Department of Energy

Bonneville Power Administration
P.O. Box 3621
Portland, Oregon 97208-3621

ENVIRONMENT, FISH AND WILDLIFE

December 16, 1999

In reply refer to: KECN-4

Mr. Richard Smith
U.S. Fish and Wildlife Service
517 South Buchanan
Moses Lake, WA 98837

Dear Mr. Smith:

Bonneville Power Administration (BPA) has completed our second biological assessment on the Methow Valley Irrigation District Project. On October 6, 1997 we sent your agency a biological assessment (BA) addressing the impacts of the project on Northern spotted owl, grizzly bear, grey wolf, and bald eagle. On October 22, 1997, we received a reply from your office (FWS ref. 1-9-97-SP-103 and 1-9-98-I-007) with concurrence that the project was not likely to adversely affect the species addressed. The project is now preparing to enter the construction phase in spring of 2000. In response to your list of October 21, 1999 (FWS Reference: 1-9-00-SP-030) showing the addition of bull trout and Ute Ladies' Tresses to the threatened and endangered species list, and the proposal to add Canada lynx to the list, we have prepared a new BA to cover these species.

BPA has determined, based on the information in the new BA, that the project may affect, but is not likely to adversely affect the bull trout or Ute Ladies' Tresses (pending a survey for the plant in August of 2000), or their critical habitats. The proposed action is also not likely to jeopardize the Canada lynx or adversely modify its critical habitat. BPA is requesting your concurrence with these determinations.

We are also consulting informally with the National Marine Fisheries Service regarding impacts to summer steelhead and spring chinook salmon. Please give me a call at 503-230-5373 if you have any questions or concerns about the BA.

Sincerely,

Nancy H Weintraub

Nancy H. Weintraub
Senior Environmental Specialist

1 Attachment
Copy of BA

bcc: (w/o attachment)
M. Keefe - Harza Engineering Company
R. Newkirk - Washington Department of Ecology
P. Stokes – Methow Valley Irrigation District
D. Byrnes - KEWN-4
P. Key - LC-7
Official File – KECN (EQ-21)

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Submitted to

National Marine Fisheries Service
and
U.S. Fish and Wildlife Service

Methow Valley Irrigation District Project

Biological Assessment for

Summer Steelhead, Spring Chinook Salmon, Bull Trout, Canada Lynx and Ute Ladies'-tresses

Prepared for

Bonneville Power Administration

Prepared by

HARZA Engineering Company

December 8, 1999

I. Description of the Proposed Action(s):

Bonneville Power Administration (BPA) is proposing to assist with the funding of renovations to the Methow Valley Irrigation District's (MVID) irrigation system. The MVID's current irrigation system is inefficient. To increase system efficiency and simultaneously allow for increased instream flows and provide improved fish passage in the Methow and Twisp rivers, a new irrigation system has been proposed by the Yakama Tribe and Washington Department of Ecology (WDOE). BPA funding this project would be partial mitigation for system–wide impacts of the Federal Columbia River Power System. The WDOE would be a co-sponsor, funding a major portion of the project. Additional funding will be provided by Washington Department of Fish and Wildlife (WDFW).

Needs to increase the efficiency of water use, enhance instream flows, and improve fish passage have been identified in several recent documents addressing fish and water issues in the Methow Basin (WDW et al. 1990, Methow Valley Water Pilot Planning Project Planning Committee 1994, CRTFIC 1995). The Columbia Basin System Planning Salmon and Steelhead Production Plan, Methow and Okanogan Rivers Subbasin (WDW et al, 1990) discussed natural production constraints for the anadromous fish species present in the Methow. While overharvest in downstream fisheries and dam-related mortality of smolts and adults were cited as the greatest limitations for anadromous salmon stocks, in-basin limitations included:

- Steelhead - slow juvenile growth rates and mortality due to winter icing, spring flooding, lack of instream winter cover, and unscreened irrigation diversions.
- Spring chinook - loss of rearing habitat due to dewatering and low flows resulting from irrigation diversions, juvenile mortality due to substandard irrigation diversions and winter icing conditions, and habitat losses from riparian development.

Several strategies identified in the subbasin plan focused on increasing salmonid smolt capacity by increasing instream flow. A recommended strategy for spring chinook was to implement water conservation and acquisition measures, including conversion to sprinkler irrigation systems, lining of earthen irrigation ditches and/or conversion to pump irrigation systems. The subbasin plan includes a specific recommendation to convert the MVID canal system to individual wells.

The draft Methow River Basin Plan (Methow Valley Water Pilot Planning Project Planning Committee, 1994) concluded that instream flow must be increased to improve fish and wildlife habitat and preserve and enhance the unique quality of the Methow Valley while allowing for growth. The plan also stated that the Committee recognized that existing instream flow levels are well below those needed to meet regional fish management objectives, and that significant opportunities exist to improve stream flows Appendix D, which discusses Agricultural Conservation Alternatives, acknowledges that while there are numerous factors that have contributed to the poor status of these stocks, irrigated agriculture is one of the most significant." It lists the MVID east and west canals as having the highest potentials of the irrigation systems listed for increasing instream flows at the points of diversion through conversion to wells and/or enclosed pipe (Table A).

The Columbia River Anadromous Fish Restoration Plan of the Nez Perce, Umatilla, Warm Springs, and Yakama Tribes, WY-KAN-USH-MI WA-KISH-WIT Spirit of the Salmon (CRTFIC 1995) noted that in the Methow River System, irrigation diversions, when combined with natural low flow occurrences and channel realignment, result in dewatering, upstream passage problems, and significant reductions in available fish habitat. Their first recommended action was to improve instream flows by implementing the recommendations of the Draft Methow Basin Plan.

MVID's gravity-fed, open-canal irrigation system has been vital to the Methow Valley's agricultural production since the MVID was organized and the system became operational in the early 1900s. Water diverted from the Methow River supplies the east side of the valley between Twisp and Carlton; water from the Twisp River supplies the west side in the same area.

By the 1930s, there appeared to be a decline in fish populations of the Methow and Twisp rivers. Much of the loss was attributed to fish being drawn out of the rivers and into the irrigation system, where they often died. Fish screens were installed at both canal intakes in 1937 to prevent the entry of fish into the irrigation system. Despite periodic remodeling, the screens are outdated and inefficient and eventually completely replaced. Efficiency of the entire MVID system has been compromised by irregular maintenance and repair. Currently, the overall conveyance efficiency (i.e., current demand for irrigation water divided by the total amount of water diverted) is estimated at 20 percent (Montgomery Water Group (MWG), 1996, page 27).

The MVID diversion structures are also in need of repair or replacement. The in-stream diversion dam on the Methow River is made up of wooden flashboards that must be adjusted by hand, and the diversion on the Twisp River is a rock levee dam that must be pushed up by a bulldozer each year. The irrigation diversions in the Methow and Twisp rivers coupled with the outdated fish screens and the inefficient canal systems contribute to poor habitat quality and poor passage conditions for anadromous fish in the Twisp and Methow rivers.

The Proposed Action would include the following elements:

- A new irrigation system would be built. It would use 46-centimeter (cm) (18-inch (in.)) groundwater wells from three well fields, one for the east canal and two for the west canal. About 21 kilometers (km) (13 miles (mi.)) of new low-pressure pipe would be placed in existing canal rights-of-way. (Figure 1.)

- Three small concrete tanks would be built aboveground to act as reservoirs for the new system. Each tank would be about 6 meters (m) tall (20 feet (ft.)) by 6 m (20 ft.) in diameter.

- Several existing canal reaches would be abandoned: *east canal*: reaches 1, 2, lower 4, 5, 6; *west canal*: 1, middle of reach 3. (West reach 5 has already been abandoned.) Areas served by these canal reaches would be removed from the MVID and served by existing or new, privately-owned groundwater irrigation wells (see Figure 2-1 in the Environmental Assessment, Boneville Power Administration 1997.)

- MVID members wishing to leave the District would keep benefits under MVID water rights and claims. The remaining 376 hectares (ha) (930 acres (ac.)) would be irrigated by the piped groundwater system. The MVID would receive authorization to transfer surface water points-of-diversion to points-of-withdrawal for existing or new, privately developed groundwater wells.

BPA, WDOE, and WDFW would fund new system construction. BPA would provide compensation funds for MVID members leaving the district, based on an acreage formula. The total estimated cost for this alternative is $4.6 million.

II. Description of the Action Area:

A. General: The Methow River Valley is located in the north-central Washington and represents the upper limit of anadromous salmonid habitat in the Columbia River system. The Methow River drains approximately 4,590 square km (1,772 sq. mi.) of the eastern slopes of the Cascade Mountain Range and enters the Columbia River at river kilometer (RK) 838 near Pateros, Washington. The Twisp River is a major tributary to the Methow River, converging with the Methow River near the town of Twisp.

Ice Age glaciation greatly influenced the geology and rivers of the Methow Valley. The valley is wide and u-shaped with glacially-rounded uplands. Thick alluvial and glacial deposits provide a broad, shallow alluvial aquifer. This aquifer is permeable, allowing water to flow down the valley as groundwater and in the rivers and streams as surface water. The water flows relatively freely between the underground aquifer and the Methow River system. Under these conditions, the groundwater in the aquifer and the surface water in the rivers and streams are described as being in hydrologic continuity with each other.

Methow and Twisp river channel characteristics and physical fish habitat are described in the In-stream Flow Incremental Methodology (IFIM) study conducted by WDOE (1992). The Methow River between Carlton and Twisp is about 50 m (160 ft.) wide, and has an average gradient of less than 0.5 percent. Cobble and some large boulders dominate its substrate. Habitat types include glides and riffles, interspersed with some deep pools. Within the project area, the Twisp River is about 18 m (60 ft.) wide, and has an average gradient of 1.7 percent. It is mostly cascade and riffle habitat with no pools. Substrate is primarily cobble and boulder.

The Methow Basin provides 294 km (182 mi.) of streams, portions of which are used by several anadromous fish species, including chinook (*Oncorhynchus tshawytscha*), sockeye (*O. nerka*), and coho (*O. kisutch*) salmon and steelhead trout (*O. mykiss*) (see Figure 2) (Mullan et al., 1992). Little is known about sockeye and coho salmon use of the MVID project area; however, such use appears to be minimal because of the basin's location and characteristics (such as limited rearing habitat for those species). Resident species (fish that do not migrate to the ocean) include rainbow *(O. mykiss*), cutthroat (*O. clarki*)/rainbow hybrid, brown (*Salmo trutta*), brook

(*Salvelinus fontinalis*), and bull trout (*S. malma*), and mountain whitefish (*Prosopium williamsoni*). The species of primary concern in this portion of the basin are spring chinook salmon, summer steelhead, and bull trout (USFWS, 1997; WDFW, 1996a).

Major factors affecting these Methow Basin salmonids include problems with both upstream and downstream fish passage, mortality at nine mainstem Columbia River dams, and overharvest in downstream fisheries (WDW et al., 1990; Caldwell and Catterson, 1992; Mullan et al., 1992). Once migratory salmonids enter the Methow basin factors affecting them include physical fish habitat as provided by instream flows, winter fish habitat (primarily cover), and entrainment of fish into the canal systems. Effects of these factors are specific to both the species type and life history stage of each species.

The WDFW classified several of the anadromous and resident species in the Methow basin as Priority Species. The sections of the Methow and Twisp rivers within the MVID project area have been designated as habitat for Priority Species. These habitats require special protective measures and management guidelines to ensure the continued existence of each species (WDFW, 1996b).

B. Environmental Baseline: See Appendix A. Checklist for Documenting Environmental Baseline and Effects of Proposed Action(s) on Relevant Indicators

III. Brief Description of the Proposed/Listed Species Affected by Proposed Action(s):

Summer Steelhead

On 11 August 1997, NMFS announced that summer steelhead in the Upper Columbia River, from the Yakima River upstream to Chief Joseph Dam, had been listed as endangered under the federal Endangered Species Act (ESA)(62 FR 43938, 11 August 1997). The listing was based on the conclusion of the Biological Review Team (BRT) whose major concern for this Evolutionarily Significant Unit (ESU) was the clear failure of natural stocks to replace themselves. Other concerns were expressed about problems of genetic homogenization due to hatchery supplementation within the ESU, apparent high harvest rates on steelhead smolts in rainbow trout fisheries, and the degradation of freshwater habitats within the region, especially the effects of grazing, irrigation diversions, and hydroelectric dams (NMFS, 1996).

Summer steelhead are present in the Methow and Twisp rivers and in most accessible tributaries in the basin, including the Chewack and Lost rivers, and Early Winters, Wolf and Gold creeks. Adults enter the Methow River system from July through October. During the winter, many adults return to the Columbia River's warmer waters. Spawning occurs in the upper mainstem Methow River upstream of the MVID project area and in tributaries, including the Twisp River, beginning in March and continuing into early June. Juveniles rear near spawning areas in tributaries. However, many juveniles migrate from smaller tributaries to rear in the warmer waters of the mainstem Twisp and Methow rivers (USFS, 1995). Juveniles generally rear in the Methow River and tributaries for 2 to 4 years before beginning their seaward migration. However, the cold waters of area rivers slow juvenile growth and maturation rates. Populations in the area contain some of the oldest documented steelhead smolts, with some juveniles beginning their seaward migration after 7 years in freshwater (Busby et al. 1996).

The 1992 Washington State Salmon and Steelhead Stock Inventory stated that the wild Methow River summer steelhead stock is depressed, based on chronically low spawning-escapement counts (WDFW1993). Between 1977 and 1986, an annual average Methow Basin return (catch plus escapement) of 8,164 steelhead occurred; 200 of these were considered naturally reproduced (WDW et al., 1990; Caldwell and Catterson, 1992). Annual spawning escapement averaged 4,050 fish, of which an estimated 93 were naturally reproduced. Between 1972 and 1992, Twisp River annual escapement averaged 913 fish, of which 79 were naturally reproduced (USFS, 1995). The naturally-reproduced component of Methow Basin run has increased since 1987, when anglers were required to catch-and-release unmarked steelhead (USFS, 1995). The average sport catch and harvest between 1977 and 1986 was 3,936.

There is a close resemblance between the hatchery and natural populations of steelhead in the Methow Basin. In fact, NMFS deemed that the Wells Hatchery steelhead supplementation program essential for steelhead recovery in the basin and this hatchery broodstock was included in the listing of the Upper Columbia ESU (Federal Register 1997). The Wells Hatchery steelhead supplementation program has used mixed stock collections from the Wells Dam to supplement natural steelhead production. Releases in the Methow Basin averaged 370,664 summer steelhead smolts per year from 1981 through 1987 (WDW et al., 1990). Survival of egg-to-smolt and smolt-to-adult for naturally reared summer steelhead is unknown for the Methow Basin, but the average smolt-to-adult survival of hatchery steelhead is 2.1 percent. The practice of mixing stocks for hatchery production has contributed to some genetic homogenization of naturally reproducing steelhead populations in this ESU (Busby et al. 1996, NMFS 1998). To minimize these effects, current efforts are focused on moving from a mixed stock hatchery program to use of locally adapted stocks for future supplementation.

The Northwest Power Planning Council's habitat-carrying-capacity model estimated that the Methow Basin is capable of producing 169,610 summer steelhead smolts (WDW et al., 1990). However, a more recent smolt production capacity estimate of 58,552 was generated when developing the Mid-Columbia Habitat Conservation Plan (NMFS 1999). Given this recent estimate, NMFS indicated that the steelhead habitat in the Methow River has been overseeded in the recent past, primarily due to hatchery steelhead. NMFS stated that overseeding may have contributed to the inability of the local steelhead populations to sustain themselves.

The steelhead management goal for the basin is to rebuild natural runs and maintain genetic integrity, while allowing a harvest of 10,000 hatchery steelhead for sport and tribal anglers (WDW et al., 1990; Caldwell and Catterson, 1992). A minimum escapement for wild fish is 3,200 with no harvest (WDW, 1990); however, a natural production goal has not been established (Wy-Kan-Ush-Mi Wy-Kish-Wit, 1995). Current natural production limitations include mainstem Columbia River dam mortalities and overharvest. In-basin factors limiting summer steelhead production include slow growing juveniles, mortalities from winter icing, spring flooding, lack of in-stream winter cover, and mortalities at inadequately screened irrigation diversions (WDFW 1990).

Spring Chinook Salmon

On 24 March 1999, Upper Columbia River spring chinook salmon, *O. tshawytscha*, were listed as endangered under the federal ESA (64 FR 14308, 24 March 1999). The Upper Columbia River ESU consists of all naturally spawning populations in Columbia River tributaries upstream of Rock Island Dam and downstream of Chief Joseph Dam, excluding the Okanogan River. The BRT expressed concern that populations in this ESU are currently at risk of extinction, because almost all the remaining naturally spawning populations have fewer than 100 adults returning annually (Myers et al. 1998). Populations in this ESU have suffered some loss of genetic integrity as a result of stock mixing associated with the Grand Coulee Fish Maintenance Project (1939-43). However, the BRT stated that this ESU contains the last remnants of the gene pool for Columbia River headwater populations and as such represents an important genetic resource.

The life history and ecology of Methow spring chinook salmon are consistent with what is known for other populations of this species. Spring chinook salmon spawning and rearing habitats are found in the mainstem Methow River and tributaries including, the Lost, Chewuch, and Twisp rivers and Early Winters Creek. Most spring chinook salmon adults return to spawn after two years in the ocean with a smaller proportion (20 –30%) returning after 3 years. Adults returning to spawn enter the Methow in mid-May through early July. Spawning takes place from late July through early September. Eggs incubate over the winter in the gravel and fry emerge during April and May. Juvenile spring chinook salmon rear in the Methow system for approximately one year before initiating their seaward smolt migration.

Long term escapement trends in the Methow River indicate that these spring chinook salmon populations are in decline. Recent spawning escapement estimates from 1987 to 1995 have ranged from 738 to 15 and averaged 394 adults (pers. comm. Joel Hubble, Yakama Indian Tribe, Yakima WA). In 1996 and 1998 there was no natural escapement, as the entire run was collected for hatchery broodstock at Wells Dam. The Twisp River run has contributed a considerable portion of the total run to the basin, 23.4 % on average. Juvenile production estimates also indicate the depressed population status of naturally reproducing spring chinook salmon in the Methow River basin. Wild spring chinook salmon smolt production has been estimated to be very low at approximately 19% of habitat capacity. (NMFS 1999).

There are several different hatchery programs operating in the Methow River basin that are included in the Upper Columbia River ESU. The Methow River Fish Hatchery and the Winthrop National Fish Hatchery both produce spring chinook salmon for release into the Methow, Twisp, and Chewuch rivers. Hatchery broodstock has been collected from weirs located below spawning areas on these rivers, as well as from mixed stock collection at Wells Dam. The short-term goals of hatchery smolt releases have been approximately 1.1 M annually (NMFS 1999). In addition, there is a captive broodstock program for the Twisp River population. Eyed-eggs, pre-emergent fry or emergent fry are collected from spawning areas and reared at Aquaseed Corporation in Rochester, WA. Production goals of the captive brood program are to release approximately 324 K second-generation smolts back into the Twisp River. Hatchery programs in the Methow River basin have been deemed essential to assist with recovery of spring chinook salmon populations (NMFS 1999).

In addition to stock recovery, priority WDFW's management goals for spring chinook salmon in the Methow River basin are to provide fish for an annual harvest of 2,000 adults, determine maximum sustainable yield (MSY) escapement, and manage escapement accordingly to provide a shared tribal and recreational harvest. Managers also will work to increase productivity of local populations while maintaining unique characteristics of the stock. Current limitations on natural production in the basin include:

- Columbia River dams and impoundments
- reduced rearing habitat resulting from low stream flows
- habitat degradation resulting from logging and agriculture
- increased juvenile mortality from winter icing.

Bull Trout

The USFWS listed the Columbia River bull trout population segment as threatened on 10 June 1998 (63 FR 31647, 10 June 1998). USFWS cited numerous factors contributing to the decline of bull trout populations in the Columbia River. Most notable is the fragmented nature of habitat throughout the basin. Hydroelectric development on the Columbia River isolated many of the fluvial bull trout populations, thereby significantly reducing bull trout rearing capacity in the watershed (WDFW 1998). Land and water management practices associated with forestry, road building, mining, agricultural practices, and livestock grazing also have reduced available bull trout habitat (Federal Register 1998). Additional factors in the decline of bull trout include competition with rainbow trout, brook trout, and other resident species, as well as possible hybridization between introduced brook trout and native bull trout (WDFW 1998, Markle 1992).

Bull trout have three distinct life history patterns: the resident or non-migratory type, fluvial fish that migrate within the river system, and adfluvial fish that migrate between river and lake habitats (Goetz 1989). All three life history patterns can be found in the Methow River basin, with the resident and adfluvial forms predominantly inhabiting isolated reaches of the upper Methow River and its tributaries (WDFW 1998). The extent of the range of fluvial bull trout in the Methow River has not been determined; however, individual sightings have been documented in the MVID project area (BPA 1997).

Bull trout populations are concentrated in the colder upper reaches of the Methow River basin streams. Optimum water temperatures for bull trout have been estimated at 2-10°C, while temperatures above 15°C are thought to provide a thermal barrier for most bull trout (63 FR 31647, 10 June 1998; Goetz 1989). For this reason, interaction between the resident and migratory population segments of different streams within the basin is likely limited. Migratory bull trout have been found to be less sensitive to higher water temperatures, and thus, it is possible they could migrate between streams in the basin (WDFW 1998).

Information regarding distribution, life history types, and population numbers of bull trout in the Methow River is limited and the majority of information is based upon documented sightings, hook-and-line sampling, and redd surveys. According to the 1995 Salmon and Steelhead

Inventory (WDFW 1998), adfluvial, fluvial and resident bull trout populations are thought to occur in the following streams within the Methow River basin:

Gold Creek	Beaver Creek
Twisp River*	East Fork Buttermilk Creek*
West Fork Buttermilk Creek*	Reynolds Creek
Lake Creek*	North Creek*
Wolf Creek*	Goat Creek
Early Winters Creek*	Cedar Creek*
Lost River	Monument Creek
Cougar Lake	First Hidden Lake
Middle Hidden Lake	West Fork Methow River*

During 1995-1998 redd surveys, the USDA Forest Service (USFS) confirmed bull trout presence for those streams above indicated with an asterisk. In addition, the Forest Service found bull trout redds in Trout, Huckleberry, and Crater creeks (USFS 1998).

Bull trout in the Methow River spawn from August to November as temperatures decrease (WDFW 1998). Spawning occurs in areas fed by a constant, cool water source such as the glacially fed headwaters of most of the Methow River basin streams. Spawning occurs at temperatures ranging from 4 to 10°C (63 FR 31647, 10 June 1998). Fry and juvenile bull trout are territorial, defending an area that meets their rearing habitat requirements including low velocity, clean gravel, low water temperature, and ample cover. The size and age of maturity in bull trout depends upon the life history pattern (adfluvial, fluvial, resident). Resident bull trout experience slower growth rates and reduced size, and are less fecund than the migratory fish. Bull trout generally reach sexual maturity in 4 to 7 years and live as long as 12 years, reaching sizes between 150-600 mm. Adults have been documented to spawn annually or in alternating years, although information on spawning frequency and mortality is limited (Federal Register 1998).

Limitations on bull trout populations primarily are related to a reduction in available habitat. Hatchery releases of rainbow trout and brook trout may have increased interspecific competition, that has pushed bulltrout out of otherwise favorable habitat (WDFW 1998). In-basin increases in water temperatures and inadequate year-around cover also contribute to habitat limitations. Additional in-basin, limiting factors include possible hybridization between bull trout and brook trout and stranding of migratory bull trout due to inefficient screen systems at diversion points.

Canada Lynx

On 8 July 1998, the contiguous United States distinct population segment of Canada lynx, *Lynx canadensis*, was proposed for listing as threatened under the Endangered Species Act (63 FR 36993, 8 July 1998). The USFWS determined that the U.S. contiguous population segment is threatened by human impacts including alteration of forests and increased human intrusion in lynx habitat, residual effects of past overexploitation, and the expanding range of known competitors, bobcat and coyote (Federal Register 1998). The Canada lynx population in Washington State has been estimated at 96-191 individuals (Federal Register 1998) and is one of two naturally reproducing populations in the contiguous U.S.

Canada lynx live in regions of North America with arctic or boreal forests. Lynx require early successional forest habitats when seeking prey and late successional forests for denning and rearing young (Koehler and Aubry 1994, Koehler and Brittell 1990). Lynx documented outside of these forest habitats are considered transients, such as young males dispersing into a new area. Such behavior is thought to be important for gene flow among lynx populations.

In the northeast Cascade Mountains, lynx occupy habitats at elevations of 750 to 2,540 m with most use between 1400 and 2150 m (McKelvey et al. 1999). At elevations below 1370 m, dominant forest types where lynx are found are Douglas fir and ponderosa pine. Above 1370 m, lynx utilize primarily lodgepole pine, subalpine fir, and Engelman spruce habitats. In central and northeast Washington, lodgepole pine forests appear to be preferred habitat by hare and lynx (McKelvey et al. 1999).

In addition to habitat type, the population abundance of Canada lynx is intimately linked to snowshoe hare population abundance. In the northern part of their range these two species are so interdependent that the lynx population cycles with and lags behind the increasing and declining hare populations. In the southern portion of their range, including Washington state, lynx live in what has been considered marginal habitat (Koehler and Aubry 1994). Hare populations as well as lynx populations tend to remain low with no evidence of cycling.

Lynx breed in late March to early April with kittens born in late May after a gestation of approximately 60 days. Under optimal conditions with high prey availability (hare abundance) females can mature as early as 10 months of age, although maturation at 22 months is more common (Koehler and Aubry 1994). Pregnancy rates increase with female age, with adults older than 3 years having the highest rates (above 90%). The average litter size also is dependent upon prey abundance as well as age at maturation, and ranges from 1.75 to 3.25 kittens per female. The success of recruitment of kittens into the adult population is highly variable, fluctuating with hare densities.

In Washington, lynx occupy 7 different management zones including the Okanogan Highlands on the east side of the northern Cascades (Richardson 1999). The WDFW's management goals for lynx are to improve habitat conditions, increase population numbers, and delist the population (Lloyd 1999). To achieve these goals, actions are needed that provide for a suitable array of forage, denning, and travel habitats, appropriately distributed in time and space. Detailed lynx management objectives can be found in WDFW's Priority Habitats and Species Management Recommendations for Lynx (Lloyd 1999) as well as in the Habitat Conservation Plans developed by the three major private landowners in Washington (Richardson 1999).

Ute Ladies'-tresses

On 17 January 1992, the USFWS listed Ute ladies'-tresses (Ul-t), *Spiranthes diluvialis*, as threatened under the federal ESA (57 FR 2048, 17 January 1992). Ute ladies'-tresses is a perennial orchid that blooms from late July thorough September depending on location and climate. *S. diluvialis* is similar in appearance to other more common species of *Spiranthes* such as the hooded ladies'tresses, *S. romanzoffiana*. Positive identification of Utes ladies'-tresses is possible only when the plant is in flower. As is common in this genus, individual plants may remain dormant for several years and forego producing above ground shoots or may produce only vegetative shoots, which complicates both positive identification and the interpretation of survey results.

This rare orchid has been documented in eight states (Utah, Nevada, Colorado, Idaho,.Nebraska, Wyoming, Montana, and Washington). In 1997, a small population was discovered in Okanogan County, WA near Wannacut Lake (pers. comm. T. Ohlson, USDA Forest Service, Twisp Ranger District). Plants in this taxon depend on natural disturbance to establish themselves in early successional communities. Although compatible with limited grazing outside the flowering season, Ul-t may be adversely impacted by extensive grazing, vegetative removal associated with development or agriculture, excavation, construction, stream channelization, or other actions that change hydrology or vegetative cover.

The general habitat of this species is considered broad, low-elevation intermontane valley plains. It is found at elevations of 457 to 2,134 m (1,500 to 7,000 ft), although more typically Western populations are found at lower elevations. It is found in areas that are periodically or temporarily inundated, such as wet meadows, riparian habitats, dry stream channels, river banks, river meadows and floodplains, where there is stable subsurface moisture and limited vegetative cover. Ute ladies'-tresses is partial to transitional zones between lower montane forests and open shrub or grassland, along medium to large streams of moderate gradient.

The habitat of the known Washington population can be described as wetland meadow. It is a periodically flooded alkaline flat adjacent to ponderosa pine and Douglas fir woodland and sagebrush steppe (T. Ohlson, USFS, Twisp Ranger District). Associated species include beaked spikerush, *Eleocharis rostellata*, creeping bentgrass, *Agrostis stolonifera*,and common silverweed, *Potentilla anserinna*. The Washington population contains fewer than 20 individuals.

IV. Effects of the Proposed Action on Proposed/Listed Species or Proposed/Designated Critical Habitat

A. Effects of the Action(s): See Appendix A. Checklist for Documenting Environmental Baseline and Effects of Proposed Action(s) on Relevant Indicators

B. Potential Impacts of the Proposed Actions:

Removal of Fish Screen and Diversion Facilities. In order to abandon the aforementioned canal reaches, the diversion and fish-screening facilities at the east canal and west canal diversion points must be removed. The demolition of existing diversion structures, intakes, and fish screens would take place in and around the rivers. This demolition activity would have the potential to result in short-term increases in sedimentation and the unlikely potential for fuel spills resulting from the use of construction equipment in the stream. Potential impacts would be minimized by compliance with terms of Washington State regulatory permits (WDFW Hydraulic Approval Permit and WDOE Section 401 Water Quality Permit). This is a one time, instream activity that will replace the annual instream construction of a berm (push-up dam) that occurred in the Twisp River previously. Additional measures to minimize potential impacts from demolition activities would include implementation of timing window for in-stream work, an erosion control plan, and a spill prevention and containment plan.

Removing the in-stream diversions would improve upstream fish passage past both canals' intakes. The diversions span most of both rivers, and most likely cause some delay in upstream migration. This delay is a problem particularly for spring chinook salmon, because the adults need to have access to deeper holding pools in the upper watersheds. Temperatures and habitat features below the diversions are probably not suitable for spring chinook holding areas, given the number of spring chinook that need to access the upper Twisp and Methow rivers. In addition, eliminating the diversions would result in increased instream flows that will facilitate fish passage (see IFIM section below).

Groundwater Wells. Under the proposed actions, the MVID would construct three groundwater well fields in locations close to the rivers yet outside of the riparian areas. In addition, MVID members who do not receive irrigation water through the pipe system could leave the MVID and use groundwater wells for irrigation. Locations of any new wells would be subject to review and approval by the WDOE and Okanogan County (under the Shorelines and Critical Areas Ordinance) to assure compliance with applicable environmental laws and regulations. Therefore, it is unlikely that construction of these wells would affect fisheries habitat. In addition, because the well sites are located on private agricultural property and are not sited in wetlands (Figure 1) it is unlikely that the construction of the wells will impact important habitat for Canada lynx or Utes ladies'-tresses.

In-stream Fish Habitat Analysis Methodology (IFIM). According to IFIM methodology, in-stream fish habitat is defined in terms of physical habitat as a function of streamflow; modeling of this relationship can aid in water management decisions that affect fisheries. A basic IFIM premise is that fish populations respond to hydraulic changes in the environmental condition of their habitat. Typically, IFIM is applied to only the spawning and rearing portions of the life cycles of salmon, because the criteria used to define a fish's preference for certain hydraulic conditions and physical habitat, including cover and substrate, are developed when fish are active and easily observed. Other factors, such as water temperatures, harvest, downstream fish passage, and management objectives, can also affect the health of a fish population, and were considered when assessing the overall impacts of a project flow change.

The IFIM study conducted by Caldwell and Catterson (1992) in the Methow River Basin was reviewed by CH_2M HILL (1997) and used in the environmental assessment (EA) (BPA 1997) to evaluate changes in in-stream fish habitat. Changes in in-stream fish habitat were evaluated as they relate to proposed changes in flow for one section in the Methow River, between the east canal diversion point and the Twisp confluence, and one section in the Twisp River, between the west canal diversion point and the Methow confluence. There would be additional benefits to in-stream flow, and consequently physical habitat, below the confluence of the two rivers. However, relationships between diversion rates, canal seepage, return flows, groundwater recharge, and groundwater-surface water continuity could not be modeled adequately to predict the extent of the these flow benefits.

The fish habitat factors evaluated in these two study reaches included adult holding (areas in which adults reside before spawning occurs) for spring chinook salmon, spawning habitat for spring chinook salmon and summer steelhead, and juvenile rearing habitat for spring chinook salmon, summer steelhead, and bull trout. These were used, as applicable, for each river section. September flows were selected for evaluation because September irrigation diversions are highest in comparison to in-stream flows, presenting the greatest challenge to the fish.

The results of the analysis are presented for two conditions, 50-percent exceedance flows (which means normal conditions) and 90-percent exceedance flows (dry conditions). Using exceedance flows (rather than average flows) is a more meaningful way to assess impacts on aquatic resources, because averages often mask true impacts. For example, fish survival in a particular stream may be more affected by the amount of water present during dry conditions than by the average flows. Exceedance values are computed by compiling the daily flow records for a given stream, or section of stream, over the period of record of interest. These daily flows are then ranked from highest to lowest. The 50-percent exceedance flow, or the normal condition, is the normal flow for the entire period of record. The 90-percent exceedance flow, or the dry condition, is the flow level at which 90 percent of all the recorded daily flows are greater than (or exceed) that flow.

The results of the evaluation indicated:

- Maximum habitat for most of these species/life history stages occurs at flows above 650 cfs. The most substantial gains in habitat occur between 90 cfs and 500 cfs.
- Under normal (50-percent exceedance) flows in the Methow River above Twisp, habitat area defined by weighted useable area (WUA) would increase by 10 to 13 percent for almost all of the species/lifehistory stages evaluated (Table 1).
- Because the flow increases in the Twisp River would be greater in proportion than flow increases in the Methow River above Twisp, habitat increases also would be greater. Habitat in the Twisp River for four of the five species/life history stages evaluated would increase by 45 to 57 percent under normal conditions (50-percent exceedance) (Table 1).
- Under dry conditions (90-percent exceedance flows), habitat increases in both the Methow River above Twisp and in the Twisp River would be greater than those under 50-percent exceedance flows (Table 2). This difference is due primarily to the relatively large percentage increase in flows as well as the relatively low flows in both

rivers if no action is taken. If no action is taken, dry-condition flows for September are only about 150 cfs in the Methow above Twisp and 24 cfs in the Twisp.

- Under dry conditions in the Methow River above Twisp, habitat would increase by 16 to 25 percent for four of the five species/life history stages evaluated; only spring chinook rearing habitat shows a smaller increase of 2% (Table 2).
- In the Twisp River, habitat increases for all species/life history stages during dry conditions would be substantial, ranging between 57 and 224 percent (Table 2). Again, spring chinook rearing would have the lowest increase. These potentially substantial habitat increases can be attributed to the fact that, under dry conditions, flows in the Twisp River are very low. Even a slight absolute increase in flows would result in a substantial percentage increase in habitat.

Temperature. Concerns have been raised that the proposed closed pipe irrigation system would change the groundwater return flows to the Methow and Twisp rivers, during both summer and winter. During summer, seepage from the open canals and irrigation water are thought to result in groundwater returns to the river that provide cooler waters. About 80 percent of the water diverted to the MVID canals has been estimated to return to the Methow River as surface or groundwater. The concern is that reducing the return flows would result in increased river water temperatures. However, using a groundwater well and closed pipe irrigation system actually would increase the amount of water that remains in the river (see Water Quantity section below). Instream flows in the Methow River above Twisp have been estimated to increase from 13 percent to 20 percent under 50 percent exceedance and 90 percent exceedance conditions, respectively. In the Twisp River flow increases are expected to be even greater with a 31 percent increase at 50 percent exceedance conditions and a 51 percent increase at 90 percent exceedance conditions. This amounts to a doubling of stream flows in the Twisp River in September. Such increases in river volume will have a moderating effect on river temperatures. In addition, groundwater returns will still come to the river from irrigation water.

A second concern is that a reduction in warmer groundwater returns during winter might decrease river water temperatures. Winter water temperatures are an important factor in fish development and survival. In the Methow Basin, summer and spring chinook salmon, and brook, brown, and bull trout all have eggs in the gravel through the winter. The rate at which fish eggs develop during that time is greatly influenced by temperature, among other variables. If groundwater return flows were reduced, egg development and fry emergence might be delayed because river water is colder. Fry might not have enough time to grow large enough and develop through the smoltification process, which would greatly reduce their chance for survival during their downstream migration.

How fast the seepage and irrigation water returns to the river is unknown, but return undoubtedly occurs for some time after the irrigation season and probably ends by December. In winter, the temperature of the groundwater return flow is about 10°C, while Methow River midwinter temperatures approach 0°C. A closed pipe irrigation system would eliminate much of the groundwater return flow during the summer and late fall. However, by the time the river has cooled significantly (December), the groundwater return flows have diminished. Thus the piped system is expected to have little or no impact on winter river temperatures, and thus salmonid egg development.

Table 1: Comparison of In-stream Habitat (WUA) between No Action Conditions and Alternative A Using the 50-Percent Exceedance (Normal) Flows for September (Caldwell and Catterson 1992)

50-Percent Exceedance Flow by River Reach and WUA[1] by Species/Life-history Stage	No Action	Alternative A	Net Change
Methow River Above Twisp			
50-percent exceedance (normal) flow (cfs)	233	272	+39
Spring Chinook			
Adult Holding	3,890	4,332	+11%
Spawning	28,624	32,446	+13%
Juvenile Rearing	20,907	20,865	0%
Summer Chinook Spawning	28,624	32,446	+13%
Summer Steelhead Juvenile Rearing	20,206	22,719	+12%
Bull Trout Juvenile Rearing	4,886	53,588	+10%
Twisp River at Twisp			
50-percent exceedance (normal) flow (cfs)	55	80	+25
Spring Chinook			
Spawning	3,058	4,429	+45%
Rearing	10,369	11,417	+10%
Summer Chinook Spawning	3,058	4,429	+45%
Summer Steelhead Juvenile Rearing	4,522	6,631	+47%
Bull Trout Juvenile Rearing	16,578	26,070	+57%

Note: Habitat was not evaluated in the Methow River below Twisp because flows are estimated to be similar to No Action conditions.

[1] WUA is defined as the amount (square feet) of habitat per 1,000 feet of stream

Table 2: Comparison of In-stream Habitat (WUA[1]) between No Action Conditions and Alternative A Using the 90-Percent Exceedance (dry conditions) Flows for September (Caldwell and Catterson 1992)

Exceed the Flow by River Reach and WUA by Species/Lifehistory Stage	No Action	Alternative A	Net Change
Methow River Above Twisp			
90-percent exceedance (dry condition) flow (cfs)	157	196	+39
Spring Chinook			
Adult Holding	2,972	3,459	+16%
Spawning	19,681	24,548	+25%
Juvenile Rearing	20,466	20,887	+2%
Summer Chinook Spawning	19,681	24,548	+25%
Summer Steelhead Juvenile Rearing	14,078	17,321	+23%
Bull Trout Juvenile Rearing	27,452	43,616	+16%
Twisp River at Twisp			
90-percent exceedance (dry condition) flow (cfs)	24	49	+25
Spring Chinook			
Spawning	820	2,659	+224%
Rearing	6,277	9,828	+57%
Summer Chinook Spawning	820	2,659	+224%
Summer Steelhead Juvenile Rearing	1,610	3,993	+148%
Bull Trout Juvenile Rearing	4,770	14,310	+200%

Note: Habitat was not evaluated in the Methow River below Twisp as the Alternative flows were estimated to be about the same as No Action conditions.

[1] WUA is defined as the amount (square feet) of habitat per 1,000 feet of stream

Fish Habitat in the Project Irrigation Canals. Presently, because water is no longer diverted to them, the project canals dry up after irrigation season. Although canals are screened, some resident and migratory fish may enter into the canals during periods of high flow. This occasional use of canal habitat by fish is considered to be detrimental because the canals are essentially isolated from the project rivers; any fish that enter the canals cannot return to the river and are considered "lost" to the river populations. Conversion from a canal system to groundwater well, closed pipe system would prevent this loss.

Water Quantity. The conversion to a groundwater well, closed pipe irrigation system is expected to have overall positive effects on surface water quantity and on the groundwater aquifer. Overall river diversions and groundwater extraction would be reduced by at least 32 percent, from more than 66.8 cfs, to 45.5 cfs.

- For the **Methow River**, a groundwater well field would be constructed to replace the canal reach between the present east canal diversion and a point about 1.6 km (1 mi.) below the confluence with the Twisp (a total of 8 km (5 mi.)). The mean peak river diversions would drop from 40.8 cfs (current peak diversion) to 0 cfs.

- For the **Twisp River**, a groundwater well field would be constructed to replace the canal reach between the present west canal diversion and a point just above the confluence with the Methow, near Alder Creek Road (about 6.5 km (4 mi.). The mean peak river diversions would drop from 26.1 cfs to 0 cfs.

These respective reductions would make additional water available for fish along those reaches of the two rivers. Instream flows in the Methow River above Twisp have been estimated to increase from 13 to 20 percent under 50-percent exceedance and 90-percent exceedance conditions, respectively. In the Twisp River flow increases are expected to be even greater with a 31 percent increase at 50-percent exceedance and a 51 percent increase at 90-percent exceedance.

Water Quality. Water temperatures exceed standards on occasion in the Methow River at Pateros, below the MVID area. The proposed actions are expected to enhance the water quality, primarily by returning the system to a more natural temperature regime. As discussed in detail above in the Temperature section, eliminating diversions into the canal system would leave more water in the Twisp and Methow rivers and will help to moderate river water temperature during summer and winter.

Riparian Habitat. Approximately 13 ha of riparian habitat that has developed along the canals would be affected by conversion to a groundwater, closed pipe irrigation system. Loss of canal riparian habitat would result in the direct loss or displacement of wildlife that utilize these areas for shelter, food, and/or water. However, improved riparian conditions along the rivers are expected to result from increased instream flows associated with abandoning the canals and should offset the loss of canal riparian habitat. Such enhanced natural riparian corridors along the Methow and Twisp rivers should provide greater wildlife benefits than the canal riparian habitat because of their connectivity to other natural wildlife habitats. In addition to wildlife benefits, the proposed actions also would improve the ability of the riverine riparian habitat to moderate flood flows, protect water quality, and provide shade and cover for fish.

The canal riparian habitat does not appear to be critical habitat for Canada lynx or any other threatened, endangered, or sensitive wildlife species. Due to the low elevation and lack of forest habitat, lynx are not likely present in the project area. Lynx would not be affected by the loss of canal riparian habitat.

Riparian areas along the canals that would be affected by the proposed project may provide habitat for the threatened orchid, *S. diluvialis*, Utes ladies'-tresses. Positive identification of this species is not possible except when it is in flower. Thus, we have not been able to complete an effective site survey of the potentially impacted area. A site survey will be conducted by qualified botanists to determine whether *S. diluvialis* is present along the canal reaches that will be eliminated. The survey will be scheduled for early- to mid-August 2000 when the plants in the known Washington population are thought to be in peak flower. The current construction schedule for the new irrigation system has well drilling scheduled to begin early next summer (Table 3). Given that the well sites are not located in potential *S. diluvialis* habitat, construction will follow the current schedule. However, construction activities that will impact the canal riparian corridor will be delayed until after the survey for *S. diluvialis* has been completed. If the presence of this species is documented, re-initiation of consultation with the USFWS (Richard Smith USFSW, Moses Lake, WA) will be required to determine the most appropriate action.

Table 3. Proposed Construction schedule for the Methow Valley Irrigation District project (Montgomery Water Group, Inc.)

Description	Date
Construct wells and pipelines off the irrigation ditch right-of-way.	Summer 2000
Start construction of pipeline in irrigation ditches and reservoirs.	Fall 2000
Complete all construction.	Spring 2001
Remove appropriate sections of existing diversions.	Fall 2001
Startup new system.	April 2001

V. Determination of Effects

Evaluation of the CHECKLIST FOR DOCUMENTING ENVIRONMENTAL BASELINE AND EFFECTS OF PROPOSED ACTION(S) ON RELEVANT INDICATORS using the Dichotomous Key for Making ESA Determination of Effects (NMFS, 1996), led to the following determinations. The proposed actions are not likely to adversely affect summer steelhead, spring chinook salmon, or bull trout and their critical habitats in the Twisp and Methow rivers. The proposed actions are not likely to jeopardize Canada lynx. Give the low probability of locating a population of Utes ladies'-tresses in the project area, the proposed actions may affect but are not likely to effect Utes ladies'-tresses. Given the rarity of this plant, this determination should be corroborated by completion of a field survey in August 2000.

VI. Mitigation Measures and Monitoring

A. Describe mitigation: The Pacific Northwest Electric Power Planning and Conservation Act of 1980 requires BPA to protect, mitigate, and enhance fish and wildlife that have been affected by the construction and operation of the Federal Columbia River Power System (FCRPS). Funding this project would be partial mitigation for the FCRPS system-wide impacts.

B. Describe monitoring: None is proposed at this time.

Appendix A. Checklist for Documenting Environmental Baseline and Effects of Proposed Action(s) on Relevant Indicators

PATHWAYS: INDICATORS	ENVIRONMENTAL BASELINE			EFFECTS OF THE ACTION(S)		
	Properly Functioning [A]	At Risk[A]	Not Propr. Functioning [A]	Restore[B]	Maintain[C]	Degrade[D]
Water Quality: Temperature			3	X		
Sediment			3			X
Chem. Contam./Nut.		3,6				X
Habitat Access: Physical Barriers		1,2,3		X		
Habitat Elements: Substrate		3,5		X		
Large Woody Debris			1,3,5		X	
Pool Frequency			3,5		X	
Pool Quality			3,5		X	
Off-Channel Habitat			1,3	X		
Refugia			3	X		
Channel Cond. & Dyn: Width/Depth Ratio			3		X	
Streambank Cond.	No mention				X	
Floodplain Connectivity			1,3	X		
Flow/Hydrology: Peak/Base Flows		3,6		X		
Drainage Network Increase			3		X	
Watershed Conditions: Road Dens. & Loc.			3		X	
Disturbance History		No mention			X	
Riparian Reserves			1,3		X	

1. Wy-Kan-Ush-Mi Wa-Kish-Wit, Spirit of the Salmon, The Columbia River Anadromous Fish Plan of the Nez Perce, Umatilla, Warm Springs and Yakama Tribes, Volume II, Subbasin Plans, CRITFC 1995.

2. NOAA Technical Memorandum NMFS-NWFSC-27. Status Review of West Coast Steelhead from Washington, Oregon, and California.

[A] These three categories of function ("properly functioning", "at risk" and "not properly functioning") are defined for each indicator in the "Matrix of Pathways and Indicators"(NMFS, 1996).

[B] For the purposes of this checklist, "restore" means to change the function of an "at risk" indicator to "properly functioning", or to change the function of a "not properly functioning" indicator to "at risk" or "properly functioning" (i.e., it does not apply to "properly functioning" indicators).

[C] For the purposes of this checklist, "maintain" means that the function of an indicator does not change (i.e., it applies to all indicators regardless of functional level).

[D] For the purposes of this checklist, "degrade" means to change the function of an indicator for the worse (i.e., it applies to all indicators regardless of functional level). In some cases, a "not properly functioning" indicator may be further worsened, and this should be noted.