



MUCKLESHOOT INDIAN TRIBE Fisheries Division

39015 - 172nd Avenue SE • Auburn, Washington 98092-9763
Phone: (253) 939-3311 • Fax: (253) 931-0752



BRIEFING PAPER

LARGE WOOD PLACEMENT AND THE ROLE OF LARGE WOOD IN KING COUNTY STREAMS

September 8, 2008

The Growth Management and Natural Resources Committee is reviewing proposed procedural standards addressing recreation safety in the placement of wood in Identified Recreational Waterways. The proposed standards would create a public review process whereby substantial design restrictions could be made on how and where wood may be placed in fish habitat restoration and mitigation projects. Identified Recreational Waterways include most, if not all, of the most important salmon habitats in the County, including the entire Cedar River below Landsburg, the entire Green River below the TPU Headworks, the entire Sammamish River, the White River from the County line to Greenwater River spanning upstream and downstream of the Muckleshoot Indian Reservation, and the lower 12 miles of the Greenwater River.

The proposed standards could restrict or discourage effective wood placement in much if not all of the County's most important river segments for salmon. Implementation of the proposed procedures and standards threaten to seriously undermine the effectiveness of habitat restoration plans and mitigation necessary to increase natural salmon production and to restore and maintain harvestable salmon runs. Any shortfalls in habitat quantity and quality which result from implementing the proposed procedures and standards should be formally assessed and fully documented, and alternative mitigation provided-- including increases in artificial salmon production if equivalent habitat mitigation opportunities are unavailable.

The importance of large wood in rivers and streams to productive salmon and steelhead habitat cannot be overstated. Large wood is a key natural component of salmonid habitat, and habitat quality for salmon is closely associated with the quantity and size of instream wood¹. In the Puget Sound Chinook Recovery Plan (Shared Strategy Development Committee 2007), the National Resource Council states that "*Perhaps no other structural component of the environment is as important to salmon habitat as is large woody debris, particularly in coastal watersheds*". Restoring large woody material to salmon habitat is a widely used management

¹ Bisson et al. 1987; Spence et al. 1996; Keller and Swanson 1979; Fausch 1984; Beechie and Sibley 1997; Bjornn and Reiser 1991; Montgomery et al. 1995; Roni et al. 2003; Reich et al. 2003; Larsson 1985; Schuett-Hames et al. 1994; Cederholm et al. 1989; Bilby et al. 1996; Robison and Beschta 1990

tool that aims to recover natural process of dynamic river flow and formation of important habitat features such as bars, pools and side channels (*Bob Lohm, NOAA, January 25, 2005 letter to Martha Parker*).

Minimum wood sizes and necessary quantities of large wood to provide adequate fish habitat have been defined by resource agencies including the National Marine Fisheries Service (see e.g., Fox and Bolton 2007). Wood levels and recruitment rates in the County's rivers and streams do not currently meet these standards, and therefore wood is rated a factor of salmon population decline (Shared Strategy Development Committee 2007). King County's own habitat plans and the various WRIA limiting factors reports addressing Endangered Species Act responsibilities acknowledge the need to correct this deficiency using both natural recruitment and wood placement. This shortage of wood results in long stretches of river with few pools, constant velocity, poor gravel stability, and an inability to form high quality fish habitats needed to restore natural salmon and steelhead production and survival in King County waterways.

The addition of large wood to streams has been shown to increase pool frequency and coho salmon production (Cedarholm et al., 1997). In a study of 30 western Oregon and Washington streams, large wood placement led to higher densities of coho during summer and winter, and higher winter densities of steelhead compared to untreated streams (Roni and Quinn 2001). Other studies have also shown that large wood addition increases salmonid biomass and density (Flebbe 1999, Lehane et al. 2002) and individual fish growth (Sundbaum and Naslund 1998).

It is likely that the proposed procedures and standards will result in project design compromises that handicap the implementation of habitat restoration plans and mitigation needed to improve natural salmon production or lessen the effects of development. Examples include prohibitions on spanning logs, logs along the outer river bends, large jams, wood extending into the river current, and blanket requirements for anchoring. Such prohibitions would result in substantial trade-offs against the functional value of wood placement in habitat restoration and mitigation projects. Restrictions on wood placement, as well as the repositioning or removal of naturally-recruited wood, will further limit the natural production potential of King County waterways by permanently curtailing those natural processes that create and maintain productive aquatic habitat.

Hundreds of river miles in King County already exist where land development, dams, and flood control infrastructure have taken priority over natural floodplain and river processes to the detriment of natural salmon and steelhead production. Design standards, procedures, or regulations restricting wood placement that further limit habitat functions and values should be recognized as permanent habitat impacts that will be difficult or even impossible to fully mitigate with alternative habitat restoration measures.

References

- Beechie, T.J., and Sibley, T.H. 1997. Relationships between channel characteristics, woody debris, and fish habitat in northwestern Washington streams. *Trans. Am. Fish. Soc.* 126:217-229.
- Bilby, R.E., Fransen, B.R., and Bisson, P.A. 1996. Incorporation of nitrogen and carbon from spawning coho salmon into the trophic system of small streams: Evidence from stable isotopes. *Canadian Journal of Fisheries and Aquatic Sciences* 53:16 & 173
- Bilby, R.E. and J.W. Ward. 1989. Changes in characteristics and function of woody debris with increasing size of streams in western Washington. *Transactions of the American Fisheries Society* 118:368-378.
- Bisson, P.A., R.E. Bilby, M.D. Bryant, C.A. Dolloff, G.B. Grette, R.A. House, M.L. Murphy, K.V. Koski, and J.R. Sedell. 1987. Large woody debris in forested streams in the Pacific Northwest: Past, present, and future. In E.O. Salo and T.W. Cundy (eds.) *Streamside Management: Forestry and Fishery Interactions*. College of Forest Resources, University of Washington, Seattle, Washington. pp. 143-190.
- Bjornn, T.C. and D.W. Reiser. 1991. Habitat requirements of salmonids in streams. In W.R. Meehan (ed.) *Influences of forest and rangeland management on salmonid fishes and their habitats*. Special Publication 19. American Fisheries Society, Bethesda, Maryland. pp. 83-138.
- Cederholm, C.J., Houston, D.B., Cole, D.L., and Scarlett, W.J. 1989. Fate of coho salmon (*Oncorhynchus kisutch*) carcasses in spawning streams. *Canadian Journal of Fisheries and Aquatic Sciences* 46:1347-1355.
- Cedarholm, C.J., R.E. Bilby, P.A. Bisson, T.W. Bumstead, B.R. Fransen, W.J. Scarlett and J.W. Ward. 1997. Response of Juvenile Coho Salmon and Steelhead to Placement of Large Woody Debris in a Coastal Washington Stream. *North American Journal of Fisheries Management*. 17:947-963.
- Fausch, K. D. 1984. Profitable stream positions for salmonids: Relating specific growth rate to net energy gain. *Can. J. Zool.* 62:441-451.
- Flebbe, P.A. 1999. Trout use of woody debris and habitat in Wine Spring Creek, North Carolina. *For. Ecol. Manage.* 114:367-376.
- Fox, M.J. and Bolton, S. 2007. A Regional and Geomorphic Reference for Quantities and Volumes of Instream Wood in Unmanaged Forested Basins of Washington State. *North American Journal of Fisheries Management* 27:342-359.
- Keller, E.A. and F.J. Swanson. 1979. Effects of large organic material on channel form and fluvial processes. *Earth Surface Processes* 4:361-380.
- Larsson, P.O. 1985. Predation on migrating smolts as a regulating factor of Baltic Salmon (*Salmo salar*). *Journal of Fish Biology* 26:391-397
- Lehane, B.M. et al. Experimental provision of large wood debris in streams as a trout management technique. *Aquatic. Conserv.* 12:289-311.
- Montgomery, D.R., Buffington, J.M., Smith, R.D., Schmidt, K.M., and Pess, G. 1995. Pool spacing in forest channels. *Water Resources Research* 31: 1097-1105.
- Reich, M., J.L. Kershner, and R.C. Wildman 2003. Restoring Streams with Large Wood: A Synthesis In Gregory, S., K. Boyer, and A. Gurnell, editors. 200e. *The ecology and management of wood in world rivers*. American Fisheries Society, Symposium 37, Bethesda, Maryland, p355-366.
- Robison, G.E. and R.L. Bestcha. 1990. Coarse woody debris and channel morphology interactions for undisturbed streams in southeast Alaska, U.S.A. *Earth Surface Process Landforms* 15:149-156.
- Roni, P., M. Liermann, and A. Steel. 2003. Monitoring and evaluating fish response to instream restoration. In: *Restoration of Puget Sound Rivers*. D. Montgomery, S. Bolton, D. Booth, and L. Wall (eds.). Center for Water and Watershed Studies. University of Washington Press, Seattle.
- Roni, P. and T. Quinn. 2001. Density and size of juvenile salmonids in response to woody debris placement in western Oregon and Washington streams. *Can. J. Fish. Aquat. Sci.* 58(2): 282-292.
- Schuett-Hames, D., A. Pleus, L. Bullchild, and S. Hall. 1994. *Timber-Fish-Wildlife Ambient Monitoring Program Manual*. Northwest Indian Fisheries Commission, Olympia, Washington.
- Spence, B.C., G.A. Lomnicky, R.M. Hughes, and R.P. Novitzki. 1996. *An Ecosystem Approach to Salmon Conservation*. TR-4501-96-6057. ManTech Environmental Research Services Corp., Corvallis, Oregon.
- Sundbaum, K. and Naslund, I. 1998. Effects of woody debris on the growth and behavior of brown trout in experimental stream channels. *Can J. Zool.* 76:56-71.