

TALL TIMBER SURFACE WATER WITHDRAWAL IMPACT ANALYSIS



Analysis from:

Mid-Columbia Coho Restoration Project, Draft EIS, Appendix 10. Effect of Surface Water Withdrawals on Listed Fish

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The proposed Tall Timber acclimation site is located adjacent to the glacially fed Napeequa River, a tributary of the White River. The White River watershed represents 6% of the Chinook, 1% of the steelhead, and 10% of the bull trout spawning redds counted in the Wenatchee Subbasin (see Appendix 9 of the EIS for further details). The White River drainage still maintains high quality, complex habitat with refuge and rearing habitat for multiple life stages and life histories (NPCC 2004). Both Chinook and steelhead have been observed spawning in the Napeequa River but few redds have been counted there in recent years (Hillman et al. 2008). No bull trout have been documented spawning in Napeequa River. A portion of the surface water from the Napeequa River is proposed to be diverted into disconnected side channel for acclimating coho salmon. The affected environment would include the Napeequa River from the intake downstream about 1,800 feet of channel to the outlet culvert (Figure 1).

Model inputs for the Tall Timber (Napeequa) analysis were based on onsite topographic survey and a combination of onsite discharge measurements and White River stream gage data. Topographic data from the affected reach of the river (Figure 1) was collected during the fall of 2009. A second survey was conducted on April 26 and 27, 2010 to gather additional flow and channel data.

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Date Returned	Rv	Priority Date	Rv	WRIA

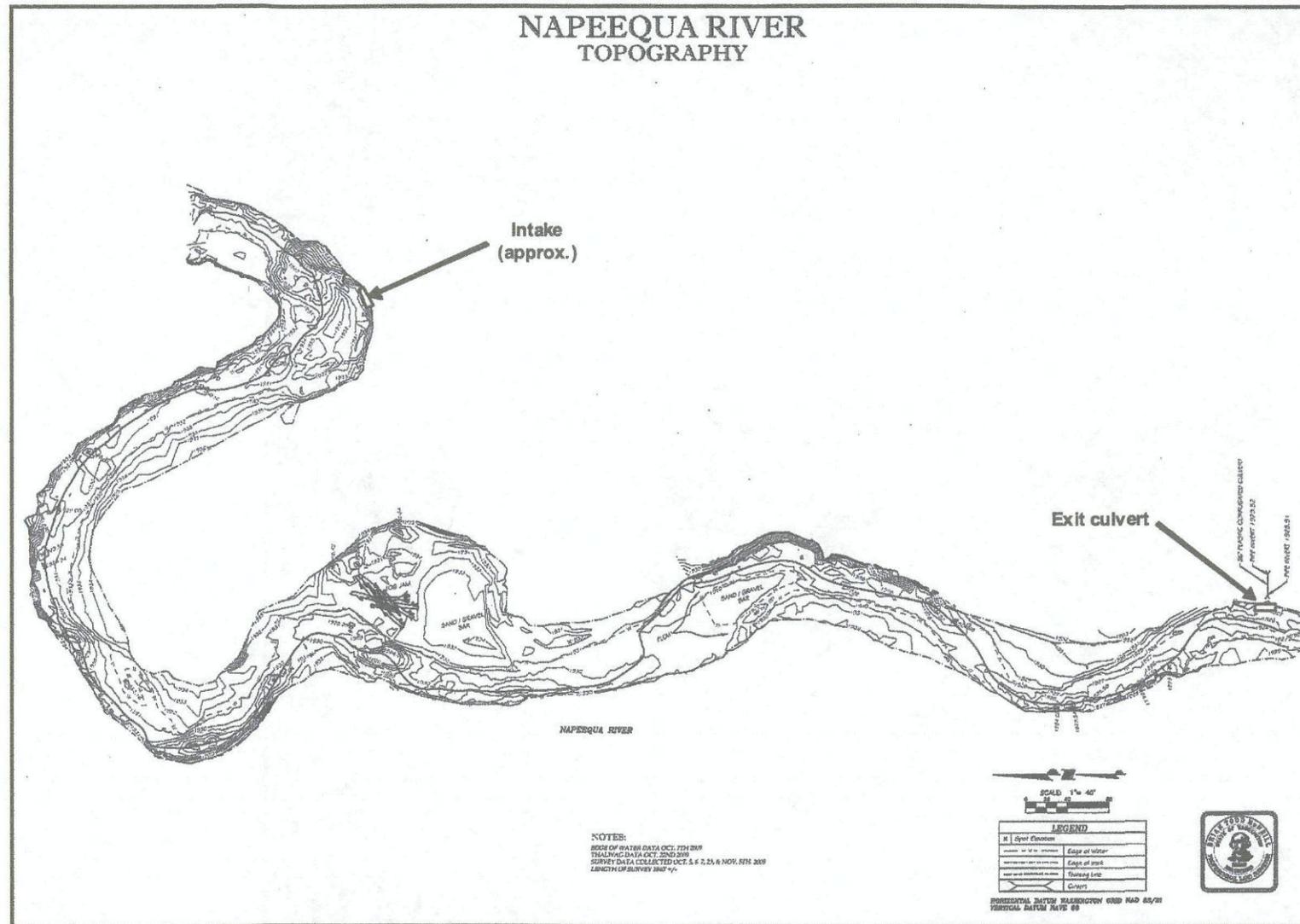


Figure 1. Napeequa River channel topography of the affected reach.

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Surface water is proposed to be withdrawn from the Napeequa River from mid March through early May. A minimum flow of 1.7 cfs is required for coho acclimation at this site (Appendix 2 of the EIS) and withdrawals were assumed to be 50% greater (2.6 cfs) for modeling purposes. Juvenile Chinook salmon, and adult and juvenile steelhead and migrant bull trout are assumed to be present in Napeequa River during this time (note that steelhead are uncommon in the White River drainage, see Appendix 9 of the EIS). Stream gage data is not available for the Napeequa River. However, a stream gage was operated on the White River at about river mile 6.5 between 1955 and 1983 (Figure 2) by the US Geological Survey (USGS). Washington Department of Ecology has operated a stream gage at the same site beginning in 2002. Daily flows in the White River typically start to increase around the end of March and peak in June (Figure 2). We compared seven flow measurements collected by the USGS between September 1975 and October 2001 (provided by John Clemens, USGS, Tacoma, Washington) and one collected by Cramer Fish Sciences in October 2009, with corresponding White River stream gage data (Figure 3). Flows from the two rivers were highly correlated ($R^2 = 0.94$). This is not surprising because they are both glacially fed rivers, and the Napeequa is the largest tributary in the White River Watershed (NPCC 2004). Based on the regression on the White River stream gage, we estimated that mean flows in the Napeequa River during the acclimation period will range between 109 and 372 cfs with the 10th percentile as low as 47 cfs and the 90th as high as 732 cfs.

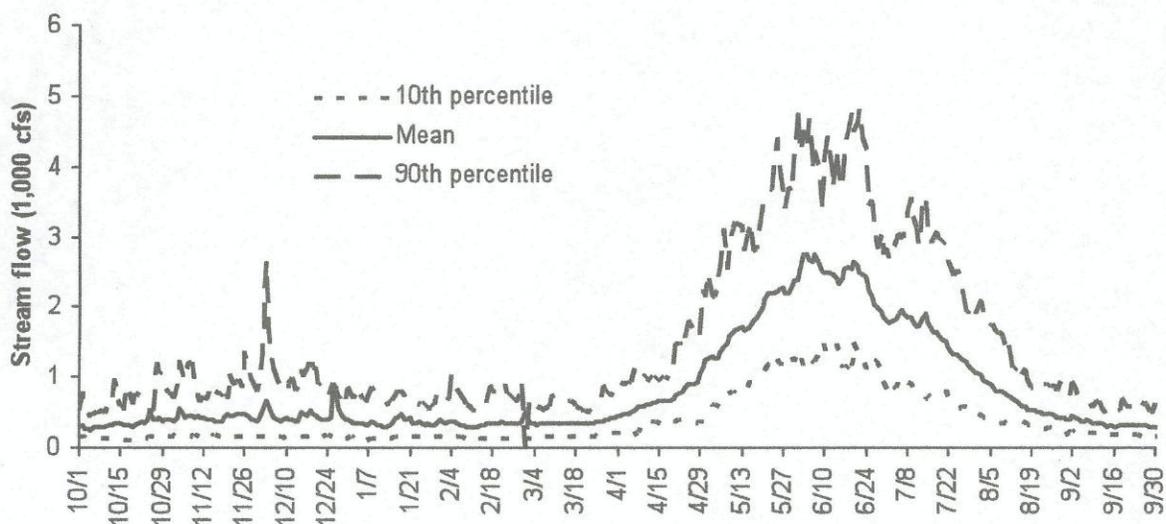


Figure 2. White River stream gage data collected by the US Geological survey, 1955-1983 (Data source: http://waterdata.usgs.gov/wa/nwis/inventory/?site_no=12454000&agency_cd=USGS&).

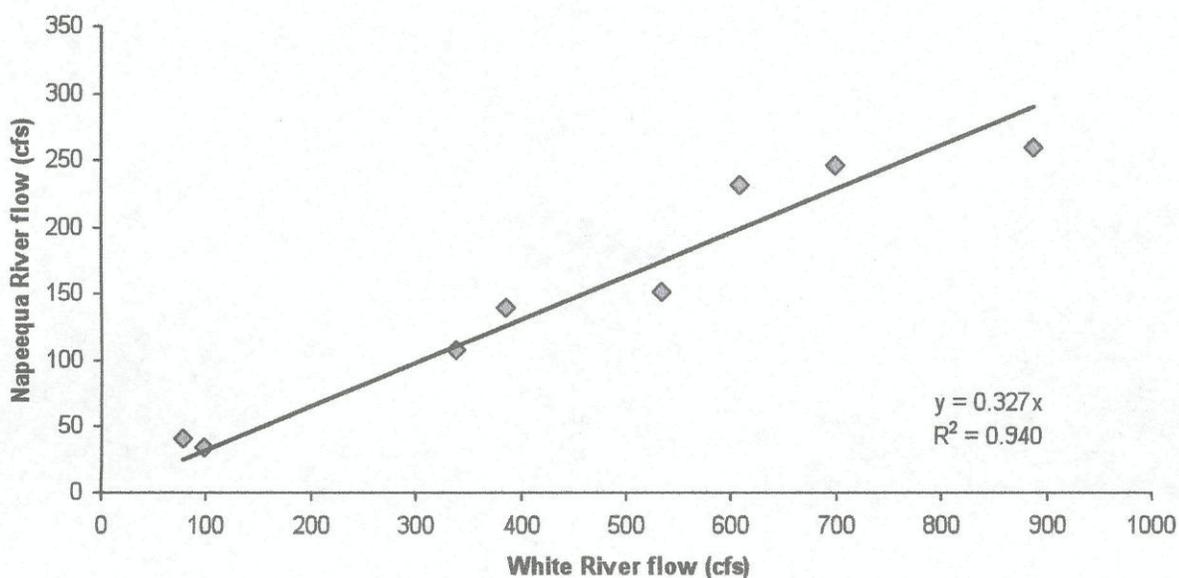


Figure 3. Relationship between Napeequa and White River flows.

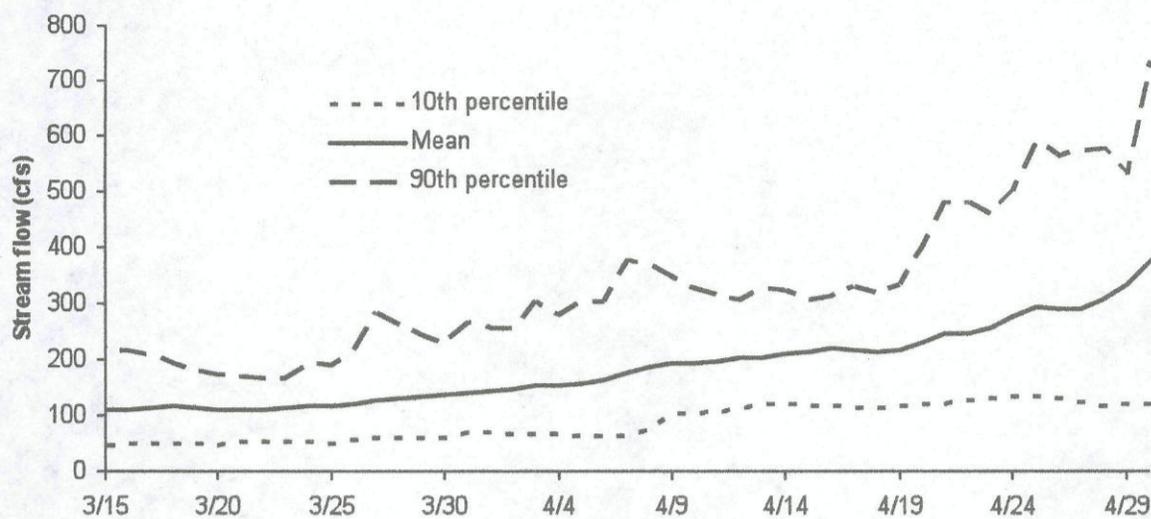


Figure 4. Estimated Napeequa River flows during the spring acclimation period based on the regression on White River gage data.

The modeled effect of flow on WUA of habitat in the affected reach of the Napeequa River varied with the species and lifestage during the spring acclimation period (Figure 5). The substrate in the affected reach was dominated by gravel and therefore was more suitable habitat for all species than was modeled for the affected reach of Chikamin Creek. The amount of steelhead spawning WUA peaked at about 13,000 ft² at 242 cfs and then decreased with increased flow (Table 1). The WUA of Chinook rearing habitat generally decreased with flow until about 180 cfs and then increased slightly. The modeled water withdrawal of 2.6 cfs tended to reduce the WUA of habitat for most species except at the highest flows which showed a slight increase for all species except bull trout which decreased by 3% (Table 1). The withdrawal generally increased WUA for Chinook salmon rearing. The change in WUA due to the water withdrawal was typically 1% or less for each modeled flow type except for the extreme low flow. The modeled 2.6 cfs withdrawal at the extreme low flow resulted in a 3% increase in Chinook rearing, a 5% decrease in steelhead spawning, a 2% reduction in steelhead rearing, and less than 1% decrease in bull trout WUA. Thus, the maximum proposed withdrawal at this site would generally decrease WUA for most species at extreme low flows by a small amount, and slightly increase WUA at higher flows.

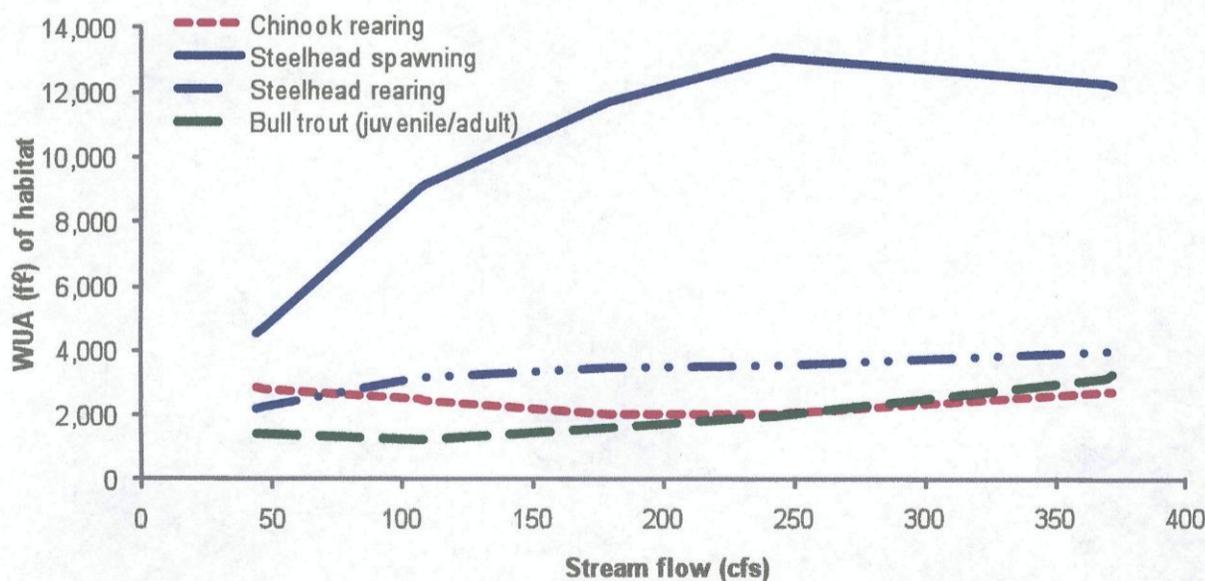


Figure 5. Estimated weighted useable area (WUA) of habitat as a function of stream flow in the affected reach of Napeequa River.

Table 1. Modeled weighted useable area (WUA) of habitat in the affected reach of the Napeequa River for expected flow values and a maximum withdrawal of 2.6 cfs.

Flow type	Model type	Flow (cfs)	Water surface elevation (ft)	Wetted surface area (ft ²)	Weighted usable area (ft ²)			
					Chinook rear	Steelhead spawn	Bull trout juvenile/adult	
Extreme low	-2.6 cfs	44.4	1,927.9	81,388	2,858	4,514	2,199	1,414
	normal	47.0	1,927.9	81,949	2,781	4,741	2,245	1,416
Mean	-2.6 cfs	106.4	1,928.4	96,432	2,472	9,013	3,154	1,209

low	normal	109.0	1,928.5	96,753	2,445	9,134	3,164	1,204
Mean	-2.6 cfs	369.4	1,930.8	131,228	2,692	12,218	3,963	3,098
high	normal	372.0	1,930.8	132,520	2,674	12,168	3,925	3,196

The design of the Tall Timber site allows use of the side channel by other species during coho acclimation (see Appendix 2 of EIS). Diverting flow into the system may increase off-channel habitat.