Table 1

Ecological Processes and Structures Affected by Major Alterations

Major Alterations	Impairments	Ecological Processes and Structure																		
			Hydrology					Sediment		Water Quality			Habitat							
		Physical and Biological Functions	Storage	Subsurface Infiltration and flow	Surface flows	Hyporheic Exchange	Groundwater Recharge	Soil Erosion	Deposition/Storage	Nutrient Sources	Temperature/Dissolved Oxygen	Toxins/Pathogen sources	Riparian Vegetation Recruitment	Native grasslands and shrub steppe	Terrestrial Species - Foraging	Terrestrial Species - Breeding/Nesting	Terrestrial Species - Migration	Aquatic Species - Spawning	Aquatic Species - Rearing	Aquatic Species - Migration
Columbia Basin Project Storage	Restricts water movement		x		x						x	x						x	x	x
	Restricts sediment movement							x	x	x										
	New lakes and wetlands						x							x	x	x	x	x	x	x
	More rapid pool elevation fluctuations					x		x					x					x	x	x
Columbia Basin Project Diversion/Conveyance	New or relocated channels and wetlands						x							x	x	x	x	x	x	x
	New recharge areas						x													
	Water velocity increases							x	x			x								
Impervious Surfaces	Runoff rather than infiltration		x	x	x			x			x	x						x	x	
	Stormwater management/infrastructure		x	x			x			x		x								
	Habitat loss												x	x	x	x	x			
Vegetation Alterations	Loss of nutrient and organic inputs, reduced evapotranspiration and bioinfiltration, increased toxin and nutrient loading									x	x	x	x	x						
	Invasive species (terrestrial and aquatic)												x	x				x	x	
	Aquatic species															x	x		x	x
	Increased soil erosion							x					x		x					
Water Quality Impacts	Fertilizer/pesticide/herbicide Inputs											x								
	Effluent inputs											x								
	Temperature increases										x									
	Bioaccumulation of toxins														x	x				
Structural Effects on Habitat	Habitat fragmentation by roads												x	x	x	x	x			
	Over-water structures alter sediment,organic material pathways, and the photic zone				x													x	x	x
	Aquatic fill, reduced water storage																	x		
Shoreline Hardening/Stabilization	Habitat loss, replacement of variable-sized material with large homogenous substrate												x		x	x	x	x	x	x
	Increased wave energy at toe of slope and energy transfer downstream/down current of hardening							x	x											
	Sediment and subsurface water cycle disruption					x			x											
	Organic material cycle disruption									x										
Channel Realignment	Water velocity increases				x				x									x	x	x
	Reduced floodplain connection and functions					x														
	Decreased temporary storage of sediment, nutrient-, toxin-, or pathogen-laden water in streams								x	x		x								
Other Alterations	Artificial lighting increases light delivery at unnatural times														x	x	x	x	x	x
	Increased noise														x	x	x			
	Recreation infrastructure increases wave energy at shoreline (boat ramps, wakes)							x	x									x	x	x
	Non-native species predation														x	x	x	x	x	x
	Competition for resources from non-native species												x	x	x	x	x	x	x	x