Draft

Bonneville Reservoir Subbasin Summary

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Prepared for the
Northwest Power Planning Council

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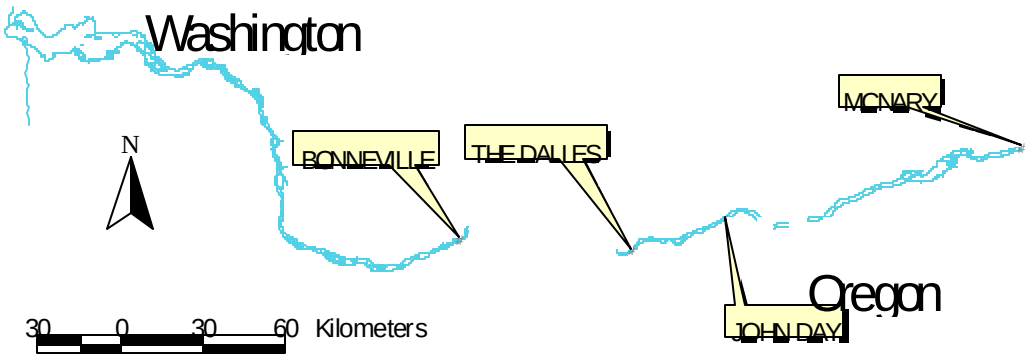
Subbasin Description

General Location

Bonneville Reservoir, a mainstem Columbia River impoundment bounded by Bonneville Lock and Dam (closed 1938) at river km 235 and The Dalles Dam (closed 1957) at river km 308, is located approximately 64 km east of Portland, Oregon and Vancouver, Washington. The reservoir is entirely within the Columbia River Gorge National Scenic Area (Figure 1).



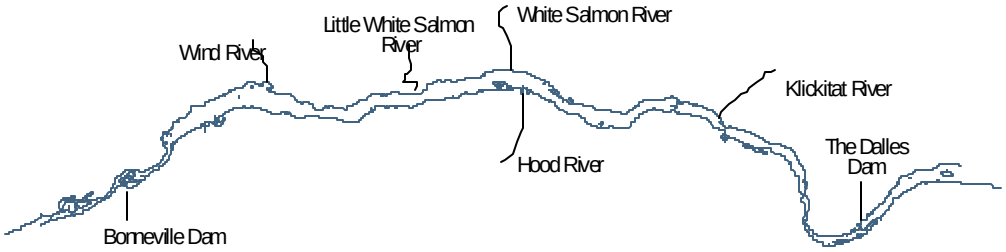


Figure 1. Location of Bonneville Reservoir along the Columbia River (upper graphic) and Bonneville Reservoir and its primary tributaries (lower graphic)

Drainage Area

At full pool (22.6 m above sea level), Bonneville Reservoir (see Table 1) is a 75 km long, 7,632-ha impoundment that receives water from Columbia River mainstem reservoirs

above The Dalles Dam as well as six primary tributaries (i.e., Wind River, WA; White Salmon River, WA; Little White Salmon River, WA; Klickitat River, WA; Fifteen mile Creek, OR; Hood River, OR) and several secondary tributaries (e.g., Rock Creek, WA; Mosier Creek, OR).

Table 1. Characteristics of Bonneville Reservoir

Characteristic	**Value**
km of shoreline	209
Volume (acre feet)	537,000
Mean width (km)	1.4
Length (km)	75
Surface area (ha)	7,632
Range in water surface elevations (m)	
Upper end	22.3-25.9
Lower End	21.5-23.2
Hydraulic capacity of the upstream dam (m3/s)	10, 645
Secchi disk depth (m)	
Chlorophyll *a* (mg/l)	
Retention time	
Average depth (m)	6.7
Area (ha) between bathymetric contours (m)	
0.00-1.82	1,036
1.83-3.66	499
3.67-5.49	1,010
5.50-9.14	1,748
9.15-18.29	2,993
>18.29	346
Substrate areas (ha)	
Hard clay	0
Mud-silt	0
Sand	6,729
Gravel	357
Cobble	195
Boulder	103
Bedrock	248

Climate

Precipitation at Bonneville Dam averages over 30.5 cm in December to a low of 2.0 cm in July. Precipitation at The Dalles, OR averages less that 7.6 cm during December to a low of 0.2 cm in July. Winter temperatures average 4.4° C at Bonneville and 3.3° C at The Dalles. Summer temperatures average 19.4° C at Bonneville in July and frequently reach over 37.8° C at The Dalles. The Columbia Gorge Province is renowned for its winds. Wind velocities of 32.2-48.3 km/h may persist for days, particularly in the

summer. Prevailing winds are from the west during the summer months and from the east during winter.

Topography/Geomorphology

Landscape surrounding Bonneville Reservoir is characterized by steep forested hillsides underlain by basalt up to 1,524 m thick with sedimentary and recent alluvium deposits. Elevations range from about 53 m below mean sea level (the deepest river bed elevation in Bonneville Reservoir) to over 1,150 m on mountains bordering the river just west of Hood River, Oregon.

Major Land Uses

Bonneville Reservoir is operated by the U.S. Army Corps of Engineers for hydropower production, fish and wildlife protection (anadromous fish passage), recreation (e.g., sport angling, windsurfing, kite skiing, boating, water skiing, sightseeing, bird watching, swimming, and waterfowl hunting), and navigation. In addition, the reservoir provides tribal subsistence fishing opportunities.

Roads and railroads occupy extensive reaches of land bordering the reservoir. The riprap revetments protecting these form a significant portion of the reservoir shoreline.

Upslope lands in the western portion of the reservoir are primarily forested or urban areas. Agriculture is prominent along the middle and eastern portions of the reservoir, particularly on the southern (Oregon) side of the river. Urbanized uses of the shorelines for commercial and dwelling purposes other than industrial constitute a significant use of lands bordering the reservoir. Extensive alterations to the natural shoreline have been made near the population centers of Stevenson, Washington, Cascade Locks, Oregon, Home Valley, Washington, Bingen, Washington, Hood River, Oregon, and The Dalles.

Fish and Wildlife Status

Fish

Seven anadromous and at least 31 resident fish species, of which at least 15 are non-indigenous, (Table 2) have been documented in Bonneville Reservoir. Some native resident fish (e.g. white sturgeon) use the reservoir habitat throughout their life cycle while others (e.g. bull trout) live primarily in tributaries and occasionally use the reservoir habitats for foraging or migrating to other tributaries. The non-game native fish act as a prey-base for native and non-native predators. Non-native fish have become established in suitable habitats throughout the reservoir. Many indigenous and non-indigenous species provide recreational fishing opportunities. Impoundment of the Columbia River inundated mainstem spawning habitats for fall chinook and white sturgeon.

Bonneville and The Dalles dams are barriers to upstream movements by most resident fish. The degree of entrainment of resident fish downstream through the dams is largely unknown. Some upstream passage by white sturgeon through fishways occurs, particularly at the east fishway at The Dalles Dam (Warren and Beckman 1989). Historically, fish elevators at Bonneville Dam were used to pass white sturgeon from the

lower Columbia River upstream into Bonneville Reservoir; however, this practice was discontinued in the 1950's.

Table 2. Current listing of the fish species that have been documented in Bonneville Reservoir

Common Name	Scientific Name	Resi-dent	Anadro-mous	Native	Intro-duced
Pacific lamprey	*Lampetra tridentata*		X	X	
White sturgeon	*Acipenser transmontanus*	X	X	X	
American shad	*Alosa sapidissima*		X		X
Bull trout	*Salvelinus confluentus*	X		X	
Cutthroat trout	*Oncorhynchus clarki*	X		X	
Chinook salmon	*Oncorhynchus tshawytscha*		X	X	
Coho salmon	*Oncorhynchus kisutch*		X	X	
Sockeye salmon	*Oncorhynchus nerka*		X	X	
Rainbow trout	*Oncorhynchus mykiss*	X	X	X	
Mountain whitefish	*Prosopium williamsoni*	X		X	
Grass carp	*Ctenopharyngodon idella*	X			X
Chiselmouth	*Acrocheilus alutatceus*	X		X	
Common carp	*Cyprinus carpio*	X			X
Goldfish	*Carassius auratus*	X			X
Peamouth	*Mylocheilus caurinus*	X		X	
Northern pikeminnow	*Ptychocheilus oregonensis*	X		X	
Speckled dace	*Rhinichthys osculus*	X		X	
Redside shiner	*Richardsonius balteatus*	X		X	
Largescale sucker	*Catostomus macrocheilus*	X		X	
Longnose sucker	*Catostomus catostomus*	X		X	
Bridgelip sucker	*Catostomus columbianus*	X		X	
Channel catfish	*Ictalurus punctatus*	X			X
Brown bullhead	*Ameiurus nebulosus*	X			X
Black bullhead	*Ameiurus melas*	X			X
Sand roller	*Percopsis transmontana*	X		X	
Threespine stickleback	*Gasterosteus aculeatus*	X		X	
Pumpkinseed	*Lepomis gibbosus*	X			X
Bluegill	*Lepomis macrochirus*	X			X
Black crappie	*Pomoxis niger*	X			X
White crappie	*Pomoxis annularis*	X			X
Smallmouth bass	*Micropterus dolomieui*	X			X
Largemouth bass	*Micropterus salmoides*	X			X
Yellow perch	*Perca flavescens*	X			X
Walleye	*Stizostedion vitreum vitreum*	X			X
Prickly sculpin	*Cottus asper*	X		X	
Mottled sculpin	*Cottus bairdi*	X		X	

Population status, trends, and characteristics are generally unknown for most species of resident fish found in Bonneville Reservoir (Table 3). Systematic assessments are not conducted to monitor growth, condition, or population trends of fish within

Bonneville Reservoir with the exception of white sturgeon and northern pikeminnow. Annual recreational fishery harvest of selected game fish is estimated during creel surveys (Table 4). Harvest of anadromous salmonids (sport and tribal commercial) occurs during seasons set by the Columbia River Compact. Tribal subsistence fishing occurs year-round.

Table 3. Population characteristics of fish found in Bonneville Reservoir

Species	Annual harvest	Spawning locations in reservoir	Juvenile rearing locations in reservoir	Adult rearing locations in the reservoir	Status (e.g. listed, managed for harvest—provide restrictions
White sturgeon	1,520 sport, 1,850 tribal commercial	Within 5 km downstream from The Dalles Dam	Reservoir wide	Reservoir wide	Managed for harvest 42" minimum length (48" for commercial harvest), 60" maximum length for retention. Total harvest restricted by annual quotas.

At the time of this report, data was not available for these species: American shad, black bullhead, black crappie, bluegill, bridgelip sucker, brown bullhead, bull trout, channel catfish, chinook salmon, chiselmouth, coho salmon, common carp, cutthroat trout, goldfish, grass carp, largemouth bass, largescale sucker, longnose sucker, mottled sculpin, mountain whitefish, northern pikeminnow, Pacific lamprey, peamouth, prickly sculpin, pumpkinseed, rainbow trout, redside shiner, sand roller, smallmouth bass, sockeye salmon, speckled dace, threespine stickleback, walleye, white crappie, yellow perch.

Table 4. Combined Oregon and Washington recreational fishery harvest and catch and release estimates for Bonneville Reservoir, January 1 through April 4, 1997 (DeVore et al. in press).

Species	Harvest
White Sturgeon	
Legals kept	1,463
Sublegals released	11,649
Legals released	264
versize released	22
Walleye	
Kept	60
Released	15
Northern pikeminnow	11
Other resident fish kept	21

Recreational fishing is important in Bonneville Reservoir. From January 1 - April 4, 1997 (when the white sturgeon fishery was closed to retention of fish), anglers fished an estimated 44,830 hours (8,087 trips) in Bonneville Reservoir, excluding angling on backwaters (DeVore et al. in press). Angling effort for white sturgeon comprised 94% of this effort. Harvest of white sturgeon per angler trip averaged 0.16 fish per trip for bank anglers and 0.26 fish per trip for boat anglers. Recreational fishing for anadromous salmonids occurs mainly on Drano Lake and at the mouth of the Wind River. These fisheries provide fishing opportunities for steelhead, spring chinook, fall chinook, and coho. Recreational fisheries for native and non-native game fish occur on most backwaters of the reservoir.

Invertebrates

The US Fish and Wildlife Service provided information on zooplankton and benthic invertebrates found in six backwaters created by Bonneville Reservoir (USFWS 1982). Tables in that report list the taxonomic classification, numbers of organisms per liter and percent abundance of organisms found in water samples taken during May through September 1980, total numbers and volume of benthic invertebrates found during late fall (November and December 1979), late spring (June 1980), and summer (August 1980). Also included in USFWS (1982) are numerous tables listing the number, volume, and percent of mollusks, annelids, and arthropods found in the stomach contents of juvenile salmonids captured in these backwaters during spring, summer, and winter periods. This information is too voluminous to be replicated in this subbasin report.

Information on the distribution and abundance of zooplankton and benthic invertebrates within Bonneville Reservoir is not available.

Wildlife

Western Pond Turtle *Clemmys marmorata*

The western pond turtle is declining throughout most of its range and is highly vulnerable to extirpation in Washington. The western pond turtle has been extirpated from most of its range in Washington. Two populations remain in the Columbia River Gorge. The total number of western pond turtles in known Washington populations is estimated at only 250-350 individuals, approximately half of which went through the head-start program at the Woodland Park Zoo. Additional turtles may still occur in wetlands that have not been surveyed in western Washington and the Columbia Gorge. As a result, the western pond turtle has been listed as endangered by Washington State.

The species requires a continued recovery program to ensure its survival in the state until sources of excessive mortality can be reduced or eliminated.

Western Gray Squirrel *Sciurus griseus*

The western gray squirrel was listed as a state threatened species in Washington in 1993, when surveys indicated that the species' distribution was becoming increasingly patchy and disjunct. Small, isolated, populations remain in south Puget Sound, the Lake Chelan area, the southeast slope Cascade region, and the Columbia River Gorge, the latter being the largest in the state. The exact reasons for this decline are unknown; however, changes in the landscape likely play a key role. Many years of fire suppression and selective logging practices have altered Washington's oak-conifer communities and the habitat of the western gray squirrel. On mesic sites, invading Douglas fir overtops the slow-growing, fire-adapted oak. In drier areas, drought and insects further stress overstocked forests. In some areas this has resulted in a wholesale loss of conifer, leading to intensive logging in remaining conifer stands. Dense pockets of conifer in oak woodlands, which frequently contain clusters of western gray squirrel nests, have been subjected to logging at an increasing rate in southwestern Washington.

The core population of the western gray squirrel is currently found in the lower Klickitat drainage from the southern Yakima Indian Nation boundary to the mouth of the Klickitat River. The remaining population is found from central Klickitat County east to Underwood near the Little White Salmon drainage. A recent report from the Vancouver area suggests that historically the Columbia River offered a dispersal corridor through the

Columbia River Gorge between Klickitat and Clark counties. Current threats include loss of habitat from logging, residential development and invasion of the eastern gray squirrel.

Riparian Avian Guild

A great number of bird species are associated with or require riparian habitats along the mainstem Columbia River. As a subset of this guild, the neotropical migrants (e.g., willow flycatcher, yellow warbler, yellow-breasted chat, red-eyed vireo, Vaux's swift) continually exhibit declining population trends in this region. Lewis's woodpeckers are closely associated with large cottonwood stands. Historically, they were common in the cottonwood habitats of the Columbia River but declines were noted after 1965 and they are now considered extirpated from the Columbia River riparian habitat. The yellow-billed cuckoo is a riparian obligate species that was once common along the Columbia River but has not been reported in this area since 1977. Other species that are marsh obligates include the Virginia rail, sora rail, and marsh wren. Loss of riparian and riparian-marsh habitat for these birds resulted from the inundation and alteration of habitats along the mainstem of the Columbia River.

Bald Eagle *Haliaeetus leucocephalus*

The bald eagle is a State Threatened species in Washington. It is vulnerable to loss of nesting and winter roost habitat, and is sensitive to human disturbance from residential development and timber harvest along shorelines; however, bald eagle populations are recovering toward target levels established by the Pacific States Bald Eagle Recovery Plan (U.S. Fish and Wildlife Service 1986).

Bald eagles are found along marine shorelines and the shorelines of freshwater lakes and rivers. Eagles defend breeding territories to protect their preferred feeding sites, and their nest, perch, and roost trees (Stalmaster 1987). In Washington, breeding territories include upland woodlands and lowland riparian stands with a mature conifer or hardwood component (Grubb 1976, Garrett et al. 1993, Watson and Pierce 1998). Territory size and configuration are influenced by a variety of factors, including breeding density (Gerrard and Bortolotti 1988) and the types of foraging habitat and prey that are available (Watson and Pierce 1998).

Bald eagles are common along the Columbia River on the Bonneville Reservoir during the winter months (December – March). Bald eagle nesting and foraging habitat has been reduced since inundation of the Columbia River. In addition, the primary fishery resource has diminished with declines in salmon numbers. It is currently unknown what the historic breeding population was along the Columbia River. There were no known bald eagle nesting territories along the Bonneville Reservoir based on surveys done during the 1980's. The breeding population has shown a gradual increase and currently there are two nesting territories associated with the Bonneville pool on the Washington side of the river.

Peregrine Falcon *Falco peregrinus*

The Columbia River Gorge is considered one of the primary recovery areas in the state of Washington for the peregrine falcon. The WDFW has been involved with the reintroduction of the peregrine falcon in the Gorge since the early 1980's. Currently,

there are three known nesting territories in the Washington portion of the Gorge, two of which are associated with the Bonneville Pool.

Peregrine falcons usually nest on cliffs typically 45 m (150 ft) or more in height. They will also nest on offshore islands and ledges on vegetated slopes. Eggs are laid and young are reared in small caves or on ledges. Nest sites are generally near water. The birds are sensitive to disturbance during all phases of the nesting season, which usually runs from 1 March through 30 June (Pacific Coast American Peregrine Falcon Recovery Team 1982, Towry 1987). Disturbance can cause desertion of eggs or young, and later in the breeding season can cause older nestlings to fledge prematurely.

Peregrine falcon populations declined worldwide as a result of sublethal doses of chlorinated hydrocarbon pesticides, especially DDT and dieldrin. Chemical contamination of the prey base resulted in reduced eggshell thickness, and consequently poor hatching success and survival of young peregrines (Snow 1972). Although these chemicals are now banned in the United States, eggshell thinning and other effects of pesticide contamination are still seen in some peregrine pairs (Peakall and Kiff 1988). Contamination probably results from consuming prey species that winter in countries that continue to use DDT and other organochlorine pesticides, from persistent pesticide residue remaining at the breeding grounds, or from current, illegal use of these chemicals in the United States (Henny et al. 1982, Stone and Okoniewski 1988).

Black-tailed deer *Odocoileus hemionus columbianus*

Black-tailed deer inhabit most of the western Washington and extend their range east of the Cascades in the Columbia River Gorge. Typically, black-tailed deer reside in finite home ranges in the lower elevation temperate forests. Along the Cascades there has been specific migration patterns from winter and summer ranges. The lower elevations in the Columbia River Gorge offer important winter range for big game.

Timber harvest, land conversion to residential uses and loss of riparian habitat to hydro inundation are considered the primary reasons for impacts to resident black-tailed deer populations. These land use patterns have threatened to reduce the carry capacity of the mainstem Columbia to support wintering migratory deer.

Habitat Areas and Quality

Aquatic

Delineation of various aquatic habitats within the Bonneville Reservoir has not been done. The best available information is presented in Table 1. The Army Corps of Engineers (USACE 1977) provided a description of shoreline features (i.e. substrates and riparian vegetation) and some habitat inventory information (i.e. potential rearing areas) in their Reach Inventory series (USACE 1977). This information is contained in a mosaic of post-impoundment aerial photographs containing written descriptions of features. That document lists 113 inventory sites located between Bonneville and The Dalles Dam that are referenced on the accompanying aerial photography. The sites are referenced by river mile, river bank (left or right), interest (i.e. archaeology, irrigation, wildlife, navigation, recreation, fishery, etc.) and a short (< 5 words) description is given.

Rock fill or riprap protecting transportation corridors comprises a large extent of the shoreline of Bonneville Reservoir.

Development of the transportation corridors and impoundment of the reservoir resulted in many backwaters that are connected either directly or via a culvert to the reservoir. These shallow backwaters and embayments are characterized by habitat conditions that differ substantially from the reservoir's main body. The US Fish and Wildlife Service inventoried and mapped these backwaters in the latter 1970s (USFWS 1980). The deepest backwater at river kilometer 348 had a mean depth of 10.7 m and the shallowest backwater at river kilometer 436 had a mean depth of 0.4 m. The largest backwater was Drano Lake at river kilometer 262 had a surface area of 86 ha and the smallest backwater had a surface area of 1.2 ha.

Most of the backwaters studied provided habitat for both cold and warm water species of fish. Physical data collected from these backwaters (USFWS 1980) such as water temperature and dissolved oxygen content reveals that most of the 15 recognizable backwaters on Bonneville Reservoir could support juvenile anadromous salmonids throughout the year, but high water temperatures during the summer and occasional freezing temperatures during the winter would preclude the year-round use of the shallower backwaters.

Mass-wasting or heavy runoff events in tributaries can introduce silt-laden water that produces localized areas of higher turbidity water within the reservoir. Otherwise, turbidities are generally low throughout the year. Water temperatures can range from near freezing to about 23°C. Annual thermal regimes can vary substantially among years.

Terrestrial

Oregon white oak (Quercus garryana) is Washington's only native oak. Although limited and declining, oaks and their associated floras comprise distinct woodland ecosystems. The various plant communities and stand age mixtures within oak forests provide valuable habitat that contributes to wildlife diversity statewide. In conjunction with other forest types, oak woodlands provide a mix of feeding, resting, and breeding habitat for many wildlife species. More than 200 vertebrate and a profusion of invertebrate species use Washington's oak woodlands. Some species occur in especially high densities, whereas others are not typically found in Washington.

Oregon white oak is considered a state priority habitat, which is determined to be of significance because it is used by an abundance of mammals, birds, reptiles, and amphibians. Many invertebrates, including various moths, butterflies, gall wasps, and spiders, are found exclusively in association with this oak species. Oak/conifer associations provide contiguous aerial pathways for animals such as the State Threatened western gray squirrel, and they provide important roosting, nesting, and feeding habitat for wild turkeys and other birds and mammals. Dead oaks and dead portions of live oaks harbor insect populations and provide nesting cavities. Acorns, oak leaves, fungi, and insects provide food. Some birds, such as the Nashville warbler, exhibit unusually high breeding densities in oak. Oaks in Washington may play a critical role in the conservation of neotropical migrant birds that migrate through, or nest in. Many invertebrates, including various moths, butterflies, gall wasps, and spiders, are found exclusively in association with this oak species. Oak/conifer associations provide contiguous aerial pathways for animals such as the state threatened western gray squirrel, and they provide important roosting, nesting, and feeding habitat for wild turkeys and

other birds and mammals. Dead oaks and dead portions of live oaks harbor insect populations and provide nesting cavities. Acorns, oak leaves, fungi, and insects provide food. Some birds, such as the Nashville warbler, exhibit unusually high breeding densities in oak. White oak habitat plays a critical role in the conservation of neotropical migrant birds by providing nesting habitat and migratory corridors.

Riparian

The majority of terrestrial vertebrate species use riparian habitat for essential life activities and the density of wildlife in riparian areas is comparatively high. Forested riparian habitat has an abundance of snags and downed logs that are critical to many cavity birds, mammals, reptiles, and amphibians. This habitat is often characterized relatively dense understory and overstory vegetation; cottonwood, alder, and willow are commonly dominant tree species in riparian areas. Riparian habitats are often forested, however they may contain important subcomponents such as marshes and ponds that provide critical habitat for a number of species (e.g., Virginia rails, sora rails, marsh wren). Riparian habitats also function as travel corridors between and connectivity to essential habitats (e.g., breeding, feeding, season ranges). Inundation of the lower reaches of the subbasin resulted in the loss of riparian habitat but also the loss of connectivity provided by that habitat along the Klickitat River to the Columbia River, and along the Columbia River to other subbasins.

Watershed Assessment (Limnological Assessment)

To date, no assessments have been conducted on Bonneville Reservoir.

Limiting Factor Analysis/Identification

Wildlife

Wildlife habitat loss has occurred through inundation of Columbia River bottomland habitat behind Bonneville Dam. In the overstory, the cottonwood/willow riparian provided a mosaic of rich habitat that was utilized by a diverse assemblage of species. This riparian habitat along the mainstem Columbia was the critical link between drainages for a number of species (i.e., black-tail deer, western gray squirrels, neotropical birds). Creation of the Bonneville Reservoir effectively cut off riparian habitat connectivity that linked riparian to rich upland areas that include mixed conifer and oak. This is evident by species extirpation (yellow-billed cuckoo) and current fragmented populations of threatened and endangered and sensitive species in watersheds along the Columbia River. Other species like the bald eagle were undoubtedly common along the riparian sections of the Columbia River. Although numbers of bald eagles have increased in the Columbia River Gorge in the past 10 years, current numbers are considered a small remnant of past population levels.

Shallow water habitats created by flooding and seasonal drying of lowland backwater areas along the Columbia River have been severely affected by impoundment of Bonneville Reservoir. These seasonal environments historically were rich in amphibian species (i.e. spotted frog and western toad) that are now primarily missing from the Columbia River lowlands. In addition, the western pond turtle was considered to have been present throughout the lower Columbia River system from The Dalles to the

Portland/Vancouver area. It is currently found in a few select upland ponds adjacent to the Columbia River. Recent review of pre-impoundment aerial photographs from the Columbia River indicate a significant loss of wetland habitat considered important to healthy populations of this species. These connected wetland habitats would have provided for more widely distributed populations of western pond turtle along the Columbia River

Artificial Production

Spring Creek Hatchery releases juvenile fall chinook (tules) directly into the waters of Bonneville Reservoir. In addition, several of the reservoir's tributaries and backwaters are stocked with anadromous and resident salmonids. Information on fish stocking in tributaries to Bonneville Reservoir can be found in the appropriate subbasin summaries. The Washington Department of Fish and Wildlife stocks resident salmonids for sport fishing in several backwaters that were created when the reservoir was impounded. These include Icicle Lake, Little Ashes Lake, Tunnel Lake, and Rowland Lake. The Oregon Department of Fish and Wildlife plants resident salmonids into Taylor Lake near The Dalles. This lake has also been planted with *Gambusia* sp. for mosquito control. These backwaters receive input from springs and generally have a single culvert connecting them to the mainstem river.

Western pond turtles are reared in captivity and released into selected habitats bordering the Bonneville Reservoir. This "head start" program is conducted to increase numbers of adults and expand the current range of western pond turtles.

Existing and Past Efforts

- Designation of the Columbia River Gorge as a National Scenic Area. This has given US Forest Service opportunity to acquire lands for protection of important habitat to develop connectivity along the river.
- Acquisition of Klickitat Wildlife Area lands by Washington Department of Fish and Wildlife (Sondino Ranch). Purchase of this land has benefited a variety of priority species, primarily western pond turtle.
- Black-tail deer ecology study – Yakama Indian Nation – US Forest Service – Washington Department of Fish and Wildlife. These studies have provided valuable information on deer migratory patterns, habitat use and mortality factors for the Klickitat and Wind River deer populations.
- Evaluated neotropical bird use of oak and oak-conifer habitat of drainage. This study identified the value of oak and oak-conifer habitat to neotropical bird populations. MAPS station currently being run at a riparian site within Skamania County, WA.
- Conducting western gray squirrel surveys in Skamania and Klickitat counties. This effort has provided Washington Department of Fish and Wildlife with important data on distribution and abundance of population in the Columbia River Gorge.
- Conducting western gray squirrel research project – WDFW and U of W cooperators. This work will provide critical ecological information of western gray squirrel use of habitat in Klickitat and Majors Creek drainages.
- US Forest Service – Washington Department of Fish and Wildlife bald eagle habitat evaluation. Provided locations of winter bald eagle foraging and roosting habitat.

- Purchase and management of Pierce Ranch National Wildlife Refuge.
- Enhanced fish, wildlife & habitat law enforcement was conducted throughout the Columbia Basin by federal, state and tribal entities during 1991-1998. Beginning in May 2000, the Columbia River Fisheries Enforcement Department is implementing increased conservation enforcement efforts in the mainstem Columbia, and its tributaries -- in cooperation with adjoining jurisdictions.

Subbasin Management

Goals, Objectives, and Strategies

Fish Goals

Overall

Protect, enhance and restore wild and natural anadromous and resident fish populations within the Bonneville Reservoir subbasin of the Columbia Gorge Province.

White Sturgeon

Fishery management goals for white sturgeon in the Bonneville Reservoir are optimal sustainable yield for tribal commercial, sport, and tribal subsistence harvest. These are met by monitoring harvest during fisheries. Currently, harvest levels are set by quota.

Wildlife Goals

Overall

Maintain and restore priority habitats and species endemic to the subbasin

Western Pond Turtle

Re-establish self-sustaining populations of western pond turtles in the Columbia Gorge region.

Riparian Avian Guild

Conservation of key avian species historically and or currently found in the Columbia River Gorge.

Riparian

Protect and develop riparian habitat along the mainstem Columbia River as well as key tributaries.

Fish Objectives

Overall

1. Maintain natural populations of anadromous and resident salmonids at levels that promote increased utilization of available habitat and that contribute to tribal and non-tribal fisheries as measured by an increasing trend in population abundance and distribution by the year 2012.

Wildlife Objectives

Western Pond Turtle

1. Establish at least 5 populations of >200 pond turtles, composed of no more than 70% adults, which occupy habitat that is secure from development or major disturbance (populations must show evidence of being sustained by natural recruitment of juveniles).
2. For downlisting to sensitive: 7 populations of >200 pond turtles will be needed. To meet these objectives, Washington Department of Fish and Wildlife will:

Western Gray Squirrel

Develop population estimates and protect the core population of animals in Klickitat County.

Columbian Black-tailed Deer

Secure adequate habitat for a healthy population of deer to allow for both native and non-native hunting population.

Bald Eagle

Identify, enumerate, and protect currently used nesting and wintering habitat.

Oregon White Oak Habitat

Secure oak habitat at current levels as per Washington Department of Fish and Wildlife Priority Habitats strategy.

Fish Strategies

Overall

1. Integrate conservation law enforcement protection into fish, wildlife and habitat management.
   1.1. Identify and enforce laws and rules pertaining to fish passage, riparian habitat, and water quality protection. Provide information on enforcement actions to the system-wide conservation enforcement monitoring and evaluation project.
   1.2. Identify and enforce laws and rules pertaining to exotic fish transfers.
   1.3. Identify violations of laws and rules pertaining to habitat protection and provide information to appropriate state, federal or tribal law enforcement entity.
   1.4. Increase enforcement of laws and fishing regulations pertaining to illegal take of fish (all life stages).
   1.5. Continue enforcement of wildlife laws and regulations affecting wildlife species and habitat.

Wildlife Strategies

Overall

Improve and/or protect key habitat conditions in the drainage. The following strategies are critical for protection of key species and habitats:

Western Pond Turtle

1. Continue the "head start" program to augment populations.
2. Improve nesting and foraging habitat through pond and meadow development.
3. Identify habitat for conservation easements and or acquisition.

Western Gray Squirrel

1. Investigate impacts from timber harvest on western gray squirrel habitat use.
2. Develop methodologies to adequately monitor population trends.
3. Conduct additional surveys on Yakama Indian Nation for population distribution.
4. Identify and acquire important lands to maintain or increase western gray squirrel population.
5. Improve travel corridors between key population centers.
6. Evaluate threat from eastern gray squirrel range expansion in western gray squirrel habitat.

Columbian Black-tailed Deer

Acquire critical winter range habitat that connects Washington Department of Fish and Wildlife's Klickitat Wildlife Area with the Yakama Indian Nation.

Bald Eagle

1. Conduct surveys to identify winter communal roost habitat in drainage;
2. Develop management plans to protect winter communal roost habitat.

Riparian Avian Guild

1. Identify priority oak, riparian, and late successional pine forests that provide habitat for avian species currently experiencing declines.
2. Select key habitats for acquisition and or conservation agreements that protect these species.
3. Reference riparian and eastside Partners in Flight Conservation Plan for priority species and habitat protection.

Oregon White Oak Habitat

Acquire or develop conservation easements for key oak habitats in the drainage; identify key habitats based upon most benefit for priority species protection.

Riparian

Identify primary riparian zones in need of restoration form logging, road construction or grazing; develop strategy for riparian restoration with Underwood Conservation District, Washington Department of Fish and Wildlife and the Yakima Indian Nation.

Research, Monitoring, and Evaluation Activities

The Washington Department of Fish and Wildlife, Oregon Department of Fish and Wildlife, and US Geological Survey are monitoring white sturgeon recruitment, stock size, growth, and harvest in the Bonneville Reservoir. The Bonneville Power Administration currently funds this work.

The Washington Department of Fish and Wildlife is primarily working on Western Pond Turtle recovery in habitat near the mouth of the Klickitat River and near Dog Mountain.

The Columbia Basin Law Enforcement Council (CBLEC) coordinates state, federal and tribal conservation law enforcement efforts throughout the Columbia Basin. Currently, a consultant for Columbia River Inter-Tribal Fisheries Enforcement is conducting monitoring and evaluation of conservation enforcement in the mainstem Columbia River between Bonneville and McNary Dams, including cooperative enforcement actions in the tributaries.

Statement of Fish and Wildlife Needs

Fish

Information is generally lacking for most mainstem reservoir biota. With the exception of the Bonneville Power Administration funded assessment of white sturgeon recruitment and population status, there is no program currently in place to assess changes in community structure or abundance of resident fish in these waters. Biological assessment information is needed to better understand how the resident fish community, biotic integrity (Hughes et al. 1998), and trophic level interactions change as management of the hydropower system changes, tributary watersheds are rehabilitated, fishery regulations change, invasive organisms become established, and the reservoir ages.

- Investigate upstream passage for white sturgeon at Bonneville and The Dalles dams.
- Obtain high resolution bathymetric and substrate distribution information for the reservoir to enable better design of sampling strategies and for long-term monitoring of reservoir aging.
- Determine distribution, abundance, and temporal variability of aquatic invertebrates.
- Investigate entrainment of resident fish downstream through Bonneville and The Dalles dams.
- Preservation of viable fish & wildlife populations through improved habitat protection, habitat enhancement and law enforcement

Wildlife

- Identification of key oak habitats that will support priority avian populations as per Partners-in-Flight conservation plans.
- Analysis of relationship between timber harvest management and western gray squirrel habitat use.
- Additional surveys of abundance and distribution of western gray squirrel populations.

- Additional surveys to determine location of spotted frog presence in the Klickitat River drainage.
- Identification of key deer winter areas for acquisitions and conservation easements associated with Klickitat Wildlife Area and mainstem Columbia.
- Surveys needed to monitor winter bald eagle population on Columbia River. Winter communal roost habitat needs to be identified and protected.
- Western pond turtle habitat along the Columbia River needs to be improved. Key acquisitions need to take place to protect habitat for in lower drainage requires habitat improvement projects.
- Beaver have a positive ecological relationship with salmon populations. They create salmon rearing habitat, provide nutrient cycling, aid in flood plain development, catch and store sediment and regulate water flows; however, beaver populations and habitat have been reduced in the Columbia Basin over the last two centuries. An inventory of historic and current beaver habitat and areas of overlap with existing anadromous fish runs should be conducted. Silvicultural treatments could be implemented to restore beaver habitat and beavers could be re-introduced to those habitats.

Subbasin Recommendations

FY 2001 Projects Proposals Review

The Columbia Gorge Province Technical Team, composed of representatives from Oregon Department of Fish & Wildlife (ODFW), Washington Department of Fish & Wildlife (WDFW), Columbia River Inter-Tribal Fish Commission (CRITFC), Confederated Tribes of the Warm Springs Reservation of Oregon (CTWSRO), and Confederated Tribes and Bands of the Yakama Nation (CTBYN), met to review FY 2001 project funding proposals on October 10 and 11, 2000. The team reviewed four subbasin proposals for new projects seeking funding for the next three years that were assigned to either the Bonneville Reservoir Subbasin or the Columbia Gorge Province in general. Each project proposal and team funding recommendation is discussed below. Two of the projects (21011 and 21013) address specific needs identified within the Bonneville Reservoir Subbasin Summary. The other two projects (21005 and 21012) address needs identified in several of the subbasins within the Columbia Gorge Province but not specifically in the Bonneville Reservoir. These projects are also discussed in the appropriate subbasin summaries where the proposed work is relevant.

Projects and Budgets

Project: 21005 - Characterize and Assess Wildlife-Habitat Types and Structural Conditions for Subbasins within the Columbia Gorge Eco-province

Sponsor: NHI
Short Description:

Fine-scale wildlife habitat assessment for the Inter-Mountain Eco-province will produce critical baseline data for planning and monitoring efforts that is consistent within the

Northwest Power Planning Council (NWPPC) Framework wildlife-habitat relationships process.

Abbreviated Abstract

As ecological assessments of the Columbia River Basin step down in geographic scale to the subbasin level, the need for fine-scale wildlife habitat depiction and assessment rises markedly. The Northwest Habitat Institute and working with NWPPC's Framework Process, developed 32 wildlife-habitat types and an associated wildlife habitat relationship data set to depict the current conditions of the Columbia River Basin. We are proposing that the same mapping methodology and wildlife-habitat types be reviewed and mapped at a finer level of resolution (4 ha minimum mapping unit, (mmu) (10 acres)) for all subbasins within the Columbia Gorge Eco-province. Our proposal plans to: (1) map wildlife-habitat types at a refined resolution (4 ha mmu) [Appendix 2], (2) map wildlife habitat structural conditions (4 ha mmu) [Appendix 2], (3) validating the mapping effort by field visits, and (4) evaluate the current conditions for wildlife using the wildlife-habitat relationships data set in conjunction with the wildlife-habitat types and structural conditions mapping information

Relationship to Other Projects

Project ID	Title	Nature of Relationship
2000742	Establishing Baseline Key Ecological Functions of Fish & Wildlife for Subbasin Planning	A refined map would depict with greater accuracy those areas where ecological functions are thought to have increased or decreased. Maintaining ecological functions is identified in the Framework Process.

Relationship to Existing Goals, Objectives and Strategies

Project Proposal 21005 was a request to fund a project to assess wildlife habitat types and structural conditions for the Columbia Gorge Province subbasins. The project addresses the overall wildlife objective and several of the wildlife strategies including riparian avian habitat, Oregon white oak and riparian strategies.

Review Comments

This project provides very interesting information; however, the application of the information for management decisions is unclear at this time. This information will be very useful for watershed assessment work. Currently accessibility to this information is not widely known. See other subbasin summaries. This project is being funded under the EDT component of the NWPPC assessment effort. If expansion of the project is necessary, that expansion should be determined and funded under the EDT development process. Not appropriate to fund with wildlife funds. The Wildlife Committee also has concerns over data access based on past experience. This project provides very interesting information, however, the application of the information for management decisions is unclear. This information will be very useful for watershed assessment work. Currently accessibility to this information is not widely known.

Budget

FY01	FY02	FY03
Rec: $58,521 Category: Do Not Fund	Rec: $0 Category:	Rec: $0 Category:

Project: 21011 - Assess the Current Status and Biotic Integrity of the Resident Fish Assemblage in Bonneville Reservoir

Sponsor: USGS/CRRL

Short Description:

Resident fish in Bonneville Reservoir will be sampled to provide baseline information on the population characteristics and status of resident fish species and the biotic integrity of the resident fish assemblage.

Abbreviated Abstract

The goal of this proposed study is to assess the status of resident fish species and the biotic integrity of the resident fish assemblage in Bonneville Reservoir. The proposed project will produce data that will establish a baseline from which, the effects of hydroelectric operations and watershed activities that influence mainstem river conditions on the resident fish assemblage in Bonneville Reservoir can be evaluated. Study objectives are to: (1) develop standardized protocols and a statistically valid sampling design (duration 2001), (2) implement and evaluate the protocols and sampling design (duration 2001-2004), (3) analyze resident fish survey data and report relative abundance and population characteristics of resident fish species in Bonneville Reservoir (2001-2005), and (4) formulate reference conditions for the resident fish assemblage in Bonneville Reservoir, identify candidate Index of Biotic Integrity metrics, examine the statistical properties and sensitivity of the individual IBI metrics and composite IBI score, relate the individual IBI metrics and composite IBI score to habitat conditions in Bonneville Reservoir, and prepare manuscripts for publication in peer-reviewed journals (2001-2005).

Relationship to Other Projects

This proposed project will complement existing information regarding the habitat requirements and other factors affecting the white sturgeon population in Bonneville Reservoir (Project #: 198605000) by providing a biological context to the physical habitat descriptions provided by Parsely and Beckman (1994) and by describing the fish assemblage that white sturgeon are contained within.

Relationship to Existing Goals, Objectives and Strategies

This project addresses a stated information need in the Bonneville Reservoir Subbasin. The proposed project would lay the groundwork for assessing the status of resident fish species and thus, native resident fish biodiversity and resident fish assemblage structure in Bonneville Reservoir. Once an assessment plan has been rigorously developed (this proposal), resident fish species could be sampled, populations assessed, and trends identified. These data could be used in evaluations of both local (e.g., hydroelectric

operations) and regional projects (e.g., watershed activities that influence mainstem river conditions).

Review Comments

The Managers have some concern that this project is only looking at one measure of biotic integrity (resident fish) within the reservoir. This is good basic research but the contribution to management decisions is unclear.

Budget

FY01	FY02	FY03
Rec: $351,700 Category: Recommended Action	Rec: $368,000 Category: Recommended Action	Rec: $380,000 Category: Recommended Action

Project: 21012 - Evaluate Status of Coastal Cutthroat Trout in the Columbia River Basin above Bonneville Dam

Sponsor: USGS-CRRL

Short Description:

Survey Columbia River tributaries above Bonneville Dam for coastal cutthroat trout to determine population status, to identify limiting factors, and to understand the role of current and past human and natural disturbances affecting status.

Abbreviated Abstract

The goal of the proposed study is to provide vital information on the current status of cutthroat trout populations in the lower Columbia River Basin as a necessary prerequisite to future recovery efforts. Study objectives are to: (1) document existing data on historical and current distribution and describe management practices that affect the coastal form of cutthroat trout in the Columbia River basin above Bonneville Dam, and (2) determine status of naturally reproducing populations of cutthroat trout above Bonneville Dam. Objective 1 will be conducted from 2001-02 using a combination of questionnaires and a review of existing biological data and land use, production, and harvest management practices. Objective 2 will be conducted from 2001-03 by conducting fish and habitat surveys. Surveys will be used to estimate density and biomass of cutthroat trout at selected index sites. Analysis of length, weight, scales, otoliths, and selected tissue samples will be used to describe population characteristics including age and growth, life history patterns, and genetic characteristics of cutthroat trout. Region-wide concern for declining stocks of Columbia River sea-run cutthroat trout is documented in section 7.5E of the 1994 Columbia Basin Fish and Wildlife Program.

Relationship to Other Projects

Project ID	Title	Nature of Relationship
9304000	Fifteenmile Creek Habitat Restoration Project	We will contact project biologists for their help in identifying potential populations of cutthroat trout populations and we will survey this

Project ID	Title	Nature of Relationship
		watershed. Habitat improvements for steelhead could help cutthroat trout.
9405400	Bull Trout Life History Project; NE Oregon	We will contact project biologists for their help in identifying potential populations of cutthroat trout populations in the Hood River watershed, a watershed that we will survey for the proposed project.
8805304	Hood River Production Program	We will contact project biologists for their help in identifying potential populations of cutthroat trout populations in the Hood River watershed, a watershed that we will survey for the proposed project.
9204101	Fish Passage Evaluations; Lower Columbia River	This project may well have data on passage of sea-run cutthroat trout to the Hood, White Salmon, Little White Salmon, Klickitat, and Wind rivers, all of which we plan to survey during the proposed project.
8812000	Yakima Natural Production and Enhancement Program	This project's activities and findings in the Klickitat watershed may help us locate populations of cutthroat trout.
9801900	Wind River Watershed Project	We will contact project biologists for their help in identifying potential populations of cutthroat trout populations in the Wind River watershed, a watershed that we will survey for the proposed project.
9033	Document Native Trout Populations	We will contact project biologist to see what they have found in some of the upper reaches of watersheds that we intend to sample. Our surveys will be more extensive (covering the Gorge Province) and in some areas more intensive (population estimates).

Relationship to Existing Goals, Objectives and Strategies

Project Proposal 21012 was a request for funding a project to evaluate the status of coastal cutthroat in the province. The team recommended funding with a high priority for project objective 1, which proposed to collect available data on cutthroat distribution and numbers. Other past or ongoing projects have collected data on cutthroat populations in the subbasin. This project would address the potential protection of sensitive or listed fish species in the subbasin.

Review Comments

Many projects within the basin are finding cutthroat information. An organized accumulation of this information is needed. This project should first accumulate all

available information from all fish and wildlife agencies and tribes in the basin. Fieldwork should then focus on subbasins and areas where data is missing.

Budget

FY01	FY02	FY03
Rec: $39,770 Category: Urgent/High Priority Notes: Funding for Objective 1 should be considered a high priority. The other objectives should be considered high priority in FY 02 and 03 if warranted based on the results from FY 01. We recommend funding only Objective 1 during FY 2001.	Rec: $240,926 Category: Urgent/High Priority	Rec: $253,038 Category: Urgent/High Priority

Project: 21013 - Western Pond Turtle Recovery - Columbia River Gorge

Sponsor: WDFW

Short Description:

Protect existing WPT population through habitat improvements, expand WPT population through "head start " program and continue reintroductions at USFWS Pierce National Wildlife Refuge.

Abbreviated Abstract

The Washington Department of Fish and Wildlife (WDFW), in cooperation with the U.S. Fish and Wildlife Service, Woodland Park Zoo, and the Oregon Zoo propose to reintroduce western pond turtles in the summer of 2001-2003 at Pierce National Wildlife Refuge. Pierce National Wildlife Refuge, administered by the U.S. Fish and Wildlife Service, is a complex of riparian and meadow habitat within the Columbia River flood plain. The refuge is considered suitable habitat for establishing a western pond turtle population.

Forty western pond turtles from the 1999 “head start program” (captive reared turtles that have reached a size large enough to reduce their chances of predation) were released at Pierce National Wildlife Refuge during the summer of 2000. These juvenile turtles are offspring from adults in the two existing populations in the Columbia River Gorge. These reintroduced turtles are being monitored to acquire data on post-release dispersal, habitat use (active and hibernation periods), and survival. Additional western pond turtle releases will be conducted until the population objectives identified in the Washington State Recovery Plan for the Western Pond Turtle are achieved.

Relationship to Other Projects

Project ID	Title	Nature of Relationship
	Western Pond Turtle Recovery Project – ALEA	Volunteer program to assist WDFW with recovery of WPT

Project ID	Title	Nature of Relationship
	Western Pond Turtle Partnerships	USFWS cost share grant for WPT work in Gorge
	WDFW/USFS/TNC WPT Habitat Development	Private/Agency program to protect WPT habitat
	Woodland Park Zoo and Oregon Zoo "head start"	Zoos currently assisting with captive breeding and juvenile care

Relationship to Existing Goals, Objectives and Strategies

Project Proposal 21013 was a request to fund recovery activities for the western pond turtle within the province. The project addresses a number of subbasin management objectives and strategies, including: (1) protection and restoration of the riparian and aquatic habitat, (2) protection and restoration of upland watershed habitat, (3) maintaining or increasing wildlife species diversity, (4) increasing wildlife habitat, and (5) potential protection of sensitive or listed wildlife species.

Review Comments

This project addresses a wildlife species that has been negatively affected by the hydrosystem. This species is listed as sensitive in the State of Washington.

Budget

FY01	FY02	FY03
Rec: $167,025 Category: Urgent/High Priority	Rec: $104,600 Category: Urgent/High Priority	Rec: $89,600 Category: Urgent/High Priority

Research, Monitoring and Evaluation Activities

New project proposal 21005 would result in the assessment of wildlife habitat and habitat condition within the subbasin. The subbasin review team recommended that project 21012 receives partial funding to help evaluate the status of coastal cutthroat within the subbasin.

Table 1. Bonneville Reservoir Subbasin Summary FY 2001 BPA Funding Proposal Matrix

Project Proposal ID	**21005**	**21011**	**21012**	**21013**
Provincial Team Funding Recommendation	**Do Not Fund**	**Recommended Action**	**Urgent/ High Priority**	**Urgent/ High Priority**
Overall Fish Objective Maintain natural populations of anadromous and resident salmonids at levels that promote increased utilization of available habitat and that contribute to tribal and non-tribal fisheries as		+		

Project Proposal ID	21005	21011	21012	21013
measured by an increasing trend in population abundance and distribution by the year 2012.				
Wildlife Objectives **Western Pond Turtle Objectives** 1. Establish at least 5 populations of >200 pond turtles, composed of no more than 70% adults, which occupy habitat that is secure from development or major disturbance (populations must show evidence of being sustained by natural recruitment of juveniles). 2. For downlisting to sensitive: 7 populations of >200 pond turtles will be needed.				+
Western Gray Squirrel Objective Develop population estimates and protect the core population of animals in Klickitat County.				
Columbian Black-tailed Deer Objective Secure adequate habitat for a healthy population of deer to allow for both native and non-native hunting population.	+			
Bald Eagle Objective Identify, enumerate, and protect currently used nesting and wintering habitat.	+			
Oregon White Oak Habitat Objective Secure oak habitat at current levels as per Washington Department of Fish and Wildlife Priority Habitats strategy.	+			
Fish Strategies **Overall CRITFC Fish Strategies** 1. Integrate conservation law enforcement protection into fish, wildlife and habitat management. 1.1. Identify and enforce laws and rules pertaining to fish passage, riparian habitat, and water quality protection. Provide information on enforcement actions to the system-wide conservation enforcement monitoring and evaluation project. 1.2. Identify and enforce laws and rules pertaining to exotic fish transfers. 1.3. Identify violations of laws and rules pertaining to habitat protection and provide information to appropriate state, federal or tribal law enforcement entity. 1.4. Increase enforcement of laws and fishing regulations pertaining to illegal take of fish (all life stages). 1.5. Continue enforcement of wildlife laws and regulations affecting wildlife species and habitat.				
Wildlife Strategies **Overall** Improve and/or protect key habitat conditions in the drainage. The following strategies are critical for protection of key species and habitats:	+			
Western Pond Turtle Strategies 1. Continue the "head start" program to augment populations. 2. Improve nesting and foraging habitat through pond and meadow development. 3. Identify habitat for conservation easements and or acquisition.				+
Western Gray Squirrel Strategies 1. Investigate impacts from timber harvest on western gray squirrel habitat use. 2. Develop methodologies to adequately monitor population trends. 3. Conduct additional surveys on Yakama Indian Nation for population distribution. 4. Identify and acquire important lands to maintain or increase western gray squirrel population.				

Project Proposal ID	21005	21011	21012	21013
5. Improve travel corridors between key population centers. 6. Evaluate threat from eastern gray squirrel range expansion in western gray squirrel habitat.				
Columbian Black-tailed Deer Strategy Acquire critical winter range habitat that connects Washington Department of Fish and Wildlife's Klickitat Wildlife Area with the Yakama Indian Nation.				
Bald Eagle Strategies 1. Conduct surveys to identify winter communal roost habitat in drainage; 2. Develop management plans to protect winter communal roost habitat.				
Riparian Avian Guild Strategies 1. Identify priority oak, riparian, and late successional pine forests that provide habitat for avian species currently experiencing declines. 2. Select key habitats for acquisition and or conservation agreements that protect these species. 3. Reference riparian and eastside Partners in Flight Conservation Plan for priority species and habitat protection.	+			
Oregon White Oak Habitat Strategy Acquire or develop conservation easements for key oak habitats in the drainage; identify key habitats based upon most benefit for priority species protection.	+			
Riparian Strategy Identify primary riparian zones in need of restoration form logging, road construction or grazing; develop strategy for riparian restoration with Underwood Conservation District, Washington Department of Fish and Wildlife and the Yakima Indian Nation.	+			

These project titles are referenced by ID above:

21005 – Characterize and Assess Wildlife-Habitat Types and Structural Conditions for Subbasins within the Columbia Gorge Eco-province

21011 - Assess the Current Status and Biotic Integrity of the Resident Fish Assemblage in Bonneville Reservoir

21012 - Evaluate Status of Coastal Cutthroat Trout in the Columbia River Basin above Bonneville Dam

21013 - Western Pond Turtle Recovery - Columbia River Gorge

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Subbasin Recommendations

FY 2001 Projects Proposals Review

The Columbia Gorge Province Technical Team, composed of representatives from Oregon Department of Fish & Wildlife (ODFW), Washington Department of Fish & Wildlife (WDFW), Columbia River Inter-Tribal Fish Commission (CRITFC), Confederated Tribes of the Warm Springs Reservation of Oregon (CTWSRO), and Confederated Tribes and Bands of the Yakama Nation (CTBYN), met to review FY 2001 project funding proposals on October 10 and 11, 2000. The team reviewed four subbasin proposals for new projects seeking funding for the next three years that were assigned to either the Bonneville Reservoir Subbasin or the Columbia Gorge Province in general. Each project proposal and team funding recommendation is discussed below. Two of the projects (21011 and 21013) address specific needs identified within the Bonneville Reservoir Subbasin Summary. The other two projects (21005 and 21012) address needs identified in several of the subbasins within the Columbia Gorge Province but not specifically in the Bonneville Reservoir. These projects are also discussed in the appropriate subbasin summaries where the proposed work is relevant.

Projects and Budgets

Project: 21005 - Characterize and Assess Wildlife-Habitat Types and Structural Conditions for Subbasins within the Columbia Gorge Eco-province

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Sponsor: NHI

Short Description:

Fine-scale wildlife habitat assessment for the Inter-Mountain Eco-province will produce critical baseline data for planning and monitoring efforts that is consistent within the Northwest Power Planning Council (NWPPC) Framework wildlife-habitat relationships process.

Abbreviated Abstract

As ecological assessments of the Columbia River Basin step down in geographic scale to the subbasin level, the need for fine-scale wildlife habitat depiction and assessment rises markedly. The Northwest Habitat Institute and working with NWPPC's Framework Process, developed 32 wildlife-habitat types and an associated wildlife habitat relationship data set to depict the current conditions of the Columbia River Basin. We are proposing that the same mapping methodology and wildlife-habitat types be reviewed and mapped at a finer level of resolution (4 ha minimum mapping unit, (mmu) (10 acres)) for all subbasins within the Columbia Gorge Eco-province. Our proposal plans to: (1) map wildlife-habitat types at a refined resolution (4 ha mmu) [Appendix 2], (2) map wildlife habitat structural conditions (4 ha mmu) [Appendix 2], (3) validating the mapping effort by field visits, and (4) evaluate the current conditions for wildlife using the wildlife-habitat relationships data set in conjunction with the wildlife-habitat types and structural conditions mapping information

Relationship to Other Projects

Project ID	Title	Nature of Relationship
2000742	Establishing Baseline Key Ecological Functions of Fish & Wildlife for Subbasin Planning	A refined map would depict with greater accuracy those areas where ecological functions are thought to have increased or decreased. Maintaining ecological functions is identified in the Framework Process.

Relationship to Existing Goals, Objectives and Strategies

Project Proposal 21005 was a request to fund a project to assess wildlife habitat types and structural conditions for the Columbia Gorge Province subbasins. The project addresses the overall wildlife objective and several of the wildlife strategies including riparian avian habitat, Oregon white oak and riparian strategies.

Review Comments

This project provides very interesting information; however, the application of the information for management decisions is unclear at this time. This information will be very useful for watershed assessment work. Currently accessibility to this information is not widely known. See other subbasin summaries.

Budget

FY01	FY02	FY03
Rec: $58,521 Category: High Priority	Rec: $0 Category:	Rec: $0 Category:

Project: 21011 - Assess the Current Status and Biotic Integrity of the Resident Fish Assemblage in Bonneville Reservoir

Sponsor: USGS/CRRL

Short Description:

Resident fish in Bonneville Reservoir will be sampled to provide baseline information on the population characteristics and status of resident fish species and the biotic integrity of the resident fish assemblage.

Abbreviated Abstract

The goal of this proposed study is to assess the status of resident fish species and the biotic integrity of the resident fish assemblage in Bonneville Reservoir. The proposed project will produce data that will establish a baseline from which, the effects of hydroelectric operations and watershed activities that influence mainstem river conditions on the resident fish assemblage in Bonneville Reservoir can be evaluated. Study objectives are to: (1) develop standardized protocols and a statistically valid sampling design (duration 2001), (2) implement and evaluate the protocols and sampling design

(duration 2001-2004), (3) analyze resident fish survey data and report relative abundance and population characteristics of resident fish species in Bonneville Reservoir (2001-2005), and (4) formulate reference conditions for the resident fish assemblage in Bonneville Reservoir, identify candidate Index of Biotic Integrity metrics, examine the statistical properties and sensitivity of the individual IBI metrics and composite IBI score, relate the individual IBI metrics and composite IBI score to habitat conditions in Bonneville Reservoir, and prepare manuscripts for publication in peer-reviewed journals (2001-2005).

Relationship to Other Projects

This proposed project will complement existing information regarding the habitat requirements and other factors affecting the white sturgeon population in Bonneville Reservoir (Project #: 198605000) by providing a biological context to the physical habitat descriptions provided by Parsely and Beckman (1994) and by describing the fish assemblage that white sturgeon are contained within.

Relationship to Existing Goals, Objectives and Strategies

This project addresses a stated information need in the Bonneville Reservoir Subbasin. The proposed project would lay the groundwork for assessing the status of resident fish species and thus, native resident fish biodiversity and resident fish assemblage structure in Bonneville Reservoir. Once an assessment plan has been rigorously developed (this proposal), resident fish species could be sampled, populations assessed, and trends identified. These data could be used in evaluations of both local (e.g., hydroelectric operations) and regional projects (e.g., watershed activities that influence mainstem river conditions).

Review Comments

The Managers have some concern that this project is only looking at one measure of biotic integrity (resident fish) within the reservoir. This is good basic research but the contribution to management decisions is unclear.

Budget

FY01	FY02	FY03
Rec: $351,700 Category: Recommended Action	Rec: $368,000 Category: Recommended Action	Rec: $380,000 Category: Recommended Action

Project: 21012 - Evaluate Status of Coastal Cutthroat Trout in the Columbia River Basin above Bonneville Dam

Sponsor: USGS-CRRL

Short Description:

Survey Columbia River tributaries above Bonneville Dam for coastal cutthroat trout to determine population status, to identify limiting factors, and to understand the role of current and past human and natural disturbances affecting status.

Abbreviated Abstract

The goal of the proposed study is to provide vital information on the current status of cutthroat trout populations in the lower Columbia River Basin as a necessary prerequisite to future recovery efforts. Study objectives are to: (1) document existing data on historical and current distribution and describe management practices that affect the coastal form of cutthroat trout in the Columbia River basin above Bonneville Dam, and (2) determine status of naturally reproducing populations of cutthroat trout above Bonneville Dam. Objective 1 will be conducted from 2001-02 using a combination of questionnaires and a review of existing biological data and land use, production, and harvest management practices. Objective 2 will be conducted from 2001-03 by conducting fish and habitat surveys. Surveys will be used to estimate density and biomass of cutthroat trout at selected index sites. Analysis of length, weight, scales, otoliths, and selected tissue samples will be used to describe population characteristics including age and growth, life history patterns, and genetic characteristics of cutthroat trout. Region-wide concern for declining stocks of Columbia River sea-run cutthroat trout is documented in section 7.5E of the 1994 Columbia Basin Fish and Wildlife Program.

Relationship to Other Projects

Project ID	Title	Nature of Relationship
9304000	Fifteenmile Creek Habitat Restoration Project	We will contact project biologists for their help in identifying potential populations of cutthroat trout populations and we will survey this watershed. Habitat improvements for steelhead could help cutthroat trout.
9405400	Bull Trout Life History Project; NE Oregon	We will contact project biologists for their help in identifying potential populations of cutthroat trout populations in the Hood River watershed, a watershed that we will survey for the proposed project.
8805304	Hood River Production Program	We will contact project biologists for their help in identifying potential populations of cutthroat trout populations in the Hood River watershed, a watershed that we will survey for the proposed project.
9204101	Fish Passage Evaluations; Lower Columbia River	This project may well have data on passage of sea-run cutthroat trout to the Hood, White Salmon, Little White Salmon, Klickitat, and Wind rivers, all of which we plan to survey during the proposed project.
8812000	Yakima Natural Production and Enhancement Program	This project's activities and findings in the Klickitat watershed may help us locate populations of cutthroat trout.
9801900	Wind River Watershed Project	We will contact project biologists for their help in identifying potential populations of cutthroat trout populations in the Wind River watershed, a watershed that we will survey for the proposed project.
9033	Document Native Trout Populations	We will contact project biologist to see what they have found in some of the upper reaches of watersheds that we intend to sample. Our surveys will be more extensive (covering the Gorge Province) and in some areas more intensive (population estimates).

Relationship to Existing Goals, Objectives and Strategies

Project Proposal 21012 was a request for funding a project to evaluate the status of coastal cutthroat in the province. The team recommended funding with a high priority for project objective 1, which proposed to collect available data on cutthroat distribution and numbers. Other past or ongoing projects have collected data on cutthroat populations in the subbasin. This project would address the potential protection of sensitive or listed fish species in the subbasin.

Review Comments

Many projects within the basin are finding cutthroat information. An organized accumulation of this information is needed. This project should first accumulate all available information from all fish and wildlife agencies and tribes in the basin. Fieldwork should then focus on subbasins and areas where data is missing.

Budget

FY01	FY02	FY03
Rec: $39,770 Category: High Priority Notes: Funding for Objective 1 should be considered a high priority. The other objectives should be considered high priority in FY 02 and 03 if warranted based on the results from FY 01. We recommend funding only Objective 1 during FY 2001.	Rec: $240,926 Category: High Priority	Rec: $253,038 Category: High Priority

Project: 21013 - Western Pond Turtle Recovery - Columbia River Gorge

Sponsor: WDFW

Short Description:

Protect existing WPT population through habitat improvements, expand WPT population through "head start " program and continue reintroductions at USFWS Pierce National Wildlife Refuge.

Abbreviated Abstract

The Washington Department of Fish and Wildlife (WDFW), in cooperation with the U.S. Fish and Wildlife Service, Woodland Park Zoo, and the Oregon Zoo propose to reintroduce western pond turtles in the summer of 2001-2003 at Pierce National Wildlife Refuge. Pierce National Wildlife Refuge, administered by the U.S. Fish and Wildlife Service, is a complex of riparian and meadow habitat within the Columbia River flood plain. The refuge is considered suitable habitat for establishing a western pond turtle population.

Forty western pond turtles from the 1999 “head start program” (captive reared turtles that have reached a size large enough to reduce their chances of predation) were released at Pierce National Wildlife Refuge during the summer of 2000. These juvenile turtles are offspring from adults in the two existing populations in the Columbia River Gorge. These reintroduced turtles are being monitored to acquire data on post-release dispersal, habitat use (active and hibernation periods), and survival. Additional western

pond turtle releases will be conducted until the population objectives identified in the Washington State Recovery Plan for the Western Pond Turtle are achieved.

Relationship to Other Projects

Project ID	Title	Nature of Relationship
	Western Pond Turtle Recovery Project – ALEA	Volunteer program to assist WDFW with recovery of WPT
	Western Pond Turtle Partnerships	USFWS cost share grant for WPT work in Gorge
	WDFW/USFS/TNC WPT Habitat Development	Private/Agency program to protect WPT habitat
	Woodland Park Zoo and Oregon Zoo "head start"	Zoos currently assisting with captive breeding and juvenile care

Relationship to Existing Goals, Objectives and Strategies

Project Proposal 21013 was a request to fund recovery activities for the western pond turtle within the province. The project addresses a number of subbasin management objectives and strategies, including: (1) protection and restoration of the riparian and aquatic habitat, (2) protection and restoration of upland watershed habitat, (3) maintaining or increasing wildlife species diversity, (4) increasing wildlife habitat, and (5) potential protection of sensitive or listed wildlife species.

Review Comments

This project addresses a wildlife species that has been negatively affected by the hydrosystem. This species is listed as sensitive in the State of Washington.

Budget

FY01	FY02	FY03
Rec: $167,025 Category: High Priority	Rec: $104,600 Category: High Priority	Rec: $89,600 Category: High Priority

Research, Monitoring and Evaluation Activities

New project proposal 21005 would result in the assessment of wildlife habitat and habitat condition within the subbasin. The subbasin review team recommended that project 21012 receives partial funding to help evaluate the status of coastal cutthroat within the subbasin.

Need Information

Needed Future Actions

Need Information

Actions by Others

Need Information

Table 1. Bonneville Reservoir Subbasin Summary FY 2001 BPA Funding Proposal Matrix

Project Proposal ID	21005	21011	21012	21013
Provincial Team Funding Recommendation	**High Priority**	**Recommended Action**	**High Priority**	**High Priority**
Overall Fish Objective Maintain natural populations of anadromous and resident salmonids at levels that promote increased utilization of available habitat and that contribute to tribal and non-tribal fisheries as measured by an increasing trend in population abundance and distribution by the year 2012.		+		
Wildlife Objectives **Western Pond Turtle Objectives** 3. Establish at least 5 populations of >200 pond turtles, composed of no more than 70% adults, which occupy habitat that is secure from development or major disturbance (populations must show evidence of being sustained by natural recruitment of juveniles). 4. For downlisting to sensitive: 7 populations of >200 pond turtles will be needed.				+
Western Gray Squirrel Objective Develop population estimates and protect the core population of animals in Klickitat County.				
Columbian Black-tailed Deer Objective Secure adequate habitat for a healthy population of deer to allow for both native and non-native hunting population.	+			
Bald Eagle Objective Identify, enumerate, and protect currently used nesting and wintering habitat.	+			
Oregon White Oak Habitat Objective Secure oak habitat at current levels as per Washington Department of Fish and Wildlife Priority Habitats strategy.	+			
Fish Strategies **Overall CRITFC Fish Strategies** 1. Integrate conservation law enforcement protection into fish, wildlife and habitat management. 1.1. Identify and enforce laws and rules pertaining to fish passage, riparian habitat, and water quality protection. Provide information on enforcement actions to the system-wide conservation enforcement monitoring and evaluation project. 1.2. Identify and enforce laws and rules pertaining to exotic fish transfers. 1.3. Identify violations of laws and rules pertaining to habitat protection and provide information to appropriate state, federal or tribal law enforcement entity. 1.4. Increase enforcement of laws and fishing regulations pertaining to illegal take of fish (all life stages). 1.5. Continue enforcement of wildlife laws and regulations affecting wildlife species and habitat.				

Wildlife Strategies - Overall Improve and/or protect key habitat conditions in the drainage. The following strategies are critical for protection of key species and habitats:	+			
Western Pond Turtle Strategies 4. Continue the "head start" program to augment populations. 5. Improve nesting and foraging habitat through pond and meadow development. 6. Identify habitat for conservation easements and or acquisition.				+
Western Gray Squirrel Strategies 7. Investigate impacts from timber harvest on western gray squirrel habitat use. 8. Develop methodologies to adequately monitor population trends. 9. Conduct additional surveys on Yakama Indian Nation for population distribution. 10. Identify and acquire important lands to maintain or increase western gray squirrel population. 11. Improve travel corridors between key population centers. 12. Evaluate threat from eastern gray squirrel range expansion in western gray squirrel habitat.				
Columbian Black-tailed Deer Strategy Acquire critical winter range habitat that connects Washington Department of Fish and Wildlife's Klickitat Wildlife Area with the Yakama Indian Nation.				
Bald Eagle Strategies 3. Conduct surveys to identify winter communal roost habitat in drainage; 4. Develop management plans to protect winter communal roost habitat.				
Riparian Avian Guild Strategies 4. Identify priority oak, riparian, and late successional pine forests that provide habitat for avian species currently experiencing declines. 5. Select key habitats for acquisition and or conservation agreements that protect these species. 6. Reference riparian and eastside Partners in Flight Conservation Plan for priority species and habitat protection.	+			
Oregon White Oak Habitat Strategy Acquire or develop conservation easements for key oak habitats in the drainage; identify key habitats based upon most benefit for priority species protection.	+			
Riparian Strategy Identify primary riparian zones in need of restoration form logging, road construction or grazing; develop strategy for riparian restoration with Underwood Conservation District, Washington Department of Fish and Wildlife and the Yakima Indian Nation.	+			

These project titles are referenced by ID above:

21005 – Characterize and Assess Wildlife-Habitat Types and Structural Conditions for Subbasins within the Columbia Gorge Eco-province

21011 - Assess the Current Status and Biotic Integrity of the Resident Fish Assemblage in Bonneville Reservoir

21012 - Evaluate Status of Coastal Cutthroat Trout in the Columbia River Basin above Bonneville Dam

21013 - Western Pond Turtle Recovery - Columbia River Gorge

Note: + = Potential or anticipated effect on subbasin objectives and strategies.