7 Technical Appendices

8 Appendix A: Wildlife Species of the Okanogan Subbasin

Table 51 Wildlife Species of the Okanogan subbasin

Shrub-steppe	Eastside (Interior) Riparian Wetlands	Herbaceous Wetlands
American Avocet	American Badger	American Avocet
American Badger	American Beaver	American Beaver
American Crow	American Crow	American Bittern
American Goldfinch	American Dipper	American Coot
American Kestrel	American Goldfinch	American Crow
American Robin	American Kestrel	American Dipper
Bank Swallow	American Marten	American Goldfinch
Barn Owl	American Redstart	American Kestrel
Barn Swallow	American Robin	American Pipit
Barrow's Goldeneye	American Tree Sparrow	American Robin
Big Brown Bat	American Wigeon	American Wigeon
Black Bear	Bank Swallow	Baird's Sandpiper
Black-billed Magpie	Barn Owl	Bank Swallow
Black-chinned Hummingbird	Barn Swallow	Barn Owl
Black-necked Stilt	Barred Owl	Barn Swallow
Black-tailed Jackrabbit	Belted Kingfisher	Barrow's Goldeneye
Black-throated Sparrow	Big Brown Bat	Big Brown Bat
Blue Grouse	Black Bear	Black Bear
Bobcat	Black Swift	Black Swift
Brewer's Blackbird	Black-backed Woodpecker	Black Tern
Brewer's Sparrow	Black-billed Magpie	Black-billed Magpie
Brown-headed Cowbird	Black-capped Chickadee	Black-capped Chickadee
Bullfrog	Black-chinned Hummingbird	Black-chinned Hummingbird
Burrowing Owl	Black-crowned Night-heron	Black-crowned Night-heron
Bushy-tailed Woodrat	Black-headed Grosbeak	Black-necked Stilt
California Myotis	Black-tailed Deer	Black-tailed Deer
California Quail	Black-throated Gray Warbler	Blue-winged Teal

Shrub-steppe	Eastside (Interior) Riparian Wetlands	Herbaceous Wetlands
Canada Goose	Blue Grouse	Bobcat
Canyon Wren	Bobcat	Bobolink
Chipping Sparrow	Bobolink	Brewer's Blackbird
Chukar	Bohemian Waxwing	Brown-headed Cowbird
Cliff Swallow	Brewer's Blackbird	Bullfrog
Columbia Spotted Frog	Brown Creeper	Burrowing Owl
Columbian Ground Squirrel	Brown-headed Cowbird	California Gull
Common Garter Snake	Bullfrog	California Myotis
Common Nighthawk	Bullock's Oriole	Calliope Hummingbird
Common Poorwill	Bushy-tailed Woodrat	Canada Goose
Common Porcupine	California Myotis	Canvasback
Common Raven	California Quail	Cascade Frog
Cooper's Hawk	Calliope Hummingbird	Caspian Tern
Coyote	Canada Goose	Cedar Waxwing
Deer Mouse	Canyon Wren	Cinnamon Teal
Eastern Kingbird	Cascade Frog	Clark's Grebe
European Starling	Cassin's Finch	Cliff Swallow
Ferruginous Hawk	Cassin's Vireo	Columbia Spotted Frog
Fringed Myotis	Cedar Waxwing	Columbian White-tailed Deer
Golden Eagle	Chipping Sparrow	Common Garter Snake
Golden-mantled Ground Squirrel	Chukar	Common Loon
Gopher Snake	Cliff Swallow	Common Nighthawk
Grasshopper Sparrow	Coast Mole	Common Porcupine
Gray Flycatcher	Columbia Spotted Frog	Common Raven
Gray Partridge	Columbian Ground Squirrel	Common Yellowthroat
Great Basin Pocket Mouse	Columbian Mouse	Cooper's Hawk
Great Basin Spadefoot	Common Garter Snake	Coyote
Great Horned Owl	Common Merganser	Deer Mouse
Greater Yellowlegs	Common Nighthawk	Double-crested Cormorant
Hoary Bat	Common Porcupine	Eared Grebe
Horned Lark	Common Raven	Eastern Kingbird
Killdeer	Common Redpoll	European Starling

Shrub-steppe	Eastside (Interior) Riparian Wetlands	Herbaceous Wetlands
Lark Sparrow	Common Yellowthroat	Forster's Tern
Least Chipmunk	Cooper's Hawk	Fringed Myotis
Lesser Yellowlegs	Cordilleran Flycatcher	Gadwall
Little Brown Myotis	Coyote	Glaucous Gull
Loggerhead Shrike	Creeping Vole	Golden Eagle
Long-billed Curlew	Dark-eyed Junco	Great Basin Spadefoot
Long-eared Myotis	Deer Mouse	Great Blue Heron
Long-eared Owl	Double-crested Cormorant	Great Egret
Long-legged Myotis	Downy Woodpecker	Great Gray Owl
Long-tailed Vole	Dusky Flycatcher	Great Horned Owl
Long-tailed Weasel	Eastern Cottontail	Greater Yellowlegs
Long-toed Salamander	Eastern Fox Squirrel	Green-winged Teal
Mallard	Eastern Kingbird	Grizzly Bear
Merriam's Shrew	Ermine	Gyrfalcon
Mink	European Starling	Herring Gull
Montane Vole	Evening Grosbeak	Hoary Bat
Mountain Bluebird	Fisher	Hooded Merganser
Mourning Dove	Flammulated Owl	House Finch
Nashville Warbler	Fox Sparrow	Killdeer
Night Snake	Fringed Myotis	Lapland Longspur
Northern Flicker	Golden Eagle	Least Sandpiper
Northern Goshawk	Golden-crowned Kinglet	Lesser Yellowlegs
Northern Grasshopper Mouse	Golden-mantled Ground Squirrel	Lincoln's Sparrow
Northern Harrier	Gopher Snake	Little Brown Myotis
Northern Leopard Frog	Gray Catbird	Loggerhead Shrike
Northern Pocket Gopher	Gray Jay	Long-billed Curlew
Northern Rough-winged Swallow	Great Basin Spadefoot	Long-billed Dowitcher
Northern Shrike	Great Blue Heron	Long-eared Myotis
Nuttall's (Mountain) Cottontail	Great Egret	Long-eared Owl
Orange-crowned Warbler	Great Horned Owl	Long-legged Myotis
Osprey	Greater Yellowlegs	Long-tailed Vole
Pacific Chorus (Tree) Frog	Green-winged Teal	Long-tailed Weasel

Shrub-steppe	Eastside (Interior) Riparian Wetlands	Herbaceous Wetlands
Painted Turtle	Grizzly Bear	Long-toed Salamander
Pallid Bat	Hairy Woodpecker	Mallard
Prairie Falcon	Harlequin Duck	Marsh Wren
Pygmy Rabbit	Heather Vole	Meadow Vole
Racer	Hermit Thrush	Mink
Red-tailed Hawk	Hoary Bat	Montane Vole
Ringneck Snake	Hooded Merganser	Moose
Ring-necked Pheasant	House Finch	Mountain Lion
Rock Dove	House Wren	Muskrat
Rock Wren	Killdeer	Northern Bog Lemming
Rough-legged Hawk	Lazuli Bunting	Northern Goshawk
Rough-skinned Newt	Least Chipmunk	Northern Harrier
Rubber Boa	Lesser Yellowlegs	Northern Leopard Frog
Sage Grouse	Lewis's Woodpecker	Northern Pintail
Sage Sparrow	Lincoln's Sparrow	Northern Pygmy-owl
Sage Thrasher	Little Brown Myotis	Northern River Otter
Sagebrush Lizard	Long-eared Myotis	Northern Rough-winged Swallow
Sagebrush Vole	Long-eared Owl	Northern Shoveler
Savannah Sparrow	Long-legged Myotis	Northern Shrike
Say's Phoebe	Long-tailed Vole	Northwestern Salamander
Sharp-shinned Hawk	Long-tailed Weasel	Nutria
Sharp-tailed Grouse	Long-toed Salamander	Pacific Chorus (Tree) Frog
Short-eared Owl	Macgillivray's Warbler	Pacific Jumping Mouse
Short-horned Lizard	Mallard	Pacific Water Shrew
Side-blotched Lizard	Masked Shrew	Painted Turtle
Snow Bunting	Meadow Vole	Pallid Bat
Solitary Sandpiper	Mink	Pectoral Sandpiper
Spotted Bat	Montane Shrew	Pied-billed Grebe
Spotted Sandpiper	Montane Vole	Pine Siskin
Striped Whipsnake	Moose	Raccoon
Swainson's Hawk	Mountain Bluebird	Redhead

Shrub-steppe	Eastside (Interior) Riparian Wetlands	Herbaceous Wetlands
Tiger Salamander	Mountain Chickadee	Red-necked Grebe
Townsend's Big-eared Bat	Mountain Lion	Red-tailed Hawk
Townsend's Ground Squirrel	Mourning Dove	Red-winged Blackbird
Townsend's Solitaire	Muskrat	Ring-billed Gull
Turkey Vulture	Nashville Warbler	Ring-necked Duck
Vagrant Shrew	Northern Alligator Lizard	Ring-necked Pheasant
Vesper Sparrow	Northern Flicker	Roosevelt Elk
Washington Ground Squirrel	Northern Flying Squirrel	Rough-legged Hawk
Western Fence Lizard	Northern Goshawk	Rough-skinned Newt
Western Harvest Mouse	Northern Harrier	Ruby-crowned Kinglet
Western Kingbird	Northern Leopard Frog	Ruddy Duck
Western Meadowlark	Northern Pocket Gopher	Rufous Hummingbird
Western Pipistrelle	Northern Pygmy-owl	Savannah Sparrow
Western Rattlesnake	Northern River Otter	Sharp-shinned Hawk
Western Skink	Northern Rough-winged Swallow	Short-eared Owl
Western Small-footed Myotis	Northern Saw-whet Owl	Shrew-mole
Western Terrestrial Garter Snake	Northern Waterthrush	Silver-haired Bat
Western Toad	Northwestern Salamander	Snowy Owl
White-crowned Sparrow	Olive-sided Flycatcher	Solitary Sandpiper
White-tailed Jackrabbit	Orange-crowned Warbler	Song Sparrow
White-throated Swift	Osprey	Sora
Woodhouse's Toad	Pacific Chorus (Tree) Frog	Spotted Bat
Yellow-bellied Marmot	Pacific Jumping Mouse	Spotted Sandpiper
Yuma Myotis	Pacific Water Shrew	Striped Skunk
	Painted Turtle	Swainson's Hawk
	Pallid Bat	Thayer's Gull
	Pied-billed Grebe	Tiger Salamander
	Pileated Woodpecker	Townsend's Big-eared Bat
	Pine Siskin	Tree Swallow
	Prairie Falcon	Tundra Swan
	Pygmy Nuthatch	Turkey Vulture
	Raccoon	Vagrant Shrew

Shrub-steppe	Eastside (Interior) Riparian Wetlands	Herbaceous Wetlands
	Racer	Vaux's Swift
	Red Crossbill	Violet-green Swallow
	Red Fox	Virginia Rail
	Red-breasted Nuthatch	Western Grebe
	Red-breasted Sapsucker	Western Harvest Mouse
	Red-eyed Vireo	Western Jumping Mouse
	Red-naped Sapsucker	Western Meadowlark
	Red-tailed Hawk	Western Sandpiper
	Red-winged Blackbird	Western Screech-owl
	Ring-necked Duck	Western Small-footed Myotis
	Ring-necked Pheasant	Western Terrestrial Garter Snake
	Rough-legged Hawk	Western Toad
	Rough-skinned Newt	White-crowned Sparrow
	Rubber Boa	White-throated Swift
	Ruby-crowned Kinglet	Wilson's Phalarope
	Ruffed Grouse	Wilson's Snipe
	Rufous Hummingbird	Wood Duck
	Savannah Sparrow	Woodhouse's Toad
	Say's Phoebe	Yellow-bellied Marmot
	Sharptail Snake	Yellow-headed Blackbird
	Sharp-tailed Grouse	Yellow-rumped Warbler
	Shrew-mole	Yuma Myotis
	Silver-haired Bat	
	Snowshoe Hare	
	Solitary Sandpiper	
	Song Sparrow	
	Southern Alligator Lizard	
	Southern Red-backed Vole	
	Spotted Bat	
	Spotted Sandpiper	
	Spotted Towhee	

Shrub-steppe	Eastside (Interior) Riparian Wetlands	Herbaceous Wetlands
	Steller's Jay	
	Striped Skunk	
	Swainson's Hawk	
	Swainson's Thrush	
	Tailed Frog	
	Three-toed Woodpecker	
	Tiger Salamander	
	Townsend's Big-eared Bat	
	Townsend's Solitaire	
	Townsend's Warbler	
	Tree Swallow	
	Trowbridge's Shrew	
	Turkey Vulture	
	Vagrant Shrew	
	Vaux's Swift	
	Veery	
	Violet-green Swallow	
	Virginia Opossum	
	Warbling Vireo	
	Water Shrew	
	Water Vole	
	Western Bluebird	
	Western Harvest Mouse	
	Western Jumping Mouse	
	Western Pipistrelle	
	Western Rattlesnake	
	Western Screech-owl	
	Western Small-footed Myotis	
	Western Tanager	
	Western Terrestrial Garter Snake	
	Western Toad	
	Western Wood-pewee	

Shrub-steppe	Eastside (Interior) Riparian Wetlands	Herbaceous Wetlands
	White-breasted Nuthatch	
	White-crowned Sparrow	
	White-headed Woodpecker	
	White-tailed Jackrabbit	
	White-throated Swift	
	Wild Turkey	
	Williamson's Sapsucker	
	Willow Flycatcher	
	Wilson's Warbler	
	Winter Wren	
	Wood Duck	
	Woodhouse's Toad	
	Yellow Warbler	
	Yellow-bellied Marmot	
	Yellow-breasted Chat	
	Yellow-pine Chipmunk	
	Yellow-rumped Warbler	
	Yuma Myotis	

9 Appendix B: Wildlife-Salmonid Habitat Associations in the Okanogan Subbasin

Table 52 Wildlife-Salmonid Habitat Associations in the Okanogan Subbasin

	Common Name	Scientific Name		Salmonid Relationship	Closely Associated with Riparian Wetlands	Closely Associated with Other Wetlands
Amphibians						
	Tiger Salamander	*Ambystoma tigrinum*			Yes	
	Long-toed Salamander	*Ambystoma macrodactylum*			Yes	
	Tailed Frog	*Ascaphus truei*			Yes	
	Great Basin Spadefoot	*Scaphiopus intermontanus*			Yes	
	Western Toad	*Bufo boreas*			Yes	
	Pacific Chorus (Tree) Frog	*Pseudacris regilla*			Yes	
	Cascades Frog	*Rana cascadae*				
	Columbia Spotted Frog	*Rana luteiventris*			Yes	
	Bullfrog	*Rana catesbeiana*			Yes	
	Total Amphibians:	**9**	**Total:**	**0**	**8**	**0**

Birds					
	Common Loon	*Gavia immer*	Yes		Yes
	Pied-billed Grebe	*Podilymbus podiceps*	Yes		Yes
	Red-necked Grebe	*Podiceps grisegena*	Yes		Yes
	Eared Grebe	*Podiceps nigricollis*			Yes
	American Bittern	*Botaurus lentiginosus*			Yes
	Great Blue Heron	*Ardea herodias*	Yes	Yes	
	Black-crowned Night-heron	*Nycticorax nycticorax*	Yes	Yes	
	Turkey Vulture	*Cathartes aura*	Yes		
	Canada Goose	*Branta canadensis*			Yes

Birds					
	Tundra Swan	*Cygnus columbianus*			
	Wood Duck	*Aix sponsa*		Yes	
	Gadwall	*Anas strepera*			Yes
	American Wigeon	*Anas americana*			Yes
	Mallard	*Anas platyrhynchos*	Yes	Yes	
	Blue-winged Teal	*Anas discors*			Yes
	Cinnamon Teal	*Anas cyanoptera*			Yes
	Northern Shoveler	*Anas clypeata*			Yes
	Northern Pintail	*Anas acuta*			Yes
	Green-winged Teal	*Anas crecca*	Yes		Yes
	Canvasback	*Aythya valisineria*	Yes		Yes
	Redhead	*Aythya americana*			Yes
	Ring-necked Duck	*Aythya collaris*			
	Greater Scaup	*Aythya marila*	Yes		
	Harlequin Duck	*Histrionicus histrionicus*	Yes	Yes	
	Barrow's Goldeneye	*Bucephala islandica*	Yes		
	Hooded Merganser	*Lophodytes cucullatus*	Yes	Yes	
	Common Merganser	*Mergus merganser*	Yes	Yes	
	Ruddy Duck	*Oxyura jamaicensis*			Yes
	Osprey	*Pandion haliaetus*	Yes		
	Northern Harrier	*Circus cyaneus*			
	Sharp-shinned Hawk	*Accipiter striatus*			
	Cooper's Hawk	*Accipiter cooperii*			
	Northern Goshawk	*Accipiter gentilis*			
	Swainson's Hawk	*Buteo swainsoni*			
	Red-tailed Hawk	*Buteo jamaicensis*	Yes		
	Rough-legged Hawk	*Buteo lagopus*			
	Golden Eagle	*Aquila chrysaetos*	Yes		
	American Kestrel	*Falco sparverius*			
	Gyrfalcon	*Falco rusticolus*	Yes		

Birds					
	Prairie Falcon	*Falco mexicanus*			
	Chukar	*Alectoris chukar*			
	Gray Partridge	*Perdix perdix*			
	Ring-necked Pheasant	*Phasianus colchicus*		Yes	
	Ruffed Grouse	*Bonasa umbellus*		Yes	
	Spruce Grouse	*Falcipennis canadensis*			
	White-tailed Ptarmigan	*Lagopus leucurus*			
	Blue Grouse	*Dendragapus obscurus*		Yes	
	Sharp-tailed Grouse	*Tympanuchus phasianellus*		yes	
	Wild Turkey	*Meleagris gallopavo*			
	California Quail	*Callipepla californica*			
	Virginia Rail	*Rallus limicola*			Yes
	Sora	*Porzana carolina*			Yes
	American Coot	*Fulica americana*			Yes
	Killdeer	*Charadrius vociferus*	Yes		
	American Avocet	*Recurvirostra americana*			Yes
	Greater Yellowlegs	*Tringa melanoleuca*	Yes		
	Lesser Yellowlegs	*Tringa flavipes*			
	Solitary Sandpiper	*Tringa solitaria*		Yes	
	Spotted Sandpiper	*Actitis macularia*	Yes		
	Long-billed Curlew	*Numenius americanus*			
	Semipalmated Sandpiper	*Calidris pusilla*			
	Western Sandpiper	*Calidris mauri*			
	Least Sandpiper	*Calidris minutilla*			
	Baird's Sandpiper	*Calidris bairdii*			
	Pectoral Sandpiper	*Calidris melanotos*			
	Stilt Sandpiper	*Calidris himantopus*			
	Long-billed Dowitcher	*Limnodromus*			

Birds					
		scolopaceus			
	Common Snipe	*Gallinago gallinago*			Yes
	Wilson's Phalarope	*Phalaropus tricolor*			Yes
	Red-necked Phalarope	*Phalaropus lobatus*			
	Ring-billed Gull	*Larus delawarensis*	Yes		
	California Gull	*Larus californicus*	Yes		
	Herring Gull	*Larus argentatus*	Yes		
	Thayer's Gull	*Larus thayeri*	Yes		
	Glaucous Gull	*Larus hyperboreus*	Yes		
	Black Tern	*Chlidonias niger*			Yes
	Rock Dove	*Columba livia*			
	Mourning Dove	*Zenaida macroura*		Yes	
	Barn Owl	*Tyto alba*			
	Flammulated Owl	*Otus flammeolus*			
	Western Screech-owl	*Otus kennicottii*		Yes	
	Great Horned Owl	*Bubo virginianus*			
	Snowy Owl	*Nyctea scandiaca*	Yes		
	Northern Pygmy-owl	*Glaucidium gnoma*			
	Burrowing Owl	*Athene cunicularia*			
	Spotted Owl	*Strix occidentalis*			
	Barred Owl	*Strix varia*			
	Great Gray Owl	*Strix nebulosa*			
	Long-eared Owl	*Asio otus*		Yes	
	Short-eared Owl	*Asio flammeus*			Yes
	Boreal Owl	*Aegolius funereus*			
	Northern Saw-whet Owl	*Aegolius acadicus*			
	Common Nighthawk	*Chordeiles minor*			
	Common Poorwill	*Phalaenoptilus nuttallii*			
	Black Swift	*Cypseloides niger*			
	Vaux's Swift	*Chaetura vauxi*			

Birds					
	White-throated Swift	*Aeronautes saxatalis*			
	Black-chinned Hummingbird	*Archilochus alexandri*			
	Calliope Hummingbird	*Stellula calliope*			
	Rufous Hummingbird	*Selasphorus rufus*			
	Belted Kingfisher	*Ceryle alcyon*	Yes	Yes	
	Lewis's Woodpecker	*Melanerpes lewis*			
	Williamson's Sapsucker	*Sphyrapicus thyroideus*			
	Red-naped Sapsucker	*Sphyrapicus nuchalis*		Yes	
	Red-breasted Sapsucker	*Sphyrapicus ruber*			
	Downy Woodpecker	*Picoides pubescens*			
	Hairy Woodpecker	*Picoides villosus*			
	White-headed Woodpecker	*Picoides albolarvatus*			
	Three-toed Woodpecker	*Picoides tridactylus*			
	Black-backed Woodpecker	*Picoides arcticus*			
	Northern Flicker	*Colaptes auratus*			
	Pileated Woodpecker	*Dryocopus pileatus*			
	Olive-sided Flycatcher	*Contopus cooperi*			
	Western Wood-pewee	*Contopus sordidulus*			
	Willow Flycatcher	*Empidonax traillii*	Yes	Yes	
	Hammond's Flycatcher	*Empidonax hammondii*			
	Gray Flycatcher	*Empidonax wrightii*			
	Dusky Flycatcher	*Empidonax oberholseri*			
	Pacific-slope Flycatcher	*Empidonax difficilis*			
	Cordilleran Flycatcher	*Empidonax occidentalis*		Yes	

Birds					
	Say's Phoebe	*Sayornis saya*			
	Western Kingbird	*Tyrannus verticalis*			
	Eastern Kingbird	*Tyrannus tyrannus*			
	Loggerhead Shrike	*Lanius ludovicianus*			
	Northern Shrike	*Lanius excubitor*			
	Cassin's Vireo	*Vireo cassinii*			
	Warbling Vireo	*Vireo gilvus*		Yes	
	Red-eyed Vireo	*Vireo olivaceus*		Yes	
	Gray Jay	*Perisoreus canadensis*	Yes		
	Steller's Jay	*Cyanocitta stelleri*	Yes		
	Clark's Nutcracker	*Nucifraga columbiana*			
	Black-billed Magpie	*Pica pica*	Yes	Yes	
	American Crow	*Corvus brachyrhynchos*	Yes		
	Northwestern Crow	*Corvus caurinus*	Yes		
	Common Raven	*Corvus corax*	Yes		
	Horned Lark	*Eremophila alpestris*			
	Tree Swallow	*Tachycineta bicolor*	Yes	Yes	
	Violet-green Swallow	*Tachycineta thalassina*	Yes		
	Northern Rough-winged Swallow	*Stelgidopteryx serripennis*	Yes	Yes	
	Bank Swallow	*Riparia riparia*	Yes	Yes	
	Cliff Swallow	*Petrochelidon pyrrhonota*	Yes	Yes	
	Barn Swallow	*Hirundo rustica*	Yes	Yes	
	Black-capped Chickadee	*Poecile atricapillus*			
	Mountain Chickadee	*Poecile gambeli*			
	Chestnut-backed Chickadee	*Poecile rufescens*			
	Boreal Chickadee	*Poecile hudsonicus*			
	Red-breasted Nuthatch	*Sitta canadensis*			

Birds					
	White-breasted Nuthatch	*Sitta carolinensis*			
	Pygmy Nuthatch	*Sitta pygmaea*		Yes	
	Brown Creeper	*Certhia americana*			
	Rock Wren	*Salpinctes obsoletus*			
	Canyon Wren	*Catherpes mexicanus*			
	House Wren	*Troglodytes aedon*			
	Winter Wren	*Troglodytes troglodytes*	Yes		
	Marsh Wren	*Cistothorus palustris*			Yes
	American Dipper	*Cinclus mexicanus*	Yes	Yes	
	Golden-crowned Kinglet	*Regulus satrapa*			
	Ruby-crowned Kinglet	*Regulus calendula*			
	Western Bluebird	*Sialia mexicana*			
	Mountain Bluebird	*Sialia currucoides*			
	Townsend's Solitaire	*Myadestes townsendi*			
	Veery	*Catharus fuscescens*		Yes	
	Swainson's Thrush	*Catharus ustulatus*			
	Hermit Thrush	*Catharus guttatus*			
	American Robin	*Turdus migratorius*	Yes		
	Varied Thrush	*Ixoreus naevius*	Yes		
	Gray Catbird	*Dumetella carolinensis*		Yes	
	Sage Thrasher	*Oreoscoptes montanus*			
	European Starling	*Sturnus vulgaris*		Yes	
	American Pipit	*Anthus rubescens*			
	Bohemian Waxwing	*Bombycilla garrulus*			
	Cedar Waxwing	*Bombycilla cedrorum*		Yes	
	Orange-crowned Warbler	*Vermivora celata*			
	Nashville Warbler	*Vermivora ruficapilla*			
	Yellow Warbler	*Dendroica petechia*		Yes	

Birds					
	Yellow-rumped Warbler	*Dendroica coronata*			
	Townsend's Warbler	*Dendroica townsendi*			
	American Redstart	*Setophaga ruticilla*		Yes	
	Northern Waterthrush	*Seiurus noveboracensis*		Yes	
	Macgillivray's Warbler	*Oporornis tolmiei*			
	Common Yellowthroat	*Geothlypis trichas*		Yes	
	Wilson's Warbler	*Wilsonia pusilla*			
	Yellow-breasted Chat	*Icteria virens*		Yes	
	Western Tanager	*Piranga ludoviciana*			
	Spotted Towhee	*Pipilo maculatus*	Yes		
	American Tree Sparrow	*Spizella arborea*			
	Chipping Sparrow	*Spizella passerina*			
	Brewer's Sparrow	*Spizella breweri*			
	Vesper Sparrow	*Pooecetes gramineus*			
	Lark Sparrow	*Chondestes grammacus*			
	Sage Sparrow	*Amphispiza belli*			
	Savannah Sparrow	*Passerculus sandwichensis*			
	Grasshopper Sparrow	*Ammodramus savannarum*			
	Fox Sparrow	*Passerella iliaca*		Yes	
	Song Sparrow	*Melospiza melodia*	Yes		
	Lincoln's Sparrow	*Melospiza lincolnii*		Yes	
	White-crowned Sparrow	*Zonotrichia leucophrys*			
	Dark-eyed Junco	*Junco hyemalis*			
	Lapland Longspur	*Calcarius lapponicus*			
	Snow Bunting	*Plectrophenax nivalis*			
	Black-headed Grosbeak	*Pheucticus melanocephalus*			
	Lazuli Bunting	*Passerina amoena*		Yes	

Birds						
	Bobolink	*Dolichonyx oryzivorus*				
	Red-winged Blackbird	*Agelaius phoeniceus*				Yes
	Western Meadowlark	*Sturnella neglecta*				
	Yellow-headed Blackbird	*Xanthocephalus xanthocephalus*				Yes
	Brewer's Blackbird	*Euphagus cyanocephalus*				
	Brown-headed Cowbird	*Molothrus ater*				
	Bullock's Oriole	*Icterus bullockii*			Yes	
	Gray-crowned Rosy-Finch	*Leucosticte tephrocotis*				
	Pine Grosbeak	*Pinicola enucleator*				
	Cassin's Finch	*Carpodacus cassinii*				
	House Finch	*Carpodacus mexicanus*				
	Red Crossbill	*Loxia curvirostra*				
	White-winged Crossbill	*Loxia leucoptera*				
	Common Redpoll	*Carduelis flammea*				
	Pine Siskin	*Carduelis pinus*				
	American Goldfinch	*Carduelis tristis*				
	Evening Grosbeak	*Coccothraustes vespertinus*				Yes
	House Sparrow	*Passer domesticus*				
	Total Birds:	***220***	***Total:***	**47**	**42**	**28**

Mammals					
	Masked Shrew	*Sorex cinereus*	Yes		
	Vagrant Shrew	*Sorex vagrans*	Yes		
	Montane Shrew	*Sorex monticolus*	Yes		
	Water Shrew	*Sorex palustris*	Yes	Yes	
	Trowbridge's Shrew	*Sorex trowbridgii*	Yes		
	Merriam's Shrew	*Sorex merriami*			

Mammals					
	Coast Mole	*Scapanus orarius*			
	California Myotis	*Myotis californicus*			
	Western Small-footed Myotis	*Myotis ciliolabrum*		Yes	
	Yuma Myotis	*Myotis yumanensis*		Yes	
	Little Brown Myotis	*Myotis lucifugus*			
	Long-legged Myotis	*Myotis volans*		Yes	
	Fringed Myotis	*Myotis thysanodes*			
	Long-eared Myotis	*Myotis evotis*			
	Silver-haired Bat	*Lasionycteris noctivagans*			
	Western Pipistrelle	*Pipistrellus hesperus*		Yes	
	Big Brown Bat	*Eptesicus fuscus*		Yes	
	Hoary Bat	*Lasiurus cinereus*			
	Spotted Bat	*Euderma maculatum*			
	Townsend's Big-eared Bat	*Corynorhinus townsendii*			
	Pallid Bat	*Antrozous pallidus*		Yes	
	American Pika	*Ochotona princeps*			
	Nuttall's (Mountain) Cottontail	*Sylvilagus nuttallii*			
	Snowshoe Hare	*Lepus americanus*		Yes	
	White-tailed Jackrabbit	*Lepus townsendii*			
	Black-tailed Jackrabbit	*Lepus californicus*			
	Least Chipmunk	*Tamias minimus*			
	Yellow-pine Chipmunk	*Tamias amoenus*			
	Townsend's Chipmunk	*Tamias townsendii*			
	Yellow-bellied Marmot	*Marmota flaviventris*			
	Hoary Marmot	*Marmota caligata*			
	Columbian Ground Squirrel	*Spermophilus columbianus*			

Mammals					
	Golden-mantled Ground Squirrel	*Spermophilus lateralis*			
	Cascade Golden-mantled Ground Squirrel	*Spermophilus saturatus*			
	Eastern Fox Squirrel	*Sciurus niger*			
	Western Gray Squirrel	*Sciurus griseus*			
	Red Squirrel	*Tamiasciurus hudsonicus*			
	Northern Flying Squirrel	*Glaucomys sabrinus*	Yes		
	Northern Pocket Gopher	*Thomomys talpoides*			
	Great Basin Pocket Mouse	*Perognathus parvus*			
	American Beaver	*Castor canadensis*		Yes	
	Western Harvest Mouse	*Reithrodontomys megalotis*		Yes	
	Deer Mouse	*Peromyscus maniculatus*	Yes	Yes	
	Columbian Mouse	*Peromyscus keeni*			
	Northern Grasshopper Mouse	*Onychomys leucogaster*			
	Bushy-tailed Woodrat	*Neotoma cinerea*		Yes	
	Southern Red-backed Vole	*Clethrionomys gapperi*		Yes	
	Heather Vole	*Phenacomys intermedius*			
	Meadow Vole	*Microtus pennsylvanicus*		Yes	
	Montane Vole	*Microtus montanus*			Yes
	Long-tailed Vole	*Microtus longicaudus*		Yes	
	Creeping Vole	*Microtus oregoni*			
	Water Vole	*Microtus richardsoni*		Yes	
	Sagebrush Vole	*Lemmiscus curtatus*			
	Muskrat	*Ondatra zibethicus*		Yes	
	Northern Bog Lemming	*Synaptomys borealis*			Yes

Mammals					
	Norway Rat	*Rattus norvegicus*			
	House Mouse	*Mus musculus*			
	Western Jumping Mouse	*Zapus princeps*		Yes	
	Pacific Jumping Mouse	*Zapus trinotatus*		Yes	
	Common Porcupine	*Erethizon dorsatum*			
	Nutria	*Myocastor coypus*			Yes
	Coyote	*Canis latrans*	Yes		
	Gray Wolf	*Canis lupus*	Yes		
	Red Fox	*Vulpes vulpes*	Yes		
	Black Bear	*Ursus americanus*	Yes		
	Grizzly Bear	*Ursus arctos*	Yes		
	Raccoon	*Procyon lotor*	Yes	Yes	
	American Marten	*Martes americana*	Yes		
	Fisher	*Martes pennanti*	Yes		
	Ermine	*Mustela erminea*			
	Long-tailed Weasel	*Mustela frenata*	Yes		
	Mink	*Mustela vison*	Yes	Yes	
	Wolverine	*Gulo gulo*	Yes		
	American Badger	*Taxidea taxus*			
	Striped Skunk	*Mephitis mephitis*	Yes		
	Northern River Otter	*Lutra canadensis*	Yes	Yes	
	Mountain Lion	*Puma concolor*	Yes		
	Lynx	*Lynx canadensis*			
	Bobcat	*Lynx rufus*	Yes		
	Elk	*Cervus elaphus*			
	Mule Deer	*Odocoileus hemionus*			
	White-tailed Deer	*Odocoileus virginianus*			
	Moose	*Alces alces*			
	Mountain Goat	*Oreamnos americanus*			

Mammals						
	Bighorn Sheep	*Ovis canadensis*				
	Total Mammals:	**86**	**Total:**	**22**	**22**	**3**

Reptiles						
	Painted Turtle	*Chrysemys picta*				
	Northern Alligator Lizard	*Elgaria coerulea*				
	Short-horned Lizard	*Phrynosoma douglassii*				
	Sagebrush Lizard	*Sceloporus graciosus*				
	Western Fence Lizard	*Sceloporus occidentalis*				
	Western Skink	*Eumeces skiltonianus*				
	Rubber Boa	*Charina bottae*				
	Racer	*Coluber constrictor*				
	Night Snake	*Hypsiglena torquata*				
	Gopher Snake	*Pituophis catenifer*				
	Western Terrestrial Garter Snake	*Thamnophis elegans*			Yes	
	Common Garter Snake	*Thamnophis sirtalis*			Yes	Yes
	Western Rattlesnake	*Crotalus viridis*				
	Total Reptiles:	**13**	**Total:**	**2**	**1**	**0**
	Total Species:	**328**	**Total:**	**71**	**73**	**31**

10 Appendix C: Relevant Species Ranking, Status and Management Lists

US Federal and State Fish Species Rankings

Table 53 US Federal and State listed fish species present or potentially present in the Okanogan Basin

(Source: Washington State Salmon and Steelhead Stock Inventory, 1992 and ESA list.)

Species and Subbasin	SASSI Stock Status	Stock Origin	ESA Status	Maximum Upriver Distribution	Mean Escapement
Spring Chinook	Depressed	Native	Endangered, 1999	Considered Extirpated	NA
Summer Chinook	Depressed		Not listed	RM 26-77	363-2,300 (1977-1991)
Sockeye	Healthy	Native	Not listed	RM 90-106	65,000-64,700 (1977-1991)
Steelhead	Depressed	Mixed	Endangered, 1997	Not definitively established	114-837 (1982-1991)
Bull trout	Threatened	Native	Threatened 1998	Not definitively established	N/A

State and Federal Wildlife Species Status in Okanogan Subbasin

Table 54 State and Federal Wildlife Species Status in Okanogan Subbasin

	Common Name	Scientific Name	State Status		Federal Status
Amphibians					
	Dunn's Salamander	*Plethodon dunni*	WA	Candidate Species	
	Western Toad	*Bufo boreas*	WA	Candidate Species	
	Columbia Spotted Frog	*Rana luteiventris*	WA	Candidate Species	
	Northern Leopard Frog	*Rana pipiens*	WA	Endangered	
Total Listed Amphibians:		**4**			

Birds					
	Common Loon	*Gavia immer*	WA	Sensitive	
	Western Grebe	*Aechmophorus occidentalis*	WA	Candidate Species	
	Northern Goshawk	*Accipiter gentilis*	WA	Candidate Species	
	Ferruginous Hawk	*Buteo regalis*	WA	Threatened	
	Golden Eagle	*Aquila chrysaetos*	WA	Candidate Species	
	Sage Grouse	*Centrocercus urophasianus*	WA	Threatened	Anticipated Candidate
	Sharp-tailed Grouse	*Tympanuchus phasianellus*	WA	Threatened	
	Marbled Murrelet	*Brachyramphus marmoratus*	WA	Threatened	Threatened
	Flammulated Owl	*Otus flammeolus*	WA	Candidate Species	
	Burrowing Owl	*Athene cunicularia*	WA	Candidate Species	
	Spotted Owl	*Strix occidentalis*	WA	Endangered	Threatened
	Vaux's Swift	*Chaetura vauxi*	WA	Candidate Species	
	Lewis's Woodpecker	*Melanerpes lewis*	WA	Candidate Species	
	White-headed Woodpecker	*Picoides albolarvatus*	WA	Candidate Species	
	Black-backed Woodpecker	*Picoides arcticus*	WA	Candidate Species	
	Pileated Woodpecker	*Dryocopus pileatus*	WA	Candidate Species	
	Loggerhead Shrike	*Lanius ludovicianus*	WA	Candidate Species	
	Horned Lark	*Eremophila alpestris*	WA	Candidate Species	Candidate
	White-breasted Nuthatch	*Sitta carolinensis*	WA	Candidate Species	
	Sage Thrasher	*Oreoscoptes montanus*	WA	Candidate Species	
	Vesper Sparrow	*Pooecetes gramineus*	WA	Candidate Species	
	Sage Sparrow	*Amphispiza belli*	WA	Candidate Species	

Birds					
Total Listed Birds:		**22**			

Mammals					
	Merriam's Shrew	*Sorex merriami*	WA	Candidate Species	
	Townsend's Big-eared Bat	*Corynorhinus townsendii*	WA	Candidate Species	
	Pygmy Rabbit	*Brachylagus idahoensis*	WA	Endangered	Endangered
	White-tailed Jackrabbit	*Lepus townsendii*	WA	Candidate Species	
	Black-tailed Jackrabbit	*Lepus californicus*	WA	Candidate Species	
	Washington Ground Squirrel	*Spermophilus washingtoni*	WA	Candidate Species	Anticipated Candidate
	Western Gray Squirrel	*Sciurus griseus*	WA	Threatened	
	Northern Pocket Gopher	*Thomomys talpoides*	WA	Candidate Species	
	Gray Wolf	*Canis lupus*	WA	Endangered	Endangered
	Grizzly Bear	*Ursus arctos*	WA	Endangered	Threatened
	Fisher	*Martes pennanti*	WA	Endangered	
	Wolverine	*Gulo gulo*	WA	Candidate Species	
	Lynx	*Lynx canadensis*	WA	Threatened	Threatened
	White-tailed Deer	*Odocoileus virginianus*	WA	Endangered	Endangered
Total Listed Mammals:		**14**			

Reptiles					
	Sharptail Snake	*Contia tenuis*	WA	Candidate Species	
	Striped Whipsnake	*Masticophis taeniatus*	WA	Candidate Species	
Total Listed Reptiles:		**2**			
Total Listed Species:		**42**			

US listing of known high-quality or rare plant communities and wetland ecosystems of the Okanogan subbasin (Washington Natural Heritage Information System 2003)

Partners in Flight species of the Okanogan subbasin (IBIS 2003)

Table 55 Partners in Flight species of the Okanogan subbasin (IBIS 2003)

Common Name	Scientific Name	PIF 1998-1999 Continental	PIF Ranking by Super Region Draft 2002	WA PIF Priority & Focal Species
Northern Harrier	*Circus cyaneus*			Yes
Swainson's Hawk	*Buteo swainsoni*		MO (Intermountain West, Prairies)	Yes
Ferruginous Hawk	*Buteo regalis*			Yes
Rough-legged Hawk	*Buteo lagopus*		PR (Arctic)	
American Kestrel	*Falco sparverius*			Yes
Gyrfalcon	*Falco rusticolus*		PR (Arctic)	
Sage Grouse	*Centrocercus urophasianus*		MA (Intermountain West, Prairies)	
Spruce Grouse	*Falcipennis canadensis*		PR (Northern Forests)	
White-tailed Ptarmigan	*Lagopus leucurus*		MO (Arctic)	
Blue Grouse	*Dendragapus obscurus*		MA (Pacific, Intermountain West)	
Sharp-tailed Grouse	*Tympanuchus phasianellus*		MO (Prairies)	Yes
Long-billed Curlew	*Numenius americanus*	Yes		
Stilt Sandpiper	*Calidris himantopus*	Yes		
Flammulated Owl	*Otus flammeolus*		MO (Pacific, Intermountain West, Southwest)	Yes
Snowy Owl	*Nyctea scandiaca*		PR (Arctic)	
Northern Pygmy-owl	*Glaucidium gnoma*		PR (Pacific)	
Burrowing Owl	*Athene cunicularia*			Yes
Spotted Owl	*Strix occidentalis*		IM (Pacific, Intermountain West, Southwest)	
Great Gray Owl	*Strix nebulosa*			Yes
Short-eared Owl	*Asio flammeus*	Yes	MA (Arctic, Northern Forests, Intermountain	Yes

Common Name	Scientific Name	PIF 1998-1999 Continental	PIF Ranking by Super Region Draft 2002	WA PIF Priority & Focal Species
			West, Prairies)	
Common Poorwill	*Phalaenoptilus nuttallii*			Yes
Black Swift	*Cypseloides niger*	Yes	IM (Pacific, Intermountain West)	Yes
Vaux's Swift	*Chaetura vauxi*			Yes
White-throated Swift	*Aeronautes saxatalis*		MA (Intermountain West, Southwest)	Yes
Calliope Hummingbird	*Stellula calliope*		MO (Intermountain West)	Yes
Rufous Hummingbird	*Selasphorus rufus*	Yes	MA (Pacific, Intermountain West)	Yes
Lewis's Woodpecker	*Melanerpes lewis*	Yes	MO (Intermountain West, Prairies)	Yes
Williamson's Sapsucker	*Sphyrapicus thyroideus*		MO (Intermountain West)	Yes
Red-naped Sapsucker	*Sphyrapicus nuchalis*		MO (Intermountain West)	Yes
Red-breasted Sapsucker	*Sphyrapicus ruber*		MO (Pacific)	Yes
Downy Woodpecker	*Picoides pubescens*			Yes
White-headed Woodpecker	*Picoides albolarvatus*	Yes	PR (Pacific, Intermountain West)	Yes
Three-toed Woodpecker	*Picoides tridactylus*		PR (Northern Forests)	
Black-backed Woodpecker	*Picoides arcticus*		PR (Northern Forests)	Yes
Pileated Woodpecker	*Dryocopus pileatus*			Yes
Olive-sided Flycatcher	*Contopus cooperi*		MA (Pacific, Northern Forests, Intermountain West)	Yes
Western Wood-pewee	*Contopus sordidulus*			Yes
Willow Flycatcher	*Empidonax traillii*		MA (Prairies, East)	Yes
Hammond's Flycatcher	*Empidonax hammondii*			Yes
Gray Flycatcher	*Empidonax wrightii*		PR (Intermountain West)	Yes
Dusky Flycatcher	*Empidonax*		MA (Intermountain West)	Yes

Common Name	Scientific Name	PIF 1998-1999 Continental	PIF Ranking by Super Region Draft 2002	WA PIF Priority & Focal Species
	oberholseri			
Pacific-slope Flycatcher	*Empidonax difficilis*		PR (Pacific)	Yes
Loggerhead Shrike	*Lanius ludovicianus*			Yes
Northern Shrike	*Lanius excubitor*		PR (Northern Forests)	
Warbling Vireo	*Vireo gilvus*			Yes
Red-eyed Vireo	*Vireo olivaceus*			Yes
Gray Jay	*Perisoreus canadensis*		PR (Northern Forests)	
Clark's Nutcracker	*Nucifraga columbiana*		PR (Intermountain West)	Yes
Horned Lark	*Eremophila alpestris*			Yes
Bank Swallow	*Riparia riparia*			Yes
Chestnut-backed Chickadee	*Poecile rufescens*		PR (Pacific)	
Boreal Chickadee	*Poecile hudsonicus*		MA (Northern Forests)	
White-breasted Nuthatch	*Sitta carolinensis*			Yes
Brown Creeper	*Certhia americana*			Yes
House Wren	*Troglodytes aedon*			Yes
Winter Wren	*Troglodytes troglodytes*			Yes
American Dipper	*Cinclus mexicanus*			Yes
Western Bluebird	*Sialia mexicana*			Yes
Mountain Bluebird	*Sialia currucoides*		PR (Intermountain West)	
Townsend's Solitaire	*Myadestes townsendi*			Yes
Veery	*Catharus fuscescens*			Yes
Swainson's Thrush	*Catharus ustulatus*			Yes
Hermit Thrush	*Catharus guttatus*			Yes
Varied Thrush	*Ixoreus naevius*			Yes
Sage Thrasher	*Oreoscoptes montanus*		PR (Intermountain West)	Yes

Common Name	Scientific Name	PIF 1998-1999 Continental	PIF Ranking by Super Region Draft 2002	WA PIF Priority & Focal Species
American Pipit	*Anthus rubescens*		PR (Arctic)	Yes
Bohemian Waxwing	*Bombycilla garrulus*		MA (Northern Forests)	
Orange-crowned Warbler	*Vermivora celata*			Yes
Nashville Warbler	*Vermivora ruficapilla*		PR (Northern Forests)	Yes
Yellow Warbler	*Dendroica petechia*			Yes
Yellow-rumped Warbler	*Dendroica coronata*			Yes
Black-throated Gray Warbler	*Dendroica nigrescens*		MO (Pacific)	Yes
Townsend's Warbler	*Dendroica townsendi*			Yes
Hermit Warbler	*Dendroica occidentalis*	Yes	MO (Pacific)	Yes
Macgillivray's Warbler	*Oporornis tolmiei*			Yes
Wilson's Warbler	*Wilsonia pusilla*			Yes
Yellow-breasted Chat	*Icteria virens*			Yes
Western Tanager	*Piranga ludoviciana*			Yes
Chipping Sparrow	*Spizella passerina*			Yes
Brewer's Sparrow	*Spizella breweri*	Yes	MA (Intermountain West)	Yes
Vesper Sparrow	*Pooecetes gramineus*			Yes
Lark Sparrow	*Chondestes grammacus*			Yes
Black-throated Sparrow	*Amphispiza bilineata*			Yes
Sage Sparrow	*Amphispiza belli*	Yes	PR (Intermountain West)	Yes
Grasshopper Sparrow	*Ammodramus savannarum*		MA (Prairies)	Yes
Fox Sparrow	*Passerella iliaca*			Yes
Lincoln's Sparrow	*Melospiza lincolnii*		PR (Northern Forests)	Yes
Lapland Longspur	*Calcarius lapponicus*		PR (Arctic)	
Snow Bunting	*Plectrophenax*		PR (Arctic)	

Common Name	Scientific Name	PIF 1998-1999 Continental	PIF Ranking by Super Region Draft 2002	WA PIF Priority & Focal Species
	nivalis			
Black-headed Grosbeak	*Pheucticus melanocephalus*			Yes
Bobolink	*Dolichonyx oryzivorus*	Yes		
Western Meadowlark	*Sturnella neglecta*			Yes
Bullock's Oriole	*Icterus bullockii*			Yes
Pine Grosbeak	*Pinicola enucleator*		MO (Northern Forests)	
Purple Finch	*Carpodacus purpureus*			Yes
Cassin's Finch	*Carpodacus cassinii*		MA (Intermountain West)	
Red Crossbill	*Loxia curvirostra*			Yes
White-winged Crossbill	*Loxia leucoptera*		PR (Northern Forests)	
Total Species:	**98**			

Canadian Wildlife Status

The BC Conservation Data Centre list of both globally and provincially threatened and endangered species in the Okanagan Basin provided below.

Global and Provincial Status of "At Risk" Wildlife Species in the Okanagan Basin

Table 56 Global and Provincial Status of "At Risk" Wildlife Species in the Okanagan Basin

Common Name	Global Ranka	Provincial Rankb	Provincial Listc
Amphibians			
Tailed Frog – Coastal	G4T4Q	S3S4	Blue
Tiger Salamander	G5	S2	Red
Great Basin Spadefoot	G5	S3	Blue
Northern Leopard Frog	G5	S1	Red
Reptiles			
Painted Turtle	G5	S3S4	Blue

Common Name	Global Ranka	Provincial Rankb	Provincial Listc
Pigmy Short-Horned Lizard	G5	SH	Red
Rubber Boa	G5	S3S4	Blue
Racer	G5	S3S4	Blue
Gopher Snake, deserticola subspecies	G5T5	S3	Blue
Western Rattlesnake	G5	S3	Blue
Birds			
Western Grebe	G5	S1B,S3N	Red
American Bittern	G4	S3B,SZN	Blue
Great Blue Heron, herodias subspecies	G5T5	S3B, S5N	Blue
Tundra Swan	G5	S3N	Yellow
Redhead	G5	S3N, S4B	Yellow
Bald Eagle	G4	S4	Yellow
Swainson's Hawk	G5	S2B, SZN	Red
Ferruginous Hawk	G4	S1B	Red
Rough-Legged Hawk	G5	S2S3N	Yellow
Peregrine Falcon, anatum subspecies	G4T3	S2B, SZN	Red
Prairie Falcon	G5	S2B, SZN	Red
Sage Grouse	G5	SX	Red
Sharp-Tailed Grouse, columbianus subspecies	G4T3	S3	Blue
Sandhill Crane	G5	S3B, SZN	Blue
American Avocet	G5	S2S3B, SZN	Blue
Upland Sandpiper	G5	S1S3B, SZN	Red
Long-Billed Curlew	G5	S3B,SZN	Blue
Ring-Billed Gull	G5	S4B, SZN	Yellow
California Gull	G5	S3B,SZN	Blue
Barn Owl	G5	S3	Blue
Flammulated Owl	G4	S3S4B, SZN	Blue
Western Screech-Owl, macfarlanei subspecies	G5T?	S2	Red
Burrowing Owl	G4	S1B, SZN	Red
Short-Eared Owl	G5	S2N, S3B	Blue
White-Throated Swift	G5	S3S4B, SZN	Blue
Lewis's Woodpecker	G5	S3B, SZN	Blue

Common Name	Global Ranka	Provincial Rankb	Provincial Listc
Williamson's Sapsucker, thyroideus subspecies	G5TU	S3B, SZN	Blue
White-Headed Woodpecker	G4	S1S2	Red
Gray Flycatcher	G5	S3	Blue
Canyon Wren	G5	S3	Blue
Sage Thrasher	G5	S1B	Red
Yellow-Breasted Chat	G5	S1B	Red
Brewer's Sparrow, breweri subspecies	G5T4	S2B	Red
Lark Sparrow	G5	S2B, SZN	Red
Grasshopper Sparrow	G5	S2B	Red
Bobolink	G5	S3B,SZN	Blue
Mammals			
Preble's Shrew	G4	S1	Red
Merriam's Shrew	G5	S1	Red
Fringed Myotis	G4G5	S2S3	Blue
Western Small-Footed Myotis	G5	S2S3	Blue
Northern Long-Eared Myotis	G4	S2S3	Blue
Spotted Bat	G4	S3	Blue
Townsend's Big-Eared Bat	G4	S2S3	Blue
Pallid Bat	G5	S1	Red
Nuttall's Cottontail	G5	S3	Blue
Mountain Beaver, rainieri subspecies	G5T4	S3	Blue
Cascade Golden-Mantled Ground Squirrel	G5	S3S4	Blue
Great Basin Pocket Mouse	G5	S3	Blue
Western Harvest Mouse	G5	S2S3	Blue
Fisher	G5	S3	Blue
Northern Bog Lemming, artemisiae subspecies	G4T2T3	S2S3	Blue
Grizzly Bear	G4	S3	Blue
Fisher	G5	S3	Blue
Wolverine, luscus subspecies	G4T4	S3	Blue
Badger	G5	S2	Red
Caribou, Southern population	G5T2T3Q	S2	Red
California Bighorn Sheep	G4G5T4	S2S3	Blue

a Basic Global Ranks include the following: GX – Presumed Extinct throughout its range, GH – Possibly Extinct and G1 through G5 where G1 is Critically Imperiled and G5 is Secure. Additional Ranking codes include G#G# which is used to indicate uncertainty regarding the exact status of a taxon; Q denotes questionable taxonomic status; T reflects the status of infraspecific taxa (subspecies or varieties) and follows the species' global rank; U indicates a lack of available information about status or trends and the species is therefore unrankable; and a ? which indicates that the global rank of a species has not yet been assessed.

b Basic Provincial Ranks are similar to that of the Global Ranking system but are based upon provincial species populations and are coded with an S (such as SX, SH, S1 through S5). Provincial ranks are sometimes followed by rank qualifiers which include B which refers to the breeding occurrences of mobile animals; N which refers to the non-breeding occurrences of mobile animals; and Z which refers to species that occurs within the province but as a diffuse, usually moving population (for which it is difficult or impossible to map static occurrences).

c Red List candidates include any indigenous species or subspecies (taxa) considered to be Extirpated, Endangered, or Threatened in British Columbia. Extirpated taxa no longer exist in the wild in British Columbia, but do occur elsewhere. Endangered taxa are facing imminent extirpation or extinction. Threatened taxa are those that have been, or are being, evaluated for these designations.

Blue List species are any indigenous species or subspecies (taxa) considered to be Vulnerable in British Columbia. Vulnerable taxa are of special concern because of characteristics that make them particularly sensitive to human activities or natural events. Blue listed taxa are at risk, but are not Extirpated, Endangered, or Threatened.

Yellow List candidates include any indigenous species or subspecies (taxa) which is not at risk in British Columbia. The CDC tracks some Yellow listed taxa which are vulnerable during times of seasonal concentration (for example, breeding colonies).

Classified Aquatic Species

Fish populations in the Okanogan Subbasin are the subject of various agency classifications, and generally represent geographically "tiered" conservation designations. These include national designations according to lists created for the Endangered Species Act (US) and the Species at Risk Act (Canada), Provincial Conservation Center ranking (BC) and State Salmon and Steelhead Stock Inventory ranking (Washington), and global ranking (IUCN).

Canadian Species at Risk Act

The status assessment of Okanagan sockeye, Chinook and steelhead salmon stocks of Canadian origin are currently under review.

Sockeye may be a subject of management concern as a response to decreased stock productivity (K. Hyatt pers. com.).

Stock status reports for Canadian origin Okanagan chinook and steelhead are under preparation by members of the COBTWG for review by Canada's assessment agency COSEWIC. Reports with recommendations on status rating to the Minister can usually be anticipated within 6 months of submission, for response by the Canadian Minister of Fisheries and Oceans within 9 months.

There are no current records of the presence of any other Canadian origin salmon stocks, white sturgeon, bull trout, cutthroat trout or Pacific lamprey.

Provincial Conservation Data Center

The Umatilla dace is Provincially Red Listed or considered rare. Mottled sculpin and the chiselmouth minnow are Blue Listed, or considered threatened (BC Conservation Data Center **http://srmwww.gov.bc.ca/cdc/index.htm**.).

The B.C. Conservation Data Centre (CDC) maintains a list of both globally and provincially threatened and endangered species in the Okanagan Basin. For fish, this list is provided in **Table 9**.

Table 57 Global and Provincial Status of "At Risk" Fish Species in the Okanagan Basin

Common Name	Global Ranka	Provincial Rankb	Provincial Listc
Freshwater Fish			
Mottled Sculpin	G5	S3	Blue
Bull Trout	G3	S3	Blue
Chiselmouth	G5	S3	Blue
Umatilla Dace	G4	S2	Red
Mountain Sucker	G5	S3	Blue

a Global Ranks: G1 through G5 where G1 is Critically Imperiled and G5 is Secure.

b Provincial Ranks: S1 through S5 as in Global Ranks

c Red List: species or subspecies (taxa) considered to be Extirpated, Endangered, or Threatened in British Columbia.

The presence of rare fish in the Okanagan Basin means that special care must be taken when planning land use, including the operating and building of any dams or water diversions. It is also an indicator of a more wide spread problem with fish habitats. It is also important that care be taken to not introduce fish species to non-indigenous habitats in order that the native species present are not threatened by competition.

Global Ranking (Source: BC Conservation Center)

The IUCN (World Conservation Union) assesses the conservation status of species, subspecies, varieties and even selected sub-populations on a global scale in order to highlight taxa threatened with extinction, and therefore promote their conservation. Global Ranking of fish stocks indigenous to the Okanogan Subbasin can be found in the Provincial Ranking and Listing above.

The 2000 IUCN Red List of Threatened Species highlights those taxa that are facing a higher risk of global extinction (i.e. those listed as Critically Endangered, Endangered and Vulnerable) and provides taxonomic, conservation status and distribution information on these taxa.

11 Appendix D: Okanogan Subbasin Projects Inventory

Table 58 Okanogan subbasin Projects list (US and Canada)

Responsible Agency	BPA Project # or Other Funder	Project Duration	Project Title	Project Description, Rationale, and Results	Assessment Unit	A.U. #	Survival Factor Assessed/Restored/ Protected (maintained)
Unknown	NA	?	Okanogan River Sockeye population				
Weyerhaeuser Canada Limited	Forest Renewal BC	Apr 97	Okanagan Falls Reconnaissance Stream Inventory	1:20K Reconnaissance Fish and Fish Habitat Inventory, performed according to Resource Inventory Committee (RIC) standards (Main Stem + Tributaries; Unnamed Creek (alias Angel Creek), WS Code: 310-444700-66300, tributary to Vaseux Creek, Okanagan/Columbia Rivers, near Oliver; Dutton Creek, tributary to Vaseux Creek, Okanagan/Columbia Rivers, near Oliver; McIntyre Creek, tributary to Vaseux Creek, Okanagan/Columbia Rivers, near Oliver; Solco Creek, tributary to Vaseux Creek, Okanagan/Columbia Rivers, near Oliver; Underdown Creek, tributary to Vaseux Creek, Okanagan/Columbia Rivers, near Oliver.)	Canadian AU's		Habitat Diversity

Responsible Agency	BPA Project # or Other Funder	Project Duration	Project Title	Project Description, Rationale, and Results	Assessment Unit	A.U. #	Survival Factor Assessed/Restored/ Protected (maintained)
PUD # 1 Douglas County	NA	???? – ongoing	Okanogan River Bank restoration and maintenance	All Species – Gordon Brett 509.884.7191 gbrett@dcpud.org	Lower, Middle Okanogan	O1	Channel Stability, Sediment
COLVILLE TRIBES	199506700	1995 ?	Hellsgate winter range land purchase	Procure habitat area between Whitmore Mtn and Columbia River (Performance Contract)	Okanogan Lower	O1	Sediment
COLVILLE TRIBES	199506700	1995 ?	Hellsgate winter range land purchase	Procure habitat area between Whitmore Mtn and Columbia River	Okanogan Lower	O1	Sediment
IEC Beak Consultants	198347700	1983 ?	Similkameen River - Enloe Dam passage opportunities	Study of fish passage issues at Enloe Dam and potential salmonid habitat upstream and in tributaries	Similkameen	O10	Obstructions
Gorman Brothers Lumber Limited	Forest Renewal BC	Apr 96 –99	Nicola/Similkameen/Okanagan River Reconnaissance (1:20 000) Fish and Fish Habitat Inventory	A sample based survey covering whole watersheds, providing information regarding fish species distributions, characteristics and relative abundance, and stream reach and lake biophysical characteristics (Main Stem + Tributaries; Chute Creek (including tributaries Nuttall/Ratnip Creeks), tributary to Okanagan Lake/Okanagan/Columbia Rivers, near Naramata)	Similkameen	O10	Habitat Diversity

Responsible Agency	BPA Project # or Other Funder	Project Duration	Project Title	Project Description, Rationale, and Results	Assessment Unit	A.U. #	Survival Factor Assessed/Restored/ Protected (maintained)
BLM	NA	2000 -2000	Mine Tailing Removal on the Similkameen River	All Species – Joe Kelly $ 1,200,000	Similkameen	O10	Habitat Diversity, Pathogens
UCRFEG	01-1436	2002 – ongoing	Assess/feasibility/ prelim design Similkameen confluence	Chinook, Steelhead, sockeye – Larry Bailey $ 282,000	Similkameen	O10	Habitat Diversity, Sediment, Channel Stability
OCD	NA	2000 - 2003	Basin-wide Water Quality Assessment	Craig Nelson $ 333,000	All US AU's	O1-10	Flow, Pathogens
COLVILLE TRIBES	199604200	2000 - ongoing	Okanogan Basin - focus watershed project feasibility	Initiate coordination of a watershed planning project	All US AU's	O1-10	Flow, Habitat Diversity, Pathogens, Temperature
BLM	NA	Ongoing	Inventory on BLM Lands	Steelhead - Joe Kelly $ 2,000	All US AU's	O1-10	
BOR	NA	Ongoing	Okanogan Project operations	Upper Columbia Area Office Manager – PO Box 1749 – Yakima, WA 509.575.5848 – Fax 509.454.5611	All US AU's	O1-10	
COLVILLE TRIBES	200399916	NA	Design and Conduct Monitoring and Evaluation Associated with Reestablishment of Okanogan	Steelhead, Spring/Summer and Fall Chinook – Joe Peone $ 480,152	All US AU's	O1-10	

Responsible Agency	BPA Project # or Other Funder	Project Duration	Project Title	Project Description, Rationale, and Results	Assessment Unit	A.U. #	Survival Factor Assessed/Restored/ Protected (maintained)
			Basin Natural Production				
COLVILLE TRIBES	200399917	NA	Develop and Propagate Local Okanogan River Summer/Fall Chinook	Summer/Fall Chinook – Joe Peone $ 393,500 est	All US AU's	O1-10	
COLVILLE TRIBES	01-1390	2002-2002	Okanogan River System Thermal Imaging	All Species – Joe Peone $ 109,568	All US AU's	O1-10	Temperature
OCD	00-1680	2000 – ongoing	Okanogan County Fish Passage Barrier Study	Craig Nelson 509.422.0855 $ 249,898	All US AU's	O1-10	Obstructions
COLVILLE TRIBES	198503800	1986 - ongoing	Upper Columbia/Okanogan - construction of resident fish hatchery	Produce 22,679 kg (50,000 lbs) of resident fish – brook trout, rainbow trout, lahontan cutthroat trout - to be released into reservation waters	Okanogan AU's	O1-10	
COLVILLE TRIBES	198503800	Jul 88 – Oct 89	Upper Columbia/Okanogan - construction of resident fish hatchery	Produce 22,679 kg (50,000 lbs) of resident fish – brook trout, rainbow trout, lahontan cutthroat trout - to be released into reservation waters	Canadian AU's	O11-20	
COLVILLE TRIBES	198508301	Jul 89	Fish Culture Training	Training of 6 members of the CCT to operate trout hatchery	Canadian AU's	O11-20	
COLVILLE TRIBES	199404100	1994 ?	Wildlife Mitigation Coordination	Develop and implement a public involvement program to review wildlife mitigation proposals of	Canadian AU's	O11-20	

Responsible Agency	BPA Project # or Other Funder	Project Duration	Project Title	Project Description, Rationale, and Results	Assessment Unit	A.U. #	Survival Factor Assessed/Restored/ Protected (maintained)
				the CCT			
District of Summerland	Forest Renewal BC	Apr 96 – Mar 98	Trout & Eneas Creek Watershed Restoration	This watershed will be assessed to determine what work will need to be completed in order to restore the areas that were damaged by past activities, such as logging	Canadian AU's	O11-20	Sediment
Okanagan Nation Fisheries Commission	?	Nov 99 - Mar 00	Equesis/Naswhito /Whiteman Creek Fish Habitat and Passage Assessments	Habitat assessment for approx. 8km	Canadian AU's	O11-20	Habitat Diversity
Glenmore-Ellison Improvement District	In Vernon it is FRBC project #KA34-96-006. Also includes FRBC project #TOM98242.	Mar 96 – Jun 96	Kelowna Creek Watershed Restoration	Assessments, rehabilitation plan and management plan	Canadian AU's	O11-20	
Glenmore-Ellison Improvement District	Forest Renewal BC	Apr 95 – Dec 98	Kelowna (Mill) Creek Watershed Restoration	Propose management strategies for existing and proposed roads within the entire watershed, stream channel assessment, gully assessment, water quality monitoring (WSC: 310-808200)	Canadian AU's	O11-20	Sediment, Channel Stability
Riverside Forest Products Limited	Forest Renewal BC	Apr 98 – Dec 98	Kelowna Creek Watershed Restoration Plan (WRP)	Rehabilitate and restore the watershed from disturbances. Produce a report containing current watershed conditions,	Canadian AU's	O11-20	Sediment

Responsible Agency	BPA Project # or Other Funder	Project Duration	Project Title	Project Description, Rationale, and Results	Assessment Unit	A.U. #	Survival Factor Assessed/Restored/ Protected (maintained)
				risks of future development, conclusions, and recommendations (WSC: 310-808200)			
City of Kelowna	?	Aug 99 – Oct 99	Lower Mill Creek Watershed Restoration Project	Habitat Restoration; 450 m of streambank stabilized, 450 m of instream complexing and 1400 m of riparian planting. Education; project open houses for public and senior staff and two newspaper articles published	Canadian AU's	O11-20	Sediment, Habitat Diversity, Channel Stabiltiy
Lower Similkameen Indian Band	?	Aug 99 – Jan 00	Snehumption Creek- Fish Absence/Presence Inventory and Preliminary Habitat Assessment	Completion of a fish absence/presence site reconnaissance inventory in the lower reaches of Snehumption Creek for purposes of gathering baseline data	Canadian AU's	O11-20	
City of Kelowna	?	Oct 99 – Mar 00	Mill Creek Interpretive Signage	Education/public awareness; installation of four interpretive signs	Canadian AU's	O11-20	
Penticton Indian Band/ Columbia Environmental Consulting	?	Feb 99 – Mar 00	Kelowna/McDougall/Vernon Creeks Urban Referral Compliance Evaluation	Review of Water Act compliance and applications for 4 urban creeks	Canadian AU's	O11-20	
BC Ministry of	?	Apr 88	Okanagan Storm	Implementation of a Storm Drain	Canadian AU's	O11-20	

Responsible Agency	BPA Project # or Other Funder	Project Duration	Project Title	Project Description, Rationale, and Results	Assessment Unit	A.U. #	Survival Factor Assessed/Restored/ Protected (maintained)
Environment Lands and Parks			Drain Marking	Marking program in the Okanagan: Coordination of school groups and volunteers, marking of storm drains, and distribution of pamphlets			
BC Ministry of Environment Lands and Parks	?	Apr 88	Kelowna (Mill) Creek Enhancement	Planning and identification of potential enhancement projects for spawning habitat with public involvement, following the construction of a flood control project	Canadian AU's	O11-20	Habitat Diversity
Riverside Forest Products Limited	Forest Renewal BC	Oct 96 – Nov 98	Lambly Creek Watershed Restoration	An Integrated Watershed Restoration Plan (IWRP), Access Management Strategy, Fish Habitat Assessment Procedure, Sediment Source Survey, and final Watershed Assessment Committee (WAC) recommendations (Lambly WSC: 310-822600)	Canadian AU's	O11-20	Sediment
BC Ministry of Environment Lands and Parks	?	Apr 88	Tadpole Lake Water Storage	Collection of information and development of a plan for sharing water storage in Tadpole Lake with Westbank Irrigation District to secure minimum flow for Powers Creek	Canadian AU's	O11-20	Flow
BC Ministry of Environment Lands and Parks	Forest Renewal BC	Mar 97 – Apr 97	Mission Creek Watershed Restoration	Integrated Watershed Restoration Plan (IWRP), Access Management Strategy (AMS), and Interior Watershed	Canadian AU's	O11-20	

Responsible Agency	BPA Project # or Other Funder	Project Duration	Project Title	Project Description, Rationale, and Results	Assessment Unit	A.U. #	Survival Factor Assessed/Restored/ Protected (maintained)
				Assessment			
City of Kelowna	?	Jan 96	Kelowna Education, Streamkeeper, and Habitat Project Coordination	Coordination of school classroom incubation, Streamkeepers, bank stabilization, interpretive fieldtrips	Canadian AU's	O11-20	Channel Stability, Sediment
BC Ministry of Environment Lands and Parks	Forest Renewal BC	Apr 98	Okanagan Timber Supply Area (TSA) Small Lakes Inventory	1:20K reconnaissance lake inventory	Canadian AU's	O11-20	
Okanagan University College	?	Feb 99 – Mar 00	Mission Creek Kokanee Habitat Enhancement	Planning phase for water management and fish enhancement goals	Canadian AU's	O11-20	
BC Ministry of Environment Lands and Parks	?	Apr 88	Mission Creek Spawning Channel Improvements	Improvements to the existing 1000 m long diversion channel for spawning kokanee: existing intake structures realigned, gravel placed, and channel regarded	Canadian AU's	O11-20	Habitat Diversity, Key Habitat Quantity
BC Ministry of Environment Lands and Parks	?	Apr 88 - 89	Kelowna/Nelson Spawning Gravel Cleaning Equipment Tests	Testing and evaluations of gravel cleaning equipment	Canadian AU's	O11-20	Sediment
BC Ministry of Environment Lands and Parks	?	Apr 89	Okanagan Storm Drain Marking Program	Implementation of a Storm Drain Marking program in the Okanagan: coordination of school groups and volunteers, marking of storm drains, and	Canadian AU's	O11-20	Pathogens

Responsible Agency	BPA Project # or Other Funder	Project Duration	Project Title	Project Description, Rationale, and Results	Assessment Unit	A.U. #	Survival Factor Assessed/Restored/ Protected (maintained)
				distribution of pamphlets			
BC Ministry of Environment Lands and Parks	?	Apr 90	Mission Creek Spawning Channel Evaluation	Evaluation of spawning channel enhancements with estimates of kokanee egg to fry survival rates. (Main Stem of Stream; Mission Creek, tributary to Okanagan Lake, Okanagan/Columbia Rivers, near Kelowna)	Canadian AU's	O11-20	Habitat Diversity
BC Ministry of Environment Lands and Parks	?	Apr 91	Mission Creek Spawning Channel Evaluation	Enumeration of fry and adult kokanee to assess effectiveness of the spawning channel (Main Stem of Stream; Mission Creek, tributary to Okanagan Lake, Okanagan/Columbia Rivers, near Kelowna)	Canadian AU's	O11-20	
BC Ministry of Environment Lands and Parks	?	Apr 92	Mission Creek Spawning Channel Evaluation	Enumeration of fry and adult kokanee to assess effectiveness of the spawning channel (Main Stem of Stream; Mission Creek, tributary to Okanagan Lake, Okanagan/Columbia Rivers, near Kelowna)	Canadian AU's	O11-20	
BC Ministry of Environment Lands and Parks	?	Apr 93	Mission Creek Spawning Channel Evaluation	Final year of fry output studies. Required to firm up egg-fry survival estimator for Okanagan spawning channels (Main Stem of Stream; Mission Creek, tributary to Okanagan Lake, Okanagan/Columbia Rivers,	Canadian AU's	O11-20	

Responsible Agency	BPA Project # or Other Funder	Project Duration	Project Title	Project Description, Rationale, and Results	Assessment Unit	A.U. #	Survival Factor Assessed/Restored/ Protected (maintained)
				near Kelowna)			
BC Ministry of Environment Lands and Parks	?	Apr 89	Mission Creek Awareness	Construct a 12-panel information kiosk, and prepare a brochure to promote fisheries awareness	Canadian AU's	O11-20	
Gorman Brothers Lumber Limited	Forest Renewal BC #DPE-WRP-98-GORMANS-1	Dec 95 – Sept 98	Naramata Creek Watershed Restoration	Summarizes the results of a surface and ground water hydrology assessments, conducted an Integrated Watershed Restoration Plan including a Sediment Source Survey (SSS) and Access Management Plan, prepared activity and channel assessment reports, conducted Geotechnical Evaluation of landslides, and geological engineering assessment of possible landslides (WSC: 310-660700)	Canadian AU's	O11-20	Flow, Sediment
Gorman Brothers Lumber Limited	Forest Renewal BC	Apr 96 – Apr 99	Nicola/Similkameen/Okanagan River Reconnaissance Fish and Fish Habitat Inventory	1:20K Reconnaissance Fish and Fish Habitat Inventory, performed according to the Resource Inventory Committee (RIC) standards	Canadian AU's	O11-20	
Okanagan Nation Fisheries Commission	Forest Renewal BC	Nov 99 – Mar 00	Equesis/Naswhito/Whiteman Creek Fish Habitat and Passage	Habitat assessment for approx. 8km	Canadian AU's	O11-20	Habitat Diversity

Responsible Agency	BPA Project # or Other Funder	Project Duration	Project Title	Project Description, Rationale, and Results	Assessment Unit	A.U. #	Survival Factor Assessed/Restored/ Protected (maintained)
			Assessments				
Riverside Forest Products Limited	Forest Renewal BC	Apr 96 – Dec 98	Naswhito Creek Watershed Restoration	Activity reports – 1) summary of implemented work at a failure on Browns Creek Forest Service Road, a summary report of road deactivation prescriptions in the watershed, and a summary report for road relocation and road upgrade for the Browns Creek Forest Service Road (WSC: 310-958000) 2) fish habitat assessment procedure conducted for the Equesis, Naswhito, Whiteman and Shorts watersheds (WSC: 310-946900 WSC: 310-905500) 3) results of the interior watershed assessment procedure conducted on the Naswhito Creek Watershed (WSC: 310-958000)	Canadian AU's	O11-20	Sediment, Channel Stability
BC Ministry of Environment Lands and Parks	?	Sep 99 – Mar 00	Okanagan Lake - Mysis Beam Trawl Harvesting Feasibility	In-lake population estimate for mysis shrimp, development of more efficient harvesting techniques, harvest product acceptability, and harvest technique cost benefits	Canadian AU's	O11-20	
Gorman Brothers Lumber Limited	Forest Renewal BC	Apr 96 – Apr 99	Nicola/Similkameen/Okanagan River Reconnaissance	1:20K Reconnaissance Fish and Fish Habitat Inventory, performed according to Resource Inventory Committee	Canadian AU's	O11-20	

Responsible Agency	BPA Project # or Other Funder	Project Duration	Project Title	Project Description, Rationale, and Results	Assessment Unit	A.U. #	Survival Factor Assessed/Restored/ Protected (maintained)
			Fish and Fish Habitat Inventory	(RIC) standards			
Okanagan Nation Fisheries Commission	?	Jul 99 – Jan 00	Okanagan Basin-Fish Species Presence and Distribution	Review of existing materials/reports within the Ministry of the Environment, Lands and Parks regional office compiled into one report	Canadian AU's	O11-20	
BC Ministry of Environment Lands and Parks	?	Apr 83	Okanagan Lake Spawning Habitat Construction	Beach gravel moved to below high water mark from above to create kokanee spawning habitat. Identification of spawning sites during the first year	Canadian AU's	O11-20	Habitat Diversity
BC Ministry of Environment Lands and Parks	?	Apr 86	Okanagan River Habitat Enhancement	Creation of spawning habitat for kokanee in the Okanagan River channel by scarifying 160 m and excavating and replacing gravel throughout 400 m of the channel	Canadian AU's	O11-20	Habitat Diversity, Key Habitat Quantity
BC Ministry of Environment Lands and Parks	?	?	Okanagan Lake fisheries awareness	Video, information pamphlet, and slide show to increase public awareness of the importance of Okanagan lake fisheries and to facilitate habitat protection	Canadian AU's	O11-20	
BC Ministry of Environment Lands and Parks	?	Apr 88	Okanagan Storm Drain Marking	Implementation of a Storm Drain Marking program in the Okanagan: Coordination of school groups and volunteers,	Canadian AU's	O11-20	Pathogens

Responsible Agency	BPA Project # or Other Funder	Project Duration	Project Title	Project Description, Rationale, and Results	Assessment Unit	A.U. #	Survival Factor Assessed/Restored/ Protected (maintained)
				marking of storm drains, and distribution of pamphlets			
BC Ministry of Environment Lands and Parks	?	Apr 89	Okanagan Storm Drain Marking Program	Implementation of a Storm Drain Marking program in the Okanagan: Coordination of school groups and volunteers, marking of storm drains, and distribution of pamphlets	Canadian AU's	O11-20	Pathogens
District of Peachland	Forest Renewal BC	Apr 96 – Jan 99	Peachland Creek and Trepanier Creek Watershed Restoration	Access Management Plan, Fish Habitat Assessment, Level 1 Coastal or Interior Watershed Assessment Procedure (CWAP or IWAP), Terrain Stability	Canadian AU's	O11-20	Habitat Diversity
BC Ministry of Environment Lands and Parks	?	Apr 86	Peachland Creek Kokanee Spawning Enhancement	Enhancement of kokanee spawning habitat by constructing 300 sq. m of gravel platforms upstream from previous enhancement activities	Canadian AU's	O11-20	Habitat Diversity, Key Habitat Quantity
BC Ministry of Environment Lands and Parks	?	Apr 87	Peachland Creek Kokanee Spawning Enhancement	Enhancement of kokanee spawning habitat by constructing more gravel platforms, cleaning sediment basins, and removing excess debris. Also, eggs collected and kokanee spawners enumerated	Canadian AU's	O11-20	Habitat Diversity, Key Habitat Quantity
BC Ministry of Environment Lands and Parks	?	Apr 88	Peachland Creek Tours	Educational tours of kokanee spawning ecology prepared and conducted for school groups and the public	Canadian AU's	O11-20	

Responsible Agency	BPA Project # or Other Funder	Project Duration	Project Title	Project Description, Rationale, and Results	Assessment Unit	A.U. #	Survival Factor Assessed/Restored/ Protected (maintained)
BC Ministry of Environment Lands and Parks	?	Apr 88	Peachland Creek Kokanee Spawning Enhancement	Maintenance and evaluation of previous projects: gravel platforms, siltation control measures, incubation boxes. Construction of an enumeration fence and collection of kokanee eggs	Canadian AU's	O11-20	Sediment, Habitat Diversity, Key Habitat Quantity
BC Ministry of Environment Lands and Parks	?	Apr 89	Peachland Creek Kokanee Spawning Enhancement	Maintenance of gravel platforms, siltation control measures, and incubation boxes. Evaluations of previous projects by assessing kokanee fry	Canadian AU's	O11-20	Sediment, Habitat Diversity, Key Habitat Quantity
BC Ministry of Environment Lands and Parks	?	Apr 90	Peachland Creek Kokanee Spawning Enhancement	Maintenance of gravel platforms, and incubation boxes, and control of siltation. Previous projects evaluated by assessing kokanee fry	Canadian AU's	O11-20	Sediment, Habitat Diversity, Key Habitat Quantity
BC Ministry of Environment Lands and Parks	?	Apr 91	Peachland Creek Kokanee Spawning Enhancement	Gravel platforms maintained, siltation controlled, and rock weirs repaired. Previous projects evaluated by assessing kokanee fry	Canadian AU's	O11-20	Sediment, Habitat Diversity, Key Habitat Quantity
BC Ministry of Environment Lands and Parks	?	Apr 89	Peachland Creek Tours	Preparation and follow through of educational tours of kokanee spawning ecology for school groups and the public	Canadian AU's	O11-20	
BC Ministry of Environment Lands	?	Apr 89	Peachland Creek Erosion Control	Construct a series of check dams to minimize siltation in the	Canadian AU's	O11-20	Sediment

Responsible Agency	BPA Project # or Other Funder	Project Duration	Project Title	Project Description, Rationale, and Results	Assessment Unit	A.U. #	Survival Factor Assessed/Restored/ Protected (maintained)
and Parks				creek and to stabilize the entire gully that is used by kokanee			
BC Ministry of Environment Lands and Parks	?	Apr 90	Peachland Creek Erosion Control	Construct a series of check dams to minimize siltation in the creek and to stabilize the entire gully that is used by kokanee	Canadian AU's	O11-20	Sediment
Weyerhaeuser Canada Limited	Forest Renwal BC: Contract #98-WRP	Apr 95 – Sep 98	Hedley / McNulty / Cahill / Winters Creek Watershed Restoration	Integrate results from the Sediment Source Survey (SSS), Access Management Strategy (AMS), Fish Habitat Assessment Procedure (FHAP), and Interior Watershed Assessment Procedure (IWAP). Also terrain stability mapping. Prescriptions for the Penticton, Shuttleworth, and Vaseux Watersheds.	Canadian AU's	O11-20	Sediment
Penticton Flyfishers	?	Nov 99 – Mar 00	Penticton Creek Interpretive Signage Project	4 interpretive signs designed and developed pertaining to Okanagan Lake kokanee and Penticton Creek habitat	Canadian AU's	O11-20	
Penticton Flyfishers	?	Nov 99 – Mar 00	Penticton Creek Resting and Leaping Pool	Improvement of fish ladder to provide access to an additional 0.6 km of stream	Canadian AU's	O11-20	Obstructions
BC Ministry of Environment Lands	?	Apr 86	Powers Creek	Replacement of an existing unscreened diversion with a	Canadian AU's	O11-20	Obstructions

Responsible Agency	BPA Project # or Other Funder	Project Duration	Project Title	Project Description, Rationale, and Results	Assessment Unit	A.U. #	Survival Factor Assessed/Restored/ Protected (maintained)
and Parks			Screening	screened irrigation diversion to prevent migrating Rainbow trout fry from becoming trapped in an irrigation canal			
BC Ministry of Environment Lands and Parks	?	Apr 86	Powers Creek Fishway Construction	Construction of a fishway to assist kokanee in bypassing a rock obstruction and reaching their spawning habitat	Canadian AU's	O11-20	Obstructions
BC Ministry of Environment Lands and Parks	?	Apr 88	Tadpole Lake Water Storage	Collection of information and development of a plan for sharing water storage in Tadpole Lake with Westbank Irrigation District to secure minimum flow for Powers Creek	Canadian AU's	O11-20	Flow
Naramata Citizens Association	?	Apr 99	Robinson Creek Riparian Fencing	Fencing construction was completed for 2 km	Canadian AU's	O11-20	Habitat Diversity
Gorman Brothers Lumber Limited	?	Dec 95 – Apr 96	Naramata Creek Watershed Restoration	Activity report includes introduction, methods, report format and project deliverables, description of watersheds, conclusions and recommendations. Report on Channel Assessment (WSC: 310-665200)	Canadian AU's	O11-20	Habitat Diversity
Tolko Industries Limited	?	Apr 96 – Feb 99	Tulameen Main Line Watershed Restoration	Channel Assessment report (draft)	Canadian AU's	O11-20	Channel Stability, Habitat Diversity
Gorman Brothers	Forest Renewal BC	Apr 96 –	Nicola/Similkameen/Okanagan	1:20K Reconnaissance Fish and Fish Habitat Inventory,	Canadian AU's	O11-20	Habitat Diversity

Responsible Agency	BPA Project # or Other Funder	Project Duration	Project Title	Project Description, Rationale, and Results	Assessment Unit	A.U. #	Survival Factor Assessed/Restored/ Protected (maintained)
Lumber Limited		Apr 99	River Reconnaissance Fish and Fish Habitat Inventory	according to Resource Inventory Committee (RIC) standards (Main Stem + Tributaries; South Keremeos Creek (tributary to Keremeos Creek), Snehumption Creek, Shoudy Creek, Robert Creek, Red Bridge Creek (tributary to Ashnola River), Duruisseau Creek (tributary to Ashnola River), Easygoing Creek (tributary to Ashnola River), tributaries to Similkameen/Okanagan/Columbia Rivers)			
Weyerhaeuser Canada Limited	Forest Renewal BC	Apr 96	Merritt Timber Supply Area (TSA) Enhanced Forestry	1:20K Reconnaissance Fish and Fish Habitat Inventory, according to Resource Inventory Committee (RIC) standards (Main Stem + Tributaries; Dillard Creek, tributary to Summers/Allison Creeks, Summers Creek tributary to Allison Creek, Spukunee Creek tributary to Hayes Creek, Siwash Creek tributary to Hayes Creek, Rampart Creek tributary to Summers Creek – tributaries to Similkameen/Okanagan/Columbia River)	Canadian AU's	O11-20	Habitat Diversity
Tolko Industries Limited	Forest Renewal BC	Apr 96	Tolko Multi Activity Land-	1:20K Reconnaissance Fish and Fish Habitat Inventory,	Canadian AU's	O11-20	Habitat Diversity

Responsible Agency	BPA Project # or Other Funder	Project Duration	Project Title	Project Description, Rationale, and Results	Assessment Unit	A.U. #	Survival Factor Assessed/Restored/ Protected (maintained)
			Based	according to Resource Inventory Committee (RIC) standards (Main Stem and tributaries of Tulameen River, Holmes Creek, tributary to Granite Creek, Fraser Gulch, Collins Creek, Otter Creek, Spearing Creek tributary to Otter Creek, Blakeburn Creek tributary to Granite Creek, Newton Creek tributary to Granite Creek, Manion Creek, tributaries to Tulameen/Similkameen/Okanagan/Columbia River)			
BC Ministry of Environment Lands and Parks	Forest Renewal BC	Apr 96 – Apr 99	Tulameen River Watershed Restoration	Channel Assessment, stream assessment, stream restoration works, surveys, assessments and prescriptions, fish habitat rehabilitation prescriptions	Canadian AU's	O11-20	Habitat Diversity
Lower Similkameen Indian Band	Forest Renewal BC	Apr 96 – Apr 98	Ashnola River Watershed Restoration	Level 1 Coastal or Interior Watershed Assessment Procedure (CWAP or IWAP), and Sediment Source Survey	Canadian AU's	O11-20	Sediment
First Nations of Okanagan-Similkameen Environmental Protection Society	Forest Renewal BC	Apr 94 – Nov 98	Arrastra Creek Watershed Restoration	In Stream & Off Channel Rehabilitation report contains executive summary, background, watershed characteristics, project design, implementation summary and recommendation for future work.	Canadian AU's	O11-20	Habitat Diversity

Responsible Agency	BPA Project # or Other Funder	Project Duration	Project Title	Project Description, Rationale, and Results	Assessment Unit	A.U. #	Survival Factor Assessed/Restored/ Protected (maintained)
Ardew Wood Products Ltd	Forest Renewal BC	Apr 98 – Feb 99	Granite Creek Watershed Restoration	Work Summary report contains introduction, methods, detailed work plan, results, recommendations and budget summary	Canadian AU's	O11-20	
First Nations of Okanagan-Similkameen Environmental Protection Society	Forest Renewal BC	Apr 95 – Mar 98	Wolfe Creek Watershed Restoration	Integrated Watershed Restoration Plan to develop a strategy to adequately protect natural resources (fisheries, water, timber) while maintaining access to, and use of these resources by stakeholders in the watershed and a report to identify potential watershed impacts in the Wolfe Creek drainage due to forest harvest practice	Canadian AU's	O11-20	
?	Forest Renewal BC	Apr 95 – Mar 98	Hedley / McNulty / Cahill / Winters Creek Watershed Restoration	Integrated Watershed Restoration Plan (IWRP), Sediment Source Survey	Canadian AU's	O11-20	Sediment
?	Forest Renewal BC	Apr 96 – Sept 98	Willis Creek Watershed Restoration	Restore the watershed to some level of pre harvest activity	Canadian AU's	O11-20	Sediment
Tolko Industries Limited	Forest Renewal BC	Apr 95 – Mar 98	Northwest Tulameen River Watershed Restoration	The Integrated Watershed Restoration Plan (IWRP) includes descriptions of the project's Sediment Source Survey, Stream Channel and Fish Habitat Assessment, and	Canadian AU's	O11-20	Sediment

Responsible Agency	BPA Project # or Other Funder	Project Duration	Project Title	Project Description, Rationale, and Results	Assessment Unit	A.U. #	Survival Factor Assessed/Restored/ Protected (maintained)
				Access Management Plan, as well as a determination of Watershed Level Objectives			
BC Ministry of Forests	Forest Renewal BC	Oct 96 – Apr 97	Old Arrastra Creek Watershed Restoration	Road deactivation prescriptions conducted, equipment supervision and remedial works for slump on Arrastra Creek FSR	Canadian AU's	O11-20	Sediment
Tolko Industries Limited	Forest Renewal BC	Apr 98	Tolko Multi-Year Plan	1:20K Reconnaissance Fish and Fish Habitat Inventory, performed according to Resource Inventory Committee (RIC) standards (Main Stem + Tributaries; Britton Creek, Lawless Creek, Coates Creek tributary to Holding Creek, Blackeye Creek, Podunk Creek (including Chisholm and Cunningham Creek tribs), Packer Creek, Squakin Creek, Gellatly Creek, Otter Creek (including Manning, Myren, and Gulliford Creeks and other un-named tribs), tributary to Tulameen River, Allison Creek, tributary to Similkameen/Okanagan/Columbia Rivers, near Tulameen)	Canadian AU's	O11-20	Habitat Diversity
Weyerhaeuser Canada Limited	Forest Renewal BC	Apr 99	Whipsaw, Smith and Willis Creek Watersheds	1:20K Reconnaissance Fish and Fish Habitat Inventory, performed according to	Canadian AU's	O11-20	Habitat Diversity

Responsible Agency	BPA Project # or Other Funder	Project Duration	Project Title	Project Description, Rationale, and Results	Assessment Unit	A.U. #	Survival Factor Assessed/Restored/ Protected (maintained)
			Reconnaissance Fish and Fish Habitat Inventory	Resource Inventory Committee (RIC) standards (Main Stem + Tributaries; Willis Creek, tributary to Wolfe Creek, Whipsaw Creek, tributary to Similkameen/Okanagan/Columbia Rivers, near Tulameen; Smith Creek, tributary to Tulameen river, tributary to Similkameen/Okanagan/Columbia Rivers, near Coalmont)			
Okanagan Region Wildlife Heritage Fund Society	Fisheries Renewa BC	Oct 99 – Mar 00	Okanagan/Boundary/Similkameen Rivers-Barriers to Fish Passage (Phase 1)	Identification of 186 potential obstructions to fish passage	Canadian AU's	O11-20	Obstructions
Okanagan Region Wildlife Heritage Fund Society	Fisheries Renewal BC	Oct 99 – Mar 00	Okanagan Region Inventory of Non-natural Barriers to Fish Passage	186 potential fish passage obstructions identified to date	Canadian AU's	O11-20	Obstructions
BC Ministry of Environment Lands and Parks	?	Apr 81	Chain Lake Chemical Rehabilitation	Chemical rehabilitation of Chain Lake to eradicate Finescale suckers and Peamouth Chub, which will enhance the Rainbow trout fishery	Canadian AU's	O11-20	
BC Ministry of Environment Lands and Parks	?	Apr 84	Allison Creek Fish Barrier Construction	Construction of a coarse fish barrier to prevent the invasion of Bridgelip suckers, Longnose dace, and Torrent Sculpin in order to protect the productive	Canadian AU's	O11-20	Obstructions

Responsible Agency	BPA Project # or Other Funder	Project Duration	Project Title	Project Description, Rationale, and Results	Assessment Unit	A.U. #	Survival Factor Assessed/Restored/ Protected (maintained)
				Rainbow trout population			
BC Ministry of Environment Lands and Parks	?	Apr 89	Rampart Dam Construction	Construct an earth-fill dam with overflow spillway to increase Rainbow trout production. Also, provide access into the lake to adult trout	Canadian AU's	O11-20	
Gorman Brothers Lumber Limited	Forest Renewal BC: Activity # 105256	Apr 98	Trepanier Creek Watershed Restoration Project	Final watershed assessment committee recommendations and current watershed conditions, a risk assessment of proposed forest development, and conclusions regarding future watershed activity.	Canadian AU's	O11-20	
District of Peachland	Forest Renewal BC	Apr 96 – Jan 99	Peachland Creek and Trepanier Creek Watershed Restoration	The purpose of the Integrated Watershed Restoration Plan (IWRP) activity is to integrate the results of the Sediment Source Survey, Access Management Strategy, Fish Habitat Assessment Procedure and Interior Watershed Assessment Procedure (IWAP) to recommend an action plan for the prescription phase.	Canadian AU's	O11-20	Sediment
Gorman Brothers Lumber Limited	Activity # 105256	Apr 98 – Dec 98	Trout Creek Watershed Restoration Project	Level 1 Coastal or Interior Watershed Assessment Procedure (CWAP or IWAP) contains the final watershed assessment committee recommendations	Canadian AU's	O11-20	

Responsible Agency	BPA Project # or Other Funder	Project Duration	Project Title	Project Description, Rationale, and Results	Assessment Unit	A.U. #	Survival Factor Assessed/Restored/ Protected (maintained)
Gorman Brothers Lumber Limited	Forest Renewal BC	Apr 96	Nicola/Similkameen/Okanagan River Reconnaissance Fish and Fish Habitat Inventory	1:20K Reconnaissance Fish and Fish Habitat Inventory, performed according to Resource Inventory Committee (RIC) standards	Canadian AU's	O11-20	Habitat Diversity
Trepanier Creek Linear Park Society	?	Feb 99 – Mar 00	Trepanier Creek Watershed Stewardship Action Plan	Stewardship/community planning; partnerships built with 11 groups/organizations	Canadian AU's	O11-20	
Trepanier Creek Linear Park Society	?	Sep 99 – Dec 99	Trepanier Creek Spawning Channel: Watershed Concerns	Preliminary evaluation of a proposed spawning channel. Developed recommendations for four issues (low flows; sedimentation from the Macdonald Creek landslide; municipal issues and public/input stewardship) that may have an impact on the proposed spawning channel and fish habitat	Canadian AU's	O11-20	Flows, Sediment, Channel Stability
BC Ministry of Environment Lands and Parks	?	Apr 88	Trepanier Ditch Upgrade	The Trepanier ditch water system upgraded to a pressurized system to contribute to upgrading the multi-user ditch system	Canadian AU's	O11-20	Flow
District of Summerland	Forest Renewal BC	Apr 96 – Mar 98	Trout & Eneas Creek Watershed Restoration	Interior Watershed Assessment Procedure (IWAP) was conducted, assessing the entire watershed including roads,	Canadian AU's	O11-20	Habitat Diversity, Sediment

Responsible Agency	BPA Project # or Other Funder	Project Duration	Project Title	Project Description, Rationale, and Results	Assessment Unit	A.U. #	Survival Factor Assessed/Restored/ Protected (maintained)
				gullies and streams - contains a Fish Habitat Assessment Procedure, Sediment Source Survey and Access Management Map			
Gorman Brothers Lumber Limited	Forest Renewal BC contract # DPE-WRP-98-GORMANS-1	Oct 96 – Dec 98	Trout Creek Watershed Restoration Project	An Interior Watershed Assessment Procedure for Trout Creek Watershed was conducted. The activity report includes: Introduction, key watershed assessment issues, watershed characteristics, methods, results of office analysis, results of past assessments and reports, risk of future forest development, conclusions and recommendations	Canadian AU's	O11-20	Habitat Diversity
Gorman Brothers Lumber Limited	Forest Renewal BC	Apr 96	Nicola/Similkameen/Okanagan River Reconnaissance Fish and Fish Habitat Inventory	1:20K Reconnaissance Fish and Fish Habitat Inventory, performed according to Resource Inventory Committee (RIC) standards	Canadian AU's	O11-20	Habitat Diversity
District of Summerland	?	Aug 99 – May 00	Trout Creek Intake Fish Screen	Design, construction, installation and maintenance of a self cleaning fish screen, located immediately downstream of the diversion intake into the	Canadian AU's	O11-20	Obstructions

Responsible Agency	BPA Project # or Other Funder	Project Duration	Project Title	Project Description, Rationale, and Results	Assessment Unit	A.U. #	Survival Factor Assessed/Restored/ Protected (maintained)
				municipal water system			
Weyerhaeuser Canada Limited	Contract #98-WRP-Prescriptions for the Penticton, Shuttleworth, and Vaseux Watersheds	Apr 95 – Mar 99	Hedley / McNulty / Cahill / Winters Creek Watershed Restoration	Access Management Strategies (AMS), Interior Watershed Restoration Plan (IWRP), terrain stability mapping, and Sediment Source Survey (SSS)	Canadian AU's	O11-20	Sediment
Weyerhaeuser Canada Limited	Forest Renewal BC	Apr 98	Weyerhaeuser-OK Falls Div.-Multi-Year Plan Reconnaissance Fish and Fish Habitat Inventory	1:20K Reconnaissance Fish and Fish Habitat Inventory, performed according to Resource Inventory Committee (RIC) standards (Main Stem + Tributaries; Un-named creek (alias Angel Creek), WS Code: 310-522400-66300, tributary to Vaseux Creek, tributary to Okanagan/Columbia Rivers, near Okanagan Falls; Dutton Creek, tributary to Vaseux Creek, tributary to Okanagan/Columbia Rivers, near Okanagan Falls; McIntyre Creek, tributary to Vaseux Creek, tributary to Okanagan/Columbia Rivers, near Okanagan Falls; Solco Creek, tributary to Vaseux Creek, tributary to Okanagan/Columbia Rivers, near Okanagan Falls; Underdown Creek, tributary to Vaseux Creek, tributary to	Canadian AU's	O11-20	Habitat Diversity

Responsible Agency	BPA Project # or Other Funder	Project Duration	Project Title	Project Description, Rationale, and Results	Assessment Unit	A.U. #	Survival Factor Assessed/Restored/ Protected (maintained)
				Okanagan/Columbia Rivers, near Okanagan Falls.)			
Oceola Fish and Game Club	?	Feb 99 – Mar 00	Vernon/Winfield Creeks Stewardship Action Plan	Habitat assessment, inventory and mapping for 6km	Canadian AU's	O11-20	Habitat Diversity
Wood Lake Improvement District	Forest Renewal BC	Mar 96 – Mar 98	Oyama Creek Watershed Restoration	Access management strategy, integrated watershed restoration plan, Upslope Restoration / Rehabilitation, Interior Watershed Assessment, Water Quality Monitoring, and Road Design (WSC: 310-939400-34700)	Canadian AU's	O11-20	
Winfield and Okanagan Centre Irrigation District	Forest Renewal BC	Apr 95 – Mar 99	Vernon Creek Watershed Restoration	Upslope Restoration / Rehabilitation, landslide rehabilitation assessment procedure, Stream Channel Assessment and Sediment Source Survey, access management strategy, Water Quality Monitoring (WSC: 310-939400)	Canadian AU's	O11-20	Habitat Diversity, Key Habitat Quantity, Sediment, Channel Stability
Tolko Industries Limited	Forest Renewal BC	Apr 96 – Mar 98	King Edward Lake Watershed Restoration	Integrated watershed restoration plan - integrate the results of the sediment source survey, access management strategy, fish habitat assessment procedure, channel assessment procedure and interior watershed	Canadian AU's	O11-20	Habitat Diversity, Key Habitat Quantity

Responsible Agency	BPA Project # or Other Funder	Project Duration	Project Title	Project Description, Rationale, and Results	Assessment Unit	A.U. #	Survival Factor Assessed/Restored/ Protected (maintained)
				assessment procedure			
BC Ministry of Forests	Forest Renewal BC	Apr 96 – Dec 98	Coldstream Creek Watershed Restoration	The objectives of this activity were to: 1) define the potential negative cumulative or site-specific effects of past forest practices, and other land uses, on the watershed's hydrology, slope and channel geomorphology, and water quality and; 2) provide guidance on continued forest operations	Canadian AU's	O11-20	Sediment, Flow
BC Ministry of Environment Lands and Parks	Forest Renewal BC	Apr 98	Okanagan Timber Supply Area (TSA) Small Lakes Inventory	1:20K reconnaissance lake inventory	Canadian AU's	O11-20	
Oceola Fish and Game Club	?	Mar 00 – Jun 00	Wood Lake Angler Survey / Creel Census	Estimation of angler pressure/effort on the lake, estimation of number of kokanee and other species harvested, education of anglers towards kokanee conservation	Canadian AU's	O11-20	
Penticton Indian Band/Columbia Environmental Consulting	?	Feb 99 – Mar 00	Kelowna/McDougall/Vernon Creeks Urban Referral Compliance Evaluation	Review of Water Act compliance and applications for 4 urban creeks	Canadian AU's	O11-20	Flow
BC Ministry of Environment Lands and Parks	?	Apr 86	Echo Lake Dam Restoration	Reconstruction of an earth-fill dam with an outlet flow control device and an overflow spillway	Canadian AU's	O11-20	Obstructions

Responsible Agency	BPA Project # or Other Funder	Project Duration	Project Title	Project Description, Rationale, and Results	Assessment Unit	A.U. #	Survival Factor Assessed/Restored/ Protected (maintained)
				to increase storage capability and increase the quality and quantity of rainbow trout production			
BC Ministry of Environment Lands and Parks	?	Apr 86	Vernon Creek Improvement Inventory	A stream inventory conducted. Identification of the methods (e.g. channelization, culvert reconstruction, rip-rap and gravel placement), locations, timing and costs for stream improvements which would benefit kokanee	Canadian AU's	O11-20	Obstructions
BC Ministry of Environment Lands and Parks	?	Apr 87	Echo Lake Dam Restoration	Reconstruction of an earth-fill dam with an overflow spillway at the outlet to improve the quality and quantity of Rainbow trout production	Canadian AU's	O11-20	Obstructions
BC Ministry of Environment Lands and Parks	?	Apr 87	Vernon Creek Passage Improvement	Improvement of passage for kokanee through construction of baffles within a culvert and weir, removing a concrete weir, and placing another weir to decrease water velocity. Volunteers coordinated to remove man-made debris	Canadian AU's	O11-20	Obstructions
BC Ministry of Environment Lands and Parks	?	Apr 88	Vernon Creek Habitat Improvement	Various stream enhancement activities for kokanee performed: boulder weirs placed, gravel spawning platforms constructed, stream clearance conducted,	Canadian AU's	O11-20	Habitat Diversity, Key Habitat Quantity

Responsible Agency	BPA Project # or Other Funder	Project Duration	Project Title	Project Description, Rationale, and Results	Assessment Unit	A.U. #	Survival Factor Assessed/Restored/ Protected (maintained)
				and 100 m of streambank excavated and stabilized.			
BC Ministry of Environment Lands and Parks	?	Apr 88	Okanagan Drainage Warmwater Fish Enhancement	Enhancement of a Smallmouth bass fishery by controlling weeds, establishing riparian vegetation, transplanting bass, constructing refuge holes, and placing brush piles in lakes for rearing habitats.	Canadian AU's	O11-20	Habitat Diversity
BC Ministry of Environment Lands and Parks	?	Apr 89	Vernon Creek Habitat Improvement	Various stream enhancement activities preformed to enhance kokanee spawning habitat: stream clearance, gravel placement, and installation of a fish barrier at the creek junction	Canadian AU's	O11-20	Habitat Diversity
BC Ministry of Environment Lands and Parks	?	Apr 90	Vernon Creek Habitat Improvement	Various stream enhancement activities performed to enhance kokanee spawning habitat: stream clearance, and gravel placement	Canadian AU's	O11-20	Habitat Diversity
Oceola Fish and Game Club	?	Apr 89	Winfield Creek Enhancement	Improve kokanee spawning habitat by excavating and replacing spawning substrate, excavating settling ponds to control silt and sand deposition, and re-aligning the stream course	Canadian AU's	O11-20	Sediment, Channel Stability, Habitat Diversity
North Okanagan Naturalist Club	?	Feb 99 – Mar 00	Coldstream Creek Renewal Project	Land use mapping, hydrology assessment, design of water	Canadian AU's	O11-20	Flow, Channel Stability

Responsible Agency	BPA Project # or Other Funder	Project Duration	Project Title	Project Description, Rationale, and Results	Assessment Unit	A.U. #	Survival Factor Assessed/Restored/ Protected (maintained)
				quality and streambed mapping, and research into previous work on Coldstream Creek			
COLVILLE TRIBES	199604200	1996 ?	Okanogan Basin - focus watershed project feasibility	Initiate coordination of a watershed planning project	All AU's	O1-20	Flow
Okanogan County	NA	2002 – ongoing	Okanogan Stream Gaging	All listed Species – Julie Dagnon	Okanogan AU's	O1-3	Flow
COLVILLE TRIBES	20001300	2000 - 2003	Skaha Lake experimental sockeye reintroduction	Examine feasibility of sockeye reintroduction upstream of Skaha Lake Dam	Skaha Lake	O18	Obstructions
COLVILLE TRIBES	20001300	2000 ?	Skaha Lake experimental sockeye reintroduction	Examine feasibility of sockeye reintroduction upstream of Skaha Lake Dam	Skaha Lake	O18	Obstructions
PUD # 1 Douglas County	NA	???? – ongoing	Okanogan River Bank restoration and maintenance	All Species – Gordon Brett 509.884.7191 gbrett@dcpud.org	Lower, Middle Okanogan	O2	Channel Stability, Sediment
BLM	NA	2001 - 2000	Whistler Canyon	Spring Chinook, Steelhead – Joe Kelly $ 10,000	Middle Okanogan	O2	
WDFW	199506800	1995 ?	Scotch Creek wildlife area enhancement	Purchase and initiate enhancement activities on site: Scotch Creek, Pogue Mtn, Chesaw and Tunk Valley Units	Okanogan Middle	O2	Sediment

Responsible Agency	BPA Project # or Other Funder	Project Duration	Project Title	Project Description, Rationale, and Results	Assessment Unit	A.U. #	Survival Factor Assessed/Restored/ Protected (maintained)
COLVILLE TRIBES	200200100	2002 -2003	Ellisforde Acclimation Pond	Spring Chinook – Chris Fisher $ 130,000	Okanogan Middle	O2	
NRCS	NA	???? - 1995	Okanogan River Streambank restoration	Randy Kelley	Okanogan Middle	O2	Channel Stability, Sediment
WA DNR	NA	1995	Loomis Forest water quality monitoring		Okanogan Middle	O2	Flow, Sediment
BLM	NA	1997-2001	Salmon Creek Land Acquistions	Steelhead/Rainbow – Joe Kelly 503.665.2118 – Joe_Kelly@or.blm.gov $ 364,000	Salmon Creek	O6,7	Sediment, Habitat Diversity
DNR	NA	2003 - unknown	Salmon Creek Confluence Land Acquisition	Anadromous fish – Chris Fisher $ 150,000	Salmon Creek	O6,7	Habitat Diversity, Sediment
City of Okanogan	99-1308	2000 - 2000	Salmon Creek Riparian Restoration	Anadromous fish – Chris Johnson $ 41,932	Salmon Creek	O6,7	Sediment, Channel Stability, Habitat Diversity
Okanogan Irrigation District	00-1144	???? - ongoing	Salmon Creek Instream Flows	Steelhead, Chinook – Tom Sullivan $ 300,000	Salmon Creek	O6,7	Flows
COLVILLE TRIBES	99-1610	2000-2000	Salmon Creek	Anadromous Fish – Hilary Lyman $ 192,000	Salmon Creek	O6-7	

Responsible Agency	BPA Project # or Other Funder	Project Duration	Project Title	Project Description, Rationale, and Results	Assessment Unit	A.U. #	Survival Factor Assessed/Restored/ Protected (maintained)
COLVILLE TRIBES	200000100	2000 - ongoing	Omak Creek anadromous fish habitat and passage improvement	Anadromous fish habitat and passage improvement (Summer Steelhead)	Omak	O8	Obstructions, Habitat Diversity
COLVILLE TRIBES	99-1611	2000 – ongoing	Omak Creek Restoration	Summer Steelhead – Chris Fisher $ 602,010	Omak Creek	O8	Habitat Diversity, Sediment
COLVILLE TRIBES	00-1683	2001 - ongoing	Omak Creek Watershed Restoration	Summer Steelhead – Chris Fisher $ 189,621	Omak Creek	O8	Habitat Diversity, Sediment
COLVILLE TRIBES	01-1420	2002 - ongoing	Omak Creek Road Decommission	Summer Steelhead – Chris Fisher $ 59,413	Omak Creek	O8	Sediment
COLVILLE TRIBES	WA-COA-01-140	2001 - 2004	Burned Area Emergency Rehab	Summer Steelhead – Chris Fisher $ 456,030	Omak Creek	O8	Sediment, Habitat Diversity, Pathogens
COLVILLE TRIBES	NA	2002-2002	Omak Creek Acclimation Pond	Spring Chinook – Chris Fisher $ 100,000	Omak Creek	O8	
OCD	NA	1994 - 1997	Omak Creek Restoration	Craig Nelson $ 1,000,000+	Omak Creek	O8	Habitat Diversity, Sediment
COLVILLE TRIBES	200000100	2000 ?	Omak Creek anadromous fish habitat and passage	Anadromous fish habitat and passage improvement	Omak Creek AU's	O8	Obstructions

Responsible Agency	BPA Project # or Other Funder	Project Duration	Project Title	Project Description, Rationale, and Results	Assessment Unit	A.U. #	Survival Factor Assessed/Restored/ Protected (maintained)
			improvement				
Riverside Forest Products Limited	Forest Renewal BC	Apr 96 – Apr 97	Naswhito Creek Watershed Assessment and Restoration	Restore the watershed to some level of pre harvest condition, to restore natural hydrology to the area, and to enhance and rehabilitate riparian habitat. Specific actions undertaken may be road deactivation, gully and landslide rehabilitation and sediment source detection.	Omak Creek AU's	O8	Sediment, Flow
UCRFEG	NA	2002 - 2002	Bonaparte Creek clean up	Larry Bailey	O9 Small Tributaries	O9	Habitat Diversity, Pathogens
UCRFEG	NA	2001 - 2002	Aeneas Creek riparian fencing	Larry Bailey	Small Tributaries	O9	Sediment, Habitat Diversity

12 Appendix E: Okanagan-Shuswap LRMP - Direction on the enhancement or restoration of fish habitat and populations in Okanagan Subbasin

Objectives: "A concise, measurable statement of a desired future condition for a resource or resource use which is attainable through management action"

Strategy: " A means of achieving a resource objective"

Restore depressed salmon and freshwater fish population to the capability of the system.

Identify depressed stocks, and root causes of population declines.

Develop and implement site-specific measures to reverse such declines.

Restore salmon and freshwater fish habitat where it is not functioning at, or near, natural capacity.

Identify fish habitats that would benefit from enhancement works.

Develop and implement site-specific habitat enhancement projects to restore riparian areas and instream fish habitats in watersheds impacted by past activities.

Through stewardship programs and agreements, the Watershed Restoration Program, Fisheries Renewal Fund or other funding sources, rehabilitate and stabilize streambanks that have been impacted by urban development activities such as agriculture and timber harvesting

Where mitigation strategies significantly impact timber values, range, agriculture and other values they need to be brought to the attention of the LRMP Implementation and Monitoring Committee (implementation).

Evaluate the effectiveness of fish habitat restoration and rehabilitative measures (implementation).

Restore channel stability in streams where assessments (e.g. IWAP) indicate a concern, or where there are known problems.

Identify stream channels with stability concerns and the cause of instability.

Avoid unmitigated development activities that could result in further instability concerns.

Restore channel stability in streams where assessments (e.g. IWAP) indicate a concern, or where there are known problems.

Develop and implement site-specific channel stability restoration measures to accelerate natural recovery processes.

Restore the structural and functional integrity of steam riparian areas on private lands.

All levels of government that work with private land owners should be encouraging the use of stream riparian buffers where riparian integrity is compromised.

Restore riparian areas that are not properly functioning as a result of improper grazing.

Utilize the "Provincial Range and Riparian Remedial Measures Procedures" as a guide when restoring non-functioning riparian areas.

Retain, or where possible, restore or enhance Crown wetlands not located within the provincial forest.

Identify and maintain a publicly accessible inventory of wetlands.

Manage development to limit negative impacts to wetlands.

Utilize the restoration and enhancement of alternate sites as part of mitigation/compensation resulting from development.

Provide stewardship information to adjacent landowners, conservation groups, the public and local governments and sub-dividing authorities.

Encourage partnership and stewardship agreements (e.g. conservation covenants) between all levels of government, private landowners, and other stakeholders (e.g. local naturalist clubs, community associations) to protect wetlands.

Provide sufficient quantity and quality of habitat to secure long-term viability and distribution of rare elements and high value habitats.

Where appropriate, restore important habitat attributes and special features (implementation).

Minimize, where practical, conflicts between agriculture and fish and wildlife interests.

Evaluate fish and wildlife population and habitat enhancement projects as to their potential impact to the agricultural sector, and develop measures to mitigate those impacts.

Achieve and maintain properly functioning conditions of streams including the timing and magnitude of flows.

Mitigate and compensate for the impacts from new development activities that may alter the hydrologic regime to the detriment of the fish.

Minimize, where practical, conflicts between agriculture and fish and wildlife interests.

Evaluate fish and wildlife population and habitat enhancement projects as to their potential impact to the agricultural sector, and develop measures to mitigate those impacts.

Enhance the non-consumptive values of fishery resources (e.g. viewing opportunities).

Allow for the development of fish education and appreciation opportunities provided they do not impact fish and their habitat.

Enhance salmon and freshwater fish populations where appropriate

Identify opportunities to enhance fish populations

Enhance salmon and freshwater fish populations where appropriate

Develop and implement site-specific measures to enhance salmon and freshwater fish populations.

Restore salmon and freshwater fish habitat where it is not functioning at, or near, natural capacity.

Identify fish habitats that would benefit from enhancement works.

Restore salmon and freshwater fish habitat where it is not functioning at, or near, natural capacity.

Develop and implement site-specific habitat enhancement projects to restore riparian areas and instream fish habitats in watersheds impacted by past activities.

Restore channel stability in streams where assessments (e.g. IWAP) indicate a concern, or where there are known problems.

Develop and implement site-specific channel stability restoration measures to accelerate natural recovery processes.

Maintain stream temperature conditions necessary to sustain and protect fish and fish habitat.

Avoid activities that could result in increases to stream temperature.

Provide adequate riparian habitat to sustain healthy aquatic ecosystems, fish and wildlife populations.

Establish 10,000 hectares of "enhanced riparian reserves" within the timber harvesting land base (THLB).

Provide adequate riparian habitat to sustain healthy aquatic ecosystems, fish and wildlife populations.

For a S5 stream establish a 10-metre reserve and retain approximately 25% of the basal area within the adjacent 20-metre riparian management zone (RMZ) by cut block.

Provide adequate riparian habitat to sustain healthy aquatic ecosystems, fish and wildlife populations.

For a larger S6 stream establish either a 10-metre reserve or retain approximately the equivalent in basal area within the RMZ by cutblock.

Provide adequate riparian habitat to sustain healthy aquatic ecosystems, fish and wildlife populations.

Variation from the strategies for S1 and S6 streams can be done pursuant to a riparian management plan, or a prescription as recommended by a qualified professional.

Provide adequate riparian habitat to sustain healthy aquatic ecosystems, fish and wildlife populations.

The 10,000 hectares of "enhanced riparian reserves" will be allocated within the plan area within five years.

Provide adequate riparian habitat to sustain healthy aquatic ecosystems, fish and wildlife populations.

Harvesting within the LRMP imposed riparian reserves is regulated in the same manner as that described for FPC riparian reserve zones in Section 4(1) of the Silviculture Practices Regulation, and Section 10(3) of the Timber Harvesting Practices Regulation

Provide adequate riparian habitat to sustain healthy aquatic ecosystems, fish and wildlife populations.

For S1 streams with a stream width greater than 20-metres and less than 100 metres, establish a riparian reserve zone (RRZ) 50 metres wide, and a riparian management zone (RMZ) 20-metres wide on each side, with an average 50% basal area retention. (The to

Provide adequate riparian habitat to sustain healthy aquatic ecosystems, fish and wildlife populations.

For S4 fish streams establish a 10-metre reserve in low windthrow areas.

Retain, or where possible, restore or enhance Crown wetlands not located within the provincial forest.

Identify and maintain a publicly accessible inventory of wetlands.

Retain, or where possible, restore or enhance Crown wetlands not located within the provincial forest.

Manage development to limit negative impacts to wetlands.

Retain, or where possible, restore or enhance Crown wetlands not located within the provincial forest.

Utilize the restoration and enhancement of alternate sites as part of mitigation/compensation resulting from development.

Retain, or where possible, restore or enhance Crown wetlands not located within the provincial forest.

Provide stewardship information to adjacent landowners, conservation groups, the public and local governments and sub-dividing authorities.

Retain, or where possible, restore or enhance Crown wetlands not located within the provincial forest.

Encourage partnership and stewardship agreements (e.g. conservation covenants) between all levels of government, private landowners, and other stakeholders (e.g. local naturalist clubs, community associations) to protect wetlands.

Restore and maintain properly functioning conditions of streams, including timing and magnitude of flows.

When recommended by a Watershed Advisory Committee, proponents are to consider undertaking long term plans to address quantity and timing of flow issues identified in the IWAP.

Okanagan-Shuswap LRMP direction on the enhancement or restoration of wildlife habitat and populations in Okanagan Subbasin

Provide sufficient quantity and quality of habitat to secure long-term viability and distribution of rare elements and high value habitats.

Recommend to the District Manager and Designated Environment Official that the following be recognized as "wildlife habitat features" under Section 1 of the FPC Operational Planning Regulations (OPR):
a) red- and blue-listed plants and plant community locations.
b) sedentary features of red- and blue-listed wildlife, such as dens, nests and hibernacula.
c) historic red-Listed species occurrences, including nests and dens.
d) Conservation Data Centre (CDC) "record trees".
e) raptor nests that are currently used.
f) mountain goat and bighorn sheep natal areas.
g) bighorn sheep ram rutting areas.

Maintain fisher habitat and provide landscape connectivity (for fisher dispersion) within the biodiversity old seral and "enhanced" riparian budget.

Manage the riparian management zone for structure and suitability along S1, S2 and S3 fish bearing streams by undertaking the following management activities: retaining all deciduous, especially cottonwood, where practicable; retaining large diameter snag

Maintain or enhance food and forage sources, cover and connectivity for marten.

Within two years of ratification, develop and initiate an operational inventory and monitoring program that will examine the effectiveness of managing various forest attributes on the maintenance and enhancement of pine marten populations

Maintain or enhance food and forage sources, cover and connectivity for marten.

Plan for connectivity during landscape unit planning, utilizing temporal and spatial distribution of cut and leave areas, old growth management areas, wildlife tree patches, and enhanced riparian protection.

Maintain or enhance food and forage sources, cover and connectivity for marten.

Consider placing WTPs to complement the retention levels along these riparian corridors.

Maintain or enhance food and forage sources, cover and connectivity for marten.

The location of WTPs should be well distributed over two broad habitats: a) drier sites that are important for denning, resting, and whelping; and b) adjacent to riparian areas to compliment structure retained for movement opportunities.

Maintain or enhance food and forage sources, cover and connectivity for marten.

In high capability marten habitats as per the "High Capability Marten Habitat" map retain "enhanced" levels of coarse woody debris along riparian management areas (RMA) that do not have a reserve. This is only required on one RMA per 40 hectares of harvest area.

Provide opportunities for the movement of bighorn sheep in the sheep habitat areas shown on the "Wildlife-Bighorn Sheep Habitat" map.

Within the bighorn sheep habitat, apply forest management prescriptions that restore, maintain or enhance sheep use of corridors linking seasonal ranges and linking fragmented sheep populations.

Improve information regarding the location and use of bighorn sheep habitat.

Where practicable, restore sheep to areas where the species has been extirpated, or reduced to critical levels, as identified by the "Wildlife-Bighorn Sheep Habitat" map (implementation).

Manage for early of mid-seral understory vegetation in lambing areas in order to promote a higher forb content in sheep forage.

Where practicable, develop and implement prescribed burn plans to enhance forage availability or improve habitat suitability on winter ranges.

Manage for early of mid-seral understory vegetation in lambing areas in order to promote a higher forb content in sheep forage.

Assess the capacity of the forage habitat in terms of the number or density of sheep that the habitat could support. Mitigate negative factors and enhance positive factors to allow sheep to reach sustainable levels (implementation).

Manage for early of mid-seral understory vegetation in lambing areas in order to promote a higher forb content in sheep forage.

Develop a strategy to enhance forage productivity by actively managing forest ingrowth into grasslands, and open forest sites. Where practical, develop prescribed burn plans or utilize other methods to enhance forage production. (Implementation).

Manage for early of mid-seral understory vegetation in lambing areas in order to promote a higher forb content in sheep forage.

Where external funding is secured, intensive silviculture of habitat enhancement activities are to enhance important habitat features in mule deer winter ranges.

Provide opportunities for the movement of bighorn sheep in the sheep habitat areas shown on the "Wildlife-Bighorn Sheep Habitat" map.

Within the bighorn sheep habitat, apply forest management prescriptions that restore, maintain or enhance sheep use of corridors linking seasonal ranges and linking fragmented sheep populations.

Manage activities within Zone 1 and 2, as identified on the "Wildlife-Derenzy Bighorn Sheep Habitat" map, to protect, maintain and/or enhance habitat for bighorn sheep or other wildlife.

Establish Zone 1, as identified on the "Wildlife - Derenzy Bighorn Sheep Habitat" map, as a wildlife management area (WMA).

Manage activities within Zone 1 and 2, as identified on the "Wildlife-Derenzy Bighorn Sheep Habitat" map, to protect, maintain and/or enhance habitat for bighorn sheep or other wildlife.

The existing local stakeholder group will be involved in Zone 1 WMA and Zone 2 development, as well as the development of access management objectives.

Manage activities within Zone 1 and 2, as identified on the "Wildlife-Derenzy Bighorn Sheep Habitat" map, to protect, maintain and/or enhance habitat for bighorn sheep or other wildlife.

Within Zone 1, habitat enhancement work may be undertaken for the benefit of the sheep.

Manage activities within Zone 1 and 2, as identified on the "Wildlife-Derenzy Bighorn Sheep Habitat" map, to protect, maintain and/or enhance habitat for bighorn sheep or other wildlife.

Within Zone 2, as identified on the "Wildlife-Derenzy Bighorn Sheep Habitat" map, maintain 33% of the stand to a height of 16 metres or greater, and a crown closure class of 3 or greater.

Manage activities within Zone 1 and 2, as identified on the "Wildlife-Derenzy Bighorn Sheep Habitat" map, to protect, maintain and/or enhance habitat for bighorn sheep or other wildlife.

Within Zone 2, develop a "Total Chance Plan" to manage access.

Manage activities within Zone 1 and 2, as identified on the "Wildlife-Derenzy Bighorn Sheep Habitat" map, to protect, maintain and/or enhance habitat for bighorn sheep or other wildlife.

Avoid Crown land alienation within Zones 1 and 2.

Manage activities within Zone 1 and 2, as identified on the "Wildlife-Derenzy Bighorn Sheep Habitat" map, to protect, maintain and/or enhance habitat for bighorn sheep or other wildlife.

Rock climbing should be discouraged within Zone 1.

Manage activities within Zone 1 and 2, as identified on the "Wildlife-Derenzy Bighorn Sheep Habitat" map, to protect, maintain and/or enhance habitat for bighorn sheep or other wildlife.

If disease or parasites of sheep become an unacceptable mortality factor MELP will consider all available management options.

Manage activities within Zone 1 and 2, as identified on the "Wildlife-Derenzy Bighorn Sheep Habitat" map, to protect, maintain and/or enhance habitat for bighorn sheep or other wildlife.

MELP will encourage the natural re-occupation and, if needed, transplants of suitable ranges historically used by California bighorn sheep.

Manage activities within Zone 1 and 2, as identified on the "Wildlife-Derenzy Bighorn Sheep Habitat" map, to protect, maintain and/or enhance habitat for bighorn sheep or other wildlife.

Should it be determined that predator control (particularly for coyote) may result in increased lamb recruitment and benefit the sheep population, MELP should consider this as a management tool.

Maintain and enhance opportunities for the public to appreciate, study and view wildlife in their natural habitat, and to maintain and enhance public use of the wildlife resources of the RMZ (Zone 1 WMA and Zone 2) for hunting.

Within Zone 1, ensure that wilderness-type outdoor experiences and high value scenic opportunities are available for recreational users.

Maintain the NDT4a (as defined by the Regional NDT4 Committee) as grasslands.

Initiate a feasibility study to determine area specific appropriateness of using prescribed fire as a management tool to maintain ecosystem integrity - e.g. to enhance *Ceanothus* (yellow stemmed buck brush) for deer forage (implementation).

Manage the NDT4b for the stand structure and understory attributes described by the Regional NDT4 Committee.

Initiate a feasibility study to determine area specific appropriateness of using prescribed fire as a management tool to maintain ecosystem integrity - e.g. to enhance *Ceanothus* (yellow stemmed buck brush) for deer forage (Implementation).

Restore and enhance ecosystem connectivity in NDT4a and b.

Avoid resource use and/or development activities that would have major implications to maintaining connectivity within this RMZ.

Maintain or enhance habitat opportunities for rare elements dependent on NDT4 ecosystems.

Any resource use activities occurring on NDT4 ecosystems must take into account habitat requirements of rare elements.

Maintain or enhance habitat opportunities for rare elements dependent on NDT4 ecosystems.

Protect rare plant communities by planning management activities so that those communities persist.

Maintain or enhance habitat opportunities for rare elements dependent on NDT4 ecosystems.

Develop and implement management prescriptions for rare plants and plant communities.

Maintain or enhance habitat opportunities for rare elements dependent on NDT4 ecosystems.

Assess habitats in the BG, PP and IDFxh zones capable of supporting rare elements prior to approving resource use and development.

Restore and/or rehabilitate NDT4 ecosystems.

Develop and implement management plans for both noxious weeds and weed species of concern. The intent is to minimize the spread and proliferation of weed species.

Restore and/or rehabilitate NDT4 ecosystems.

Utilize native seed species mixes wherever practical.

Restore and/or rehabilitate NDT4 ecosystems.

A committee will be structured to promote and review enhancement projects. Approved projects will have priority for funding from the Grazing Enhancement Fund (GEF).

Provide suitable habitat attributes for bull trout, geographically isolated populations, high value spawning areas, cutthroat trout, and salmon as shown on the "Fish RMZ" map.

Identify spawning areas, and assess the potential for enhancement.

Maintain the productivity of these provincially important broodstock collection sites as shown on the "Broodstock Collection Sites" map.

For all other fish-bearing streams within the Pennask Creek drainage not included the protected area, any proposed activities will be addressed through the management direction found in the Riparian & Wetlands section.

Within goat habitat identified in the "Wildlife-Mountain Goat Habitat RMZ" map, provide forage for goats.

Where other resource values are not threatened, enhance early seral foraging opportunities by implementing a "let burn" policy for high elevation wild fires in inoperable areas that are on, or adjacent to, goat winter ranges.

Enhance food and forage sources, cover and connectivity for grizzly bear as per the "Wildlife - Grizzly Bear Habitat RMZ" map.

Manage for "enhanced" leveled of coarse woody debris (CWD) within moderately-high and high grizzly bear habitat.

Enhance food and forage sources, cover and connectivity for grizzly bear as per the "Wildlife - Grizzly Bear Habitat RMZ" map.

Through ongoing inventories and research, identify and assess the amount and quality of habitat and the ecological processes that are required to ensure effective management of the grizzly bear (implementation).

Enhance food and forage sources, cover and connectivity for grizzly bear as per the "Wildlife - Grizzly Bear Habitat RMZ" map.

Review the recovery plans for the North Cascades and Kettle/Granny grizzly bear units as they apply to the plan area (implementation).

Enhance food and forage sources, cover and connectivity for grizzly bear as per the "Wildlife - Grizzly Bear Habitat RMZ" map.

On a trial basis, for those subzone variants defined in Table 1, manage to minimum stocking rates as targets and look at planning for 10% voids in other areas (implementation).

Enhance food and forage sources, cover and connectivity for grizzly bear as per the "Wildlife - Grizzly Bear Habitat RMZ" map.

Maintain naturally occurring non-forested features (avalanche tracks, non-productive brush sites, berry sites in the non-timber harvesting land base).

Enhance food and forage sources, cover and connectivity for grizzly bear as per the "Wildlife - Grizzly Bear Habitat RMZ" map.

Plan development in watersheds so that at a minimum approximately 20% of the area is in early seral condition.

Enhance food and forage sources, cover and connectivity for grizzly bear as per the "Wildlife - Grizzly Bear Habitat RMZ" map.

Where possible, prime berry producing sites will be incorporated into wildlife tree patches (WTPs), provided they have WTP characteristics.

Enhance food and forage sources, cover and connectivity for grizzly bear as per the "Wildlife - Grizzly Bear Habitat RMZ" map.

Maintain areas for berry production by promoting variable inter-tree spacing and/or cluster planting.

Enhance food and forage sources, cover and connectivity for grizzly bear as per the "Wildlife - Grizzly Bear Habitat RMZ" map.

In important berry producing areas, as defined in Table 1, minimize, where practicable, the adverse impacts of site preparation and timber harvesting on *Vaccinium*.

Enhance food and forage sources, cover and connectivity for grizzly bear as per the "Wildlife - Grizzly Bear Habitat RMZ" map.

In forested riparian site series (I.e. no distinct water feature) manage to the stocking standards outlined in Table 2.

Enhance food and forage sources, cover and connectivity for grizzly bear as per the "Wildlife - Grizzly Bear Habitat RMZ" map.

For site series associated with water features (I.e. streams, lakes or wetlands - see Table 2), manage riparian site series for bear forage, cover and connectivity by: a) avoiding road construction in these areas, except for crossings or where no other pr

Enhance food and forage sources, cover and connectivity for grizzly bear as per the "Wildlife - Grizzly Bear Habitat RMZ" map.

For riparian, inundated and forested site series adjacent to the main stem floodplains of the Seymour, Anstey, Perry, Upper Eagle, and Upper Shuswap River systems, and the Ratchford and Wap Creek systems, manage riparian site series as defined by Table 2

Provide forest cover that is adequate to meet mule deer thermal, snow interception and security requirements in the mule deer winter range habitats shown on the "Wildlife - Mule Deer Winter Range RMZ" map.

Where external funding is secured, intensive silviculture or habitat enhancement activities are to enhance important habitat features in mule deer winter ranges.

Maintain and/or enhance forage for mule deer.

Promote ground forage productivity.

Maintain and/or enhance forage for mule deer.

Range use plans (RUPs) in mule deer winter range areas (see the "Wildlife - Mule Deer Winter Range RMZ" map) will identify and manage for desired plant communities (DPC) that favor mule deer winter browse species.

Maintain and/or enhance forage for mule deer.

Re-vegetation of permanent grassland range within mule deer winter range will, wherever practicable, be done using available native species mixes.

Maintain and/or enhance forage for mule deer.

Where practicable, utilize prescribed burns under specific conditions or mechanical treatment to enhance winter range forage values.

Maintain and/or enhance forage for mule deer.

Forest harvesting is to be distributed across the planning cells to maintain sufficient early seral areas for forage.

Maintain and/or enhance forage for mule deer.

Specific forage objectives will be developed as part of the implementation strategy so as to co-ordinate the relationship between forage and cover and incorporate proposed research trials (see Appendix IX). (Implementation).

Maintain and/or enhance forage for mule deer.

Manage for tree stocking densities as outlined in Table 2.

Manage Mission Creek watershed for sustainability of both consumptive and instream uses in an integrated manner for both Crown land (industrial, commercial and recreational) activities and private land activities.

The Regional District of Central Okanagan (RDCO), in partnership with MELP and MoF is to create and support Enhanced Watershed Advisory Committee (EWAC) that will provide advice on the management of land use activities (resource extraction, urban development

13 Appendix F: Level of Proof (LOP) percent frequency for each EDT habitat attribute and associated data sources and comments for the Okanogan basin.

Table 59 Definitions for key headings in the Reach Analysis Reports.

Ecological Attribute	Level of Proof	Data Sources and Comments
Alkalinity	1) 1% 2) 31% 3) 68% 4) 5)	Used USGS/WDOE monitoring sites for the mainstem In or near the rating high range, Palmer Lake et., al naturally alkaline Based upon CCT Environmental Trust data Extrapolated from similar streams from CCT Environmental Trust data In or near the rating high range, Palmer Lake et., al naturally alkaline
Bed Scour	1) 2) 3) 4)100% 5)	Based on field observations of largest material moved down channel Chris Fisher, John Arterburn expert opinion based on largest sizes of material mobile in channel, determined as influenced by gradient and flow. Omak Creek highly variable and flashy,
Benthic Community Richness	1)7% 2)6% 3) 4)16% 5)71%	Used the 4 WDOE watershed sites and expanded to the rest of the basin. Lowered the level of proof to 4 or 5 in most cases to highlight the uncertainty of this expansion and identify as a data gap.
Channel Length	1)100% 2) 3) 4) 5)	Used Terrain Navigator to measure reach lengths (HWG 2003)
Channel Width Maximum	1)25% 2)13% 3) 4% 4)58% 5)	Remote sensing using aerial and Terrain Nav. OCD 2003 Dames and Moore 1999 measurements taken in lower river Assumed based on Dames and Moore 1999 measurements taken in lower river CCT Fish and Wildlife stream surveys
Channel Width Minimum	1)26% 2)14% 3) 60% 4) 5)	OCD 2003 Derived from series of maximum ratio calc demonstrating an avg. reduction of max channel width percent change from max to min at .61

Ecological Attribute	Level of Proof	Data Sources and Comments
Confinement Man-Caused	1) 2) 3)100% 4) 5)	% confinement by reach, multiplied by 2 for both stream banks. Confinement by riprap, roads, railroad beds, etc. HWG 2003. Terrain Navigator used to measure distances of confinement/total reach bank length
Confinement Natural	1)1% 2) 3) 99% 4) 5)	% confinement by reach, multiplied by 2 for both stream banks. Confinement by riprap, roads, railroad beds, etc. HWG 2003. Terrain Navajo used to measure distances of confinement/total reach bank length Derived from DOE WQ data for WRIA 49, and HWG 2003
Dissolved Oxygen	1)12% 2)88% 3) 4) 5)	WDOE Gauging Station OID 2003
Embedded-ness	1)16% 2)3% 3) 5% 4)76% 5)	V-star sediment analysis CCT 2000 CCT Fish and Wildlife stream Surveys
% Fines	1) 2) 3) 4)100% 5)	no data exist assume up rate one category and additional in AG reaches Field observations of CCT biologists, high gradient. V-star sediment analysis CCT 2000 CCT fish and wildlife department stream surveys
Fish Community Richness	1) 2) 3) 27% 4)73% 5)	HWG using spreadsheet workbook exercise to populate matrix of presence/absence. Data from WDFW surveys. HWG 2003
Pathogens	1) 2) 3) 100% 4) 5)	Rated qualitatively using proximity to hatchery release sites.
Fish Species Exotic	1) 2) 3) 100% 4) 5)	HWG 2003 using species present/absent matrix Only Brook Trout are known to exist based on CCT fisheries data when channel has water

Ecological Attribute	Level of Proof	Data Sources and Comments
Flow High	1) 2) 3) 100% 4) 5)	Gauging station showed no trends, no high flow measurements are available for pre-development. Used Road density as an indicator to scale the score between a 2 and 3. derived from road density (if < 2.5 then no impact)(2.5-6 mi/mi^2= EDT score 2.25-3.25)--Mel Bennett USFS data no data; assume its similar to Loup Loup and Chilowist derived from road density (if < 2.5 then no impact)(2.5-6 mi/mi^2= EDT score 2.25-3.25) Although road density was low, Runoff from impervious surfaces in Okanogan and Omak would increase flashiness. It also has higher road density upstream which will effect down stream. Although road density was low, Runoff from impervious surfaces in Okanogan and Omak would increase flashiness. It also has higher road density upstream which will effect down stream. No data: assume its similar to Tunk and Aeneas Ck. No data: assume its similar to Antoine and Siwash buffered peak flows due to runoff storage by Zosel Dam
Flow Low	1) 2) 3) 4) 100% 5)	Rated qualitatively by the Habitat Work group 2003
Flow Diel Variation	1) 2) 3) 4)100% 5)	Wells pool effect; no data was available to evaluate daily fluctuations Assume no diel effect of irrigation diversions, dams, etc. USGS gage at Oroville based on Osoyoos operations --need to check capacity Lake to determine if 60 days of flow is stored. May be affected by Boohoos Lake mgmt.
Flow Flashy	1) 2) 3) 100% 4) 5)	Gauging station showed no trends, no high flow measurements are available for pre-development. Used Road density as an indicator to scale the score between a 2 and 3. derived from road density (if < 2.5 then no impact)(2.5-6 mi/mi^2= EDT score 2.25-3.25) no data; assume its similar to Loup Loup and Chilowist Although road density was low, Runoff from impervious surfaces in Okanogan and Omak would increase flashiness. It also has higher road density upstream which will effect down stream. No data: assume its similar to Tunk and Aeneas Ck. No data: assume its similar to Antoine and Siwas
Gradient	1) 100% 2) 3) 4) 5)	Measured in Terrain Navigator

Ecological Attribute	Level of Proof	Data Sources and Comments
Habitat: Backwater- Pools; Large Cobble Riffles; Pool- Tailouts; Small Cobble-Riffles; Glides; Beaver Ponds; Primary-Pools;	1)25% 2) 3) 75% 4) 5)	Hanson 1995, Dames and Moore 1999, Fisher and Federsen 1998 Exptrapolated from CCT Fish and Wildlife Department Stream Surveys based on the description describing the primary pool habitat for Omak Creek Difficult to determine based on survey data but expert opinion determined that 5% was appropriate unless constrained by hydraulic conditions
Offchannel Habitat	1)24% 2) 3) 76% 4) 5)	Hanson 1995, Dames and Moore 1999, Fisher and Federsen 1998 Gradient, defined channel, and small drainage area made this habitat minimal, CCT Fish and Wildlife Stream Surveys
Harassment	1) 2) 3) 100% 4) 5)	Rated qualitatively based on proximity to roads and population centers
Hatchery Fish Outplants	1)100% 2) 3) 4) 5)	Stocking records and locations provided by WDFW and CCT.
Hydrologic Regime Natural	1)100% 2) 3) 4) 5)	Based on USGS Flow patterns
Hydrologic Regime Regulated	1)35% 2) 3) 4)65% 5)	Data needs to analyzed to compare the storage in Osoyoos to the flow of the Okanogan above and below the Similkameen. No water storage projects Need to confirm storage capacity of Lieder Lake relative to stream flow. Need to confirm the storage capacity of Conconelly relative to the flow of Salmon Ck. Enloe is run of the River; need to confirm with documentation
Icing	1) 2)	Based on elevation. Likely not persistent nor frequent occurrences of anchor ice. HWG 2003

Ecological Attribute	Level of Proof	Data Sources and Comments
	3) 4)100% 5)	
Metals in Water Column	1) 2)100% 3) 4) 5)	Based on the 303 d list, assuming that the USGS/WDOE sites are representative.
Metals in Soils/ Sediment	1) 2)100% 3) 4) 5)	A few points in the basin were monitored and this was expanded to everywhere else. Probably should be a data gap and have much less confidence in the Level of Proof because there could be high impact areas in between survey sites.
Miscellaneous Toxins	1) 2) 3) 48% 4)52% 5)	1998 303 d list DDD, DDE, PCB 1254, PCB1260 agricultural area has some toxins 1998 303 d list DDT not on 303 d list and limited agriculture so minimal toxic effects 1998 303 d list, Arsenic 1998 303 d list DDD, DDE 1998 303 d list DDT,
Nutrients	1) 2) 3) 100% 4) 5)	Wolf and Terrel, 2003 using WRIA 49 WQ data from DOE
Obstructions	1) 2) 3) 50% 4) 50% 5)	Some were surveyed and some were not.
Predation Risk	1) 2) 3) 4) 100% 5)	based upon census of non native fish. HWG 2003
Riparian Function	1) 2) 3) 4)100% 5)	Remote sensing using Terrain Navigator. HWG 2003 Heavy grazing damage, channel alterations, and timber harvest reduce functional riparian areas vegetation mostly composed of young plants Bedrock canyon provides no riparian area

Ecological Attribute	Level of Proof	Data Sources and Comments
Salmon Carcasses	1)10% 2) 3) 72% 4)18% 5)	Assessment of Adult Steelhead Migration through the Mid-Columbia River using Radio-Telemetry Techniques, 1999-2000 Karl K. English, Cezary Sliwinski, Bryan Nass, and John R. Stevenson. Used dist. From SSHIAP work group 2003.
Temperature Maximum	1)4% 2)92% 3) 4% 4) 5)	extrapolated from WDOE Okan. @ Brewster gauge WDOE Okan. @ Brewster gauge WDOE Okan. @ Malott gauge OCD 2003, 1 sample/ mo 2000-2003 OCD 2003, only one measurement in July and no flow Aug-Oct.; used chilowist values. OCD WQ survey 2000-2003 no data for this stream; took the average of all other small tribs with OCD temperature data WDOE Okan. @ Oroville gauge OCD 2003; no flow after June so used Bonaparte as surrogate No data so used Antoine as surrogate WDFW temp logger at the Similkameen pond intake
Temperature Minimum	1)4% 2)92% 3) 4% 4) 5)	extrapolated from WDOE Okan. @ Brewster gauge WDOE Okan. @ Brewster gauge WDOE Okan. @ Malott gauge OCD 2003, 1 sample/ mo 2000-2003 OCD 2003, only one measurement in July and no flow Aug-Oct.; used chilowist values. OCD WQ survey 2000-2003 no data for this stream; took the average of all other small tribs with OCD temperature data WDOE Okan. @ Oroville gauge OCD 2003; no flow after June so used Bonaparte as surrogate No data so used Antoine as surrogate WDFW temp logger at the Similkameen pond intake
Temperature Spatial Variation	1) 2) 3) 100% 4) 5)	Due to low average summer temps groundwater and springs must be major contributors in this hot dry area. Bonaparte had higher avg. temps than other small tribs, so presumeably less groundwater input.
Turbidity	1)1% 2)91% 3) 7% 4)1% 5)	Extrapolated from Okan @ Malott WDOE gauge, used 2 month duration OCD 2003 No OCD data so we used the average of all the small tribs Averaged Sililkameen and Okanogan together, but weighted it towards Similk because of more flow during runoff Extrapolated from Similkameen @ Oroville WDOE gauge, used 2 month duration

Ecological Attribute	Level of Proof	Data Sources and Comments
		Extrapolated from Okan. @ Oroville gauge Okan. @ Oroville gauge
Withdrawals	1) 2) 3) 4)100% 5)	Rated qualitatively due to no comprehensive survey of all water withdrawals.
Woody Debris	1) 2) 3) 4)100% 5)	Remote sensing data. Terrain Nav. Satellite and HWG 2003 Current loadings are rear and recruitment is minimal due to lack of riparian area. Current loadings are mostly from willow and alder large wood likely will increase due to recent fires . Current loadings are mostly from willow and alder.

Rationale for Rating Environmental Attributes in the Canadian Portion of the Okanagan River Basin

Background

As outlined in the Okanogan/Similkameen Subbasin Summary (Talayco, 2001), subbasin planning will assist in the allocation of funding for fisheries work throughout the Columbia Basin.

The Okanagan is the largest single subwatershed in the entire Columbia Basin. Since most of it is situated within Canada, a cooperative trans-boundary approach is required. Canadian Fisheries Authorities, working cooperatively through the Canadian Okanagan Basin Technical Working Group (COBTWG), have agreed that the Okanagan Nation Alliance Fisheries Department should provide Canadian content for the Okanogan Subbasin Plan. However, COBTWG approval of the specific ratings would be valuable before the ratings are finally adopted into the plan.

It is valuable to be aware that COBTWG has begun work on a separate "made in Canada" planning exercise known as Watershed-based Fish Sustainability Planning. Methodology is outlined in Anon. (2001). Stage 1 of the 4 stage process is being implemented in 2004.

Limitations

Subbasin Planning is a US initiative and only a token limit of funding has been allocated to the Canadian Section of the Okanogan. As a result, planning has had to be minimized wherever possible. Instead of covering the entire Okanagan/Similkameen Watershed up to the height of land, we include only those areas that anadromous salmonids can presently access (border to McIntyre Dam) or may soon be able to access if re-introduction plans are implemented (McIntyre Dam to Okanagan Lake).

To further reduce the quantity of work we have included only the most significant tributaries in terms of anadromous fisheries potential (Inkaneep Creek, Vaseux alias McIntyre Creek, and Shingle Creek. We do not include minor tributaries such as Hester, Testalinden, and Wolfcub. Neither do we include Park Rill, McLean, Shuttleworth or Ellis since these are unlikely to be important to anadromous fish in the short term. Proposals which consider non-anadromous salmonids should consider including at least Park Rill, and McLean Creeks.

We cover only the lower portions of each of the tributaries. In the case of Inkaneep up to an impassable falls, for Vaseux up to the canyon and for Shingle up to the fishway.

The southern portion of Okanagan Lake (from Okanagan Lake Dam to Trout Creek) has been included to provide a comparison with the other lakes that are being considered.

When resources become available for a future iteration of this planning exercise a wider geographic range should be considered.

Focal Species

The focal species for the US Sub-basin Plan will be andromous fish which are of concern to managers in the US and that spend part of their life history in Canadian waters. These will include sockeye, Chinook and coho salmon.

COBTWG has determined that the focal species for the Canadian Watershed-based Fish Sustainability Planning exercise will include sockeye and kokanee.

Scoring

Ecosystem Diagnosis and Treatment (EDT) has been chosen as the method for describing fisheries habitats within each of the Subbasins. EDT divides the watersheds into reaches and rates 48 channel and habitat attributes within each reach. General guidelines on how to apply ratings have been provided by Mobrand Biometrics Inc. (2003), but the explanation for the choice of specific ratings with the Canadian portion of the subbasin is the purpose of this report.

Authors

This process was directed by Howie Wright, Fisheries Biologist with Okanagan Nation Fisheries Department with help from Keith Wolf of KWA Consultants. Rating was carried out by C. Bull of Glenfir Resources, a fisheries biologist who has worked on the Okanagan River since 1974 and has written several scientific reports on the river (Bull 1999a, 1999b, 2000, 2002, 2003). Brent Phillips, a biologist with Summit Environmental Consultants Ltd., rated attributes pertaining to substrates in the Okanagan River. Brent

has several years of experience working directly with salmon redds, bed scour and sediments in the Okanagan River.Jim Bryan, rated attributes relating to water quality and water withdrawal in Okanagan River. Dr. Bryan was head of the Water Quality Section of Ministry of Environment, Lands and Parks for many years. Kari Long, Habitat Biologist with Okanagan Nation Fisheries Department, rated habitat attributes for both the Okanagan River and tributaries.

Confidence Ratings

Confidence ratings reflect the certainty of the data. The following rating scales were used:

Empirical observation – 1

Expansion of empirical observation - 2

Derived information – 3

Expert opinion – 4

Hypothetical – 5

The financial resources available to complete the Subbasin planning exercise in the Canadian portion of the Okanagan Basin were very limited. The time to research background information was limited and expert opinion had to be used in many instances.

Ratings

Attribute #1 - Alkalinity

Alkalinity can be used as a measure of the primary and secondary productivity of a stream. Hence it is a general indicator of the streams capacity to produce fish food organisms and ultimately fish. Dr. J. Bryan rated Okanagan River and the lakes. H. Wright and C. Bull rated the tributary streams. J. Bryan and C. Bull rated the lakes.

Rating Okanagan River Reaches

EDT Rating Guidelines state that when an average alkalinity value is 100-300, that reach falls into Index 4. Consequently a Current Index rating of 4 was assigned in all reaches of the Okanagan River because the average alkalinity exceeded 100 mg/L at all of the sites for which data sets were available.

Reaches which included one of the sites with published data were given a Confidence Rating of 1 whereas those without data were given a Confidence Rating of 2 by extension The data for OKR4 are from Whipperman and Webber (1996) and data for all other sites can be found in Haughton, Giles, and Feddes (1974).

The historical rating was also assumed to be fairly high since this system lies east of the Cascades in a dry, lake-headed, low elevation area that was probably productive even in historical times.

Rating the Tributary Stream Reaches

No empirical data is available for the tributary streams. However, because they are not lake headed and are fed by flows from higher elevations it is assumed that they would be slightly less productive than the mainstem rivers. Therefore they were rated 3.

Rating the Lakes

Alkalinity ratings for the lakes averaged 109 mg/l (SE = 0.37) (Bryan, 1990) and so these reaches fell into category 4.

The effects of cultural eutrophication were becoming evident in Skaha Lake in the 1970s when occasional algae blooms occurred. Since then, however, nutrient levels in the lakes have been reduced as a result of tertiary sewage treatment plants installations in all the major centres.

Provincial fishery managers have recently expressed concern that fish production may have been adversely affected by altering the nitrogen to phosphorus ratios.

Attribute #2 - Bed Scour

Bed scour is a measure of the depth at which substrate materials are moved during high flows. It is an important factor in the survival of fish eggs, incubating fry, juvenile fish (which at times hide in the interstitial spaces), and aquatic insects. Scour increases when land use practices such as clear-cutting increase freshet flows.

Brent Phillips rated the Okanagan River. C. Bull and H. Wright estimated values for the tributary streams. This attribute does not apply to lakes.

Rating Okanagan River

In general, bed scour in the Okanagan River is relatively low. Firstly, peak flows in the river are dampened by the presence of large lakes upstream. Secondly, in addition to natural flow dampening by the lakes, water storage typically reduces peak river flows and increases flows at other times of year (Summit, 2002a). Under current water management practices there is little bed scour during the period when sockeye and kokanee eggs and alevins are in the gravel. Finally scour occurs in the redd mound at lower water velocity than in the bed proper. Summit Environmental determined the depth of egg deposition to figue out egg losses at various scour levels. Their findings show that scour begins in the Okanagan River when discharges reach 25 cubic meters per second and gets really critical when velocities hit 40 cms. The ratings used in this section are based on expert opinion derived from hydrologic and bed scour analyses completed in recent years.

Rating the Tributary Streams

No empirical information is available for the tributary streams. The rating was expert opinion based upon the stream gradients and substrates. All the tributaries are steeper than the mainstem and the presence of cobbles indicates a higher degree of scour than the mainstem. Hence the rating was increased in comparison to Okanagan River. Vaseux Creek has much larger cobbles than Inkaneep and Shingle Creeks, hence it was rated higher than them.

Rating the Lakes

The bed scour attribute does not apply to lakes.

Attribute #3 - Benthos Diversity and Production (Benthic Community Richness)

Benthic insects are both a critical component of the food web and a readily measurable indicator of system health. Inventories are underway in the Okanagan Basin but results are preliminary and most of the work has so far been limited to tributaries of Okanagan and Kalamalka Lake (personal communication, Vic Jensen, BC Ministry of Water Land and Air Protection).

River ratings were carried out by J. Bryan. C. Bull rated the tributaries. Since this metric was meant to be applied to flowing systems it was not applicable to lake reaches.

Rating Okanagan River

The only known data set for benthic invertebrates in the Okanagan River was obtained by Truscott and Kelso (1979). Invertebrates were collected in two reaches of the river and showed a wide variety of taxa and substantial numbers of individuals despite a discharge of domestic wastewater with tertiary treatment between the two sites. Using this data and the simple EDT Index, Index 2 seems the most appropriate rating. Although Ephemeroptera, Tricoptera, and Plecopetera were found, the taxa were fewer than might have been expected, so these reaches fall into the category of Index 2. These reaches were assigned Confidence Level 1 and the reach upstream (OKR28) Confidence Level 2. For most other reaches, the confidence levels are lower because of the spatial variability typical of benthos. The reaches which have not been channelized (OKR 16 & 17) were assigned Index 1 since more natural reaches generally have more diverse benthic communities, and the slow-flowing reaches were assigned Index 3 as such reaches generally have less diversity and production.

The historical ratings were also indicative of a rich benthic community because the area was low elevation and lake-headed so water temperatures and flows were moderated.

Rating the Tributary Streams

No information is available for the tributary streams. However they are neither unusually productive, nor unproductive and there are no effluent discharges. Consequently invertebrate production would likely be indicative of a normal stream. An index rating of 1 has been assigned and it is consistent with the unchannellized portions of the mainstem.

Rating the Lakes

This attribute was not meant to be applied to lake reaches.

Attribute #4 - Channel Length

Channel length is a measure of the quantity of habitat available. All values are given in meters to fit with standard scientific practice rather than feet or miles as is sometimes found in US documents.

Rating Okanagan River

Current channel lengths for Okanagan River were taken from post-channelization river surveys by Schubert (1980) and are shown in Table 60. Although this information is nearly 25 years old it remains accurate because the vast majority of the river is confined between armoured dikes and has not changed length. The few reaches which remain unconfined are fairly short and some were naturally confined so once again the Schubert surveys will still be fairly accurate.

Table 60 Current Reach lengths (measurements from Schubert, 1980)

Reach	Start Point	End Point	Distance (m)
Ok R 1	390 m upstream from Osoyoos Lake	1795	1405
OK R 2	1795	4605	2810
OK R 3	4605	5932	1327
OK R 4	5932	6418	486
OK R 5	6418	7197	779
OK R 6	7197	9419	2222
OK R 7	9419	9803	384
OK R 8	9803	10858	1055
OK R 9	10858	11952	1094
OK R 10	11952	12747	795
OK R 11	12747	13815	1068
OK R 12	13815	14928	1113
OK R 13	14928	16248	1320
OK R 14	16248	17347	1099
OK R 15	17347	18251	904
OK R 16	18251	20548	2297
OK R 17	20548	22588	2040
OK R 18	22588	24196	1608
OK R 19	24196	26038	1842
Vaseux Lk	26038	30692	4654
OK R 20	30692	33435	2743
OK R 21	33435	34402	967
OK R 22	34402	34934	532
OK R 23	34934	35286	352
OK R 24	35286	35922	636

Reach	Start Point	End Point	Distance (m)
OK R 25	250 upstream from Skaha Lake	2956	2706
OK R 26	2956	3300	344
OK R 27	3300	5623	2323
OK R 28	5623	6287	664

Historic river lengths were obtained by preparing a collage of aerial photos from before the river was channelled (the river was channelled between 1952 and 1955 and the photos were taken in 1938). Reaches were marked on the collage and a meilograph (map wheel) was used to follow the old channels and record lengths. Aerial photograph numbers are shown in **Table 4**.

Table 61 Numbering system for pre-channellization (1938) aerial photographs of Okanagan River

General Area of River	River Reach Numbers	Photograph Numbers
Okanagan Lake to Skaha Lake	OK R 25-28	BC 105.2
		BC 104.65
		BC 104.16
Okanagan Falls to Vaseaux Lake	Ok R 20 -24	BC 101.85
		BC 101.32
		BC 101.11
Vaseaux Lake to OKR 4	OK R 4 - 19	BC 101.20
		BC 99.14
		BC 99.86
		BC 98.13
		BC 97.40
		BC 99.46

Rating the Tributary Streams

The length of the tributary stream reaches was taken from Long, 2000 for Inkaneep Creek. For the other tributaries the approximate distance was taken from aerial photographs using a meilograph (map wheel). All lengths are approximate.

Rating the Lakes

The length of Vaseux Lake was taken from engineering diagrams (Shubert, 1980). Other lake reaches corresponded to lake basins and their approximate lengths were measured

from bathymetric maps provided in Okanagan Basin Agreement, Tech. Supp. V, 1974. For the purposes of this study the southern limit of the south basin of Osoyoos Lake was assumed to coincide with the Canada/US border. The Okanagan Reach covered the distance from the Lake outlet at Penticton to Trout Creek Point.

Attributes #5 - Channel Width Max

Rating Okanagan River

This attribute is meant to provide an estimate of relative size of the river. Survey information by Schubert (1980) provides maps of channel cross sections in late June 1980. These should suffice to provide a close enough estimation of maximum width for the purposes of this exercise (i.e. to place the river into a size category). Since these are actual measurements but span only a limited time-frame the confidence rating is reduced to 2 for the current ratings.

Historic measurements are not available but it is probable that maximum sizes were somewhat greater than current because freshets would be higher prior to storage and because the flood plain was not confined. The increase in maximum size would likely have put the river into a 3 rating but it would not have likely reached a 4. Since there is no empirical evidence a level of confidence of 4 is assigned for the historic ratings.

Rating the Tributary Streams

Time and financial resources precluded actual surveys of the widths of the tributary streams. The values given are guesses based upon memory of the appearance of the stream or quick inspections and in the case of Inkaneep from photographs provided in Long, 2000. This will probably suffice to put the streams into the correct rating categories but the assigned values should be reconsidered as soon as the opportunity to do measurements arises.

Due to percolation and water use, reach 1 of Vaseux Creek goes dry nearly every summer. This probably did not happen historically since there was no water use, no logging in the head waters and less percolation (the current percolation problems are said to have originated due to disturbance of the river bed for flood control [Barisoff – long time resident – personal communication]).

Rating the Lakes

This attribute does not apply to lakes because it is a river rating rather than an actual measure of width.

Attributes #6 – Channel Width Minimum

Rating Okanagan River

Throughout most of the river current maximum and minimum widths are identical because channelling keeps the river bounded by armoured banks. Within the U shaped channel water velocities and depths change but widths do not.

Historical estimates are not available but it is likely that low flows were often significantly lower than current because of the lack of storage and planned releases.

However, it is unlikely that the river got down to a minimum channel width of less than 15 ft (i.e. index value 1), therefore a historic value of 2 is derived by conjecture.

Rating the Tributary Streams

Time and financial resources precluded actual measurements of the widths of the tributary streams. The values given are guesses based upon memory of the appearance of the stream or quick field inspections and in the case of Inkaneep Creek on photographs from Long, 2000. This will probably suffice to put the streams into the correct rating categories but the assigned values should be reconsidered as soon as the opportunity to do measurements arises.

Rating the Lakes

This attribute does not apply to lakes.

Attribute #7 - Confinement – Hydromodifications (Confinement – man caused)

Rating Okanagan River

Every reach of the Okanagan River has been modified by man to some extent and nearly every reach has been completely channelled. Exceptions are portions of Reach 17 (over 50% pristine) and portions of Reaches 18 and 24 which are naturally confined. The only completely untouched portion is 1128 meters of river located within Reach 17 and situated completely on Osoyoos Indian Reservation (river distance 21,159 – 22287 m from Osoyoos Lake).

Below this pristine portion is a 2,908 meter semi-natural strip with setback and meandering dikes. It is located within Reaches 16 and 17 between river distances 18,251 and 21,159 m.

Information for rating this attribute was taken from pre and post channelling aerial photographs and maps and post channelling engineering surveys (Schubert, 1980).

Rating the Tributary Streams

All the tributaries have been modified to some degree for flood control (Vaseux Creek and Inkaneep Creek) or road construction (Shingle Creek). Estimates are based upon memory.

Rating the Lakes

This attribute does not apply to lakes.

Attribute #8 - Confinement Natural

Rating Okanagan River

Historic photographs from 1938 (prior to channelization) show the system in its nearly natural state. The valley floor is (and was) fairly flat with sands and silts allowing the river to meander tortuously throughout most of its length. However, there was some

natural channel confinement in reaches 17-19 and 24 as shown by single thread straight channels.

Rating the Tributary Streams

Inkaneep Creek rating was based upon memory and pictures in Long, 2000. Vaseux Creek was rated from memory. Shingle Creek was based upon field observation.

Rating the Lakes

This attribute does not apply to lakes.

Attribute #9 - Dissolved Oxygen

Rating Okanagan River

Jim Bryan rated the river reaches. He used unpublished BC Environment data collected between June and September 1972 and 1983. YSI dissolved oxygen meters were used to obtain 55 values from 8 sites. DO saturation levels were determined with the nomogram of Rawson (1944).

The average DO value was 9.07 and DO levels were near saturation; even at sites downstream from treated wastewater. There were a few DO measurements less than 8, but the median value was 9 and the average 9.07, therefore for all reaches of the river, Index Level 0 is the appropriate value. As the DO data set is unpublished but considered reasonably reliable, the Confidence Level 4 seems appropriate.

Historically, river oxygen levels were probably at or near saturation since the flows originated in steep valley draws or in the surface waters of large windy lakes.

Rating the tributaries reaches

No empirical data was available for the tributaries, but the systems are well known to the raters and they knew of no oxygen deficit problems nor any substance which would contribute to a biochemical oxygen demand. For this reason there was not assumed to be a problem with oxygen readings in the tributaries at this time.

Rating the lake reaches

H. Wright and C. Bull rated the lake reaches. The area of the lake that was rated was the preferred habitat range for salmonids where oxygen levels were at least 4mg/L and water temperatures were less than 17 degrees C. This area was based on work by Fisheries and Oceans Canada and 2001-2003 sampling by ONAFD (Wright 2002; Wright & Lawrence 2003) (ONAFD unpublished data from 2003).

The south and central basins of Osoyoos lake were rated index 4 based on 2001 data (Wright 2002). In these basins the preferred zone for salmonids disappears completely during some months of the year. The ratings show that there is still a small zone of preferred habitat remains throughout the summer months in the north Basin of Osoyoos Lake (warranting a rating of 3) and a much bigger area is available in Skaha Lake. Okanagan is even less of a concern because of its large volume, and deep morphometry

and frequent wind circulation. Research into the frequency and extent of the temperature/oxygen "squeeze" is presently being pursued as part of the Fish Water Management Tool Project (explained elsewhere in this text). Fish Water Management Tools is working out the river discharge required to provide sufficient turnover within the lake to avoid density dependent mortalities of salmonids.

Okanagan lake has been found to have oxygen levels at or near saturation except for certain eutrophic sites within Armstrong Arm at the north end of the lake (Okanagan Basin Agreement, Tech. Supp V, 1974 and Andrusak et. al., 2001).

Attribute #10 - Embededness

Rating Okanagan River

Embededness measures the extent to which cobbles or gravel are surrounded or covered by fine sediments. This has a direct bearing on the survival of fish and fish food organisms.

Mobrand Biometrics (2003) points out that embededness is only a meaningful measurement where the substrates are cobble and gravel. They recommend that embededness ratings of 0 be assigned where embeddedness is not a suitable measure of channel characteristics. Reaches 1-16; 19-23; and 25 are all low gradient and so the 0 rating could be applied. However every reach has some gravel substrate that adds to the fisheries production potential of the river. Consequently each reach was rated based upon the gravel areas within it regardless of the fact that many of the reaches are low gradient and heavily weighted toward sand and silt substrates.

Ratings reaches were scored by Brent Phillips, a biologist with Summit Environmental Consultants Ltd.. Brent referred to scientific studies listed on the tables and also relied upon his experience of working on Okanagan River substrates for four years. During that time, Brent collected sediment composition samples and excavated sockeye salmon redds. Results are found in ONAFD and Summit (2003b) and Wright (2003).

The scoring of current embeddedness is based on a combination of substrate objective and subjective observations during four yeas of sockeye habitat assessments (two reports cited), sediment composition measurements (Wolman samples) taken for Summit 2002b, and recent sockeye redd excavation work in the dyked and natural sections of river downstream of McIntyre Dam (ONAFD and Summit, 2003). Historical embeddedness is based on substrate notes in Anonymous (1909) for the river through Penticton and channel and substrate descriptions/samples in Hourston et al. (1954) for the river downstream of Vaseux Lake.

Historical information was gleaned from Anon (1909) and Hourston et. al., 1954.

Rating the Tributary Streams

Inkaneep Creek was assigned a value of 2 based upon the fact that mass wasting has been a significant problem in this watershed (Long, 200: Alex & Long, 2002: Davies, 1999). Vaseux Creek was rated 0 because although it is the main source of gravel recruitment for the Okanagan River fine sediments are thought to flush through this high gradient system.

Shingle Creek was rated 1. There are unstable banks throughout the fields which have been cleared of riparian vegetation in the areas upstream from Reach 1. However, Reach 1 is fairly high gradient so much of the fines pass through to the Okanagan River channel.

Rating the Lakes

This attribute does not apply to lakes.

Attribute #11 - Fine Sediment

Rating Okanagan River

Fine sediment (less than 0.85 mm) can smother the eggs and alevins of salmonids as well as benthic invertebrates. Levels in untouched salmonid spawning areas generally range between 6% and 11% (Mobrand Biometrics Inc., 2003). Levels quite often increase due to land disturbances such as agriculture, forestry, mining and urban development. Low slope areas of river (therefore most of the Okanagan River) are particularly sensitive to sediment loading.

To rate this attribute, historic information was gleaned from detailed surveys of the Okanagan river between Okanagan and Skaha Lakes (Anon., 1909). For these Reaches (25 – 28) substrate descriptions and sketches were available with notations of clay, mud, sand , fine gravel medium gravel, gravel, coarse gravel and small boulders. For Reaches 1 -18 information was taken from Hourston et al.(1954) that described habitat conditions existing prior to river channelization.

Information for rating current conditions came from ONAFD and Summit (2003) and Wright (2003). These studies provided sediment core analyses from sockeye redds downstream from McIntyre Dam (Reaches 1 – 24).

Rating the Tributary Streams

Inkaneep Creek was assigned a value of 2 based upon the fact that mass wasting has been a significant problem in this watershed (Long, 200: Alex & Long, 2002: Davies, 1999). Vaseux Creek was rated 0 because although it is the main source of gravel recruitment for the Okanagan River fine sediments are thought to flush through this high gradient system.

Shingle Creek was rated 1. There are unstable banks throughout the fields which have been cleared of riparian vegetation in the areas upstream from Reach 1. However, Reach 1 is fairly high gradient so much of the fines pass through to the Okanagan River channel.

Rating the Lakes

This attribute does not apply to lakes.

Attribute #12 - Fish Community Richness

The fish community richness rating is based upon the number of taxa (species) found in the Okanagan Basin (i.e. the river and the lakes).

A number of intensive inventory projects have been carried out and results are easily located in FISS (Fisheries Information Summary System) found online at

www.bcfisheries.gov.bc.ca/fishinv/fiss.html . Table 62 shows that thirty (30) species are found currently in the Okanagan but only 19 are indigenous.

Rating Okanagan River

Several of these species do not frequent the river so that ratings have been lowered to 2. Note that below McIntyre 3 anadromous species are found (sockeye, Chinook and steelhead) whereas they have been extirpated from the waters above McIntyre. Additional species such as coho and chum salmon are also reported to have been extirpated from the system (Howie Wright, fisheries scientist, Okanagan Nation Alliance Fisheries Dept., personal communication).

Native salmonids are considered a focal group for reasons set out in Bull (2002 b). However another species that has been found in the Okanagan River which is important because is rare is the Chiselmouth (*Acrocheilus alutaceus*). According to Cannings & Ptolemy (1998) this species is being tracked by the BC Conservation Data Centre and is considered vulnerable or sensitive because of its restricted distribution and occurrence.

Rating the Tributary Streams

The tributary streams tend to be higher gradient, lower temperature, and lower productivity than the mainstem. Therefore warmwater species are rare or absent. FISS reports that Shingle Creek supports sculpin, long nose sucker, brook trout, kokanee, rainbow trout, longnose dace, and peamouth chub. Vaseux Creek has been found to contain sculpin rainbow trout, longnose dace, and mountain whitefish. Inkaneep Creek supports sockeye salmon, bridgelip sucker, rainbow trout and kokanee.

Rating the Lakes

A lot of inventory is available for the lakes. Thirty species are present in the lower part of the system and 25 in the upper (Table 51). Anadromous salmonids have disappeared from Okanagan, Skaha and Vaseux Lakes but 11 species of exotics have entered.

Table 62 Species of fish found in the Okanagan Basin (Alexis, Alex and Lawrence, 2003 and Pinsent, Koshinsky, Willcocks and O'Riordan, 1974). Non-indigenous species are listed in italics.

Genus & Species	Common Name	Historic Presence	Current Presence
Lota lota	Burbot	Present	Present[1 2 3]
Mylocheilus caurinus	Chub - Peamouth	Present	Present[1 2 3]
Acrocheilus alutaceus	Chiselmouth	Present	Present[1 2 3]
Oncorhynchus nerka	Salmon - Sockeye	Present	Present[1 2]
O. nerka	Salmon - Kokanee	Present	Present[1 2]
O. tschawytscha	Salmon - Chinook	Present	Occasional[1 2]
O. mykiss	Steelhead	Present	Occasional [2]
O. mykiss	Rainbow (fluvival)	Present	Present[1 2]
O. mykiss	Rainbow (adfluvial)	Present	Present[1 2]

Genus & Species	Common Name	Historic Presence	Current Presence
Entosphenus tridentatus	Pacific Lamprey	Present	Extirpated
Catostomus macrocheilus	Largescale sucker	Present	Present [2]
Catostomus catostomus	Longnose sucker	Present	Present [2]
Pytlocheilus oregonensis	Northern pikeminnow	Present	Present [1] [2]
Prosopium coulteri	Whitefish - Pygmy	Present	Present [2] [3]
Prosopium williamsoni	Whitefish - Mountain	Present	Present [2]
Richardsonius baleatus	Shiner - Redside	Present	Present [1] [2]
Rhinichthys cataractae	Dace - Longnose	Present	Present [1] [2]
Rhinichthys falcatus	Dace - Leopard	Present	Present [2]
Cottus asper	Sculpin Prickly	Present	Present [1] [2]
Cottus cognatus	Sculpin Slimy	Present	Present [1] [2]
Micropterus dolomieui	*Bass - Smallmouth*	*Absent*	*Present [1] [2]*
Micropterus salmoides	*Bass - Largemouth*	*Absent*	*Present [1] [2]*
Ictalurus melas	*Bullhead Black*	*Absent*	*Present [1] [2]*
Lepomis microchirus	*Bluegill sunfish*	*Absent*	*Present [1] [3]*
Cyprinus carpio	*Carp*	*Absent*	*Present [1] [2]*
Pomoxis nigromaculatus	*Crappie - Black*	*Absent*	*Present [1] [2]*
Salvelinus fontinalis	*Eastern brook trout*	*Absent*	*Present [1]*
Lepomis gibbosus	*Pumpkinseed*	*Absent*	*Present [1] [2]*
Tinca tinca	*Tench*	*Absent*	*Present [1] [3]*
Perca fluviatilis	*Yellow perch*	*Absent*	*Present [1] [2]*
Coregonus clupeaformis	*Whitefish - Lake*	*Absent*	*Present [2] [3]*

[1] Source = Alexis et. al., 2003

[2] Source = Pinsent et. al., 1974.

[3] Found in Basin but seldom found in river

Attribute #13 - Fish Pathogens

Rating Okanagan River

A comprehensive study of pathogens in Okanagan River fish was carried out in 2000, 2001 and 2003. The work was done in response to a proposal to extend the present range of sockeye salmon (Evelyn and Lawrence, 2003).

Over 700 fish were tested including 3 species of salmonids and 11 species of non-salmonids. The key findings were:

- IHNV (infectious haematopoietic necrosis virus) Type 1 and Erythrocytic Inclusion Body Syndrome (EIBSV) were found routinely throughout the system
- IHNV Type 2, IPNV (infectious pancreatic necrosis virus) and *Myxobolus cerebralis* (whirling disease) were not found
- *Ceratomyxa shasta* (ceratomyxosis) was found infrequently throughout the system.
- *Parvicapsula minibicornis* was found in the lower part of the system.

The authors conclude that pathogens do not constitute an unusual risk to fish populations in the system. The possible exception is the recently discovered parasite *Parvicapsula minibicornis* which requires further research.

This information would indicate a rating of 2, however, the rating guidelines indicate a value of 4 should be assigned if C. Shasta is known to occur in the watershed. Hence all waterways have been assigned a value of 4. With no indication of what the base case (historic case) may have been the value of 4 is repeated.

Rating the Tributary Streams

There is no information on the tributary streams. Since we are dealing only with the lowest reach (ie accessible to anadromous salmonids) the default value is 4.

Rating the Lakes

Die-offs of kokanee occur in Okanagan Lake every few years. These always occur in June or July and affect only 2 year old kokanee. The cause has not been determined. Similar die-offs have occurred in other large B C lakes (eg Shuswap, Quesnel, Kootenay) but have not been reported in Skaha or Osoyoos.

Given the information available we have chosen to rate the lakes 1 since viruses are known to occur but no disease related incidents have been noted.

A large provincial fish hatchery is located at Summerland on Okanagan Lake and a small one is located adjacent to the south basin of Skaha Lake.

Attribute #14 - Exotic Fish Species

Rating Okanagan River

As with fish pathogens, a comprehensive study of exotic fish in the Okanagan Basin was carried out in 2000, 2001 and 2003 in response to a proposal to extend the present range of sockeye salmon (Alexis, Alex and Lawrence, 2003).

The exhaustive study captured fish throughout the basin using electro-fishing gear, gill nets, minnow traps, beach seines, trap nets, angling and the by-catch from a weed harvester. Twenty two (22) fish species were captured. These are included in Table 3.

Table 51 shows that eleven (11) species of fish in the Basin are exotics. While most of these are lake dwellers some (e.g. carp, brook trout and smallmouth bass) have become some of the most frequently observed river species.

Rating the Tributary Streams

The tributary streams are colder, more flashy, higher gradient and less productive than the mainstem and the lakes. Consequently they support fewer species. However some exotics such as brook trout use the tributaries at certain life history stages. Thus we rated the tributaries as 1.

Rating the Lakes

The lakes contain the full gamut of exotic species. Since there are 11 exotic species listed in Table 51 the lakes are rated at 3.

Attribute #15 - Changes in inter-annual variability of high flows

This metric is designed to note the relative change in average peak annual discharge compared to an undisturbed watershed. It is meant to describe both short-term and long-term changes in flow size and timing due to man made changes such as urbanization, channelization, timber harvest and water storage. In the Okanagan a noticeable change in flows has resulted from construction and operation of dams on both the headwater lakes and on Okanagan Lake. Further changes have resulted from logging.

Rating Okanagan River

Okanagan Dam retains the vast majority of flow passing through the Okanagan River and Skaha, Vaseux and Osoyoos Lakes. Summit Environmental Consultants Ltd. (2002d) used a model to reconstruct the natural hydrograph of the river and compare it with the hydrograph that has resulted since the construction of storage. The model shows that high flows are less than would have occurred historically in the months of June to September. These results are statistically significant ($\alpha = 0.01$) and show that the June peak is reduced about 35% by regulation. As a consequence this attribute was assigned a rating of zero. All reaches are given the same rating because the vast majority of the flow originates in Okanagan Lake and passes through all of the river reaches.

Rating the Tributary Streams

Generally Okanagan tributary streams nearly all support storage reservoirs which fill in the spring lowering the freshet. However, Okanagan watersheds are also generally heavily logged which causes higher and earlier freshets. The two factors tend to offset one another and therefore the change in peak flows over historical is buffered.

As a consequence the tributary streams have been rated 2 – typical of relatively undisturbed watershed.

Rating the Lakes

This attribute does not apply to lakes.

Attribute #16 – Changes in inter-annual variability of low flows

Rating Okanagan River

Changes in low flow due to land use such as timber harvest and urbanization are very evident in most of the tributary streams to Okanagan Lake. However, storage on Okanagan Lake stabilizes river flows and is thought to mask the low flow problem which would have occurred had storage not been developed. As a consequence the model developed by Summit (see text under attribute 15) shows that there is no statistical difference in the low flows that have been happening since regulation versus what would have been expected if the river ran naturally. This is only the case for the low flow months of September and October. There are statistical differences in regulated versus natural flows in all other months of the year.

The lack of perceptible differences in low flows resulted in a rating of 2. As mentioned earlier, all reaches are given the same rating because the vast majority of the flow originates in Okanagan Lake and passes through all of the river reaches.

Rating the Tributary Streams

As mentioned earlier, changes in low flow due to land use such as timber harvest and urbanization are very evident in most of the tributary streams. Since water is such a sought after commodity low flows in the late summer and fall months are a major problem. Vaseux Creek runs dry every year. Inkaneep and Shingle Creeks do not but they still suffer from low flow problems. As a consequence Inkaneep and Shingle are assigned a rating of 3 while Vaseux gets a 4.

Rating the Lakes

This attribute does not apply to lakes.

Attribute #17 - Flow - Intra-daily (diel) variation

This attribute describes the daily changes in flow that occur throughout a season. . It reflects such things as ramping for hydro-electric generation or spiky flows resulting from urbanization. Pristine basins are rated 0 indicating slight daily fluctuations over the month when the greatest variation would be noticed.

Rating Okanagan River

Some ramping up or down of flows from Okanagan Lake must be conducted to meet flow regulation guidelines but attempt to avoid rapid diel changes (Brian Symonds, Water Manager – personal communication). Since there is some departure from the pristine situation but it is done carefully the rating for this attribute was chosen as 1.

Rating the Tributary Streams

Although there is some storage on the three tributary streams it is not generally thought to be a major cause of intra-daily change. A value of 2 was assigned but it is purely speculative.

Rating the Lakes

This attribute does not apply to lakes.

Attribute #18 Flow Flashy - Changes in intra-annual flow pattern

This attribute describes the variations which occur in the primary runoff season (i.e. the "flashiness" of the system). It is meant to identify changes caused by such factors as storm runoff or flow regulation which might result in desiccation of fry on the low flow end or bed scouring on the high flow end.

Rating Okanagan River

The pristine rate is 2. Regulation and storage results in flows that are less flashy than would have been experienced historically and so the assigned rating is 1.

Rating the Tributary Streams

It seems obvious that with all the changes that have taken place on the tributary streams flow patterns are no longer identical to the historic patterns. Logging and other forms of land clearing will have made flows more flashy in the spring and it is unlikely that the small storage impoundments on these systems would offset that substantially. In the summer and fall it is likely that high water consumption would also increase the variability by quickly lowering the available volume of water from time to time.

Although some "flashiness" may result from land use, the dominant factor seems to be meteorological events (Geostream Consulting, 2001 and Hawthorn and Karanka, 1982 [in Geostream Consulting, 2001]).

Given all the factors mentioned, a value of 3 has been assigned.

Rating the Lakes

This attribute does not apply to lakes.

Additional Note in regard to Okanagan River Flows

Fisheries authorities have recognized the critical importance of flows in the production of salmonids in the Okanagan River. Thus a multi-disciplinary team has recently constructed a state-of-the-art computer model that uses real-time data to assist with water balance decisions. The tool, known as the Fish Water Management Tool, has been developed by ESSA Technologies for Canada Fisheries and Oceans, B. C. Ministry of Water, Land and Air Protection, Okanagan Nation Alliance and Public Utility District No. 1 of Douglas County, Washington.

Attribute #19 – Gradient

Rating Okanagan River

A survey of the Okanagan River with cross sections and profile was completed in 1980 (Schubert, 1980). Some changes will have taken place since that time but the system is fairly stable because it is confined by dykes, and the gradient is controlled by 17 drop

structures. Flows are regulated by dams and the stability prevents excessive scouring and material transport. Tributary streams are few and extremely small.

The few steeper sections of Okanagan River have not been channelled and ratings for these reaches will not have changed substantially as compared with the historic situation. In the channelled sections which make up most of the river, however, gradients were, and still are, low and so all reaches are in the zero index category.

Historically the elevation change which now occurs at the 17 Vertical Drop Structures would have been spread out through the river. This would provide a greater rating if the river was the same length. However, aerial photographs show that the river was much longer before it was channelled (see channel length). The extra length that the river once had would offset the greater elevation change, therefore the historic gradients were, in the opinion of the rater, similar to the present gradient.

Rating the Tributary Streams

The gradient for Inkaneep Creek was taken from Long 2000 (page 5). The approximate gradients for Vaseux and Shingle Creeks were calculated by dividing the drop (ascertained from topographical maps) by the channel lengths (see Channel Length Attribute). Calculations are given in Table 63.

Rating the Lakes

This attribute does not apply to lakes.

Table 63 Calculation of gradients for rating the tributary reaches (approximate).

Tributary	Elevation Drop (m) (from topo maps)	Reach Length (m) (from aerial photos)	Approximate Gradient (%)
Shingle Creek	3220	62	1.9
Vaseux Creek	2730	81	2.9

Attribute #20 - Habitat - back water pools

Backwater pools are alcoves connected to the main channel. They are one of the main channel slow water habitats (along with primary pools, backwater pools, pool tailouts/glides, and beaver ponds) and can provide key habitat for some species of juvenile salmonids.

Rating Okanagan River

The current ratings within the channelled reaches are easily estimated with a good deal of accuracy (there are few if any backwater pools). These are rated zero. Most of the unchannelled reaches are steeper sections and again there are few backwater pools. These have been assigned a rating of 1 (though they are probably on the low end of the 1 range). No quantification of the habitat has been carried out so the confidence level of the rating slips from 1 to 4.

In historic times the reaches which are now channelled ran slowly and meandered through many oxbow turns so the backwater pools were probably found extensively. These are conjecturally rated at 2.

Rating the Tributary Streams

Rating of the tributary reaches was based on the memories of the raters (K. Long and C. Bull) and on the knowledge that the number of pools varies inversely with the gradient.

Rating the Lakes

This attribute does not apply to lakes.

Attribute #21 Habitat - beaver ponds

Beaver ponds are one of the main channel slow water habitats (along with primary pools, backwater pools, and pool tailouts/glides). They are considered important because of their ecological functions (e.g. nutrient retention and sediment trapping) and their importance as rearing and overwintering areas for some salmonids.

Rating Okanagan River

The current rating of the Okanagan river is easy. There are very few beaver dams and water managers actively exclude them from the engineered channel. Thus the rating is zero throughout the mainstem. Historically there were undoubtedly a number of beaver dams since the system was slow and meandering.

Rating the Tributary Streams

Rating of the tributary reaches was based on knowledge of the system by the raters (K. Long and C. Bull). The steep gradients encountered in the tributaries would no doubt discourage a lot of potential beaver activity.

Rating the Lakes

This attribute does not apply to lakes.

Attribute #22 - Habitat – glides

Glides are one of the main channel slow water habitats (along with primary pools, backwater pools, pool tailouts, and beaver ponds) and serve as rearing areas for some life history stages of salmonids.

Rating Okanagan River

Much of the mainstem is currently glide habitat resulting from the construction of a uniform straight channel with little habitat diversity. Historically it was likely similar due to the low gradient and extensive meanders. The higher gradient sections between McIntyre Dam and Vertical Drop Structure 13 and between Skaha Lake Dam and Shuttleworth Creek are exceptions.

Rating the Tributary Streams

The tributary streams are higher gradient than the mainstem and support extensive riffle habitat Thus they are rated lower than the mainstem reaches. Inkaneep Creek has more glide habitat than the other two tributaries which is to be expected since it is lower gradient.

Rating the Lakes

This attribute does not apply to lakes.

Attribute #23 - Habitat - large cobble/boulder riffles

This metric is a measure of one type of habitat used by salmonids at certain life history stages.

Rating Okanagan River

Since the river is channellized and low gradient throughout much of its length cobble riffles are rare. Ratings are minimal except in the higher gradient areas which have been left unchannellized.

Rating the Tributary Streams

Riffle habitat is common in the tributaries. The extent of this habitat varies directly with the gradient so that the highest concentration is found in Vaseux Creek followed by Shingle and finally Inkaneep.

Rating the Lakes

This attribute does not apply to lakes.

Attribute #24 - Habitat - small cobble/gravel riffles

Riffles support high densities of benthic invertebrates and are significant food producing areas. They are also good rearing areas for some juvenile salmonids

Rating Okanagan River

Since the river is channellized and has a relatively low gradient throughout much of its length, riffles are rare. Ratings are minimal except in the higher gradient areas which have been left unchannellized.

Rating the Tributary Streams

Riffle habitat is common in the tributaries. The Cobble riffles are most extensive in the highest gradient tributaries such as Vaseux Creek. In lower velocities creeks such as Inkaneep small cobble and gravel riffles predominate.

Rating the Lakes

This attribute does not apply to lakes.

Attribute #25 – Habitat - off channel habitat

Oxbows, ponds and marshes and other off channel habitats store water, nutrients and sediments; slow water during floods and provide refugia for aquatic animals. They are also important for some salmonids at certain life history stages.

Rating Okanagan River

Historic pictures of the Okanagan River show that it was one a magnificent example of habitat diversity. However, in the 1950s channellization separated the river from the flood plain cutting off nearly all of the off channel habitat. Hence ratings are high historically and very low currently.

Rating the Tributary Streams

The higher gradient, linear tributary streams appear to always have been devoid of off channel habitat.

Rating the Lakes

This attribute does not apply to lakes.

Attribute #26 – Habitat - primary pools

Primary pools are one of the main channel slow water habitats (along with backwater pools, pool tailouts/glides, and beaver ponds).

Rating Okanagan River

The current ratings within the channelled reaches of the mainstem are easily estimated with a good deal of accuracy because there are few, if any, backwater pools. These are rated zero.

Most of the unchannelled reaches are steeper sections and again there are few primary pools. These have been assigned a rating of 1 (probably on the low end of the 1 range). No quantification of the habitat has been carried out and the ratings are purely conjectural so the confidence level of the rating is 5.

In historic times the reaches which are now channelled ran slowly and meandered through many oxbow turns so pools were probably found extensively. These are conjecturally rated at 2.

Rating the Tributary Streams

The steepest of the tributaries, Vaseux Creek, has few pools below the canyon. It has been rated 0. Shingle has more and is rated 1. Inkaneep has the most extensive pool habitat of the tributaries and is rated 2.

Rating the Lakes

This attribute does not apply to lakes.

Attribute # 27 - Habitat - pool tailouts

They are one of the main channel slow water habitats (along with primary pools, backwater pools, pool tailouts/glides, and beaver ponds)

Rating Okanagan River

See comments under pools.

Rating the Tributary Streams

See comments under pools.

Rating the Lakes

This attribute does not apply to lakes.

Attribute #28 – Harassment

This attribute is meant to address the problem of poaching and harassment of spawning fish.

Rating Okanagan River

The access along Okanagan river is heavily developed. Dikes with good roads are present throughout most of the river, though in most reaches (see comments on the rating sheet) public access is limited to hiking and biking. Highways parallel the river in many reaches and major centers are located along the river (Penticton, Okanagan Falls and Oliver).

Boat traffic is nil in many reaches because of the 17 drop structures. However, floating on inner tubes has become a major tourist attraction with thousands of tubers using the river on hot summer days. Tubing is a major recreational industry in Penticton (Reaches 25 – 28) and it is beginning in Oliver (Reaches15-17). Waterski boats make heavy use of Reach 1 even though it is illegal. Skiers find it novel to ski on a river and wind is not a factor.

Despite the easy access and heavy recreational use of the river, harassment does not seem to be a major factor affecting salmonids. Salmon spawn in October and trout spawn from mid May to mid June. At these times low water temperatures prevent the use of the river for floating and water skiing. For this reason harassment ratings are assigned a higher number than would have been expected given the access and proximity to urban centers.

Historically (i.e. prior to European contact) harassment would have been low in most reaches. However, Okanagan Falls, the mouth of Shingle Creek and the island upstream from the mouth of Vaseaux (McIntyre) Creek are all known native fishing sites and so these reaches received a higher historic ratings for the harassment attributed.

Rating the Tributary Streams

Shingle Creek and Inakaneep Creeks are located on Indian Reserves with no access to non-natives but easy access for natives. Little information is available and the frequency or extent of harrassment. They were assigned a value of Index 2.

Vaseux Creek is near Gallagher Lake, Okanagan Falls and Oliver and has easy road access through the lower half of the reach. The upper half of the reach is on private land but is well used by trespassers and campers. It was assigned a value of 3.

Rating the Lakes

This attribute does not apply to lakes.

Attribute #29 - Hatchery Outplants

The deleterious effects of hatchery outplants on wild fish stocks is well documented. This metric rates the degree of outplanting on the territory in question. Excellent records have been kept for all stocking throughout British Columbia and the results are easily accessible on line through the "Fish Wizard" http://srmaps.gov.bc.ca/apps/fidg/stockingQuery.do .

The Fish Wizard does not include salmon stockings that were part of the Grand Coulee mitigation scheme. Nor does it include the transfer of smallmouth bass into Skaha Lake in the mid 1980s.

Rating Okanagan River

A lot of stocking has been carried out in the Okanagan Basin but mainly in the headwater lakes well removed from the river. No stocking has been carried out in either the river or the Mainstem Lakes (adjacent to the river) in the last 10 years, so the rating is 0.

Stocking began in the Mainstem lakes as early as 1894, so it is difficult to know what number to assign to the historical column. However, the rating for the time period prior to mans interference the rating would be zero and that is what we have used.

It is well to note that Okangan sockeye eggs are presently incubating in Shuswap Falls hatchery and they were collected with the intention of releasing them at the top end of Okanagan River in the spring of 2004. If this occurs the current ratings would need to modified.

Rating the Tributary Streams

The Fish Wizard shows that there has never been any stocking into Inkaneep or Vaseux Creeks. Shingle Creek has been stocked with native rainbow twice but the stockings occurred in 1923 and 1936. Consequently all the tributaries were rated 0.

Rating the Lakes

See the comments under "Rating the River". A variety of fish (rainbow, brooks, sockeye, kokanee, lake whitefish and cutthroat) have been stocked in the mainstem lakes but the lasts stocking was 1989.

Attribute #30 - Hydrological Regime (natural)

This attribute is meant to describe the nature of the natural flow regime. It does not apply to highly regulated systems like current state of the Okanagan River. It does apply however to the historic state of river and to the tributary streams. The next heading applies to the current state of the Okanagan River.

Rating Okanagan River

Only the historic state is applicable. It is best described as Index Value 1. I.e. "Spring snowmelt dominated, non-glacial, temporarily consistent (*not flashy)* and moderate peak and low flows."

Rating the Tributary Streams

The tribuatary streams fit with the rating applied to the mainstem as compared with other categories such as "groundwater source dominated…or rain on snow transitional…or rainfall dominant with flashy winter peaks…or glacial runoff system."

Rating the Lakes

This attribute does not apply to lakes.

Attribute #31 - Hydrological Regime (regulated)

This attribute addresses the seasonal change in the hydrograph as a result of storage for hydro-electric purposes. In the case of the Okanagan River the storage is for flood control but the metric applies. A major storage project on Okanagan Lake retains the vast majority of flow passing through the system.

A very intensive computer modelling program is presently being developed which will assist water and fisheries authorities to regulate the hydrograph in an optimal fashion. The project is called Fish Water Management Tool and more information may be obtained by contacting any of the partners (Fisheries and Oceans Canada ; BC Ministry of Water, Land and Air Protection; Okanagan Alliance Fisheries Department; O Douglas County Public Utility District).

Rating Okanagan River

Summit Environmental Consultants Ltd. (2002d) used a model to reconstruct the natural hydrograph and compare it with the hydrograph that has resulted after storage was developed on the system. The model showed that regulated discharges exceed the estimated natural mean monthly discharges for the months of October to May, but are less than natural discharges in the months of June to September. These results were statistically significant ($\alpha = 0.01$) for all months except September and October.

Peak flows were reduced about 35% so the current index value was assigned a rating score of 4.

Rating the Tributary Streams

No storage has been developed on Shingle, Vaseux or Inkaneep Creek so the attribute does not apply.

Rating the Lakes

This attribute does not apply to lakes.

Attribute #32 – Icing

Icing can damage fish habitat when anchor ice forms or when the channel freezes causing flooding and erosion on the floodplains.

Rating Okanagan River

Anchor ice is experienced frequently in the neighboring Similkameen Watershed but large lakes and a much warmer climate in the Okanagan mean that icing is very limited except in side channels. Nevertheless there are occasional problems such as icing of the dam control gates which can affect the hydrograph. Consequently the rating is 1 throughout.

Rating the Tributary Streams

Problems with anchor ice develop occasionally but the most applicable rating is 1.

Rating the Lakes

This attribute does not apply to lakes.

Attribute #33 - Metals in the Water Column

This attribute is intended to measure whether contamination from metals is affecting fish populations.

Rating Okanagan River

Metals were assigned the value Index Value 1 for all reaches of the Okanagan River based on samples taken in Reach OKR4 (Whipperman and Webber, 1996). The samples were collected every two weeks from 1991 to1995. There were also data prior to 1991, however, many of those samples had been inadvertently contaminated by the containers used to store the reagents added to the metals collection bottle in order to preserve the samples. The following metals were present in concentrations which always fell within guidelines (Nagpal, Pommen, and Swain 1995) for protecting aquatic life: arsenic, cobalt, copper, lead, manganese, molybdenum, nickel, selenium, and zinc**.** Total aluminum, total chromium, and total iron sometimes exceeded the guidelines for the dissolved forms of these metals, particularly during freshet which indicates that much of these metals were in the suspended form which is relatively inert (Whipperman and Webber, 1996). Unfortunately dissolved metals were not measured and it is impossible to be certain that these metals would have always been within guidelines although it is likely that they were. Because of the uncertainty for these metals, the Index Value 1 rather than 0 seems appropriate. The Confidence Rating is 1 for Reach OKR4 and 2 for all other reaches.

It is recommended that a letter be written to Environment Canada and BC WLAP asking that in order to find out whether there may be toxicity, they test for the dissolved forms of Aluminum, Chromium, and Iron as recommended in their own report.

Sample data compiled by BC Ministry of Energy and Mines was used to determine the probable level of metals in sediments of the Okanagan River.

Rating the Tributary Streams

With no data available for the tributary streams they were given the same rating as the main river.

Rating the Lakes

J. Bryan searched the water quality data files of WLAP (B. C. Ministry of Water, Land, and Air Protection) for the last decade (1993-2003) of record. Because several techniques were used for metal analyses which differed in their analytical power, and consequent detection limit, only those results with the lowest detection limits were used in this exercise. Appendix 1 summarizes data for metals which have associated Canadian Environmental Quality guidelines for levels in freshwater to protect aquatic life (Anon. 1999). The data fell within the guidelines , with the qualifications explained in the next paragraph.

The data for cadmium are not adequate as the Guideline is an order of magnitude less than the minimum detection limit. This means that the data are likely to include false excedances just because of the level of quantification.

Chromium meets the Guideline assuming that all results are in the trivalent form. The sample analysis did not split chromium results into tri or hexavalent forms, but the waters were well oxygenated and under such conditions chromium is normally in the trivalent form (McKee and Wolf 1963, p163). The data for nickel and selenium in Okanagan Lake were three orders of magnitude greater than for Skaha or Osoyoos lakes. Since Okanagan Lake flows into the others, such a circumstance is exceedingly unlikely and it is probable that there was some error in coding these data making them 100 times higher than reasonable, so these data were disregarded.

Index Value 0 is appropriate for all three lakes (plus Vaseaux for which no data are available) as none of the metals fell outside the Canadian Environmental Quality Guidelines for levels in freshwater to protect aquatic life (Anon. 1999). As the data are unpublished, Confidence Level 4 was assigned.

Attribute #33 and 34 - Metals in the soil sediments

This attribute is intended to measure whether contamination from metals is affecting fish populations or other aquatic organisms.

Rating the Okanagan River

No information was located regarding metals in the sediments and this metric should be identified as a data gap. Comments under the section “Rating the Lakes” apply and the river is rated similarly

Rating the Tributary Streams

See comments pertaining to the river and lakes.

Rating the Lakes

The only known data on metal and pollutant levels in sediments are for Vaseaux and Osoyoos.

Contaminant levels in fish give an indication of levels in sediment as most of the contaminant load originates in the sediment and passes to fish from the benthic invertebrates which they eat. For rainbow trout from Okanagan Lake in 1988, the levels of PCB, DDT, and mercury in fish tissue fell within Canadian Guidelines for human consumption (Bryan and Jensen 1994). The same was true for 3 fish captured in Osoyoos Lake in 1998 and 2000 (E. V. Jensen, personal communication). A more extensive data set for fish from Vaseaux and Osoyoos Lakes is being evaluated by Environment Canada staff as part of a report scheduled for completion in 2004. The contact person for obtaining a copy of this report is Ms. B. McNaughton (telephone 604 664-4055).

Since there are some contaminants in lake sediments and biota, the Index Value 1 with Confidence Level 5 seems appropriate for the lakes just as it was for the Okanagan River. When the report by Environment Canada is available, these ratings may need to be revised. However, for now, this is a subject where further study seems warranted.

Attribute #35 - Miscellaneous toxic pollutants in water column

This attribute is intended to measure whether there are any toxic substance affecting fish populations.

Rating Okanagan River

There are no known toxic pollutants in the water column that continuously or periodically produce chronic toxicity to salmonids. There is only one discharge of wastewater directly to the Okanagan River and that is domestic wastewater with tertiary treatment from City of Penticton which has a diffuser pipe across the river channel in Reach OKR 27. Usually the quality of this discharge is very good, although in January 1995 there was an upset in the plant which resulted in poor treatment and a consequent release of wastewater high in ammonia. Caged trout above and below the outfall showed that there was no acute toxicity resulting from this discharge. There was, however, some mortality near a storm drain in the lower part of OKR27 and the toxicant would have affected OKR26 and OKR25 as well. There are also storm drains into Okanagan River from the town of Oliver in Reach OKR 13. As there are no known miscellaneous toxic pollutants in Okanagan River and growth of salmonids in the river is normal, Index Value 0 is appropriate for all reaches of the river and the Confidence Level is 4. This said, it is wise to note that Serdar (2000) found significant DDT and PCB loadings in the lower Okanagan River. The loadings were found to be largely internal, presumably through bottom sediments rather than incoming tributaries.

Rating the Tributary Streams

Comments from “Rating Okanagan River” and “Rating the Streams” apply.

Rating the Lakes

There are no known toxic pollutants in the water columns of any of the Okanagan Valley lakes. There are, however, sizable discharges of municipal wastewater with tertiary treatment. There has never been an evaluation of possible endocrine disrupters in this wastewater. This is an area where an assessment by a qualified expert would seem to be warranted.

Given that no toxic pollutants are known, the Index Level 0 seems appropriate for the lakes, the same as for the Okanagan River. Because there has been no evaluation of whether or not endocrine disrupters are a real or potential problem, Confidence Level 5 is appropriate.

Attribute #36 - Nutrient Enrichment

Nitrogen and phosphorus usually limit primary production. Enrichment of these nutrients as a result of agricultural runoff, failing septic tanks, wastewater discharges and stormwater runoff can increase algal growth. This in turn can choke off the interstitial spaces needed by fish eggs and benthic organisms. Water quality can be degraded due to lower Oxygen, higher pH and higher turbidity.

Rating Okanagan River

The Okanagan River has been enriched with nutrients from direct discharge of domestic wastewater as well as septic tanks, agriculture, and logging (Anon. 1974). Phosphorus is the controlling nutrient (Anon. 1982). In 1970, the phosphorus load from anthropogenic sources was about twice that from natural sources; whereas by 1980, improved wastewater treatment had dropped the anthropogenic load (10500 kg/yr) to less than the natural (10,700 kg/yr). Phosphorus loads from direct discharges continued decreasing while those from diffuse sources continued to rise through the 1980s, but the anthropogenic load by 1990 was still estimated to be less than the natural load (Nordin, Bryan, and Jensen 1990).

It is clear that the Okanagan River has been enriched but since the river has not developed dense mats of green or brown algae on river bottom during summer months, Index Level 1 is appropriate for all reaches of the Okanagan River. No published or unpublished measurements of periphyton chlorophyll a are available to confirm that Index Level 1 is appropriate. Because of this lack of direct evidence, the Confidence level 4 has been assigned. Periphyton standing crop data is an important data gap which ought to be filled through a study of levels in Okanagan River.

Rating the Tributary Streams

Some degree of enrichment has occurred due to land clearing in both Inakneep and Shingle Creeks. Vaseux Creek is less affected and is probably not substantially different form historical in terms of nutrient content.

Rating the Lakes

Sewage discharge into the lakes was having a noticeable affect in terms of nutrient enrichment in the 1970 era. This led to the installation of tertiary sewage treatment

facilities in all the major centers. As a consequence point source nitrogen and phosphorus levels decreased significantly.

Nevertheless there has been nutrient enrichment of all the lakes in the Okanagan through many cultural activities including disposal of treated domestic wastewater. Okanagan Lake has been less affected than Skaha, Vaseaux, or Osoyoos. The appropriate Index Levels are 1 for Okanagan Lake (Bryan and Jensen, 1994) and 2 for Skaha, Vaseaux, and Osoyoos (Nordin 1994). The respective Confidence Levels are 1 for Okanagan and Skaha Lake and 2 for Vaseaux and Osoyoos Lake.

Attribute #37 - Predation Risk

This attribute is meant to assess whether predation rates on fish have been affected due to changes in rivers due to mans activities (e.g. building dams).

Rating Okanagan River

Man has radically altered the predation risk by altering both the species mix and the ease of predators capturing prey. Nine exotic fish species have entered the mix including two species of bass (known to be highly piscivorous). Seventeen artificial drop structures have been built in the river each with a bank-to-bank hydraulic curl which could temporarily confuse and dis-orient outmigrating fry.

If these were the only factors affecting predation risk a current rating of 4 would be assigned. However, channellization has shortened and simplified the river and this probably results in faster downstream passage and fewer dwelling spots for predators. These affects would lower the predation rating and as a result a level of 3 has been assigned to each reach.

Rating the Tributary Streams

Tributary streams have been simplified. Lack of woody debris and undercut banks and other micro-habitat niches have increased risk of predation by birds, mammals and fish. The streams also now support bass and brook trout. Thus a rating of 3 has been assigned.

Rating the Lakes

Bass have been added to Skaha, Vaseux and Osoyoos lakes but not Okanagan. Although Okanagan has received a wide variety of exotic species the major predatory types such as bass have not yet reached Okanagan. Thus Okanagan has been rated 2 while the other lakes have been rated 3.

Attribute #38 – Obstructions

This attribute records obstructions to fish passage.

Rating Okanagan River

Aerial photographs and site visits were used to rate obstructions to fish passage in the Okanagan River. A lot of expense and effort went into designing drop structures that would not obstruct migrating sockeye salmon (Hourston et. al., 1954). However, since sockeye salmon were not able to migrate past McIntyre Dam at the time of design, the

drop structures upstream may not have been designed for fish passage and may present challenges to migrating fish. This is a knowledge gap that requires further consideration since salmon passage through this section is contemplated. To draw attention to this potential problem the reaches above McIntyre Dam that have drop structures have been rated 1 whereas those below have been rated 0.

The drop structures below McIntyre have affected migrating sockeye during times when flows were minimal and stop logs were used on some drop structures to raise water levels in order to service water intakes (Bruce Shepherd, DFO, personal communication). However, an agreement was made that stoplogs would no longer be used. Thus the rating is presently 0 for reaches downstream from McIntyre Dam.

Some fisheries authorities question whether the Okanagan Falls historically was a complete or partial barrier to fish migration. The question has never been completely resolved to everyone's liking but the bulk of the evidence appears to indicate that fish did pass that point (Bruce Shepherd, DFO and H. Wright, ONAFD, personal communication). Since this is a controversial point the historical rating has been assigned as 1 rather than 0.

Okanagan River reaches that terminate in a currently impassable dam were rated 4.

Rating the Tributary Streams

The reaches on the tributary stream have been selected so that they stop where an obstruction starts. Thus by definition the tributary reaches receive a rating of 0. Nevertheless it would be wise to investigate the barriers – particularly the fishway on Shingle Creek which is meant to pass kokanee and rainbow trout but may not.

Rating the Lakes

This attribute does not apply to lakes.

Attribute #39 - Riparian Function

This attribute provides an estimation of the extent to which a riparian zone is in a "Proper Functioning Condition". The riparian zone and wetland is considered to be functioning properly when adequate vegetation, landform, or large woody debris is present to:

- Dissipate energy associated with high water flow, thereby reducing erosion and improving water quality;
- Filter sediment, capture bedload, and aid floodplain development;
- Improve flood-water retention and ground water recharge;
- Develop root masses that stabilize streambanks against cutting action
- Develop divers ponding and channel characteristics to provide the habitat and the water depth, duration and temperature necessary for fish production , waterfowl breeding and other uses.
- Support greater biodiversity.

Rating Okanagan River

The points made under "Confinement – Hydrological Modifications" apply here. Every reach of the Okanagan River has been modified by man and most have been completely channelled and cut off from their riparian floodplains. The only completely untouched portion is 1128 meters of Reach 17 situated on Indian Reserve lands.

Information for rating this attribute was taken from pre and post channelling aerial photographs, maps and post channelling engineering surveys (Schubert, 1980), and on-site visits.

Rating the Tributary Streams

The riparian zones of all of the tributaries mentioned has been affected to some extent but not nearly as completely as the mainstem. Inkaneep was given a rating of 2 based upon significant loss of riparian vegetation with some channelization.

Vaseux was rated 3 based upon heavy diking and loss of riparian vegetation.

Shingle Creek was rated 2 since it has been channelled and has lost much of the original riparian vegetation. Replanting of cottonwoods is being undertaken by Penticton Indian Band (Enowkin Centre).

Rating the Lakes

This attribute does not apply to lakes.

Attribute #40 - Salmon Carcasses

The density of salmon carcasses in areas of the watershed is important because of the contribution they make in transporting energy and nutrients from the ocean to freshwater. This provides food for both fish and wildlife. This attribute rates the reaches based upon the abundance of carcasses.

Rating Okanagan River

Okanagan Nation Alliance Fisheries Department and DFO has recorded sockeye salmon spawner distribution in Okanagan River for a number of years (Stockwell and Hyatt, 2003). Most of the spawning takes place in the 5 mile long section of river between Vertical Drop Structure 13 in Oliver and the McIntyre Dam (Reaches 14- 18). The total number of sockeye spawning annually has averaged about 15,000 for the period 1935 – 1998 (Bull, 1999; Stockwell and Hyatt, 2003), therefore nearly 3,000 fish per mile would be available in these reaches and the index value is 0.

In reaches 1 – 12 the count would be low but some spawners are found near the drop structures and nutrient drift would be experienced from the upstream areas. Therefore these reaches were assigned an index value of 3.

Reaches 19 – 28 are above the present limit of migration and so they were assigned rated with an index number of 4.

The historic rating is more difficult. Two surveys below McIntyre Dam prior to river channellization indicated numbers and distributions similar to the present (Hourston et. al, 1954).

Prior to the construction of McIntyre Dam (which has been a complete barrier to salmon since about 1920) salmon were reportedly found throughout the system and were very abundant at Okanagan Falls. An index of 0 is therefore assigned to Reach 24. Most other reaches above McIntyre Dam are assigned an index of 3 based upon very low gradients (see section on gradients). Exceptions are Reaches 26 and 27 which were reported to be fishing sites and probably had higher historical gradients. These are rated 0. However, these suppositions are highly conjectural.

Rating the Tributary Streams

Traditional Ecological Knowledge reports that salmon were once common in Inkaneep Creek. However, few if any salmon use the system currently. Consequently the rating is 2 historically and 4 currently.

Local residents report that sockeye salmon were once abundant in Vaseux Creek (Blake Kennedy and Barry Barisoff, personal communication). Chinook salmon and steelhead trout were also found there according to Sandy McDonald, regional biologist, approximately 1970- 1974 (personal communication). Salmon are seldom observed today.

There are few reports of the exact species of fish that historically entered Shingle Creek. However, journals of the Okanagan Historical Society mention a major native fishing site at the confluence of Shingle Creek and Okanagan River. Thus the historic rating is 2 and the current rating is 4.

Rating the Lakes

This attribute does not apply to lakes.

Attributes #41 – 43 - Temperature (Maximum, Minimum and Spatial Variation)

Water temperature is a critical habitat attribute for aquatic organisms. Fish are poikilotherms (cold blooded) and so their metabolic rate varies according to the water temperatures. Maximum temperatures become a limiting factor for salmonids in some reaches Okanagan at certain times.

The spatial variation metric is meant to provide a measure of the extent of groundwater entering the system.

Rating Okanagan River

Temperature records for Okanagan River have been compiled by Stockwell, Hyatt and Rankin, 2001. The years covered run from 1971 to present.

Between year variances are large. For example minimum temperatures of less than 1°C were not found in the winter of 1999/2000 but occurred 54 days in 1996/1977. Nevertheless, a clear picture emerges of the water temperature regime. Minimum temperatures are not usually a major concern but maximum temperatures are a critical

factor. This is not surprising given that the area is arid and hot, tributary flows are minimal in the late summer, and river water originates from the surface of large warm lakes. Biologists studying the system during the Okanagan Basin Study (1970s) were of the opinion that water temperatures were a controlling factor for rainbow trout and other riverine salmonids.

Spatial variation in water temperatures is not well studied. However, the Okanagan Basin Study work reported that water temperatures were very slightly lower at the downstream end of the river than they were at the upstream end. This is suspected to be due to groundwater return. This theory is supported by reports from biologists working in the river that occasional pockets of upwelling cold water are to be found. In addition, Park Rill Creek, a tributary to the Okanagan River that is known to carry a substantial amount of groundwater, runs about 2°C cooler than the main river during the hot season.

In summary then, the information indicates that Okanagan River approaches the upper limit of tolerable temperatures for salmonids in mid to late summer but there may well be micro-habitats that act as temperature refugia.

Rating the tributary stream reaches

No empirical data was available for the tributaries, but the systems are well known to the raters. Temperatures are believed to be warm but not quite as warm as the mainstem since the water is coming from higher elevations and there is much more shading. Nevertheless the rating of 3 is probably valid for maximum water temperatures in the streams.

Groundwater (as measured by the "spatial variation in water temperature" metric) is not known to be a significant factor in the tributary streams studied though it is likely to be significant in Park Rill Creek where abundant groundwater sources are observable (as shown by the frequent and extensive seepage areas with growths of watercress). .

Rating the lake reaches

Temperature ratings for the lake reaches were rated by H. Wright and were based on the fact that temperature/oxygen squeeze is a concern in much of the system. Dangerously high temperatures are found to depths where oxygen levels become intolerable in the south and central basins of Osoyoos Lake and in Vaseux Lake. This temperature/oxygen "squeeze" makes these areas unsuitable during July, August and September. Most of the north basin of Osoyoos Lake is also considered to stressful to salmonids during these months. Conditions are more reasonable in Skaha Lake, and Okanagan Lake is even less of a concern because of large volume and high levels of wind circulation. Available back ground reports include Wright (2002), Wright and Lawrence 2003 and unpublished ONAFD 2003 field work.

Attribute #44 - Turbidity

This attribute should be thought of as suspended sediment – the transport of mineral and organic particles in the water column. Suspended sediments affect fish behaviour, physiology and survival. This habitat attribute is meant to reflect the intensity of land use.

Rating Okanagan River

Turbidity was assigned the value Index Value 1 for all reaches of the Okanagan River based on suspended sediment samples taken in Reach OKR4 (Whipperman and Webber, 1996). The samples were collected every two weeks from 1990 to spring 1996 and sporadically between 1980 and 1990. In their report, Whipperman and Webber (1996) presented the data graphically but the scale did not facilitate the determination of Index Value, so the tabulated data was requested and used for comparison with the numbers presented in GEA Table 3. Assumptions were made about the probable length of time that the suspended sediment values remained high, but it is very probable that daily measurements would show that the Okanagan River meets the criteria in Table 51 for Index Level 1. The Confidence Rating is 1 for Reach OKR4 and 2 for all other reaches.

Rating the Tributary Streams

In 1998 a major mass wasting event (landslide) in the Inkaneep Creek Watershed caused major changes in channel morphology and impacted fish habitat (Geostream Consulting, 2001). This was attributable to a combination of road building activities and unstable soils. A number of other unstable areas have been identified (Davies, 1999). As a result, Inkaneep was rated 2 currently. An historic rating of 1 was assigned because there were no anthropogenic factors in the watershed but the unstable banks were there.

Vaseux and Shingle Creeks are thought to experience turbidity problems from time to time but not to the same extent as Inkaneep Creek and not to an extent that would cause direct mortalities to fish. Consequently an index of 1 has been assigned.

Rating the Lakes

This attribute does not apply to lakes

Attribute #45 - Water Withdrawals

This attribute is meant to address the likelihood of entrainment or injury to fry migrating past unscreened outtakes. The effect due to loss of water is covered by another attribute (flow).

Rating Okanagan River

Data on the volume of water which can be legally withdrawn from the Okanagan River each day were obtained from staff of Ministry of Water, Land, and Air Protection for each reach of the River. The reaches which had improperly screened outfalls were determined from a report by Chapman (2000).

The reach which runs from McIntyre Dam to Vaseux Lake was rated as 4 by C. Bull because of the huge unscreened diversion known as SOLID (because it was constructed by South Okanagan Lands Irrigation District). Other reaches were rated by J. Bryan and the ratings were based upon recoded withdrawals.

Rating the Tributary Streams

A site visit to Inkaneep Creek revealed one area where there appears to be extensive withdrawal of water from the creek through an open ditch. In Vaseux Creek there were two such areas. Consequently both systems are rated 3.

In Shingle Creek there is reportedly a pipeline which takes-off from the dam at the upper end of the reach. This is reportedly screened but perhaps not effectively. This should be investigated and constitutes a data gap. However, in the absence of this information an index of 1 is assigned.

Rating the Lakes

This attribute does not apply to lakes.

Attribute #46 - Woody Debris

Large woody debris (greater than 0.1m in diameter and 2 m in length) plays a role in creating and maintaining the pools, side channels and backwaters. It also provides structural complexity and cover for fish and it affects the transport of sediment, gravel and organic matter.

Rating Okanagan River

In its current state the Okanagan River is lacking large woody debris. Channellization of nearly the entire system has robbed it of riparian vegetation and the straight uniform channels provide no opportunity for wood to pile up. Consequently Most of the river reaches currently receive a rating of 4 for wood. In the natural section (Reach 17) and in the semi-natural areas above and below it the rating is 3.

Historically, the Okanagan River was probably not a big producer of large woody debris. While cottonwoods, water birch and willows lined some of the riparian zone, there were few coniferous trees like cedars which would last much longer as large woody debris in the channel. The surrounding land was not heavily forested as the lower elevation Okanagan was dry grassland and shrubland rather than forest. Also the large mainstem lakes would have slowed the recruitment of wood from the uplands tributaries to the river. Because of these considerations, historic ratings are 1 or 2 instead of zero. Ratings of 3 are assigned in the areas which received in less wood because they were naturally confined.

Rating the Tributary Streams

None of the tributary streams have very much woody debris. This is a result of limited recruitment (land clearing and an arid area), limited retention (straight channels) and interference by man (debris removal and channelization for flood control). Consequently they were assigned a current rating of 4.

Many of the aforementioned factors would have been present historically so that ratings would have been lower but similar in those times.

Rating the Lakes

This attribute does not apply to lakes.

Table 64. Metal levels (uG/L) in the water columns of Three Okanagan Lakes and the CCME water quality guidelines

Table v. Metal levels (uG/L) in the water columns of Three Okanagan Lakes and the CCME water quality guidelines														
OKANAGAN LAKE														
				Chromium										
Metal:	Aluminum	Arsenic	Cadmium	Trivalent	Copper	Iron	Lead	Molybdenum	Nickel	Selenium	Silver	Zinc	Alkalinity	Hardness
CanGuideline	**5-100**	**5.0**	**0.0170**	**8.9**	**2.0-4.0**	**300.0**	**1.0-4.0**	**73.0**	**25-150**	**1.0**	**0.10**	**30.0**		
Minimum	1.1	0.7	0.01	0.4	0.52	8	1.00	2.50			<0.02	1.82	108	
Maximum	3.2	0.8	0.08	2.0	5.20	11	7.00	4.50			0.02	2.92	112	
Median	1.1	0.5	0.01	0.3	0.78	8	1.00	3.36			<0.02	2.55	110	
Mean	2.2	0.51	0.03	0.7	1.39	7.75	1.50	3.38			<0.02	2.47	110.7	
number	9	9	6	4	12	4	178	14			6	9	15	
Guideline?	**met**	**met**	*****	**met**	******	**met**	******	**met**	*******	*******	**met**	**met**		

SKAHA LAKE														
				Chromium										
Metal:	Aluminum	Arsenic	Cadmium	trivalent	Copper	Iron	Lead	Molybdenum	Nickel	Selenium	Silver	Zinc	Alkalinity	Hardness
CanGuideline	**5-100**	**5.0**	**0.0170**	**8.9**	**2.0-4.0**	**300.0**	**1.0-4.0**	**73.0**	**25-150**	**1.0**	**0.10**	**30.0**		
Minimum	0.4	0.4	<0.01	0.2	0.53	12	0.01	3.20	1.29	0.2	<0.02	<0.1	105	110
Maximum	10.5	1.1	0.07	8.0	2.80	60	0.60	4.00	1.36	0.5	0.02	5.60	114	125
Median	3.7	0.6	0.04	0.8	1.70	29	0.06	3.45	1.33	0.4	0.02	0.30	110.00	115.00
Mean	4.1	0.6	0.04	2.3	1.50	33	0.27	3.51	1.33	0.4	0.02	1.58	110.00	115.00
number	5	7	4	5	8	6	7	6	2	4	2	4	13	7
Guideline?	**met**	**met**	*****	**met**	**met**	**met**	**met**	**met**	**met**	**met**	**met**	**met**		

OSOYOOS LAKE														
				Chromium										
Metal:	Aluminum	Arsenic	Cadmium	trivalent	Copper	Iron	Lead	Molybdenum	Nickel	Selenium	Silver	Zinc	Alkalinity	Hardness
CanGuideline	**5-100**	**5.0**	**0.0170**	**8.9**	**2.0-4.0**	**300.0**	**1.0-4.0**	**73.0**	**25-150**	**1.0**	**0.10**	**30.0**		
Minimum	5.3	0.6	0.01	0.3	0.31	28	0.01	3.33	1.12	0.4	<0.02	0.10	93	118
Maximum	8.1	0.9	0.02	0.4	2.20	38	0.03	3.88	1.95	0.6	<0.02	8.00	126	130
Median	6.5	0.7	0.02	0.4	0.74	34	0.03	3.68	1.54	0.4	<0.02	0.35	113.00	124
Mean	6.6	0.7	0.02	0.4	0.99	33	0.02	3.64	1.54	0.5	<0.02	2.20	112.70	123.4
number	4	5	2	2	5	3	4	4	2	3	2	4	12	11
Guideline?	**met**	**met**	*****	**met**	**met**	**met**	**met**	**met**	**met**	**met**	**met**	**met**		

* Minimum detection limit of samples inadequate to check guideline. More detail in notes.

**Both mean and median within guidelines, so considered met despite one or a few high values.

***Water sample data available for Okanagan Lake are considered erroneous. More detail in notes.

14 Appendix G: Public Comments

Comments Received on the Draft Okanogan and Methow Subbasin Plans

Note: Every effort has been made to fully consider and implement applicable comments that were received during the formal public comment periods for the subbasin plan. However, given this, it is recognized that it may be possible that this was not completely accomplished due to the time constraint of meeting the May 28, 2004 NPCC deadline. During the NPCC's Response Period (after the 90 public and ISRP comment period), comments received on the initial plan will then be reconsidered.

PUBLIC COMMENTS ON THE METHOW AND OKANOGAN SUB BASIN PLANS

FEBRUARY 11, 2004 – APRIL 16, 2004

Sub-Basin - Comments on Draft Sub-basin Plan

Thanks for the opportunity to comment. Please note my attached comments. Thank you,

Dick Ewing

From: "Dick Ewing" <fawn@mymethow.com>

To: "Sub-Basin" <sbp@co.okanogan.wa.us>

Date: 3/10/2004 8:08 AM

Subject: Comments on Draft Sub-basin Plan

COMMENTS ON SUB-BASIN SUMMARY FOR METHOW BASIN:

1. P. 22. the USGS Water Resources Investigations Report # 03-4246 needs to be included in this section. So model runs with and without groundwater seepage from canals have already been made. What has been found needs to be cited here.

Response: The comment has been forwarded to the Habitat Working Group (HWG).

2. P. 22: regarding a test site for examining the affects of seepage from canals ….

This has already been done with the Twisp Power and Irrigation Canal study

initiated by the USGS. This work needs to be cited with its present conclusions.

Response: The comment has been forwarded to the Habitat Working Group (HWG).

3. Unfortunately the present draft is not complete. The information presented contains most of the background materials and ESA techno-babble that we are all familiar with concerning the region and listed species. What is missing is the core of the draft that actually explains the sub-basin planning perspective, its analysis of the problem and its proposed goals and solutions. Most importantly the present draft does not show any linkage with present watershed planning efforts and how they will be incorporated into sub-basin planning.

Response: Okanogan County's public involvement strategy has been to offer opportunities for involvement while the process was ongoing and work was in progress. The public has been invited to join as a participant in the process, rather than receive materials about it after the fact.

Last sentence of the paragraph: Sub basin planning outreach staff met with the Methow Basin Planning Unit to address the issue on March 31st,2004.

4. References to the Methow Sub Basin Summary by the Conservation Commission do not cite the deficiencies in this summary noted by Ken Williams' review of this summary which was part of the materials submitted for this process. It would be helpful to have as part of the sub basin plan a process cited on how these deficiencies are going to be addressed so a more accurate approach may be initiated in the Methow.

Response: The comment has been forwarded to the Habitat Working Group (HWG).

# # # # # # # # # # # # # # #

Sub-Basin - Okanogan County Subbasin Planning

Comments on Subbasin Plans attached. Thanks. Darlene

From: "hajny" <hajny@pctelecom.us>

To: "Julie Dagnon" <jdagnon@co.okanogan.wa.us>

Date: 3/11/2004 11:56 PM

Subject: Okanogan County Subbasin Planning

CC: "Mike Wilson" <mjwilson@televar.com>, <Commissioners@okanogan.wa.us>,

"Kurt Danison" <kdanison@ncidata.com>

Julie Dagnon, Water Resource Division Manager

Okanogan County Water Resources

123 N 5th Avenue – Room 110

Okanogan, WA 98840

Re: Comment Letter on Draft Subbasin Plans: Okanogan/Similkameen and Methow

Dear Ms. Dagnon:

There is growing concern that the Northwest Power and Conservation Council (NPPC) Subbasin Plans will ultimately be used to direct land management decisions on public and private lands. We adamantly oppose the use of sub basin Plans for land management purposes and strongly encourage our Legislators and Commissioners to support our position.

Response: Sub basin plans are not land management plans, as such. Local land use management continues to be the responsibility of local government. State government has existing land-use regulatory responsibilities in certain cases. The Sub basin plans are permissive, not prescriptive; they provide a framework for proposed projects. That framework recognizes existing legal mandates and may inform ongoing updates to existing regulations. Local and state government agencies and willing landowners may use the framework to inform land management actions. Effective species recovery will need to include land use management considerations.

The brief comment period of 13 days makes complete review of the draft Subbasin Plans impossible; however following is a list of several major concerns and specific comments on material that has been reviewed to date. It should be noted that the draft plans are very sketchy and core information about how or why species management assumptions were made is not included in the draft plans.

Response: The comment period has been extended; comments on the first draft will be taken until April 16th. (The final draft will be available for review and comment on April 23 – May 10, 2004.) EDT does explicitly document the assumptions made in habitat assessment and working hypotheses. Okanogan County's public involvement strategy has been to offer opportunities for involvement while the process was ongoing and work was in progress. The public has been invited to join as a participant in the process, rather than receive materials about it after the fact.

Subbasin Planning Limitations: The reported purpose of sub basin planning is to direct Bonneville Power Administration mitigation funding through the Northwest Power and Conservation Council. It is important that subbasin plans not be extended to land management planning and management due to fundamental limitations of the plans, which include:

•Subbasin plans are being developed solely for the benefit of fish and wildlife, with no consideration of costs, economic losses or conflicting human interests, which results in faulty findings.

Response: The purpose of Sub basin Planning is to develop management strategies to recover fish and wildlife. The April 23 draft plan will include economic goals, and the feasibility of the projects that are proposed to be implemented. Sub basin planning strategies may be constrained by human costs and interests. Sub basin planning does not impose mandatory actions, but provides a framework within which projects may be proposed. Projects may benefit the human community as well as target species.

•The "ecosystem approach" used does not make any distinction between public land and privately owned land in its determination of fish and wildlife management plans.

Response: Because ecosystems cross land boundaries, assessments included all land within each sub basin. Management strategies and actions may distinguish between public and private lands.

•Private property rights and land rights including water rights are not recognized.

Response: The April 23 draft sub basin plan will explicitly state that sub basin planning recognizes and will not impeded those legal rights.

•Management plan goals are based on comparisons to "historic" or perfect, untouched conditions that are thought to exist prior to European settlement, which are not attainable, sensible or necessary.

Response: A baseline of some sort is needed to provide a benchmark against which change can be measured. Where the baseline is set does not affect the focus of the assessment, which reflects the condition of the resource today. The baseline simply allows changes to be compared across reaches and streams. If the baseline were raised or lowered, relative change (compared to today's conditions) would remain the same. The issue remains the condition of the resource today and what to do about that. The sub basin plans do not advocate returning to a pristine baseline. Management strategies seek to return to properly functioning conditions when necessary for species recovery.

•Goals are widely based on data with significant information gaps and unmeasurable outcomes with minimal public involvement.

Response: Data gaps are explicitly documented in the process. Sub basin planning is not funded (nor intended) to remediate data gaps by new field work, but its recommendations provide the framework for proposals to conduct additional work to fill data gaps. Measurable objectives are included. The sub basin Coordinators have conducted a very substantial public outreach and involvement effort. This effort is more explained in the April 23 draft sub basin plan. Public outreach has included inviting the public to participate in defining goals and management strategies.

•The cumulative effects of restrictions and regulations on private property ownership and land use are not measured.

Response: The sub basin plan does not address cumulative socioeconomic effects. The plan provides a framework for potential projects and recovery planning, and proposed actions may require cumulative effects analysis.

•The economic losses to the private landowner, agriculture, natural resource-based industries and county economic viability are not considered.

Response: The sub basin plan does not address cumulative socioeconomic effects. The plan provides a framework for potential projects and recovery planning, and proposed actions may require cumulative effects analysis.

•The subbasin planning process bypasses land management planning safeguards and requirements such as economic review, public notice and public involvement.

Response: Sub basin plans provide a framework within which projects may be proposed. Land management planning requirements will be met prior to implementation of any proposed project.

•There is no legislative oversight of back-door ecosystem approaches to manage lands.

Response: Sub basin planning is a federal process, and has been the subject of considerable federal oversight. It is not subject to state legislative oversight; however, state and local (as well as federal) requirements will be met prior to implementation of any proposed project.

Examples of Faulty Model Outcomes: Ecosystem Diagnosis and Treatment (EDT) was elected as the model to establish watershed management plans in Okanogan County. The EDT dispenses priority ratings for management actions based on the input or assumptions it receives. The EDT does not consider costs or other competing human interests, which has resulted in flawed and shortsighted outcomes such as:

Response: EDT is a tool used for biological and ecological assessments. It is not intended to incorporate competing human interests. Human factors are addressed in the sub basin plan's goals, and may be addressed in project development and implementation.

The controversial Salmon Creek Project rising to the top of the priority list even though funding has been consistently denied in the past because of the unreasonable high costs per benefit and potential ongoing and escalating costs for maintenance of a pumping stations. Competing human interests and rights again are not considered in the EDT prioritization.

Response: Project prioritization is not complete, and won't be until recovery planning is complete. To the extent that Salmon Creek has been discussed in the sub basin planning process, it has been in an open public process with a multi-stakeholder sub basin core team.

Land acquisition and conservation easements identified as a recurring management priority in a county already burdened with excessive government ownership. This would place more land and land rights under state and federal control and ownership and further expand federal and state regulatory control over land use.

Response: Land and easements can be acquired by state, federal, or local agencies, by private nonprofit organizations. Easements neither take land out of production nor convert it from private ownership. They help keep land in production and in private ownership. Land acquired by agencies is sold to those agencies by willing landowners, often because its productive

capacity has been depleted and the owner no longer finds it profitable to manage. Both acquisition and easements can prevent subdivision; landowners sell land or easements as a means of keeping their holdings intact. We have also received the comment that the sub basin plan should not impair private property rights. By limiting land acquisitions and conservation easements, this action would do such impairment feared.

Acquisitions and easements are particularly noticeable as a management strategy in the Methow Watershed. The draft plan recognizes that the government has accumulated 85% of the entire watershed, with only 15% remaining in private ownership; still the management plans call for continuous acquisitions and easements under the guise of increased protection of fish and wildlife.

Response: The comment has been forwarded to the SCT. As stated above as well, we have also received the comment that the sub basin plan should not impair private property rights. By limiting land acquisitions and conservation easements, this action would do such impairment feared.

Increasing flows irregardless of competing water rights and human demands is a dominant management outcome, as well as returning to "natural" pre-European conditions in post-European settlement areas.

Response: Flow rates are frequently a limiting factor, and management strategies address this concern. Flow recommendations seek improvements to flow regimes, but do not necessarily advocate restoring pristine flow regimes. There are numerous strategies to increase flows, many are listed in the Methow Basin watershed plan; may of these recommendations could be potential projects.

Sub basin planning process: Public outreach did not begin until approximately six months after the technical team began work on the plans and public involvement occurred at seven months. The technical team, called the Habitat Work Group, apparently consists of agency staff and consulting firms. Members of the group remain unidentified although we have asked for a list of who is involved in the group.

Response: Technical staff (the HWG) did begin to organize and assess data prior to public involvement, with the intention of efficiently completing the very technical work prior to inviting public participation. Stakeholders were offered opportunities to comment and to participate in development of the subbasin assessment, including opportunities to review the data being used and comment on decisions made about the use of that data. HWG members were identified in a list sent to the entire sub basin planning outreach email list; HWG members were introduced at early subbasin core team meetings and lists of HWG members were posted at those meetings.

The draft plans acknowledge some of the scheduling difficulties people have experienced throughout the sub basin planning process, which was attributed to NPCC's lack of adequate

time for public outreach. Although there were scheduling conflicts and problems, the biggest problem has been the lack of core information.

Response: The subbasin planning process occurred on a very fast-track schedule to meet a deadline set by NPCC. The schedule was difficult for all participants. Evening meetings would have required 2-3 times as many meetings to accomplish what could be done in one full-day meeting, and the schedule would not have allowed for that, nor would a heavy evening meeting schedule have been well received. Evening summary meetings were scheduled in an attempt to provide a window for the public who could not attend day meetings. The number of participants and meetings and the status of work often required changes in meeting schedules and locations, and this was a problem.

Public outreach and involvement consists of 1) e-mails that advise only meeting dates and times and what "stage" the process is in, 2) evening meetings with a slide show and verbal presentations with no handouts and at times no technical person to answer questions and 3) day-long meetings consisting of technical people and "stakeholders." The day-long meetings are difficult for working people not on the payroll to attend, particularly on a regular basis.

Response: Handouts were not always available at public or sub basin core team (SCT) meetings because work was underway immediately before, and often during, the meetings. The SCT, including technical members, have been using their available time to keep the process on track in order to meet a deadline imposed by the NPCC, and had little time to create polished handouts. As noted in Response 4, members of the public have been invited to join as participants in the process, rather than receive materials about it after the fact. Technical team members could not attend all public meetings, but did attend most of them. The subbasin planning process occurred on a very fast-track schedule to meet a deadline set by NPCC. The schedule was difficult for all participants. Evening meetings would have required 2-3 times as many meetings to accomplish what could be done in one full-day meeting, and the schedule would not have allowed for that, nor would a heavy evening meeting schedule have been well received. Evening summary meetings were scheduled in an attempt to provide a window for the public who could not attend day meetings. The number of participants and meetings and the status of work often required changes in meeting schedules and locations, and this was a problem.

As noted, in spite of the complex information, that was shown on slides and presented verbally, no handouts were made available at the evening summary sessions. The complicated information that was presented in this way made it difficult to get a clear picture of the process itself let alone the content information and findings. Requests for handouts and more information have also gone answered. Members who asked questions about the complexity and reliability of the EDT model were referred to the Mobrand website.

Response: Handouts were not always available at public or sub basin core team (SCT) meetings because work was underway immediately before, and often during, the meetings. The SCT, including technical members, have been using their available time to keep the process on track in order to meet a deadline imposed by the NPCC, and had little time to create polished

handouts. Members of the public have been invited to join as participants in the process, rather than receive materials about it after the fact. Technical team members could not attend all public meetings, but did attend most of them. Outreach staff gave some information about EDT during presentations, and did refer stakeholders to Mobrand's website for more detailed information in order to use meeting time efficiently.

Agencies and consultants in the Habitat Work Group have generated huge volumes of fast-paced information that has not been made available to the public. There is tremendous frustration throughout the county that this is just another process where an unidentified team of government entities and consultants has come together to write the plans and pass them off as "local" without meaningful local review or input.

Sincerely,

Mike Wilson, President

Okanogan County Farm Bureau

Attachment: Comments on the contents of the plans.

Cc: Okanogan County Commissioners

7th and 12th District Legislators

Kurt Danison, Highlands Associates

Specific Comments

Methow:

1. The USGS Water Resources Investigations Report # 03-4246 needs to be included in this section. So model runs with and without groundwater seepage from canals have already been made. What has been found needs to be cited here on Pg. 22.

Response: The comment has been forwarded to the Habitat Working Group (HWG).

2. Regarding a test site for examining the affects of seepage from canals: This has already been done with the Twisp Power and Irrigation Canal study initiated by the USGS. This work needs to be cited with its present conclusions. (Pg. 22)

Response: The comment has been forwarded to the Habitat Working Group (HWG).

3. The information presented contains most of the background materials and ESA information that we are all familiar with concerning the region and listed species. What is missing is the core

of the draft that actually explains the sub basin planning perspective, its analysis of the problem and its proposed goals and solutions.

Response: Okanogan County's public involvement strategy has been to offer opportunities for involvement while the process was ongoing and work was in progress. The public has been invited to join as a participant in the process, rather than receive materials about it after the fact.

4. Most importantly the present draft does not show any linkage with present watershed planning efforts and how they will be incorporated into sub basin planning.

Response: Sub basin planning outreach staff met with the Methow Basin Planning Unit to address the issue on March 31st. An organized planning unit for the Okanogan sub basin has not been developed.

5. References to the Methow Sub basin Summary by the Conservation Commission do not cite the deficiencies in the summary noted by Ken Williams' review, which was part of the materials submitted for this process. It would be helpful to have as part of the sub basin plan a process cited on how these noted deficiencies are going to be addressed so a more accurate approach may be initiated in the Methow.

Response: The comment has been forwarded to the Habitat Working Group (HWG).

Okanogan:

Comments Regarding Farm Bureau Outreach: Please correct your statements to reflect that an article was submitted to Okanogan County Farm Bureau for consideration of printing in the B Newsletter." Sandra contacted us and asked us if she could write an article for our newsletter; we did not request it. I told her to feel free to submit an article if she would like.

Response: Flow rates are frequently a limiting factor, and management strategies address this concern. Flow recommendations seek improvements to flow regimes, but do not necessarily advocate restoring pristine flow regimes. There are numerous strategies to increase flows, many are listed in the Methow Basin watershed plan; may of these recommendations could be potential projects.

General: Numerous statements are made and conclusion rendered without benefit of resources cited. It is difficult to determine what is author's opinion and what is cited references, particularly as related to perceived environmental threats. (Third Paragraph, Page 21, 5th Paragraph, Page 21, Paragraph 2, Page 24)

Response: The comment has been forwarded to the technical writer. This is a very early rough draft. Some references are missing and need to be supplied, and the references section needs to be edited. The assessment of environmental conditions was done by the Habitat Work Group.

The Projects Inventories should show costs of projects as an accountability feature to the public.

Response: The comment has been forwarded to the technical writer.

In an apparent effort to combine BC and US portions of the watershed yet keep them distinct, it is difficult to distinguish between the two in portions of the material.

Response: The comment has been forwarded to the technical writer.

Paragraph 3, Page 23 (statement repeated in Paragraph 5)

The Forest section appears to have numerous unreferenced claims.

Response: The comment has been forwarded to the technical writer. "North of Oroville" has been corrected to read "south of Oroville."

Sub basin in Relation to Region, 2nd Paragraph, Page 18

The following statements appear to be more philosophically poetic than factual which does not seem appropriate, and the first sentence in particular is unclear in its meaning.

Response: The comment has been forwarded to the technical writer.

No references are cited.

The Okanogan Subbasin exemplifies the popularity of the modern rural lifestyle and the controlling-protection paradox practiced by the growing number of valley residents. Constraints to the sustainability of anadromous and resident fish, wildlife, and their habitats result from the footprints of this growth within the basin; many of these impacts and their resolution have cross-border implications. Such impacts include matured agriculture, forest and hydroelectric industries, and their extended affects which reach from the alpine mountain tops to the confluence with the Columbia River and beyond.

5th Paragraph, Page 18

The following statement is unclear. Also, is this author's opinion?

Dealing with these constraints will require both institutional and technical approaches, and links between communities of science, interest and place.

Paragraph 1, Page 26

No reference quoted for final portion of the sentence. Is this author's opinion?

Dominant riparian species include black cottonwood, water birch, and white and thinleaf alder (Arno, 1977), but riparian forests and shrub steppe have been virtually eliminated in the basin.

Paragraph 3, Page 27

Who/what is OWSAC? Is this listed in references?

Conversion of privately owned timber areas into other uses, such as residential subdivisions, is a trend, but not on the large scale that it is further south, in Wenatchee and Entiat (NMFS, 1998). During a recent four year period (1994 1997), approximately 11,000 acres of forestland were subdivided (OWSAC, 2000).

Land Use and Demographics, Paragraph 1, Page 28

In order to present a more accurate and complete picture, more specifics on protected land would be in order, i.e. how much land is in wildlife areas, etc. What does "dominated" mean? Perhaps forestry and range should be broken down rather than grouped together. Is this author's opinion?

Forestry and range are by the far the major uses of land in the Okanogan Basin, followed by croplands (Figure 8). Most of the landscape, from the riparian areas to the upper elevation forests, have been used extensively for agriculture and resource extraction. The valley bottom is dominated by agriculture, primarily orchards and livestock feed. The benches are dominated by livestock grazing, and the lower to mid-upper elevation forests have been harvested for timber and used for livestock grazing. The Okanogan Basin contains six state wildlife areas, a natural preserve in the DNR's Loomis Forest, and a portion of the USFS.s Pasayten Wilderness.

Response: The comment has been forwarded to the technical writer. Forest and range are represented in different parts of Figure 8. "Dominated" has been changed to "predominantly".

Urbanization and population growth, Table, Page 29

Is the 2000 census that last census available?

Response: Yes

Socio-Economic Conditions – Colville Reservation

Is the following statement actual wording of the court's findings? Reference to court ruling?

The Court also ruled that the Colville Tribes possess federally reserved water rights to stream flows sufficient to preserve or restore tribal fisheries.

Response: Federally reserved water rights are established for all tribes under the Winters Doctrine. The statement cited is an accurate reflection of that doctrine.

Starting Paragraph 3, Page 30

Treaties and mitigation for dams are complex issues. Is this the correct forum to discuss the "unfairness" of the mitigation programs to the Colville Tribe? Are some of the following statements fact or opinion?

In 2000, the Bureau of Reclamation agreed with the Colville Confederated Tribes that the Federal government had not completed its authorized anadromous fish mitigation for construction of Grand Coulee Dam over 60 years ago. Planned artificial production programs were not implemented for the Okanogan River Basin when the outbreak of World War II halted non-war related construction projects.

Tribes of the Colville Reservation have been seriously harmed by the lack of Grand Coulee mitigation, with ceremonial and subsistence fisheries declining to minimal levels, even in years of substantial runs entering the Columbia River. Fishing opportunity is now severely limited to summer/fall Chinook immediately below Chief Joseph Dam and an occasional sockeye fishery in the Okanogan River. This situation has been adversely compounded by later formulas for mitigation of mid-Columbia Public Utility District dams where the Federal Energy Regulatory Commission does not require mitigation for now, non-existing. Additional hatchery production under the proposed mitigation agreement with the PUDs is based on the run sizes of salmon and steelhead in a 10-year period during the 1970.s and 1980.s (Bugert 1998). Most of these post-dam runs were supported in large part by the initial hatchery mitigation programs funded by the PUDs and the Federal government. Since the CCT did not receive the initial mitigation from the construction of Federal and PUD dams, the basis for the new agreements discounts obligations to the CCT. Without the initial Federal salmon mitigation that other watersheds in the province obtained, the Okanogan Basin and Colville Tribes again were provided without mitigation. Additionally, the Federal government has never provided Okanogan anadromous fish mitigation for the Colville Tribes for the loss of adult and juvenile fish passing through the four Corps of Engineers hydroelectric projects on the Lower Columbia River. Fish mortality at these projects have been generally estimated at about 10% per project, but were historically higher. Finally, Chinook mitigation by Douglas PUD for losses due to inundation and passage has been sited downriver, at Wells Hatchery and in the Methow River, away from the Colville Tribes reservation fisheries. The Colville Tribes total anadromous salmonid harvest is normally below 1,000 total salmon and steelhead combined and similar estimates are reflected in the Okanagan Nation fisheries upstream in Canada. Yet, in the 1800.s prior to over harvest in lower river commercial fisheries and subsequent habitat destruction, the Colville Tribes were estimated to have harvested in excess of 2 million pounds of salmon and steelhead annually (Koch 1976).

Response: The Tribes' representative advises that the points made in the text have been upheld. The mitigation cited is directly germane to sub basin planning.

<u>Agriculture</u>, Paragraph 5, Page 31

Says who?

Livestock grazing practices have led to trampled stream banks, increased bank erosion and sedimentation, and changes in vegetation, including loss of native grasses, impacts to woody vegetation, and establishment of noxious weeds.

Response: Livestock impacts are based on the habitat assessment conducted by the HWG and reviewed by the SCT. The assessment process documented the level of certainty associated with each habitat attribute. The sub basin plan should recognize the benefits of limited grazing under proper management and monitoring.

Paragraph 6, Page 31

Who is PNRBC? Is a 1970's report relevant?

A 1970s rangeland evaluation indicated that 25 percent of rangeland in the basin was in good condition, 34 percent in fair condition, and 41 percent was in poor condition (PNRBC, 1977).

Response: PNRBC is the Pacific Northwest River Basin Commission. The technical writer has been asked to search for more current information.

Appendix A, Page 147

Federal ESA species are listed "that are present or may be present in Okanogan" but there is no way to know which listings are actually present and affect Okanogan County. Two separate lists would correct that.

Response: The comment has been forwarded to the technical writer.

# # # # # # # # # # # # # # #

Sub-Basin - Comments on Draft Methow Subbasin plan

Comments on Draft Methow Subbasin plan:

To All on distribution:

My comments prior to 11 March initial comment period deadline attached as MS Word2002 .doc. Please let me know if you have any problem reading that document.

Cordially,

Ken Sletten

360-620-5008 (cell)

From: <wasbra@wavecable.com>

To: <sbp@co.okanogan.wa.us>

Date: 3/8/2004 12:20 AM

Subject: Comments on Draft Methow Subbasin plan

CC: <tkarier@ewu.edu>, <fcassidy@nwcouncil.org>, <lpalensky@nwcouncil.org>, <parlette_li@leg.wa.gov>, <armstron_mi@leg.wa.gov>, <condotta_ca@leg.wa.gov>, <commissioners@co.okanogan.wa.us>, <jdagnon@co.okanogan.wa.us>, <beichdvb@dfw.wa.gov>, <kdanison@ncidata.com>, <JPratt@entrix.com>, <fawn@mymethow.com>, <ramshead@methow.com>, wasbra@wavecable.com Sub-Basin - Methow Subbasin issues; + missing document.

FROM:

Ken Sletten

Box 902

688 Wolf Creek Road

Winthrop, WA 98862-0902

wasbra@charter.net cell: 360-620-5008

TO:

Lynn Palensky, NWPCC Subbasin Planning Coordinator lpalensky@nwcouncil.org 503-222-5161

COPIES:

Senator Linda Evans Parlette parlette_li@leg.wa.gov, Senator Bob Morton morton_bo@leg.wa.gov, Rep. Mike Armstrong armstron_mi@leg.wa.gov, Rep. Cary Condotta condotta_ca@leg.wa.gov, Okanogan County Commissioners commissioners@co.okanogan.wa.us, Okanogan County - Julie Dagnon sbp@co.okanogan.wa.us, MBWPU: Dick Ewing fawn@mymethow.com, Ron Perrow ramshead@methow.com

SUBJECT:

Methow Subbasin planning issues; and important missing document.

REFERENCE:

(a) http://www.nwcouncil.org/fw/subbasinplanning/Methow/default.asp

(b) http://www.nwcouncil.org/fw/subbasinplanning/admin/recommendations.htm

(c) http://www.cbfwa.org/cfsite/ReviewCycle.cfm?ReviewCycleURL=FY%202003%20Columbia%20Cascade#reports (CBFWA draft Methow

Subbasin Summary dated 2002-05-17)

Lynn,

I am aware from the 11 February 2004 Okanogan Chronicle that the Methow Basin Watershed Planning Unit (MBWPU) has filed a formal complaint with the NWPCC about effectively being left out of the regional subbasin planning process. I'm not necessarily saying the reasons for this

complaint are completely the fault of the NWPCC: There are some issues internal to Okanogan County with respect to officially finishing 'final final' revisions to the Methow Basin Watershed Management Plan (MBWMP). However, given looming NWPCC subbasin planning deadlines I'm afraid that an opportunity to integrate the MBWMP in the NWPCC subbasin process will be lost if steps are not taken to immediately correct this situation. Three key points:

(1) Under headings of full disclosure and presenting an honest picture of the situation in each subbasin, a formal complaint by key players in local watershed planning like members of the MBWPU clearly deserves and needs to be prominently accessible through your Methow Subbasin web page (reference (a)). Now it's possible that it COULD be hidden somewhere on the very extensive NWPCC web site (which is generally pretty well put together and organized); all I can say is I can't find it. I guess nothing is stopping me or members of the MBWPU from posting their complaint to the currently-empty Methow Subbasin public file exchange page, but in my opinion citizens should not have to informally take action to get a document this important and pertinent to Methow Subbasin planning included on the reference (a) web page. This should be done officially by the NWPCC: Please add a link to the MBWPU complaint at least at the reference (a) level ASAP.

Response: The comment letter was addressed to the NPCC; we are not sure what comment is appropriate from us.

(2) I am fully in accord with opinions expressed by the MBWPU in their complaint. I note a few key snippets from your 'Notice of request for recommendations' document on the NWPCC web site at reference (b):

'.... The Council intends to incorporate these specific objectives and measures into the program in locally developed subbasin plans for the 62 subbasins of the Columbia River'

and especially:

'Integration with local efforts - The Council recognizes that there are other watershed and recovery planning efforts taking place across the Columbia basin. Where groups are already working at a local level, the Council will work in partnership with those efforts. The desired approach is to make those existing planning groups aware of the opportunity to have their subbasin plans adopted as part of the fish and wildlife Program, and where there is interest, to make additional resources and guidance available to those planners so that they can assimilate the Council's subbasin planning components into their existing efforts.'

After many years of intensive, dedicated work by members of the MBWPU, no one can deny that they are (and have been) actively working at the local level; and they are without doubt 'interested'. The next phrase in your above says: ' the Council will work in partnership with those efforts.' It does not say 'might' or 'may': It says WILL work. I respectfully suggest that the

apparent complete failure to date by the NWPCC subbasin planning process to work with the MBWPU or to in any substantive way recognize and incorporate the large amount of excellent technical work already done by that group is unacceptable. In fact, that omission appears to be such a glaring violation of above quoted NWPCC principles that from my admittedly amateur perspective it appears that if the situation is not promptly corrected it might be a valid legal 'cause for action'. At the very least it will be cause for serious complaint to the Washington State Legislature.

Response: The Methow Basin Planning Unit was one of the key groups identified early in the sub basin planning outreach process. The group's participation was expressly solicited; Planning Unit members elected not to participate because completion of the Watershed Plan was demanding a great deal of time and energy during the period when sub-basin planning was initiated. Planning Unit members have been included in outreach efforts throughout the process.

(3) If you click on reference (a) 'Read full subbasin summary', you get redirected to the reference (c) CBFWA web site. The 'Draft Methow Subbasin Summary' info listed on that page is dated 17 May 2002. Given that public meetings have already been held this month to discuss the latest updates, shouldn't the CBFWA web site be better than nearly two years out of date ?... wherever they are publicly posted, latest draft versions of the various subbasin plans should be as up to date as possible.

Response: Since the comment letter was addressed to the NPCC we are unsure as to what comment is appropriate from us.

Respectfully submitted,

Ken Sletten

# # # # # # # # # # # # # # #

Sub-Basin - Comments on Okanogan/Methow subbasin planning

From: "Patrick Plumb" <pplumb@nvhospital.org>

To: <lpalensky@nwcouncil.org>, <jdagnon@co.okanogan.wa.us>, "Mary Lou Peterson"

<PETE6976@co.okanogan.wa.us>, <jsto461@ecy.wa.gov>, <barbaram@iac.wa.gov>

Date: 3/18/2004 3:37 PM

Subject: Comments on Okanogan/Methow subbasin planning

CC: <oc3@northcascades.net>, "hajny" <hajny@pctelecom.us>, <plr@bossig.com>

As a Tonasket City Councilman and also as the Chairman Elect of Okanogan County Citizens Coalition, I would like to concur with the Okanogan County Farm Bureau on the statement below, and also air my cautionary position that local involvement in this subbasin planning process has not been satisfactory to having my input. Whether that be my fault or a fault of bureaucracy I am not sure yet, but I would like to be a part of this process. Promises made in the plan that I have read so far says that local officials will be made aware of what is going on, and I would like to see someone give an update to the Tonasket City Council on where this process is and how we should be able to give input to the watershed planning. I am not sure if a WIRA has been formed for the Okanogan River Watershed, and also I have attended a WIRA meeting for the Kettle River watershed, and I would like to be involved with the watershed that I have a direct connection to (Okanogan River). The comments that I concur with the Okanogan County Farm Bureau are listed below.

Response: Sub basin plans are not land management plans, as such. Local land use management continues to be the responsibility of local government. State government has existing land-use regulatory responsibilities in certain cases. The Sub basin plans are permissive, not prescriptive; they provide a framework for proposed projects. That framework recognizes existing legal mandates and may inform ongoing updates to existing regulations. Local and state government agencies and willing landowners may use the framework to inform land management actions. Effective species recovery will need to include land use management considerations.

There is growing concern that the Northwest Power and Conservation Council (NPPC) Subbasin Plans will ultimately be used to direct land management decisions on public and private lands. I adamantly oppose the use of Subbasin Plans for land management purposes and strongly encourage our Legislators and Commissioners to support our position.

The brief comment period of 13 days makes complete review of the draft Subbasin Plans impossible; however following is a list of several major concerns and specific comments on material that has been reviewed to date. It should be noted that the draft plans are very sketchy and core information about how or why species management assumptions were made is not included in the draft plans.

Response: The comment period has been extended; comments on the first draft will be taken until April 16th. (The final draft will be available for review and comment on April 23rd.) Okanogan County's public involvement strategy has been to offer opportunities for involvement while the process was ongoing and work was in progress. The public has been invited to join as a participant in the process, rather than receive materials about it after the fact. EDT does explicitly document the assumptions made in habitat assessment and working hypotheses.

Subbasin Planning Limitations: The reported purpose of subbasin planning is to direct Bonneville Power Administration mitigation funding through the Northwest Power and Conservation Council. It is important that subbasin plans not be extended to land management planning and management due to fundamental limitations of the plans, which include:

Subbasin plans are being developed solely for the benefit of fish and wildlife, with no consideration of costs, economic losses or conflicting human interests, which results in faulty findings.

Response: The purpose of Sub basin Planning is to develop management strategies to recover fish and wildlife. The April 23 draft plan will include economic goals, and the feasibility of the projects that are proposed to be implemented. Sub basin planning strategies may be constrained by human costs and interests. Sub basin planning does not impose mandatory actions, but provides a framework within which projects may be proposed. Projects may benefit the human community as well as target species.

The "ecosystem approach" used does not make any distinction between public land and privately owned land in its determination of fish and wildlife management plans. Private property rights and land rights including water rights are not recognized.

Response: Because ecosystems cross land boundaries, assessments included all land within each sub basin. Management strategies and actions may distinguish between public and private lands. The April 23 draft sub basin plan will explicitly state that sub basin planning recognizes and will not impeded those legal rights.

Management plan goals are based on comparisons to "historic" or perfect, untouched conditions that are thought to exist prior to European settlement, which are not attainable, sensible or necessary.

Response: A baseline of some sort is needed to provide a benchmark against which change can be measured. Where the baseline is set does not affect the focus of the assessment, which reflects the condition of the resource today. The baseline simply allows changes to be compared across reaches and streams. If the baseline were raised or lowered, relative change (compared to today's conditions) would remain the same. The issue remains the condition of the resource today and what to do about that. The sub basin plans do not advocate returning to a pristine baseline. Management strategies seek to return to properly functioning conditions when necessary for species recovery.

Goals are widely based on data with significant information gaps and unmeasurable outcomes with minimal public involvement.

Response: Data gaps are explicitly documented in the process. Sub basin planning is not funded (nor intended) to remediate data gaps by new field work, but its recommendations provide the framework for proposals to conduct additional work to fill data gaps. Measurable objectives are included. The sub basin Coordinators have conducted a very substantial public outreach and involvement effort. This effort is more explained in the April 23 draft sub basin plan. Public outreach has included inviting the public to participate in defining goals and management strategies.

The cumulative effects of restrictions and regulations on private property ownership and land use are not measured.

Response: The sub basin plan does not address cumulative socioeconomic effects. The plan provides a framework for potential projects and recovery planning, and proposed actions may require cumulative effects analysis.

The economic losses to the private landowner, agriculture, natural resource-based industries and county economic viability are not considered.

Response: The sub basin plan does not address cumulative socioeconomic effects. The plan provides a framework for potential projects and recovery planning, and proposed actions may require cumulative effects analysis.

The subbasin planning process bypasses land management planning safeguards and requirements such as economic review, public notice and public involvement.

Response: Sub basin plans provide a framework within which projects may be proposed. Land management planning requirements will be met prior to implementation of any proposed project.

There is no legislative oversight of back-door ecosystem approaches to manage lands.

Response: Sub basin planning is a federal process, and has been the subject of considerable federal oversight. It is not subject to state legislative oversight; however, state and local (as well as federal) requirements will be met prior to implementation of any proposed project.

Examples of Faulty Model Outcomes: Ecosystem Diagnosis and Treatment (EDT) was selected as the model to establish watershed management plans in Okanogan County. The EDT dispenses priority ratings for management actions based on the input or assumptions it receives. The EDT does not consider costs or other competing human interests, which has resulted in flawed and shortsighted outcomes such as:

Response: EDT is a tool used for biological and ecological assessments. It is not intended to incorporate competing human interests. Human factors are addressed in the sub basin plan's goals, and may be addressed in project development and implementation.

The controversial Salmon Creek Project rising to the top of the priority list even though funding has been consistently denied in the past because of the unreasonably high costs per benefit and potential ongoing and escalating costs for maintenance of a pumping station. Competing human interests and rights again are not considered in the EDT prioritization.

Response: Project prioritization is not complete, and won't be until recovery planning is complete. To the extent that Salmon Creek has been discussed in the sub basin planning process, it has been in an open public process with a multi-stakeholder sub basin core team.

Land acquisitions and conservation easements identified as a recurring management priority in a county already burdened with excessive government ownership. This would place more land and land rights under state and federal control and ownership and further expand federal and state regulatory control over land use.

Response: Land and easements can be acquired by state, federal, or local agencies, by private nonprofit organizations. Easements neither take land out of production nor convert it from private ownership. They help keep land in production and in private ownership. Land acquired by agencies is sold to those agencies by willing landowners, often because its productive capacity has been depleted and the owner no longer finds it profitable to manage. Both

acquisition and easements can prevent subdivision; landowners sell land or easements as a means of keeping their holdings intact. We have also received the comment that the sub basin plan should not impair private property rights. By limiting land acquisitions and conservation easements, this action would do such impairment feared.

Acquisitions and easements are particularly noticeable as a management strategy in the Methow Watershed. The draft plan recognizes that the government has accumulated 85% of the entire watershed, with only 15% remaining in private ownership; still the management plans call for continuous acquisitions and easements under the guise of increased protection of fish and wildlife.

Response: The comment has been forwarded to the SCT. As stated above as well, we have also received the comment that the sub basin plan should not impair private property rights. By limiting land acquisitions and conservation easements, this action would do such impairment feared.

Increasing flows irregardless of competing water rights and human demands is a dominant management outcome, as well as returning to "natural" pre-European conditions in post-European settlement areas.

Response: Flow rates are frequently a limiting factor, and management strategies address this concern. Flow recommendations seek improvements to flow regimes, but do not necessarily advocate restoring pristine flow regimes. There are numerous strategies to increase flows, many are listed in the Methow Basin watershed plan; may of these recommendations could be potential projects.

Subbasin Planning Process: Public outreach did not begin until approximately six months after the technical team began work on the plans and public involvement occurred at seven months. The technical team, called the Habitat Work Group, apparently consists of agency staff and consulting firms. Members of the group remain unidentified although we have asked for a list of who is involved in the group.

Response: Technical staff (the HWG) did begin to organize and assess data prior to public involvement, with the intention of efficiently completing the very technical work prior to inviting public participation. Stakeholders were offered opportunities to comment and to participate in development of the subbasin assessment, including opportunities to review the data being used and comment on decisions made about the use of that data. HWG members were identified in a list sent to the entire sub basin planning outreach email list; HWG members were introduced at early subbasin core team meetings and lists of HWG members were posted at those meetings.

The draft plans acknowledge some of the scheduling difficulties people have experienced throughout the subbasin planning process, which was attributed to NPCC's lack of adequate time

for public outreach. Although there were scheduling conflicts and problems, the biggest problem has been the lack of core information.

Response: The subbasin planning process occurred on a very fast-track schedule to meet a deadline set by NPCC. The schedule was difficult for all participants. Evening meetings would have required 2-3 times as many meetings to accomplish what could be done in one full-day meeting, and the schedule would not have allowed for that, nor would a heavy evening meeting schedule have been well received. Evening summary meetings were scheduled in an attempt to provide a window for the public who could not attend day meetings. The number of participants and meetings and the status of work often required changes in meeting schedules and locations, and this was a problem.

Public outreach and involvement consists of 1) e-mails that advise only meeting dates and times and what "stage" the process is in, 2) evening meetings with a slide show and verbal presentations with no handouts and at times no technical person to answer questions and 3) day-long meetings consisting of technical people and "stakeholders." The day-long meetings are difficult for working people not on the payroll to attend, particularly on a regular basis.

Response: Handouts were not always available at public or sub basin core team (SCT) meetings because work was underway immediately before, and often during, the meetings. The SCT, including technical members, have been using their available time to keep the process on track in order to meet a deadline imposed by the NPCC, and had little time to create polished handouts. As noted in Response 4, members of the public have been invited to join as participants in the process, rather than receive materials about it after the fact. Technical team members could not attend all public meetings, but did attend most of them. The subbasin planning process occurred on a very fast-track schedule to meet a deadline set by NPCC. The schedule was difficult for all participants. Evening meetings would have required 2-3 times as many meetings to accomplish what could be done in one full-day meeting, and the schedule would not have allowed for that, nor would a heavy evening meeting schedule have been well received. Evening summary meetings were scheduled in an attempt to provide a window for the public who could not attend day meetings. The number of participants and meetings and the status of work often required changes in meeting schedules and locations, and this was a problem.

As noted, in spite of the complex information that was shown on slides and presented verbally, no handouts were made available at the evening summary sessions. The complicated information that was presented in this way made it difficult to get a clear picture of the process itself let alone the content information and findings. Requests for handouts and more information have also gone unanswered. Members who asked questions about the complexity and reliability of the EDT model were referred to the Mobrand website.

Response: Handouts were not always available at public or sub basin core team (SCT) meetings because work was underway immediately before, and often during, the meetings. The SCT, including technical members, have been using their available time to keep the process on track in order to meet a deadline imposed by the NPCC, and had little time to create polished handouts. As noted in Response 4, members of the public have been invited to join as

participants in the process, rather than receive materials about it after the fact. Technical team members could not attend all public meetings, but did attend most of them.

Agencies and consultants in the Habitat Work Group have generated huge volumes of fast-paced information that has not been made available to the public. There is tremendous frustration throughout the county that this is just another process where an unidentified team of government entities and consultants has come together to write the plans and pass them off as "local" without meaningful local review or input.

Specific Comments

Methow:

1. The USGS Water Resources Investigations Report # 03-4246 needs to be included in this section. So model runs with and without groundwater seepage from canals have already been made. What has been found needs to be cited here on Pg. 22.

Response: The comment has been forwarded to the Habitat Working Group (HWG).

2. Regarding a test site for examining the affects of seepage from canals: This has already been done with the Twisp Power and Irrigation Canal study initiated by the USGS. This work needs to be cited with its present conclusions. (Pg. 22)

Response: The comment has been forwarded to the Habitat Working Group (HWG).

3. The information presented contains most of the background materials and ESA information that we are all familiar with concerning the region and listed species. What is missing is the core of the draft that actually explains the subbasin planning perspective, its analysis of the problem and its proposed goals and solutions.

Response: Okanogan County's public involvement strategy has been to offer opportunities for involvement while the process was ongoing and work was in progress. The public has been invited to join as a participant in the process, rather than receive materials about it after the fact.

4. Most importantly the present draft does not show any linkage with present watershed planning efforts and how they will be incorporated into subbasin planning.

Response: Sub basin planning outreach staff met with the Methow Basin Planning Unit to address the issue on March 31st.

5. References to the Methow Subbasin Summary by the Conservation Commission do not cite the deficiencies in the summary noted by Ken Williams' review, which was part of the materials submitted for this process. It would be helpful to have as part of the subbasin plan a process cited on how these noted deficiencies are going to be addressed so a more accurate approach may be initiated in the Methow.

Response: The comment has been forwarded to the Habitat Working Group (HWG).

Okanogan:

General: Numerous statements are made and conclusion rendered without benefit of resources cited. It is difficult to determine what is author's opinion and what is cited references, particularly as related to perceived environmental threats. (Third Paragraph, Page 21, 5th Paragraph, Page 21, Paragraph 2, Page 24)

Response: The comment has been forwarded to the technical writer. This is a very early rough draft. Some references are missing and need to be supplied, and the references section needs to be edited. The assessment of environmental conditions was done by the Habitat Work Group.

The Projects Inventories should show costs of projects as an accountability feature to the public.

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In an apparent effort to combine BC and US portions of the watershed yet keep them distinct, it is difficult to distinguish between the two in portions of the material.

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Subbasin in Relation to Region, 2nd Paragraph, Page 18

The following statements appear to be more philosophically poetic than factual which does not seem appropriate, and the first sentence in particular is unclear in its meaning. No references are cited.

The Okanogan Subbasin exemplifies the popularity of the modern rural lifestyle and the controlling-protection paradox practiced by the growing number of valley residents.

Constraints to the sustainability of anadromous and resident fish, wildlife, and their habitats result from the footprints of this growth within the basin; many of these impacts and their resolution have cross-border implications. Such impacts include matured agriculture, forest and hydroelectric industries, and their extended affects which reach from the alpine mountain tops to the confluence with the Columbia River and beyond.

Response: The comment has been forwarded to the technical writer.

5th Paragraph, Page 18

The following statement is unclear. Also, is this author's opinion?

Dealing with these constraints will require both institutional and technical approaches, and links between communities of science, interest and place.

Paragraph 1, Page 26

No reference quoted for final portion of the sentence. Is this author's opinion?

Dominant riparian species include black cottonwood, water birch, and white and thinleaf alder (Arno, 1977), but riparian forests and shrub steppe have been virtually eliminated in the basin.

Paragraph 3, Page 27

Who/what is OWSAC? Is this listed in references?

Conversion of privately owned timber areas into other uses, such as residential subdivisions, is a trend, but not on the large scale that it is further south, in Wenatchee and Entiat (NMFS, 1998). During a recent four year period (1994 1997), approximately 11,000 acres of forestland were subdivided (OWSAC, 2000).

Land Use and Demographics, Paragraph 1, Page 28

In order to present a more accurate and complete picture, more specifics on protected land would be in order, i.e. how much land is in wildlife areas, etc. What does "dominated" mean? Perhaps forestry and range should be broken down rather than grouped together. Is this author's opinion?

Forestry and range are by the far the major uses of land in the Okanogan Basin, followed by croplands (Figure 8). Most of the landscape, from the riparian areas to the upper elevation forests, have been used extensively for agriculture and resource extraction. The valley bottom is dominated by agriculture, primarily orchards and livestock feed. The benches are dominated by livestock grazing, and the lower to mid-upper elevation forests have been harvested for timber and used for livestock grazing. The Okanogan Basin contains six state wildlife areas, a natural preserve in the DNR.s Loomis Forest, and a portion of the USFS.s Pasayten Wilderness.

Response: The comment has been forwarded to the technical writer. Forest and range are represented in different parts of Figure 8. "Dominated" has been changed to "predominantly".

Socio-Economic Conditions – Colville Reservation

Is the following statement actual wording of the court's findings? Reference to court ruling? The Court also ruled that the Colville Tribes possess federally reserved water rights to stream flows sufficient to preserve or restore tribal fisheries.

Response: Federally reserved water rights are established for all tribes under the Winters Doctrine. The statement cited is an accurate reflection of that doctrine.

Starting Paragraph 3, Page 30

Treaties and mitigation for dams are complex issues. Is this the correct forum to discuss the "unfairness" of the mitigation programs to the Colville Tribe? Are some of the following statements fact or opinion?

In 2000, the Bureau of Reclamation agreed with the Colville Confederated Tribes that the Federal government had not completed its authorized anadromous fish mitigation for construction of Grand Coulee Dam over 60 years ago. Planned artificial production programs were not implemented for the Okanogan River Basin when the outbreak of World War II halted non-war related construction projects. Tribes of the Colville Reservation have been seriously harmed by the lack of Grand Coulee mitigation, with ceremonial and subsistence fisheries declining to minimal levels, even in years of substantial runs entering the Columbia River. Fishing opportunity is now severely limited to summer/fall Chinook immediately below Chief Joseph Dam and an occasional sockeye fishery in the Okanogan River. This situation has been adversely compounded by later formulas for mitigation of mid- Columbia Public Utility District dams where the Federal Energy Regulatory Commission does not require mitigation for now, non-existing. Additional hatchery production under the proposed mitigation agreement with the PUDs is based on the run sizes of salmon and steelhead in a 10-year period during the 1970.s and 1980.s (Bugert 1998). Most of these post-dam runs were supported in large part by the initial hatchery mitigation programs funded by the PUDs and the Federal government. Since the CCT did not receive the initial mitigation from the construction of Federal and PUD dams, the basis for the new agreements discounts obligations to the CCT. Without the initial Federal salmon mitigation that other watersheds in the province obtained, the Okanogan Basin and Colville Tribes again were provided without mitigation. Additionally, the Federal government has never provided Okanogan anadromous fish mitigation for the Colville Tribes for the loss of adult and juvenile fish passing through the four Corps of Engineers. hydroelectric projects on the Lower Columbia River. Fish mortality at these projects have been generally estimated at about 10% per project, but were historically higher. Finally, Chinook mitigation by Douglas PUD for losses due to inundation and passage has been sited downriver, at Wells Hatchery and in the Methow River, away from the Colville Tribes. reservation fisheries. The Colville Tribes. total anadromous salmonid harvest is normally below 1,000 total salmon and steelhead combined and similar estimates are reflected in the Okanagan Nation fisheries upstream in Canada. Yet, in the 1800.s prior to over harvest in lower river commercial fisheries and subsequent habitat destruction, the Colville Tribes were estimated to have harvested in excess of 2 million pounds of salmon and steelhead annually (Koch 1976).

Response: The Tribes' representative advises that the points made in the text have been upheld. The mitigation cited is directly germane to sub basin planning.

Agriculture, Paragraph 5, Page 31

Says who? I cannot agree with a statement that does not list the positive benefits of Livestock Grazing and this needs to be corrected.

Livestock grazing practices have led to trampled stream banks, increased bank erosion and sedimentation, and changes in vegetation, including loss of native grasses, impacts to woody vegetation, and establishment of noxious weeds.

Response: Livestock impacts are based on the habitat assessment conducted by the HWG and reviewed by the SCT. The assessment process documented the level of certainty associated with each habitat attribute. The sub basin plan should recognize the benefits of limited grazing under proper management and monitoring.

Paragraph 6, Page 31

Who is PNRBC? Is a 1970's report relevant?

A 1970s rangeland evaluation indicated that 25 percent of rangeland in the basin was in good condition, 34 percent in fair condition, and 41 percent was in poor condition (PNRBC, 1977).

Response: PNRBC is the Pacific Northwest River Basin Commission. The technical writer has been asked to search for more current information.

Appendix A, Page 147

Federal ESA species are listed "that are present or may be present in Okanogan" but there is no way to know which listings are actually present and affect Okanogan County. Two separate lists would correct that.

Response: The comment has been forwarded to the technical writer.

Thank you for reading my comments and pass them on to any organization or entity that you deem necessary.

Patrick Plumb

Tonasket City Councilman

Okanogan County Citizens Coalition chairman-elect

pplumb@ncidata.com

work: 509-486-3105

home: 509-486-0688

# # # # # # # # # # # # # # #

From: "Ron Perrow" <ramshead@methow.com>

To: <sbp@co.okanogan.wa.us>

Date: 3/8/2004 12:50 PM

Subject: extension for comment

Please see attached letter

Thank you

Ron Perrow, chairman

Methow Basin Watershed Planning Unit

March 8, 2004

Okanogan County Water Resources

Northwest Power and Conservation Council

Re: DRAFT Methow and Okanogan Subbasin Planning

Dear Sirs:

This letter is in response to the February 23rd Memo soliciting comments by March 11th from "Interested Stakeholders" for the Draft Methow and Okanogan Sub-Basin Plans. Many of the individuals involved in watershed planning have been monitoring this process. It is the determination of the planning unit that there should be an extension of the comment deadline for the following reasons:

• Incomplete and inadequate information available for substantive comments.

Response: Okanogan County's public involvement strategy has been to offer opportunities for involvement while the process was ongoing and work was in progress. The public has been invited to join as a participant in the process, rather than receive materials about it after the fact.

• Public meetings provided only verbal/visual presentations without informational handouts or technical personnel to answer questions.

Response: Handouts were not always available at public or sub basin core team (SCT) meetings because work was underway immediately before, and often during, the meetings. The SCT, including technical members, have been using their available time to keep the process on track in order to meet a deadline imposed by the NPCC, and had little time to create polished handouts. As noted in Response 4, members of the public have been invited to join as participants in the process, rather than receive materials about it after the fact. Technical team members could not attend all public meetings, but did attend most of them.

• Failure to provide comment document in a timely fashion. (Several reported they had to make repeated requests for the draft and in fact received it between several days to one week after Feb 23rd Memo.)

Response: Delays in data processing (EDT model runs) resulted in delays in releasing the draft. The sub basin planning Coordinators sent the draft to all those who requested it, as soon as it was available.

• Unknown agency bureaucrats selected information and programmed computer models for subbasins before any public involvement.

Response: Technical staff (the HWG) did begin to organize and assess data prior to public involvement, with the intention of efficiently completing the very technical work prior to inviting public participation. Stakeholders were offered opportunities to comment and to participate in development of the subbasin assessment, including opportunities to review the data being used and comment on decisions made about the use of that data. HWG members were identified in a list sent to the entire sub basin planning outreach email list; HWG members were introduced at early subbasin core team meetings and lists of HWG members were posted at those meetings.

• Public meetings were generally held during the day when much of the public is working and not able to attend.

Response: The subbasin planning process occurred on a very fast-track schedule to meet a deadline set by NPCC. The schedule was difficult for all participants. Evening meetings would have required 2-3 times as many meetings to accomplish what could be done in one full-day meeting, and the schedule would not have allowed for that, nor would a heavy evening meeting schedule have been well received. Evening summary meetings were scheduled in an attempt to provide a window for the public who could not attend day meetings. The number of participants and meetings and the status of work often required changes in meeting schedules and locations, and this was a problem.

Since the full extent of how these plans will be used for water management are not known, we are concerned about the fast-track development at the expense of any meaningful public participation.

Sincerely,

Ronald E. Perrow

Chairman

# # # # # # # # # # # # # # #

March 10, 2004

TO: Okanogan County Water Resources

RE: Methow Subbasin Plan

Time for public comment was to brief.

Response: The comment period has been extended; comments on the first draft will be taken until April 16th. (The final draft will be available for review and comment on April 23rd.)

The document is not complete.

Response: Okanogan County's public involvement strategy has been to offer opportunities for involvement while the process was ongoing and work was in progress. The public has been invited to join as a participant in the process, rather than receive materials about it after the fact.

No public comment before EDT model runs were conducted.

Response: The sub basin planning process was designed to solicit and respond to stakeholder comment after the EDT run for each assessment unit. Comments regarding the data used and the outcomes will be incorporated in the findings for each assessment unit and will be considered in establishing priorities and management strategies for each sub basin.

No input from the Methow Basin Planning Unit was included before model runs were conducted.

Response: The Methow Basin Planning Unit was one of the key groups identified early in the sub basin planning outreach process. The group's participation was expressly solicited; Planning Unit members elected not to participate because completion of the Watershed Plan was demanding a great deal of time and energy during the period when sub-basin planning was initiated. Planning Unit members have been included in outreach efforts throughout the process.

The Methow Basin Planning Unit Rejected the EDT model, it's a black box we don't know anything about, it should not have been used. Because it was this plan looses credibility with the citizens of the valley.

Response: The NPCC required sub-basin planners to use either EDT or QHA. Planners in the Upper Columbia province elected to use EDT because it incorporates empirical data rather than relying solely on expert opinion.

Politics and state policy do show through bright and clear on page 22 – 6th paragraph. For the benefit of the Methow Basin please stop talking about lining our open canals. Look what was done to Skyline and Wolf Cr. It cost one million to destroy Wolf Cr. Now it's costing another million almost to fix it. Two million, it was working fine the way it was.

Response: The comment has been forwarded to the SCT.

Hannelor Vandenhengel

Box 533

Twisp, WA. 98856

# # # # # # # # # # # # # # #

Okanogan County Water Resources

Comments on Methow Subbasin Plan

March 10, 2004

The time allowed for responses was to short. Please extend it.

Response: The comment period has been extended; comments on the first draft will be taken until April 16th. (The final draft will be available for review and comment on April 23rd.)

The plan is not complete. The plan should have been complete. Putting out incomplete plans is a strategy that's used when you have something to hide, or something you don't want the public to see just yet. This reduces the publics response time overall on specific information that may be controversial.

Response: Okanogan County's public involvement strategy has been to offer opportunities for involvement while the process was ongoing and work was in progress. The public has been invited to join as a participant in the process, rather than receive materials about it after the fact.

It's my understanding that the Methow Planning Unit (PU) was not a part of this plan. The integration of all information in the planning process is key to successful planning. Your desire for citizen input in this plan seems a shame without input from the PU.

Response: The Methow Basin Planning Unit was one of the key groups identified early in the sub basin planning outreach process. The group's participation was expressly solicited; Planning Unit members elected not to participate because completion of the Watershed Plan was

demanding a great deal of time and energy during the period when sub-basin planning was initiated. Planning Unit members have been included in outreach efforts throughout the process.

EDT model runs were made prior to input from the public. This process is backwards, unless your plan has a predetermined outcome, then public comments are just a nuisance and will probably end up in the trash can.

Response: The sub basin planning process was designed to solicit and respond to stakeholder comment after the EDT run for each assessment unit. Comments regarding the data used and the outcomes will be incorporated in the findings for each assessment unit and will be considered in establishing priorities and management strategies for each sub basin.

State agencies have ignored the possibility that recharge from unlined canals is a benefit. When I read page 22 I can see the plan was not based on science, just politics and state policy. The county and state have been represented on the PU. Why hasn't Okanogan County given direction as to the multiple benefits of recharge water form open canals as identified by the PU? Why hasn't the state seen to it that this information was incorporated in the Subbasin Plan?

Response: The comment has been forwarded to the SCT.

The determinations made by the PU do not jive with Washington state policy. So it seems the state has decided to go out on their own with backing from the NWPCC, using rate payer monies, ignoring the PU findings, and push state policy down our throats.

Response: Please note that the sub basin plan is permissive, not prescriptive. It includes a range of strategies that may be used depending on the limiting factors being addressed in a particular situation, and the characteristics of the project site.

Ken Bruce

488 Twisp-Carlton Rd.

Carlton, WA 98856

# # # # # # # # # # # # # # #

OC3 – OKANOGAN COUNTY CITIZENS COALITION LETTERHEAD

PO Box 1662 – Omak, WA 98841

Email: **oc3@northcascades.net**

United For Multiple Use Resources and Constitutional Government

To: Okanogan County Water Resources

Northwest Power and Conservation Council

From: Okanogan County Citizens Coalition

Date: March 5, 2004

Re: DRAFT Methow and Okanogan Subbasin Planning

Subject: Request for Extension of Comment Period

This letter is in response to the February 23rd Memo soliciting comments by March 11th from "Interested Stakeholders" for the Draft Methow and Okanogan Subbasin Plans.

Individuals from several OC3 member groups have been monitoring this process. Following reports/discussion at the March 2nd OC3 meeting, all those in attendance (delegates representing 13 member groups) unanimously approved a letter to request an extension of the comment deadline for the following reasons:

Response: The comment period has been extended; comments on the first draft will be taken until April 16th. (The final draft will be available for review and comment on April 23rd.)

Incomplete and inadequate information available for substantive comments.

Response: Okanogan County's public involvement strategy has been to offer opportunities for involvement while the process was ongoing and work was in progress. The public has been invited to join as a participant in the process, rather than receive materials about it after the fact.

Public meetings provided only verbal and visual presentations without informational handouts or technical personnel present to answer questions.

Response: Handouts were not always available at public or sub basin core team (SCT) meetings because work was underway immediately before, and often during, the meetings. The SCT, including technical members, have been using their available time to keep the process on track in order to meet a deadline imposed by the NPCC, and had little time to create polished handouts. As noted in Response 4, members of the public have been invited to join as participants in the process, rather than receive materials about it after the fact. Technical team members could not attend all public meetings, but did attend most of them.

Failure to provide comment document in a timely fashion. (Several reported they had to make repeated requests for the draft and in fact received it between several days to one week after Feb 23rd Memo.)

Response: Delays in data processing (EDT model runs) resulted in delays in releasing the draft. The sub basin planning Coordinators sent the draft to all those who requested it, as soon as it was available.

Unknown agency bureaucrats selected information and programmed computer models for subbasins before any public involvement.

Response: Technical staff (the HWG) did begin to organize and assess data prior to public involvement, with the intention of efficiently completing the very technical work prior to inviting public participation. Stakeholders were offered opportunities to comment and to participate in development of the subbasin assessment, including opportunities to review the data being used and comment on decisions made about the use of that data. HWG members were identified in a list sent to the entire sub basin planning outreach email list; HWG members were introduced at early subbasin core team meetings and lists of HWG members were posted at those meetings.

Since the full extent of how these plans will be used for land and water management and, more importantly, how they will impact private property and water rights; OC3 groups are concerned about the fast-track development of these plans at the expense of any meaningful public participation.

Sincerely,

Ronald E. Perrow

Chairman

CC: Okanogan County Commissioners

7th & 12th Dist Legislators

Congressman George Nethercutt

Senators Patty Murray / Maria Cantwell

Bonneville Power Administration, Administrator Steve Wright

NOAA Fisheries, Regional Director Bob Lohn

# # # # # # # # # # # # # # #

March 12, 2004

To: Julie Dagnon, Okanogan County Water Resources

From: Mike Gage

Re: Methow Subbasin Plan Comments

Julie,

The comment time on the Subbasin Plan was not along enough. There's a lot to read. Then you need time to digest it and respond.

Response: The comment period has been extended; comments on the first draft will be taken until April 16th. (The final draft will be available for review and comment on April 23rd.)

The subbasin Plan is not a complete plan, there's a lot missing. This means that in future drafts the public will have even less time to correct problems in the plan.

Response: Okanogan County's public involvement strategy has been to offer opportunities for involvement while the process was ongoing and work was in progress. The public has been invited to join as a participant in the process, rather than receive materials about it after the fact.

There has been no attempt to coordinate planning efforts with the citizens driven MBPU. This is not what was indicated by the county over one year ago. There is a feeling by some members of the MBPU that the county and state are trying to do an end run around the MBPU. I hope that's not true.

Response: The Methow Basin Planning Unit was one of the key groups identified early in the sub basin planning outreach process. The group's participation was expressly solicited; Planning Unit members elected not to participate because completion of the Watershed Plan was demanding a great deal of time and energy during the period when sub-basin planning was initiated. Planning Unit members have been included in outreach efforts throughout the process.

I have a problem with the EDT model that was used in the Subbasin Plan. The MBPU was not comfortable with EDT. We has our TAG member, Ken Williams review information regarding EDT, Ken recommended the MBPU not use the EDT model. Models can be manipulated and they are only as good as the data that's put into them. If you control the input of data going into the model you control the results the model will spit out. The MBPU was not allowed a part in the control of data that went into the Subbasin Plan. I now have no confidence in the model results. The citizens of the Methow Basin have been hammered, by state and Federal agencies to the point where we would be total fools to trust anything they tell us. The county sits on both planning groups, why didn't the county step in and ask that EDT not be used, you knew it was very controversial.

Response: The NPCC required sub-basin planners to use either EDT or QHA. Planners in the Upper Columbia province elected to use EDT because it incorporates empirical data rather than relying solely on expert opinion. Material addressing the deficiencies of EDT and the MBPU's rationale for rejecting it will be appended to the Methow sub basin plan.

Through the parts of the Subbasin Plan that I had time to read the plan talks about bringing things back to natural. Yes there Probably is less "natural" riparian habitat today than there was 110 years ago. But there is more riparian habitat over all in the Methow Basin today then there ever was naturally. RCW 90.82 is about not just protecting existing habitat but enhancing what we have. Today we have more trees in the basin than it ever had before the white man came. We have more habitat for wildlife than was here naturally. Because of our farming practices etc. we have more nutrients going into the streams, these enhance the food web providing more food for fish, thus increasing the fish populations by as much as 30% in some streams. Pollution is not a problem in the Methow Basin, nor is sediment. Mullan & Williams found that sediment was only 10% above natural levels. The gradients in the basin are steep and sediments are washed away causing no problems. Natural is not always better.

Response: A baseline of some sort is needed to provide a benchmark against which change can be measured. Where the baseline is set does not affect the focus of the assessment, which reflects the condition of the resource today. The baseline simply allows changes to be compared across reaches and streams. If the baseline were raised or lowered, relative change (compared to today's conditions) would remain the same. The issue remains the condition of the resource today and what to do about that. The sub basin plans do not advocate returning to a pristine baseline. Management strategies seek to return to properly functioning conditions when necessary for species recovery.

Page 22 is scary, the authors of this plan are still looking at unlined canals as being detrimental. These ideas come from state policy. State policy lags way behind good current science. This is another area where the county should have stepped in and contributed recharge information from the MBPU plan, the county didn't, now we have two plans that will be conflicting with one another in the direction they take. The county is creating a big mess, will the residents ever get out of it, and how much will it cost them in the end.

Response: The comment has been forwarded to the SCT. In addition, sub basin planning outreach staff met with the Methow Basin Planning Unit to address the issue on March 31st. Please note that the sub basin plan is permissive, not prescriptive. It includes a range of strategies that may be used depending on the limiting factors being addressed in a particular situation, and the characteristics of the project site.

Reading this plan has been irritating. After 20 years of trying to see the truth come out I now wonder if it ever will. I feel like a thief is going from door to door and window to window at my house, every time he finds a door locked and bared he tries another then he tries the windows, if one is locked he goes to another. Doors and windows keep appearing and I keep running around locking them and baring them but it never ends. You call for help and they send out more thieves to help the ones already there. The state wants our water, they will take it anyway they can. Next it will be our property.

MBPU members sent a letter of concern to the county and NWPCC. I am sending a copy of the letter and would like it to be part of my comments on the Subbasin plan.

Michael D Gage

Carlton

MBPU Letter enclosed with Michael D Gage's letter:

Northwest Power and Conservation Council

Bonneville Power Administration

Upper Columbia Salmon Recovery Board

Okanogan County Commissioners

RE: Sub-basin Planning

Attention: Sub-basin Planners

It appears that the Northwest Power and Conservation Council (NPCC) sub-basin planning process (SBP) initiated by Okanogan County, Colville Tribes and Washington Department of Fish and Wildlife for determining the restoration measures in the Methow Basin is flawed. The Methow Basin Watershed Planning Unit (planning unit) has not been included in this process. In fact the planning unit has not been contacted nor allowed input into this process. The planning unit was told the process was being initiated well over a year ago. We were told we would be receiving a letter from the SBP group asking that a representative from the planning unit sit on a board with the three SBP agencies named above to set the course in determining the restoration measures that would be taken in the Methow Basin, this never happened. Later we were told the SBP group would be attending a planning unit meeting to gather input in determining restoration measures, this has not happened.

Response: The comment letter was addressed to the NPCC; we are not sure what comment is appropriate from us.

We can not overlook the fact that the key to successful sub-basin planning is the integration of any efforts into the watershed plan developed by the planning unit. Further more the planning unit has been involved in watershed issues for the last five years with some members also having involvement in the Pilot Plan and Ground water advisory Board, which goes back to the 1980's. Due to the planning unit not being included in the SBP, the ingredients for good planning is not there. This is primarily because the studies and information developed by the planning unit are not being considered or included in the SBP. Thus your desire for local expertise is not even represented.

Response: The subbasin planning process occurred on a very fast-track schedule to meet a deadline set by NPCC. The schedule was difficult for all participants. Evening meetings would have required 2-3 times as many meetings to accomplish what could be done in one full-day meeting, and the schedule would not have allowed for that, nor would a heavy evening meeting schedule have been well received. Evening summary meetings were scheduled in an attempt to provide a window for the public who could not attend day meetings. The number of participants

and meetings and the status of work often required changes in meeting schedules and locations, and this was a problem. Because most of the SCT meetings were held during the day, a summary meeting was held to accommodate those stakeholders who were not able to attend day-time meetings. The MBPU's schedule was a factor in choosing the meeting date; the sub basin coordinators chose an evening on which the MBPU had decided not to meet. After the SCT meeting had been scheduled and advertised, the MBPU decided to hold a meeting on the same evening. While the conflict was regrettable, the coordinators did not think it would be fair to other members of the public to cancel a meeting that had already been advertised. Sub basin Planning outreach staff met with the MBPU on March 31st to discuss the sub basin plan and receive comments. The Methow Basin Planning Unit was one of the key groups identified early in the sub basin planning outreach process. The group's participation was expressly solicited; Planning Unit members elected not to participate because completion of the Watershed Plan was demanding a great deal of time and energy during the period when sub-basin planning was initiated. Planning Unit members have been included in outreach efforts throughout the process. The NPCC required sub-basin planners to use either EDT or QHA. Planners in the Upper Columbia province elected to use EDT because it incorporates empirical data rather than relying solely on expert opinion. Material addressing the deficiencies of EDT and the MBPU's rationale for rejecting it will be appended to the Methow sub basin plan.

While some efforts have been made to make this process know to the planning unit this ignores the fact that the planning unit is on a fast track to complete its plan, and that the planning unit was told that this process would be integrated with watershed planning. It now appears that an end run is being made around the planning unit because there has been no contact nor integration attempted and because the SBP effort is creating a demanding schedule in parallel with the planning units heavy schedule.

In observing these things there is a real fear that efforts such as this will create conflicting or duplicate planning. This is reinforced by the fact that recent key meetings have been held during the day or in conflict with the planning unit meetings. This has eliminated in effect comments that could be provided by experienced planning unit members. Also sub-basin planning is being done without integration of the planning unit priorities. One such priority is that the planning unit on advise from its TAG rejected the EDT modeling technique as a valid tool for assessing habitat conditions and functions in the Methow Basin. This has not been considered by the SBP. The planning unit TAG recommended that an actual habitat assessment be completed focused on what the fish are doing in relation to existing habitat conditions. The planning unit was not able to do this because of funding and time constraints.

Furthermore how can there be valid input if the model runs are already one without citizen or planning unit input? The invitational letter shows that the Upper Columbia Salmon Recovery Board is doing the integrating. They are forming an overall strategy not a Methow Basin specific strategy. The planning unit has specifically made provisions for future planning by setting up a Methow Watershed Council (MWC). The SBP should be seeking to make provisions to integrate its efforts with the planning unit and in the future with the MWC. Without such considerations it is our belief that the SBP group is doing an end run around the state legislature which specifically intended that watershed planning be done by the local citizens. Salmon recovery was a key component of the watershed planning act.

There are too many mandates and differing agendas not based on real science, which in the long run look to be more damaging to the environment than helpful. Such pitfalls should be avoided and agencies responsible for funding restoration and recovery efforts are obligated to see that the process was not done incorrectly, and that funds were spent wisely.

Would it be appropriate for you to come directly to the planning unit for recommendations on recovery and funding projects?

Please send your responses to:

Methow Basin Watershed Planning Unit

PO Box 247

Twisp, WA 98856

Signed by:

Marty Williams – Planning Unit Member

Ron Perrow - Planning Unit Member

Mike Fort - Planning Unit Member

Mark Love - Planning Unit Member

Karla Christianson - Planning Unit Member

John Umberger - Planning Unit Member

Michael D Gage - Planning Unit Member

Dick Ewing - Planning Unit Member

Fred Colley - Planning Unit Member

Ray Campbell - Planning Unit Member

Gary W Erickson - Planning Unit Member

Cc: Sen. Linda Evans Parlette

Sen. Bob Morton

Rep. Cary Condotta

Rep. Michael Armstrong

Rep. Bob Sump

Rep. Cathy McMorris

# # # # # # # # # # # # # # #

April 13, 2004

TO: Okanogan County Water Resources

Northwest Power and Conservation Subbasin Planning

123 North 5th Avenue Rm. 110

Okanogan, WA. 98840

RE: Methow Subbasin Plan

In 1999, Okanogan County, the Town of Twisp, the Methow Valley Irrigation District (MVID), and the Colville Tribe established themselves as "initiating governments" for the watershed planning process, and began developing a stakeholder group, now called the Methow Basin Planning Unit, or MBPU. Members of the MBPU represent the diverse interests in the Methow Valley, and the group has been meeting regularly for about five years.

The MVID represents about 200 members. The Methow Valley Canal Associates (MVCA) is also represented on the MBPU and has about 90 members. I have represented the MVID and the MVCA for just about 5 years. I have concerns with the Methow Subbasin Plan (MSP). Why wasn't the MBPU involved in the MSP? Its true a meeting was set up between the MBPU and the MSP but this happened only after the plan came out for public review and after many comments and complaints over this. The group of MBPU members that attended the meeting were given a lot of lip service. We were told that you realized things were not done right, but tough you were going forward anyway. I guess we'll see if any of our comments will be incorporated in the next draft.

The legislature felt that the local development of watershed plans for managing water resources and for protecting existing water rights was vital to both state and local interests. The development of such plans serves the state's vital interests by ensuring that the state's water resources are used wisely, while protecting existing water rights and ESA listed fish, and by providing for the economic well-being of the state's citizenry and communities.

Okanogan County was sent a letter of concern from members of the MBPU, and I was one of those concerned members that signed on to the letter. Okanogan County Water Resources replied to the letter, but did not address the concerns of the MBPU members. The counties reply was just a whitewash. This sends up red flags of warning.

On page iii – you state coordinators delivered briefings to interest groups, and you have a list of interest groups that were included in the MSP. The MBPU is a much larger interest group with about 26 stakeholder groups being represented. The MBPU was told over a year ago we would be included in the MSP and would have a member sitting on your board, this never happened. The MBPU was latter told the MSP group would be attending a MBPU meeting to get input from the MBPU, it never happened. It appears you have misrepresented your intentions and were purposely avoiding the MBPU.

On page iv – you mention EDT, the model used to develop your management strategies. The EDT model is a black box, the public is keep in the dark as to how it works. The MBPU TAG rejected the EDT modeling technique as a valid tool for assessing habitat conditions and functions in the Methow Basin. The MBPU TAG recommended that an actual habitat assessment be completed focused on what the fish are doing in relation to existing habitat conditions. Furthermore the model runs were already done without citizen or planning unit input. When asked for the information that was feed to the model I was not supplied with it but was told there was to much paper to deal with. At this time I do not know what information was feed to the EDT model. Was the information any good? Was the information controversial? There was no information/input from the MBPU, nor from local citizens that went into the EDT model. Models can be manipulated just like a crooked roulette wheel, the person in control of the wheel will get the numbers he wants. More red flags.

On page xii – the Methow Basin Summary is mentioned. The Methow Basin Summary was done using the limiting factors review. The MBPU was to have input on the Limiting Factors Review, MBPU TAG member Ken Williams reviewed it, Ken stated it should not go to print in its presently written form. Many MBPU members also had input on the Limiting Factors review and were waiting for Ken to finish his review so all input from the MBPU could be included at one time. The review and the comments from the MBPU were never looked at because the Limiting Factors Review was completed without the MBPU input being allowed. The MBPU was never told what the comment closing date was. The County Water Resources head at that time was Dennis Beich, Beich was also the county representative to the MBPU and at this time MBPU chair. Carmin Andonaegui, Washington Conservation Commission, was writing the limiting factors review. Carmin was living with Beich as his girl friend at the time the Limiting Factors Review was written. Beich was dealing with Ken Williams and was the MBPU go between. When the review was completed Beich said sorry to late for comments the Limiting Factors is finished and its being printed. So errors in the Limiting Factors Review were never corrected these errors then were included in the Methow Basin Summary, then were they feed into the EDT model? Garbage in garbage out.

I gave input on the Methow Basin Summary, I asked that winter be recognized as the bottle neck for fish production, I asked that Mullan and Williams statement "Irrigation at current levels in the Methow River Basin, may be more beneficial than detrimental to salmonid habitat because of its positive influence on groundwater" be included and researched. I thought these were key elements in planning but they were not included in the final product, except Ken Williams review was put in an appendix after much debate with Dennis Beich now the regional head for WDF&W. All three of the above mentioned plans had a very limited amount of time in which to do them. It was rush, rush, rush, no time for this, not enough time to do that. Why is the BPA in

such a hurry to spend rate payers money. From the Limiting Factors Review to the Methow summary to the Methow Subbasin Plan the whole process has been questionable and there are a lot of red flags.

On page xii – at the bottom of the page are a number of important headings that are not complete, why? If you don't know what the Subbasin Goals, Recovery Goals, and the Vision Statement is by now there is a problem. Why didn't you complete all these headings? The plan is incomplete, how did you even make the model runs without some of this information, and the model should have provided the information for the rest. More red flags.

On page 22 – the plan talks about the lining of irrigation canals, you say this plan is based on science, what science has been done in the Methow Basin, that is worth anything, where it has been determined unlined irrigation canals are detrimental. Those of us that have been involved in water planning know, in the Methow Basin unlined canals are beneficial. Transportation water does recharge the water table. This recharge occurrence is but one of the multiple benefits derived from irrigation water rights.

Data provided by the USGS shows that recharge water is significantly delayed in its return to the river. Because of the delay in returning to the river, and other factors, the MBPU has determined that recharge water has many benefits. These benefits have been known by local residents, and were mentioned in previous studies by Mullan and Willams and by Buell & Assoc. The DOE has refused to recognize these benefits, and has even denied their existence.

We have seen the negative affects caused by piping unlined canals in the Wolf Creek area. The lowering of the water table, loss of wet lands, and unseen at this time or at least not admitted to, the lost of instream flows for fish during the winter bottle neck. Everyone on the valley floor is a secondary water user of water from an unlined irrigation canal. Wake up, don't screw with our ground water. All of these benefits are supposed to be protected by state agencies like the DOE and WDF&W. I'll bet none of this recharge information went into the EDT model.

<u>The plan and the whole process should to be reevaluated.</u>

I have not had time to fully review this plan, its doubtful if anyone has had sufficient time to fully review the MSP.

The plan is incomplete and should not have been set out for review until it was complete.

The final USGS data was not incorporated into the plan nor does it look like the final USGS data was feed to nor part of the EDT modeling.

Information fed to the EDT model may have been incorrect. If information from the limiting factors review was used, or if information from the Methow Subbasin Summary was used, that information may have been wrong because of errors found by the MBPU TAG review. These errors in the Limiting factors Review were never corrected and were passed on to the Methow Subbasin Summary and would have corrupted the EDT models findings.

Information submitted by me on irrigation benefits and the winter bottle were not included in the Methow Subbasin Summary. This was information key to the EDT model and it appears this information may have been purposely left out.

Transportation water from unlined irrigation canals has multiple benefits which need to be protected and not ignored nor done away with as suggested on page 22. Recharge projects will increase instream flows for fish through the entire year, particularly during winter, the bottle neck for fish production. Groundwater recharge projects should be at the top of the funding list. Recharge projects are not mentioned in the MSP, why?

Ratepayer monies are being spent on this process so make sure the process is done right, and is above board. Right now the process is very questionable.

Michael D Gage

Cc:

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PUBLIC COMMENTS RECEIVED ON THE APRIL 23, 2004 – MAY 10, 2004 DRAFT METHOW AND OKANOGAN SUB BASIN PLANS

Public Comments on Methow Basin Draft Subbasin Plan

Bailey / Boshard, submitted May 10, 2004

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Public comments submitted for inclusion in Methow Subbasin Plans

Prepared by: Larry Bailey, Michelle Boshard Phone: 509 486 2400

Submitted to J. Dagnon, Okanogan County Water Resources Coordinator

May 10, 2004

Methow Subbasin Plan

General comments:

1) The plan is grossly incomplete in content (many sections and/or discussion of critical tables and reference documents are not provided in the text where they are brought up—to the point where it is not ready for presentation / understandable). Some sections appear to just be incomplete with notes left for what to include, which might indicate the writers have not met time deadlines for production. This document is marginally better in places than the Okanogan plan in terms of pointing out and acknowledging things like gaps in knowledge which need to be addressed to better implement priorities and projects.

2) Plan is incomplete in presentation (critical tables and figures are missing which makes it impossible for full understanding by public, not to mention that not all the supporting material was made available)

3) Plan lacks professionalism, even for a draft (spelling errors, formatting issues which make it difficult to navigate the document)

4) The document was dated April 23, 2004. The deadline for public review is May 10th, 2004. The article in the newspaper (Omak Chronicle) letting the public know the plan was even available for review did not occur until April 28th. This left effectively 10 days for the public to review the document, which was not posted on the internet in all the places it said it would be (not on County Water Resources website as of April 30, 2004) and copies not easily made available for pickup for public to review when they could (i.e. they would have to photocopy the 400 of 1600 pages made available themselves, or sit in the library for hours). Additionally, the full document was not made available. This is a grossly insufficient amount of time even for the "pared down" version of the document. It took a team of agency people and consultants a year to produce the document and it still appears to be incomplete. The fact community groups and/or local governments could not take this back to regular monthly meetings because they did not have enough time, and that they did not have access to major sections important for understanding the document make it impossible for the kind of review needed to approve the plan and claim stakeholders were involved.

5) There is no evidence that this plan has been based on anything that the public or stakeholders desire(s) or consider(s) important, despite the fact NWPPC and these planning exercises were "created by Congress to give the citizens of Idaho, Montana, Oregon and Washington a stronger voice in determining and balancing the future of key resources". There is a complete lack of appendices of any public feedback, opinion, questionnaires, responses to inquiries or requests for public input anywhere in the document. No information is available on the already completed public review that was supposed to have occurred during the development of the plans.

6) This plan vastly out of step with current thinking regarding the way agencies in the Columbia Basin should be approaching planning exercises such as the Subbasin process. Executive Director of the Columbia Basin Fish and Wildlife Authority, told the Columbia Basin Bulletin, 'Agencies have to come to grips with the idea that they have to let loose of the controls. They have to lead from behind. This is not about controlling people and making them do things. It's about enabling them to do their best. People really respond to that. The vast majority of people want to do things to make things better. But mostly they don't have the ideas of how to do it. Or they don't have the resources to get it done.' ".

Response: Comment noted. An extensive and responsive public outreach program was conducted; see appropriate plan appendix. The subbasin plan needs to be edited to be more concise, rather than to include more technical information. Supporting technical information can be found in the references cited by the plan. See response to comment S3-S4 regarding public involvement. Prioritization for fish and wildlife is being developed and will be included in the formal draft plan that will be posted for public review from June 5 through August 12, 2004 on the NPCC website.

7) Executive Summary: Vision. The vision statement in this plan is verbatim what is stated as in the Okanogan Plan. The Methow and the Okanogan subbasins are different landscapes physically, socially and economically and require very different solutions tailored to suit the people/demographics, landscapes/impacts and local resource restoration needs. The vision statements of both the Okanogan and Methow plans, if truly based on the individual subbasin and the stakeholders in it, are not likely to be exactly the same. This indicates that the vision comes from the writers of the plan rather than from a collective understanding and agreement reflected in a statement generated by stakeholders based on that basin's needs. What is written just sounds good and is generic enough not to really mean anything in either basin. It does not reflect useful vision which achievement can be measured against in any real terms, which is the point of this plan.

Response: The vision statement is intended to provide broad guidance for future desired conditions. The objectives and strategies are specific to the subbasins and stream reaches.

8) See other comments in Okanogan Subbasin Plan "General Comments" Section.

Specific comments:

1) Section 2.1 Subbasin Assessment--Subbasin Overview. Plan states it will solve challenges facing the Methow by "providing a compendium of resource information and the tools to empower planners and decision-makers to implement programs appropriately and in a coordinated manner at the local level". The goal of this document was to provide such a plan, not the tools for others to make the plan.

Response: The subbasin plan is not intended to be prescriptive but to provide a framework for implementation.

Public Comments on Methow Basin Draft Subbasin Plan

Bailey / Boshard, submitted May 10, 2004

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2) Section 2.1 –Methow watersheds. No simplified comparative impact scale summary provided to help understanding of prioritization of restoration projects and funding expenditures.

Response: The subbasin plan is not intended to address impacts but to assess current condition of habitat for fish and wildlife recovery. It does not identify and prioritize specific projects or funding.

3) Section 2.1 –Anthropogenic Disturbances. No inclusion of public / landowner perspective on results of these disturbances and impact to them as given by the public/ landowners. Neither is there recognition of the considerations resulting from those issues that later will affect the plan implementation, and how to deal with them. This plan is not occurring in a vacuum and will need to deal with these realities. There is no background or linkages to other major initiatives in the area involving public in watershed planning and dealing with anthropogenic disturbances, nor inclusion of reports on already accumulated consensus on how to deal with anthropogenic and social issues.

Response: The subbasin plan is based on an objective habitat assessment and an extensive and responsive public outreach program; see appropriate plan appendix. The Subbasin Core Team sought public involvement to address the issues raised in this comment.

4) Section 2.1—Terrestrial Wildlife Relationships, Special Plant Species. Not provided.

5) Section 2.2—Focal Species: Population Characterization and Status. Although technical reasons for species selection (and the impacts causing the selections) are provided, there is no information on what implications plans for restoration of these species will have for public, landowners and other stakeholders, nor is there information on how or where the restoration will occur and who will be responsible, which is what the plan is meant to do. Sections such as "Population Management Regimes and Activities ", "Ecologic Effects / Relationships", "Relationship with Other Species" and other more basic technical information are not provided for some species. The prioritized list of limiting factors for each species and how these limiting factors compare to the limiting factors of other selected focal species in order to determine which

species to fix first is neither provided nor discussed in the text in this section. It is impossible for the public to assess and provide feedback on these plans and their impacts to the public when no information is provided to the public on these issues. If it is not completed, it also seems difficult for agencies to determine priorities based on this information and comes across as a regurgitation of what is already known.

Response: Focal species were selected to be representative of a broad range of habitat types located within the basin. It does not exclude other species from consideration. The subbasin plan develops strategies for species recovery; it is not intended to address the effects of species recovery on landowners and other stakeholders. It addresses action strategies; it does not identify specific projects. Prioritized limiting factors will be provided in the formal draft plan that will be posted for public review from June 5 through August 12, 2004 on the NPCC website. S3, S4: *An extensive and responsive public outreach program was conducted; see appropriate plan appendix.*

6) Section 2.3—Environmental Conditions, Changes in Wildlife Habitats. Plan only briefly states that major land use changes have cause shifts in critical habitat-type shifts which affect the focal species, but does not discuss or reference technical or objective documents which demonstrate what these implications mean. Neither does it provide references to support the statement that "subbasin wildlife managers, however, believe that significant physical and functional losses have occurred to these important wetland habitats from hydroelectric facility construction and inundation, agricultural development, and livestock grazing." This seems to be either a subjective impression by agency employees which is unsupported or contradicted by their own data, or an unexplained "group conclusion" of the SCT for which no explanation was provided.

It appears landowners or industries influencing the land use changes and habitat itself were

not consulted despite the fact their livelihoods depend on having a significant amount of this knowledge. While feedback from such sources is not scientific in nature, the plan writers themselves admit that the technical bases which agency employees use to make their determinations (e.g. IBIS databases etc) are not accurate. This results in a "we don't have a clue, and we haven't asked anyone who lives there, but we're going to plan anyway" approach which is no longer a scientific debate but a political contest in which the public and landowners don't have an even footing, and often lose.

Response: The comment is not clear.

7) Section 2.3—Environmental Conditions, Re-iteration and Expansion of the Guiding Principles. The plan begins this section by stating "The economic, cultural, and social valuation of fish resources is derived from the characteristics of the ecosystem that supports them" and then launches into technical prioritizations of ecological objectives set by agencies and their technicians (most of which were developed without specific or broad public input in regards to the impacts at local levels where priorities would be applied). The premise that this argument is

built on—the statement that economic values are determined by the ecosystem—is fundamentally untrue. It is not surprising that fish and wildlife scientists writing this plan do not have a firm grasp on economic realities, which are determined by social, cultural and market values not in their realm of expertise. But this affects the appropriateness of the plan because the logic thread proposed by the technical people seems to be basically that "the economy is based on the health of the environment/ watershed and its capacity, which we measure in focal / indicator species performance, and that if we set and meet the objectives we set for how a certain fish does it therefore improves (or meets objectives set by community for) the economy, and furthermore that science technicians would know best about that without asking the local community or researching what economic plans are already in place". There is no true inclusion of economic, social or cultural values referenced or included at all in the priorities set by the Regional Technical Committee (RTT), likely because the RTT is a strictly (and self-admittedly) defined technical body that doesn't deal with non-science issues. There is a vast amount of economic and cultural information in relation to the environment and economy, derived locally and paid for with public money in order that they be specifically included in plans like this, which are not included in this plan. Yet the writers of this plan insist the priorities set by the RTT "reflect a synthesis of goals and objectives from the various management plans directing tribal, state and federal agency policies within the Methow Basin." This is a specific demonstration of how science and government agencies are using their argument (made later in the paper) for separating policies (which they say specifically in the plan should be based on public goals) from the "how to get there" (the guiding principles for technical priorities). This excludes the opportunity for public to comment on specific application. This is a kind of sleight of hand saying "we want technically sound plans and we are technical people so we didn't collect social data--that's the policy department" while the policy department says " we

base our policies on scientific data and broad public goals our agency is given" without referencing or collecting the local economic and social community information a specific subbasin plan should be tied to and of which there is a vast amount. This process therefore never allows for the ground-truthing and reality checking and may cause Public

subbasin plans to be rejected by the public due to conflicts with community interests and ongoing initiatives, not to mention they will be useless to project proponents in seeing where they fit in the big picture in this regard.

Response: The subbasin plan presents broad guiding values and goals in its vision statement. It is not intended to develop these in the body of the plan. The formal draft plan will be edited with this in mind.

8) Section 2.3—"Relationship of Scientific Conceptual Foundation to Subbasin Goals" Not provided (see above—affects publics ability to understand how exactly their needs and interests have been considered or not).

9) Section 2.3—Historical conditions, current conditions, no-action conditions, or future desired conditions are not provided.

10) Section 2.3—"Out-of-Subbasin Effects" and "Environment/Population Relationships" not provided.

11) Section 2.6— Synthesis Of The Most Important Factors For Decline. Plan states it will "summarize and compare some of the central findings and conclusions offered in a number of key reports". Although a lengthy regurgitation of ideas from obviously libraries of information, this section does not then provide a meaningful discussion or prioritization of what the central findings of the current knowledge base mean, or indicate what should be done further based on common knowledge. The plan subsequently states that "to date no quantitatively structured analysis of limiting factors has been reported in the documents discussed here. Such analyses are being considered or planned using EDT or QHA. Until those analyses are published these qualitative assessments will have to suffice." This seems to mean that this subbasin plan, although it could not provide what it was supposed to, was done anyway, and without public input. It does therefore not meet the task assigned for the plan, and admits to itself this plan is not what it is supposed to be. The public cannot make an assessment of this plan based on either its content, or how it meets the goals set out for itself if it is has not been written to respond to the goals set out for it. Even if it manages to get by the public because of the short review period, it will likely never gain true public support and implementation, but instead will either sit on a shelf or draw lawsuits and opposition.

Response: Prioritization for fish and wildlife is being developed and will be included in the formal draft plan that will be posted for public review from June 5 through August 12, 2004 on the NPCC website.

12) Section 2.6—Synthesis and Interpretation of Assessment in regard to Terrestrial / Wildlife. Plan states "Subbasin assessment conclusions are identical to those found at the Ecoprovince level for focal habitat types and species. An assessment synthesis is included in section 6 in Ashley and Stovall (unpublished report 2004)." The draft then has a comment which reads "Need more wildlife material summarizing conclusions

here??". This is evidence of the derivative "cut and paste" nature of the document and unnecessary padding after conclusions are already drawn, perhaps to distract from the obvious lack of content in the plan. This section does not draw ecosystem linkages across fish and

wildlife priorities in assessment units or discuss how separate fish and wildlife projects will be prioritized for maximization of funding efficiency.

Response: These comments respond to an early draft of the subbasin plan, made available in order to increase the opportunity for public review. Missing information will be included in the formal draft plan will be posted for public review from June 5 through August 12, 2004 on the NPCC website. Agree that linkages across fish and wildlife priorities are not made, and represent an unfinished agenda that should be addressed in future plan update or implementation.

13) Section 2.6—Fisheries Assessment Methodology. Section does not provide the rationale for the basis of the "exceptions" made during technical prioritizations, was this because they didn't fit the model? If so, how do those exceptions relate to real life impacts on fish—which is the priority, not making the model run smoothly.

Response: Exceptions included some reaches where sediment load or temperature only had a high impact to spawning or egg incubation. Additionally, a survival factor was considered a primary limiting factor if there was small to moderate impacts across most (9-12) life stages, thereby producing a cumulative impact that could be just as severe as high and extreme impacts to fewer life stages. Secondary limiting factors generally had small to moderate impacts to several (5-8) life stages. An exception occurred with the survival factor "food"; when there was small to moderate impacts to two or three juvenile life stages in most of the reaches of a particular assessment unit then we considered it a secondary limiting factor. To clarify further, the assessment of a given reach may or may not result in a rating for a particular attribute that denotes "poor" or altered habitat conditions. However, if it is rated as altered, and if fish spend little time in this reach, or if the reach is not specifically tied to a life history phase where the condition would cause mortality (e.g., high sediment in a migration reach), then the planners refrained from citing this as a primary or even a secondary limiting factor. This is because for the reach in question the habitat condition, in and of itself, may not necessarily result in direct mortality or even "harm,".

14) Section 2.6—Strengths and Weakness of Assessment Methods / Data Availability and Quality. Not provided. This section is critical to public's ability to assess the plan in terms of the appropriateness of use based on the model used and the data it generates, on which assumptions for plan are based. Just like the IBIS database, we cannot make plans on incorrect models—no crosscheck process is outlined to verify findings.

Response: Missing information will be included in the formal draft plan will be posted for public review from June 5 through August 12, 2004 on the NPCC website.

15) Synthesis of Key Findings. Not provided. Social and economic implications for landowners and public not discussed.

Response: Missing information will be included in the formal draft plan will be posted for public review from June 5 through August 12, 2004 on the NPCC website.

16) Integrated Priority Assessment Units. Plan states "The integrated priority list for restoration and protection can be seen in tables Table 50 and Table 51, respectively." Not provided.

Response: Missing information will be included in the formal draft plan will be posted for public review from June 5 through August 12, 2004 on the NPCC website.

17) Plan states "We also integrated the inter-species priority list with the assessment unit limiting habitat attribute summary analysis to provide a matrix of "where" and "what" needs restoration in the Methow Subbasin." Not provided.

Response: Missing information will be included in the formal draft plan will be posted for public review from June 5 through August 12, 2004 on the NPCC website.

18) Section 3. Inventory of Existing Activities. This section provides a text summary (some of which is inaccurate) of the groups in the region, but does not provide an assessment of what projects are fulfilling what priorities found in the analysis, how they will be tied together, cost-saving analyses etc for review. Although this would be the foundation piece to a sound management strategy acceptable to the public (is not provided for their consideration), a detailed management strategy and approach is then subsequently proposed for consideration in the following sections. This seems to indicate that despite needing to work with existing bodies and stakeholders already undertaking activities / implementing plans or listening to the public about what will work on the ground in consideration of technical issues, planners are forging ahead alone. The management strategies later proposed do not refer to or link to appropriate sections of other plans by other groups. The writers then refer to their own flawed argument of "mixing of conceptual foundations" (i.e. keeping public policy and technical separate) as

the reason things aren't working, and as a reason for ignoring anything but technical

considerations. The plan states "Too often in the past, the implementation of inappropriate strategies was made possible by altering the science (conceptual foundation) until it was consistent with the favored strategy. That was possible as long as the conceptual foundation remained unstated and hidden from view. In some hatchery and harvest management programs, as well as salmon restoration programs, scientific knowledge was suppressed or "bent" in order to justify the desired strategies". While this is an expectable backlash by science to political decisions which have damaged salmon stocks in the past, it implies another "technical only" solution created in a vacuum rather than a balanced one. Generally judgments made are inappropriate, and the plan's proposed directions do not even live up to its stated plan goal of balancing science, policy and on-ground local community/public needs, concerns and interests (economic and social issues).

19) Section 4. Management Plan. Our Vision for the Methow subbasin. Given the fact that any local and specific watershed based data, public involvement and conceptual conflicts discussed above are not provided or do not exist, the entire Section 4—the Management Plan for the future—becomes entirely suspect as to whether it will work in the Methow at all. Likewise for

the Okanogan plan, despite the fact that both plans state in their "Specific Planning Assumptions" portion that "the ultimate success of the projects, process, and programs used to implement the sub basin plan will require a cooperative and collaborative approach that balances the economies, customs, cultures, subsistence and recreational opportunities within the basin with the federal/state mandates to protect fish and wildlife." This plan does not reach this goal in process, content, or direction.

Response: Comment noted.

20) This plan does and will not allow the specific goals in the "Specific Planning Assumptions" section to be reached, including 1) that "The Bonneville Power Administration should make available sufficient funds to implement projects developed within the framework providing by this plan in a timely fashion", because it does not provide the list for funding, and 2) "participation of stakeholders, local and regional planning organizations and/or groups in implementation of subbasin plans should be fostered to the fullest extent possible or where appropriate", for reasons discussed above.

Response: Comment noted.

21) Section 4.1 Recovery Goals. These goals and opinions are not goals as reflected by landowners and public to truly make this plan a reality, but rather either the incomplete or unprovided technical / scientific agency-based goals and priorities (sections 4.2 through 4.4) which may or may not be reachable, given local realities and considerations not incorporated in this plan. Of the five criteria listed presumably for determining for recovery goals (none of which are actually provided or discussed for comment), the community and social considerations (a.k.a. "social based criteria" which presumably

refer to the direct impacts to the landowners and public this plan will have) are listed last,

below even the way agencies administrative way will handle the money to come for the projects they have not prioritized yet. This shows exactly the level of interest by planners in ensuring the local community and stakeholders are involved in the plan.

Response: An extensive and responsive public outreach program was conducted; see appropriate plan appendix. The Subbasin Core Team sought public involvement to address the issues raised in this comment.

22) Section 4.7—Recommendations For Monitoring In Subbasin Plans. Plan states "Both top-down, and bottom-up approaches are necessary to develop a regional monitoring plan. Generally, subbasin plans embody the bottom-up approach, as they will contain input from a wide range of stakeholders and provide professional input from those who are most familiar with the logistical needs for these programs. When first written two years ago, the requirements for the monitoring

components of subbasin plans also followed this philosophy, recognizing that the majority of on-going monitoring activity is at the project and subbasin scale." This plan does not provide a strategy for this. Plan lacks specificity on monitoring needed for this basin and the priority projects planned or ongoing that require monitoring. Misses one of the most cost-effective and beneficial strategies for accomplishing monitoring by not including where, when or how community can be involved in the monitoring, its synthesis, priority development, projects or initiatives to effect improvement of habitat as a result of good monitoring. Noone knows their river or their land better than the landowner or local community members. The public is a vast untapped resource which enjoys and would like to help in resource protection and restoration. Employing volunteer monitoring programs provides cost-effective leverage, relationship building, public outreach opportunities that can never be realized by conventional agency approaches. Well developed, coordinated, supported and funded it can even reach the landscape scale at which the agencies cannot. It requires training, quality assurance and control measures, and consistency in funding support but is a far more cost-effective mechanism for monitoring than currently spent monitoring dollars can do when used in a conventional manner. There are many regional, statewide and national organizations ready to help with a program that makes sense. The fact that this is not included in the plan is a major omission and flies in the face of the plan's stated goals of "inclusion of communities of science, interest and place".

Response: The monitoring plan was completed in April 2004 is now available for public review of the NPCC website.

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Public Comments on Okanogan Basin Draft Subbasin Plan

Bailey / Boshard, submitted May 10, 2004

Page 1 of 8

Public comments submitted for inclusion in Okanogan Subbasin Plans Prepared by: Larry Bailey, Michelle Boshard Phone: 509 486 2400

Submitted to J. Dagnon, Okanogan County Water Resources Coordinator

May 10, 2004

Public Comments on Okanogan Basin Draft Subbasin Plan

Bailey / Boshard, submitted May 10, 2004

Page 2 of 8

Okanogan Subbasin Plan

General comments:

1) Plan is incomplete in content (many uncompleted sections—to the point where it is not ready for presentation, some sections appear to be incomplete or hold some outdated information). It does not draw conclusions for the reader to consider and debate.

Response: These comments respond to an early draft of the subbasin plan, made available in order to increase the opportunity for public review. The formal draft plan including the wildlife section will be posted for public review from June 5 through August 12, 2004 on the NPCC website.

2) Plan is incomplete in presentation (tables and figures are missing which makes it impossible for full understanding by public, not to mention that not all the supporting material was made available)

Response: These comments respond to an early draft of the subbasin plan, made available in order to increase the opportunity for public review. The formal draft plan including the wildlife section will be posted for public review from June 5 through August 12, 2004 on the NPCC website.

3) Plan lacks professionalism, even for a draft (spelling errors, formatting issues which make it difficult to navigate the document)

Response: These comments respond to an early draft of the subbasin plan, made available in order to increase the opportunity for public review. The formal draft plan including the wildlife section will be posted for public review from June 5 through August 12, 2004 on the NPCC website.

4) The document was dated April 23, 2004. The deadline for public review is May 10th, 2004. The article in the newspaper (Omak Chronicle) letting the public know the plan was even available for review did not occur until April 28th. This left effectively 10 days for the public to review the document, which was not posted on the internet in all the places it said it would be (not on County Water Resources website as of April 30, 2004) and copies not easily made available for pickup for public to review when they could (i.e. they would have to photocopy the 400 of 1600 pages made available themselves, or sit in the library for hours). Additionally, the full document was not made available. This is a grossly insufficient amount of time even for the "pared down" version of the document. It took a team of agency people and consultants a year to produce the document and it still appears to be incomplete. The fact community groups and/or local governments could not take this back to regular monthly meetings because they did not have enough time, and that they did not have access to major sections important for understanding the document make it impossible for the kind of review needed to approve the plan and claim stakeholders were involved.

Response: These comments respond to an early draft of the subbasin plan, made available in order to increase the opportunity for public review. The formal draft plan including the wildlife section will be posted for public review from June 5 through August 12, 2004 on the NPCC website.

5) There is no evidence that this plan has been based on anything that the public or stakeholders desire(s) or consider(s) important, despite the fact NWPPC and these planning exercises were

"created by Congress to give the citizens of Idaho, Montana, Oregon and Washington a stronger voice in determining and balancing the future of key resources". There is a complete lack of appendices of any public feedback, opinion, questionnaires, responses to inquiries or requests for public input anywhere in the document. No information is available on the already completed public review that was supposed to have occurred during the development of the plans.

Response: Extensive public outreach was conducted; please see appropriate plan appendix. Public review comments are provided as an appendix to the plan.

6) Plan does not provide an overall clear prioritization of fish and wildlife initiatives, projects and activities in basin for funders to contribute towards as their funding envelopes allow.

Response: Prioritization for fish and wildlife is being developed and will be included in the formal draft plan that will be posted for public review from June 5 through August 12, 2004 on the NPCC website.

7) Plan's "Vision" and foundational principles seem to be limited to tribal and tourist perspectives—those of residents and community organizations and initiatives of their interest are not included at all, or are not referenced. This does not reflect the citizenry of the region as shown in the demographic profiles.

Response: The vision statement was created in a collaborative process through the Subbasin Core Team and included a broad range of interests.

8) Plan does not articulate (or give examples of) how this plan will relate to, or help coordinate multiple existing operational and budgetary linkages of other planning and program documents at all the levels of government. It does not identify how any or all of these plans relate to, or could leverage cost-saving opportunities in conjunction with, major efforts and initiatives by non-profit and community organizations. This plan is supposed to provide a prioritized list of projects and initiatives for the future, inclusive of those of non-agency community origin, which all regional partners and the public agree can be participated on and that hydropower mitigation and other funding should be spent on. This plan does not include the community projects and initiatives into that prioritization.

Response: The subbasin plan's relationship to other concurrent planning process is addressed in plan's inventory section. The subbasin plan is not intended to propose specific projects and initiatives.

9) Overall quality of the plan is neither commensurate with the time and energy, technical knowledge and ability of bureaucrats, staffers, and consultants working on it, nor the level of funding spent to date considering what has yet to be spent and the drastic improvements needed.

10) Overall this comes across as a very expensive library "cut and paste" exercise with nothing new learned and no strategies or action plans proposed for the future, and is unequal in value to the amount of time, energy and funding put into it. It is derivative in approach and contains little new information. The holes that leaves are important, as it does not address vast gaps in knowledge, particularly community knowledge, which creates a plan of dubious value at best.

Response: The subbasin planning process is designed to use existing information.

11) As stated succinctly by international river restoration expert Dr. Bob Newbury who resides in the Canadian portion of this river basin and who has worked on this river system "much of what needs to be done is obvious, simple and locally doable" –this plan does not clarify a plan of attack for what is already known to be important to be done.

Response: The subbasin plan provides a framework to support implementations actions.

Specific Comments

1) Executive Summary. Not Provided.

Response: These comments respond to an early draft of the subbasin plan, made available in order to increase the opportunity for public review. The formal draft plan including the wildlife section will be posted for public review from June 5 through August 12, 2004 on the NPCC website.

2) Section 1.1. Not Provided.

Response: These comments respond to an early draft of the subbasin plan, made available in order to increase the opportunity for public review. The formal draft plan including the wildlife section will be posted for public review from June 5 through August 12, 2004 on the NPCC website.

3) Section 1.1—Participation. Despite the fact public outreach was assigned to the Okanogan County, all key leads on the planning process have access to public outreach

capacity and bear responsibility for lack of public and stakeholder participation, not just

Okanogan County. It is doubtful, for example, for Okanogan County to be expected to reach regular tribal members and constituents regarding the plan and its impacts—something better done by CCT themselves. Likewise, WDFW should use existing and partner programs it is involved with (such as the WDFW hosted and State legislated RFEG program to assist in public outreach) to support the plan regionally. There is no documentation provided on exactly what public outreach occurred, the specific outreach, education or involvement strategies employed and explanation of why they were most effective, and no estimate in any change in level of understanding of those reached. There was no copy of the flier provided to the public to determine if it contained all the information needed for the public. There was no compilation of notes and results on public feedback. There was no list of specific groups spoken with or amount of public reached in the document. The approach to public outreach was a "we'll tell you" rather than "what do you have to say" exercise that effectively blocked true guidance and grounding of the plan which would have provided it the foundation for public acceptance of subsequent plans to spend recovery funds. Other methods and opportunities for collection of this input offered by organizations outside the SCT wishing to partner and who were experts in this arena were specifically declined by Okanogan County.

Response: An extensive and responsive public outreach plan program was conducted; see appropriate plan appendix.

4) Section 1.1—Infrastructure and Organization, Subbasin Core Team (SCT). There is no evidence that at any time did the SCT ever provide regular detailed (not summary) updates to the public or specific stakeholders about their intended technical approach and considerations being made in the development of the plan, nor how stakeholders could contribute to the SCT efforts. There was no effective way that stakeholders could input on or affect the approach in which SCT made the plans. 5) Section 1.2—Socioeconomic conditions. The plan state that "dealing with constraints will require both institutional and technical approaches, and links between communities of science, interest and place", but does not indicate how the plan will address or link to those already addressing the critical issue of large existing gaps in communications and coordination between scientists, government and tribal agents and landowners / communities in this region. The public will not accept the plan if it conflicts with their interests in this regard.

Response: An extensive and responsive public outreach plan program was conducted; see appropriate plan appendix.

5.)Section 1.2 – Socioeconomic conditions. The state that "dealing with constraints will require both institutional and technical approaches, and links between communities of science, interest, and place", but does not indicate how the plan will address or link to those already addressing the critical issue of large existing gaps in communications and coordination between scientists, government and tribal agents and landowners / communities of science in this region. The public will not accept the plan if it conflicts with their interest in this regard.

Response: Comment noted.)

6) Section 1.4—Key findings and conclusions. Not Provided.

Response: These comments respond to an early draft of the subbasin plan, made available in order to increase the opportunity for public review. The formal draft plan including the wildlife section will be posted for public review from June 5 through August 12, 2004 on the NPCC website.

7) Section 1.5—Plan Goals. Not Provided.

Response: These comments respond to an early draft of the subbasin plan, made available in order to increase the opportunity for public review. The formal draft plan including the wildlife section will be posted for public review from June 5 through August 12, 2004 on the NPCC website.

8) Section 1.7— Synopsis of Major Findings and Conclusions. Not Provided.

Response: These comments respond to an early draft of the subbasin plan, made available in order to increase the opportunity for public review. The formal draft plan including the wildlife section will be posted for public review from June 5 through August 12, 2004 on the NPCC website.

9) Section 1.8—Review of Recovery Actions. Not Provided.

Response: These comments respond to an early draft of the subbasin plan, made available in order to increase the opportunity for public review. The formal draft plan including the wildlife

section will be posted for public review from June 5 through August 12, 2004 on the NPCC website.

10) Section 1.9—Review of Recovery Commitments. Not Provided.

Response: These comments respond to an early draft of the subbasin plan, made available in order to increase the opportunity for public review. The formal draft plan including the wildlife section will be posted for public review from June 5 through August 12, 2004 on the NPCC website.

11) Section 2.1—Subbasin Overview, Socioeconomic conditions. Although it provides background on tribal socioeconomic impact backgrounds, this section does not assess how the current economic climate in the region might influence the prioritization of funding to be spent based on this plan, which was one of the points of the plan. It does not even mention (or reference available documents that do) any of the many non-tribal related economic issues, including massive changes in economic trade which has regionally and largely affected agricultural patterns in the apple, cattle, and logging industries. These industries have key habitat and resource impacts. It would appear from this that either no-one but tribal members live in the Okanogan, or that there are no other considerations from a non-tribal perspective considered important in the plan.

Response: The subbasin plan is not intended to provide an economic analysis.

12) Section 2.1—Subbasin Overview, Agriculture. The plan states that as "Agriculture is not a focal wildlife habitat type and there is little opportunity to effect change in agricultural land use at the landscape scale, Ecoprovince and subbasin planners did not conduct a full-scale analysis of agricultural conditions". This boils down to an untrue excuse to avoid looking at one of the foremost and key issues in the US portion of the Okanogan ecosystem. Most of the major impacts to the most sensitive salmon habitat and overall to watersheds have occurred as a result of agriculture and not addressing this issue is a complete failure by planners. The assertion that there is no way to change things at a landscape scale is untrue—the writers either must not know how, or will not work with the partners necessary to do so. Working with all landowners on all parcels can be done and is currently being worked on, with very little or no support from agencies. If salmon recovery is to take effect in the Okanogan, there is no other way to fix habitat than to deal with individual landowners and involve communities and other land ownership partners. This applies also to the other major land-use impacts discussed in the rest of this section.

13) Section 2.1—Subbasin Overview, Tourism. The plan states that the "most potentially developable land (including many areas formerly covered by wetlands) in the basin has now been developed…" While this might be true in the Canadian portion of the Okanogan basin

where impacts are extreme in comparison with the relatively pristine US river conditions, it is extremely untrue that land development has reached its maximum capacity. Regional economic development efforts are in fact pushing development of the region. For example, there is a major development proposed for waterfront and other sensitive habitat on Osoyoos Lake, a critical habitat for the most impacted and limiting lifestage of one of the last two wild Sockeye salmon runs in the Columbia Basin. Additional examples include major landowners planning to do hundreds of property developments in the headwaters of Bonaparte Creek, which has already been recognized in the regional Water Quality Implementation Plan as the single largest contributor of sediment to the Okanogan River in the US portion of the basin. These issues are swept away with the broad statement that somehow development has reached a peak in the US portion of the Okanogan, when in fact it is only beginning. Anyone that goes to the Methow or the Canadian portion of the Okanogan can see the future of this watershed

and the potential impacts to these resources. Clearly the US portion of the Okanogan is the next target for regional development, and none of these factors are considered in the plan or its priorities for monitoring actions, protection of existing habitat, and restoration efforts.

14) Section 2.2— Focal Wildlife and Fish Species and Representative Habitats. There needs to be more reference to or inclusion of more detailed scientific information on the overall “indicator habitat & indicator species” approach being used to base plans on, such as examples of where it has been employed to date and how it worked. Also, more information on or reference to specific sections of documents explaining monitoring protocols and procedures, and adaptive management processes would be employed to ensure subbasin plans are always relevant to the on-ground habitat restoration realities discovered by monitoring. Plan does not mention how the public involvement in monitoring (well established as useful in other ecosystems), and does not touch on or consider key strategies that would provide cost-effective support and leverage opportunities to on-ground recovery, general agency knowledge and benefit community relationship building. In the end, it would cost way less if you involved landowners and communities. This plan as stands instead is the kind of plan that draws lawsuits instead of partnership. The minor initial cost of involving public from the beginning saves more in the end. This is given lip-service by agencies but no true in this plan, as exampled by statement by Executive Director of the Columbia Basin Fish and Wildlife Authority, told the Columbia Basin Bulletin, 'Agencies have to come to grips with the idea that they have to let loose of the controls. They have to lead from behind. This is not about controlling people and making them do things. It's about enabling them to do their best. People really respond to that. The vast majority of people want to do things to make things better. But mostly they don't have the ideas of how to do it. Or they don't have the resources to get it done.' ". The specific selection of focal fish and wildlife species identified in this section for recovery focus, including the comparative scientific criteria and processes employed by reviewers and others involved to put them in this plan, are neither explained in the text or appendices, nor referenced elsewhere to provide scientific basis for this approach. A brief rationale for selection is given with each species as to why they are

generally selected, but no comparative prioritization for restoration purposes is provided between species, nor is a reference to documents that do. Most of the information contained in this section is a "cut-and-paste" repeat of prior and assembled information and does not fulfill the plan's goal of providing new and coordinated direction and guidance to restoration priorities. The public can not make an assessment of the appropriateness of this plan on this information.

Response: The subbasin plan needs to be edited to be more concise, rather than to include more technical information. Supporting technical information can be found in the references cited by the plan. See response to comment S3-S4 regarding public involvement. Prioritization for fish and wildlife is being developed and will be included in the formal draft plan that will be posted for public review from June 5 through August 12, 2004 on the NPCC website.

15) Section 2.3 Environmental Conditions, Descriptions of Focal Wildlife Habitat. All major sections relating to fish are not provided, including: In-channel condition and function, Riparian/floodplain condition and function, Water quality, Water quantity,

Flow, Future No-action Conditions (2050). This completely disallows public ability to

provide feedback on whether they feel the plan is appropriate for the existing conditions or not.

Response: These comments respond to an early draft of the subbasin plan, made available in order to increase the opportunity for public review. The formal draft plan including the wildlife section will be posted for public review from June 5 through August 12, 2004 on the NPCC website.

16) Section 2.3 Environmental Conditions, Synthesis of Environment / Population Relationships. This part of the plan states what is already known—that we need to fix things, and we know what is important. It does not provide general or specific recommendations for prioritization and debate. It lists the wildlife species of importance and what their situation is but does not provides a prioritization of (or reference to documents that prioritize) projects to be funded with mitigation money and how this money will leverage additional money. Although it contains wildlife, this section does not provide the aquatically related species of importance and what their desired future condition is, much less a prioritization of projects to be funded. The plan states "To move forward on either (mitigating hydropower development or stopping degradation of ecological function) alone, or delay efforts in one sector, may constrain the rate of recovery, or even prevent it. Implementing improvements in hydro and habitat in tandem should maximize productivity by compounding survival improvements across several life stages in lock-step. We think this interaction will maximize the potential for a swifter recovery of these ESUs." but provides no plan as to how to do these things which is the point of the plan itself. It covers objectives and strategies that are already well known and in place, and is basically a repeated laundry list of things everyone knows should be done but is not structured in a useful way to

prioritize which projects get what money when or how to fill gaps in order to proceed through priorities.

Response: The subbasin plan does provide recommendations for prioritization and debate. It is not intended to identify or prioritize specific projects. Desired future conditions for aquatic species will be provided in the formal draft plan that will be posted for public review from June 5 through August 12, 2004 on the NPCC website. The subbasin plan identifies the linkage between habitat and hydro but is limited to addressing habitat; it is not intended to develop a plan for hydro and the other "H's".

17) Most sections of Section 2.6, HAVE NOT BEEN WRITTEN including:

Synthesis of Key Findings

Status of species

Status and Health of the Environment

Biological Performance of the Environment

Summary Key Limiting Factors

Working Hypothesis

Description of Key Assumptions

Key Decisions and Rational

Desired Future Conditions

Reference Conditions

Species Loss from Historic Conditions

Estimated Species Abundance and Productivity

Relationship to Subbasin Goals

Opportunities and Challenges

Despite the technical background information that is included on specific species, this section is supposed to provide "the point" and is one of the most critical section to the

plan for the public in terms of understanding what the basis and background for management is. It does not provide understanding of the basis of the prioritization of future actions and spending

of funding which the plan is meant to provide. If this has not been synthesized already after a year, the management plans provided in section 4 become suspect. If it has been synthesized, then the plan should include it for public review. The public can not make assessments based on this level of information.

18) Section 3. Inventory of Existing Activities. GROSSLY INCOMPLETED, with outdated information included. No summary of how these plans or ongoing initiatives interrelate or will be coordinated for the accomplishment of subbasin priorities is provided. No summary of ongoing initiatives outside of government and tribal agents are listed. This is an insult to community efforts and non-profit initiatives making some of the biggest differences to habitat improvement on ground, and who in comparison to agencies have no resources. Some of the most extensive studies on the largest stretches of the most important habitat has been coordinated by or done by non-profit groups and is not really mentioned or discussed. The public cannot decide whether it wants to participate or support the plans if they don't know the players and the scene correctly—they also cannot determine if the plan's priorities are appropriate based on this incomplete and in places inaccurate picture of efforts in the basin.

Response: Comment noted.

19) Section 4 Management Plan—Definition of Conceptual Foundation. The plan states that its "Goals are a result of a public process, while the conceptual foundation is result of a scientific process. Strategies are derived from the combination of goals (what we want to achieve) and conceptual foundation (the ecological condition needed to achieve the goals)." While once public sets the goals science can provide the answer to "how we get there", this section seems to completely inappropriately infer that public should not, is not capable of, or has no place in being involved in developing and determining if the "how we get there" answer is appropriate one or will have the most cost-effective and/or beneficial results to the public. This is often used to effectively block community involvement in salmon recovery and watershed planning which results in the very clash that is even specifically recognized in the plan between strategy and on-ground implementation. It is, in fact, imperative that the public be involved in the "how we get there" in order to point out ground truths that will affect the effectiveness of the strategies employed. There is no mechanism for this proposed in the plan. Science and government / tribal bureaucrats argue their tactical reasons for keeping technical or logistical planning and policy development on separate tracks, which ends up continually creating the well-known and almost universally acknowledged difference between having a plan with goals that doesn't really result in getting something done or spending money well. What it does result in is the ability of science and government to control the plans, spend money on

their portions of the plans and programs without public interference, and keep Public communities excluded to the detriment of the entire process. This plan reflects the needs of the

consultants and bureaucrats writing it and not the best interest of public money expenditure. Rather than developing this strategy and have the public continually reject it, the public should be involved the development of the strategy (not just goal setting) so the plan that results is automatically accepted and well coordinated at the ground level for maximum cost-effectiveness. This has been done in other areas and can be done if the scientists, agencies and tribes embrace it.

Response: An extensive and responsive public outreach program was conducted; see appropriate plan appendix. The Subbasin Core Team sought public involvement to address the issues raised in this comment.

20) Section 4 Management Plan, Management and Recovery goals. NOT PROVIDED FOR FISHERIES SECTION. The public cannot make a determination on the appropriateness of this plan if there is no information.

Response: These comments respond to an early draft of the subbasin plan, made available in order to increase the opportunity for public review. The formal draft plan including the wildlife section will be posted for public review from June 5 through August 12, 2004 on the NPCC website.

21) Section 4 Near-Term Opportunities AND Prudent Strategies. GROSSLY INCOMPLETE.

Response: These comments respond to an early draft of the subbasin plan, made available in order to increase the opportunity for public review. The formal draft plan including the wildlife section will be posted for public review from June 5 through August 12, 2004 on the NPCC website.

22) Section 4.5 and 4.6 NOT PROVIDED

Response: These comments respond to an early draft of the subbasin plan, made available in order to increase the opportunity for public review. The formal draft plan including the wildlife section will be posted for public review from June 5 through August 12, 2004 on the NPCC website.

23) Section 4.7 Recommendations for Monitoring. Lacks specificity on monitoring needed for this basin and the priority projects planned or ongoing that require monitoring. Misses one of the most cost-effective and beneficial strategies for accomplishing monitoring by not including where, when or how community can be involved in the monitoring, its synthesis, priority development, projects or initiatives to effect improvement of habitat as a result of good monitoring. No-one knows their river or their land better than the landowner or local community members. The public is a vast untapped resource which enjoys and would like to help in resource protection and restoration. Employing volunteer monitoring programs provides cost-effective leverage, relationship building, public outreach opportunities that can never be realized by conventional agency approaches. Well developed, coordinated, supported and funded it can even reach the landscape scale at which the agencies cannot. It requires training, quality assurance and control measures, and consistency in funding support but is a far more cost-effective mechanism for monitoring than currently spent monitoring dollars can do when used in a conventional manner. There are many regional, statewide and national organizations ready to help with a program that makes sense. The fact that this is not included in the plan is a major omission and

flies in the face of the plan's stated goals of "inclusion of communities of science, interest and place".

Response: The monitoring plan was completed in April and is now available for public review on the NPCC website.

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COMMENTS ON PRELIMINARY DRAFT METHOW SUB-BASIN

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Date: May 10, 2004

In general it is not possible to devote the time necessary to review the plan and suggest rewrites for all the sections I am concerned about. In general I feel the plan adopts the usual environmentalist position that: 1) population must be limited, 2) the best way to preserve the environment is to keep it away from human intrusion, 3) government management of lands is better than private ownership and the resulting human activities on it and 4) addresses problems in environmentalist generalities which are not true or specific to the Methow. If we are to succeed as humans in living well with our environment more time and credibility needs to be given to how human activity improves the environment including activities on private lands.

Response: This paragraph addresses several generalities beyond the scope of this planning effort. Thanks for comment.

Below is a snapshot of what I have seen through out the document. If I had the time to be complete in my comments you would have another document of similar size to read.

P. 19 Regulation of land use: The planning assumptions associated with regulation of land use presuppose that only government owned or tribal lands contribute to restoration. None of the planning assumptions addressed the positive contribution of private land ownership to the environment or species recovery. It appears that all human ownership and use of private lands do not contribute to the environment.

Response: The document does not address comparative benefits of public versus private ownership.

P.40 This wording needs to replace the paragraph beginning with "The natural flow..:

Response: The USGS report is one of three relevant reports addressing the issues raised in this comment. Inclusion of sections from one necessitates inclusion of the counterpoint and context contained in the Phase II report (Golder 2003) and the USGS Precipitation-runoff Simulations for the Current and Natural Streamflow Conditions in the Methow River Basin Report No. 03-4246. Additionally, subbasin planners requested information such as this from the Planning Unit in late 2003. Because the Watershed Plan was not completed, and has not been approved yet by Okanogan County and the Department of Ecology, inclusion of the referenced is information is problematic until the parties can agree and jointly endorse its findings.

The USGS completed in July 2003 a natural flow watershed model. The resulting Water-Resource Investigation Report 03-4246 simulated current, natural flows and the effect of irrigation canal seepage on stream flow. Irrigation- canal seepage contributes to streamflow throughout the year with the greatest effect during the irrigation season.[4]

Response: Wording will be considered by technical reviewers/editors for inclusion.

P. 41 Delete paragraph beginning with "Leaking irrigation canals are expected.." Then add:

Field studies have shown that 50 per cent or more of the canal discharge can be returned to the ground-water system through canal seepage. Data modeled on the Chewuch and Twisp rivers showed that there is an increasing gain in streamflow from May through October 7. When the canals are shut off after October 7 the net gain begins to decrease, but remains throughout the year[5].

Response: Wording will be considered by technical reviewers/editors for inclusion. Further, the USFWS requires mitigation and assessment "at the point of impact" marking the claim of benefit to fish from irrigation ditch recharge as an unresolved issue and an issue that does not have broad agreement or support.

P. 41 Delete paragraph beginning with "To date the timing…" replace with:

The seepage from irrigation canals recharges the unconsolidated aquifer during the late spring and summer and may contribute as much as 38,000 acre ft. annually to aquifer recharge to the basin[6]. This represents about 9 percent of annual non-fluvial ground-water recharge in the basin simulated by the water model for years 1992 to 2001. Seepage from the canals is likely to have the greatest effect on stream flow in September and October when streamflow and diversions are

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[4] Precipitation-Runoff Simulations of Current and Natural Streamflow conditions in the Methow River Basin, Washington; Water Resources Investigations Report 03-4246; USGS, 2003 p. 1 of Abstract

[5] Precipitation-Runoff Simulations of Current and Natural Streamflow conditions in the Methow River Basin, Washington; Water Resources Investigations Report 03-4246; USGS, 2003 p. 27

[6] Hydrology of the Unconsolidated Sediments, Water Quality and Ground-water/Surface-water Exchanges in the Methow River Basin, Okanogan County, Washington; Water Resources Investigations Report 03-4244, USGS, 2003 p. 1 Abstract.

relatively low but ground-water flow from the seepage is still relatively high. A transient increase in ground-water discharge of about 30 cfs to the Methow River from Winthrop to Twisp and of about 10 cfs to the lower Twisp River was observed in late summer and early autumn correspond to winter[7].

Response: *Wording will be considered by technical reviewers/editors for inclusion. Further, the USFWS requires mitigation and assessment "at the point of impact" marking the claim of benefit to fish from irrigation ditch recharge as an unresolved issue and an issue that does not have broad agreement or support.*

P. 41 Delete the last paragraph beginning with "There is a great deal of conflicting.." Replace with:

Golder Associates as part of the Phase II Assessment of Watershed Planning made an assessment of agriculture uses including water rights, claims, certificates, and actual acreage of irrigated lands. An assessment of municipal, industrial and domestic uses was made as well.

Response: *Wording will be considered by technical reviewers/editors for inclusion. Further, the USFWS requires mitigation and assessment "at the point of impact" marking the claim of benefit to fish from irrigation ditch recharge as an unresolved issue and an issue that does not have broad agreement or support.*

P.45 Water and Habitat Quality. This section failed to mention the USGS study on water quality which concluded: Surface and ground-water generally was of high quality. Water temperature measurements at all surface water sites at the time of sampling was within the criteria for class AA streams[8]. This statement should call into question that more data is needed for the stated 303 (d) listings mentioned and the associated effects of low stream flows or absence of flows associated with natural aquifer properties. Perhaps natural occurrences should be considered when designating a 303(d) listing.

Response: Wording will be considered by technical reviewers/editors for inclusion. Further, the USFWS requires mitigation and assessment "at the point of impact" marking the claim of benefit to fish from irrigation ditch recharge as an unresolved issue and an issue that does not have broad agreement or support.

P. 52 References to anthropogenic disturbances: It is important to note that not all human disturbances are negative, in fact they may improve habitat. For example Mullan, *et. al.* notes the positive contribution of rip rap at certain sites. Conversion of riparian areas to agriculture and residences is not necessarily a negative. There needs to be more of an attitude of a case by case evaluation of human activity.

Response: Agree in concept, but more recent studies and independent scientific review do not support conclusions of Mullen. Contemporary studies refute many of the claims, findings and assumptions contained in Mullen et al. Specifically, rip rap has not been found to provide a positive contribution, or surrogate to natural conditions, for fish life and health. Additionally,

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[7] *Ibid*, USGS, p. 55.

[8] *Ibid*, USGS, p. 22.

extensive use of rip rap along stream banks can exacerbate temperature problems in near shore areas through conductive heating.

P.63 No one has explained why just after the ESA listing of Chinook Salmon there have been good returns up to the present. Mullen *et.al.* and later evaluations by Ken Williams showed that spawner recruitment for the Methow was at restocking levels based upon the harvest catch. Harvest and later the dams, not degradation of the Methow basin is more the issue on why salmon returns were low in the Methow.

Response: Factors outside the subbasins such as ocean conditions and harvest regulations may account for strong returns

P. 113 References to grazing show an ignorance of various activities by the Okanogan Conservation District, NCRS and rancher which have changed grazing practices and have fenced off livestock from critical riparian areas. The tone and direction of these statements give no credence to the many changes in agricultural practices that have occurred in the Methow since 1988.

Response: Grazing discussion is based on existing published information; authors would appreciate any additional references to be incorporated in subbasin plan.

P. 114 References to Timber management are important. However, I would stress that logging has for the most part been terminated from the Okanogan National Forest. What is left is a forest that in some places has been over harvested and needs restoration and in areas where the forest has returned it is thick dog hair trees. Both situations do not allow for good precipitation capture and water retention which is needed in order to have higher stream flows later in the season. I saw no comments which stressed the need for restoration and management of forests for their potential to increase stream flows.

Response: References are needed for assertions made regarding termination of timber harvest and regarding precipitation capture and retention. Timber harvest management is beyond scope of subbasin plan.

P.114 This particular statement is untrue based upon the USGS water quality study completed in 2003 which said that Methow waters meet drinking water standards. They did not find any levels of pesticides or herbicides that warrant this conclusion Agricultural operations have increased sediment loads and introduced herbicides and pesticides into streams. Its also doubtful that Agricultural activity whether grazing or raising of crops has contributed to the sedimentation load. The Chewuch is naturally high in sediments. Most of the man made influence on sedimentation may come from road banks. Lastly there is a contingent of the WDFW that is seeking to preserve or increase the sediment loading during high flows. So there appears to be a contradiction of fact among the agencies on this one.

Response: USGS water quality study was not released to subbasin team for review. Water quality needs differ for aquatic life (e.g., bioaccumulation due to long exposure) and human consumption.

P.116: This statement: “Channelization and development along water courses has eliminated riparian and wetland habitats.” would be more honest if it said: “Where development along stream banks has occurred riparian and wetland habitat has been confined to the existing channel.”

Response: This will be reworded for accuracy. Reworded to: “Channelization and development along water courses has altered riparian and wetland habitats.”

P.116: The comments on environmental and ecologic relationships is definitely biased in its conclusions that humans have only done bad things. Current data shows that water quality is high in Methow streams. If that is so how has residential development degraded water quality? Also I would point out that a holistic management of forests by MAN that includes harvest, proper thinning, restoration and use of fire would be a better statement. Is it really true that species are forced out of their habitats due to human development? Initially I would say yes during the development stages, but later once normal human is maintained species return. How do you account for the return of birds, deer, raccoons coyotes etc. where humans are present? Its more an issue of whether or not people welcome these species and restore habitat they can use after they have built their home. Even the Audubon Society knows this and provides books on how you can do this.

Response: Subbasin plan data is based on objective findings of fact. Additional scientific information has invited through SCT review and public comment.

P.145 In reference to how human land management affects the environment it might also be pointed out that man made decisions to restore the environment by lining canals or doing other activities has negatively impacted the environment because cumulative effects were not considered. This factor of net benefit is never discussed in the document. This evaluation should include both the positive contribution that human presence provides as well as negative and the evaluation of whether or not returning an ecosystem back to its perceived original native state is a better benefit than what now exists.

Response: Subbasin plan did not analyze effects of activities, but assessed current habitat conditions and modeled historic conditions.

P. 145 This statement is a good example of environmental propaganda:

Response: This will be reworded to improve accuracy. Reworded to: “Seasonal naturally occurring and human influenced low stream flows and occasional dewatering can alter fish passage to upstream spawning and rearing habitat. Low flows also affect water quality by contributing to higher stream temperatures in summer months. Stream borne sediment, when present in altered or unnatural amounts and timing, degrade overall water quality. In addition, low stream flows tend to concentrate any toxic material or other contaminants entrained in stream flow.

Seasonal naturally occurring and human influenced low stream flows and occasional dewatering can alter fish passage to upstream spawning and rearing habitat. Low flows also affect water quality by contributing to higher stream temperatures in summer months. Stream borne sediment also degrades overall water quality. In addition, low stream flows tend to concentrate any toxic materials or other contaminants entrained in the stream flow.

These are generalized statements which cause the uniformed reader to conclude that low flows and dewatered areas are bad, sediment is always bad, low flows always mean higher stream temperatures etc. For the Methow this is not the case. Most low flows are natural. Its not clear that human use of water has caused low flows that have been passage barriers when fish need it, and water temperatures in the Methow don't necessarily correlate with low flows as much as a streams orientation towards the path of the sun and its not been proven that there are toxic materials and other contaminants in the Methow basin to concentrate. Lately on a project I am working it has just been stress to me that sedimentation recruitment is needed in order to rejuvenate fish habitat each year not to mention the need for significant enough flows to move boulders downstream to rearrange the stream channel. So such statements above are not truthful and of the sort that should be in a plan like this.

# #

May 7, 2004

Okanogan County Water Resources

123 North 5th Ave., Room 110

Okanogan, WA 98840

Attn: Julie Dagnon, OCWR Manager

Mark Walker, Director of Public Affairs
Northwest Power and Conservation Council
851 SW 6th Ave., Suite 1100
Portland, OR 97204

Subject: Subbasin Watershed Planning Recommendations and Comments on two plans

Please accept the following recommendation and comments on behalf of over 800 members of Kettle Range Conservation Group, whose mission is to defend wilderness, protect biodiversity, and restore ecosystems of the Columbia River Basin.

Recommendation

The goals of the Subbasin Watershed Planning Process should remain flexible through the years. Attendance at several meetings during the current effort indicate that the process is being viewed as a "solution" rather than a "process". To meet this recommendation would require that the Subbasin Watershed Planning Process include a means for incorporating changes. What we found at the meetings was more akin to a few spreadsheets with no formalized procedure or

designation of authority. The document provided at your website titled "Considerations for Monitoring in Subbasin Plans", by the Pacific Northwest Aquatic Monitoring Partnership make the mistake of equating a programmatic approach with a coarse-scale approach. This is a serious flaw which will result in wasted expenditures, because it doesn't incorporate "adaptive management".

Response: Adaptive management is integral to the subbasin plan; it is intended to be flexible. The intent is to be strategic, rather than opportunistic in management. The subbasin plan process does incorporate changes through its monitoring program and the use of objectives and working hypotheses.

Yet this is exactly what is being proposed--to move away from project-specific pilot projects toward state and regional models. The document claims that "these pilot projects demonstrate how the top-down approach can work to create monitoring projects that have systemwide applications." We can only accept this if the program to continue with pilot projects that deliver money to the ground rather than to remove beltway bureaucrats is continued.

The list of projects is then divided into top-down and bottom-up categories, yet these categories are never defined, nor does the document indicate if coarse scale measurements will be applied to time series as well as spatial data. In other words, we believe this is a veiled attempt to keep money within the agencies rather than disbursing it to the collaborators. While there may be good reasons to minimize the huge costs to disbursing funds to individuals or non-profit groups, you can obtain the same results by simply defining the parameters of "monitoring" to define who makes what decision when. What needs to be specifically described are a roadmap of the plan and checkpoints along the way, that identify who will be making decisions and what the criteria will be for "success".

We believe that it is in the best interest of both the Northwest Power and Conservation Council as well as the public interests to establish a clear and concise process for incorporating changes in input parameters, and hope you can honor our recommendation with specific answers.

Response: The subbasin does not propose projects. The comments in paragraphs 1-3 address the PNAMP document, which is one of a number of sources used to develop the subbasin plan monitoring section. The monitoring section develops a framework that addresses the watershed environment against the objectives of the subbasin plan, rather than specific projects. Adaptive management and criteria are both developed in the subbasin plan monitoring section. The subbasin plan is silent on implementation and funding.

Comments on the Methow Subbasin Plan

We would like to prioritize increased aquifer and groundwater storage within the basin to benefit both fish, wildlife and agricultural uses.

We would like to prioritize restoration of beaver dams and beaver habitats throughout the basin. Basic research on the benefits of beaver dams and their habitats is lacking throughout the northwest. Research should include surveys on the quality and quantity of beaver dams as they relate to water storage, fish habitat, flood protection and wildlife habitat. More research is needed on the value of beaver dams to downstream water users and fisheries.

More funding is needed for protecting riparian and floodplain integrity. Problems continue to increase with flooding, sedimentation, stream gravel embeddedness, lack of quality pools, lack of LWD, and debris flows resulting from managed landscapes. There should be incentive programs to protect these resources and disincentives for shoreline development.

There needs to be more emphasis on shoreline restoration projects that increase fisheries and beaver dam habitats. Funding needs to be targeted toward endangered species restoration. Bull trout should receive special protection as an indicator species for clear water habitats. Projects are needed for restoration of side channels and breeding habitats off of the main channels, including native plant species restoration.

Increase protection for all native fish species including bull trout in all the areas where they historically occurred. Maintain separate demographic tallies for native species and hatchery fish. Do not fund projects that spend funds to count wild and hatchery fish together.

There should be increased funding to support the lower reaches of the Methow River, from Carlton to the mouth, and including tributaries Gold Creek, Libby Creek and Squaw Creek.

Some studies should be concerned with the relationship of upland ponderosa pine and shrub-steppe habitats to the riparian ecosystems. A number of key species may be linked to the protection of both these ecosystems, including moose, beaver, black and grizzly bear.

There should be funding for research on the distribution and abundance of Western Gray Squirrels, a State listed species that occurs in the southern portion of the Methow subbasin. Funding for conservation and restoration projects should be prioritized to protect and enhance Western Gray Squirrel habitat.

There should be more funding for non-chemical noxious weed control programs and plans. The Noxious Weed Control Boards have shown that there is insufficient encouragement from the state to use more sensitive methods of weed control, and as a result, there are a number of areas where healthy ecosystem values along sprayed roads are being lost due to denudification of the ground and vegetation. Areas treated are sometimes directly in streams, and the county Weed Boards do not have the resources to address the technical aspects of the chemical industry.

Response: The suggestions made in these sections of the comment letter exemplify the kind of project that are expected would be conducted during subbasin plan implementation. The subbasin plan does identify specific projects.

Comments on the Okanogan Subbasin Plan

We would like to prioritize increased aquifer and groundwater storage within the basin to benefit both fish, wildlife and agricultural uses.

We would like to prioritize restoration of beaver dams and beaver habitats throughout the basin. Basic research on the benefits of beaver dams and their habitats is lacking throughout the northwest. Research should include surveys on the quality and quantity of beaver dams as they relate to water storage, fish habitat, flood protection and wildlife habitat. More research is needed on the value of beaver dams to downstream water users and fisheries.

More funding is needed for protecting riparian and floodplain integrity. Problems continue to increase with flooding, sedimentation, stream gravel embeddedness, lack of quality pools, lack of LWD, and debris flows resulting from managed landscapes. There should be incentive programs to protect these resources and disincentives for shoreline development.

There needs to be more emphasis on shoreline restoration projects that increase fisheries and beaver dam habitats. Funding needs to be targeted toward endangered species restoration. Bull trout should receive special protection as an indicator species for clear water habitats. Projects are needed for restoration of side channels and breeding habitats off of the main channels, including native plant species restoration.

Increase protection for all native fish species including bull trout in all the areas where they historically occurred. Maintain separate demographic tallies for native species and hatchery fish. Do not fund projects that spend funds to count wild and hatchery fish together.

Some studies should be concerned with the relationship of upland ponderosa pine and shrub-steppe habitats to the riparian ecosystems. A number of key species may be linked to the protection of both these ecosystems, including moose, beaver, black and grizzly bear.

There should be funding for research on the distribution and abundance of Western Gray Squirrels, a State listed species that occurs in the southern portion of the Methow subbasin. Funding for conservation and restoration projects should be prioritized to protect and enhance Western Gray Squirrel habitat.

There should be more funding for non-chemical noxious weed control programs and plans. The Noxious Weed Control Boards have shown that there is insufficient encouragement from the state to use more sensitive methods of weed control, and as a result, there are a number of areas where healthy ecosystem values along sprayed roads are being lost due to denudification of the ground and vegetation. Areas treated are sometimes directly in streams, and the county Weed Boards do not have the resources to address the technical aspects of the chemical industry.

Response: The suggestions made in these sections of the comment letter exemplify the kind of project that are expected would be conducted during subbasin plan implementation. The subbasin plan does identify specific projects.

Thank you. We appreciate the opportunity to participate and comment on these issues.

Sincerely yours,

George Wooten, Botanist
Kettle Range Conservation Group
<gwooten@kettlerange.org>
509-997-6010

##

From: "Lee Bernheisel" <owl@mymethow.com>

To: "Julie Dagnon" <jdagnon@co.okanogan.wa.us>

Date: Sun, May 9, 2004 7:37 AM

Subject: Subbasin Plan

Julie

Here's a couple of quick comment on the Draft

1. Pateros Dam

On page 42 and 81 the plan still says that the dam in the Methow near Pateros blocked all passage for fish.(Impoundment and Irrigation Projects) This is incorrect and has remained in the literature long enough its time to correct it in this plan with the fisheries agency's addressing its past mistakes. Please contact me if you need more information than I have already submitted.

Response: This will be reworded to improve accuracy.

2. Irrigation Districts

The Methow Valley Irrigation District was reorganized in and around 2000 and at that time the acreage was reduced to about 850 acres. The MVID is not required to supply 12cfs to the Barkley ditch. Their agreement is for the Barkley to supply water to the MVID ditch for its patrons along the ditch. (For conformation or more info check with me or Bob Barwin,WDOE)

Response: Discussion of MVID will be researched and revised.

The Skyline ditch is now completely lined or piped (p44 check with Greg Knott, BPR for details)

Response: The lowest ¼ mile not yet lined/piped.

That's it for now, good luck

Lee Bernheisel

##

Methow Valley Citizens' Council

P.O. Box 774, Twisp, WA 98856

Okanogan County Water Resources May 10, 2004

123 North 5th Ave., Room 110

Okanogan, WA 98840

Attn: Julie Dagnon, OCWR Manager

Subject: Subbasin Watershed Plan Draft Comments

We feel the main priority of watershed planning is to increase aquifer surface and groundwater storage for overall subbasin ecosystem health. Areas for which we support funding include:

Removal of bank armoring/dikes/riprap etc.

Riparian and floodplain integrity preservation. Funding for monetary incentive programs that protect and restore fisheries habitat. Disincentives for shoreline development including removal of riparian vegetation, subdivision or any kind of bank armoring.

Shoreline restoration projects to increase suitable fisheries habitat. Funding for projects that will nurture endangered species restoration. Funding of projects for research and restoration of side channel restoration for breeding habitat, water storage and riparian area improvement, including native plant species restoration.

Native fish species protection. Increase protection for all native fish species including bull trout in all the areas where they historically occurred. Keep native species categorized separately from hatchery fish when assessing threatened and endangered species status.

Restoration of beaver habitat. This needs to include funding of research projects such as inventory of existing beaver dams and development of historical data. Also more research is needed on the value of beaver dam induced water storage on downstream water users, benefits to wildlife, and fisheries.

Conservation easements and public land acquisition in critical habitat areas.

Funding to support further study of the lower reach of the Methow river, from Carlton to the mouth.

We also believe that the conservation of upland Ponderosa Pine and Shrub- Steppe habitat is crucial to the health of the subbasin. Areas for which we support funding include:

Funding for research on the distribution and abundance of Western Gray Squirrels, a State listed species, in the southern portion of the Methow subbasin. Funding for conservation and restoration projects that protect and enhance Western Gray Squirrel habitat.

Funding to study the local distribution and abundance of focal species identified in the Draft Subbasin Plan, and to conserve key habitat that provides connectivity for these species.

Funding for educational programs that assist private landowners in the Shrub steppe and Ponderosa Pine habitat types to integrate habitat conservation with forest restoration and fire prevention activities.

Funding that supports landowners and the Okanogan County Weed Board in performing non-toxic noxious weed control for such species as knapweed, white top, toadflax, etc.

Response: The suggestions made in these sections of the comment letter exemplify the kind of project that are expected would be conducted during subbasin plan implementation. The subbasin plan does not identify specific projects.

The draft Subbasin Plan document is missing information under key headings such as "Key findings and Conclusions;" "Synopsis of Major findings;" and "Plan Scope." We expect that these and other headings in the document will be completed before the Final draft, in time for public review.

Response: We recognize that information is missing and will be incorporated in the draft that will be posted for public review from June 5 through August 12, 2004 on the NPCC website.

We appreciate the opportunity to participate and comment on this important plan.

Sincerely,

Vicky Welch, Chairman, MVCC

##

OKANOGAN COUNTY FARM BUREAU

May 10, 2004

10 Wilson Ranch Rd

Riverside, WA 98849

Julie Dagnon, Water Resource Division Manager

Okanogan County Water Resources

123 N 5th Avenue – Room 110

Okanogan, WA 98840

Re: Okanogan County Farm Bureau Comments on 2nd Draft Subbasin Plans: Okanogan/Similkameen and Methow

Dear Ms. Dagnon:

Following are the Okanogan County Farm Bureau comments and concerns.

Local Concerns

County Commissioners' Concerns: Okanogan County Commissioners met on 5/3/04 to outline county concerns about the content and tone of the subbasin plans. Those in attendance (county staff, public outreach contractor, and representatives from WDFW and the Colville Tribe) agreed with the concerns and the need to rewrite large segments prior to submitting the plans to Northwest Power Conservation Council (NPCC). Extensive and repetitive attacks on agriculture, grazing, irrigation and forestry throughout the plans were a major concern and remain very troubling.

Response: Comment noted.

Okanogan County Farm Bureau agrees with the concerns expressed by Okanogan County Commissioners and we support the need for considerable revisions to the plans. The following comments are based on the 4/23/04 draft as the public will not have access to the revised plans before they are submitted to NPCC.

Process Concerns/EDT: Subbasin plans are heralded as *local plans* in spite of inadequate local public involvement and lack of information provided to the public even when requested. The Habitat Working Group (referred to as the "technical folks") met outside public purview for approximately seven months to make assessments relying on "expert opinion." After defining and describing 148 stream reaches, rating 46 habitat attributes for those reaches, reforming those reaches into 21 Assessment Units, the information was fed into the controversial Ecosystem Diagnosis and Treatment (EDT) Model to determine the working hypothesis and management strategies. Excerpts from a scientific review outlines the *pitfalls of the EDT Model* used in subbasin planning (See Appendix A). The review states, "EDT exemplifies how modeling should not be done."

The Methow Watershed Planning Unit elected not to use the EDT because of the problems associated with the model.

Response: All Habitat Work Group meetings were open to the public and were advertised through the County. The habitat assessment relied on the full range of data available, including empirical data, expanded and derived information, expert opinion/local knowledge. The documentation is transparent as to what level of data was available, the confidence associated with the data used, and identifies where more information is needed. EDT is the preferred model authorized by the NPCC for the subbasin planning process.

Local Watershed Planning Ignored: The Methow Watershed Planning Unit that includes years of work and research by local volunteers and experts was virtually ignored in the subbasin process. No direct contact was solicited for input and key on-the-ground studies that were conducted in the Methow were discredited and/or minimized in the Methow subbasin plan and replaced with hypothetical analysis.

Response: The Methow watershed planning unit was invited to participate, and opportunities were made available for their involvement. USGS water quality study was not released to subbasin team for review.

It is of interest also that the Methow USGS study was previously disregarded because it had not been published, and the subbasin plans are riddled with unpublished data.

Summary: The plans touch on some of the limitations of the process with the "compressed process that has allowed little flexibility in stakeholder involvement" [Page 4] but does not give an accurate picture of the difficulties those who tried to participate experienced. The closed-door assessment process by the technical Habitat Working Group, the lack of handouts of information, difficulty in obtaining any core information throughout the process, unanswered requests and disregard for reasonable public input makes these plans "local" in name only. This is just another case of the state and federal agencies and tribe writing the plan; the only difference is that they came to the county to do it. Credibility of information and accountability to the public are lacking.

Response: All Habitat Work Group meetings were open to the public and were advertised through the County. Requests for information were honored and opportunities for reasonable public input were provided throughout the process.

General Concerns

Due to the complexities of the subbasin planning process and plans, repeated revisions, significant data gaps and access to only approximately 378 pages of the 1,600-page plans, it is extremely difficult for Okanogan County Farm Bureau members and other stakeholders and groups to make substantative comment. Many of our comments will be general in nature where continued review has raised several topics of overriding concern.

Response: These comments respond to an early draft of the subbasin plan, made available in order to increase the opportunity for public review. The formal draft plan and supporting materials in plan appendices will be posted for public review from June 5 through August 12, 2004 on the NPCC website. The subbasin plan is not 1600 pages in length.

Our previous comments stressed the importance that *subbasin plans not be extended to land management planning and management due to fundamental limitations of the plans* (Appendix G). In spite of the severe limitations of the plans:

The original purpose of subbasin planning to direct NPCC funding has been expanded to function as a general "framework" for future projects, actions, activities and land use planning throughout the county.

Subbasin plans expand land management beyond legal mandates for Endangered Species Act (ESA) listed species to include management of all fish and wildlife.

Subbasin plans and the NPCC Fish and Wildlife Program are elevated to ESA and Clean Water Act status, creating another layer of federal land management extended to all fish and wildlife.

Subbasin plans will be used for federal recovery plans.

Response: Subbasin plans are not land management plans, as such. Local land use management continues to be the responsibility of local government. State government has existing land use regulatory responsibilities in certain cases. The subbasin plans provide a framework for proposed projects. That framework recognizes existing legal mandates and may inform ongoing updates to existing regulations. It also provides recommendations to local and state government and willing landowners, that may be implemented by them. Effective species recovery will need to include land use management considerations. The subbasin plan guides Bonneville's actions under the existing Biological Opinion, but has no regulatory authority and is not characterized as having regulatory authority. It does not expand the legal mandates of the ESA. Background information developed through subbasin planning will be used in recovery planning, however implementation of a federal recovery plan is strictly voluntary.

Expanded Purpose: The purpose stated over and over to the public was that subbasin plans would be used by NPCC to prioritize and direct Bonneville Power Administration NPCC mitigation project funding. Language now shows that the NPCC subbasin plans will be used as a "framework" for all actions and activities in the Okanogan and Methow Subbasins:

"Actions taken in the subbasin[s] should be consistent with, and designed to fulfill the vision of the Okanogan [and Methow] subbasins." "This vision and subbasin plan…is intended to provide a framework under which future projects can be developed and implemented*."[Okanogan, Page 207 – Methow, Page 19]*

Response: Subbasin plans will be used as a framework for all BPA-funded actions and activities, not "all actions and activities" in the Okanogan and Methow. The mission statement and introduction language will be clarified.

Expanded to All Fish and Wildlife: NPCC mitigation reaches beyond listed species and includes all fish and wildlife. Use of subbasin plans as a framework for county projects, actions and land management goes beyond legal mandates and expands all fish and wildlife to ESA-listed recovery status.

"Future land use planning and activities that involve potential impacts to fish and wildlife and their habitats should be fully discussed with the agencies and tribes with management authority prior to implementation."

[Okanogan, Page 207 - Methow Page 19]

Subbasin Plans Expand Federal Land Management: The following indicates subbasin plans are being developed as a back-door land management authority despite the lack of openness and credibility of the process and the plans and the limitations of the process, methods and results and elevates NPCC and the Fish and Wildlife Program to federal ESA/CWA status.

Actions taken in the sub basin should be consistent with the Okanogan sub basin plan, the NPCC Columbia Basin Fish and Wildlife Program, Clean Water Act, and the Endangered Species Act."[Okanogan, Page 2]

Use of Subbasin Plans Extended to Federal Recovery Planning: Again in spite of the limitations, the plans will be used as the foundation for NOAA (National Marine Fisheries Service) and US Fish and Wildlife Service ESA federal recovery planning requirements.

Response: Background information developed through subbasin planning will be used in recovery planning.

Management Plans

Conflict of Interest: The plans will direct future project funding and the writers of the plans are the recipients of the project funds. Several project needs continued to resurface throughout the Okanogan plan that are known to be "pet projects" of the agencies and tribe. Among those specifically noted are Salmon Creek, Omak Creek, and the Conservation Reserve Program (CRP). It appears there may be a conflict of interest in order to receive funding.

Response: The subbasin plan is silent on implementation and funding.

Land acquisitions and purchase of water rights are also common management tools throughout the plans.

Wildlife Section: This is the first opportunity the public has had to review the Wildlife portion of the plans. The Wildlife portion was produced outside the public and Subbasin Core Team process and information requested by the public throughout the process was not provided.

The focal species descriptions do not apply to our area and cannot be viewed as "local information." At least one focal species does not inhabit the Okanogan or surrounding areas. Many references are outdated or unpublished and mostly unavailable to the public.

The focal species and broad management appears to follow the information from Partners In Flight referenced in the plan, which is a group of agencies, environmentalists, consultants and academia with established focal species and management plans. It appears the wildlife section for focal bird species used much of the information from Partners in Flight. The wildlife portions were written outside the county with little application to our specific area and no public input, which is a disservice to our county.

Further research will determine whether the wildlife portions of the plans were re-writes of the Partners In Flight information. Regardless, the wildlife portion is far from "local."

Response: These comments respond to an early draft of the subbasin plan, made available in order to increase the opportunity for public review. The formal draft plan including the wildlife section will be posted for public review from June 5 through August 12, 2004 on the NPCC website. The focal species were selected as indicative of habitat types that occur in the subbasins.

Missing Information: As noted above, agriculture, grazing, forestry, irrigation and any human contact with the land are viewed as damage to the environment compared to "natural pre-European conditions. Agency mismanagement is not listed, such as lack of predator control or predator introduction, bird impacts on migrating smolts, state-required removal of LWD from streams and rivers, etc.

Response: Comment notes. The subbasin plan does not consider land ownership or impacts, but only assesses the current condition of the land and its ability to support fish and wildlife.

Summary

Please refer to the comment letter by Okanogan County Farm Bureau dated March 11, 2004 for further comments and concerns that have yet to be addressed.

We will continue to review the subbasin planning process and make further general and specific comments during the NPCC comment period when it is anticipated the complete plans will be available. We look forward to the NPCC scientific review with the hope that further direction will solve some of the local conflicts and credibility issues.

Sincerely,

Mike Wilson, President

Attachments: Appendix A and B

Cc: Washington Farm Bureau

Okanogan County Commissioners

7th and 12th District Legislators

Northwest Power and Conservation Council

Emphasis added throughout.

[ ] Writer's comments

Appendix A

Excerpts from the

SALMON RECOVERY SCIENCE REVIEW PANEL

Report for the meeting held

December 4-6, 2000

Northwest Fisheries Science Center

National Marine Fisheries Service

Seattle, Washington

II. MODELS

A. STYLES OF MODELS AND THEIR UNDERLYING PHILOSOPHIES

The management of natural populations is an exercise in quantitative science; hence mathematical models are essential and invaluable tools. However, they must be used wisely and with understanding of limitations. Fisheries biology, in particular, has been a rich breeding ground for mathematical descriptions ever since the great mathematician Vito Volterra turned his attention to the fluctuations of the Adriatic fisheries. Volterra's models were simple in structure, but complex in dynamics; this duality made them powerful aids in understanding key features of complex population fluctuations. Years later, William Ricker, perhaps the most innovative and influential of fishery scientists, showed how fairly simple age-structured models of fish populations could exhibit even more complicated dynamics (Ricker 1954); indeed, his simulations were probably the first demonstrations in ecology of chaotic population dynamics, whose importance was clarified twenty years later in a landmark paper of Robert May (1974).

The lessons of these seminal studies are inescapable: Models can play a fundamental role in demonstrating the mechanisms underlying observed phenomena, but even simple models can have complicated dynamics. The more complex models become, the more easily one can twist them to do almost anything, and the less reliable they become. Ludwig and Walters (1985) explored these truths in detail for fishery models in particular, taking into account explicitly the problems associated with parameter estimation. Their work demonstrated that, although models must include enough detail to capture the essential, unique aspects of a problem, too much detail can render models useless. The key to intelligent modeling is to find the optimal level of detail and to suppress confounding statistical noise. This is basically the approach that has worked so effectively in physics, in which statistical mechanical methods allow one to capture robust

macroscopic features in terms of the collective dynamics of large numbers of unpredictable parts. This is the only approach that makes sense for modeling large-scale, intrinsically complex and dynamic systems.

The conclusions to be derived are that large-scale models that attempt to capture the dynamics of many species, or that rely upon the measurement of massive numbers of parameters, are doomed to failure. They substitute sledgehammer simulation for analytical investigation and efforts to identify the few key driving variables. Large models are bedeviled by problems of parameter estimation, the representation of key relationships, and error propagation. When the phenomena are fundamentally non-linear, this leads naturally to path dependence and to sensitivity of results to parameter estimates. As the number of parameters increases, the potential for mischief increases.

Thus it is essential to rid models of irrelevant parameters, and to identify key relationships. It also emphasizes the importance of locating what aspects of the model are most likely to lead to the expansion of error, and to focus on representing these as accurately as possible. This can only be done reliably through data-driven methods, with attention to appropriate statistical methodology.

When the data are not available for the needed estimates of parameter values, there is a tendency to insert values based on opinion or expert testimony. This practice is dangerous. The idea that opinion and "expert testimony" might substitute for rigorous scientific methodology is anathema to a serious modeler and clearly represents a dangerous trend. Indeed, there are limitations even to what can be done on the basis of data: the fact that relationships are often nonlinear, and further that interest often rests on understanding the behavior of populations beyond the range of variables that has been observed, creates vexing problems for the modeler. It provides a compelling argument for experimentation in order to elucidate underlying mechanisms, for the recognition of limits to predictability, and for the use of adaptive assessment and management (Ludwig and Hilborn 1983; Holling 1978).

EDT is a case study of the problems just discussed. The current version which uses 45 habitat variables might be a useful list of things to consider, but the incorporation of so many variables into a formal model renders the predictions of such a model virtually useless. Even more vexing is that EDT depends upon a large number of functional relationships that are simply not known, (and cannot be known adequately) and yet they play key roles in model dynamics. The inclusion of so much detail may creates an unjustified sense of accuracy; but actually it introduces sources of inaccuracy, uncertainty and error propagation. Subjective efforts to quantify these models with "expert opinion" compound these ills. (Pages 4-5)

EDT exemplifies how modeling should not be done. It is overparameterized, includes key functional relationships that cannot be known and cannot be tested, creates a false sense of accuracy, yet introduces error and uncertainty. Its very complexity makes it difficult to determine

the effect of various assumptions and parameter values on the model's behavior and relation to data. The attempt at quantification through subjective "expert opinion" compounds these fatal weaknesses, especially the model's inability to confront and improve with confrontation of data. (Page 8)

Emphasis Added

The entire document can be viewed at: http://publicnwfsc.afsc.noaa.gov/trt/rsrpdoc2.pdf

Appendix B

Subbasin Planning Limitations

Okanogan County Farm Bureau Comment Letter – March 11, 2004

Subbasin Planning Limitations: The reported purpose of subbasin planning is to direct Bonneville Power Administration mitigation funding through the Northwest Power and Conservation Council. It is important that subbasin plans not be extended to land management planning and management due to fundamental limitations of the plans, which include:

Subbasin plans are being developed solely for the benefit of fish and wildlife, with no consideration of costs, economic losses or conflicting human interests, which results in faulty findings.

The "ecosystem approach" used does not make any distinction between public land and privately owned land in its determination of fish and wildlife management plans.

Private property rights and land rights including water rights are not recognized.

Management plan goals are based on comparisons to "historic" or perfect, untouched conditions that are thought to exist prior to European settlement, which are not attainable, sensible or necessary.

Goals are widely based on data with significant information gaps and unmeasurable outcomes with minimal public involvement.

The cumulative effects of restrictions and regulations on private property ownership and land use are not measured.

The economic losses to the private landowner, agriculture, natural resource-based industries and county economic viability are not considered.

The subbasin planning process bypasses land management planning safeguards and requirements such as economic review, public notice and public involvement.

There is no legislative oversight of back-door ecosystem approaches to manage lands.

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TO: Okanogan County Water Resources

Northwest Power and Conservation Subbasin Planning

123 North 5th Avenue Rm. 110

Okanogan, WA. 98840

RE: Comments on Methow Subbasin Plan

This document should not be called a plan because it's not a plan. It's a bunch of philosophical statements, most of which have nothing to do with the Methow Basin. It's also made up of policy judgements and a lot of assumptions. Where is the science you claim this plan is based on? Policy judgements and assumptions should not be funded with rate payer monies, and flowery philosophical statements that have no relationship to what really needs to be done in the Methow Basin are nothing but filler for the document. You don't really say anything in this document, it's a complete waste of ratepayers monies. What you do in this document is leave the door open to do anything you wish. The plans a blank check with nothing but a signature, the citizenry is supposed to trust that the state will do the right thing with it, haven't seen it happen yet. This is why we have a public comment period so we can weed out the garbage. In this case you were afraid of getting caught so you didn't include the garbage "yet", even though what you do present I also consider garbage of another type. The people responsible for this garbage should be fired and put into positions fitting their abilities, garbage collectors.

Again this document is incomplete, the following categories have all been left out.

1.2 Local and Regional Scio-economic Conditions

1.3 Overall Direction and Goal of Subbasin Plan

1.4 Key Findings and Conclusions

1.5 Plan Goals

1.6 Plan Scope

1.7 Synopsis of Major Findings and Conclusions

1.8 Review of Recovery Actions

1.9 Review of recovery Commitments

The above list is the meat of the plan. What you have us reviewing is nothing, you wasted our time, you wasted our money, and you've destroyed your credibility.

I sat on the MBPU for the last five years. We had preliminary information supplied to us by the USGS, which the MBPU wished to incorporate into our plan. John Storman the DOE representative to the MBPU was adamantly opposed to this incorporation of information supplied by the USGS even though it was based on very good science. He stated that USGS information could not be used until the USGS report had been reviewed and completed. I see John Stormon is listed on the Habitat Work Group list representing the DOE. It appears the DOE is now willing to use policy judgements, assumptions and Philosophical statements in place of good science. What ever it takes to get them where they want to be.

You make a statement on page 145 about low flows affecting water quality by contributing to higher stream temperature in summer months. I assume you are claiming this condition is occurring in the Methow Basin or why would you have put it in the Methow Subbasin Plan.

Well the USGS state that irrigation withdrawals on the Twisp River "were not" raising water temperatures. They also state that they had not done the work to say whether or not recharge water was cooling the Twisp River, but studies have been done that show recharge water from groundwater aquifers helps cool stream flows. I'm sure the folks on the Habitat work Group are aware of this occurrence but I don't see where you included this language in the plan, I guess it doesn't fit in with your policy goals.

You seem to think natural or what was here before the white mans settled the area was better than what is here today. You hammer everything the white man has touched. In those times before the white man came the Methow Basin was a very harsh place for all species of life to make a living in. Dry and hot in the summers (high Desert), it lie's in the coldest of the 24 western climate zones, even the native Americans left the valley in the winter time. In early times the Methow Basin was not the Garden of Eden, we were thrown out of the Garden of Eden because of a liar and manipulator, does this remind you of someone. Today the Methow Basin is a friendlier place to all forms of life due to mans influence on the environment. Sure there has been some thing's done that were not beneficial, hell, Washington State agencies are still doing them under the guise of fish recovery. Today there is more riparian habitat, more habitat of all kinds due to mans influence. There is 10% to 30% more fish being reared naturally in the rivers because of nutrients from mans activities entering wasteways. Recharge water from unlined irrigation canals recharge groundwater aquifers that in turn recharge instream flows. "Salmon populations are greatest in streams that receive high groundwater input, which sterilizes base flows and water temperatures, and promotes greater water fertility" (Hendrickson and Doonan 1972; White et al. 1976; Meisner et al. 1988). This is happening today here in the Methow Basin. Its time to stop hammering the things man has influenced in the basin and start realizing the benefits of mans influence in the basin. These beneficial influences need protection from those that would destroy them. This plan does not recognize the benefits of mans influence on the environment and would destroy 100 years of beneficial influence. The Methow Basin Watershed Planning Units Plan did recognize these benefits, if the Northwest Power and Conservation Council really wants to protect and enhance habitat, fish and wildlife they should contact the MBPU for funding direction.

Michael D Gage