3.6 LAND AND SHORELINE USE

3.6.1 EXISTING CONDITIONS

3.6.1.1 Lower Salmon Creek Area

This analysis of existing land and shoreline uses in the vicinity of proposed Project actions is based upon Okanogan County Assessor's records and visual observation of the Project area. The analysis along Salmon Creek is limited to those parcels that lie all or partially within 300 feet of the centerline of Salmon Creek. This includes 197 individual parcels and excludes much of the public right of way contained within the streets and roads of the City of Okanogan and Okanogan County. **Figure 3-17** provides an overview of land use designations within the Project area.

The Lower Salmon Creek area includes a wide range of land uses from fairly dense commercial and residential land uses within the corporate limits of the City of Okanogan to low density residential and agricultural land uses in the unincorporated areas. There are also several parcels of publicly owned property including the City of Okanogan's Alma Park along the southern edge of the Creek from First Avenue to the Okanogan River, a City owned boat launch ramp and overlook just north of the confluence with the Okanogan River, an old landfill, and several adjacent undeveloped parcels and the Salmon Springs watershed area (part of the City's overall water supply). Okanogan County also owns a portion of the area, primarily the right-of-way for the Salmon Creek Road.

From its mouth upstream to First Avenue, Salmon Creek is straddled by public land owned by the City of Okanogan. The City has a well on either side of the Creek in this area and there is also a small parcel of private land with two single-family residences adjoining the City property at the mouth.

Between First and Second Avenues, land uses are primarily commercial in nature. Between Second and Fifth Avenues land uses are mixed and include commercial, a large nursing home facility, a church and several single and multi-family residential units. Upstream from Fifth Avenue to the OID Diversion, land uses are primarily single family residential that give way to undeveloped land, city owned properties and small farms upstream from the City limits.

Jurisdiction of the Lower Salmon Creek area is divided between Okanogan County and the City of Okanogan. Within the corporate limits, the City manages land use with its comprehensive plan and zoning, subdivision, flood damage prevention, SEPA ordinances, and shoreline master program. Within the unincorporated area, Okanogan County manages land use with its comprehensive plan and zoning, subdivision, flood damage prevention, critical areas, and SEPA ordinances.

Salmon Creek

Okanogan River

Omak

Highway 97

State Highway 155

State Highway 215

Shellrock Pump Station

Proposed Pump Site 2

Stream

Lake

Road

Local Road

State Highway

Highway

Okanogan Irrigation District

Place

Main Canal

Existing 30" Pipeline from Shellrock

Proposed Pipeline

Proposed Pipeline To Shellrock Sediment Basin

Landuse

Residential

Commercial/Public Use

Current Use Agriculture

Undeveloped Lands

N
W
E
S

1:40,000

2,500 1,250 0 2,500 5,000 Feet

Projection: UTM Zone 11 Datum: NAD27

Figure 3-17
Landuse in Vicinity of Pumps, Pipeline and OID Canal

ENTRIX

C:\GIS\entrix\SalmonCreek1\map\SCrk_Landuse02.mxd 5/24/2004 6:47:43 PM Mukhtyar

The City of Okanogan's comprehensive plan provides the following designations for the land along Lower Salmon Creek: *Institutional* from the mouth upstream to First Avenue; *Central Business* from First to one-half block west of Second Avenue; *Mixed Residential* from one-half block west of second to Fifth Avenue; *Single Family Residential* on the south side of Mill Street from Fifth Avenue upstream to the vicinity of the Mill Street Bridge and *Institutional* on the north side of Mill Street. The balance of the area within the City limits is *Single Family Residential* along the Creek and north and *Rural Residential* to the south.

The City of Okanogan's Zoning Code regulates land uses along Lower Salmon Creek via the application of zoning districts, each with its own set of allowed uses, setbacks, and other variables. From the mouth upstream to Third Avenue, the land adjoining the Creek is zoned C-1, the City's downtown commercial district. Between Third and Fifth Avenues the zoning changes to R-4, the City's multi-family residential zone. From Fifth Avenue upstream to the City limits (including the former landfill site), the land adjoining the Creek is zoned R-3, a mixed single and multi-family zone.

In addition to the comprehensive plan designations and zoning districts, portions of the area also lie within the 100-year flood plain of Salmon Creek and the Okanogan River. Land along the Okanogan River is also regulated under the City of Okanogan's Shoreline Master Program (SMP). Regulation of development within the floodplain requires that structures for human habitation be elevated to 1 foot above the 100-year flood elevation and other uses are required to be flood-proofed.

The City's SMP regulates land uses within 200 feet landward on a horizontal plane from the ordinary-high-water-mark (OHWM) or the floodway boundary of the Okanogan River. The City's SMP designates the first 25 feet landward of the OHWM as Conservancy with the remainder of shoreline jurisdiction designated as Urban. Development within lands designated as "Conservancy" by the City's SMP is limited to actions that are water-dependent or that are required to protect or enhance the shoreline area. Construction or development of non-water-dependent uses are generally prohibited in the "conservancy" environment.

Okanogan County's Comprehensive Plan was adopted in 1964. The plan designates the land along Lower Salmon Creek outside the Okanogan city limits as *Intensive Agriculture* and it is zoned Minimum Requirement District. The "Intensive Agriculture" designation is intended to recognize the agricultural nature of existing land uses, however the Minimum Requirement District places mimimal requirements on development, primarily lot size, bulk, height and setbacks. Most land uses are permitted outright within this zoning district. Only those uses that have a significant potential for negative impacts require a conditional use permit. All residential and most commercial uses are allowed. **Table 3-27** provides data on current land use within the Project area.

Table 3-27. Current Land Use in Project Areas.

	Lower Salmon Creek Rehabilitation		Okanogan River Pump Station/Pipeline		Salmon Lake Feeder Canal		Shellrock Point Pipeline	
Land Use	Acres	Number of Parcels	Acres	Number of Parcels	Acres	Number of Parcels	Acres	Number of Parcels
Residential								
Single Family	140	87	20.54	18	14.05	52	55.57	17
Multi Family	3.41	5	0	0	0	0	0	0
Commercial	3.35	13	2.95	4	3.06	7	3.75	2
Public/Semi Public								
City	54.79	14	0.78	1	0	0	0.71	1
County	0.26	2	0	0	0	0	0	0
Churches	1.47	4	0	0	0	0	0	0
Schools	0.92	2	0	0	0	0	0	0
US	39.68	1	0	1	308.33	8	0	0
Hospital	0	0	0	0	0	0	22.56	4
Agriculture	916	28	373.51	19	46.78	2	156.54	15
Undeveloped	36.6	41	51.15	9	26.2	7	2.5	1
Total Land Area	1196.48	197	448.93	52	398.42	76	241.63	40

3.6.1.2 Okanogan River Pump Station and Pipeline Route

The proposed pump station site is located in a commercial area with auto-oriented commercial uses to the north and west, the County Historical Society's Museum and a few single-family homes to the south and agricultural land and a single family home to the east across the Okanogan River.

The pipeline route crosses S.R. 215 in a narrow strip of auto-oriented commercial land uses that quickly give way to vacant commercial lots and a narrow band of single family residential uses along N. Fourth Avenue. Due to the steep hillside, the western side of Fourth Avenue is undeveloped all the way to the edge of the flat with the exception of a City well facility. Land use shifts to commercial agriculture with a few scattered single-family homes for the remainder of the pipeline route.

Jurisdiction of the Pump Station/Pipeline area is divided between Okanogan County and the City of Okanogan. The City of Okanogan's comprehensive plan provides the following designations for the land at the proposed pump station site and along the pipeline route include: *Institutional* and *Industrial* at the pump station site, and *Single Family Residential* for the pipeline route in the City.

The City of Okanogan's Zoning Code regulates land uses in the Project area via the application of zoning districts, each with its own set of allowed uses, setbacks, etc. The pump station site and the first part of the pipeline route is zoned C-2, the City's auto-oriented commercial district. Between S.R. 215 and Fourth Avenue, the zoning changes to R-3, a mixed single and multi-family zone. West of Fourth Avenue the pipeline route leaves the city limits.

In addition to the comprehensive plan designations and zoning districts, the pump station and the initial portions of the pipeline route lie within the 100-year flood plain of the Okanogan River and are regulated under the City of Okanogan's Flood Hazard Prevention Ordinance and Shoreline Master Program (SMP). Regulation of development within the floodplain requires that structures for human habitation be elevated to 1 foot above the 100-year flood elevation and other uses are required to be flood-proofed.

The City's SMP regulates land uses within 200 feet landward on a horizontal plane from the ordinary-high-water-mark or the floodway boundary of the Okanogan River. The City's SMP designates the first 25 feet landward from the OHWM as Conservancy with the remainder of shoreline jurisdiction designated as Urban.

Okanogan County's Comprehensive Plan was adopted in 1964. The plan designates the land along the pipeline route as *Intensive Agriculture* and it is zoned Minimum Requirement District.

3.6.1.3 Feeder Canal

This analysis of existing land and shoreline use is based upon Okanogan County Assessor's records and visual observation of the Project area. The analysis is limited to those parcels that lie all or partially within 300 feet of the centerline of the feeder canal. This includes 76 individual parcels and excludes the public right of way contained within the streets and roads of the Town of Conconully and Okanogan County in the Project area.

The feeder canal area includes primarily single-family residential uses (both permanent as well as seasonal), an undeveloped mountainside, and a few commercial uses.

From the headgate on the North Fork of Salmon Creek, the feeder canal right-of-way forms a boundary between a number of permanent and seasonal residences and vacant lots and the sparsely timbered lower reaches of Funk Mountain. The canal route contours south and east along the slope of the mountain until it empties into Salmon Lake.

The feeder canal area is divided between Okanogan County and the Town of Conconully. Within the corporate limits, the Town manages land use with its community plan. At present, the Town has not adopted zoning, subdivision, flood damage prevention, and SEPA ordinances nor is it required to have a shoreline master program. Within the unincorporated area, Okanogan County manages land use with its comprehensive plan and zoning, subdivision, flood damage prevention, critical areas, SEPA ordinances, and Shoreline Master Program.

The County's SMP regulates land uses within 200 feet landward on a horizontal plane from the ordinary-high-water-mark of Salmon Lake. The SMP designates the entire shoreline area of Salmon Lake as *Conservancy*. Any action affecting private utilities or other facilities and structures that lie on leased federal land would require review and approval under the Okanogan County Shoreline Master Program.

3.6.2 LAND USE IMPACTS

3.6.2.1 Alternative 1: Okanogan River Pump Station and Pipeline

Alternative 1 would impact land and shoreline use at the pump station site and along the pipeline route. The impact to existing land and shoreline uses would result primarily from construction activities and noise from the pump station when it is in operation. The greatest impact to land and shoreline use (beyond those related to construction with the shoreline and floodplain areas at the pump station site and initial portions of the pipeline route) would be constraints on development of properties adjoining the pipeline easement, and the removal of several rows of fruit trees along the northern edge of Glover Lane to accommodate construction of the pipeline.

Environmental impacts on land and shoreline use along Lower Salmon Creek depend on the resulting flow regime. The potential exists for greater regulation of adjoining land uses as a result of the existence of flows for longer period of times. These flows could increase the potential for creation of fish and wildlife habitat that would require protection under the City's and County's Critical Areas Ordinances. Also, if the mean annual flow of Salmon Creek is increased enough to meet or exceed 20 cfs, the City and County would be required to amend their shoreline master plans to include the shoreline of Salmon Creek as a regulated area.

The most likely impacts include imposition of increased setbacks and requirements for new permitting, review and mitigation. In addition, it is possible that certain types of land uses that are determined to have a negative impact on the critical areas could be restricted. With increased stream flows and better access, ESA listed species may return with more frequency. Adjacent property owners could be directly affected only through direct NOAA Fisheries enforcement against "take" or by third party lawsuits seeking to enforce against take. As described above, it is most likely the City or County would regulate land use.

3.6.2.2 Alternative 1: Feeder Canal Upgrade

The primary impact to existing land and shoreline uses resulting from the feeder canal upgrade would be construction related. Long-term impacts would be improved stability of the slope in the vicinity of the feeder canal, which would eliminate potential erosion and slide hazards that presently affect adjoining land uses.

3.6.2.3 Alternative 1: Stream Rehabilitation

The primary impact to existing land uses resulting from the rehabilitation of lower Salmon Creek would be disruptions caused by construction activities.

3.6.2.4 Alternative 2: Upgrade Shellrock Pumping Plant

The upgrade of the Shellrock Pumping Station would include construction of a new pipeline from the existing pipeline near the south end of Hubbert Road westward to a new sediment pond to be constructed on the slope of Pogue Mountain west of the Okanogan Valley Golf Club. The

new pipeline would deliver water to the OID's distribution system between Diversion No. 2 and the OID Headquarters off Douglas Road.

Upgrade of the pump station would have limited impact since most of the work would take place within the footprint of the existing facility.

The new pipeline route would begin with a tie into the OID's existing pipeline on the small flat above the end of Haussler Road. Land use in this area is a mixture of single-family residences and small farms accessed by Hubbert Road. The pipeline route would then head directly west up a short undeveloped hillside to Pogue Flat and an area dominated by commercial orchards. Approximately halfway across Pogue Flat, the pipeline route would cross two small riparian zones and then climb back to the flat to follow an existing road through commercial orchards. The pipeline would then cross the Conconully Highway to an area where land use changes to pasture lands and a narrow band of single-family residences that line Pogue Road. Once past the houses, the pipeline route would cross the 2nd, 3rd, 4th and 5th fairways at the Okanogan Valley Golf Club before ascending the undeveloped lower reaches of Pogue Mountain and terminating at the proposed sediment pond. The site of the sediment pond would be an undeveloped slope on Pogue mountain.

Jurisdiction of land uses for the Shellrock Pump Station and the proposed pipeline route lies with Okanogan County. The County's Comprehensive Plan designates the affected areas as *Intensive Agriculture* and all areas lie within the Minimum Requirement District under the County's Zoning Code.

This alternative would impact land and shoreline use at the pump station site and along the pipeline route. The impact to existing land and shoreline uses would result primarily from construction activities and noise from the pump station when it is in operation. The greatest impact to land and shoreline use (beyond those related to construction with the shoreline and floodplain areas at the pump station site and initial portions of the pipeline route) would be constraints on development of properties adjoining the pipeline easement, and potential removal of fruit trees to accommodate construction of the pipeline. There would be short-term disturbance due to construction across two seasonal riparian zones totaling less than 0.1 acres.

Impacts to land use along Lower Salmon Creek due to changes in the flow regime would be similar to those described for Alternative 1 in **Section 3.6.2.1**.

3.6.2.5 Alternative 2: Feeder Canal Upgrade

Land use impacts would be similar to those described for Alternative 1 in **Section 3.2.2.2**.

3.6.2.6 Alternative 2: Stream Rehabilitation

Land use impacts would be similar to those described for Alternative 1 in **Section 3.6.2.3**.

3.6.2.7 Alternative 3: Water Rights Purchase

Alternative 3 has greatest potential to impact land use due to the removal of water from land that is presently under some form of agricultural production. Once irrigation water is removed from a property, the land would no longer be viable for agricultural production and either would be converted to some other less water intensive use, or would lie fallow. In order for the land to be converted to some other use, which in the case of lands within the OID would most likely be for some form of low density residential uses, a source of domestic water must be found. This would most likely be in the form of individual exempt wells, except in the area of the Duck Lake Ground Water Management Subarea. Establishment of the Subarea effectively closed the basin to future groundwater withdrawals (Chapter 173-132 WAC). The Duck Lake Water Users Association provides a domestic water system and controls ground water withdrawals for land within portions of the OID, however the Association has expanded to the limits of its water right, and new connections are not available. OID has the right to artificially stored groundwater in the Duck Lake aquifer because it provides the primary source of recharge to the local aquifer (from water diverted from Salmon and Johnson creeks for storage in Duck Lake). OID has provided water service in the area, but artificial recharge would decline with reduced operations, resulting in less availability of water for new connections. It is difficult to predict the environmental impacts of this alternative due to the fact that the lands where the water would be purchased or leased have not been identified. This is important in that the potential for conversion to other types of land use would depend on location and ability to secure some form of domestic water.

Impacts to land use along Lower Salmon Creek due to changes in the flow regime would be similar to those described for Alternative 1 in **Section 3.6.2.1**.

3.6.2.8 Alternative 3: Feeder Canal Upgrade

Land use impacts would be similar to those described for Alternative 1 in **Section 3.2.2.2**.

3.6.2.9 Alternative 3: Stream Rehabilitation

No stream rehabilitation is proposed so no impacts are expected.

3.6.2.10 No Action Alternative

Under this alternative, changes in land use along Lower Salmon Creek and in the vicinity of the feeder canal and the pump stations and pipeline would be driven by changing economic conditions in the local area. Any new growth or development would need to be in compliance with City and/or County plans and regulations.

3.6.3 MITIGATION MEASURES

The primary impacts to land use arise from increased regulation, which is itself intended to mitigate the consequences of unplanned development.

The purchase of buffer easements to protect project improvements, particularly where rehabilitation has occurred should be considered.

No further mitigation for land or shoreline use is proposed.

Wherever feasible, new pipeline should stay within existing rights-of-way or easements and wherever possible it should be constructed along property lines in order to minimize or eliminate increased limitations on the use of the subject property.

The feeder canal upgrade mitigates any risks posed to downslope properties by the condition of the existing canal. No further mitigation is proposed.

3.6.4 UNAVOIDABLE ADVERSE IMPACTS

No unavoidable adverse impacts to land and shoreline use are anticipated as a result of any portion of the proposed Project.

3.7 VISUAL RESOURCES

3.7.1 EXISTING CONDITIONS

The visual landscape of the areas surrounding the proposed Project includes residential and commercial development, public facilities, and agricultural lands. Important visual and recreational features include Conconully Lake, Salmon Lake, Duck Lake, lower and middle reaches of Salmon Creek, the Okanogan River, and the topography of sagebrush covered hills. In general, many of the natural and agricultural landscape features and patterns are attractive and interesting, but they are not visually distinctive or unusual within the region.

Figure 3-18. New Pump Station Site.

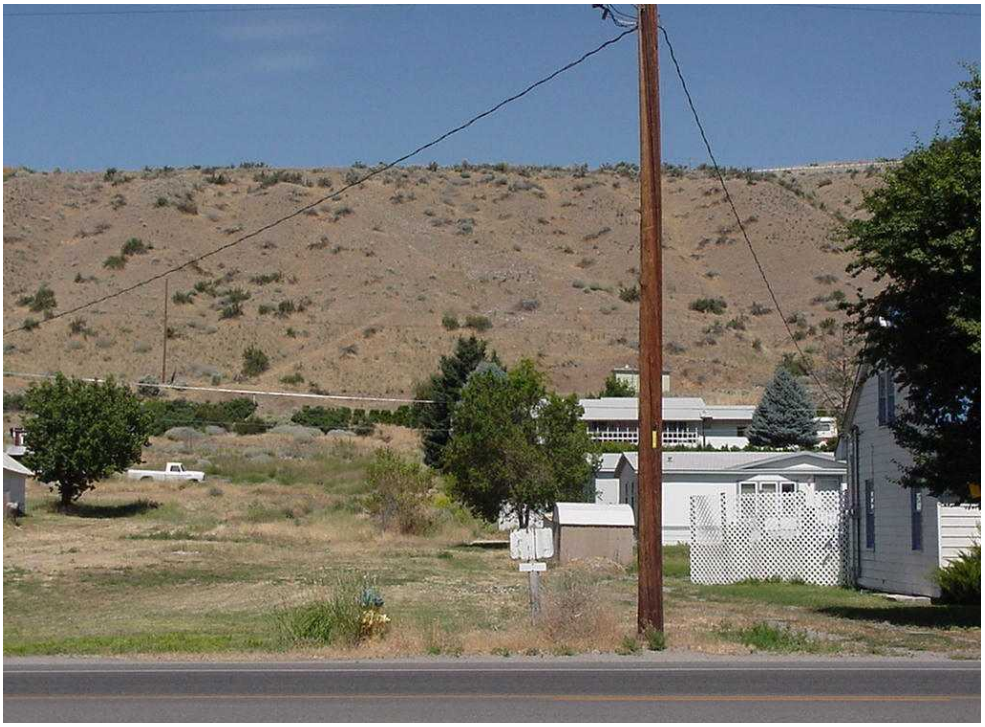


Figure 3-19. Pipeline Route

3.7.1.1 Pump Station/Pipeline

The Pump Station site is located in a commercial area with auto-oriented commercial uses to the north and west, the County Historical Society's Museum and a few single-family homes to the south and agricultural land and a single-family home to the east across the Okanogan River. The Pump Station site provides riparian vegetation to the waters edge, primarily consisting of white alder, cottonwood and other native vegetation (See **Figure 3-18**).

The pipeline route crosses S.R. 215 in a narrow strip of auto-oriented commercial uses, vacant commercial lots, and small clustering of single-family residences along North Fourth Avenue (See **Figure 3-19**). Due to the steep hillside on the west side of North Fourth Avenue, the pipeline passes through undeveloped areas with the exception of a City owned well facility at the edge of the flat. The remainder of the pipeline route is dominated by scattered commercial, agricultural, and residential uses.

Feeder Canal

The Feeder Canal area includes primarily single-family residences, an open pine forest on a mountain side, and a scattering of commercial uses. The headgate on the North Fork of Salmon Creek is in a very natural scenic setting in the creek adjacent to a road. The feeder canal right-of-way forms a boundary between a number of permanent and seasonal residences and the sparsely timbered lower reaches of Funk Mountain. The east end of the canal route contours through a relatively open, rocky, unstable slope of the mountain before it empties into Salmon Lake Reservoir. Overall, this area would be considered a natural appearing setting.

3.7.1.2 Lower Salmon Creek

The Lower Salmon Creek area includes a wide range of visual settings from fairly dense commercial and residential buildings within the corporate limits of the City of Okanogan to low density residential and agricultural land uses in the unincorporated areas. There are also several parcels of publicly owned property including the City of Okanogan's Alma Park along the southern edge of the Creek from First Avenue to the Okanogan River; a City owned boat launch ramp and river overlook just north of the confluence with the Okanogan River; an old landfill and several adjacent undeveloped parcels; and the Salmon Springs watershed area (part of the City's overall water supply). Okanogan County also owns a portion of the area, primarily the right-of-way for the Salmon Creek Road (see **Figure 3-20**).

Salmon Creek's watershed downstream of Conconully Reservoir is about 15 miles long and has several short minor tributaries. The middle reach of Salmon Creek is about 11 miles long and lies in a relatively scenic natural setting of riparian forest and agricultural lands. The lower reach of Salmon Creek extends for about 4.3 stream miles from the diversion dam through the City of Okanogan to the Okanogan River. This section of Salmon Creek is dewatered under normal irrigation operations, except during spring runoff events. Riparian vegetation along this stretch of the creek is sparse, and uncontrolled runoff has eroded the banks.

Figure 3-20. Lower Salmon Creek.

3.7.2 VISUAL IMPACTS

3.7.2.1 Alternative 1: Okanogan River Pump Station

This Alternative includes a new pump station that would be located on the west bank of the Okanogan River, within the limits of the City of Okanogan and about 1.3 miles upstream from the confluence of salmon Creek. Construction of a new pump house station would remove existing riparian vegetation and alter the visual landscape. The new structure would be visible from the Okanogan River, and to properties adjacent and/or near the site. The Project would include a new pump house, pumps, motors, control center, valves and related equipment. Associated with this Alternative would be a new pipeline, which would be approximately 10,630 feet long. It would follow County roads and existing BOR rights-of-way and easements over most of its length. The pipeline would be a buried 48-inch diameter spiral welded steel pipe. Short-term visual impacts may occur due to construction activities. These activities may include the use of heavy equipment, storage and staging areas near the proposed pipeline alignment, a construction facility office, and traffic impacts to some local roadways. Where the pipeline climbs a 25 percent grade some short term scarring of the hillside would occur as a result of trenching for the pipeline. Short-term construction impacts are not anticipated to result in significant visual impacts.

There would be no visual impacts to the upper or middle reaches of Salmon Creek as a result of Alternative 1. The addition of water to Lower Salmon Creek would generally have positive impacts on the visual landscape by reestablishing some riparian vegetation along the banks of lower Salmon Creek. Alternative 1 would promote the reestablishment of native riparian vegetation with the provision of fish flows positively impacting Lower Salmon Creek. No adverse visual impacts are anticipated as a result of this Alternative.

Salmon Lake Reservoir seasonal fluctuations would be reduced and Conconully Lake Reservoir water surface elevations would generally increase. There would be no important adverse visual impacts to Salmon Lake or Conconully Lake reservoir as a result of Alternative 1.

3.7.2.2 Alternative 1: Feeder Canal Upgrade

There would be no long-term negative visual impacts as a result of upgrading the existing canal. Approximately two-thirds of the canal would be left in place. The other one-third will have the canal removed but a buried pipeline installed in the same alignment. This area would actually look more natural in the long-term than the current condition. Upgrading the canal would improve the ability of the OID to maintain Salmon Lake levels, avoiding exposure of muddy shorelines, which impact the visual quality of the landscape.

Short-term construction activities would involve heavy machinery, temporary storage and office facilities, and temporary staging areas for pipe and miscellaneous construction materials. Construction materials and machinery would be stored on and adjacent to the existing feeder canal. The ground where the canal would be removed would look the most disturbed for the duration of construction activities and there would be a period of time before vegetation recovery occurs. The new alignment for the buried pipeline would also have a disturbed appearance for a short period of time. Upgrading the feeder canal is not expected to result in important adverse visual impacts because of the temporary and transitory nature of construction.

3.7.2.3 Alternative 1: Stream Rehabilitation

Short-term construction activities would involve the use of heavy machinery during late summer to early fall, temporary storage of equipment and construction materials, and increased traffic on local roads that access the Project area. Short-term construction impacts would be highly noticeable during the duration of the construction.

3.7.2.4 Alternative 2: Upgrade Shellrock Pumping Plant

Upgrading the Shellrock pump station would not significantly change the visual effect of the existing site. Alternative 2 includes stream rehabilitation, which would have a positive impact on the visual landscape. Alternative 2 would keep the median lake elevations higher and reduce seasonal fluctuations to a degree. Fluctuations would occur in Salmon Lake Reservoir, exposing muddy shoreline below the active storage elevation.

Associated with this Alternative would be a new pipeline, which would be approximately 10,200 feet long. It would follow roads over most of its length. The pipeline would be a buried 30-inch

diameter ductile pipe. Short-term visual impacts may occur due to construction activities. These activities may include the use of heavy equipment, storage and staging areas near the proposed pipeline alignment, a construction facility office, and traffic impacts to some local roadways. Where the pipeline climbs a 25 percent grade some short term scarring of the hillside would occur as a result of trenching for the pipeline. Short-term construction impacts are not anticipated to result in significant visual impacts.

3.7.2.5 Alternative 2: Feeder Canal Upgrade

The impacts would be the same as described in **Section 3.7.2.2.**

3.7.2.6 Alternative 2: Stream Rehabilitation

The lower two miles of Salmon Creek would receive extensive reconstruction. Reconstruction would incorporate various treatment types to create a stream channel allowing adult fish to migrate upstream and convey floodwaters without excessive sedimentation, or property loss. The addition of water to Salmon Creek would generally have positive impacts on the visual landscape by reestablishing some riparian vegetation along the banks of the creek. It will take 5-10 years before this long-term impact of improvement is evident to the common observer. Short-term construction activities would involve the use of heavy machinery during late summer to early fall, temporary storage of equipment and construction materials, and increased traffic on local roads that access the Project area. Short-term construction impacts would be highly noticeable during the duration of the construction (expected to extend seasonally over a period of one or two years).

3.7.2.7 Alternative 3: Water Right Purchase

No infrastructure is associated with this Alternative. Water obtained through water rights purchase would be stored in Conconully and Salmon Lake Reservoirs and released into Salmon Creek using existing controls. Under Alternative 3, the visual landscape within the boundaries of the OID would be altered. Approximately 1,470 acres of farmland would be removed from production returning to a more arid, sparsely vegetated landscape than currently exists.

Under Alternative 3, there would be an overall positive impact to the visual landscape in the middle and lower reaches of Salmon Creek, with the regulation and provision of flows. No adverse visual impacts are anticipated as a result of this Alternative. This Alternative would enhance the visual landscape by promoting the reestablishment of riparian vegetation incident to flows for fish migration.

This alternative eliminates seasonal fluctuations in Conconully Lake and Salmon Lake reservoirs, such that median reservoir elevations are near full active storage in most months. No visual impacts are anticipated as a result of this Alternative.

3.7.2.8 Alternative 3: Feeder Canal Upgrade

The impacts would be the same as described in **Section 3.7.2.2.**

3.7.2.9 Alternative 3: Stream Rehabilitation

No stream rehabilitation is proposed so no impacts are expected.

3.7.2.10 No Action Alternative

Under this alternative lower Salmon Creek would continue to be dewatered in most years, and the Okanogan Irrigation District (OID) would continue to divert its irrigation water supply under existing water claims from its existing diversion dam at RM 3.4 on Salmon Creek. This trend is consistent with existing and historical conditions. In short, the visual landscape would remain unchanged except for continued bank erosion and further loss of already sparse riparian vegetation in Lower Salmon Creek (see **Figure 3-21**). The negative visual impact of the dewatered stream and degrading stream corridor would continue unabated.

Salmon Lake Reservoir

Conditions under the No Action Alternative would be similar to existing conditions. A small decrease in lake levels could occur, exposing muddy shorelines and stumps and impacting the visual quality of the landscape

Conconully Lake Reservoir

Under the No Action alternative, Conconully Lake Reservoir levels would be consistent with existing and historical conditions. A small decrease in lake levels could occur, exposing muddy shorelines and stumps and impacting the visual quality of the landscape (see **Figure 3-22**).

3.7.3 MITIGATION MEASURES

Vegetative screening should be considered for the new pump house under Alternative 1. No other significant visual impacts are identified which require mitigation.

3.7.4 UNAVOIDABLE ADVERSE IMPACTS

There are no unavoidable adverse impacts associated with the proposed alternatives as compared to the No Action Alternative.

3.8 SOCIOECONOMICS

3.8.1 EXISTING CONDITIONS

For the purposes of EIS analysis, the study region is defined as Okanogan County, Washington. Okanogan County is Washington's largest county in terms of land area, with nearly 3.4 million

acres[13]. About 30 percent of the land within the county is in private ownership. The Colville Indian Reservation occupies approximately 700,000 acres of the county, and is located in the southeast corner of the county. The remainder of the county land area is made up of state and federal land[14]. A detailed Socioeconomics Resource Report is presented in **Appendix F**.

3.8.1.1 Population Characteristics

Age, race, and ethnic characteristics of the Okanogan County population, as recorded by the 2000 Census, are presented in **Table 3-28**. A total of 39,564 people lived within the county in 2000. The distribution among age groups is fairly similar to that of the state of Washington except for a slightly larger percentage, 14 percent, of county residents are over the age of 65, compared to less than 11 percent for the state, and a smaller percentage of county residents, 16 percent, belong to the age group of 20 to 34 years, compared to 21 percent for the state.[15]

Table 3-28. Age, Race, and Ethnicity Characteristics of Okanogan County Population

Note: Percentages may not appear to add to 100 due to rounding.

Source: U.S. Census Bureau, Census 2000, *Table DP-1 Profile of General Demographic Characteristics: 2000,* Geographic Area: Okanogan County, California.

Age, Race, and Ethnicity Characteristics	Number of People	Percentage of County Total
Age Group (years)		
0 to 19 years	12,012	30%
20 to 34 years	6,156	16%
35 to 44 years	5,757	15%
45 to 54 years	5,937	15%
55 to 64 years	4,145	10%
65 years and over	5,557	14%
Race		
White	29,799	75%
Black or African American	109	<1%
American Indian and Alaska Native	4,537	11%
Asian	176	<1%
Native Hawaiian and Other Pacific Islander	28	<1%
Some Other Race	3,791	10%
Two or More Races	1,124	3%
Hispanic Origin		
Hispanic	5,688	14%
Non-Hispanic	33,876	86%
TOTAL POPULATION	39,564	100%

[13] 3,371,698 acres, according to U.S. Department of Agriculture, *1997 Census of Agriculture*.
[14] "Okanogan County Demographics," from the Okanogan County website, http://www.okanogancounty.org /DEMO.HTM, accessed June 9, 2003.
[15] U.S. Census Bureau, Census 2000, Table DP-1 Profile of General Demographic Characteristics: 2000, Geographic Area: Washington.

Figure 3-21. Typical Summer Conditions of Lower Salmon Creek.

Figure 3-22. Low Storage Level for Conconully Lake Reservoir (October 2001).

The county population is predominantly white, with 75 percent of those counted by the 2000 Census identifying themselves as white. The next largest racial group is American Indian or Alaska Native, which accounts for 11 percent of the county population, likely due to the presence of the Colville Indian Reservation. Of the 4,537 people within Okanogan County that identified their race as American Indian or Alaska Native, 3,369 live on the reservation.[17] Another 10 percent of the county population identified themselves as "Some Other Race." Because the 2000 Census allowed the selection of more than one race for each person, another three percent of the county population selected "two or more races."

Hispanic origin is tallied separately from race, as a person of Hispanic origin can be of any race. Over 14 percent of the county's population identified themselves as being of Hispanic origin in the 2000 Census, as compared to 7 percent of the state population.[18] The economic dominance of agriculture and specifically labor-intensive orchard crops such as apples and cherries in Okanogan County has drawn many laborers of Hispanic origin to the area.[19]

Table 3-29. Okanogan County Cities and Population (2000).

City	Number of People	Percentage of County Total
Brewster	2,189	6%
Conconully	185	<1%
Coulee Dam (part)	915	2%
Elmer City	267	1%
Nespelem	212	1%
Okanogan	2,484	6%
Omak	4,721	12%
Oroville	1,653	4%
Pateros	643	2%
Riverside	348	1%
Tonasket	1,013	3%
Twisp	938	2%
Winthrop	349	1%
Incorporated	15,917	40%
Unincorporated	23,647	60%

Source: Washington State Office of Financial Management, Forecasting Division, June 28, 2002, April 1 Population of Cities, Towns, and Counties Used for Allocation of Selected State Revenues State of Washington, (Census 2000 series).

Most of the residents of Okanogan County, or 60 percent of the total population, live outside of the incorporated areas of the county, as shown in **Table 3-29**. The largest city is Omak, with a population of 4,721 people, or 12 percent of the county's residents. The cities of Okanogan, with

[16] U.S. Census Bureau, Census 2000, Table DP-1 Profile of General Demographic Characteristics: 2000, Geographic Area: Washington.

[17] U.S. Census Bureau, 2000 Census of Population and Housing, 2002, *Summary Population and Housing Characteristics,* PHC-1-49, Washington, p. 48.

[18] U.S. Census Bureau, Census 2000, Table DP-1 Profile of General Demographic Characteristics: 2000, Geographic Area: Washington.

[19] Washington State Employment Security Department, Labor Market and Economic Analysis Branch, September 2002, *Okanogan County Profile*, p. 6.

a population of 2,484, and Brewster, with a population of 2,189, each account for about six percent of the county total. The other cities and towns are even smaller, with the smallest being Conconully, with only 185 residents.

3.8.1.2 Okanogan County Economy

An input-output (I-O) model has been developed for this study, incorporating economic activity in Okanogan County. The model is used to measure the indirect effect that changes in crop production may have on the regional economy, in terms of changes in industry output, employment, and income. The model is based on IMPLAN ("impact analysis for planning"), a system of software and data used to perform economic impact analysis. Originally developed by the USDA Forest Service, the system is now maintained and marketed by the Minnesota IMPLAN Group, Inc. (MIG). The databases are developed by MIG annually, using data collected at the national, state, and county level for all possible elements from a variety of state and federal sources. The model developed for this study is based on 2000 data, the most recently available at the time of this analysis.

Table 3-30 displays the base data for the Okanogan County IMPLAN model developed for this study. Three different economic measures are presented here and would be referenced when discussing impacts later in this report. "Output" (also known as total industry output) is the first measure, and represents the value of production of goods and services by businesses in the local economy. This can serve as an overall measure of the local economy, and is useful for comparing regions and looking at impacts.

Table 3-30. 2000 Okanogan County IMPLAN Model

Industry	Output *($millions)*	Income *($millions)*	Employment *(# of jobs)*
Agriculture, Forestry, and Fishing	$202.329	$94.907	5,480
Mining	$17.024	$3.843	92
Construction	$119.066	$33.523	1,081
Manufacturing	$159.396	$40.709	1,172
Transportation, Communication, and Public Utilities	$56.535	$16.636	450
Trade (Retail and Wholesale)	$161.580	$72.227	4,165
Finance, Insurance, and Real Estate	$206.812	$22.947	1,062
Services	$223.606	$115.075	5,152
Government	$216.778	$156.300	4,618
Other[1/]	-$0.743	$1.232	119
TOTAL	$1,362.383	$557.401	23,391

[1/] For this model, "other" consists primarily of domestic services (such as cleaning and maid services), as well as an "inventory valuation adjustment," used to estimate the value of goods removed from inventory that were produced in a previous time period at a different value.

Source: 2000 IMPLAN data from Minnesota IMPLAN Group, Inc., with modifications by NEA.

The second measure is "Personal Income," which is the sum of employee compensation and proprietor income. Employee compensation represents total payroll costs, including wages and salaries paid to workers plus benefits such as health insurance, as well as retirement payments and non-cash compensation. Proprietor income includes payments received by self-employed

individuals as income, such as income received by private business owners, doctors, or lawyers. This measure is useful to show how the employees and proprietors of businesses producing the output share in the fortunes of those businesses. The third measure is "Employment." This represents the annual average number of employees, whether full- or part-time, of the businesses producing the output.

Nearly $1.4 billion in goods and services are produced within Okanogan County, with local industry supporting over 23,000 jobs and earnings in excess of $557 million. The most significant industries in terms of output, each accounting for about 15 to 16 percent of the total county output, are services; government; finance, insurance, and real estate; and agriculture, forestry, and fishing. Nearly 5,500 jobs, or 23 percent of county employment, are in the agriculture, forestry, and fishing industry, making it the largest employer in the county. Other significant employers are services, government, and wholesale and retail trade.

Employment and Earnings

Employment and earnings by industry are presented in **Figures 3-23** and **3-24**. These employment numbers from the Department of Commerce's Regional Economic Information System (REIS) count all jobs, including non-agricultural wage and salary employment, agricultural employment, and non-agricultural jobs that are not covered by state unemployment insurance, such as the self-employed. These numbers may differ slightly from the IMPLAN model data, which are compiled from a number of sources.

The importance of agricultural production to Okanogan County's economy is evident by the large share, nearly one-quarter of total county jobs, found either on farms or in the agricultural services, forestry, and fishing sector. Over 85 percent of these agricultural jobs are in fruit orchards.[20] Apples are the prominent crop produced in Okanogan County, although other orchard crops are also grown, such as pears and cherries. Livestock production, primarily cattle, is also an important element of the county's agricultural sector.

The services sector is also a significant employer in Okanogan County, providing one-quarter of the total jobs in the county. One of the largest areas of employment in the services sector is health services, which includes private hospitals (public hospitals fall into the government category), dentist and doctor offices, nursing care facilities, and other health-related businesses.[21] Membership organizations also are significant employers in Okanogan County that belong to the services sector, and include unions, religious organizations, fraternal organizations, tribal administration, and similar groups. One of the larger employers in the county is the Colville Tribal Enterprise, which belongs to this division of the services sector.[22] Social services, such as individual and family social services, job training and vocational rehabilitation services, child day care, and residential care, and lodging services, such as hotels and motels, also provide employment within the county's services sector.

[20] Washington State Employment Security Department, Labor Market and Economic Analysis Branch, September 2002, *Okanogan County Profile*, p. 18.
[21] Ibid., p. 23.
[22] Ibid.

With 18 percent of employment, government is another significant employer in the county. Government is typically a large sector in all counties, but is even larger in Okanogan County due to the state and federal management of forests, parks, and dams in the county, as well as regulatory oversight of farming. Local government makes up about two-thirds of government employees, and many of these jobs are in primary and secondary education, as well as other executive and legislative work and public hospitals. A small portion of government employment is for the state, and includes employees of community colleges and social workers. The federal government has a large share, about 22 percent, of the government jobs in the county. Many of these jobs are related to the operation of the large irrigation system, while others are involved in land, mineral, or wildlife conservation.[23]

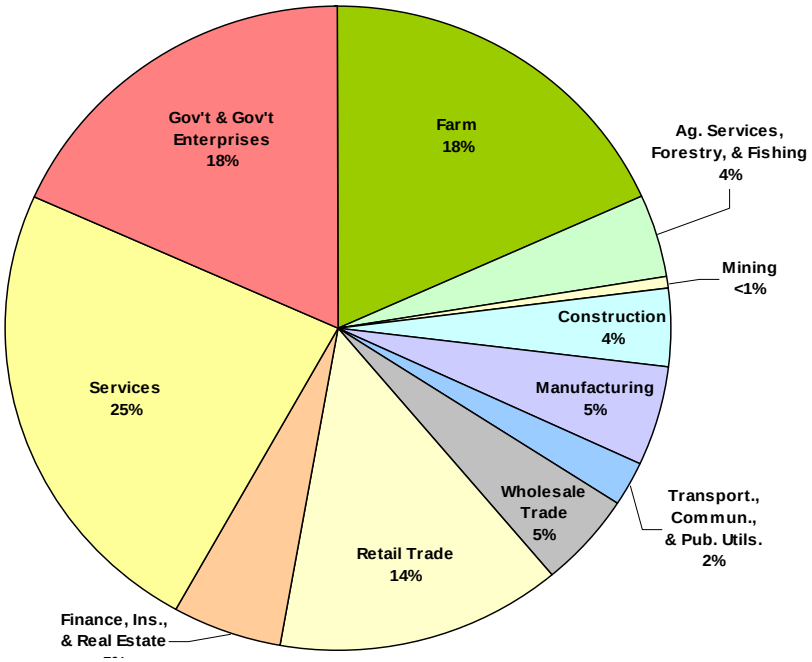
Retail and wholesale trade account for 14 and 5 percent of employment, respectively. Within the retail sector, eating and drinking establishments employ the most workers, followed by food stores and auto dealers and service stations.[24] About 80 percent of wholesale trade employment is related to wholesale fresh fruit and vegetable distribution, primarily for apples, but also pears, other tree fruits, grain, and livestock/meat products.[25]

The other sectors of the local economy are responsible for smaller shares of employment. Finance, insurance, and real estate provide a little over five percent of the total jobs in the county, most of these in real estate and banking. Manufacturing employment contributes slightly less than five percent of total jobs, and the majority of these jobs are in lumber and wood processing. About four percent of total county jobs are in construction, which includes special trade contractors, general building contractors, heavy construction workers, and other construction trade workers. Transportation, communication, and public utilities, with just over two percent of total employment, consists mainly of trucking and warehousing; communications such as telephone, television, or radio services; and utilities such as electric, gas, and sanitary services. About one-third of these jobs are in trucking and warehousing, related to the transportation of agricultural crops. Mining is the smallest sector in the county in terms of employment, with less than one percent of the total jobs found in this sector.

Earnings represent the sum of three components of personal income: wage and salary disbursements, other labor income (includes employer contribution to pension and profit-sharing, health and life insurance, and other non-cash compensation), and proprietors' income. Earnings reflect the amount of income that is derived directly from work and work-related factors. Earnings can be used as a proxy for the income that is generated within a geographical area by industry sectors, and can be used to identify the significant income-producing industries of a region or to show trends in industry growth or decline.

In terms of earnings, government is the largest sector in the county, with 27 percent of all earnings. The government sector accounts for just 18 percent of jobs in the county, but these jobs tend to be higher paying than those in some other sectors, such as agriculture or retail trade. The second largest county sector in terms of earnings is the services sector, contributing 24

[23] Ibid.
[24] Ibid., p. 21.
[25] Washington State Employment Security Department, Labor Market and Economic Analysis Branch, *Okanogan County Profile*, September 2002, p. 21.



Source: U.S. Departı , May 2002, *Regional Economic Information S*

Figure 3-23. Okanogan County 2000 Employment by Industry.

Source: U.S. Department of Commerce, Economics and Statistics Administration, Bureau of Economic Analysis, May 2002, *Regional Economic Information System (REIS), 1969-2000*, CD-ROM.

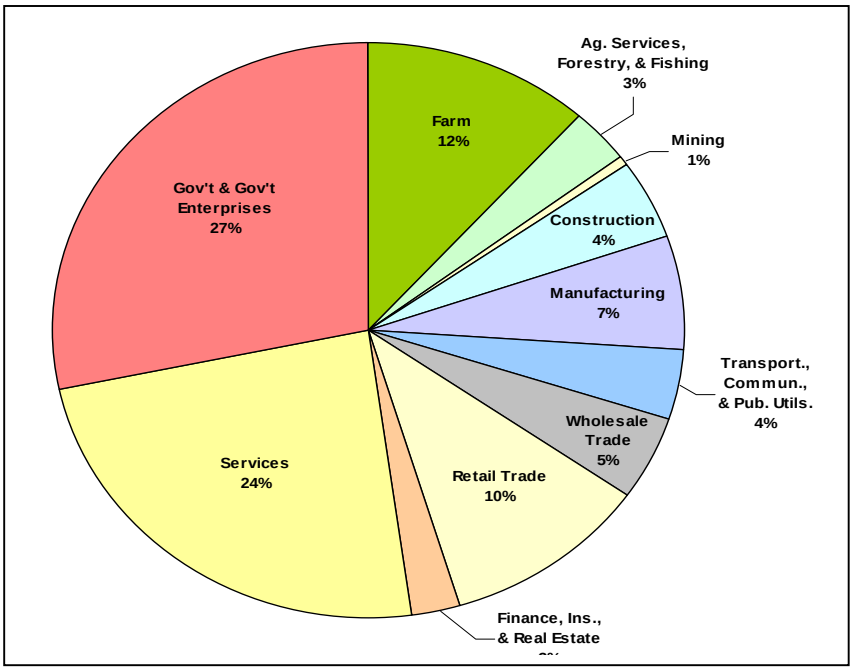


Figure 3-24. Okanogan County 2000 Earnings by Industry

percent of total earnings. As in the government sector, higher pay also characterizes the manufacturing and transportation, communication, and public utilities sectors, where five and two percent of total jobs, respectively, are responsible for seven and four percent of total earnings.

While agricultural jobs make up a large portion of county employment, earnings for farm and agricultural services, forestry, and fishing workers make up a lesser share of the total county earnings. Farm employment accounts for 18 percent of all jobs in the county, yet only contributes 12 percent of total earnings, and jobs in the agricultural services, forestry, and fishing sector account for four percent of total employment, yet only three percent of total earnings. The preponderance of part-time and seasonal workers in the agricultural industry, as well as the tendency for wages to be lower for these jobs than those in other industries, contributes to this lesser earning power. This is also true for retail trade, where employment makes up 14 percent of total jobs, but these jobs earn just 10 percent of the county's total earnings.

The labor force is made up of all persons 16 years of age or older within a specific geographic area who are either working or actively looking for work. The unemployment rate is the percentage of people within this labor force who are not employed, but still actively seeking work. The unemployment rate for Okanogan County has been almost five percentage points higher than the state average in the past three decades, only falling below 10 percent during the relatively prosperous 1990s.[28] The annual average unemployment rate for Okanogan County was 11.6 percent in 2002, compared to a rate of 6.4 percent for Washington State.[29]

The seasonal nature of many agricultural jobs leads to a changing unemployment pattern in Okanogan County throughout the year. During the summer months, the unemployment rate typically falls, as agricultural work opportunities increase, and the unemployment rate increases in the winter months when agricultural work opportunities decrease. This seasonality is typical of counties with agricultural or timber dependent economies.

Economic Well-Being

Personal income is another indicator of a region's economic vitality. Personal income encompasses not only earnings, such as wages and salaries and other work-related compensation as discussed previously, but also transfer payments and investment income. Transfer payments are comprised of payments such as income maintenance, unemployment insurance, retirement benefits, and medical payments. Investment income includes interest, dividends, and rent from investments.

Per capita income is calculated by dividing the total personal income by the total population for a particular area. This figure can be used to compare regions or time periods, and is a useful

[26] Ibid., p. 21.
[27] Washington State Employment Security Department, Labor Market and Economic Analysis Branch, *Okanogan County Profile*, September 2002, p. 21.
[28] Ibid., p. 10.
[29] Washington State Employment Security Department, Labor Market and Economic Analysis Branch, April 1, 2003, *2001 Annual Average Washington State Resident Civilian Labor Force and Employment.*

indicator of the character of consumer markets and the overall economic "well-being" of area residents. Per capita income provides a good measure of how personal income is growing relative to a population, but does not necessarily indicate how that income is distributed among the population.

Okanogan County's per capita income in 2000 was $20,117, which was substantially less than that of the state of Washington, or $31,230.[30] Okanogan County ranked 34th of Washington's 39 counties in terms of per capita income, with King County reporting the highest, at $45,536.[31]

Another measure used to indicate economic well-being in a region is the percentage of people who are estimated to live below the poverty level. These data are based on national levels set for minimum income requirements for various different sizes of households. There is no correction for the variation in costs of living among areas. For example, if housing prices and food prices in a county were lower than national levels, then a family in that county with an income at the national poverty level might be better off than a family with the same income living elsewhere in the nation. However, poverty figures can be useful to permit comparison between geographic areas and time periods.

The most recent available poverty data is from the 2000 Census, and is based on income levels reported for 1999. In 1999, 1,697 families in Okanogan County were found to have incomes below the poverty level, representing 16.0 percent of all families in the county for which poverty status was determined.[32] This is much greater than the 7.3 percent of families living in poverty that was reported for the state of Washington.[33] When individual people are counted, 8,311, or 21.3 percent, of the Okanogan County residents for which poverty status was determined lived below the poverty level in 1999.[34] This is also a far greater rate than that of the state, which reported that 10.6 percent of individuals for which poverty status was determined had incomes below the poverty level in 1999.[35]

3.8.1.3 Okanogan Irrigation District

The Okanogan Irrigation District (OID) in Okanogan County, Washington, was authorized in 1905 to serve 10,000 acres.[36] Currently, OID consists of 5,032 assessed acres near the Okanogan River. Irrigation water is primarily supplied to the district through a diversion from Salmon Creek, a tributary to the Okanogan River. Two storage facilities, Conconully Reservoir and Salmon Lake, store Salmon Creek flows and are operated to meet downstream irrigation demand within the district. Supplemental water supplies are pumped directly from the Okanogan River

[30] U.S. Department of Commerce, Economics and Statistics Administration, Bureau of Economic Analysis, May 2002, *Regional Economic Information System (REIS), 1969-2000*, CD-ROM.
[31] Ibid.
[32] U.S. Census Bureau, Census 2000, *Table DP-3, Profile of Selected Economic Characteristics: 2000*, Geographic Area: Okanogan County, Washington.
[33] U.S. Census Bureau, Census 2000, *Table DP-3, Profile of Selected Economic Characteristics: 2000*, Geographic Area: Washington.
[34] U.S. Census Bureau, Census 2000, *Table DP-3, Profile of Selected Economic Characteristics: 2000*, Geographic Area: Okanogan County, Washington.
[35] U.S. Census Bureau, Census 2000, *Table DP-3, Profile of Selected Economic Characteristics: 2000*, Geographic Area: Washington.
[36] The district was never built-out to serve the full 10,000 acres that were authorized.

at the Shellrock pumping station and from Duck Lake when Salmon Creek supplies are inadequate to meet irrigation demands.

The Salmon Creek diversion dam, located approximately 12 miles downstream from Conconully Reservoir, diverts water from Salmon Creek into the Main Canal. The Main Canal is 7.6 miles of open concrete lined canal that runs along the western border of the district. Water is diverted from the Main Canal into five laterals consisting of more than 44 miles of closed, pressurized pipeline. The maximum capacity of the Main Canal is estimated to be 80 cubic feet per second (cfs).

OID has more than 600 member accounts with assessable acres ranging from approximately 0.2 acres to 230 acres per account. The average assessed acreage per account in the district is 8.2 acres and the median is 3.5 acres. While the district supports a large number of full-time producers, part-time producers with primary sources of income other than farming manage much of the irrigated acreage. In addition, an increasing share of the district is being converted from commercial agricultural production to rural/residential uses with parcels smaller than five acres. According to OID crop reports, urban lands served by district water supplies increased from 115 acres in 1990 to approximately 550 acres in 1998. This trend toward smaller acreages within the district has continued in recent years. Currently, nearly one-third of the district's annual assessment fees are paid by members with less than five acres served by district water supplies.

Crops in OID consist primarily of tree fruits and forage crops. Approximately half of the assessed acres in the district are planted to tree fruits. Apples are the most prevalent tree fruit in the district, followed by pears and cherries. In addition, more than 1,300 acres are planted to pasture and hay crops.

Financial Conditions and Repayment Obligations

The projected total 2003 assessment for OID is approximately $650,000. Assessment charges vary according to the size of the account. Small acreages receiving OID service are generally assessed at a higher rate than larger acreages. Each account is charged a fixed fee of $50 per acre. **Table 3-31** shows how district charges vary with acreage.

Table 3-31. Okanogan Irrigation District Assessment Schedule, 2003

Acres	Assessment
0.01-1.00	$142
1.01-1.50	$213
1.51-2.40	$284
Remaining Acres	$120/acre

Source: Tom Sullivan, Okanogan Irrigation District.

In addition to assessments, OID receives revenue from a variety of sources including grants, interest, and charges to domestic well users benefiting from groundwater recharge at Duck Lake. Planned expenditures for 2003 include approximately $500,000 for operations and maintenance, $65,000 for debt repayment associated with the Shellrock facility, and nearly $210,000 in rehabilitation and betterment bond payments. Debt obligations are projected to remain relatively

constant at approximately $60 per acre through 2013 but would decline to less than $14 following repayment of the rehabilitation and betterment bond in 2014.

Current Crop Production and Markets

Agricultural production within OID consists primarily of orchard crops. Apples are the most commonly produced tree fruit and are planted to more acres than any other crop produced in the district. Common apple varieties found in the district include Red Delicious, Golden Delicious, Gala, and Braeburn, among others. Pears and cherries are other important crops but are grown on fewer acres than apples. Growers in the district have increased the acreage of pears substantially due to poor apple market conditions in recent years. Similarly, cherry acreage has doubled in OID during the last five years but still represents a relatively small amount of district acreage. Other less hardy tree fruit has not increased in acreage substantially.

While orchard crops generate a major share of crop revenues within OID, forage crops are produced on a large portion of the district's irrigated acres. Hay and pasture production has generally been increasing over the last decade as orchard crops have been removed due to depressed prices and land has been subdivided and converted to small acreage rural/residential sites. Many of these rural/residential sites maintain small pastures or hay fields to support livestock on the property.

Table 3-32 provides the cropping history for OID from 1991 through 1998 as well as current estimates collected from parcel records maintained by the Okanogan County Assessor's Office. Currently, an estimated 3,907 acres (harvested acreage plus young trees) are irrigated compared to 4,317 acres in 1990. Although total apple acreage has declined by nearly 700 acres since 1990, total orchard acreage in production (including young trees) declined by only 315 acres over the same period as producers shifted from apples to other tree fruits.

Apple acreage by variety has not been historically collected and reported by OID.[37] Current apple variety information was obtained by reviewing Assessor field notes for each district parcel at the Okanogan County Assessor's Office. In total, 660 acres of Red Delicious, 287 acres of Golden Delicious, and 638 acres of other apple varieties remain in the district. This variety mix is consistent with a recent fruit survey of the Wenatchee District, which includes OID, conducted by the Washington Agricultural Statistics Service. The 2001 survey reported that of the 54,000 acres in the Wenatchee District, 41.5 percent were planted to Red Delicious, 16.5 percent were planted to Golden Delicious, and 42 percent were planted to other apple varieties.[38] Since 1993, Red Delicious acreage has declined by more than 25 percent throughout Washington State, while Golden Delicious acreage has shown only a slight decline. Total Washington State apple acreage was estimated at 192,000 acres in 2001, compared to 172,000 acres in 1993. Current estimates place Washington's total apple crop at 175,000 acres.[39]

[37] Personal communication with Tom Sullivan, OID Manager, March 2003.
[38] Washington Agricultural Statistics Service, "Washington Fruit Survey 2001."
[39] Tom Schotzko, "Apple Outlook, 2002 Crop," Washington State University Cooperative Extension.

Table 3-32. Crop Production in Okanogan Irrigation District, Selected Years, 1990-Present

Harvested Acreage	1990	1991	1992	1994	1995	1996	1998	Current
Alfalfa/Other Hay	534	539	539	554	636	636	610	473
Pasture	828	808	808	876	805	805	800	870
All Apples	2,289	2,222	2,222	2,250	2,173	2,173	1,810	1,586
Red Delicious								*660*
Golden Delicious								*287*
Other Varieties								*638*
Apricots	3							4
Cherries	8	8	8	25	15	15	50	107
Peaches	31	31	31	25	17	17	10	5
Pears	458	456	456	450	260	260	260	436
Other Crops								30
Family Plots	106	113	113	24	127	127		
Total Harvested Acreage	4,257	4,177	4,177	4,204	4,061	4,061	3,550	3,510
Acres Not Harvested								
Cropland (young trees)	60	69	69	32	174	174	602	397
Fallow or Idle	470	571	571	365	301	96	76	321
Roads, ditches, drains	136	100	100	96	96	301	255	255
Urban/Suburban Lands	115	121	121	335	400	400	549	549
Total Acres Not Harvested	781	861	861	828	971	971	1,482	1,522
Total Assessed Acreage	5,038	5,038	5,038	5,032	5,032	5,032	5,032	5,032

Sources: Okanogan Irrigation District Crop Reports, 1990-1998. Okanogan County Assessor's Office.

Crop Value

The estimated market value of agricultural products sold in the county in 1997 was $133.5 million, primarily from crop production. An estimated 568 farms contain nearly 30,000 acres of orchard crops in Okanogan County.[40] In comparison, Washington State reported more than 300,000 acres in orchards. Washington State is the leading U.S. producer of apples and pears, producing approximately 50 percent of total U.S. apple and pear crops.[41] Orchard crops are labor and input intensive relative to many other irrigated crops. As a result, a large portion of the regional economy is comprised of industries that directly support orchard production with labor and input supply, as well as industries that process, package, and market the harvested fruit.

The total value of crops grown in OID in 2002 is estimated to be $12,152,039 (see **Table 3-33**). This estimate is based on 2002 crop prices and current crop information collected at the Okanogan County Assessor's Office and supplemented with historic crop reports provided by OID to account for parcels without crop information provided. Value per acre is based on the farm level rather than retail price of each crop.

[40] USDA, "1997 Census of Agriculture."
[41] Northwest Horticultural Council, May 2003.

Apples accounted for 37.5 percent of crop acres and contributed nearly 72 percent to total farm revenues within the district. Conversely, pasture and hay comprised 30 percent of the acres, but 4 percent of value. Pears are the second highest revenue crop in the district, earning 17.8 percent of the value from 10.3 percent of the acreage. Lastly, cherries make up 2.5 percent of the acres and 5.9 percent of value.

Table 3-33. Crop Acres, Value per Acre, and Total Crop Value, Okanogan Irrigation District, 2002

Crop	Acres	Value/Acre	Total Value	Percent of Acres	Percent of Value
Alfalfa	372	$810	$301,646	8.8%	2.5%
Other Hay	101	$845	$84,930	2.4%	0.7%
Pasture	870	$435	$375,638	20.6%	0.8%
Apples	1,586	$5,381	$8,533,949	37.5%	71.9%
Pears	436	$4,842	$2,111,724	10.3%	17.8%
Cherries	107	$6,528	$696,500	2.5%	5.9%
Apricots	4	$3,132	$12,234	0.1%	0.1%
Peaches	5	$6,895	$35,419	0.1%	0.3%
Other Minor Crops	30	$-	$-	0.7%	0.0%
Young Trees	397	$-	$-	9.4%	0.0%
Fallow/Idle	321	$-	$-	7.6%	0.0%
Total	4,22842		$12,152,039	100.0%	100.0%

Note: Totals may appear not to add precisely due to rounding.

Source: Washington Growers Clearing House, May 2003, Washington State Agricultural Statistics Service.

Apple prices vary considerably by variety. Red Delicious prices have been consistently below other varieties over the last five years. According to published Washington crop budgets for Red Delicious, the breakeven price is approximately $13.20 per pack. As shown below, the average price did not reach the breakeven level between 1997 and 2002. Furthermore, there has only been one year in the last decade that the Red Delicious price has exceeded $13.00.[43] Some newer Red Delicious crops are able to earn a profit because of high quality fruit production. However, older trees, which represent the majority of Red Delicious acres in Washington State and OID, generally have a lower packout of high quality fruit and earn lower prices. On average, Red Delicious producers have experienced estimated net losses of approximately $1,000 per acre in recent years.[44]

Golden Delicious is a marginal performing apple variety with prices high enough in some years to earn a profit, but below breakeven levels in others. Much of the acreage consists of trees more than 20 years old, which can make it difficult to produce and market the highest quality fruit. The estimated breakeven price for Golden Delicious is $13.09 per pack (about 42 pounds). Average prices were above breakeven levels in four of the last five years and average net returns

[42] The column does not total to 5032 acres because of lands reported by the District in "roads, ditches, and drains" and "urban/suburban" lands (see Appendix F Socioeconomics Resource Report for more detail). Also, no value was assigned to "minor crops" because the specific crops that fall in this category are undocumented.

[43] Washington Growers Clearing House, May 2003.

[44] Derived from crop budgets assembled by Jim DuBruille, Wenatchee Valley College, and Washington State University Cooperative Extension.

for Golden Delicious with good yields have been approximately $450 per acre in recent years. However, older trees, with lower yields and less high quality fruit, have generally experienced losses.

Other apple varieties such as Gala and Fuji earn higher prices and tend to be more profitable than Red and Golden Delicious. For example, the average estimated net returns to Gala and Fuji production have been $1,328 and $793 per acre, respectively.

3.8.1.4 Recreation: Conconully Reservoir and Salmon Lake

Okanogan County Overview

In 1972, the North Cascades Scenic Highway (Highway 20) was completed, thus significantly reducing the travel time for people from Seattle and other areas on the I-5 corridor to the scenic North Cascades and to Lake Chelan. Since that time, tourism has increased in importance in Okanogan County.[45] Okanogan County offers impressive vistas, including large glaciers in the North Cascades. It also offers opportunities for alpine and nordic skiing, hiking, biking, mountain and rock climbing, snowmobiling, fishing, hunting, lake and river recreation, rodeos, pow-wows, and other outdoor activities.[46]

Conconully and the Recreation-Based Economy

The city of Conconully is on the North Fork of Salmon Creek, and was originally settled as a mining community. Dams form two lakes near the city: Salmon Lake, an off-stream storage reservoir, and Conconully Reservoir, formed just downstream within Salmon Creek. Conconully is located approximately 19 miles from Okanogan and 16 miles west of Riverside.

Employment within the town of Conconully is highly dependent upon recreation. The Conconully Chamber of Commerce's membership directory includes seven camping and lodging facilities, three of which also provide boating access and rentals, three restaurants, and one general store.[47] One additional motel was not listed in the membership directory. Conconully State Park also provides access for fishing, camping, and boating. Another general store and one recreational vehicle park closed within the last three years. Privately owned or rented cabins and summer homes dot the area, with some 28 summer homes along the north shore of Salmon Lake.[48]

---

[45] Twisp Chamber of Commerce, 2002, "Welcome to Twisp, Washington!" Webpage: http://www.twispinfo.com/history.html, accessed June 17, 2003. Okanogan County Tourism Council, 2002, "Camping and Fishing Guide to Washington's Okanogan County." The Omak Chronicle, Inc.

[46] The Omak Chronicle, Inc., 2002, *Vacationland: The Official Visitors' Guide to Okanogan Country 2002-03*, The Chronicle, Omak, Washington. Omak-Okanogan County Chronicle, 2003, *InfoBook Okanogan County 2003*, Omak, Washington.

[47] Omak-Okanogan County Chronicle, 2003.

[48] Highlands Associates, n.d., Salmon Creek Project: Salmon Lake Level Increase Built Environment Analysis, Okanogan, Washington.

Fishers and boaters impact the Conconully economy by paying locally for camping spaces and other lodging, paying for boat rentals and launch fees, and buying fishing equipment, gasoline for boats and cars, camping supplies and equipment, and food and drink. During fall and winter, hunters and snowmobile enthusiasts rent cabins or motel rooms, and frequent the restaurants and the general store in town.

Recreation businesses and tourism are service sectors with a dominant role in the local economy. Service sectors generally receive lower income per worker than professional or production market sectors. Median household income in Conconully was $23,314 in 1999, which is lower than the 1999 median household income for Okanogan County of $29,726.[49]

Patrons and Recreational Activities

The peak visitation period for all businesses and the state park generally falls between late April and early November. Fishing is dominant in late April through May. Another peak occurs in August when families with children come for swimming and water sports. Weekends, holidays, and Conconully celebrations, including those in the winter, provide other visitation opportunities.

Business owners estimate the number of visitors from the "westside" (western Washington) range from a low of no winter visitors, to a high of 95 percent of all summer visitors. Businesses open only in the spring through fall season report a range of 65 to 95 percent of their visitors are from the westside. Out-of-county visitors from the "eastside," primarily the areas of Wenatchee, Spokane, and the Tri-Cities, are estimated to constitute a low of five percent for seasonal businesses, to a high of 50 percent of all visitors to year-round businesses. During the winter, visitors from Omak and Okanogan constitute from zero to about 10 or 15 percent of the visitors, with the rest generally being local residents.

Spring and summer fishing and motorized water sports are the foundations of Conconully's recreation economy, with business owners estimating that 60 to 90 percent of their April through August visitors fish and participate in water-based recreation. Camping and room rentals increase along with visitation for fishing and water sports. Fishing is mostly for trout stocked in the lakes. In addition to the Washington Department of Fish and Wildlife's stocking of rainbow trout, local residents purchased large, fast-growing, sterile trout and stocked the lakes with those. Most fishing, approximately 70 percent, is catch and keep. Other activities occurring in the summer include over 30 family reunions per summer, about 12 weddings per summer (mostly at the state park), four-wheeling, hiking, biking, bird watching, and even "deer counting." Hunting and snowmobiling generally provide fewer out-of-county visitors but are nonetheless important contributors to the town's economy in the fall and winter seasons.

Recent Conditions and Recreation

Owners of Conconully businesses and the Conconully State Park manager were interviewed to determine: (1) the nature and capacity of businesses, including during peak seasons; (2) the types

[49] U.S. Census Bureau, 2000, *Census 2000 Summary File 3 (SF3) Sample Data*, Table: "P56, Median Household Income in 1999 (Dollars) by Age of Householder." Omak-Okanogan County Chronicle, 2003.

of patron activities the businesses support, the origin of their patrons, and visitation length; and (3) opinions regarding the qualitative relationship between lake levels and visitation. The findings of these interviews are summarized below.

Due to serious drought since 1999, Conconully residents and business owners have experienced a consistent decline in spring and summer water levels at both Salmon Lake and Conconully Reservoir. The record of lake levels discussed below documents this observation. During the height of the fishing and summer seasons in 2001 and 2002, and at the beginning of the fishing season in 2003, lake levels were low enough to expose large expanses of muddy flats up to lakeshores and around boat launches and docks. Boating, water-skiing, swimming, and fishing activities were severely affected.

After experiencing more than one year of low lake levels, it is reported that a large percentage of repeat visitors to Conconully decided not to return. In addition, it was reported that some tourists saw the condition of the lakes, and left to look for another location to camp. Business owners reported that they began to see their profits decline dramatically and are concerned that their businesses may ultimately fail if lake levels do not improve. Additional details about recreation facilities and business interviews may be found in **Appendix F**.

Historic records on lake levels are available for a period of 58 years for Salmon Lake and Conconully Reservoir. In 45 of the 58 years (78 percent) of record, the annual maximum level of Salmon Lake was within two feet of the maximum level for all years, and in 48 of the 58 years (83 percent), it was within three feet. This indicates that during this period the supply of water from the watershed feeding the lake was able to fill the lake close to capacity in about three out of four years. The pattern displayed in the data indicates that it has been rare for the lake to not fill to near capacity two years in a row. The exception to this pattern began in 1999 and continues to the present due to drought, with the highest lake level reached during this period in 2002, when the highest level was about 20 feet below full capacity.

A similar but more extreme pattern occurs in Conconully Reservoir. In 36 of the 58 years of record (62 percent), the annual maximum level was within two feet of the maximum level for all years, and in all 58 years, the annual maximum level was within three feet of this maximum.

3.8.1.5 Tax Base and Property Values

There are several facets to the taxation of an agricultural enterprise in the State of Washington. Farmland can be taxed at its highest and best use value. In Okanogan County this is considered its market value for agricultural production. Under state law, agricultural land can also be taxed as "open space." If the agricultural land is planted to perennial plants, such as orchards and vineyards, the trees and vines may be taxed. Personal property, such as farm machinery and irrigation systems, is also taxed.

Valuation of Open Space Agricultural and Farm Land

The Department of Revenue uses code numbers to identify the different types of land use.[50] The code numbers, corresponding land use description, and assessed value per acre are presented in **Table 3-34**.

Table 3-34. Open Space Agricultural and Farm Land Values

Land Use Code	Land Use	2002 Current Use Valuation per acre*	2003 Current Use Valuation per acre**
831	Orchard	$600	$672
832	Irrigated Alfalfa	$400	$500 to $921
833	Dryland Alfalfa	$100	$129
834	Improved Pasture	N/A	N/A
835	Irrigated Pasture	$150	$200
836	Range Land	$6	$6
837	Dryland Grain	$100	$100

*Okanogan County Assessor valuation, January 30, 2002.

**Okanogan County Assessor valuation, January 29, 2003.

Taxation of Perennial Plants, including Orchards and Grapes

For tax purposes, crops are divided into two classifications: (1) growing crops (tax exempt) and (2) perennial plants (taxable). To distinguish between the two groups, the Washington Department of Revenue states that "growing crops" are grown from soil for annual production, and "perennial plants" produce fruit or some other vegetation that are harvested annually.[51] Fruit orchards and grape vineyards are considered perennial plants.

When the perennial plants qualify the land for farm and agricultural classification, the assessor needs to determine if the market dictates that the perennial plant has a true and fair market value, irrespective of the highest and best use of the land. If this is the case, that value is the improvement value when the land is classified as farm and agricultural land.[52] **Table 3-35** provides the valuation for different types of perennial plants.

Under certain circumstances, perennial plants may have true and fair value of zero as a result of limited yields of the plants or change in market conditions for the crop.[53] In Okanogan County, orchards are taxed a flat rate because of current poor markets for the varieties of apples commonly grown.[54] In addition, Red and Golden Delicious trees more than 16 years old are not taxed.

[50] Department of Revenue, April 1999, "Land Use Codes"
[51] State of Washington, Department of Revenue, October 2002, "Property Tax Advisory."
[52] State of Washington, Department of Revenue, October 2002, "Property Tax Advisory."
[53] State of Washington, Department of Revenue, October 2002, "Property Tax Advisory."
[54] Personal communication with Jim White, Chief Appraiser, Okanogan County, April 8, 2003.

Agricultural and farm land in Okanogan County that does not meet criteria for open space is assessed using market value (comparable sales). This results in a wide range of values as sales in different areas vary.[55]

Table 3-35. Valuation of Perennial Plants

Fruit Types	Value Per Acre
Apple	$1,000
Pear	$1,500
Cherry	$2,000
Stone Fruits	$1,000
Wine Grape Vines	$1,000

Irrigated Land Values

In recent years, the market value of land with water rights in Okanogan County and within OID has declined dramatically. Currently, it is estimated that bare ground with OID water rights is selling at between $1,000 and $2,000 per acre compared to $6,000 per acre in the mid-to late-1990s. However, the majority of the recent transactions are "forced sales" prompted by foreclosure. In general, there are few buyers in the market relative to the availability of land. One local expert indicated that land with water rights outside of the district is selling for a higher price due to the relative ease in transferring of water rights to new lands and new uses, whereas such transfers of irrigation district water rights are more difficult to accomplish.[58] The low market value of irrigated land within OID has resulted in a conversion from commercial agricultural to rural/residential use in some areas of the district. These subdivided parcels, which retain rights to OID water, tend to sell for a significantly higher per acre price than land remaining in agricultural use.[59]

Non-Irrigated Land Values

Non-irrigated parcels in OID are assessed using market values. There are approximately 80 parcels of land in the district that are larger than five acres and designated as agricultural or farm land not classified as open space or undeveloped land. The average market value per acre for these parcels is $3,054, with values ranging from a low of $567 per acre to a high of $11,571 per acre. The wide range of value contained in this data set limits its use for analytical purposes.

[55] Personal communication with Jim White, Chief Appraiser, Okanogan County, June 11, 2003.
[56] Personal communication with Jim White, Chief Appraiser, Okanogan County, April 8, 2003.
[57] Personal communication with Jim White, Chief Appraiser, Okanogan County, June 11, 2003.
[58] Personal communication with Richard Witt, Appraiser, June 16, 2003.
[59] Personal communication with Jim White, Chief Appraiser, Okanogan County, May 2003.

Levy Rate

The levy rate is the rate per $1,000 of assessed value used to determine the property tax; that is, the assessed value of your property multiplied by the levy rate for the area that a property lies within determines the annual amount of property taxes. This amount can change from year to year based on changes in assessed value and/or the levy rate.[60] The levy rate is found in the Taxing Code Authority database for Okanogan County and ranges between 12.81 and 14.65 for the parcels discussed in this report.[61] For purposes of analysis the average levy rate, 13.73, is used.

Summary of Valuation

The appraised values for agricultural land vary widely in the assessment database. An objective of EIS analysis is to evaluate the impacts of changing agricultural land from irrigated to non-irrigated on the tax base and taxes. The methods used to value open space use (**Table 3-34**) offer the best chance of making a meaningful comparison of this. As presented in this table, irrigated cropland is valued from $500 to $921 per acre. For analytical purposes, a mid-range value of $725 per acre is used. Non-irrigated cropland is valued between $100 and $129 per acre and a mid-range value of $125 is used. Thus, when an acre changes from an irrigated status to a non-irrigated status but remains in agricultural production, its use value changes $600.

3.8.2 SOCIOECONOMIC IMPACTS

Section 3.8.2 describes the direct and indirect economic impacts of all the alternatives. Three distinct flow regimes representing different enhancement options (steelhead with channel rehab, steelhead/chinook with channel rehab, steelhead without rehab) were analyzed for each alternative. Each enhancement option results in different water supply volumes to OID from each source available to the district. However, while the mix of water supply may differ among the three enhancement options, the Water Allocation Model estimates that overall district crop water needs are met in most years. Consequently, the impacts are presented for each alternative, but separate impacts are not provided for each of the enhancement options.

3.8.2.1 Alternative 1: Okanogan River Pump Station

It is assumed that OID would not bear any of the fixed costs associated with constructing the facility or pipelines to convey the water to the district. However, OID would pay pumping costs equivalent to the annual pumping costs identified under the No Action Alternative ($97,021 per year). Pumping costs beyond the No Action level would be assumed to be paid by an entity located outside of Okanogan County. The Water Allocation Model estimates that pumping from the Okanogan River would average 9,491 AF annually and that district irrigation needs are fully met in all years.

[60] Okanogan County Assessor's Office, February 2003, www.okanagancounty.org/Assessor.
[61] Okanogan County Assessor's Office, 2003, "2003 Levy Rates Okanogan County."

The effect on reservoir recreation of the Okanogan River Pump Exchange Alternative is to reduce the seasonal fluctuation of lake levels, but not change the absolute levels of the lake in wet or normal water years, as compared to the No Action Alternative. In dry years, lake levels may the same or slightly higher as the No Action Alternative. The net effect is that the Okanogan River Pump Exchange Alternative is expected to have a somewhat positive effect on reservoir recreation and the associated recreation-based economy in Conconully.

3.8.2.2 Alternative 1: Feeder Canal Upgrade

There are no additional socioeconomic impacts anticipated as a result of the feeder canal upgrade.

3.8.2.3 Alternative 1: Stream Rehabilitation

Rainbow trout, brook trout, and some kokanee spilled over during flood events can be found in the middle reach of Salmon Creek. However, Washington Department of Fish and Game prohibits any fishing in the reaches of Salmon Creek below Conconully, and this has been the case for some years.[62] The lower reach of the creek is dewatered except in rare cases of flood conditions. The lack of flow in this reach has prevented fish from inhabiting this area.

It is likely that additional water would be beneficial to game species in addition to the target species (see **Section 3.5**). However, this benefit may be mitigated by competition between game fish and populations of steelhead and Chinook (see **Section 3.5**). It is uncertain under what conditions the middle and/or lower reaches may be opened to sport fishing, given that endangered species might be taken incidentally if sport fishing were to occur in the same reaches. Thus, there are no impacts on the recreation economy to be assessed as a result of this component.

3.8.2.4 Alternative 2: Upgrade Shellrock Pumping Plant

Under the Shellrock Pump Upgrade Alternative, it is assumed that OID would only be responsible for pumping costs up to the amount estimated under the No Action Alternative ($97,021 per year) and that an entity other than OID would pay capital and operating costs above that amount. Under the alternative, the Water Allocation Model estimates that district irrigation needs are fully met in all years for two of the enhancement options and all but four of the 99 model years analyzed under the other enhancement option (steelhead and Chinook) according to the Water Allocation Model. The level of shortage identified by the model is within the range allowed by the shortage criteria. As a result, the long-term cropping pattern, total production, crop revenue, and net income within the district are estimated to not change relative to the No Action Alternative. The shortages, which occur during periods of extreme sustained drought, would require the district to ration water supplies and may result in a small reduction in crop yields. However, the level and duration of the estimated shortages indicate that yield losses are

[62] Washington Department of Fish and Wildlife, May 1, 2003, Fishing in Washington, Sport Fishing Rules, 2003/2004 Pamphlet Edition, Olympia, Washington, p. 72, Webpage: http://www.wa.gov/wdfw/fish/regs/2003/2003sportregs.pdf, accessed July 8, 2003. Personal communication with Ryan Layton, Conconully State Park Ranger, April 29, 2003.

likely to be very minor and are therefore not specifically addressed in this analysis. As a result, the cropping pattern, total production, and crop revenue within the district is estimated to not change relative to the No Action Alternative.

The effect on reservoir recreation of the Shellrock Pump Upgrade Alternative is to reduce the seasonal fluctuation of lake levels, but not change the absolute levels of the lake in wet or normal water years, as compared to the No Action Alternative. In dry years, the lake levels may actually be slightly higher. Therefore, the Shellrock Pump Upgrade Alternative is expected to have a somewhat positive effect on reservoir recreation and the associated recreation-based economy in Conconully.

3.8.2.5 Alternative 2: Feeder Canal Upgrade

The impacts would be the same as described in **Section 3.8.2.2**.

3.8.2.6 Alternative 2: Stream Rehabilitation

This section provides a discussion of the economic benefits associated with the rehabilitation of Salmon Creek. While it is noted that the actual quantification of these benefits is extremely difficult – some would say impossible – it is nevertheless important to acknowledge that there would be non-market benefits associated with the objectives of the proposed Project.

Rainbow trout, brook trout, and some kokanee spilled over during flood events can be found in the middle reach of Salmon Creek. However, Washington Department of Fish and Game prohibits any fishing in the reaches of Salmon Creek below Conconully, and this has been the case for some years.[63] The lower reach of the creek is dewatered except in rare cases of flood conditions. The lack of flow in this reach has prevented fish from inhabiting this area.

It is likely that additional water and stream rehabilitation would be beneficial to game species in addition to the target species (see **Section 3.5** above). However, this benefit may be mitigated by competition between game fish and populations of steelhead and Chinook (see **Section 3.5** above). It is uncertain under what conditions the middle and/or lower reaches may be opened to sport fishing, given that endangered species might be taken incidentally if sport fishing were to occur in the same reaches. Thus, there are no impacts on the recreation economy to be assessed as a result of this component.

Stream restoration involves the repair of a natural resource asset. In the case of Salmon Creek, the objective of the restoration of flows is the enhancement of spawning and rearing habitat for salmon and steelhead. This restoration and enhancement of the fishery is expected to produce benefits to society. Some of these benefits result from direct use of the fishery. Other benefits may not involve direct use but may still be important in understanding the total benefits associated with the repair of a natural resource asset.

[63] Washington Department of Fish and Wildlife, May 1, 2003, Fishing in Washington, Sport Fishing Rules, 2003/2004 Pamphlet Edition, Olympia, Washington, p. 72, Webpage: http://www.wa.gov/wdfw/fish/regs/2003/2003sportregs.pdf, accessed July 8, 2003. Personal communication with Ryan Layton, Conconully State Park Ranger, April 29, 2003.

The direct use value comes from fishing and other visits to the resource involving non-consumptive use such as viewing the fish, bird watching, etc. Non-market valuation techniques are commonly used to quantify these types of benefits. These involve devising a way to measure use, such as establishing a relationship between fish catch, angler effort, and a per day value for the number of days or the number of fish per angler. Typically the value is estimated using a non-market valuation technique such as the travel cost method and the contingent valuation method. Principles and guidelines for using these techniques for evaluating benefits from federal water resource projects are contained in "Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies", published by the U.S. Water Resources Council, March 1973.

In addition to direct use values, there are nonuse values. Randall and Peterson[64] define these as option value, quasi-option value, and existence value. Option value and quasi-option value relate to the value of maintaining options for the future and differ only in how the existence of future information is treated. Existence value is the value an individual obtains from just knowing something exists. In a natural resource context, this typically means maintaining a natural resource in a certain condition (or preserving it). If a particular state of resource condition declines, such as the diminishing of the population of a species, then individuals would suffer a loss in existence value. Conversely, the restoration of a natural resource that has been perceived as diminished would result in a gain in existence value to individuals.

Because of the size of the Salmon Creek Project and its predominantly local nature, gains in direct use values are likely to be small, particularly if measured using the travel cost method, which is one possible method for site measurement. On the other hand, measurement of existence value using contingent valuation methods is likely to identify significant values over a wider geographic area. Loomis[65] studied the existence value of the removal of dams on the Elwha River and the restoration of the river for anadromous fish habitat in Washington. He found that the mean annual value per household locally (Clallam County) was $59 per year for ten years, for the state $73, and $68 in the rest of the United States. Since Salmon Creek is a small project and has not received widespread publicity as did the Elwha dams, a similar study would likely produce much lower values for Salmon Creek. It is cited here to illustrate that existence values exist, can be measured, and can be perceived to exist over a wider geographic area than use values. In a companion study, Loomis[66] included a variable for distance from the site to test the idea that values would be lower the farther removed the respondents to the survey were from the site. He found this to be true. However, since a majority of households were outside the immediate site, even though their values diminished with distance the sheer preponderance of numbers meant that a large part of the total benefit came from outside the immediate area.

---

[64] Peterson, George L., and Alan Randall, eds., 1984, *Valuation of Wildland Resources*, Chapter 1, Westview Press, Boulder, CO, p. 29.

[65] Loomis, John B., February 1996, "Measuring the economic benefits of removing dams and restoring the Elwha River: Results of a contingent valuation survey," *Water Resources Research*, Vol. 32, pp. 441-447.

[66] Loomis, John B., 1996, "How large is the extent of the market for public goods: evidence from a contingent valuation survey," *Applied Economics*, pp. 779-782.

3.8.2.7 Alternative 3: Water Right Purchase

Under the Water Purchase Alternative, water rights would be permanently acquired from OID and used to meet instream flow objectives in Salmon Creek. The structure, acceptability, and possible implementation of the alternative are uncertain at present. As a result of this uncertainty, a review of existing water acquisition programs was conducted to provide guidance on water acquisition methods that have been effective in other areas. This is included in **Appendix F**. In addition to the information provided in **Appendix F,** a brief description of the water leasing program in Salmon Creek is provided below.

The Washington Water Trust (WWT), with funding provided by BPA, has leased over 4,550 AF from irrigators in the Okanogan Irrigation District to enhance streamflow in Salmon Creek. WWT is a private non-profit organization established in 1998 that is dedicated to streamflow restoration and water quality improvement in rivers and streams in the state of Washington. The Salmon Creek water-leasing program was established in 2000.

Prices paid by the WWT have been negotiated with the Okanogan Irrigation (OID) District Board and have been set at a fixed price for all participating acres in the district. The term of lease contracts are for one year from April 1 through March 31. Prices on an acre basis have increased from $135 in 2000 to $175 in 2002. During that period, OID irrigation assessment fees have averaged approximately $125/ per acre. Voluntary participants are all members of the irrigation district, and are required to pay the district assessment fee on acres enrolled in the water-leasing program. Participating acres have involved primarily idle land previously used to produce orchard crops. Other participating acres were primarily used to grow pasture and hay crops.

Table 3-36 presents summary information on the Salmon Creek Water Leasing Program. Program participation nearly doubled between 2000 and 2002. During the bank's first year of operations, 42 irrigators enrolled 322 acres in the program. In 2002, 60 irrigators enrolled 624 acres, leaving approximately 1,900 AF of water in lower Salmon Creek during the irrigation season. In 2003, OID elected to not participate in the water-leasing program due to poor water supply conditions in upstream storage facilities and concern about meeting the district's water needs for permanent crops.

Table 3-36. Salmon Creek Water Leasing Program, 2000-2003.

Year	Acres	$/Acre	AF	$/AF
2000	322	$135	966	$45
2001	573	$145	1719	$48
2002	624.36	$175	1873.08	$58
2003	No Water Leasing Program			

Source: Washington Water Trust and Okanogan Irrigation District.

Table 3-37 provides detail on the participating acres in the program. More than 80 percent of the acreage consisted of recently pulled orchard crops (primarily low valued apple varieties) and

acreage that had been idle for a number of years. The remaining acreage participating in the program included small fields of pasture and alfalfa.

Table 3-37. Participating Acreage in Salmon Creek Water Leasing Program, 2002.

Crop	2002 Acres
Alfalfa	69
No Crop	135
Pasture	34
Pulled Orchard	373
Unknown	13
Total	624

Source: Okanogan Irrigation District and Okanogan County Assessor's Office.

Participation by irrigators in the water leasing program was primarily motivated by an interest to cover assessment charges on idle land rather than an economic decision concerning whether or not to produce a crop during that year. The program structure and factors associated with decisions for a *permanent* sale, as opposed to a single year lease, of water rights would be significantly different. Consequently, information on the Salmon Creek water leasing program was not used in this analysis to provide guidance on analysis of the Water Purchase Alternative.

The following criteria and assumptions are applied in the analysis of the Water Purchase Alternative. These criteria and assumptions were developed from the requirements specified by the OID Board, review of existing transfer programs, discussions with Ecology, and analysis of property values in the area.

Water would be made available to the instream flow water right through irrigated land retirement. The same volume of water (5,100 AF) would be allocated to instream flows in Salmon Creek in all years, and with the possible exception of small volumes in good water years would not be carried over as reservoir storage for use in subsequent years, due to limitations in storage capacity.

For analytical purposes, crop acres are retired according to estimated profitability with the least profitable crops retired first. This is consistent with observed activity in other water purchase programs.

No crops are retired from accounts with less than five assessed acres. Small acreage properties (less than five acres) are generally not used for commercial agriculture. Any agricultural income from these properties contributes little to the overall income of the residents. Furthermore, these rural/residential parcels sell for a significantly higher price per acre than larger agricultural properties within the district boundaries. Consequently, it is less likely that the small acreage properties would be willing to permanently sell their water rights.

The water right purchaser would pay the annual irrigation assessment for retired acres, in perpetuity. This is consistent with approaches used in other existing water right purchase

programs. This is an important assumption because it allows assessment fees to remaining district members to be unaffected by land retirement. If the assessment fee on the retired land was not continued, district fixed costs would spread over fewer acres and assessment fees would increase as a result. The higher assessment fees could have additional impacts on crop production and income within the district.

A water purchase price is not determined in this analysis for permanently transferred water. However, the decline in net income estimated by the Agricultural Production Model represents the estimated *minimum* level of payment that would be required to leave irrigators with net incomes equal to that which would have been earned through irrigated crop production. A premium above this amount is typically required to bid water away from irrigators. The level of premium depends upon many specific factors that were not analyzed in this study including water right transferability, alternative land uses, regional water demand, regional water supply, and crop outlook.

Because there are little, if any, return flows to lower Salmon Creek, it is assumed in this analysis that the full diversion quantity would be transferable to an instream flow water right.

Under the Water Purchase Alternative, the Water Allocation Model estimates that irrigation diversions by OID would range between 9,972 and 10,679 among the three enhancement options. Despite the smaller district size, pumping from Shellrock would be significantly increased over the No Action Alternative, on average. Pumping at Shellrock would increase to as much as 5,092 AF in an average year, compared to 2,414 AF under the No Action Alternative. Under one of the flow enhancement options, crop water requirements are not fully met in two consecutive years out of the 99 model years. The shortage criteria are not violated and the remaining district acreage (following the water right sale) would not be impacted in the long-term. The shortages may result in a small reduction in crop yield but the impact is expected to be insignificant due to the low level of shortage.

Table 3-38. Change in OID Cropping Pattern Under Alternative 3.

Crop	Acreage Change
Hay	-444
Pasture	-497
Apples	-260
Pears	-190
Cherries	0
Apricots	0
Peaches	0
Other Minor Crops	0
Young Trees	-79
Urban Yards/Gardens	0
Fallow/Idle	0
Roads, Ditches, and Drains	0
Total Acreage Reduction	-1,470

Table 3-38 summarizes the change in cropping pattern and irrigated acres associated with the Water Purchase Alternative.

Total irrigated acreage within OID is reduced by 1,470 acres under this alternative. Hay and pasture acres are reduced by 941 acres. Orchard crops, primarily consisting of apples, are reduced as well. Due to the reduction in orchard crops, the estimated acreage in young trees is also reduced.[67]

Estimated changes in revenue and net income are shown in **Table 3-39**. Total grower revenue is estimated to decline by $2.9 million annually. Net income is not projected to change, however, because it is assumed that the reduction in income is exactly offset by payments to growers participating in the water purchase program.

Table 3-39. Change in Revenue and Net Income, Alternative 3.

Alternative	Change in Revenue to Irrigators	Change in Net Income to Irrigators
3	-$2,913,048	$0

For the Water Purchase Alternative, the losses anticipated in agricultural revenue were also entered into the economic impact model for Okanogan County and are presented in **Table 3-40**. The agricultural revenue loss results in additional indirect and induced losses of economic output within the local economy, with the total loss to output of nearly $4.1 million. Job losses associated with the change in agricultural revenue are fairly significant, and are estimated to be 118 jobs. Most of the jobs lost are farm labor directly involved in the production and harvesting of the crop that is no longer produced. These job losses represent about two percent of the total jobs in the directly affected agricultural sectors. Income losses are approximately $1.8 million in Okanogan County.

Table 3-40. Economic Impacts of Change in Agricultural Revenue, Alternative 3.

Impacts	Direct	Indirect	Induced	Total
Output *($)*	-$2,913,048	-$502,140	-$639,924	-$4,055,112
Income *($)*	-$1,356,617	-$203,545	-$213,318	-$1,773,479
Employment *(jobs)*	-96.0	-11.9	-10.5	-118.4

The effect on reservoir recreation of the Water Purchase Alternative is to reduce the seasonal fluctuation of lake levels. The absolute levels of the lakes in wet or normal water years would remain unchanged, as compared to the No Action Alternative. Average lake levels are reduced only in Salmon Lake and Conconully Reservoir during dry water years. The impact is relatively small, however, as levels average no more than 3.7 feet less than those achieved in the No Action Alternative during the recreation season. The maximum lake level impacts at Conconully Reservoir and Salmon Lake occur in dry years during June, where the elevation is 5.2 feet below the No Action Alternative. On balance, the Water Purchase Alternative is expected to have a small but negative effect on reservoir recreation.

67 It is assumed that no more than 15 percent of the orchard acres are in young trees.

3.8.2.8 Alternative 3: Feeder Canal Upgrade

The impacts would be the same as described in **Section 3.8.2.2**.

3.8.2.9 Alternative 3: Stream Rehabilitation

There would be no impact associated with this alternative.

3.8.2.10 No Action Alternative

Apple production within OID and much of eastern Washington is currently in a transitional period. Poor fruit prices for some prevalent varieties caused by overproduction, international competition, and quality considerations have prompted growers to shift to alternative crops, including other tree fruits, new apple varieties, and annual crops. Currently, some acreage within OID that has historically produced tree fruits is idle as producers decide what crops to plant. Other acreage with trees removed is being used for forage crops either as a temporary or permanent crop change.

Orchardists have pulled a significant portion of the older varieties of apple trees out of production in Okanogan County, and throughout the state. One local expert estimates that growers have removed the trees on 15 percent of the apple acreage in Okanogan County, primarily consisting of Red and Golden Delicious. Some of this acreage has not yet been replanted to trees or other crops and remains fallow. This trend is more dramatic in the northern fruit growing areas of the county including OID, where there tends to be colder sites that are less attractive for fruit production than other available land in the region.[68] Within OID, approximately 25 to 30 percent of the apple acreage with older, less marketable varieties has been pulled in recent years, with nearly half of the acreage currently not replanted to tree crops.

Because these shifts are currently taking place within the district, a projected baseline that differs from the current cropping pattern is used to represent the No Action Alternative. The projected baseline is determined through crop and acreage shifts estimated by an agricultural production model. Details regarding the development of this model are provided in **Appendix F**. **Table 3-41** compares the current crop acreage with the crop acres applied to the No Action Alternative.

The projected baseline (No Action Alternative) contains a higher number of acres in pasture and hay crops, fewer apple acres, and more pear and cherry acres. These changes are consistent with current trends in the district and reflect the transition from less profitable Red and Golden Delicious to other crops and apple varieties. Overall acreage devoted to orchard crops is projected to decline slightly from 2,535 to 2,515 acres. Acreages in minor crops and urban yards/gardens were held constant.

[68] Personal communication with Dan McCarthy, Okanogan County Pest Control, April 30, 2003.

Table 3-41. Comparison of Current Crop Acres with No Action Alternative Acres.

Crop	Current Acres	No Action Alternative
Hay	473	636
Pasture	870	970
Apples	1,586	1,467
Red Delicious	*660*	*185*
Golden Delicious	*287*	*98*
Other Apples	*638*	*1,184*
Pears	436	449
Cherries	107	213
Apricots	4	4
Peaches	5	5
Other Minor Crops	30	30
Young Trees	397	377
Urban Yards/Gardens	549	549
Fallow/Idle	321	76
Roads, Ditches, and Drains	255	255
Total	5,032	5,032

According to the Water Allocation Model used for this EIS, annual water diversions to OID average 15,745 AF from all supply sources and range between 13,149 and 19,201 AF. The Water Allocation Model allows OID to respond to reduced water supplies through short-term improvements in on-farm irrigation efficiency and increased pumping from the Shellrock Pump Station. According to the Water Allocation Model, these two actions allow OID to divert and pump adequate water supplies to fully meet crop irrigation needs in all model years for the No Action Alternative.

Based on data provided by OID, the variable cost (energy and O&M) of operating Shellrock averaged $40.19 per acre-foot pumped in 2001 and 2002. Under the No Action Alternative, pumping from Shellrock is estimated to increase over historic levels. Between 1987 and 2002, OID pumped an average of 1,733 AF annually from Shellrock. In comparison, the Water Allocation Model predicts that OID would pump an average of 2,414 AF from Shellrock each year. The estimated annual variable cost associated with this level of pumping is $97,021, compared to $69,642 historically. This increased level of pumping would result in somewhat higher assessment charges to district members due to higher water delivery costs. In this analysis, the increased pumping costs above historic levels are incorporated into the No Action Alternative as an increase in production costs. **Table 3-42** provides a summary of the cropping pattern, revenues, and returns estimated under the No Action Alternative.

Table 3-42. OID Crop Acres, Revenues, and Net Income, No Action Alternative.

Crop	Model Acres	Revenue per Acre	Costs per Acre	Net Income per Acre	OID Revenue	OID Net Income
Alfalfa	591	$767	$728	$39	$453,225	$22,831
Other Hay	45	$878	$847	$31	$39,232	$1,384
Pasture	969	$432	$420	$12	$418,766	$11,938
Apples	1,467	$5,308	$4,833	$475	$7,786,644	$696,318
Pears	450	$4,509	$4,308	$201	$2,029,066	$90,466
Cherries	213	$7,323	$5,843	$1,480	$1,559,743	$315,237
Apricots	4	[a]	[a]	[a]	[a]	[a]
Peaches	5	[a]	[a]	[a]	[a]	[a]
Other Minor Crops	30	[a]	[a]	[a]	[a]	[a]
Young Trees	377	[a]	[a]	[a]	[a]	[a]
Urban Yards/ Gardens	549					
Fallow/Idle	76					
Roads, Ditches, and Drains	255					
Total	5,032				$12,286,675	$1,138,173
Adjusted for Additional Pumping at Shellrock					$12,286,675	$1,110,795

[a] Crop revenues, production costs, and returns were not calculated for minor crops (apricots, peaches, and "other") and young trees. Acreages in minor crops were assumed not to vary under the alternatives and therefore were not explicitly modeled.

Under the No Action Alternative, annual revenues and net income to producers within the district are estimated to be $12,286,675 and $1,138,173, respectively. These revenues and net returns do not include minor crops or annual costs associated with young (non-bearing) fruit trees. Total net income is reduced to $1,110,795 after adjusting for the increased costs associated with pumping additional water above historic levels at Shellrock.

3.8.3 MITIGATION MEASURES

Each of the three action alternatives would result in increased pumping from the Okanogan River by OID, in order to offset lost water supply from Salmon Creek. Pumping would result in higher costs to OID for delivery of water for irrigation, both in terms of additional energy costs plus (depending upon alternative) capital investment and O&M for the pumps. In order to minimize the impact of these higher costs on OID, a distinct element of all three action alternatives would be for the public sector to cover additional capital investment, water right purchase, and pumping costs that would be incurred over and above the No Action Alternative. This section describes those mitigation costs.

Under Alternative 1, it is assumed that OID would not be required to pay any capital or operational costs associated with the Okanogan River pump above the pumping costs estimated under the No Action Alternative. The capital costs for the 80 cfs pump were estimated to be between $4.7 million and $7.0 million, depending upon whether or not the facility would be

designed to deliver pressurized water to all OID laterals.[69] Estimated annual electricity costs ranged from $92,000 to $350,000 using an electricity price of $0.0165/kwh.[70] Currently, the electricity price is $0.0285/kwh.[71] **Table 3-43** provides an estimate of the annual pumping costs from the proposed Okanogan River pump station using recent estimates of the costs of pumping at the Shellrock facility and average pumping volume estimated by the Water Allocation Model. Thus, the total mitigation costs would be the capital cost for the pump, plus an annual cost of $284,393.

Table 3-43. Anticipated Public Sector Mitigation Costs

Alternative	Estimated Capital Cost	Additional Pumping Cost ($/year)
1	$7.3 million	$284,393
2	$10.2 million	$202,062
3	$5.9 million	$107,620

For Alternative 3, the full cost of the water rights purchase has not been determined. However, the economic model estimates that a minimum annual payment of $251,647 would be required in order to induce water right holders to consider a permanent sale of the necessary quantity of water rights. This annual payment represents the net income that would have been earned by the district members had they continued to irrigate rather than participate in the water purchase program. In addition, the annual OID assessment for retired acres with water rights in the amount of $176,400 would be borne by the purchaser. Finally, additional pumping costs of $107,620 would be incurred. Thus, the mitigation costs associated with Alternative 3 would amount to about $535,668 annually. In order to provide a comparison with the other alternatives, the estimated minimum annual payment to irrigators and the OID assessment charges for the retired acres are capitalized in **Table 3-43** using a discount rate of six percent for a 30 year period. This discount rate represents a conservative estimate of the long-term real returns to irrigated crop production. The estimated capitalized cost of the Water Purchase Alternative is $5.9 million in addition to an annual pumping cost of $107,620 per year.

For Alternative 2, it is assumed that OID would not be required to pay annual costs associated with increased use of Shellrock and would also not pay any of the capital costs needed to upgrade the facility. The cost of upgrading the facility was estimated to be $10.3 million.[72] However, this cost is considered preliminary at this time. Additional pumping costs of $202,062 would also be an annual mitigation cost with this alternative.

3.8.4 UNAVOIDABLE ADVERSE IMPACTS

There are no unavoidable adverse impacts anticipated as a result of Alternatives 1 and 2, to the extent that the public sector absorbs mitigation costs as described in **Section 3.8.3**. There is an impact associated with fixed resources from the public sector being perpetually dedicated to this

[69] Dames & Moore, July 30, 1999, Joint Study on Salmon Creek: Draft Report.
[70] Independent Economic Analysis Board, May 25, 2001, Economic Review of Instream Water Supply Components of the Salmon Creek Project.
[71] Personal communication with Tom Sullivan, OID manager, June 2003.
[72] U.S. Department of the Interior, Bureau of Reclamation, April 2004. Shellrock Pump Station Improvements - Feasibility Study Report of Findings - Addendum.

Project as compared to projects elsewhere. For Alternative 3, the regional economy would absorb a loss in output in the amount of $4.1 million, loss in income of $1.8 million, and a loss of approximately 118 jobs, primarily in the agricultural sector. These losses are unavoidable and not mitigated, but represent only a small percentage of the agricultural sector and so are not considered significant. Several measures could be considered for reducing or minimizing the loss of jobs. A fund could be established to support job retraining for affected workers. Efforts could be made to minimize the number of labor-intensive crop acres that would be retired, or retirement could be targeted to the least productive land through incentives. Finally, efforts could be made to support continued on farm water conservation measures to reduce the number of acres that should be retired.

3.9 PUBLIC SERVICES AND UTILITIES

3.9.1 EXISTING CONDITIONS

3.9.1.1 Lower Salmon Creek

Analysis of existing public services and utilities is based upon information provided by the City of Okanogan and Okanogan County and visual observation of the Project area. Other service providers were contacted to determine the scope of their service with the Project area. The analysis is limited to services and utilities that lie all or partially within 300 feet of the centerline of the lower 4.3 miles of Salmon Creek.

The Lower Salmon Creek area includes a variety of public services and utilities. Primary service and utility providers include the City of Okanogan (water, sewer, garbage, parks, fire protection, streets and bridges, library, law enforcement – under contract to County Sheriff, land and shoreline use permitting), Okanogan County (roads and bridges, sanitary landfill), Washington State Department of Transportation (Second Avenue is State Route 215), Okanogan PUD (electricity and telecommunications), Okanogan Irrigation District (irrigation diversion and distribution facilities), Fire Protection District 3 (co-located with City of Okanogan), Qwest (telecommunications), Charter Communications (cable television), Hospital District 3 (Mid Valley Hospital in Omak), Television and FM District 1 (maintains repeater service), Lifeline Ambulance (a private emergency medial services provider) and NCI Datacom (a private wireless telecommunications company).

The City of Okanogan provides the greatest number of services and utilities within the 4.3-mile Project area. From its mouth upstream to First Avenue, Salmon Creek is straddled by public land owned by the City of Okanogan. The City has a well on either side of the Creek, a boat launch ramp and river overlook and Alma Park, a developed community park with play equipment, sports courts and an outdoor swimming pool. The first utility crossing is a 9-inch cast iron universal water main circa 1959. The water main is under the bridge along 2nd Ave. S. The sewer main is a 16-inch ductile iron pipe located along First Avenue South, between Man Hole MH(Man Hole)200 and MH210, about 35 feet downstream, and is buried approximately 5 feet.

From the First Avenue Bridge upstream the stream banks have been channelized and stabilized, partially through an Army Corps of Engineers flood control project and partially by adjoining

landowners in an effort to stave off erosion of property along the Channel. The next utility crossing, a 12-inch ductile iron water main inside a 24-inch casing, 40 feet long, occurs in the vicinity of the Second Avenue Bridge approximately 206 feet upstream above Fifth Avenue South. The water main is buried approximately 5 feet.

Upstream from Second Avenue to the Fifth Avenue Bridge the channelization/stabilization continues. The next utility crossing is a 6-inch cast iron water main circa 1960. The water main is located along Eighth Avenue South, and is buried approximately 5 feet.

Upstream from the Fifth Avenue Bridge to the Mill Street Bridge, the stream channel has not been channelized or stabilized. The next utility crossing is an 8-inch concrete sewer main located between MHK240 and MHK230 under the bridge, and is buried approximately 2½ feet deep.

From the Mill Street Bridge upstream to the City limits, water and sewer mains are confined to the public right-of-way within Mill Street, south of the stream and Monroe Street north of the stream.

There are four bridge crossings of Salmon Creek within the City. The bridges are located at First Avenue, Second Avenue, Fifth Avenue and Mill Street. The Mill Street Bridge is scheduled for replacement over the next twelve months (the existing bridge is under load restrictions). The new bridge, a cooperative project of the City of Okanogan with funding through the Washington State Department of Transportation, would allow for a wider stream channel and would be better aligned with the stream. In addition, the City has a small bridge over Salmon Creek in the vicinity of Salmon Springs that provides access from the County road to the springs.

The City provides a variety of services within its corporate limits. The City of Okanogan Volunteer Fire Department, with a paid chief and 27 volunteers, is based at the fire station adjoining City Hall at 235 Oak Street. The City Fire Department has a mutual aid agreement with Fire District 3 whereby they share volunteers, equipment and the City Fire Hall. This means that the entire Lower Salmon Creek Project Area is served through the combined efforts of the City and District. The City also provides a variety of parks and recreation facilities, with Alma Park and the Boat Launch Ramp and Overlook located adjacent to Salmon Creek.

Services and utilities provided by Okanogan County with the Lower Salmon Creek area are primarily roads and bridges. The Salmon Creek Road, Glover Lane and the Danker Cutoff are County Roads within the Lower Salmon Creek area. The County also maintains two crossings, the Stadler Bridge just below the intersection of Salmon Creek Road and Glover Lane and a box culvert upstream from the intersection of the Salmon Creek Road and the Danker Cutoff.

The Okanogan Public Utility District is the provider of electrical power and is beginning to deploy a fiber optic network in cooperation with several private companies. The PUD's network of easements and rights-of-way is also used by other telecommunications providers (Qwest, Charter Telecommunications, etc.). The PUD has nine crossings of Salmon Creek, all above ground.

Qwest, the area's primary telephone service, has buried phone lines along the Salmon Creek Road and Glover Lane.

3.9.1.2 Okanogan River Pump Station and Pipeline Route

These areas have a variety of public services and utilities. Primary service and utility providers include the City of Okanogan (water, sewer, garbage, parks, fire protection, streets and bridges, library, law enforcement – under contract to County Sheriff, land and shoreline use permitting), Okanogan County (roads and bridges, sanitary landfill), Washington State Department of Transportation (Second Avenue is State Route 215), Okanogan PUD (electricity and telecommunications), Okanogan Irrigation District (irrigation diversion and distribution facilities), Fire Protection District 3 (co-located with City of Okanogan), Qwest (telecomunications), Charter Communications (cable television), Hospital District 3 (Mid Valley Hospital in Omak), Television and FM District 1 (maintains repeater service), Lifeline Ambulance (a private emergency medial services provider) and NCI Datacom (a private wireless telecommunications company).

The Pump Station site lies entirely within the City of Okanogan while the pipeline route is primarily within the unincorporated area. The proposed pump station site is located adjacent to S.R. 215, which is not only a significant transportation corridor but a major utility corridor. The City has an 8-inch water main and the PUD a 7.620KV/13.20KV overhead distribution line along the western edge of the highway right-of-way and the City has a 12-inch sewer force main also in the right-of-way.

From S.R. 215 westward, the pipeline route is planned to run through an easement or right-of-way to Fourth Avenue North, a primitive road maintained by the City and County. The City has an 8-inch water main along Fourth Avenue N. that connects City Well No. 3 with the City's water system. This well is located in close proximity to the planned pipeline crossing of Fourth Avenue North. In addition to the PUD's line along S.R. 215, two others are affected by this portion of the pipeline route: a line crossing north/south approximately one-half of the distance between S.R. 215 and Fourth Avenue North; and a 7.620KV/13.20KV distribution line with fiber optic cable along the western right-of-way of Fourth Avenue North.

After the pipeline route crosses Fourth Avenue North, there are no utility issues along the route to the top of Pogue flat. From that point the route lies with the county-owned rights-of-way along the eastern edge of the Conconully Highway and northern edge of Glover Lane. The route also follows an existing pipeline easement that contains a 8-inch OID irrigation line. Other utilities along this route include a PUD line along the western edge of the Conconully Highway and a line and underground phone cable along the northern edge of Glover Lane.

3.9.1.3 Feeder Canal

The feeder canal route includes a variety of public services but very little in regards to utilities. Primary service and utility providers include the Town of Conconully (sewer, garbage, fire protection, streets and bridges, law enforcement land use permitting), Okanogan County (roads and bridges, sanitary landfill), Okanogan PUD (electricity and telecommunications), Okanogan Irrigation District (operates and maintains Feeder Canal), Qwest (telecomunications), Charter

Communications (cable television), Hospital District 3 (Mid Valley Hospital in Omak), Television and FM District 1 (maintains repeater service) and Lifeline Ambulance (a private emergency medial services provider).

The feeder canal lies within lands served by the Town of Conconully and Okanogan County. The utilities affected by the proposed Project include the North Fork Salmon Creek Road in the vicinity of the head gate and the Sinlahekin Road, both maintained by Okanogan County. The feeder canal crosses under Sinlahekin Road, which is also the right-of-way for a PUD line and the County's low pressure sewer main that serves the cabins on Salmon Lake.

3.9.2 PUBLIC SERVICES AND UTILITES IMPACTS

3.9.2.1 Alternative 1: Okanogan River Pump Station and Pipeline Route

Only water supply Alternative 1 impacts public services and utilities at the pump station site and along the pipeline route. The impacts to existing services and utilities would include an increased demand for power at the pump station site and utility interruptions while the pipeline is constructed and crosses existing City water and sewer mains and PUD distribution lines and Qwest phone lines.

3.9.2.2 Alternative 1: Feeder Canal Upgrade

Impacts to public services and utilities resulting from the feeder canal upgrade include a significant improvement in the OID's ability to divert and store water for its members and the temporary disruption of the sewer service to the Salmon Lake Area.

3.9.2.3 Alternative 1: Stream Rehabilitation

Impacts to existing public services resulting from the rehabilitation of lower Salmon Creek would primarily be disruptions caused by construction activities. No utilities would be moved or interrupted by the rehabilitation of the stream channel.

3.9.2.4 Alternative 2: Upgrade Shellrock Pumping Plant

This alternative would have less impact on public services and utilities use than Alternative 1 because it is an upgrade of the existing pumping facility rather than construction of a new one. The upgrade may increase power demand but the infrastructure is in place to provide the needed electricity. The impacts would include utility interruptions while the pipeline is constructed and crosses existing City water and sewer mains and PUD distribution lines and Qwest phone lines.

3.9.2.5 Alternative 2: Feeder Canal Upgrade

The impact would be the same as described in **Section 3.9.2.2.**

3.9.2.6 Alternative 2: Stream Rehabilitation

The impact would be the same as described in **Section 3.9.2.3**.

3.9.2.7 Alternative 3: Water Rights Purchase

The impacts to public services and utilities from the water supply alternative based on acquisition, through purchase or lease, of OID water rights would impact the OID through reduced demand for water and on the PUD with a corresponding reduced demand for electrical power. No impacts to other service and utility providers are anticipated.

3.9.2.8 Alternative 3: Feeder Canal Upgrade

The impact would be the same as described in **Section 3.9.2.2.**

3.9.2.9 Alternative 3: Stream Rehabilitation

There would be no impacts from stream rehabilitation with this alternative.

3.9.2.10 No Action Alternative

Lower Salmon Creek Vicinity

Under this alternative public utilities and services along Lower Salmon Creek and the pump station/pipeline route would remain relatively unchanged subject to changing economic conditions in the local area and utility and road projects planned by the City and/or County, PUD or other providers.

Feeder Canal Vicinity

Under this alternative the existing feeder canal would continue to be maintained in its current condition. Other services and utilities would remain relatively the same subject to changing economic conditions in the local area and utility and road projects planned by the Town and/or County, PUD or other providers.

3.9.3 MITIGATION MEASURES

3.9.3.1 Lower Salmon Creek Vicinity

Mitigation measures along Lower Salmon Creek would primarily be construction related to ensure minimum disruption to existing water, sewer, power and telecommunications customers.

Mitigation measures with the pump station and pipeline routes would be directly related to the scope and extent of construction. Construction of the pump station would require careful design,

engineering, and construction methods that reduce or eliminate impacts and interruptions of utilities. This is particularly important where the Alternative 1 pipeline route intersects the water main connecting a 550,000-gallon reservoir with the north end of the City's water system in the vicinity of Well No. 3. In addition, construction would necessitate crossings of S.R. 215, Fourth Avenue North, and the Conconully Highway. After construction, each roadway crossing would be returned to as near pre-project conditions as possible.

3.9.3.2 Feeder Canal Vicinity

The proposed feeder canal upgrade can almost be considered mitigation in its own right as the present canal is prone to leakage and has fallen into disrepair.

3.9.4 UNAVOIDABLE ADVERSE IMPACTS

There are no unavoidable adverse impacts to public services and utilities.

3.10 CULTURAL RESOURCES

3.10.1 EXISTING CONDITIONS

3.10.1.1 Introduction

This section provides background information and context on cultural resources in the project area, describes previously identified historic, archaeological, and ethnographic resources, and provides information about potential areas of sensitivity for archaeological and ethnographic resources. Chapter 27.53.060 RCW provides for protection of cultural resources on private and public lands in the State of Washington. Section 106 of the National Historic Preservation Act (NHPA), as amended, requires that any federal agency having direct or indirect jurisdiction over a proposed federal or federally assisted undertaking, or issuing licenses or permits, must consider effects on historic properties. This section describes the current condition of cultural resources in the Project area and the potential impacts of alternative actions to cultural resources.

Methodology

Information regarding previously recorded archaeological and historic resources within the Area of Potential Effect (APE) was obtained from OAHP records, including the National Register of Historic Places (NRHP) and the Washington Heritage Register. Investigators reviewed NRHP determinations of eligibility within the APE generated through prior Section 106 reviews, and a prioritization of areas for cultural resource discovery potential and sensitivity in the Okanogan Highlands (Mierendorf, 1981). The two main repositories for existing information consulted for this analysis included the BPA Collections Library in Portland, OR, and the OAHP, in Lacey, WA.

A BPA archaeologist and the Assistant State Archaeologist conducted an onsite visit in April 2003 to determine the APE of proposed alternatives and develop an overview of cultural

resources that may be present at the location of Project components (see **Table 3-44** for a description of the APE). An environmental protection specialist conducted an onsite visit in July to determine the history and current condition of the Okanogan town dumpsite. This visit was conducted in coordination with the Okanogan city planner. Interviews were conducted with nearby long-time residents of the town. The city planner provided information from city records. Information about Salmon Lake Dam was provided by the U.S. Bureau of Reclamation (BOR), which recently completed a Historic Archaeological Engineering Record (HAER) for the dam and associated structures. This section summarizes the results of these field visits and existing data records.

Agency and Tribal Consultation

BPA identified the Confederated Tribes of the Colville Indian Reservation (Colville Tribes) as the primary tribes with Ceded Lands and/or Usual and Accustomed Areas within the APE. The Colville Tribes are one of the sponsors of the Salmon Creek Project. BPA has held meetings with the Colville Tribes to scope and address tribal concerns relative to cultural and natural resources (water, fisheries, wildlife, and botanical) that could be impacted by the proposed Project (See Appendix G).

BPA met with the Colville Tribe History and Archaeology Department on two occasions and discussed the proposed APE. Discussions have also taken place with the Colville Tribe to provide a description of their Traditional Cultural Properties (TCP) in the area, however this information has not yet been obtained.

Following Section 106 regulations, BPA has notified the State Historic Preservation Office that the Project is an "undertaking" as defined in 36 CFR 800.16(Y). BPA obtained concurrence from the Washington SHPO regarding the APE for this project (Appendix G). Coordination with the SHPO would continue throughout the environmental review process, and would include requests for concurrence on NRHP recommendations, determinations of effect, and consultation on proposed measures to avoid or mitigate effects to historic resources.

The Pacific Northwest Office of the BOR owns the facilities associated with the Okanogan Irrigation Project. Alterations or additions to existing facilities have taken place in the past, which have required their own Section 106 consultations. As a cooperating agency on this Project proposal, BOR has been instrumental in providing information from recently completed cultural resource reviews and mitigation requirements on their facilities.

Area of Potential Effect

As required under NHPA, the Area of Potential Effect has been determined for all proposed components of this Project. The determination was made by BPA and concurrence provided by the Washington State Office of Archaeology and Historic Preservation. The dispersed geography of the components of the Project alternatives has resulted in six specific areas of potential effect as shown in **Table 3-44**. The table also shows the alternative for which the specific area is applicable.

Table 3-44. Areas of Potential Effect (APE).

APE	Project Component	APE Description	Alternative or Component
A	Lower Salmon Creek rehabilitation work from the confluence of Salmon Creek and Okanogan River upstream for 4.3 miles to the Okanogan Irrigation District (OID) diversion dam.	100 feet wide on each bank of Salmon Creek along entire length of component (4.3 miles).	Alternative 2
B	Proposed 80 cfs pump station located on the west bank of the Okanogan River.	An approximate area of 100 ft. x 100 ft., to include the area of bank shaping and armoring, an intake to be located on the bank, and a pump station structure.	Alternative 1
C	Upgrade of the Shellrock pumping facility to 35 cfs from the current use at 24 cfs.	The area immediately surrounding the pump station and intake location. Area immediately surrounding settling pond.	Alternative 2
D	Proposed new pipeline from the proposed pump station on the west bank of the Okanogan River to Diversion 2 of the OID.	15 feet on each side of the centerline of the designed alignment of the new pipeline.	Alternative 1
E	The Salmon Lake feeder canal replacement option of burying a pipeline along the current alignment of the canal.	50 feet on each side of the centerline of the current canal alignment.	Alternatives 1, 2, and 3
F	Proposed new pipeline from the Shellrock pump station on the Okanogan River to a sediment basin in the main canal of the OID.	15 feet on each side of the centerline of the designed alignment of the new pipeline.	Alternative 2

Source: Bonneville Power Administration, Washington Office of Archaeology and Historic Preservation, July, 2003 (except F)

Field Survey

The overall region of Salmon Creek/Conconully/Okanogan has been the subject of much historic and prehistoric investigation that offers generally relevant information. Preliminary joint field reconnaissance conducted by BPA and OAHP in April 2003 and a single, on-site visit by a BPA environmental protection specialist in July 2003 are the only site-specific investigation that has been done. This field work was conducted prior to the final determination of the APE and so was unable to provide comprehensive reconnaissance at that time. The subsequent APE determination now should enable the necessary cultural resource work to be completed. This information will be compiled into a Section 106 Technical Report prior to completion of the Final EIS.

As part of preliminary joint field reconnaissance conducted by BPA and OAHP in April 2003, additional actions and field work were jointly recommended to be accomplished prior to the publication of the Record of Decision for this Project:

Archaeological Resources

- Intensive pedestrian survey of the identified APE areas.
- Shovel test probes at the Okanogan pump station site and at any areas that would be disturbed by the proposed upgrade to the Shellrock pump station.

- Shovel test probes along any proposed pipeline near the town of Okanogan on banks, terraces, and landforms with less than 10% slope. Recommended spacing of test holes at 20 to 40 meter intervals. As an alternative to test probes, full cultural resource monitoring of all pipeline excavation on banks, terraces, and landforms with less than 10% slope would be appropriate.
- Historic documentation of the Salmon Lake Feeder Canal (HABS/HAER completed).
- Shovel test probes along those alluvial benches of Salmon Creek that would be affected by stream rehabilitation. Some benches have little soil deposition and should be considered to have a low probability of containing subsurface cultural resources.
- Avoidance of the historic Okanogan Town trash dump located along the north bank of Salmon Creek.

Additional Cultural Properties:

It is recommended that further discussions with the Colville Tribe be conducted to determine the location of any TCPs and to include any ethnographic information the Tribe is willing to share within this section or to be included within a Technical Report.

3.10.1.2 Historic Resources Overview

Early Fur Trading Influences

Fur trappers and traders were the first Euro-Americans to enter the territory in the vicinity of the Project area. For interior tribes, the fur trade era was between 1807 to 1843. The former date includes the year of the Corps of Discovery's (Lewis and Clark [1803-1806]) journey back from their epic expedition west to the Pacific Ocean. At that time Lewis and Clark met with "numerous parties of traders wending their way to the heart of the wilderness which these explorers [Lewis and Clark] had just left". The latter date (1843) is the year of the first great influx of Euro-Americans, often called the "great migration," to cross the Great Plains to Oregon and California (Bruce 2003).

Although the fur trade was a short-lived economic enterprise, it was the *only* one of importance between Euro-Americans and Indian peoples before 1846 in the Trans-Mississippi West. Its existence profoundly affected Indian peoples living in the Project area as it did indigenous peoples living elsewhere in the Trans-Mississippi West during those years. Moreover, the fur trade era influenced and hastened emigration and development patterns of non-indigenous peoples into western lands, and generally expedited economic and political gain by Euro-Americans throughout the Trans-Mississippi West.

Effects of the fur trade commerce typically influenced Indian peoples before actual contact with Euro-Americans took place. This happened through various means that lasted into the contact period. This included the introduction of European, British, and American trade goods that were passed on tribe-to-tribe, and, which in time, created a dependence by Indian people on such goods and the procurement of those goods, and that gradually led to a falling away of their own means of production of implements and ornaments of cultural importance.

A second, more pernicious pre-contact-Euro-American effect of the fur trade was the introduction of diseases, many of which were not formerly experienced by indigenous people. These diseases included smallpox, measles, malaria, and venereal disease. Native peoples had little or no resistance to these afflictions.

Despite disruption of their life ways through the introduction of trade goods and other Euro-American influences, and decimation of their people through disease transmitted to them by non-indigenous people, Indians were, and continued to be, essential to the successful operation of the fur trade in the Trans-Mississippi West until the demise of the fur trade as a lucrative enterprise in the 1840s. In large part, Indians "were themselves the producers; that is, they trapped the beaver and hunted the buffalo, whose skins they exchanged for whatever the white men brought into their country" (Bruce 2003).

Establishment of forts, posts, or houses as they were variously named provided for trade and protection of traders and trappers. In 1811, David Stuart, an agent of John Jacob Astor's Pacific Fur Company, established Fort Okanogan about half a mile from the confluence of the Okanogan River with the Columbia River. Chosen to serve as the northern outpost of Astor's fur empire, the fort was the first American settlement in what later became the state of Washington. Fort Okanogan was later taken over by the Hudson's Bay Company when the Pacific Fur Company moved to another site one mile southeast of the fort. Trapping and fur trading were to remain the primary industries in the Okanogan region up through the mid-1800s. Thereafter, the industry slowly declined as otters and beavers were subject to overkill, causing fur stocks to be depleted.

Fort Okanogan was sited on a major north-south trail used by Indians. This trail, which became known as the Hudson's Bay Brigade Trail, was used to trade furs along a network of outposts in southern interior of British Columbia and northern Washington between 1826 to about 1845. Each winter the furs traded at the posts in the northern interior were brought to Fort St. James, the headquarters of New Caledonia, with dog sledges. As soon as the ice broke up, generally about April 20, boats loaded with cargoes of furs started from Stuart Lake to pick up the furs from Fort Fraser, Fort McLeod and Fort George (now Prince George.) At Alexandria, the horse brigade started out for Fort Okanogan, sometimes accompanying and sometimes following the Thompson's River brigade, which was taking out the furs of the Kamloops district. There was a general rendezvous of the Thompson, New Caledonia and Colville traders at Fort Okanogan, and then a senior officer took charge of the united brigade for the boat run to Fort Vancover (Wilson 1966).

Mining

Many prospectors were busy along the waters of the Columbia River and on both sides of the Canadian boundary in the late 1850's. Reports of gold in the Thompson and Fraser rivers in British Columbia in 1856-57 produced the great "rush" of 1858 to those streams. Prospectors passed through the Okanogan Valley on their way to the Cariboo gold fields of British Columbia. The route was sometimes referred to as "The Okanogan Trail.", but its extension into the Cariboo mining district of British Columbia caused it to become labeled "The Cariboo Trail," and it is best known by that name. The Cariboo Trail was more of a route than a trail. The miners and cattleman who used it sometimes came up one side of a river or lake, sometimes the other. They cut across open country freely (Wilson 1999), but generally traveled to the east of the project area through the Okanogan valley.

The late 1880s and early 1890s saw renewed economic development in the region with the onset of railroad construction in the county. The Pacific Northern and Great Northern railroads began their inroads into the county in 1881 and 1892, respectively. As rail construction reached further into the region's interior, an increasing number of settlers, as well as necessary goods and supplies, were afforded easier access into the county. However, it was the discovery of gold by Chinese railroad laborers in the 1880's that precipitated the steady influx of newcomers, mostly prospectors from the east and Midwest (Conconully Chamber of Commerce 2000).

With the flurry of gold rush settlement came the proliferation of mining towns such as Conconully and Ruby in the county's central mining district, each of which claimed county seat for a time during this period. While most newcomers came in search of gold and eventually picked up and moved farther west, many found the region to their liking and chose to settle. Their efforts were aided by the opening of the Columbia and Moses reservations to permanent homesteading and mining in 1886.

Known Historic Resources

An old city dump is located less than one-mile northwest of Okanogan, Washington. The site lies on both banks of Salmon Creek. The majority of the property on which the dump is located is owned by the City of Okanogan, although it may extend to an adjacent private property. The stream channel in the vicinity of the dumpsite has experienced downcutting, water table decline, and loss of riparian vegetation. It continues to experience stream bank failure during high stream flow events. Remnants of an old wooden bridge that traversed the creek and allowed access to the east bank still remain. The actual dumpsite covers approximately 6 acres of the City property.

Accounts of dump operations go back to at least 1941. The City dump was used by farmers, residences, and businesses from the local community. Regular deposits were made by the city dump truck. Dumping occurred at random locations throughout the site. Once an area was full, the City would burn the debris and then cover and level it with native fill taken from the hillside to the east. Dumping occurred on both sides of the creek and in some instances right up to the creek. The site was closed in the mid-1970s.

Soil surfaces within the dump are speckled with broken and melted glass, tin cans, and small amounts of other solid waste. There are isolated areas where lenses of debris can be seen in the deep cut bank sections (10 feet or greater) of the creek. The debris lenses are located in the upper one half section of the bank cut, which demonstrates that the severe bank cuts and subsequent exposure of solid waste are the result of high spring or winter flows. There were small amounts of scattered debris located along the bottom of the creek bed. It is likely there are additional historic artifacts buried within the site.

There currently is one historic building within the town of Okanogan, the Okanogan Post Office. Other historic buildings may be located within the towns, however, their locations (and their areal relationship to the several alternatives and components of this Project proposal) are not fully identified as they are not found close to any elements of any of the proposed alternatives.

Within the overall Okanogan Irrigation District area, Okanogan Project facilities have been reviewed for NRHP eligibility. The Salmon Lake feeder canal and dam were built in 1920 as part of the Okanogan Project. Both structures have been determined to be eligible for listing on the National Register of Historic Places (NHRP) because the Salmon Lake Project was one of the first irrigation projects undertaken by Reclamation and the first authorized in Washington State. Conconully Dam has already been placed on the NRHP. **Table 3-45** summarizes the NRHP status of Okanogan Project facilities.

Table 3-45. Eligibility Status of Okanogan Project facilities for National Register of Historic Places.

Project Component	Eligibility Status
Conconully Dam	Listed on NRHP 9/6/74
Salmon Lake Dam	Determined eligible 11/29/84, HAER completed 3/03
Salmon Creek Diversion and Cipoletti weir	Determined eligible 11/29/84, HAER completed 3/03
Hi & Low Line Main Canals	Determined eligible 11/29/84
Patrol House (demolished)	Determined not eligible
Robinson Flat Pump Plant	Determined eligible
Duck Lake Pump Plant	Determined eligible
Power Plants—Drops 1 & 2	Determined eligible
Distribution laterals	Determined not eligible 9/5/84

Source: Lynne MacDonald, Archaeologist, US Bureau of Reclamation, electronic correspondence, 6/13/03

3.10.1.3 Prehistoric Resources

Regional Overview and Context

Organization of Tribes

Ray (1933 and 1936) asserted the Plateau's uniqueness as a definite culture area based on linguistic groupings, subsistence orientation, and intergroup socio-economic relationships. Though his extensive field research over simplified certain behaviours and cross-cultural differences, he satisfactorily demonstrated that the aboriginal Interior Plateau was essentially a "single social system".

According to Ray, in this part of the aboriginal Plateau, villages often joined together as larger political units, called bands. Two types of bands were recognized by Ray (1939, in Ross 1968).

> *One [type of band] is merely the embryonic tribe developing under indirect influence from the Plains. Its most objective marks are common action in war and the recognition of a common war chief. Subjectively it involves a weakly developed national feeling and pride in the strength of unity. The tendency [towards this type] is…observed among the Wenatchi, Columbia, Spokane, Palus, and Kalispel. The second subtype is characteristic of the western Plateau of Canada [including the Nespelem's neighbors to the west, the southern Okanogan]…. Here the band is merely one unit of an expanded autonomous local group. Instead of the tiniest settlements maintaining strict independence, as among the Sanpoil, a*

small number within a relatively small range join together in a mutually advantageous union. In this case the group is looked upon in the same light as a large village. It is essentially a union of domestic and peacetime order.

Given these variations in Plateau ethnic group organization between groups and even, over time, within groups, designating territories of Plateau ethnic groups can be difficult.

The exactitude with which boundaries are drawn varies greatly…. Where the village is the political unit boundaries are automatically exact so far as the settlements themselves are concerned, but intervening and tributary territory must be divided arbitrarily, or be used in common. In the typical organization of the Plateau, territorial segmentation is highly specific along river courses, but hunting territory is invariably used in common by a number of villages or small bands…The actual line of division [between villages] is seldom geographically intermediate, but is determined with regard to fishing grounds…Hunting and gathering grounds, on the other hand, cannot be so neatly parceled out…It must be emphasized at this point that these distinctions and differences are largely formal and structural, not economically functional. (Ray 1939, in Ross 1968)

Early ethnographies also identify underlying problems associated with territorial lines of ethnic groups in the Plateau.

Teit (1930) described them partly by territory and partly by speech. He subdivided the Okanogan ethnic group by "tribes" as the Okanogan proper, the Sanpoil, the Colville, and the Lakes. Later studies revealed that the Okanogan proper were divided into two regional distinct groups, the northern Okanogan of Canada and the Sinkaietk of the Okanogan River in Washington. The Sinkaietk, as we have observed, were comprised of many localized, nearly autonomous villages, but they have not been clearly differentiated from the Wenatchi, Methow, and Moses-Columbia on any but dialectal grounds (Spier 1936). Walters (1938) compared the groups on a purely territorial basis. Spier observed that "dialectic and territorial affiliations systematically relate to the larger groupings …[However,] one must not assume that dialect and tribal [territorial] groupings were always one and the same thing" (1936). (Ross 1968)

Few if any ethnic groups in the aboriginal Plateau would have recognized the boundaries designated by anthropologists. With the possible exception of the eastern groups like the tribalistic Nez Perce and Spokane who had experienced substantial Plains influence, Plateau inhabitants were not much concerned about ethnic group boundaries (Ross 1968).

Tribal Culture

Walker (1967, in Ross 1991) succinctly delineated the principal elements of ethnographic Plateau culture as:

- *Riverine settlement patterns.*
- *Reliance on aquatic foods as a major element of their diet.*
- *A complex fishing technology.*
- *Mutual cross-utilization of subsistence resources with other ethnic groups of the Plateau.*
- *Extension of kinship ties into other ethnic groups of the Plateau through systematic intermarriage.*

- *Extension of trade links throughout the Plateau by institutionalized trading partnerships.*
- *Relatively simple political organization.*

Salmon was central to the economy, cultural, and spiritual lives of the Plateau people. The bountiful salmon and steelhead runs of the Columbia River provided the Plateau people with one of their main subsistence resources. Salmon also occupied a central place in their cultural and spiritual life. Each tribe had a narrative of how, in an earlier, "mythological" time, the most powerful being, Coyote, brought salmon to the people. The people eagerly awaited the first arrival of fish from the ocean in the spring, and marked the first catch of the season with five days of ceremony and elaborate ritual behavior. In practicing the first salmon ceremony, the people assured the yearly return of the fish – both by following the laws laid down by the Creator, and by allowing sufficient fish to escape to spawn the next generation. Nineteenth century Euroamerican visitors to the Plateau described with awe the tens of thousands of pounds of fish harvested and prepared by the Indians at their principal fisheries (Ortolano et al. 2000).

Salmon and other fish were caught in nearly all the rivers, streams, and lakes in the region. Each tribe had its own fishing locations, and also shared in the harvest at the large intertribal fisheries, following the anadromous fish in their course upriver. The tribe that controlled a particular fishery appointed a salmon chief to oversee the harvest, distribution, and proper observance of ritual. In most years there was a surplus that could be traded for items and materials not found in their own territory, such as shells and baskets from the coast. Games, horse racing, gambling, and trade took place at the camps surrounding the fisheries (Ortolano et al. 2000).

Salmon nourished the Indian people physically, providing one-quarter or more of the caloric needs for most of the Plateau tribes. The annual salmon ceremony and the salmon stories told throughout the year were central to spiritual life, they reflected the reverence native peoples held for all life forms. The distribution of fish to all members of the community and to all visitors reinforced core cultural values of egalitarianism and generosity. The intertribal gatherings that accompanied the salmon harvest promoted reciprocal and peaceful relationships across the Plateau (Ortolano et al. 2000). The tribes were guided in all their choices and relationships by certain well-defined beliefs and values. Emphasis in education, training, religion, and all social and political action, was strongly placed on this system of values. The responsibilities of chiefs and other leading men were primarily the support of these principles. Issues and matters of a material nature were of distinctly less importance (Ray 1977).

Land Use – Subsistence and Settlement

The most significant writing of mutual cross-utilization of economic resources in the Interior Plateau is Walker's (1967) work, which firmly established the importance of dependence of Plateau peoples upon fishing and root gathering during the aboriginal and early historical periods (Ross 1991).

> *Logistically, the winter location reflected ease of water travel and communication, driftwood, certain hydrophytes, availability of particular animals, and weather. During the winter peoples lived mostly on stored foods and the occasional foray to hunt or fish, accomplished individually or with a small group.*

Winter residence was an often semi-subterranean conical lodge of pole covered with sewn tule mats, and was usually occupied by one or more extended families. Double layers of mats and banked earth provided a comfortable environment. Smoke from heat and cooking fires was vented by a "long appeture in the middle of the roof (Teit 1927). Large communal lodges were also constructed and the oblong cedar bark lodge was large enough to house as many as four families (Teit 1927). This structure was sometimes used throughout the year.

Other structures in the cultural landscape were women's menstrual huts of conical construction from cedar bark, old tule mats, and sewn skins. An important structure used almost daily throughout the Plateau was the sweathouse. This dome-shaped low structure was constructed by bending willow and covering with skin, bark, or old tule mats. Permanent sweathouses were further covered with overlaid sod or earth. A sweathouse, according to size, would accommodate three to eight individuals who used the structure and its paraphernalia for spiritual purification, physical cleansing, socialization, social control, and on occasion for curing.

Winter was a time for socialization, story-telling, trading, games and gambling, courting, the maintenance and manufacture of tools and weapons, curing ceremonies, and certain important rites of intensification which were important to the general welfare of the participants.

Briefly, summer camps tended to be located at major food resource sites, and reflected the need for sharing technologies when mutually exploiting a common resource. This was particularly true for fishing stations as large numbers of people from different groups converged to exploit a channeled migratory food.

Root digging and berry collecting camps in the spring were invariably relatively small since little if any cooperation is required in gathering plant foods. With the exception of the occasional berdache, women's camps were occupied by women and young children when digging roots. Late summer and early fall camps, often on higher elevations, had no division of labor by sex as men would frequently spend the day deer hunting and women collecting, with both sexes sharing the camp as extended families.

[Hunting, fishing, and gathering] delineated the annual round into three major phases (Keeler 1973); these activities tended to overlap with one another and, consequently, articulated to form a complete annual cycle of resource exploitation (Liljeblad 1972). Each economic complex exhibited its own particular technology of predation and gathering, division of labor, location of subsistence, supernatural ritual, storage techniques, and even patterns of distribution. (Ross 1991)

Ross (1968) discusses two major types of settlements – the large winter village and the smaller summer camp – that existed in the aboriginal Plateau. The winter village location was often determined by fuel, topography, and relative warmth. The summer camp location was determined largely by the availability of fish, game, and roots. Ross described this seasonal round:

As soon as the fish season is over, the Indians again withdraw into the interior or mountains, as in the spring, and divide into little bands [camp groups] for the purpose of hunting the various animals of the chase…The Indians, after passing a month or six weeks in this roving state congregate into larger bands [villages] for the purpose of passing the winter on the banks of small rivers, where wood is plentiful. (Ross 1849, in Ross 1968)

Far more mobile than the Colville, the Lakes were canoe-oriented rather than horse or foot oriented and placed a greater emphasis on hunting than fishing or plant gathering. The Colville subsisted mostly on fish, while their northern neighbors depended equally on fishing, hunting, and gathering. The Colville had four great hunts: in spring for deer and sheep; in late fall for deer, sheep, elk, and bear; in midwinter for deer; and in late winter for sheep. Deer ceremonialism and ritual feasting has been reported (Ackerman 1996).

The catching of salmon and the manufacturing and care of fishing equipment was usually the job of men, while the women were responsible for butchering the fish and preparing it for winter storage by means of sun-drying and smoke-drying. In 1866, a government official among the Colville estimated that their diet was largely comprised of salmon, most of which was caught at Kettle Falls. Chance (1973) has estimated that salmon made up 50% of the Colville diet. Salmon fishing at communal sites such as Kettle Falls was under the direction of a salmon chief. This person performed a ceremony to mark the catch of the first salmon, a ritual that symbolized the people's dependence on the annual salmon harvest (Ackerman 1996).

Each man got his turn at the fishing stations, and each woman received a share of the catch to dry for winter use. Mourning Dove, born in 1888 and the granddaughter of a Colville chief, wrote: "Everyone got an equal share so that the fish would not think humans were being stingy or selfish and so refuse to return (Miller 1990)" (Ortolano et al. 2000).

First-fruits and first-roots ceremonies were held in the spring to thank the spirits of the plants for the return of the crop. Dancing and feasting were central components of these rituals. Sometimes entire families participated in harvesting plant foods, although it was generally the task of women. The digging grounds and berry-picking patches were not considered either village or group property, and although the women worked together, each kept her own harvest. Many plant foods were stored for winter consumption (Ackerman 1996). The Sanpoil would periodically join with other Plateau tribes for a buffalo hunting trip to the Plains, but since only the buffalo hides were brought back to the Plateau the meat could not be considered an essential part of the annual diet (Ray 1932).

The Sanpoil had three kinds of residences, the winter mat house, the semi-subterranean lodge, and the summer mat lodge. Additionally, there was a mat hut used when traveling, a menstrual lodge, and a sweat lodge. In post contact times, the canvas-covered tipi replaced the mat hut for summer use. The semi-subterranean lodge is the older housing type and was falling into disuse in protohistory. The winter mat lodge was about sixteen feet wide, but varied in length. It could house two to eight families (Ray 1933).

If a death occurred in the winter, all parts of the house were burned except the mats. Every winter house was taken apart anyway, but the poles were cached. The poles were not used again for a house, but the mats were reused. For rebuilding a winter house, a new location was sought, perhaps in the same general vicinity, very likely on a clean site without the debris that commonly collected around dwellings. Mats were reused in temporary huts too. At the fishing grounds, the summer mat houses were rectangular flat-roofed structures. It housed several related families (Ray 1933).

Establishment of the Colville Reservation

The first Colville Reservation was established by executive order on April 9, 1872. The Executive Order states the intention to place the Methow (determined at the time to number 316), Okanogan (n=340), Sanpoil (n=538), Lake (n=230), Colville (n=631), Kalispel (n=420), Spokane (n=725), Coeur d'Alene (n=700), and "such other Indians as the Department saw fit to locate" there for a total population of about 4,200. It was a large reservation, bounded on the south by the Spokane River, on the west by the Columbia River, on the north by the International Border, and on the east by the Pend Oreille River and the Idaho State border.

However, within three months a second executive order countermanded the first and changed the boundaries moving the reservation west of the Columbia River. By excluding the land east of the Columbia River, the new reservation also effectively excluded several of the tribes placed on the original Colville Reservation, namely the Spokane, Pend d'Oreilles, and Coeur d'Alenes. The new reservation consisted of 2.9 million acres of the heart of the Okanogan highlands, a rocky, dry landscape. This land was not as productive as that of the original reservation, with far less acreage available for the self-sustaining land-use practices insisted upon by the Indian agents. The government intended assimilation of the natives to Euroamerican lifestyles in part by implementing an agricultural lifeway, but the land available was generally unsuited to these practices (Ackerman 1996).

Further, gathering groups like the Chelan, Entiat, and Methow onto what was homeland of the southern Okanogan, Lakes, Colville, Sanpoil, and Nespelem tribes was considered an intrusion and added to the already tense atmosphere. In an attempt to resolve the trouble created, a separate Columbia Reservation was created through executive orders in April 1879 and March 1880 through agreement with the Columbia's powerful headman Chief Moses. By 1883, settlers had applied pressure to obtain land on the Columbia Reservation that ultimately led to its being returned to public domain in 1886. By 1884, Moses and most of the people in the four tribes of the Columbia confederacy had moved to the Colville Reservation (Lahren 1998), however it took military intervention to force the Entiat and Chelan onto the reservation. In 1885, the Chief Joseph (Wallowa) band of Nez Perce were allowed to return from their forced placement in the Indian Territory, and being unwelcome on the Nez Perce Reservation were allowed to settle on the Colville Reservation. This created additional conflicts as the Nez Perce were still remembered as enemies of many of the other tribes already on the Colville Reservation. The Palouse people had included the northern Columbia Basin in their annual round in late prehistory and many had drifted to the Colville Reservation as staying in their traditional territory along the Snake and Palouse Rivers became untenable.

Social and cultural turmoil reigned on the Colville Reservation during the early 1880s as their daily lives were impacted by the events described above and below including:

> *The creation and the quick termination of the neighboring Columbia-Moses reservation; the Homestead Act; increased alcohol consumption; Euro-American religious beliefs (which led to the burning down of the Chelan mission while the Jesuit missionary was absent); encroachment on the reservation, which caused hostilities including murder; and various Unites States government actions, including the placing of the unrelated Joseph Nez Perce non-treaty political prisoners in the same vicinity as the Sanpoil and Nespelem pacifists in 1885. (Reichwien 1988).*

In 1892, the Colville Reservation was reduced by approximately half to about 1.5 million acres as pressure from mining interests led the U.S. government to purchase the north half of the reservation. Inter-tribal strife on the reservation was further aggravated since many of the tribes felt that Moses and the Nez Perce had arranged the sale of the land. The remaining south half of the reservation was allotted in 1906, and then opened for homesteading in 1916 (Lahren 1998).

Construction of the Grand Coulee Dam devastated the way of life of the upper Columbia River tribes. In the 1930s most of the Colville people lived along rivers. The loss of anadromous fish, destruction of wildlife habitat, loss of access to gathering grounds, and loss of prime agricultural lands and homes eliminated the economic base of many members of the Colville and Spokane reservations. The Colville Tribe later estimated that the reservoir displaced 2,000 of its members (Ortolano et al. 2000). Inundation of the river valleys above the dam took much of the best reservation farm land, and forced half or more of the Colville tribe's population and a number of Spokanes to move from their homes with minimal compensation. Grand Coulee Dam severely damaged the physical and spiritual health of tribal members throughout the region (Ortolano et al. 2000 – final report annexes).

Known Prehistoric Resources

Little is definitively known about prehistoric cultural resources within the overall Project area. Field analysis, as recommended above, should identify what, if any, such resources may be present.

Potential Prehistoric Resources

The region encompassing the Salmon Creek Project has received significant cultural resources attention over the years. From this work it is possible and appropriate to develop certain generalizations about the types of prehistoric resources that would be expected to be present and about the types of landscapes and locations where such resources might be found. The types of sites that have the potential to be present in the project area include habitation sites, hunting camps, fishing stations, tool procurement areas, or ritual sites. These potential areas are described in more detail below.

Habitation sites often hold the potential to yield information about prehistoric adaptations and settlement patterns and thus many of these sites would be considered potentially eligible for inclusion in the NRHP. Archaeological sites containing housepit features are generally thought to represent a more sedentary lifestyle. Housepit features have the potential to yield information on aspects of human behavior including technology, resource procurement, subsistence and adaptation strategies, trade networks, and social stratification. Housepit sites are generally documented along the river shore and on islands (Greengo 1986). Intact datable materials, the preservation of floral and faunal remains on structure floors, variations in housepit design and orientation, and the presence of associated or subfloor features are all important contributing aspects involved in the investigation of habitation structures.

Another type of habitation site is the open camp or small habitation site. These types of sites do not generally exhibit specific evidence for habitation structures although some form of temporary structure may be suggested by the varied artifact content of occupations at these sites. Small habitation or open campsites are thought to represent temporary occupation by small groups of

people at resource procurement or processing camps. That temporary structures may not have left archaeological evidence of their presence at sites is also an important consideration in documenting subsistence and settlement patterns within the Project area. These types of sites may contain significant information in regards to resource procurement and processing activities through the potential preservation of floral and faunal remains, and in the types and stages of lithic materials left at these locations. These sites may yield important information for National Register evaluation if they contain intact stratigraphic deposits and preserved materials.

Procurement of natural resources such as toolstone material, fish, freshwater aquatic species, plants for food, medicine, or other household needs, mammalian species, or avian species are generally considered the types of activities associated with resource procurement and processing sites. Hunting camps or stations will generally include specific tools, faunal remains, and lithic debitage associated with procurement and processing of animal remains. The environmental setting of hunting camps may include topographic or man-made features associated with hunting blinds, precipices, ridges, rock alignments, or canyons that would have been used to procure game species. Projectile points, chopping tools, scraping tools, hammerstones, utilized flakes, and anvils may be anticipated artifacts associated with hunting stations. Fishing stations may contain features such as boulder aggregations, shallow depressions, or other cobble features. Net weights, grooved notched cobbles, numerous utilized flakes, stone points, and bone tools are anticipated artifacts associated with fishing camps. Plant processing sites may be recognized by features such as roasting pits or bedrock mortars and by artifacts such as grinding implements. These types of resource procurement and processing sites are important because of their potential to yield information about prehistoric subsistence strategies and cultural adaptations that occur through time due to variations in climate conditions and societal preferences for various resources.

Toolstone raw material procurement and processing sites are evidenced by the presence of a variety of debitage stages, the presence of cores, blanks, the predominance of primary or decortication flakes at quarry sites, hammerstone, flaked cobble scatters, broken tools and projectile points, and possibly discrete knapping areas within other sites. These scatters are often associated with natural outcrops of raw material, some of which is toolstone quality. The analysis of lithic materials may reveal attributes of specific tool reduction techniques or possibly provide information on complete diagnostic stone tools. Toolstone quarry areas may provide additional information on group mobility patterns, trade networks, travel routes, and be related peripherally to other seasonal round activities. The presence of non-local raw materials and the reduction stages of lithic debitage associated with non-local toolstone materials also may provide important data related to trade networks and exchange systems as well as to types of raw material preferred by specific groups or individuals as well as to tool production techniques using a variety of raw toolstone materials.

Ritual sites can include cairns, rock art, burials, and cemeteries. These property types are associated with religious and ceremonial activities that necessitate tribal involvement with any investigations and should be treated with care and sensitivity. Ritual properties are important not only because they represent physical manifestations of spiritual values of prehistoric peoples but also because they are important culturally and spiritually to modern Native Americans. Ritual sites may be considered significant under more than one NRHP criterion factor and thus care needs to be used not only in correctly identifying cairns from modern property markers or talus pits associated with burials as opposed to those that may have been used for storage facilities.

3.10.1.4 Evaluation Criteria

The description of impacts to cultural resources uses the following definitions for potential discovery of cultural resources and likelihood of impact due to Project components.

Areas with high sensitivity include:

- Banks, terraces, and landforms with slopes less than 10 percent on the first two benches above the Okanogan River.
- Above-ground activities near historic structures.
- Alluvial benches in the lower reaches of Salmon Creek.

Areas with moderate sensitivity include:

- All landforms with slopes greater than 10 percent in the vicinity of the first two benches above the Okanogan River.
- Cobble benches with minimal soil deposition along Salmon Creek.

All other areas not described above are considered low sensitivity.

3.10.2 CULTURAL IMPACTS

3.10.2.1 Alternative 1: Okanogan River Pump Station and Pipeline Route

The location of the proposed pump station is immediately adjacent to the Okanogan River, and has a high likelihood of discovery of cultural resources. This area is likely to have a high density of prehistoric use and is in a zone of high sensitivity to impact (Mierendorf, 1981).

The new pipeline route from the proposed pump station on the west bank of the Okanogan River crosses State Route 215 from the pump station site and proceeds over flat, undeveloped land. It then rises up a 25-percent grade to Pogue Flat. It continues north along Conconully Road and west on Glover Road to the Diversion 3 pump station, then crosses orchard land to terminate at Diversion 2. Approximately 85 percent of the route lies on Pogue Flat, which has a 1.5 percent grade. Most of this route would have a moderate to high sensitivity to disturbance. Between the river flat and Pogue Flat is a narrow, old river terrace, which has a historic housesite on it, and is a high probability area for historic and prehistoric remains.

This alternative would increase stream flows in Salmon Creek. Impacts could include an increase in streambank erosion in portions of the creek sensitive to higher flows. This could have the potential of unearthing cultural resources at a faster rate than they would be without the increased stream flow. The only difference between this alternative and the No Action Alternative is the shortened timeframe for the effects of erosion to take place within the floodplain and streambanks of Salmon Creek.

3.10.2.2 Alternative 1: Feeder Canal Upgrade

Reconstruction of this canal would alter it from its current condition and remove a portion of the canal and replace it with a pipeline to improve operations and efficiency. For approximately three-quarters of the length of the canal, the existing alignment would be used; the remaining quarter of the existing alignment would not be followed in the upgrade (see Section 2.2.2). Because the canal was determined eligible for the NRHP in a previous study, A Historic American Engineering Record (HAER, March 2003) has been completed for the Salmon Lake Dam, including this canal. This documentation was considered mitigation for construction activities conducted at Salmon Lake Dam in 2000-2002. No further work related to the canal as a cultural resource is needed.

3.10.2.3 Alternative 1: Stream Rehabilitation

The mouth of Salmon Creek is thought to be an area used as a prehistoric fishing camp and winter residence area, and therefore is expected to have a high potential density of cultural resources. Lower Salmon Creek above the mouth and first terrace was a winter residence area, which is expected to have a moderate to high density of cultural resources (Mierendorf, 1981). Overall sensitivity of land use zones range from high on the Okanogan streambank to the first terrace to moderately high along the lower Salmon Creek drainage. Rehabilitation work at the mouth of Salmon Creek would have a moderate to high likelihood of unearthing or disturbing cultural resources.

3.10.2.4 Alternative 2: Upgrade Shellrock Pumping Plant

The location of the proposed additional work is immediately adjacent to the Okanogan River, and has a high likelihood of discovery of cultural resources. This area is likely to have a high density of prehistoric use and is in a zone of high sensitivity to impact (Mierendorf, 1981).

The new pipeline route would branch off the existing pipeline just east of Pogue Flat. It continues due west across Pogue Flat following an existing dirt road. Approximately 90 percent of the route lies on Pogue Flat, which has a 1.5 percent grade. Most of this route would have a moderate to high sensitivity to disturbance.

This alternative would increase stream flows in Salmon Creek. Impacts could include an increase in streambank erosion in portions of the creek sensitive to higher flows. This could have the potential of unearthing cultural resources at a faster rate than they would be without the increased stream flow. The only difference between thies alternative and the No Action Alternative is the shortened timeframe for the effects of erosion to take place within the floodplain and streambanks of Salmon Creek.

3.10.2.5 Alternative 2: Feeder Canal Upgrade

The impacts would be the same as described in Section 3.10.2.2.

3.10.2.6 Alternative 2: Stream Rehabilitation

The Conceptual Rehabilitation Plan for Lower Salmon Creek (June 2002) states that the segment of stream in the vicinity of the town dumpsite requires substantial channel reconstruction, localized bed or bank stabilization, reestablishment of riparian vegetation, and year-round moisture to sustain it. Any restoration activities within the vicinity of the Okanogan town dump site would likely expose debris contained within the dump, however, exposure to such debris is likely to be encountered only in isolated areas of the site. If the site was used from the 1940s to the 70s, and the material in it was regularly burned, there are not likely to be significant artifacts still present. If the dump was used earlier in the 20th century, there might be some materials of interest, but if they were burned and pushed around, they are not likely to be very significant. If the dump was used in the 19th century, there might be some significant materials there. Avoidance of disturbance to the area in the vicinity of the town dumpsite is recommended, however, some armoring of the bank to prevent further erosion may be necessary.

The mouth of Salmon Creek is thought to be an area used as a prehistoric fishing camp and winter residence area, and therefore is expected to have a high potential density of cultural resources. Lower Salmon Creek above the mouth and first terrace was a winter residence area, which is expected to have a moderate to high density of cultural resources (Mierendorf, 1981). Overall sensitivity of land use zones range from high on the Okanogan streambank to the first terrace to moderately high along the lower Salmon Creek drainage. Rehabilitation work would have a moderate to high likelihood of unearthing or disturbing cultural resources.

There is a moderate to high likelihood of prehistoric artifacts being present within the area that would be impacted by rehabilitation activities. Some benches were noted to have little soil deposition and should be considered as having a low probability of containing subsurface cultural

3.10.2.7 Alternative 3: Water Rights Purchase

This alternative would increase stream flows in Salmon Creek. Impacts could include an increase in streambank erosion in portions of the creek sensitive to higher flows. This could have the potential of unearthing cultural resources at a faster rate than they would be without the increased stream flow. The only difference between this alternative and the No Action Alternative is the shortened timeframe for the effects of erosion to take place within the floodplain and streambanks of Salmon Creek.

3.10.2.8 Alternative 3: Feeder Canal Upgrade

The impacts would be the same as described in Section 3.10.2.2.

3.10.2.9 Alternative 3: Stream Rehabilitation

There would be no stream rehabilitation under this alternative.

3.10.2.10 No Action Alternative

Erosion would continue to occur along unstable streambanks during active stream flows in the winter and during storm events. Cultural resources may become visible following these high flow events or become further buried in sediment deposition areas. Potential cultural resources from the town dumpsite are already being exposed by current stream flow. This would continue to occur under the No Action Alternative.

No disturbance to cultural resources would occur at the site of the proposed Okanogan pump station and along its associated pipeline or along the additional pipeline required for the Shellrock pump station as a result of this Project.

The feeder canal would continue to deteriorate with time, particularly on its east end near Salmon Lake, where active sloughing and debris falls are damaging the canal. Active maintenance would continue to be needed to keep the feeder canal functional.

3.10.3 MITIGATION MEASURES

There are a number of recommendations for further work that should take place prior to the development of specific mitigation measures. These recommendations were listed above as part of the Existing Conditions section.

- Avoidance is the best form of mitigation. Once the preferred alternative is selected, and prior to the Final EIS, care should be taken to avoid any known cultural resources within the APE. This analysis is preliminary because of the difficulty in assessing effects prior to selecting a preferred alternative and identifying the local commitment to avoidance or mitigation measures.
- HABS/HAER documentation could be undertaken for demolition or alteration of historical resources. Salvage of building parts or the moving of historical resources is another form of mitigation.
- In the event that human remains are discovered during the conduct of any of the fieldwork proposed, the protocol detailed within an Unanticipated Discovery Plan should be followed. Such a plan should be developed as part of a Memorandum of Agreement (MOA) prior to the completion of the Final EIS. Construction monitoring of areas with high sensitivity for archaeological resources should also be included within the MOA.

Listed below are additional potential mitigation measures that could be included in the MOA:

- Shovel test probes 50 centimeters in diameter and up to one meter deep would have to be conducted prior to commencement of any construction activity or disturbance on banks, terraces, and landforms with slopes less than 10 percent. This would include the area around the Okanogan pump station, Shellrock pump station, alluvial benches of Salmon Creek where rehabilitation work is proposed, and over 90 percent of the pipeline proposed for the Okanogan pump station and 65 percent of the pipeline route for Alternative 1. Backhoe testing is a possible option, or requiring a cultural resource specialist to monitor excavation of the high sensitivity areas.

- A cultural resource monitor should be present on site if any work is conducted in the area of the town dumpsite. An option would be to conduct backhoe trench testing prior to bank stabilization.
- Conduct an intensive pedestrian survey prior to starting construction on any component of this Project that would disturb ground, including rehabilitation work along the streambanks of Salmon Creek.
- Conduct a hydraulic assessment of the creek taking into account the proposed increase of stream flows and its effects on bank erosion. Increases in the water table should be considered.
- If further testing determines there are very old (19th century) artifacts, avoid disturbance of the Okanogan town dumpsite, if possible.
- Minimize disturbance to any discovered cultural resources, if possible.

3.10.4 UNAVOIDABLE ADVERSE IMPACTS

The alteration of the feeder canal would be a significant unavoidable adverse impact that has been mitigated previously with HABS/HAER documentation. Unknown archaeological resources and TCP areas may be present within the APE. These resources, if present, should be avoided. Further discussion of unavoidable adverse impacts should be revisited pending full field investigation as recommended. [1, 2]

3.11 HEALTH AND SAFETY

This section describes the current public health and safety conditions in the vicinity of Project components. It also describes the sources of potential human health and safety impacts caused by proposed Project construction and operation. Human health can be affected by changes in background noise, by introduction of toxic or hazardous chemicals on the land or in the water during construction and operation of Project components, or by changes in frequency of fire or other catastrophic events. Health and safety risks consist of those that could be experienced by construction or operations and maintenance personnel, as well as by the general public.

3.11.1 EXISTING CONDITIONS

3.11.1.1 Regulatory Framework

A variety of federal and state safety regulations and guidelines apply to Project design and construction. Federal safety regulations are issued under the authority of the Occupational Safety and Health Act. State safety regulations are issued under the Washington Industrial Safety and Health Act. In addition, the National Electrical Manufac-turers Association and the

[1] Letter from Bonneville Power Administration to Washington Office of Archaeology and Historic Preservation (Rose, Donald L., 6/12/2003)

[2] Letter from Washington Office of Archaeology and Historic Preservation to Bonneville Power Administration (Williams, Scott, 6/18/2003)

Institute of Electrical and Electronics Engineers issue standards for the design of electrical equipment and controls. The Okanogan County Building Code (which is based on the Uniform Building Code) sets standards for fire, life, and structural safety aspects of buildings and related structures.

Several portions of the Code of Federal Regulations (CFR) governing the handling of hazardous materials would potentially apply to the proposed Project, including:

- 40 CFR 112 (Spill Prevention Control and Countermeasures)
- 40 CFR 262-266 (Resource Conservation and Recovery Program)

Whether these and other regulations apply to the Project would depend on the exact quantities and types of hazardous materials used and stored onsite.

3.11.1.2 Noise Regulations

The Washington Administrative Code (173-60 WAC) provides the applicable noise standards for Washington State. The Washington regulation specifies noise limits at the receiving property for three types of land which roughly correspond to residential, commercial/recreational, and industrial/agricultural uses:

- Class A: Residential property where people reside and sleep
- Class B: Commercial and recreational property requiring protection against noise interference with speech
- Class C: Industrial and agricultural property where economic activities are of such a nature that higher noise levels are anticipated

Table 3-46. State of Washington Noise Regulations (173-60-040 WAC)

	Sensitivity of Receiving Property		
Sensitivity of Noise Source	Class A	Class B	Class C
Class A	55 dBA	57 dBA	60 dBA
Class B	57 dBA	60 dBA	65 dBA
Class C	60 dBA	65 dBA	70 dBA

Note: Standard applies at the property line of the receiving property.

Source: WAC 173-60-040.

The areas proposed for activity associated with this Project are a combination of Class B in the vicinity of the proposed pump station in Okanogan and the Shellrock facility, and Class A for much of the remaining area. **Table 3-46** summarizes the maximum permissible levels applicable to noise received at residential areas and commercial and recreational property. Construction noise and alarms or safety devices are exempted from the limits in **Table 3-46** between the hours of 7 a.m. and 10 p.m. (per 173-60-050 WAC).

In addition, the regulations specify that:

(a) Between the hours of 10:00 p.m. and 7:00 a.m. the noise limitations of the foregoing table shall be reduced by 10 dBA for receiving property within Class A.

(b) At any hour of the day or night the applicable noise limitations above may be exceeded for any receiving property by no more than:

(i) 5 dBA for a total of 15 minutes in any one-hour period; or

(ii) 10 dBA for a total of 5 minutes in any one-hour period; or

(iii) 15 dBA for a total of 1.5 minutes in any one-hour period.

3.11.1.3 Methodology

The primary sources of information for this section are published information and descriptions of health and safety risks related to construction projects in environmental analyses of similar projects.

A review of Federal and state databases for unauthorized releases of hazardous materials or hazardous waste was conducted. No sites or facilities in the vicinity of Project components appear on any state or federal list that tracks hazardous materials. The only facility identified that could result in some impact as a result of proposed Project activities is the old Okanogan town dumpsite.

On July 21, 2003, a BPA environmental protection specialist conducted a site reconnaissance of the town dumpsite. Chris Johnson, planner for the City of Okanogan, and an additional unidentified long-time resident of Okanogan were interviewed and present during the site reconnaissance. The objective of the site reconnaissance and interviews was to obtain information indicating the likelihood of identifying recognized environmental conditions in connection with the town dumpsite.

3.11.1.4 Affected Environment

The Project study area lies in a sparsely to moderately populated rural agricultural area consisting of rangeland, farms, and orchards. A portion of the stream rehabilitation is proposed for more densely populated areas within the town of Okanogan. Potential hazards on the site include the fire hazard presented by dry crops and grasses (especially in the summer months) and some construction on moderately steep hills. Another potential hazard is the former town dumpsite that is located along Salmon Creek less than one mile northwest of Okanogan, Washington (see Section 3.10.1 for a description of the Okanogan town dump).

As described in Section 3.10.1, operation of the dump occurred from the 1940s or earlier until the dump was closed in the mid-1970s. Waste observed at the dumpsite includes broken and melted glass, tin cans, and small amounts of other solid waste. In addition, lenses of debris are

visible at the dumpsite along the banks of Salmon Creek, which has experienced severe bank cuts from high runoff flows and subsequent exposure of solid waste (**Figure 3-25**).

Available information indicates that the town dump was not attended by an on-site operator during its operation, did not have specific hours of operation, and did not have any restrictions on what could be placed at the site. In addition, there are no records or documentation available that pertain to the operation of the dump (Walasavage, 2003). It is thus not possible to identify the potential contents of the dump from available records, and whether any hazardous waste or other

Figure 3-25. Salmon Creek Streambank with Debris Visible in Top Third of Bank. Note Lack of Streambank Vegetation and Water in the Stream Channel.

materials have been disposed of and possibly contaminated the site. However, the dumpsite does not appear on any Federal and state hazardous waste databases or lists.

Due to the lack of record keeping for the site, it is also difficult to assess the full extent or depth of the dumping area. There is evidence that dumping did occur right up to the creek in isolated areas, however, these areas are limited to the top one half of the exposed creek bank. This suggests that significant erosion has occurred since the dumping activities were terminated. Areas of the dump that were exposed along the creek bed appear to be visible as a result of high spring or winter flows that are naturally occurring.

Noise

Typical sound levels of familiar noise sources and activities are presented in Table 3-47. The human perception of a doubling of loudness is reflected in the scale as an increase of 10 dBA (A-weighted decibel). Therefore, a 70 dBA sound level would sound twice as loud as a 60 dBA sound level to most individuals. People's perception of noise increases depending upon the nature of the background noise compared to the intruding noise. If the background noise is of the same character as the intruding noise (e.g., new traffic noise added to existing traffic noise),

Table 3-47. Common Sound Levels/Sources and Subjective Human Responses.

Thresholds/ Noise Sources	Sound Level (dBA)	Subjective Evaluations[1]	Possible Effects on Humans
Human threshold of pain Carrier jet takeoff (50 ft)	140	Deafening	Continuous exposure to levels above 70 can cause hearing loss in majority of population
Siren (100 ft) Loud rock band	130		
Jet takeoff (200 ft) Auto horn (3 ft)	120		
Chain saw Noisy snowmobile	110		
Lawn mower (3 ft) Noisy motorcycle (50 ft)	100	Very loud	
Heavy truck (50 ft)	90		
Pneumatic drill (50 ft) Busy urban street, daytime	80	Loud	
Normal automobile at 50 mph Vacuum cleaner (3 ft)	70		Speech interference
Large air conditioning unit (20 ft) Conversation (3 ft)	60	Moderate	
Quiet residential area Light auto traffic (100 ft)	50		Sleep Interference
Library Quiet home	40	Faint	
Soft whisper (15 ft)	30		
Slight rustling of leaves	20	Very faint	
Broadcasting studio	10		
Threshold of human hearing	0		

[1] Note that both the subjective evaluations and the physiological responses are continual without true threshold boundaries. Consequently, there are overlaps among categories of response that depend on the sensitivity of the individuals exposed to noise.

then people generally cannot detect differences less than one (1) dBA. However, if the intruding noise is of a different character than the background noise (e.g., the whine of a new turbine superimposed onto rural background noise) then the intruding noise could be easily discernible even if it adds less than 1 dBA to the background noise level.

Currently, noise levels are faint to moderate in the sparsely populated portions of the Project area and moderate to loud in the urban areas of Okanogan during daytime hours. All areas are

predominantly very faint to faint during nighttime hours. Residents adjacent to the Shellrock pumping station have erected barriers to abate the noise coming from the pumps, which run around the clock during the summer irrigation season in most years and are not housed in any structure that dampens the noise.

3.11.1.5 Evaluation Criteria

- Impacts to health and safety from the proposed Project would be considered high (and significant) if exposure to a site-related hazard resulted in a substantial, increased risk to human health and safety for site personnel or the general public (assuming those exposed were following site safety procedures and obeying applicable laws--for example not trespassing).
- Impacts to health and safety from the proposed Project would be considered moderate if exposure to a site-related hazard resulted in some risk to human health and safety for site personnel or the general public (assuming those exposed were following site safety procedures and obeying applicable laws).
- Impacts to health and safety from the proposed Project would be considered low if exposure to a site-related hazard resulted in a minor risk to human health and safety for site personnel or the general public (assuming those exposed were following site safety procedures and obeying applicable laws).

3.11.2 HEALTH AND SAFETY IMPACTS

3.11.2.1 General Impacts During Construction

Public health and safety risks for construction workers and the general public associated with construction of any of the Project components would be low if appropriate health and safety procedures are employed. Even with appropriate safety procedures during construction, minor health and safety risks exist for workers and visitors. Each contractor would maintain a safety plan in compliance with State of Washington requirements.

Highway-authorized vehicles and construction equipment would be fueled, serviced, and cleaned offsite. Construction equipment that is transported to the Project site on flatbed trucks (because such equipment is not authorized for operation on the highway) would be fueled and serviced onsite during the construction phases. All fueling and servicing of such equipment, whether on or off the Project site(s), would be in accordance with typical construction practices and in compliance with applicable laws and regulations. A spill prevention, control, and countermeasures (SPCC) plan would be required to minimize the impacts of any spills that occur.

Any construction off of surfaced roads would create a risk of fire if operations occur during the dry summer months. Driving of vehicles or equipment through dry brush and grass, or sparks generated during digging, blasting, or bulldozing operations can ignite dry fuels.

Operation of vehicles and equipment during construction would contribute to the degradation of air quality in the area, although it would be of short duration. There would be noise impacts due

to the operation of heavy equipment, but this would take place only during appropriate hours between 7 a.m. and 10 p.m.

3.11.2.2 General Impacts During Operation and Maintenance

Health and safety risks for Project personnel and the general public during operation and maintenance of pump stations, the feeder canal, and pipelines would be low, if appropriate prevention and response procedures are used. Nevertheless, potential health and safety risks during operation and maintenance of Project components would exist.

No extremely hazardous materials (as defined by 40 CFR 335) are anticipated to be produced, used, stored, transported, or disposed of as a result of this Project. Potential risks associated with storage and use of these materials would be minimized through compliance with applicable local, state, and federal environmental laws and regulations.

3.11.2.3 Impacts Common to All Three Action Alternatives

All of the Action Alternatives would have a potential impact associated with the increase of stream flows in Salmon Creek. Increased summer stream flows may raise the water table in the vicinity of the town dumpsite between May and September. It is uncertain what the impact of this seasonal change in water table would be or what this change would mean to the water table level during the remainder of the year. It is possible that a permanent, annual increase in summer flow could lead to an overall, year-round increase in the water table. There is no expected change to the water flows that have typically occurred during spring during the past 90 years. However, even if there would be no increase in groundwater recharge in other seasons, the higher summer flows levels could lead to a higher late summer water table level that would then be supplemented by the fall/winter/spring hydrology. Therefore, the winter water table levels would also stand a chance of being higher (assuming inputs and outputs to the system are constant with historical rates). It is expected that the environmental effect of increased stream flow during the summer months would be low, however, additional investigation into the potential impact on the water table in lower Salmon Creek and the potential for leachates from the dumpsite is recommended.

3.11.2.4 Alternative 1: Okanogan River Pump Station and Pipeline

The physical components of this alternative include the proposed Okanogan pump station and the proposed new pipeline from the Okanogan pump station to Diversion 2. The following potential impacts to health and safety may occur due to construction activities.

Potential Releases of Hazardous Materials to the Environment

Hazardous materials used during construction of the pump station and pipelines would be limited to gasoline, diesel fuel, motor oil, hydraulic fluid, solvents, cleaners, sealants, welding flux and gases, various lubricants, paint, and paint thinner. Construction vehicles would be serviced from portable fuel trucks.

Small quantities of fuel, oil, and grease may leak from construction equipment. Such leakage should not be a risk to health and safety or the environment because of low relative toxicity and low concentrations. If a large spill from a service or refueling truck were to occur, contaminated soil would be placed in barrels or trucks by a licensed, qualified waste contractor for offsite disposal. Appropriate procedures would depend on the waste classification of the contaminated soil. For example, if soils were to classify as dangerous waste, they would be transported to a permitted hazardous waste disposal facility.

If a spill were to involve hazardous materials equal to or greater than the specific reportable quantity, all federal, state, and local reporting requirements would be met. Other wastes likely to be generated include: used oil, spent antifreeze, unused adhesives, and discarded chemicals and residuals. Non-hazardous solid waste associated with construction activities could include empty containers, scrap wood, scrap metal, and trash.

In general, the construction contractor would be considered the generator of waste oil and miscellaneous hazardous waste produced during facility construction and would be responsible for compliance with applicable federal, state, and local laws, ordinances, regulations and standards. This would include licensing, personnel training, accumulation limits, reporting requirements, and record-keeping.

Although it is not anticipated, in the event that contaminated soil is encountered during excavation activities for proposed Project facilities, the soil would be segregated, sampled, and tested to determine appropriate disposal/treatment options. If required, the soil would be hauled to a Class I landfill or other appropriate soil treatment and recycling facility.

Noise

Construction of the new pump house in the town of Okanogan would introduce a new source and location for the noise associated with pumps. The pumps would be housed in a concrete pump house building designed to mitigate noise. State ordinances regarding noise would be enforced. The structures surrounding the location of the proposed pump house are mostly commercial and would be considered class B sensitivity. To the south is the County Historical Museum; to the east is the river; to the north is an auto-body shop and a tire store; and across the street to the west is an ATV/snowmobile store and a vacant lot. The nearest residential homes are to the south of the ATV/snowmobile store and vacant lot. The impact of introduced noise is expected to be low.

Risk of Fire

The risk of fire during construction or operation of the water supply pipelines and pump station would be low if proper fire prevention equipment and procedures are followed during construction of the pipeline. Operation of the pump station or pipelines would have no impact on the risk of fire.

3.11.2.5 Alternative 1: Feeder Canal Upgrade

General construction related impacts would occur by bringing in heavy equipment to complete proposed work. Changes to background noise levels would be expected and minor impacts to air quality and risk of introduction of hazardous materials such as fuels and oil may occur during construction. These impacts would be of short duration, although possibly noticeable to local residents since background levels of noise are faint and the quality of air in the vicinity of Conconully is very good.

Potential risks to landowners would be minimized by coordinating construction activities with access needs and landowner schedules. Unauthorized visitors would be discouraged during construction hours by the presence of construction workers and warning signs.

The risk of fire during construction would be dependent upon the time of year of construction. However, the overall risk would be low if proper fire prevention equipment and procedures are followed during construction the pipeline. Operation of the pipeline and canal would have no impact on the risk of fire.

3.11.2.6 Alternative 1: Stream Rehabilitation

This component would involve work along the streambanks and in the streambed at the mouth of Salmon Creek. General construction related impacts would occur by bringing in heavy equipment to complete proposed work. Changes to background noise levels would be expected and minor impacts to air quality and risk of introduction of hazardous materials such as fuels and oil may occur during construction. These impacts would be of short duration.

Potential risks to landowners would be minimized by coordinating construction activities with access needs and landowner schedules. Unauthorized visitors would be discouraged during construction hours by the presence of construction workers and warning signs.

The risk of fire during construction would be dependent upon the time of year of construction. However, the overall risk would be low if proper fire prevention equipment and procedures are followed during construction.

3.11.2.7 Alternative 2: Upgrade Shellrock Pumping Plant

The only source of introduction of hazardous materials would be from construction equipment spills or leakage along the water supply pipeline during construction and operation. The potential for environmental impact would be low. Construction work at the Shellrock facility would not be as extensive as the work described in Section 3.11.2.1. Impacts due to construction of the pump facility would be similar to Alternative 1, but perhaps shorter in duration.

Upgrading this facility and regular annual use would increase the frequency and duration of noise generated by the pumps. There currently is no pump house to contain the noise generated by the pumps. A pump house to mitigate generation of noise is recommended.

3.11.2.8 Alternative 2: Feeder Canal Upgrade

Impacts would be the same as described in Section 3.11.2.5.

3.11.2.9 Alternative 2: Stream Rehabilitation

This component would involve work along the streambanks and in the streambed of the lower 4.3 miles of Salmon Creek. General construction related impacts would occur by bringing in heavy equipment to complete proposed work. Changes to background noise levels would be expected and minor impacts to air quality and risk of introduction of hazardous materials such as fuels and oil may occur during construction. These impacts would be for up to two years.

Stream rehabilitation activities within the vicinity of the dumpsite could expose debris contained within the dump. This exposure could result primarily from excavation of soils for stabilizing and reconstructing the streambed and its banks in the vicinity of the dumpsite. However, due to the dispersed nature of debris at the dumpsite, exposure of such debris is likely to be encountered only in isolated areas of the site. In addition, it is not known whether petroleum, hazardous waste, or other toxic materials may have been disposed of at the dumpsite, and it is thus uncertain if any of this debris would present a health and safety risk.

Streambank stabilization and reestablishment of riparian vegetationcould slow the current rate of bank erosion and exposure of debris. It appears that a majority of the erosion currently taking place is due to high water flow events and the lack of vegetation along the banks. Reconstruction of the lower two miles of the stream bed would strive to create a stream channel that conveys floodwaters without excessive erosion, sedimentation, or property loss. Overall risk of damage due to flooding may be decreased if stream channel rehabilitation is completed and established before the next flood event occurs. Timing of such an event would be critical.

Potential risks to landowners would be minimized by coordinating construction activities with access needs and landowner schedules. Unauthorized visitors would be discouraged during construction hours by the presence of construction workers and warning signs.

The risk of fire during construction would depend on the time of year of construction. However, the overall risk would be low if proper fire prevention equipment and procedures are followed during construction.

3.11.2.10 Alternative 3: Water Right Purchase

This alternative would not have an impact upon health and safety due to construction activities, although the impacts associated with increased water flows in lower Salmon Creek would occur.

3.11.2.11 No Action Alternative

There would be no change to noise levels associated with this alternative. No construction or operation related hazards or effects would be introduced.

Erosion of the Salmon Creek stream bank is occurring and exposing some items that were deposited in the dump site. According to state and federal records, no evidence of leaching or contamination from hazardous or toxic materials has been detected thus far. Taking no action would result in the bank continuing to erode at its current rate, further exposing buried items and unknown other materials.

Sloughing of the hillside into the feeder canal and potential failure of the canal would remain as a concern. Annual maintenance to keep the feeder canal functioning would be required.

3.11.3 MITIGATION MEASURES

- Investigate and identify possible contaminants in the Okanogan town dumpsite if proposed rehabilitation would impact the area.
- Conduct a hydraulic assessment of Salmon Creek taking into account the proposed increase of stream flows and its effects on bank erosion and determine whether there would be increases in the water table and potential resultant leachates from the dumpsite.
- Any spills or releases of hazardous materials would be cleaned up and disposed of or treated according to applicable regulations. Accidental releases of hazardous materials to the environment would be prevented or minimized through the proper containment of oil and fuel in storage areas.
- A spill prevention, control, and countermeasures (SPCC) plan would be prepared prior to the start of construction, and implemented to minimize the potential for hazardous materials to enter surface or groundwater.
- When working within or adjacent to any drainage ditch, watercourse, ravine, etc., the construction contractor would have an emergency spill containment kit to contain and remove any accidentally spilled fuels, hydraulic fluids, etc.
- Equipment refueling and storage of fuels and hydraulic fluids or any other toxic or deleterious materials would not occur within 100 feet of surface water.
- Strict procedures for disposal of common construction materials (e.g., concrete, paint, and wood preservatives) and petroleum products (e.g., fuels, lubricants, and hydraulic fluids) or any other hazardous materials used during construction would be followed.
- Discharge of solid materials including building materials into waters of the United States would be avoided unless authorized by a Clean Water Act Section 404 permit.
- To the extent possible, excavation and grading would be timed to coincide with the dry seasons to reduce the potential for water erosion. Water would be applied to control dust and minimize wind erosion.
- To the extent feasible, slopes would be graded to no steeper than 2 horizontal: 1 vertical
- All noise producing equipment and vehicles using internal combustion engines would be equipped with mufflers and air inlet silencers, where appropriate; be in good operating condition; and meet or exceed original factory specifications. Mobile or fixed "package" equipment (e.g., arc welders and air compressors) would be equipped with shrouds and noise control features that are readily available for that type of equipment.

- To prevent accidental fires during construction of the Project, workers would be required to avoid idling vehicles in grassy areas and to keep welding machines and similar equipment away from dry vegetation.

3.11.4 UNAVOIDABLE ADVERSE IMPACTS

There are no foreseeable unavoidable adverse impacts associated with any of the Project components.

3.12 RELATIONSHIP BETWEEN SHORT-TERM USES OF THE ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

This section of NEPA asks the Lead Agency to consider whether a proposed action is sacrificing a resource value that might benefit the environment in the long term, for some short-term value to the sponsor or public.

The central purpose of the Salmon Creek Project is to achieve an enhancement of long-term productivity, by taking action to rehabilitate Lower Salmon Creek that would provide passage flows and improve the low flow channel in Lower Salmon Creek to allow migrating salmonids access to good quality habitat in the middle reach of Salmon Creek; contribute to the recovery of salmonids listed as threatened or endangered under the Endangered Species Act; improve and reestablish riparian vegetation in Lower Salmon Creek; and reconnect Lower Salmon Creek to its floodplain.

The uses of the environment proposed to achieve these goals include commitments of water and farmland (discussed in **Section 3.13** below); the use of the existing Shellrock pump station site or proposed new Okanogan River pump station site; the pipeline corridor to connect the proposed new Okanogan River pump station to the Okanogan Irrigation District conveyance facilities; and the use of existing storage reservoirs at Conconully Reservoir and Salmon Lake.

Overall, the proposal's use of the environment results in substantial long-term benefits in exchange for very little unavoidable adverse impact. The long-term benefits include Lower Salmon Creek rehabilitation, contributions to the recovery of listed salmonids, better maintenance of reservoir levels for recreation in most months under most scenarios, and the preservation of reliable irrigation water supply and the socioeconomic benefits to the local area of the agricultural sector of its economy (unless the water rights purchase alternative is chosen as the preferred action). The short-term environmental uses are limited to sites and routes temporarily disturbed for construction (principally for Alternative 1 and stream rehabilitation), and the siting of the proposed new pump station under Alternative 1.

3.13 IRREVERSIBLE OR IRRETRIEVABLE COMMITMENTS OF RESOURCES

Resources proposed to be used to achieve the environmental enhancements described in **Section 3.12** and maintain long-term environmental productivity are primarily water and farmland.

Water supply alternatives considered under this EIS principally shift the source of water (Alternatives 1 and 2) for irrigation, or reduce the use of it (Alternative 3). Water withdrawals for irrigation are shifted from Salmon Creek to the Okanogan River through pumping from the River to the irrigated lands of the Okanogan Irrigation District, allowing the storage and use of natural flows for instream flows and environmental values in Salmon Creek. Water use for irrigation is reduced under Alternative 3 by the purchase of water rights and the retirement of 1470 acres of irrigated land. The retirement of irrigated land represents an additional resource commitment in removing productive farmland from production.

Other minor commitments of resources are involved in the construction materials that would be invested in stream rehabilitation, the construction or upgrading of pumping plants (Alternatives 1 and 2), and the construction of a new pipeline (Alternative 3).

3.14 CUMULATIVE IMPACTS

NEPA and its implementing guidelines require an assessment of the proposed Project in the context of past, ongoing, and reasonably foreseeable future actions that together may create impacts beyond the impacts of the proposed Project. Past actions affecting the Salmon Creek watershed have significantly impacted its functionality as anadromous fisheries habitat, creating both local and regional impacts to sustainable salmonid populations. Some of these actions were undertaken to develop an irrigation-based farming economy in the Salmon Creek area. Ongoing and foreseeable future actions could affect the functionality of Salmon Creek and the local economy in many ways, both positively and negatively. Ongoing and future actions are subject to political, legislative, and fiscal uncertainties. The assessment of cumulative impacts in the local and regional sense is therefore relatively speculative. This section describes past, ongoing and reasonably foreseeable future actions relevant to this Project.

3.14.1 PAST ACTIONS

3.14.1.1 Hydroelectric Development of Columbia River System

The development of hydroelectric facilities on the Columbia River and commercial harvest have had substantial positive effects on the growth of the economy of the Pacific Northwest, and have also had substantial negative effects on anadromous fish runs in the basin. Rock Island Dam was the first mainstem dam constructed on the Columbia River. Construction began in 1929 and was completed before the 1932 adult fish migrations. Counts of fish passing through the Rock Island Dam fish ladders began in 1935. Although two fish ladders were constructed at the Project, fish passage was restricted until a third ladder was constructed in 1940 (Craig and Suomela, 1941).

Anadromous fish runs to the upper Columbia River dramatically changed as a result of the construction of Grand Coulee Dam, which blocked these species from an estimated 1,140 miles of potential spawning and rearing habitat (Fish and Hanavan, 1948). This habitat loss directly and significantly impacted the fisheries resources of the Colville Confederated Tribes. The U.S. Fish and Wildlife Service began the Grand Coulee Fish Maintenance Program (GCFMP) in 1939 to relocate returning adults from the upper river runs to accessible drainages downstream of Grand Coulee Dam. Between 1939 and 1943, salmon and steelhead were intercepted at Rock

Island Dam and transported to the Wenatchee, Entiat, Methow, and Okanogan rivers to spawn (Peven, 1992). Some of these intercepted fish were also artificially spawned and their progeny reared and released from hatcheries in the Wenatchee, Entiat, and Methow rivers (Craig and Suomela, 1941). Despite this extensive recovery program, adult returns of these relocated fish were estimated at 1 percent or less (Mullan, 1987).

3.14.1.2 Development of Salmon Creek Watershed

Anadromous fish species known or suspected to have historically occurred in Salmon Creek include spring chinook and summer steelhead. The construction of the Conconully Dam by the Bureau of Reclamation in 1910 and the OID diversion dam in 1916 significantly impacted the functionality of Salmon Creek for salmonid usage in the following years and up to the present. However, the construction of these projects also supported the development of an irrigation-dependent farming economy in the local area. The OID diversion dam is located 4.3 stream miles above the mouth of Salmon Creek. For more than 80 years, these lower 4.3 stream miles of Salmon Creek have been dewatered under normal irrigation operations, except during spring runoff events that result in uncontrolled spill at the reservoirs and diversion dam. Historical land use-related effects of upland vegetation and sediment production, altered streamflow regimes, and direct manipulation of streambanks and/or riparian vegetation have adversely affected the channel geometry, streambank stability and riparian aquatic habitat value of lower Salmon Creek. The lack of streamflow below the diversion dam has historically precluded fish migration into lower Salmon Creek from the Okanogan River. Fish passage above the Conconully Dam is not possible due to the lack of passage structures. Recently, the Bureau of Reclamation installed fish passage structures at the OID diversion dam, allowing passage to the middle reach of Salmon Creek.

3.14.2 ONGOING AND REASONABLY FORESEEABLE FUTURE ACTIONS

3.14.2.1 Federal Actions

BPA, the U.S. Corps of Engineers (USCOE), and the BOR are the Action Agencies under the NOAA Fisheries and USFWS Biological Opinions on the Federal Columbia River Power System (FCRPS). In compliance with the Endangered Species Act, these Action Agencies are implementing the *Draft Endangered Species Act Implementation Plan for the FCRPS Biological Opinions (2002-2006)*. This plan addresses a "gravel to gravel" approach to threatened and endangered anadromous fisheries recovery, focusing on the operations of the hydroelectric power system, aquatic habitat, hatcheries, and harvest programs. An extensive recovery program for listed species has resulted from this plan and will continue through the time period for the Alternatives considered in this EIS. The Alternatives are consistent with the Immediate Habitat Priorities (2002-2006) of the Implementation Plan. The Plan states, "In the **tributaries**, the Action Agencies will implement projects in priority sub-basins that improve flow, passage, and screening problems (Federal Caucus, 2001)."

BPA will also continue to fund and implement elements of the Northwest Power and Conservation Council (Council) Fish and Wildlife Program consistent with its obligations under the Federal Power Act and the Northwest Power Act of 1980. These programs will be

coordinated to the extent practicable with the programs developed in the Draft Implementation Plan described previously.

The Council is conducting sub-basin planning as part of the Council's Columbia River Basin Fish and Wildlife Program. The Upper Columbia Salmon Recovery Board (UCSRB) has agreed to a province-focused approach to sub-basin planning. Okanogan is one of six sub-basins contributing to the Columbia Cascade Province Plan. Sub-basin plans will help direct the Bonneville Power Administration funding of projects that protect, mitigate, and enhance fish and wildlife that have been adversely impacted by the development and operation of the Columbia River hydropower system. The alternatives are consistent with the kind of actions that will be identified by the sub-basin and province plans for salmon recovery. The Salmon Creek Project has been funded in part through the Council and is being considered by the Council under its Major Project Review process.

Since the OID is a BOR Project, the BOR is the federal agency responsible for ESA compliance related to the irrigation project. BOR and NOAA Fisheries could initiate Section 7 consultation under the Act at some time in the future. Such consultation could result in requirements for "reasonable and prudent alternatives" to current operations affecting Salmon Creek. The consultation scenario would not be likely under any of the Alternatives. This action is reasonably foreseeable under the No Action Alternative.

The NRCS is proposing to implement stream improvement projects in the middle reach of Salmon Creek in cooperation with individual landowners.

3.14.2.2 State Actions

The governors of Washington, Oregon, Idaho, and Montana released a combined "Recommendation for the Protection and Restoration of Fish in the Columbia River Basin (July, 2000)." This joint statement prescribed a series of general salmon recovery actions for the states, including habitat reforms, harvest reforms, hatchery reforms, and funding and accountability.

Washington State's 1998 Salmon Recovery Planning Act developed the program under which the state will support and fund watershed and habitat restoration projects. The Alternatives are consistent with and would benefit the goals of the Act, if implemented. Funding for parts of the Alternatives could be generated through the state's Salmon Recovery Funding Act. The Alternatives are also consistent with the state's Watershed Planning Act. Alternative 1 alternatives generate from voluntary joint cooperation and planning by the OID and the Colville Confederated Tribes, with input from local stakeholders and community members.

The state could also in the future address TMDL requirements for either or both the Okanogan River in the vicinity of the mouth of Salmon Creek and Salmon Creek itself. Future water rights adjudications in the general Project area could also be possible. Water right decisions will be made on pending applications in the Project APE.

3.14.2.3 Local and Private Actions

There currently are no large new land use development actions known that could affect Salmon Creek. Land use actions of local governments and private citizens could occur in the future that would potentially enhance or diminish the potential for water use to restore Salmon Creek fisheries. In any case, future actions by these entities designed to enhance Salmon Creek fish populations would need to be integrated and sustainable to have long-term beneficial effect. Actions at the local and private level that are not consistent with a plan to improve resource sustainability could have significant deleterious effects on remaining fisheries resources. Market forces may lead to changes in land use in the Project area, such as conversion of currently irrigated land to fallow or other uses. Local and regional entities addressing imperatives for salmon recovery could provide support and funding for Salmon Creek Alternatives as part of required mitigation for Project activities or in compliance with 4(d) Rule or HCP programs.

3.14.2.4 Tribal Actions

Salmon Creek Project Alternatives, in conjunction with other proposed actions in the Okanogan watershed sponsored by the CCT, would have measurable positive impacts on the fisheries resources. The Alternatives, however, represent a potential for collaborative and adaptive resource management between the CCT, OID, and the local community. The Alternatives are consistent with a trend toward collaborative, multi-stakeholder planning and management of water, watershed, and fisheries resources in which Tribes and irrigators are emerging leaders. The Joint Committee formed by the CCT and OID is joined in this trend by the collaboration of irrigators with the Umatilla Tribes on the Umatilla Basin Project, and the Jamestown S'Klallam Tribe with the Sequim Dungeness Valley Agricultural Water Users' Association.

In a less collaborative, potentially confrontational scenario, competing water needs could be addressed through extensive, costly, and time-consuming litigation. Such a scenario could develop under the No Action Alternative.

3.14.3 CUMULATIVE IMPACTS OF THE ALTERNATIVES

3.14.3.1 The Action Alternatives

Ten areas of potentially significant cumulative impacts, both beneficial and adverse, are identified under the imposition of various action alternatives. These potential impacts are described in the following sections.

Water Supply for Irrigation

Under Alternative 3, the purchase of water rights to ensure the level of flow to support sustainable salmon populations in Salmon Creek will diminish the number of irrigated acres potentially in production in Okanogan County. In conjunction with potential future market pressures that could also reduce irrigated acreage as growers respond to low prices by retiring land, the combined cumulative effect on the local economy could be significant. The impact on the broader regional economy would not be significant.

Fisheries

Under all Alternatives, the provision of water sufficient to sustain either or both summer steelhead and spring chinook salmon in Salmon Creek is a significant beneficial impact that enhances the ongoing and future efforts of federal, state, tribal and local agencies in the restoration of salmon runs to the Columbia Basin.

On a regional basis, the Alternatives would produce a potential thermal refuge at the mouth of Salmon Creek that could be used by fish migrating further upstream in the Okanogan, where elevated temperatures currently present a major barrier to upstream migration. This thermal refuge would add a cumulative benefit to the other efforts addressing Upper Columbia Basin salmon restoration by providing a small thermal refuge upstream of the Wells reservoir.

Cumulative impacts to fish may occur from the interactions of this project with other ongoing and future projects within the Okanogan River, its tributaries, and neighboring watersheds. There are currently approximately 50 federal and state projects in the Okanogan Basin (Golder August 2003). Many of these are assessment and monitoring projects, but may lead to future restoration/enhancement or reintroduction/augmentation projects that are not described below. Of the 50 projects, twelve projects are considered particularly pertinent to the cumulative impacts assessment for this project. Eight of the twelve projects are related to enhancement/restoration of habitat, and four to fish reintroduction or augmentation. Restoration and enhancement projects can have short-term impacts, such as sedimentation from construction activities. Long-term benefits include a decrease in overall sediment loads, lower water temperatures and overall higher quality fish habitat. These projects are expected to improve survivability and productivity of fish within the Okanogan and its tributaries, including Salmon Creek.

Restoration or enhancement projects where cumulative impacts may occur include Salmon Creek land acquisitions by the Bureau of Land Management and Department of Natural Resources. The lands acquired are along Salmon Creek and allow access for restoration projects and are managed in a manner that promotes stream habitat recovery. An Okanogan River bank restoration and maintenance project sponsored by Public Utility District (PUD) No. 1 of Douglas County has involved various enhancement projects along nearly 17 miles of PUD owned shoreline. The Upper Columbia Region Fish Enhancement Group has also been involved with enhancement and restoration (project number 01-1436) designed to protect and restore flood plain processes for nine miles of spawning, rearing, and migratory habitat supporting listed sockeye, steelhead, and chinook salmon at the confluence of the Okanogan and Similkameen Rivers. The Okanogan Irrigation District is also implementing agricultural water conservation to improve instream flows in Salmon Creek (Salmon Recovery Funding Board (SRFB) project number 00-1144).

The Colville Confederated Tribe's (CCT) Omak Creek Restoration projects (SRFB project numbers 99-1611 and 00-1683) and Omak Creek Road Decommissioning (SRFB project number 01-1420) will restore riparian habitat, reduce surface and bank erosion, reduce water temperature and sediment yield, and provide passage and habitat to anadromous and resident species. Omak Creek is a major tributary to the Okanogan River at RM 31. While there are no current Natural

Resource Conservation Service (NRCS) projects in the Salmon Creek vicinity, preliminary coordination with landowners is underway for restoration/conservation activities.

Reintroduction and augmentation of fish species in the Okanogan River and its tributaries, increases the potential for harvestable anadromous and resident fish populations in the Okanogan River, Salmon Creek, and other tributaries. Stocking of some hatchery fish can increase interspecies and intraspecies competition. If sustainable population levels are eventually achieved through improved habitat and resulting fish production, more stable fisheries will result in harvest opportunities for sport, commercial, subsistence and cultural purposes within the Okanogan and its tributaries, as well as the Columbia River and Pacific Ocean. Successful species may be removed from the ESA list.

As mitigation for the fish migration blockage created by the Chief Joseph Dam on the Columbia River, the CCT has been operating a rainbow and brook trout hatchery since 1986 (BPA project number 198503800). These fish are planted in area lakes and streams. The CCT has also conducted an experimental re-introduction of sockeye salmon in Skaha Lake, one of series of 6 lakes in British Columbia at the head of the Okanogan River (BPA project number 200001300), and has been involved with the Ellisforde Acclimation Pond (BPA project number 200200100) at RM 25 on the Okanogan River and the Omak Creek Acclimation Pond, which aid in acclimation of hatchery spring and summer chinook and summer steelhead for reintroduction in the Okanogan River and its tributaries. An additional CCT project will propagate local Okanogan River summer and fall chinook (BPA project number 200399917).

Terrestrial Biology

The Alternatives would benefit wildlife, vegetation and wetland resources by rehabilitating the riparian corridor in Lower Salmon Creek. This benefit will support and enhance current efforts to protect and restore habitat in the region, and would counter ongoing cumulative loss of habitat.

Stream Erosion and Sedimentation

Cumulative erosion and sedimentation impacts in Lower Salmon Creek would be reduced by the significant positive effects of stream rehabilitation. Construction in the upstream part of the lower reach and in the middle reach would be on a smaller scale and would slightly increase sedimentation in the Okanogan downstream of the mouth of Salmon Creek for a short time.

Water Temperature

The Alternatives would reduce water temperatures in Salmon Creek and could create a thermal refugia at the mouth of the creek (in the Okanogan River), countering long-term trends that have seen cumulative increases in water temperatures and concomitant loss in habitat value.

Streamflow

Increased groundwater pumping from future development of exempt wells on riparian parcels could diminish base flows. The Alternatives provide increased base flows on the order of 4 to 7 cfs, and may also increase groundwater recharge. These beneficial effects of the Alternatives may at least partially offset potential future adverse cumulative effects on Salmon Creek base flow from riparian groundwater pumping.

Potential new surface water diversions within the affected reach of the Okanogan River are represented by pending applications to Ecology for diversions in the affected reaches of the river (**Table 3-48**). The total diversion rate and volume of the pending surface water right applications are small compared to river flow. Increased groundwater pumping from future development of exempt wells on riparian parcels could also diminish flows. However, the number and total volume of riparian exempt wells in the foreseeable future are likely to be small. Cumulative effects on Okanogan River streamflow with Alternatives 1 and 3 are adverse, but of small magnitude in all water years. Cumulative effects on Okanogan River streamflow with Alternative 1 are adverse, and could be somewhat significant in dry years and less substantial in below normal water years.

Table 3-48. Okanogan River Pending Water Right Applications in Affected Reaches.

File Number	*Name*	Type of Application	Priority Date	Flow (cfs)	Acre-Feet	Irrigated Acres	Purpose
S4-32441	Fitzhugh	New	4-19-96	0.18 cfs	0	80	irrigation, stockwater
CG4-GWC691-D	Fisher	Change to surface source	7-1-98	240 gpm (0.53 cfs)	100		none stated

Groundwater

Although a local cone of depression may form in the vicinity of the Shellrock and new Okanogan River pump stations during peak pumping periods, public water service is available in these areas and new exempt wells are not expected to be developed in large numbers. Pending applications to Ecology for new groundwater rights in the affected reaches of the Okanogan River (**Table 3.14-1**) include several substantial applications for irrigation, domestic use, and fish propagation purposes. These new applications, together with pumping under Alternatives 1 or 2, could cumulatively affect groundwater levels in the area, however Ecology is required to apply tests that include water availability, nonimpairment of existing rights, and the public interest in approving any new water rights (including the change in water rights that would be required for Alternatives 1 or 2).

Buildout of undeveloped parcels along Salmon Creek would likely use groundwater supply from exempt wells. However, the Alternatives increase groundwater recharge potential. The beneficial effect of the Alternatives may at least partially offset potential future adverse cumulative effects on Salmon Creek base flow from groundwater pumping.

The Alternatives may cause decreases in seepage to the Duck Lake aquifer, which, in combination with any changes in OID sales storage of groundwater, could cumulatively reduce groundwater supply available to serve domestic use, either from exempt wells or via existing water purveyors. Alternative 3 would reduce irrigation recharge and could locally lower the static water level in wells. Reduction of artificial recharge is not considered an impairment of a water right, however this could interact with large future groundwater withdrawals to cumulatively affect the ability to obtain groundwater at shallower levels, increasing local well drilling costs.

Socioeconomics

Alternative 3 supplements a trend in the decline of net productive agricultural acreage, particularly apple cultivation. In conjunction with existing and potential future market forces, this could lead to a small reduction in employment in the Okanogan County agricultural sector but is not expected to represent a significant impact to the economy on a regional basis.

Cultural Resources

The Alternatives would tend to have a net cumulative beneficial impact on the cultural values of the Colville Confederated Tribes. The harvesting of salmon and the use of salmon in traditional activities are important elements of the cultural milieu of the Tribes. Past actions have devastated local fish production, and most of the traditional fishing grounds of the CCT were lost due to the Grand Coulee dam construction. While the salmon may not return to Salmon Creek in the thousands as a result of the Alternatives, the return of these species to the area would represent a significant cultural benefit to the tribal people.

Land Use

Alternative 1 would continue the long-term development of Okanogan River frontage in the Okanogan-Omak area.

3.14.3.2 The No Action Alternative

There are eight areas where cumulative impacts of the No Action Alternative could be significant. These areas are discussed below.

Water Supply for Irrigation

Under the No Action Alternative, potential future actions of NOAA Fisheries and other federal agencies could lead to proscriptive reasonable and prudent alternatives to current water supply operations on Salmon Creek resulting from Section 7 consultation under ESA. Conflicting water use issues potentially could be addressed through litigation rather than through collaborative planning and win-win negotiation.

Fisheries

There would be no contribution to overall salmon recovery in the Upper Columbia Basin under the No Action Alternative. The habitat considered the best remaining unused salmonid habitat in the Upper Columbia Basin would stay unconnected from the Okanogan River and the Columbia River System. A potential thermal refuge at the mouth of Salmon Creek would not be available to assist salmonids migrating upstream within the Okanogan River. The No Action Alternative would counter the cumulative effects of the sustained long-term effort in the region and throughout the Northwest to recover salmonid populations and restore habitat.

Terrestrial Biology

Continued channel degradation is expected to occur under the No Action alternative, which would result in continuing loss of riparian vegetation. This loss could be permanent, and would continue habitat loss in riparian corridors that has accumulated with property development in the middle and lower reaches and loss of flow in the lower reach.

Stream Erosion and Sedimentation

Cumulative adverse erosion and sedimentation impacts from a number of activities in the Okanogan River and Salmon Creek watersheds have occurred over many decades. These include increased, and in some areas severe, erosion and sedimentation problems in downstream reaches of Salmon Creek from channelization, floodplain encroachment, bank disturbance and loss of riparian habitat, aggradation, and a modified flow regime. These activities and problems have caused increases in suspended sediment and solids concentrations and loads during some higher flows. Under the No Action Alternative, these existing cumulative impacts would likely continue, increasing erosion and sedimentation problems in the lower reaches of Salmon Creek.

Water Temperature

Cumulative adverse water temperature impacts have occurred from a number of activities in the Okanogan River and Salmon Creek watersheds over many decades. Water temperatures in some lower Salmon Creek locations have probably increased with high temperatures occurring with greater frequencies and over larger reaches as physical conditions have degraded. These changes have resulted from increases in the diversion and use of water (and subsequent lack of instream flows), channelization and downcutting, bank erosion and associated loss of riparian vegetation, and aggradation causing shallower, slower flow in some areas. Under the No Action Alternative, the existing cumulative impacts discussed above would likely continue causing elevated water temperatures. Ongoing activities in the Okanogan River and Salmon Creek watersheds would continue to require more water, thereby continuing to increase water temperatures. Alteration of the riparian zone, including floodplain encroachment and removal of vegetation, would also continue to increase water temperatures. This is particularly true along Salmon Creek, where the smaller flows and significant, ongoing bank erosion and sedimentation problems would continue to cause channel widening, shallower flows, and higher water temperatures

Socioeconomics

Under the No Action Alternative, market forces alone would determine the number of acres within the Project area that stay in apple cultivation. There would be no opportunity to afford monetary benefits to growers who would choose to sell water rights for environmental restoration.

Cultural Resources

There would be no increased opportunity to enrich the cultural traditions of the CCT through local salmonid enhancement. The best remaining habitat in the area to support reintroduced summer steelhead and spring chinook runs would remain unconnected to the Okanogan River and the Columbia River System. The No Action Alternative would counter the cumulative effects of the sustained long-term effort in the region and throughout the Northwest to recover salmonid populations and restore habitat.

Land Use

Ongoing, incremental loss of riverbank lands to erosion is projected to be a continued effect of not rehabilitating lower Salmon Creek. This would lead to cumulative loss of land and shoreline.