Appendix E

Developed by Jeff Spencer and others from the Yakama Nation involved with the Subbasin Planning Effort
Developed from EDT data
Developed on 5/21/04

EDT Data Sources

Attribute	Description
Reach Breaks	Ecologically homogenous environments with consistent gradient and geomorphic characteristics (primarily confinement); field work, topographic map interpretation and aerial video interpretation; SSHIAP layer for gradient
Alkalinity	EPA storet database, Yakama nation field samples. Regression equations created for reaches with no data, conductivity field samples converted to alkalinity values
Bed Scour	Relationships with gradient and natural confinement were utilized for base numbers that were modified from hydro confinement, increases of peak flow and wood densities.
Benthic Community Richness	YkFP staff discussions based on field observations, correlations were made in areas of high temperatures or agricultural practices with potential increased levels of nutrient enrichment
Channel Length	Delineation with the use of GIS
Channel widths	Personal field data collection with laser range finder, Yakama Nation TFW database
Natural Confinement	field surveys, aerial video interpretation that was used in conjunction with GIS
Hydroconfinement	Aerial video and USGS topographic maps were used to assess roads, railroads, and riprap; portions were delineated with GIS. A secondary component considered was severe entrenchment in localized areas; it was considered in the overall length of hydroconfinement within reaches of concern.
Dissolved Oxygen	Sources of DO concentration were utilized from Boise Cascade Upper Little Klickitat Analysis, Klickitat river basin level 1 assessment, EPA storet database
Embeddedness	Regression equations created by Mobrand correlating embeddedness to % fines were used for all reach entries except where field knowledge override

Fine Sediment	In Klickitat mainstem and lower Little Klickitat McNeil samples were used. In upper Little Klickitat, Boise Cascade cites amount delivered (tons/yr) related to rd extension. In tributaries where road densities existed, correlation used from Rittmueller (1986) findings.
Fish Community Richness	Yakama Nation field observations and screw trap data.
Fish Pathogens	Proximity of hatcheries and WDFW fish stocking records (1935-2002)
Fish Species Introduction	Yakama Nation field observations and screw trap data.
Flow High	Boise Cascade Upper Little Klickitat Watershed Analysis, White Creek Roads Assessment, extrapolation was used in Watersheds with similar climate, hydrology and natural resource management implications
Flow Low	Chapter 6 of the Klickitat River Basin Level I Assessment (Water rights and Water use) actual water use was used in conjunction with gauge records to estimate the decrease in low flow for the Little Klickitat watershed. Swale creek decreases based on local reach overbank storage degradations and anecdotal evidence from GLO surveys dated back to late 1800's. Riparian degradations and professional opinions used to estimate few reaches located within a watershed with management practices.
Flow DielVar	This attribute adddresses ramping rate associated with in channel hydro projects. This attribute does not apply to the Klickitat
FlwIntra Annual	Magnitudes of changes for the high flow attribute were used for this hydrologic attribute as well.
Gradient	Spatial analysis from GIS used for majority of reach gradients, maptech terrain navigator used for remainder of reaches
	TFW habitat survey data was available for over half of reaches. For inaccessible reaches, video interpretation was relied upon. In areas without TFW survey data, subsamples from a variety of reaches were collected and aerial video was utilized.
Habitat Pools	Straight from TFW database
Habitat Tailouts	With stream orders 1 and 2, 25% of pools were designated as pool tailouts; with stream orders of 3 & 4 15-20% were designated as pool tailouts
Habitat Glides	Within in each TFW survey, there were 10 transects. Summed all ten transects, averaged, then converted to glide, riffle, small cobble and large cobble. These numbers were reviewed along with other available reach information, which included one or more of the following: video interpretation, field work, best professional judgment by a biologist.

Habitat Riffle	Within in each TFW survey, there were 10 transects. Summed all ten transects, averaged, then converted to glide, riffle, small cobble and large cobble. These numbers were reviewed along with other available reach information, which included one or more of the following: video interpretation, field work, best professional judgment by a biologist.
Habitat Small Cobble	Within in each TFW survey, there were 10 transects. Summed all ten transects, averaged, then converted to glide, riffle, small cobble and large cobble. These numbers were reviewed along with other available reach information, which included one or more of the following: video interpretation, field work, best professional judgment by a biologist.
Habitat Large Cobble	Within in each TFW survey, there were 10 transects. Summed all ten transects, averaged, then converted to glide, riffle, small cobble and large cobble. These numbers were reviewed along with other available reach information, which included one or more of the following: video interpretation, fieldwork, and best professional judgment by a biologist.
Harassment	Qualitative EDT definitions were used describing accessibility due to roads, boat ramps or proximity to human population centers.
Hatchery Outplants	WDFW fish planting records (1935-2002); YN records of fry and parr outplants from 2000 and 2002 for above Castile Falls; Klickitat Hatchery records; YN Coho records
Hydro Regime Natural	Hydrologic framework chapter of the Klickitat River Basin Level I Assessment where WDNR precipitation zones are exhibited
HydroRegime Regulated	No regulated hydro regimes occur in the Klickitat Subbasin
Icing	Elevations and precipitation associated with climate and temperatures
Nutrient Enrichment	Data sources used for DO concentrations suggest that DO concentrations are greater than 8 mg/L. This correlates to an EDT ranking of 2. Reaches with point sources of irrigation return flow or agricultural practices received rankings no greater than 2.0 due to High DO concentrations present
Obstructions	Field observations
Predation	YKFP staff discussions reflecting biological opinions
Riparian Function	Mainstem below Castile Falls was based on canopy loss due to rip-rap and hydroconfinement. Above Castile Falls, the same analysis was performed with the addition of considering grazing, local entrenchment, and logging history. In tributary watersheds, loss of canopy cover, riparian harvest, local entrenchment, and grazing practices considered. .
Salmon Carcasses	Redd count; escapement, and spawning disruption were used to calculate spawning densities.

Temperature month Maximum	3-5 years of continuous hobo temperature data was use for reaches with temperature loggers, Other reaches were extrapolated from near reach values
Temperature month Minimum	3-5 years of continuous hobo temperature data was downloaded into Mobrand temperature generator which automated EDT rankings to one-hundredth decimal place
Temp spatial variation	Topographic maps displaying sources of springs, areas of late summer flow with relatively cool temperatures identified. Surficial Geologic GIS layers were combined with EDT stream reach layer to identify areas with Wanapum basalt contacts, or areas of mass wasting and slumping associated with the Wanapum basalt.
Turbidity	All available turbidity information was analyzed from the EPA STORET and YKFP screw trap. Regression equations were used to construct in-basin NTU to TSS relationships. Daily discharge values were correlated to NTU samples with rising and falling limbs of hydrograph and then used to model turbidity conditions for each month of the year. In a few instances, Boucher (1974) was utilized. See EDT citation for full explanation.
Withdrawals	No surface water diversions are thought to exist in tributaries with Anadromous fish stocks where screening may influence juvenile entrainment
Woody Debris	TFW survey data was available for more than half the reaches; they were utilized. In areas without TFW surveys, field biologists with experience in reach made estimates. Aerial video interpretation was utilized in the remaining areas.