds for WDFW

To assure a controlled level of mitigation required for erosion control efforts Chelan PUD will make available to WDFW $5,000 per year for each of the first 20 years of the New License, to be used by WDFW in obtaining, transporting, storing and distributing LWD or other

bioengineering bank protection and in-lake fish habitat restoration, enhancement and mitigation materials (called "other materials") for use on state and private land within or adjacent to Lake Chelan. WDFW will be responsible to obtain any permits necessary for this work.

The funds may be used by WDFW to purchase or transport LWD and other materials to WDFW-provided storage sites within the Lake Chelan basin, for eventual use in bioengineered bank protection and fish habitat installation projects on state and private lands within or immediately adjacent to Lake Chelan.

If the total mitigation costs required by permits exceed the costs that would result from the one-to-one ratio described in section 4.2, Chelan PUD may reduce the funds provided to WDFW by the amount of the additional cost incurred.

4.7 Preparation for Flood Events

This plan is not intended to provide for management of all LWD in the lake, and does not address the effects of floods that may cause large inputs of LWD into the lake. Parties interested in helping to deal with such events are encouraged to plan specific actions and methods of responding to large quantities of debris and to draft a Memorandum of Understanding (MOU) that provides for the additional coordination and funding needed to address such events. Potential participants may include WDFW, USACE, USDA Forest Service, NPS, WDOE and Washington Department of Natural Resources.

SECTION 5: LITERATURE CITED

Duke Engineering & Services, Inc. (DE&S). 2000. Lake Chelan fisheries investigation – final, Lake Chelan Hydroelectric Project No. 637. Prepared by DE&S, Bellingham, Washington. Prepared for Chelan PUD. September 26, 2000. 95 pp.