CHAPTER 5.0 IMPACTS AND MITIGATION MEASURES FOR EARLY ACTIONS

This chapter describes the impacts and mitigation measures for the early actions evaluated in this programmatic EIS. The early actions are those actions identified for early implementation under the Management Program. The early actions include the additional drawdown of Lake Roosevelt (Section 2.6.1), the Supplemental Feed Route (Section 2.6.2), and processing the first Voluntary Regional Agreement (VRA), which was submitted by the Columbia-Snake River Irrigators Association (CSRIA) (Section 2.6.3). The first two projects involve a partnership with Reclamation. The additional drawdown of Lake Roosevelt is within the normal operation of the lake. Reclamation will complete National Environmental Policy Act (NEPA) analysis of any federal actions such as water service contracts and Trust Water Rights. Ecology will prepare a Supplemental EIS on the drawdowns. Reclamation will prepare a NEPA EA for the Supplemental Feed Route project. In addition, Reclamation will be preparing the appropriate NEPA documentation on future extension of Columbia Basin Project to provide surface water as a replacement for groundwater irrigation in the Odessa Subarea (Section 2.1.2.1)

This programmatic EIS evaluates the impacts associated with the State Environmental Policy Act (SEPA) actions related to the early actions. For the Lake Roosevelt drawdown, the SEPA action would be Ecology's approval of new water rights and water rights changes. The SEPA actions for the Supplemental Feed Routes would be the issuance of permits by Ecology (or other state agencies), including a Hydraulic Project Approval (HPA) and construction stormwater permits. The SEPA action for the CSRIA VRA would be Ecology's signing of the VRA, allowing the agreement to move forward. Some VRA conservation projects, such as on-farm improvements, would be unlikely to require additional SEPA review. Larger conservation projects could require additional SEPA review. Ecology would make a SEPA threshold determination in the future for any new water rights issued as a result of conservation projects undertaken as part of the VRA.

The following sections present brief discussions of the general types of impacts associated with each of the proposed early actions and analyze the impacts of the SEPA actions. Mitigation measures are described. Following the sections on the early actions is a general discussion of the impacts associated with the No Action Alternative.

5.1 Lake Roosevelt Drawdown

There are two proposals for additional drawdowns of Lake Roosevelt—82,500 acre-feet in non-drought years to benefit municipal/industrial supply, the Odessa Subarea, and instream flows; and an additional 50,000 acre-feet in drought years to supply interruptible water rights and augment instream flows (see Section 2.6.1). For both proposals, the amount of drawdown is expected to be within the normal operation of the lake. No construction would be required for the project except possible conveyance structures in the Odessa Subarea.

5.1.1 Impacts at Lake Roosevelt for Non-Drought and Drought Year Withdrawals

5.1.1.1 Earth

Short-term impacts

The annual drawdown of Lake Roosevelt from January through May for flood control purposes ranges from approximately 20 to 82 feet (Figure 3-10). The proposed action would result in an additional 1.0 foot of drawdown (1.5 feet in drought years) during summer months (after spring refill). Drawdown may expose additional lakeshore sediments that would not typically be exposed during the irrigation season; however, drawdown would be within the current operating range of the lake. Depending on the rate of drawdown and soils exposed, shallow sloughing (or slope failure) could occur as pore pressures are released. Slope failure is less likely if well-drained soils or rock are exposed and more likely if fine-grained soils that retain water are exposed. Assuming the rate and methods of drawdown for the proposed action (the additional 1.0 to 1.5 foot) is the same as for the current annual drawdown of approximately 20 to 82 feet, it is unlikely that the additional proposed drawdown would cause significant sloughing during summer months.

Long-term impacts

Long-term impacts for earth would be the same as short-term impacts discussed above.

Mitigation

It is expected that the rate and method of additional drawdown would follow the existing operational management guidelines to reduce the potential for slope failure and erosion; therefore, no additional mitigation is required.

5.1.1.2 Air

Short-term impacts

Because no construction activities are proposed for the additional drawdowns, no short-term impacts on air quality are anticipated.

Long-term impacts

The proposed drawdowns at Lake Roosevelt in both drought years and non-drought years would occur primarily in the summer months of July and August and could increase the area of shoreline exposed. Some areas of shoreline may contain contaminated sediments from the lakebed (see Section 3.3.5). These soils could dry out and become airborne through wind action. Although it is not yet known whether such dust would be a hazard to human health, the additional drawdowns could contribute to the potential problem by extending the length of time that the upper reaches of shoreline are allowed to dry out. However, the daily fluctuation in lake water levels during summer months is such that most or all of the lakebed area that would be exposed by proposed additional drawdowns would likely be rewetted on most days. This would

reduce the likelihood of sediments becoming airborne. Therefore, this project is unlikely to cause a substantial increase in airborne sediments.

The concern regarding windblown dust is primarily during the spring months when the lake is drawn down to its lowest levels in anticipation of spring runoff from the mountains. The U.S. Environmental Protection Agency (EPA) is continuing to study the potential human health effects from airborne sediments in this area (USGS 2006c); results of their study will be incorporated into operational procedures at the lake, and if appropriate, mitigation measures will be developed.

Mitigation

No significant impacts to air quality are anticipated; therefore, no mitigation is proposed. If the US EPA studies show that dust from the lakebed creates a potential hazard to human health, Ecology would work with Reclamation to minimize the potential for sediments to become airborne.

5.1.1.3 Surface Water

Short-term impacts

Water Quantity. Short-term impacts from drawdown will be a reduction in water levels in Lake Roosevelt and an increase in flow in the Columbia River downstream of Grand Coulee Dam. The reduction in water levels could be up to 1.0 foot during non-drought years and 1.5 feet during drought years. The reduction in water levels would occur gradually throughout the irrigation season and peak at the end of the irrigation season in late September. Based on recent operating history, the water levels at the end of September range from approximately 1,282 to 1,289 feet mean sea level (msl). During the dry year in 2003, the water level at the end of September was 1,284.5 feet. A water level reduction of 1.0 to 1.5 feet below the levels experienced in 2003 would still be within the normal operating range of the lake.

Water Quality. The drawdown of Lake Roosevelt would decrease the amount of water in Lake Roosevelt by 82,500 acre-feet during non-drought years and by 132,500 acre-feet (82,500 acre-feet plus 50,000 acre-feet) during drought years. Lake Roosevelt has an active storage capacity of 5.2 million acre-feet. An additional 132,500 acre-feet is less than 3 percent of the active storage capacity. Reduced volume could affect hydrodynamics of the lake and change water quality characteristics such as temperature, dissolved oxygen, and aquatic plant biomass in the lake. However, because of the small relative volume of the additional drawdown, and the fact that it will be spread across and within the normal operating levels of the reservoir, effects to lake water quality are expected to be small. If increased drawdown were to significantly change redox (reduction/oxidation) conditions at the bottom of the lake (at the sediment-water interface), then the dynamics of metals released from lake sediments to the water column could change. The impacts of these water quality changes could be positive or negative depending on a number of factors. Water temperatures, for example, under the increased drawdown could be both cooler and warmer compared to current conditions depending on the time of year and location within the lake.

Further analysis using water quality models of specific drawdown scenarios would be required to quantify the magnitude of potential impacts. However, a 3 percent change in the active storage capacity of the lake is not expected to cause significant changes in water quality.

Long-term impacts

Water Quantity. No long-term impacts from the drawdown would occur as Lake Roosevelt would refill during the next spring runoff period. A small reduction in Columbia River flow would occur in the next spring runoff period to make up for the storage previously released. The reduction in flow would be very small as the lake contains 5.2 million acre-feet of storage. A majority of the flow into Lake Roosevelt occurs during the spring runoff season lasting from April to July, which accounts for 65 to 70 percent of the total annual average inflow volume of 99.3 million acre-feet. The maximum volume released would be 132,500 acre-feet, which represents on average about 0.2 percent of the inflow to Lake Roosevelt during the spring runoff season. The drawdown is also within the normal operating range of Lake Roosevelt so no long-term operational impacts would occur (see Table 2-1).

Water Quality. Long-term effects on water quality from seasonal reductions in water volume should be similar to short-term effects (see above). Long-term impacts to Lake Roosevelt's water quality due to a decrease in reservoir volume are not expected to be significant.

Mitigation

No significant water quantity or quality impacts from the additional drawdown of Lake Roosevelt are expected; therefore, no mitigation is required.

5.1.1.4 Ground Water

Short-term impacts

A seasonal increase in drawdown of Lake Roosevelt may slightly reduce summer ground water levels in the immediate vicinity of the lake for aquifers in direct hydraulic connection with the lake. However, the decline in ground water level is insignificant compared to what occurs every year in the early spring during drawdown for flood protection. Additional summer drawdown is not expected to cause impacts to ground water supplies or ground water discharge to the lake.

Long-term impacts

Long-term effects on ground water from seasonal reductions in water levels should be similar to short-term effects.

Mitigation

Significant impacts to ground water are not anticipated; therefore, no mitigation is required.

5.1.1.5 Water Rights

Short-term impacts

The drawdown of the reservoir could have short-term or long-term impacts depending on the frequency and extent of the drawdown. To the extent Reclamation has senior rights to water in the lake, it has the right to operate the reservoir as it chooses. However, to the extent its rights are junior to other rights from Lake Roosevelt, it may not operate the reservoir in a way that adversely affects the senior rights.

Long-term impacts

In a December 2004 Memorandum of Understanding (MOU) between the state of Washington, Reclamation, and the three irrigation districts within the Columbia Basin Project (South Columbia Basin, East Columbia Basin, and Quincy-Columbia Basin Irrigation Districts), the state, and Reclamation agreed to make best efforts to enter into contracts to allow additional water from Lake Roosevelt to be used downstream (Section 1.3.1.1).

Reclamation is required to apply for a secondary permit to deliver additional water for beneficial use, and Ecology will apply the same four-part test in determining whether to grant the permit as it does for any application for a new water right. "An application filed by the department of ecology or its assignee, the United States Bureau of Reclamation, for a permit to appropriate waters of the Columbia River under Chapter 90.03, for the development of the Grand Coulee project shall be perfected in the same manner and to the same extent as though the appropriation had been made by a private person, corporation or association" (RCW 90.40.090).

The permit is not, however, subject to the Columbia River instream flow rule: "waters withdrawn by the United States pursuant to RCW 90.40.030 prior to the effective date of this rule relating to the second half of the Columbia basin project, and water right permits and certificates hereafter issued by the department of ecology pertaining to such withdrawn waters, are not subject to the provisions of this chapter" (WAC 173-563-020(5)).

To the extent Reclamation has senior rights to water, it has the right to operate the reservoir as it chooses. However, to the extent its rights are junior to other rights from Lake Roosevelt, it may not operate the reservoir in a way that adversely affects the senior rights.

Mitigation

The additional drawdown of Lake Roosevelt is authorized under Reclamation's existing storage rights. Mitigation would be required if exercise of that right would adversely affect senior water rights that divert from Lake Roosevelt. Any required mitigation would be determined by Ecology as the water rights applications are processed.

5.1.1.6 Fish, Wildlife, and Plants

Short-term impacts

Fish. Drawdown of Lake Roosevelt is considered an operational influence on aquatic species. The additional drawdown contemplated under the proposed action is discussed in the following section.

Wildlife and Plants. No short-term impacts to plants and wildlife are anticipated from the drawdown of Lake Roosevelt.

Long-term impacts

Fish. *Non-Drought Drawdown*: The influence of an additional 1.0 foot of drawdown during spring, summer, and early fall months of the irrigation season will be minor relative to existing reservoir operational impacts on aquatic species. Existing drawdowns and subsequent lake elevations during average, wet and dry years are shown in Figure 3-10. Lake elevations under current reservoir operations have the potential to affect:

- Access to tributaries and lakeshore habitats for spawning fish;
- Dewatering of spawning habitats following the spawning season;
- Stranding juvenile fish or aquatic species along shallow littoral habitats including regions near the confluences of major tributaries (Spokane, Sanpoil and Kettle Rivers);
- Water quality by means of suspension of lakeshore sediment;
- Increased likelihood for fish entrainment at the diversion site;
- Reducing the reservoir level will decrease retention time within the reservoir, which could reduce plankton productivity, and result in reduced food sources for fish; and
- Reservoir productivity.

Spring Drawdown: Current spring drawdown for flood control purposes typically begins in mid-March through mid-May when the lake can be drafted (drawn down) 20 to 30 feet, depending on the water year (Figure 3-10). The maximum drawdown during a wet year in 1997 was 81 feet from the full pool elevation of 1,290 feet mean sea level (msl). A 1.0 foot decrease in lake elevations during this time frame is relatively insignificant. However, during the spring season drawdown period, many of the fish species of interest that support lake fisheries either spawn (walleye, yellow perch) or are emerging juveniles (kokanee, rainbow trout). Lakeshore and tributary spawning is limited due to reservoir level fluctuations under current operations (Fickeisen and Geist 1993). Similarly, reservoir drawdown that dewaters existing redds or shallow lakeshore vegetation adversely influences juvenile recruitment to fish populations. An additional 1.0 foot drawdown is not anticipated to alter the current reservoir effects substantially, but may expose more surface area in shallow waters and increase the potential for juvenile fish stranding in specific locales.

Summer Drawdown: After mid-May, the lake is refilled and elevations are maintained in the range of 1,278 to 1,290 feet msl during the summer months. Reclamation operates with the goal of keeping the reservoir above 1,280 feet msl unless below-average water year conditions occur.

Reservoir drafting of an additional 2 feet to 1,278 feet msl is allowed during below-average water years. A 1.0 foot drawdown with the proposed non-drought water right application would increase the risk that lake elevations would fall below 1,280 feet during average as well as below-average water years. As an example, during the dry year in 2003, lake elevations would have fallen to 1,277 feet in late August under the proposed drawdown.

Although the biological effect of slightly lower summer reservoir levels is small, Fickeisen and Geist (1993) suggest existing juvenile walleye rearing habitat downstream of Little Falls Dam can become dewatered due to operations at the dam after mid-July and that further drawdown of Lake Roosevelt from July through August would make such dewatering more severe. Similarly, comments during the scoping meeting on this Management Program EIS suggested shallow water rearing habitat at the mouth of the Kettle River is also sensitive to stranding juvenile fishes during this time frame.

Fall Drawdown: Reclamation prefers to maintain lake elevations in October between 1,283 and 1,285 feet msl to provide kokanee (land-locked sockeye salmon) access to tributary waters, including the Sanpoil River, for spawning and to support brood stock collection at the hatchery facility. During wet years, a small fall drawdown in October, on the order of 5 feet, might be needed to accommodate anticipated inflow to the lake, as occurred in 1997 (Figure 3-10). An additional 1-foot drawdown with the proposed non-drought water right application would increase the risk that lake elevations would fall below 1,283 feet; however, the risk remains only during wet years.

Species Effects: The effects on individual species vary according to the life history stages present and the current fishery management strategies that exist for each species. For example, the fisheries for both kokanee and rainbow trout in the lake are managed by means of hatchery supplementation. The existing fish populations and ongoing fisheries for these species should not be influenced by a 1-foot increase in the irrigation season drawdown. Conversely, Fickeisen and Geist (1993) present information indicating the walleye population in the lake is limited primarily by the abundance of forage fish and that year-class strengths fluctuate substantially with the food base. Forage fish for walleye, including yellow perch, sculpins and cyprinids (minnows), spawn in shallow water. Adhesive eggs of some species are attached to aquatic vegetation. Reproduction of forage fish is limited by reservoir drawdown during spring and summer spawning periods when shoreline vegetation is either not available or dewatered. Annual reservoir refill from mid-May through mid-June prevents the effects of dewatered spawning sites for May spawning fish. However, eggs deposited by early spring spawning species from mid-March through April are at risk of dewatering under current lake management. It is unlikely an additional foot of spring drawdown would have a material influence on walleye or their forage fish that spawn during early spring.

The Colville Tribe is conducting an ongoing resident fish study in the lake to help assess the effects of reservoir levels. Data from the study will be included in the Supplemental EIS for this project.

Drought Drawdown: Like the non-drought drawdown, the influence of 1.5 feet of drawdown during spring, summer and early fall months of the irrigation season under drought conditions will be small. The biological differences between 1.0 and 1.5 feet of added drawdown under

non-drought and drought conditions, respectively, are not measurable and are likely within the range of background daily reservoir fluctuations. The aquatic impacts discussion under non-drought conditions would apply to drought condition drawdowns.

Wildlife and Plants. Operational impacts to plants and wildlife due to the drawdown of Lake Roosevelt would occur during the time period when the water is released from the reservoir. The current operation of Lake Roosevelt includes a large release of water in early spring for flood storage and downstream agricultural use. In average years, a 20- to 25-foot drop in the water level occurs between early April and mid-May (see Figure 3-10). Drawdown of reservoir water levels can affect wildlife species that occupy habitats along the water's edge through the loss of floating vegetation and draining of side channels (USFWS 1982). Conversely, drawdowns may increase shorebird use of additional exposed mudflat areas or use by herons, bald eagles, or other fish-eating birds taking advantage of fish caught in shallow pools (USFWS 1982; Sprandel et al. 2002). Nesting waterfowl and breeding amphibians along the edge of Lake Roosevelt, including geese, ducks, and frogs, are currently impacted by the rapid annual fluctuation of water levels due to reservoir operations. The current drawdown results in loss of eggs, nests, and young each year. Comments received during the scoping meeting on this Management Program EIS suggested that spotted frogs occur in shallow waters at the mouth of the Kettle River and are sensitive to change in water levels. The additional drawdown of the lake is not anticipated to increase the current level of impact substantially, but may expose more surface area in shallow waters.

The proposed drawdown could result in a 1.0 to 1.5-foot decrease in water levels between April and October annually. The water level decrease is expected to be within the normal operation drawdown of the reservoir. Nesting waterfowl and breeding amphibians would be exposed to an increased level of impact with the proposed additional drawdown. However, the slight increase in the current level of impact is not considered to be significant.

Mitigation

Fish. Although the proposed drawdown of Lake Roosevelt is within the normal operation of the reservoir, the potential impacts to resident fish are not known. The net impact of 1.0 or 1.5 feet of additional drawdown of the lake compared to baseline drawdown is not likely measurable. The Colville Tribe is conducting an ongoing resident fish study in the lake to assess the effects of reservoir level fluctuations. This study may identify the need for mitigation which would be resolved as part of the Agreement in Principle (AIP) between the state of Washington and the Confederated Tribes of the Colville Reservation (Section 1.3.1.2). The AIP indicates the state of Washington will pursue replacement water for the Lake Roosevelt drawdown and will:

- Provide for investigation of potential impacts of the Lake Roosevelt drawdown and compensation of the Confederated Tribes of the Colville Reservation for impacts;
- Create an economic development capital fund for the Tribe; and
- Create a fisheries enhancement capital fund and provide for joint work on fisheries management.

The Lake Roosevelt drawdown project includes streamflow augmentation of the Columbia River with 27,500 acre-feet (approximately 460 cfs if the water is distributed over a one-month period) under non-drought conditions, and 44,500 acre-feet (approximately 750 cfs if distributed over one month) of water under drought conditions (see Table 2-1). The water would be put initially into Ecology's Trust Program, but it is planned for downstream flow augmentation in the mainstem Columbia River during low flow conditions. The actual timing and location of Trust Program water discharge will be determined with subsequent agency and tribal consensus. Downstream annual flow augmentation of 460 to 750 cfs could be used to potentially increase water velocities, lower water temperatures and improve water quality conditions in the mainstem river, reducing the risk of these factors on juvenile fish survival, migration delays, and increased prevalence of disease during summer low flow conditions.

The National Research Council report suggests there is a potential risk in maintaining sufficient instream flow levels in the Columbia River mainstem during dry water years in the months of July and August (National Research Council 2004). Smolt migration flow targets are not always met and it is difficult to maintain mainstem flows above the NOAA Fisheries target for the entire fish migration period (National Research Council 2004). In dry years, decreased flow regimes in the Columbia River are problematic and flow targets are routinely missed. The mainstem discharge contemplated as mitigation under this program will assist in reducing such risk. However, as pointed out by other reviewers of the National Research Council report, shifting more water into the July to August period for the mainstem Columbia River may not guarantee measurable benefits to ESA-listed fish species (Olsen 2005).

The largest amount of water contemplated under this mitigation program during drought conditions, if concentrated and discharged annually during the lowest monthly flow (750 cfs compared to the lowest mean monthly flow on record at Priest Rapids Dam; 56,700 cfs), represents a 1.3 percent increase in flow conditions in the free-flowing Hanford Reach section of the Columbia River. Under average conditions the 450 cfs discharged during normal August flow conditions (120,000 cfs below Priest Rapids Dam; USGS, 2006) represents 0.4 percent increase in flow. Such flow level increases are unlikely to have a measurable influence on river temperatures, habitat conditions or aquatic resources in the mainstem Columbia River. Holding water in the Trust Program and discharging only during drought conditions might result in a greater benefit to flow and habitat conditions downstream of Lake Roosevelt than an annual release strategy. Other options for use of this water to leverage benefits to streamflows and fish species (e.g., augmentation during other months of the year, enhancement of tributary flows and source water exchanges) will be explored with the resource agencies.

Wildlife and Plants. No mitigation is expected to be required for impacts to plants and wildlife.

5.1.1.7 Socioeconomics

Short-term impacts

There would be few socioeconomic impacts other than increased activity to implement each drawdown. Owners of some marinas and private boat docks might take steps to anticipate or adjust to each drawdown.

Long-term impacts

No long-term socioeconomic impacts are anticipated.

Mitigation

No adverse impacts to socioeconomics are anticipated; therefore, no mitigation is required.

5.1.1.8 Land and Shoreline Use

Short-term impacts

Drawdowns from Lake Roosevelt already occur on a daily and seasonal basis and no construction or short-term activities would be necessary to accomplish the additional drawdowns for this project. Therefore, no direct short-term impacts on land use are anticipated.

Long-term impacts

Drawdowns at Lake Roosevelt would not be likely to result in long-term changes in land use in the Lake Roosevelt area, because they are within the range of drawdowns that already occur each year. While some individual recreational uses may be affected, the drawdowns are not expected to cause any major shifts in the types of recreation that occur on and adjacent to the lake.

Mitigation

No mitigation is proposed for land use impacts in the Lake Roosevelt area.

5.1.1.9 Cultural Resources

Short-term impacts

No short-term impacts to cultural resources are anticipated as a result of additional drawdowns within the normal range of reservoir operation fluctuations.

Long-term impacts

Depending on the time of year the drawdown occurs, there may be an adverse effect on cultural resources due to the additional drawdown of Lake Roosevelt. The most significant adverse effect during the spring drawdown would be vandalism, particularly off-road vehicle use on exposed beaches and purposeful looting (Yu 2006). An additional 1.5-foot of drawdown during this time could exacerbate the existing adverse effect. Similarly, additional drawdown during times of heaviest recreational use (generally between Memorial Day and Labor Day) could be expected to contribute to the existing adverse effect. The active drawdown zone (approximately 1,220 to 1,290 feet above mean sea level) would be most impacted by the proposed additional drawdown (Galm 1994).

Other impacts to cultural resources could include exacerbation of erosion from wind and water; chemical weathering of organic specimens; and changes to soil chemistry and sediment structure. All of these adverse effects are currently ongoing in the reservoir. Because the additional

drawdown would be within the normal range of reservoir operations, no significant impacts to cultural resources are anticipated.

Mitigation

Because the additional drawdown would be within the normal range of reservoir operation fluctuations, mitigation measures are being conducted by Reclamation to address the ongoing impacts. No further mitigation measures would be necessary.

5.1.1.10 Transportation

Short-term impacts

Drawdowns from Lake Roosevelt occur on a daily and seasonal basis and no construction or short-term activities would be necessary to accomplish the additional drawdowns for this project. Therefore, no short-term impacts to transportation systems are expected from the drawdowns.

Long-term impacts

Drawdowns at Lake Roosevelt would not likely result in long-term effects on transportation systems in the Lake Roosevelt area. Since the drawdown is within the normal range of operations, the Keller Ferry on State Route 21 would not be affected.

Mitigation

No impacts to transportation are expected; therefore, no mitigation is required.

5.1.1.11 Recreation and Scenic Resources and Aesthetics

Short-term impacts

Drawdowns from Lake Roosevelt occur on a daily and seasonal basis, and no construction or short-term activities would be necessary to accomplish the additional drawdowns for this project. Some recreational sites may need to adjust the length of docks, boat ramps, and other structures to accommodate lower lake levels. Because most facilities are designed to accommodate the wide fluctuations that already occur, most facilities will not need modifications. Therefore, only minor short-term impacts to recreation and scenic resources are expected from the drawdowns.

Long-term impacts

Drawdowns at Lake Roosevelt would not likely result in long-term adverse effects on recreational uses in the area. The drawdowns would likely occur during summer months, when recreational use is at it highest. However, the drawdowns would take place gradually and be within the normal range of daily fluctuations during the summer months (approximately 6 to 10 feet). Therefore, it would be difficult for most users to notice the change. At the end of the summer season, the drawdowns would have cumulatively reduced the average high water level of the lake by approximately 1.0 foot in non-drought years, and by approximately 1.5 feet in drought years. This would expose slightly more land above the water's edge, which would create wider beaches in most areas, and higher banks above the water in other areas. While some

individual recreational uses may be affected, the drawdowns are not expected to cause any major shifts in the types of recreation that occur on and adjacent to the lake.

The additional drawdowns for non-drought years would not significantly change the appearance of the shoreline at Lake Roosevelt. The maximum water level for the lake would remain the same, even though the average high and low water levels would be slightly lower in late summer. However, some individuals may notice the changes and perceive them negatively.

Mitigation

No mitigation measures for impacts to recreation are proposed because reservoir fluctuations will be within normal operations.

5.1.1.12 Public Services and Utilities

Short-term impacts

Drawdowns from Lake Roosevelt occur on a daily and seasonal basis and no construction or short-term activities would be necessary to accomplish the additional drawdowns for this project. Therefore, there no short-term impacts on are expected from the drawdowns.

Long-term impacts

Drawdowns at Lake Roosevelt would require the use of additional electricity to pump water from Lake Roosevelt to Banks Lake for delivery to the Odessa Subarea. The increased electrical use would be offset somewhat by increased generation at the Main Canal Headworks and Summer Falls hydroelectric plants as the water is conveyed through irrigation facilities to the East Low Canal.

Power generation at Grand Coulee Dam would change due to the water diverted to the Columbia Basin Project; however, these changes are expected to be within the normal operation of the lake.

Mitigation

Since the proposed drawdowns will be within the normal range of reservoir operations, no mitigation is proposed.

5.1.2 Impacts in Receiving Areas

There are four general receiving areas for the additional water withdrawn from Lake Roosevelt. A total of 30,000 acre-feet will be diverted to the Odessa Subarea to offset some ground water use for irrigation. Instream flows will be provided in the Columbia River downstream of Grand Coulee Dam. Additional water will be supplied to municipal/industrial users in the project area. During drought years, water will be available to supply interruptible water rights holders on the Columbia River mainstem. The impacts of supplying additional water to these areas are described in this section.

No additional studies are proposed for supplying 30,000 acre-feet to the Odessa Subarea. Reclamation will prepare a NEPA EIS on its proposal to supply additional water (above the 30,000 acre-feet). That EIS will be prepared in 2007 (see Section 2.1.2.1).

5.1.2.1 Earth

Short-term impacts

Short-term earth related impacts to receiving areas could result from construction if new or modified conveyance or storage structures are needed to transport the additional water from Lake Roosevelt to the receiving areas (e.g., Odessa Subarea). Typical construction-related earth impacts are discussed in Section 4.1.1.1. Augmenting instream flows and supplying water to municipal/industrial uses or interruptible water rights will not likely cause any short-term impacts to earth.

Long-term impacts

Long-term impacts to earth would be associated with maintenance of any newly constructed infrastructure. This may require maintenance roads to access the infrastructure. Typical construction-related impacts are discussed in Section 4.1.1.1. Augmenting instream flows and supplying municipal/industrial uses or interruptible water rights will not likely cause any long-term impacts to earth.

Mitigation

Appropriate mitigation for construction-related earth impacts is described in Section 4.1.1.1. No mitigation is required for augmenting instream flows.

5.1.2.2 Air

Short-term impacts

No construction would result directly as a result of the additional drawdowns. Indirect impacts could occur if development increases as a result of municipal water suppliers benefiting from the new water supplies. Construction of new infrastructure for the Odessa Subarea could also cause indirect air quality impacts. Construction activities would cause temporary increases in airborne dust and vehicle emissions, but these impacts are not expected to be significant.

Long-term impacts

The only long-term impacts to air quality that could occur indirectly as a result of the additional drawdowns would be associated with development in areas served by municipal water supplies. New urban development would include increased vehicle and other emissions. These emissions are regulated and are not expected to be significant.

Mitigation

Mitigation for construction activities and for long-term impacts would be provided through compliance with local, regional, and state regulations protecting air quality. Mitigation measures would be similar to those described in Section 4.1.1.

5.1.2.3 Surface Water

Short-term impacts

Water Quantity. An increase in the amount of water conveyed through Banks Lake, the Main Canal and the East Low Canal would result from providing a surface water supply to irrigators in the Odessa Subarea. This action could require construction of irrigation water conveyance structures (pump stations, pipelines, canals) from the East Low Canal to areas being served in the Odessa Subarea.

Diversion facilities such as pump stations and fish screens may be needed for municipal/industrial water users that will use water supplied by the drawdown. Short-term construction related impacts could occur similar to those described in Sections 4.1.1.3 and 4.1.2.3.

An increase in flow in the Columbia River downstream of Grand Coulee Dam would result if water is released from storage to meet municipal/industrial and irrigation needs along the Columbia River and to benefit instream flows. The increased flow includes an increased ability to meet minimum mainstem Columbia River flow targets established by NOAA Fisheries, and reserved tribal rights to water to hunt and fish in usual and accustomed places.

The total additional volume of water to be discharge from the lake to the Columbia River as part of the Lake Roosevelt drawdown during non-drought years may be 52,500 acre-feet, and during drought years up to 102,500 acre-feet. The 30,000 acre-feet of water for the Odessa Subarea would not be released into the Columbia River. The total additional flow released from Lake Roosevelt in non-drought years would be approximately 430 cfs (assuming a release over two months) or 850 cfs (assuming a release over one month). Approximately 230 cfs (release over two months) or 450 cfs (release over one month) is allocated specifically for instream flow augmentation during non-drought years. During drought years, the total additional flow released from Lake Roosevelt would be approximately 840 cfs or 1,700 cfs assuming a release over two months or one month, respectively. Approximately 360 cfs (release over two months) or 725 cfs (release over one month) of this drought-year release is allocated specifically for instream flow augmentation during drought years. Water released to benefit downstream interruptible water right holders and municipal/industrial water users would also have an instream flow benefit to the point the water is withdrawn. However, the exact location of downstream withdrawals is not known at this time. As a comparison, the mean monthly flow in the Columbia River downstream of Grand Coulee Dam was 50,590 cfs during July 2001 and 68,700 cfs during August 2001, a severe drought year (USGS 2006f).

Water Quality. Short-term water quality impacts to receiving areas from Lake Roosevelt drawdown would primarily be construction-related if modified or new storage facilities are required to convey the additional waters associated with the project. Impacts to surface water

quality caused by construction of conveyance and small storage have been discussed previously (Section 4.1.1.3). Where water from Lake Roosevelt is used to replace existing ground water use in the Odessa Subarea, the water quality of the surface water, after conveyance to the Odessa Subarea, could be of poorer quality or better quality than the existing ground water source(s) currently used to service the receiving area.

Long-term impacts

Water Quantity. As long as the capacity of the Main Canal and the East Low Canal is sufficient to supply surface water to irrigators in the Odessa Subarea, no long-term operational impacts would result from the conveyance of additional water through the irrigation canals. The capacity of the canals will be studied by Reclamation as part of its NEPA EIS on the Odessa Subarea project.

An increase in the amount of surface water supplied to irrigated acres may increase return flow in the Columbia Basin Project if the irrigators use more surface water than their previous ground water supply. The increase in return flow could increase flow in drainages that are currently dry during the summer, and could increase sedimentation loading in surface water bodies. The increased return flow would most likely end up in Potholes Reservoir, increasing the water supply for the South Columbia Basin Irrigation District. The impacts of this are likely to be small as the irrigators will pump from the East Low Canal to their farms, incurring power costs and providing an incentive to conserve water. The farmers also all currently use pressurized sprinklers, which keep return flow to a minimum.

The additional non-drought releases of 27,500 acre-feet for instream flow and 25,000 acre-feet for municipal/industrial use associated with this project would slightly increase instream flow downstream of Grand Coulee Dam on a permanent basis. The increased flow may result in an increased ability to meet minimum mainstem Columbia River flow targets established by NOAA Fisheries, and reserved tribal rights to water to hunt and fish in usual and accustomed places. However, the flow increase would be a small percentage of the average flow in the river.

Water Quality. Long-term water quality impacts to receiving areas from Lake Roosevelt drawdown would primarily be related to differing water quality in surface waters or in infiltration to shallow ground waters.

The increased amount of water conveyed through Banks Lake, the Main Canal and the East Low Canal may cause increased sedimentation loading of surface water bodies. More detail is needed to assess sedimentation; this potential would be assessed when the project-specific evaluation is conducted.

An increase in flow in the Columbia River downstream of Grand Coulee Dam would result if water is released from storage to meet municipal/industrial and irrigation needs along the Columbia River and to benefit instream flows. Although this increase in flows is small in comparison to overall flow in the Columbia River (see Water Quantity section above), it is possible that small improvements to water quality in the Columbia River could occur from increased releases from Lake Roosevelt. Specific temperature and other water quality impacts of

increased discharge from Lake Roosevelt to receiving waters will be investigated as part of the Supplemental EIS that Ecology will prepare on the Lake Roosevelt drawdowns.

Mitigation

Water Quantity. The amount of surface water supplied to irrigators in the Odessa Subarea should be limited to that needed for efficient operation of their irrigation system.

Mitigation such as best management practices (BMPs) to prevent construction impacts would be implemented, as described in Sections 4.1.1.3 and 4.1.2.3.

Water Quality. The mitigation of surface water quality associated with the conveyance of water to the receiving area would be addressed in project-specific water quality plans if necessary. Real-time monitoring of inflowing water quality would allow observation and mitigation of introduced contaminants through conveyance. Sediment filters, bioswales, settling ponds, and/or removal of accumulated sediments may help limit the accumulation of contaminants or sediments in the impoundment structures and other surface water bodies.

5.1.2.4 Ground Water

Replacement of ground water use with surface water sources in the Odessa Subarea could reduce the rate of ground water level decline in the Odessa Subarea. The 30,000 acre-feet of irrigation water from Lake Roosevelt will replace ground water supplies in the Odessa Subarea, but is not intended to recover ground water levels to pre-development conditions. However, it will improve the rate at which historical ground water level declines have occurred over the past 50 years. Information on current levels of ground water pumping in the Odessa Subarea is not available for this EIS, but will be included in the NEPA environmental documentation that Reclamation will prepare on the Odessa Subarea Special Study.

Use of surface water, rather than ground water, for irrigation could result in changes to water quality in shallow aquifers that receive irrigation recharge, either from on-farm irrigation or from canal leakage.

Short-term impacts

Short-term impacts from replacement of ground water sources in the Odessa Subarea with surface supply from Lake Roosevelt will primarily be associated with improving or building conveyance to bring additional water to the receiving areas (discussed in Section 4.1.1.4).

Long-term impacts

Long-term impacts from replacement of ground water sources in the Odessa Subarea with surface supply from Lake Roosevelt include a reduction in the rate of declining ground water levels in the Odessa Subarea. A recovery of ground water levels (e.g., increases in ground water levels to pre-development levels) is not expected because the amount of replacement is small relative to total ground water use in the Subarea. Replacement of ground water sources may also change local gradients and flow directions.

Ground water quality in shallow aquifers could change as a result of different water quality in irrigation water or in water conveyed to the Odessa Subarea in open canals. Impacts to shallow ground water quality could be positive or negative depending on specific soil and water application characteristics.

Impacts could also be negative in specific areas if shallow water tables cause drainage problems, such as local flooding, inundation, or water-logging of agricultural soils.

Mitigation

Ground water quality and ground water level monitoring in the Odessa Subarea would help to establish current conditions and to assess impacts to water quality from replacement of ground water sources. Additional drains and wasteways may be required to help capture and direct additional surface and ground water.

5.1.2.5 Water Rights

Short-term impacts

No short-term impacts to water rights are anticipated.

Long-term impacts

Municipal/Industrial Areas. According to the December 2004 Memorandum of Understanding (MOU), Reclamation and the state, acting through Ecology, will make their "best efforts" to enter into a water service contract (Municipal and Industrial Contract) to deliver an additional 37,500 acre-feet of water (MOU, Section 12) (see Section 1.3.1.1).[1] Under the MOU, the water would be transferred to the State Trust Water Rights Program as Trust Water Rights. Of the total amount of water, 25,000 acre-feet would be made available to mitigate new water rights for municipal/industrial uses as the need arises, and 12,500 acre-feet would remain as instream flow to benefit flows and fish downstream of Grand Coulee Dam. The MOU also provides that water under the Municipal and Industrial Contract will be allocated to the state in "increments of time and quantity based on satisfactory performance" under the agreement in the MOU regarding the Odessa Subarea (MOU, Section 13). The MOU provides that the first increment of water was to be from January 2006 through December 2007. After that time, increments will run for six-year periods "to align water supply decisions with the next increment of municipal growth as projected through municipal water supply plans required by state law" (MOU, Section 13).

Reclamation holds two state water right certificates to store 6.4 million acre-feet of live storage in Lake Roosevelt and an additional 3,162,000 acre-feet of dead storage in the lake (see Table 3-15). Reclamation currently has beneficial use water right certificates for the delivery of approximately 3 million acre-feet per year for consumptive uses.[2] Therefore, the agency will not

[1] Water service contracts are appropriate where Reclamation has a water right to store the water and the recipient of the water will beneficially use the water under existing water rights.

[2] Reclamation has additional water rights for non-consumptive hydropower generation.

need to store additional water to provide water under the Municipal and Industrial Contract.[3] Providing additional water from storage for new instream and out-of-stream water rights is wholly consistent with the Columbia River Water Management Act.

Odessa Subarea. In Section 14 of the MOU, the parties agreed "to support and pursue the diversion and delivery of an additional 30,000 acre-feet of water from Lake Roosevelt to the Odessa Subarea" (MOU, Section 14). The purpose is to make water available to existing agricultural land within the Subarea, and the priority is to supply water to "lands currently irrigated under state ground water permits where the Odessa aquifer is declining" (MOU, Section 14). The MOU provides that lands that receive water from Reclamation shall not divert water under their ground water permits. The ground water code has a specific provision to address such situations:

> The department shall issue a superseding water right permit or certificate for a ground water right where the source of water is an aquifer for which the department adopts rules establishing a ground water management subarea and water from the federal Columbia basin project is delivered for use by a person who holds such a ground water right. The superseding water right permit or certificate shall designate that portion of the ground water right that is replaced by water from the federal Columbia basin project as a standby or reserve right that may be used when water delivered by the federal project is curtailed or otherwise not available. The period of curtailment or unavailability shall be deemed a low flow period under RCW 90.14.140(2)(b). The total number of acres irrigated by the person under the ground water right and through the use of water delivered from the federal project must not exceed the quantity of water used and number of acres irrigated under the person's water right permit or certificate for the use of water from the aquifer (RCW 90.44.510).

On August 19, 2005, Reclamation filed an application with Ecology for a permit for 30,000 acre-feet to irrigate 10,000 acres of land within the Columbia Basin Project. Specifically, the place of use is an area capable of being served by the Columbia Basin Project distribution system within "Adams, Franklin, Grant and Lincoln Counties and within the boundaries of the Odessa Subarea" (2005 Reclamation Water Right Application). Reclamation states in the application that "[w]ater under the 1938 Withdrawal is currently stored in Franklin D. Roosevelt reservoir for irrigation and power generation. No additional storage is sought or required by this application" (2005 Reclamation Water Right Application).

As is the case for any water right application, Ecology may only approve Reclamation's water right application if there is water available (here from storage in Lake Roosevelt), it will be put to a beneficial use (here irrigation), it will not impair existing rights, and it will not be detrimental to the public interest. Because Reclamation will not need to store additional water, there should be no impairment of existing rights. If it is determined that it is in the public interest to continue irrigated agriculture in the Odessa Subarea, granting Reclamation's permit should be in the public interest.

[3] The reservoir certificates list only irrigation and hydropower as purposes of use of the stored water. However, two beneficial use certificates issued to Reclamation, which have the same priority date as the reservoir certificates, list as purposes of use irrigation, hydroelectric, recreation, municipal, industrial.

Instream Flow Enhancement Downstream of Grand Coulee. The additional instream flow would be acquired through the Municipal and Industrial Contract discussed above. A total of 12,500 acre-feet would be transferred to the Trust Water Rights Program specifically for instream flow. As discussed above, Reclamation would not need a new water right to store additional water because it has sufficient storage capacity under its existing reservoir certificates. There should not be any adverse impacts on existing water rights. To the contrary, the additional water for instream flows would contribute to attaining minimum flows set by rule as well as the flows under the federal Biological Opinion (see discussion of Biological Opinion flows in Sections 3.4.1.1 and 3.6.1.6).

Providing Uninterruptible Flows during Drought Years. Sections 9 through 11 of the MOU include provisions for Reclamation to supply additional water during drought years both for out-of-stream interruptible water right holders and for instream flow enhancement. The state and Reclamation agreed to use best efforts to enter into a contract (the Drought Relief Contract) under which Reclamation would agree to make available up to 50,000 acre-feet of water from Columbia Basin Project storage in Lake Roosevelt during any year when the National Weather Service March 1 runoff forecast at The Dalles for April through September is less than 60 million acre-feet, and the Governor of the state makes a formal request in accordance with the Reclamation States Drought Relief Act of 1991 (P.L. 102-250, the Drought Relief Act).

Under the Drought Relief Contract, Reclamation would provide up to 33,000 acre-feet for existing state-based water rights "along the mainstem" that are currently subject to interruption when flows fall below those set in the 1998 Columbia River Instream Flow Rule (Chapter 173-563 WAC). Reclamation would make available up to an additional 17,000 acre-feet of water to improve instream flows during the drought. Parties holding interruptible water rights would be required to apply to Ecology for a temporary permit. Reclamation would temporarily donate the water for instream flow to the Trust Water Rights Program.

The parties acknowledged in the MOU that the federal Drought Relief Act was set to expire on September 30, 2005, and that any subsequent renewals of the Drought Relief Contract would depend upon extension or reauthorization of the Act (MOU, Section 11). The Drought Relief Act was extended to September 30, 2010 by Title 2, Chapter 3, Sec. 2306 of Public Law 109-234, June 5, 2006 (Emergency Supplemental Appropriations Act for Defense, The War on Terror, and Hurricane Recovery, 2006).

The fact that Reclamation has agreed to provide additional water during drought years, within the bounds of the MOU and any Drought Relief Contract, indicates they have adequate storage capacity and water rights to make such deliveries. The potential impacts on water rights are positive for those holding interruptible water rights and for instream flows and fish.

Mitigation

Appropriate mitigation for any impacts to water rights would be determined by Ecology during the processing of applications for new water rights or water rights changes.

5.1.2.6 Fish, Wildlife, and Plants

Short-term impacts

Fish. No short-term impacts to fish are anticipated, but long-term impacts are described below.

Wildlife and Plants. No short-term impacts to plants and wildlife are anticipated. Some construction may be required for infrastructure to supply the Odessa Subarea.

Long-term impacts

Fish. The location and timing of Trust Program water discharge has not been defined to date, making assessment of the adverse or beneficial influences to aquatic resources difficult. In general, prevailing management strategies suggest the more mainstem water volume the better, especially during less-than-average water years in July and August when meeting target instream flow levels at McNary Dam is problematic (National Research Council 2004). However, the contemplated flow increases from Lake Roosevelt drawdown of 460 to 750 cfs on a single month basis during non-drought and drought years, respectively, represents only 1.3 percent of the seasonal minimum monthly flow on record and 0.3 percent of the mean monthly August flow at Priest Rapids Dam. This relatively insignificant magnitude of flow increase makes the augmentation from Lake Roosevelt drawdown inconsequential with respect to biological resources.

With respect to providing uninterruptible flows during drought years, the National Research Council (2004) review of the Columbia River Initiative did not recommend providing uninterruptible water rights. They stated:

> Conversion of interruptible water rights to uninterruptible status makes an adaptive management response to the benefit of aquatic resources and ESA listed species more difficult. Interruptible water rights are interruptible so that at times of scarcity, instream flows can be protected. Making any out-of-stream right uninterruptible reduces flexibility to retain water in the river when salmon mostly need it during low-flow periods.

The National Research Council (2004) concluded:

> The conversion of water rights to uninterruptible status will decrease flexibility of the [water management] system during critical periods of low flows and comparatively high water temperatures. Conversions to uninterruptible rights during these critical periods are not recommended.

Similarly, Battelle, Pacific Northwest Division suggested in a letter report to the Columbia-Snake River Irrigators Association (CSRIA) that uninterruptible water rights in their water management plan proposal might not be supportable (Dauble et al. 2006).

Drawdown of Lake Roosevelt for the Management Program will result in increased water flow through Banks and Billy Clapp Lakes. Both of these reservoirs are common to all of the Supplemental Feed Routes. Reclamation and Ecology have not identified Banks Lake storage

and drawdown operating options under the Management Program. Consequently, the timing, magnitude, and duration of resulting elevations and flow velocities in Banks and Billy Clapp Lakes have not been determined to date. These project specifics will be addressed in the Lake Roosevelt Drawdown Supplemental EIS. Possible short- and long-term effects on aquatic resources in the lake based on altered flow regimes include the following ecosystem-related issues:

- Changes in shoreline vegetation and nearshore habitat structure and resulting disruption of fish spawning, rearing and refuge sites;
- Changes in water quality, including seasonal dissolved oxygen and turbidity levels;
- Changes in lake productivity, including phytoplankton, zooplankton and subsequent food chain issues for all aquatic consumers;
- Altered predator/prey relationships;
- Altered fish population dynamics as a result of the habitat, productivity and predation changes; and
- Changes in fish entrainment with increased flows in Banks Lake.

Wildlife and Plants. No long-term impacts to plants are anticipated. Increased flow volumes during drought years may help to sustain riparian habitat in those reaches affected by declining water levels. Long-term impacts to the migratory mule deer population may be increased from current levels if infrastructure such as canals were built to supply water to the Odessa Subarea. Mule deer in the Odessa Subarea could experience direct mortality by falling into concrete-lined canals, and the canals can act as a barrier to deer migration.

Mitigation

Fish. Greater beneficial effects for instream habitat conditions and aquatic resources can be realized by storing the mitigation water in the Trust Program and releasing larger volumes during drought years than through an annual release for downstream flow augmentation. The drought cycle over the past century is approximately one drought in seven years. Releasing Trust water stored in Banks Lake once in seven years downstream in the mainstem Columbia River would result in approximately a 10 percent increase in mean monthly flows at Priest Rapids Dam. This level of flow release is more meaningful and it could be timed when aquatic resources would need it the most. Other options for use of this water to leverage benefits to streamflows and fish species (e.g., enhancement of tributary flows and source exchanges) will be explored with the resource agencies.

Wildlife and Plants. Mitigation for construction activities and for long-term impacts would be provided on a project-by-project basis and would be similar to measures described in Section 4.1.1.6.

5.1.2.7 Socioeconomics

Short-term impacts

Increased certainty of water for irrigation might increase the expected future productivity of irrigated land. This in turn could trigger increases in the market value of irrigated farmland and farm-related residential and commercial/industrial land.

Long-term impacts

In general, impacts associated with irrigation, municipal/industrial, and other uses of diverted water could be similar, on a per-unit basis, to those associated with potential uses of increased supplies under the storage option. The availability of surface water for irrigation in the receiving areas would likely enable continuation of current economic activities associated with irrigated agriculture. This would be especially evident for potatoes and other water-intensive crops that otherwise would cease because of the declining supplies of ground water in these areas. Bhattacharjee and Holland (2005) estimated the annual production of potatoes in the Odessa Subarea generates $179 million in sales in the surrounding counties, 1,136 jobs, and $54 million in income. They also found the economic effects of potato processing are more than twice as large. Changes in crop production stemming from new surface water supplies would interact with agricultural markets: increases in production generally would lower prices, and decreases in production would raise them. Irrigators' net earnings would increase or decrease proportionately with the change in costs of irrigating with new surface water supplies. The economic impacts of a change in irrigators' net earnings, if any, would depend on how it affects their decisions about which crops to grow on how many acres, how much water conservation to employ using which technology, how much money to spend within the local economy, and other economic concerns. Increased reliance on surface water, rather than on ground water, may increase irrigators' susceptibility to declines in water supplies during periods of drought, and expand future demands placed on public and private drought-assistance programs. Increased flows may affect the amount of water available to generate hydropower.

Mitigation

Adverse impacts, if any, may induce affected parties to seek mitigation.

5.1.2.8 Land and Shoreline Use

Short-term impacts

Indirect impacts could occur if development increases as a result of municipal water suppliers benefiting from the new water supplies. Because the municipal service areas that might receive the water are generally small and spread over a large region, new water supplies for these areas are not expected to result in large amounts of growth in any one location, or in significant short-term impacts to land use.

Long-term impacts

No new development would result directly as a result of the additional drawdowns. Indirect long-term land use impacts could occur as a result of development in areas served by municipal water supplies that currently have interruptible water rights. Indirect impacts could also occur from the conversion of land from one type of agriculture to another. Impacts from these types of crop conversion are discussed in Section 4.1.1.8. In the Odessa Subarea, the additional water supply is expected to allow existing agricultural practices to continue. Changes in types of agriculture on properties with interruptible water rights are not likely to produce significant changes in land use, but minor changes in land use patterns could occur as discussed in Section 4.1.1.8.

All counties potentially affected by these new water supplies, except for Lincoln and Okanogan, are fully planning under GMA, and therefore have considered the impacts of development as part of their comprehensive planning process. Compliance with these comprehensive plans is expected to minimize any significant impacts to land use. Any large development project would undergo separate SEPA review prior to proceeding, which would provide an additional opportunity to examine land use impacts.

Lincoln and Okanogan Counties have not developed comprehensive plans. They also do not have any major cities and have relatively low growth rates. The largest municipalities in Okanogan County include Omak (population: 4,495), Brewster (2,055), Oroville (1,615), Tonasket (1,025), Twisp (1,000), Coulee Dam (890), and Pateros (595) (Okanogan 2006). The largest municipalities in Lincoln County include Davenport (1,730), Odessa (957), Wilbur (914), Reardon (608), Sprague (490), and Harrington (426) (OFM 2006). Growth as a result of the availability of new water supplies for these municipal areas is not expected to result in significant land use impacts because of the relatively small sizes of the towns. As discussed above, any large development project would undergo separate SEPA review prior to proceeding, which would provide an additional opportunity to examine land use impacts.

Mitigation

Mitigation for construction activities and for long-term impacts would be provided through compliance with local and state regulations regarding land use. Mitigation measures for land use impacts would be similar to those described in Section 4.1.1.8.

5.1.2.9 Cultural Resources

Short-term impacts

Short-term impacts in receiving areas are expected to be generally low. Ground-disturbing activities such as construction have the potential to impact cultural resources. Providing additional water could allow diversification of agricultural land use, which has the potential to impact cultural resources during planting of orchards or plowing. Possible impacts could occur to any historic structures that might be present in the receiving areas.

Long-term impacts

Long-term impacts in receiving areas are expected to be generally low. Municipal or industrial uses may eventually increase land development, which could impact cultural resources. Flow enhancement may impact cultural resources by increasing erosion due to fluctuations in water levels and potential additional influx of cattle.

Mitigation

Development of a Cultural Resources Management Plan (CRMP), as described in Section 4.1.1.9, would include identification of appropriate mitigation measures for impacts in receiving areas. Impacts may be mitigated through avoidance of cultural resources.

5.1.2.10 Transportation

Short-term impacts

No significant short-term impacts on transportation are expected, because construction in the receiving areas would be very limited and spread over a wide area. Construction activities would have transportation impacts similar to those described in Section 4.1.1.10. If new infrastructure were required to deliver water to the Odessa Subarea, it would likely include canals and pipes. Canals and pipes, because of their linear nature, would likely intersect with roads and result in construction delays in some areas. If major infrastructure improvements are needed, additional environmental review will be conducted on the specific projects.

Long-term impacts

Development in areas served by municipal water supplies that would benefit from the project could increase, which would increase demands on transportation systems. As described in the land use section above, new development expected as a result of the new water supplies is expected to be consistent with adopted land use plans and policies, which have incorporated transportation requirements to accompany growth projections.

Mitigation

Mitigation for construction impacts on transportation systems would be provided on a project-by-project basis, and would be similar to measures described in Section 4.1.1.10.

5.1.2.11 Recreation and Scenic Resources and Aesthetics

Short-term impacts

No construction would result directly as a result of the additional drawdowns. The only construction that could occur indirectly as a consequence of the new water supplies would be associated with development in areas served by municipal water supplies that would benefit from the project, and construction of new irrigation infrastructure for the Odessa Subarea.

Construction activities would have impacts similar to those described in Section 4.1.1.11. Most of these construction activities would occur in or near already developed areas, or on agricultural

lands. Thus, the temporary aesthetic impacts of construction would not likely be as noticeable or as adverse as they would if they were to occur in natural areas.

Recreation resources in the receiving areas, including parks and wildlife areas, could be affected by some of the construction activities described above, depending on the location of the development. These temporary impacts are not expected to be significant.

Long-term impacts

As a consequence of the new water supplies, development in areas served by municipal water supplies that would benefit from the project could increase. This could affect scenic resources if the development occurs within scenic areas. Additional development and population growth would also increase the demand for recreation areas. However, most of this development would be expected to occur in already developed areas, and thus additional development would not likely have significant adverse impacts.

Providing non-interruptible water supplies to existing interruptible water rights holders would not likely adversely affect recreation or scenic resources. Recreation facilities, such as playfields and parks, could benefit from more reliable municipal water supplies. This could also encourage new development, increasing the demand for recreational resources.

Mitigation

Mitigation measures for recreation and scenic impacts would be similar to those described in Section 4.1.1.11.

5.1.2.12 Public Services and Utilities

Short-term impacts

Because construction in the areas receiving water from the drawdown would be limited and spread over a wide area, no significant short-term impacts on public services and utilities are expected. Construction activities would have impacts similar to those described in Section 4.1.1.12.

Long-term impacts

Water from drawdowns would benefit municipal water suppliers and irrigation districts by providing more water to meet growing demand and by providing more dependable water supplies in drought years. The increase in electrical demand associated with pumping from the East Low Canal to the Odessa Subarea may be offset by reduced electrical demand when pumping from deep wells ceases.

Mitigation

Mitigation for construction impacts on public services and utilities would be provided on project-by-project basis, and would be similar to measures described in Section 4.1.1.12.

5.2 Supplemental Feed Route

Reclamation is proposing three alternatives for a Supplemental Feed Route to supply water to Potholes Reservoir—Crab Creek, W20 Canal, and Frenchman Hills Wasteway. The purpose of the Supplemental Feed Route is to provide a more reliable supply to Potholes Reservoir. Reclamation is currently conducting feasibility studies on the feed route alternatives. Results from some of the studies will be included in the NEPA EA that Reclamation will prepare on the Supplemental Feed Route.. Reclamation will be preparing a NEPA EA on the Supplemental Feed Routes in 2007. The EA will determine the specific impacts and mitigation of the proposal. The following sections describe the general impacts that would be associated with the alternative routes.

5.2.1 General Impacts of a Supplemental Feed Route

5.2.1.1 Earth

Short-term impacts

This action includes construction or modification of feed water conveyance facilities (open canals and channels, pipelines, siphons, hydraulic structures). Construction of new conveyance facilities and/or drains and wasteways will involve earth disturbances. Typical construction-related earth impacts are discussed in Section 4.1.1.1.

Long-term impacts

The range of proposed flow contributions to Crab Creek is approximately 100 to 500 cubic feet per second (cfs). The flows exceed this level 90 percent of the time. The Crab Creek flows range from approximately 10 to 40 cfs from April to September. The channel governing flow (bank full flow) in Crab Creek is approximately 300 cfs (see Section 5.2.1.3, Surface Water). The increased flow contribution may cause changes in channel morphology, and may increase erosion and sedimentation. Increased flow contributions may also change localized drainage characteristics. Specific impacts will be evaluated by Reclamation in its NEPA EA on the Supplemental Feed Route project. Reclamation is currently conducting a study on the erosion and sedimentation potential on the proposed Crab Creek alternative. The results of that study will be included in the NEPA EA that Reclamation will prepare on the Supplemental Feed Route..

Mitigation

Mitigation of typical construction-related earth impacts is discussed in Section 4.1.1.1. Mitigation for changes in soil saturation, localized impacts from changes in water table elevations, and drainage conditions will be evaluated by Reclamation in its NEPA EA on the project. Assessment of potential impacts and the development of mitigation approaches to channel morphology require a more detailed inventory and characterization of the existing geomorphic and hydrologic channel conditions.

Mitigation measures addressing potential erosion and sedimentation would be developed using input from the channel geomorphic inventory to delineate potential problem areas. Mitigation approaches may include:

- Modification of the operation of additional flow releases to match and/or maintain stable channel conditions;
- Erosion protection and bank stabilization projects;
- Sediment management projects such as sediment filters;
- Bioswales, settling ponds, or placement and/or removal of accumulated sediments;
- Inventory and/or monitoring of problem erosion areas;
- Enhanced vegetation planting programs;
- Improvement of floodplain connectivity; and
- Long-term monitoring of channel conditions in order to support adaptive management approaches.

5.2.1.2 Air

Short-term impacts

The Frenchman Hills route would require minor construction. The Crab Creek and W20 Canal routes would require major construction. Air quality impacts associated with construction for the alternative routes would be similar to those described in Section 4.1.1.2.

Long-term impacts

Rerouting water through any of the routes is not likely to affect air quality or climate over the long term.

Mitigation

Mitigation measures for air quality impacts during construction would be similar to measures described in Section 4.1.1.2.

5.2.1.3 Surface Water

Short-term impacts

Water Quantity. This action includes construction or modification of feed water conveyance facilities (open canals and channels, pipelines, siphons, hydraulic structures). Short-term construction impacts to surface water bodies could occur similar to those described in Section 4.1.1.3.

Water Quality. The three Supplemental Feed Route alternatives involve varying levels of construction or modification of feed water conveyance facilities. Construction and modification of new conveyance facilities and/or drains and wasteways will involve earth disturbances that could cause short-term impacts to surface water quality. Typical construction-related water quality impacts are discussed in Section 4.1.1.3.

The Crab Creek route will require modifications to the outlet at Pinto Dam to minimize the potential for erosion; modifications to the outlet of Brook Lake to prevent inundation of the toe drains at Pinto Dam; modifications (deepening) to the Crab Creek channel from Brook Lake to Round Lake; and replacement of culverts at Stratford Road. Erosion and sedimentation are likely to occur with channel modification and construction and the higher flows associated with the Crab Creek alternative (see Section 4.1.1.3). Reclamation is currently studying the potential for erosion and sedimentation in Crab Creek. The results of the study will be included in the NEPA EA Reclamation will prepare on the Supplemental Feed Route.

The W20 Canal route would require the construction of approximately two miles of new conveyance to connect to the Rocky Ford arm of Moses Lake along with other improvements. Construction may impact surface water quality as described in Section 4.1.1.3.

The Frenchman Hills option is not expected to require additional construction of conveyance facilities other than modification of road culverts. Impacts of culvert modification to surface water quality are described in Section 4.1.1.3.

Long-term impacts

Water Quantity. For the Crab Creek Supplemental Feed Route alternative, water would be discharged from Billy Clapp Lake to Brook Lake and routed down middle Crab Creek, increasing the volume of water typically conveyed down the stream at certain times of the year. The rate of flow that may be conveyed down lower Crab Creek could range from 100 to 500 cfs, with the higher flows anticipated for the summer period in drought years under one operational alternative. The increased flow could exceed the two-year recurrence interval peak discharge for Crab Creek near Moses Lake, which is 322 cfs (USGS 2006). A two-year flood is the approximate "channel forming" flow that creates the channel shape. Therefore, the Crab Creek channel may enlarge in response to higher flows causing erosion in excess of what currently occurs as the channel changes shape to meet a new "channel forming" flow.

Some of the water discharged into Crab Creek will infiltrate into ground water, reducing the increase in flow in Crab Creek. The ground water is expected to resurface in Rocky Ford Creek, increasing surface water flow in that stream. The amount that will infiltrate is not known at this time; tests have been undertaken by Reclamation to estimate that amount.

An increase in flow during the spring (without a change in the total annual volume of feed flow to the Potholes) could also occur in the feed route path to Moses Lake for the W20 Canal route. For this feed route alternative, 500 to 600 cfs would be delivered through the W20 system to a new outlet at Moses Lake. The feed would need to be scheduled prior to May 18 to avoid a conflict with discharge regulations for aquatic herbicides. The feed would occur through existing or new irrigation canals and pipelines. An increase in flow through Moses Lake may also occur depending on the amount of water discharged through this route compared to the amount that currently flows through Moses Lake from the existing feed route through Rocky Coulee Wasteway.

An increase in flow in the Frenchman Hills Wasteway during the spring would occur in the feed route to Potholes Reservoir for that alternative. Road culverts at Dodson Road and Road C SE

would need to be replaced to allow the additional feed. A maximum feed of 700 cfs may be conveyed through Frenchman Hills Wasteway during the spring when sufficient space in the West Canal is available and prior to the need to apply aquatic herbicides to the canal.

Reclamation is conducting a feasibility study of the three alternatives and an erosion and sedimentation study on the Crab Creek alternative. These studies will be included in the NEPA EA Reclamation will prepare on the Supplemental Feed Route. In addition, Reclamation will be preparing a NEPA EA on the Supplemental Feed Route, which will evaluate potential impacts to surface water.

Water Quality. The Supplemental Feed Route alternatives will all involve linking water bodies and conveyance facilities that have different water quality. Ultimately, water quality in Potholes Reservoir could change because the timing of the additional flows in the Supplemental Feed Routes would change. Depending on the feed route chosen, water quality in Lake Roosevelt, Banks Lake, Billy Clapp Lake, Brook Lake, Upper Crab Creek, Moses Lake, Rocky Ford Creek, Rocky Coulee Creek, West Canal, and the Frenchman Hills Wasteway all have the potential to impact water quality in Potholes Reservoir. Water quality impacts are being evaluated as part of the EA on the Supplemental Feed Routes.

The Crab Creek alternative is not longer than the current route and is therefore not expected to increase the temperature of the water flowing into the receiving areas. However, the Crab Creek route could decrease Rocky Coulee Creek's temperature by potentially increasing ground water inputs from the additional infiltration from Crab Creek. Although the W20 Canal and Frenchman Hills alternatives are longer than the existing route, the use of these routes would end in mid-May and would not occur during the summer months when temperature issues are most critical.

Fecal coliform found in Crab Creek may lead to increased loading in Potholes Reservoir. Similarly, the excess nutrients, 2,3,7,8-TCDD and total PCBs found in Moses Lake may lead to increased loading in Potholes Reservoir for both the Crab Creek and W20 feed route alternatives which convey water through portions of Moses Lake. Changing the quantities of feed flow through the Supplemental Feed Routes at different times of the year may result in an increase in contaminant concentrations as the water flows through the system. Spreading the total volume of feed flow over a longer period (the annual volume of feed flow is not expected to change) decreases the dilution effects from larger volumes of flows through the Supplemental Feed Route(s).

The temperature of water delivered to Moses Lake could have an influence on lake dynamics and trophic state. Depending on the timing of delivery, larger inflows of cooler water could improve water quality and existing eutrophic or hypereutrophic conditions present during the summer months. The Crab Creek alternative has the potential to improve the water quality in Moses Lake. The additional water fed through the lake in the summer months could dilute the concentration of total phosphorus and reduce algal mass (Ecology, 2006c). However, the Crab Creek alternative may introduce additional phosphorus as it migrates through the Adrian Sink from Crab Creek to Rocky Ford Creek. The W20 and Crab Creek alternatives could increase water circulation and flush phosphorus from the main arm of the lake below the mouth of Rocky Ford Creek. Increased sediment loads could increase nutrient or other contaminant loads and

further degrade water quality. The Frenchman Hills route would not convey water through Moses Lake.

Reclamation will evaluate potential water quality impacts of the Supplemental Feed Route in its NEPA EA on the project.

Mitigation

Water Quantity. A review of the potential for erosion and flooding along each feed route path would be conducted during the project-specific evaluation. Mitigation such as best management practices to prevent construction impacts would be implemented, as described in Sections 4.1.1.3 and 4.1.2.3.

Water Quality. Reclamation plans to study phosphorus and nitrogen levels in the proposed W20 Canal reach and Crab Creek area and is currently developing a water quality study for the Frenchman Hills Wasteway. The results from these evaluations will be incorporated into the project design. Past surface water quality sampling has occurred only during the irrigation season so Reclamation intends to begin sampling during the non-irrigation season. The additional sampling will provide a better understanding of background phosphorus and nitrogen levels and indicate the contribution of phosphorus and nitrogen to surface water bodies via irrigation water (Hoff, personal communication, 2006). The NEPA EA that Reclamation will prepare will determine appropriate mitigation measures for impacts to surface water.

5.2.1.4 Ground Water

Short-term impacts

Short-term impacts to ground water associated with the development of any of the three feed route alternatives would primarily be associated with construction or modification of feed water conveyance facilities. Impacts to ground water due to these types of construction activities have been discussed previously in Section 4.1.1.4.

The Crab Creek route is a natural waterway and is expected to require some channel modification to accommodate increased flows. Given the hydraulic continuity between ground water and surface water over some reaches in this stream, it is expected that impacts may include short-term changes to shallow ground water levels and ground water/surface water interaction associated with channel modifications.

The W20 Canal route would require the construction of approximately two miles of new conveyance to connect to the Rocky Ford arm of Moses Lake along with other improvements. Construction could temporarily impact shallow ground water.

The Frenchman Hills option is not expected to require additional construction of conveyance facilities other than modification of road culverts. These modifications would have minimal potential to impact ground water.

Long-term impacts

The addition of surface water in any of the lakes, canals and wasteways for any of the Supplemental Feed Route alternatives may increase ground water levels along the route and in the vicinity of the impoundments due to an increased hydraulic head in the impoundments and seepage along the conveyance facilities. Additional water from the Supplemental Feed Routes will not increase the water level of Potholes Reservoir. Therefore, there would be minimal changes in ground water flow around Potholes Reservoir due to implementation of any of the Supplemental Feed Route alternatives over the long term.

Development of a Supplemental Feed Route would provide flexibility to deliver replacement water for ground water use in the Odessa Subarea. The replacement water would decrease ground water use and declines in ground water levels.

Crab Creek Alternative. Crab Creek becomes a perennial waterway just upstream of Irby (Garrett 1968). If the Crab Creek route is chosen, ground water may be recharged along the stream's natural route. From Brook Lake above Stratford, through Adrian, ground water is present in gravels directly below the surface drainage of Crab Creek. Crab Creek loses much of its flow to ground water in this reach. The Adrian sink extends for nearly three miles about midway between Adrian and Soap Lake; the normal flow and even moderately high flows of Crab Creek are absorbed by the gravels, and only during extreme flood conditions does any surface drainage reach Moses Lake through Crab Creek (Mundorff et al. 1952; Blanchard, personal communication, August 2006). The ground water is expected to resurface in Rocky Coulee Creek, which drains to Moses Lake, increasing surface water flow in that stream. Water temperatures in Rocky Coulee Creek often exceed the 18º C criterion from May through August (Ecology 2006c). Additional ground water flow to Rocky Coulee Creek could be a source of cool water for the stream that could improve the stream's water quality.

As part of the Supplemental Feed Route Study for Potholes Reservoir, Reclamation is conducting hydraulic testing of Crab Creek. Test flows were initiated in August 2006 to determine how water is flowing through Crab Creek below Brook Lake to determine the stream's potential as a supplemental route to convey water downstream and through Moses Lake to Potholes Reservoir. This test should provide data regarding potential surface water losses to ground water in the vicinity of Adrian Sink, as well as concerns about erosion and sediment that might be subsequently transported to Moses Lake. Results of this study will be included in the NEPA EA Reclamation will prepare on the Supplemental Feed Route.

W20 Canal Alternative. Much of the W20 route is unlined and it is expected that there would be hydraulic connection between flow in the canal and shallow ground water. Canal seepage to shallow ground water would occur along the route and could potentially increase as a result of additional water in the canal.

Frenchman Hills Wasteway Alternative. The majority of the Frenchman Hills route is unlined, open channel with no impoundments. Therefore, it is expected that surface water to ground water interaction and general canal seepage in the vicinity of this route would occur and could potentially increase as a result of additional water in the canal. Additional surface water in the Frenchman Hills Wasteway may slow the rate of ground water discharge into the wasteway.

Mitigation

Impacts to ground water resulting from the implementation of Supplemental Feed Route may be mitigated by conducting appropriate hydrogelogical studies prior to project implementation and incorporating the results of these investigations into project design. The degree of study would depend on the magnitude of the project's impact to that area.

Because drainage is a consideration throughout the project area, drains and wasteways have been constructed to help mitigate drainage impacts (Reclamation 2006e). Additional drains and wasteways may be required to help capture and direct additional surface and ground water resulting from additional water from the feed routes.

While natural mixing and dilution of ground water may sufficiently mitigate localized changes to ground water quality, increased public awareness and sensitivity to the potential problem may help ensure ground water quality. Decreasing potential contamination pathways, such as the removal of contaminated sediments in areas expected to become saturated, will help decrease the likelihood of contaminants leaching into the ground water.

5.2.1.5 Water Rights

Short-term impacts

No changes to Reclamation's water rights would be required to deliver water via a Supplemental Feed Route. No water right impacts are anticipated.

Long-term impacts

Reclamation currently moves water from storage in Banks Lake to the Potholes Reservoir via the East Low Canal. The development of Supplemental Feed Routes would not require new water rights; however, several sections of Chapter 90.40 RCW do govern such activities. RCW 90.40.020 provides that "[t]he United States shall have the right to turn into any natural or artificial water course, any water that it may have acquired the right to store, divert, or store and divert, and may again divert and reclaim said waters from said course for irrigation purposes subject to existing rights."

RCW 90.04.050 addresses lands owned by the state, "including the beds and shores of any lake, river, stream, or other waters" and requires the United States to list the lands where the United States acquires rights-of-way for canals, ditches, or laterals, which are then reserved from sale by the state. "The title to the beds and shores of any navigable lake or stream utilized by the construction of any reservoir or other irrigation works created or constructed as a part of "an appropriation by the United States, "shall vest in the United States to the extent necessary for the maintenance, operation and control of such reservoir or other irrigation works" (RCW 90.40.040).

No changes to Reclamation's water rights would be required to deliver water via a Supplemental Feed Route. No water right impacts are anticipated.

Mitigation

No impacts to water rights are anticipated; therefore, no mitigation is required.

5.2.1.6 Fish, Wildlife, and Plants

Short-term impacts

Fish. Potential impacts related to using alternative routes to supply supplemental feed water to Potholes Reservoir from Billy Clapp Lake will depend the type of channel and the presence of aquatic resources. The three Supplemental Feed Routes include middle Crab Creek, the W20 Canal, and Frenchman Hills Wasteway. The existing conditions and biological resources present within each of these routes have been described in Section 3.7.1 and Section 5.2.1.3.

The middle section of Crab Creek between Brook Lake and Willow Lakes is a natural but ephemeral channel bed. The stream is routinely dry along major portions of this reach for years at a time. This reach readily loses water to the aquifer and is seldom flowing. The channel does not support aquatic species use and provides only patchy areas of habitat for aquatic invertebrate organisms. The W20 Canal and Frenchman Hills Wasteway are developed irrigation canals. Although fish can occasionally find their way into the canals, these alternative routes are not regarded as waterways that support aquatic species production.

Construction impacts for improvements to all three of the Supplemental Feed Routes will comply with WDFW Hydraulic Project Approval (HPA) permits where appropriate to minimize adverse influence to aquatic species due to activities below the Ordinary High Water Mark (OHWM). Short-term waivers for water quality standards including turbidity might be needed during construction of channel capacity improvements in Crab Creek.

Wildlife and Plants. Reclamation is currently studying the Supplemental Feed Routes. Construction of the new conveyance line will result in disturbance and removal of vegetation. If the areas provide habitat for wildlife, that habitat will be lost. Similarly, wildlife occupying those habitats, such as birds, small mammals, amphibians or reptiles, could be lost or displaced by construction. If the habitat is shrub-steppe and supports wildlife species dependent on shrub-steppe habitat, the impact will be considered significant due to the lack of habitat in the project area and the difficulty in restoring disturbed soils or vegetation. Wildlife in the vicinity of the construction areas would also be temporarily disturbed and displaced by noise and construction activities.

Long-term impacts

Fish. Reclamation modeled preliminary flow volumes and rates for the Supplemental Feed Routes (see Section 3.4.3.2; Blanchard 2006). Supplemental feed from Billy Clapp Lake is estimated to range from 100 to 500 cfs, with the highest flows occurring in summer (Blanchard 2006). For the Crab Creek alternative route, some of the 100 cfs release is anticipated to be lost to ground water. Reclamation is currently studying the amount of infiltration to ground water.

The two-year peak flow event in Crab Creek near the Moses Lake gaging station (USGS 12467000) is 322 cfs. Hydrologists consider a two-year event to be representative of a channel-forming flow, meaning the flow is sufficient to scour and move bed materials and realign the stream banks. Transporting an estimated 400 to 450 cfs of supplemental feed in Crab Creek in April and May will exceed the existing two-year event on an annual basis. This volume of water in the natural channel will likely increase the risk of bed scour and bank erosion, and could realign the channel on an annual basis until a state of equilibrium is reached with the channel banks. The potential impacts to aquatic species include scoured shellfish beds or spawning sites for early spring spawning fish species in Crab Creek, and/or increased magnitude and frequency of turbidity and sedimentation of existing shellfish beds and spawning sites, compared to current conditions in both Crab Creek and possibly Moses Lake. Increased levels of turbid water may also have an adverse influence on fish feeding behavior and rearing success. Contaminants associated with re-suspended sediments might also lower aquatic productivity.

An increased stable streamflow level in Crab Creek and additional flow in Rocky Ford Creek for the balance of the year should provide benefits to all aquatic species. Such benefits are likely given the low overall streamflows prevalent in Crab Creek and a near doubling of streamflow in Rocky Ford Creek (Blanchard 2006).

Using either the W20 Canal or the Frenchman Hills Wasteway to transport an additional 500 to 600 cfs in April and early May is unlikely to have an influence on aquatic habitat. There are no known spawning or rearing habitat features or native freshwater shellfish in the developed irrigation canal system.

Moses Lake reservoir elevations are not anticipated to fluctuate substantially with the Crab Creek feed route alternative. However, deposition of sediments and increased turbidity with the release of 500 cfs in Crab Creek in April and May could have an influence on the walleye fishery in Moses Lake that peaks in intensity during the same period as the release of feed water.

Wildlife and Plants. The W20 Canal and Frenchman Hills Wasteway routes would not cause long-term impacts to wildlife and plants. The Crab Creek route may benefit some species by providing water during dry seasons. The current Crab Creek drainage is an ephemeral system composed of dry grassland and shrub-steppe habitats and ponds. Introducing permanent water flow through the system will likely alter vegetation communities in the long term, converting arid habitats to riparian areas, wetland marshes, or shallow ponds. Additional water in Crab Creek may create new habitat for waterfowl species, especially during spring and fall migration. However, species currently using the grassland and shrub-steppe would be displaced to adjacent habitats. Those species dependent on shrub-steppe habitats would experience loss of habitat over time and associated decreased populations.

Mitigation

Fish. Reclamation is considering improving Crab Creek in this reach to minimize erosion and sediment transport issues. Flow tests are underway to identify the loss rate to ground water and channel capacity in Crab Creek. Results will help identify proper techniques for minimizing adverse influence to aquatic habitats based on the increased potential for scour and erosion with this alternative. No mitigation would be required for the W20 Canal or Frenchman Hills

Wasteway alternatives. Mitigation related to altered flow regimes in Banks and Billy Clapp Lakes will be addressed in the Lake Roosevelt Drawdown Supplemental EIS.

Wildlife and Plants. No mitigation measures are anticipated for this early action. A NEPA EA for the Supplemental Feed Routes is currently being developed and is scheduled for release in July 2007. The EA will evaluate environmental impacts and propose appropriate mitigation measures to avoid or reduce impacts to plants and wildlife, particularly listed species. Impacts to fish, plants, and wildlife will also be evaluated during state permitting process for in-water work and the stormwater permit.

5.2.1.7 Socioeconomics

Short-term impacts

The design and scope of individual projects would determine the levels of costs and benefits, impacts on jobs and income, distribution of costs and benefits, interactions with the socioeconomic structure, and levels of risk and uncertainty. Design, pre-construction, and construction activities would have impacts similar in nature to those associated with the proposed storage option. Job opportunities may be filled by local residents or in-migrants. Increased income earned locally would stimulate local sales of consumer goods and services. The degree of funding from outside sources would influence the extent to which costs are borne by Washingtonians.

Long-term impacts

The design and scope of individual projects would determine the levels of costs and benefits, impacts on jobs and income, distribution of costs and benefits, interactions with the socioeconomic structure, and levels of risk and uncertainty.

Mitigation

Adverse effects, if any, may induce affected parties to seek mitigation in the form of compensation or other measures.

5.2.1.8 Land and Shoreline Use

Short-term impacts

Each of the Supplemental Feed Routes under consideration would require a limited amount of construction that is not expected to cause any major disruptions to land uses along the routes or in the Potholes Reservoir or Moses Lake areas.

Long-term impacts

Rerouting water through any of the routes is not likely to significantly affect land use over the long term. However, increased availability of irrigation water could result in pressure to convert habitat areas to agricultural production. Providing a reliable water supply to the Potholes Reservoir would help to ensure that existing agricultural land uses served by that reservoir would continue.

Mitigation

No adverse land use impacts are expected and no mitigation is proposed.

5.2.1.9 Cultural Resources

Short-term impacts

Ground disturbance activities could result in short-term impacts to cultural resources. Impacts to cultural resources that may be present could occur at the location and in the vicinity of construction or improvements related to the selected Supplemental Feed Route and any new conveyance systems, as well as any staging areas. Possible impacts could occur to historic structures that might be present in the construction areas.

Long-term impacts

Long-term impacts to cultural resources could occur along Supplemental Feed Routes. Based on a cursory review of identified cultural resources and the lack of cultural resources investigations in the vicinity of the three alternatives, it is assumed that impacts would include adverse effects. Impacts could include year-round inundation of cultural resources that were formerly exposed during seasonal drought; alterations to historic structures related to the waterways; impacts from erosion and land development; and changes to soil chemistry.

Mitigation

Mitigation for any identified impacts would vary based the nature of the identified resource and the potential impact. Mitigation measures would be determined by Reclamation in consultation with DAHP, the affected tribes, and other interested parties during the NEPA Environmental Assessment process.

5.2.1.10 Transportation

Short-term impacts

Each of the Supplemental Feed Routes under consideration would require a limited amount of construction that is not expected to cause any major disruptions to transportation systems along the routes or in the Potholes Reservoir or Moses Lake areas. Some road and/or railroad crossings could be required, which could result in temporary delays or detours during construction.

Long-term impacts

None of the Supplemental Feed Routes would result in long-term transportation impacts. Periodic maintenance of crossings at roads and railroads would be required, and could generally be accomplished without disrupting traffic.

Mitigation

Mitigation for construction impacts on transportation systems would be similar to measures described in Section 4.1.1.

5.2.1.11 Recreation and Scenic Resources and Aesthetics

Short-term impacts

The construction required for the Supplemental Feed Route is not expected to cause major disruptions to recreation uses along the routes or in the Potholes Reservoir or Moses Lake areas. Minor effects on scenic resources due to construction activities, similar to those described in Section 4.1.1.11, would occur with any of the alternatives. These temporary impacts are not expected to be significant.

Long-term impacts

Providing a reliable water supply to the Potholes Reservoir would help to ensure that existing recreational uses, including Potholes Wildlife Area, Potholes State Park, and the reservoir itself, would have adequate water in the future. These areas are used for camping, swimming, boating, hunting, fishing, and other recreational purposes. These areas are also considered scenic resources.

Mitigation

Mitigation measures for impacts to recreation resources would be similar to those described in Section 4.1.1.11.

5.2.1.12 Public Services and Utilities

Short-term impacts

Each of the Supplemental Feed Routes under consideration would require some construction that is not expected to cause major disruptions to public services and utilities along the routes or in the Potholes Reservoir or Moses Lake areas. Some utility crossings, including water, sewer, and gas lines, could be required, which could result in temporary disruptions in service during construction.

Long-term impacts

None of the Supplemental Feed Routes would result in significant public services and utilities impacts in the long term. Irrigation districts and Reclamation would have to maintain and operate the Supplemental Feed Routes in the long term. However, all of the routes would reduce maintenance demands on the existing routes; so in the long term, overall maintenance costs may be similar to those of the current system.

Another objective of the Supplemental Feed Route project is to provide dependable water supplies while protecting against flood flows in the system. All of the proposed routes would accomplish these objectives to some degree, by allowing fall water levels at Billy Clapp Lake to

be lowered to better accommodate flood flows while still providing enough water to keep the reservoir full enough for summer use (Blanchard, personal communication, 2006). A dependable water supply would benefit the South Columbia Basin Irrigation District. By reducing flood risk, emergency services and repair work to public infrastructure would also be less likely to be needed in areas downstream from Potholes Reservoir than under current management practices.

Mitigation

Mitigation for construction impacts on public utilities would be similar to measures described in Section 4.1.1.12.

5.2.2 Comparison of Impacts for Alternative Routes

Table 5-1 compares the potential impacts of the proposed Supplemental Feed Routes. The table highlights the major differences in impacts of the three routes. The table also includes potential impacts that could occur in the receiving areas for the water—Moses Lake and Potholes Reservoir.

Table 5-1. Comparison of Impacts for Feed Route Alternatives and Receiving Areas

Element of the Environment	Crab Creek Route	W 20 Route	Frenchman Hills Route	Receiving Areas
Earth *Short-Term* *Long-Term* *Mitigation*	Includes construction or modifications to Brook Lake, Crab Creek and culverts at Stratford Road that would have construction related impacts. Increased flow in the natural stream channel may result in increased erosion	Includes construction of two miles of new conveyance to Moses Lake that would have construction-related impacts.	Improving the Frenchman Hills route would have construction-related impacts that are smaller and more localized than the W20 route.	Crab Creek route may result in increased sediment loading in Moses Lake. Same impacts from all three routes to Potholes Reservoir assuming construction related sedimentation is mitigated.
Air *Short-Term* *Long-Term* *Mitigation*	Minor construction would have short-term impacts similar to impacts described in 4.1.1. No long-term impacts to air are expected. Mitigation for short-term impacts would be similar to measures described in section 4.1.1.	Same as for Crab Creek Route, however, impacts would be greater in magnitude because construction is larger is scale. No long-term impacts are expected.	Same as for Crab Creek Route, but with few construction impacts.	No short- or long-term impacts to air are expected on air quality in the Moses Lake or Potholes Reservoir areas.
Surface Water *Short-Term* *Long-Term* *Mitigation*	Quantity. Additional flows would be delivered through Crab Creek which is a more natural channel than other alternatives; increased flow may cause erosion to stream channel. Quality. Increased erosion may increase sedimentation, which would impact surface water quality. No change in length of existing Crab Creek route so no expected water temperature increases. Possible decrease in temperature in Rocky Coulee Creek because of increased inputs of cool ground water from the additional infiltration from Crab Creek.	Quantity. Construction-related impacts would occur from construction of new siphon, improvement of canals and new outlet to Moses Lake from the W20 lateral. Quality. Route is longer than Crab Creek, but the use would end in mid-May and not occur in summer when temperature issues are most critical.	Quantity. Fewer construction-related impacts would occur than the other alternatives. Less impact to Moses Lake would occur. Quality. Route does not include Moses Lake and associated water quality problems. Longest route . but the use would end in mid-May and not occur in summer when temperature issues are most critical.	Quantity. More water would flow through Moses Lake in the spring with the Crab Creek and W20 alternatives. No change in flow in Moses Lake would occur for the Frenchman Hills alternative. Quality. Relative impacts to receiving areas would be based on the quantity and quality of the inflow associated with each route. Requires modeling or additional data to assess.
Ground Water *Short-Term* *Long Term* *Mitigation*	Possible increases in ground water recharge may increase shallow ground water levels along the route and in the vicinity of impoundments. Potential leaching of contaminants into the ground water. Additional ground water flow to Rocky Coulee Creek could be a source of cool water for the stream that could improve the stream's water quality. Mitigation could include conducting appropriate hydrogeologic studies and monitoring of potential ground water contamination from surface water.	Possible increases in ground water recharge may increase shallow ground water levels along the route and in the vicinity of impoundments. Potential leaching of contaminants into the ground water (channel is primarily unlined).	Possible increases in ground water recharge, which may increase the ground water levels along the route (channel is unlined). No ground water level increases through impoundments (no impoundments).	No impacts to ground water are anticipated.
Water Rights *Short-Term* *Long-Term* *Mitigation*	No changes to water rights would be required; therefore, no impacts are anticipated.	No changes to water rights would be required; therefore, no impacts are anticipated.	No changes to water rights would be required; therefore, no impacts are anticipated.	No changes to water rights would be required; therefore, no impacts are anticipated.

Element of the Environment	Crab Creek Route	W 20 Route	Frenchman Hills Route	Receiving Areas
Fish *Short-Term* *Long-Term* *Mitigation*	Existing aquatic resources should benefit with enhanced flow ranging between 40 and 60 cfs during June through March annually in middle Crab Creek and Rocky Ford Creek. This benefit could extend over approximately 35 miles of streambed between Brook and Moses Lakes. Flows in Crab Creek from 400 to 450 cfs during April and May will exceed the 2-year channel forming flow of 322 cfs at USGS gauging station #12467000 near Moses Lake, creating the potential for bed scour, bank erosion and channel realignment with adverse effects on early spring spawning fish species, increased magnitude and frequency of sediment yield and potential for water quality effects and sediment deposition.	No existing aquatic resources of concern would be affected.	No existing aquatic resources of concern would be affected.	Increased flow through Banks Lake may have an influence on primary and secondary productivity of the lake with associated changes in fish food webs. Flow fluctuations may also influence warmwater fish spawning along the shoreline. Increased bed and bank scour and sediment yield in the Crab Creek alternative has the potential to adversely influence water quality and sediment deposition in the upper section of Moses Lake with attendant effects on local aquatic species. No adverse influences of the Supplemental Feed routes are anticipated on aquatic species in Potholes Reservoir since lake elevations are forecast to rise less than 1 foot under the alternatives. Increased frequency of spill from the Potholes Reservoir into lower Crab Creek is possible with supplemental feed, but the rate will comply with existing limitations to spill and the end of month Potholes rule curve.
Wildlife and Plants *Short-Term* *Long-Term* *Mitigation*	Short-term impacts anticipated due to construction of conveyance lines. Long-term impacts include alteration of plant communities and wildlife habitats from arid habitats to riparian areas and wetlands.	Construction of new conveyance line between West Canal and Moses Lake would result in short-term noise and construction activity impacts to plants and wildlife. Long-term impacts would be habitat loss.	Minor short-term impacts anticipated. Long-term impacts are the same as the Crab Creek Route.	Long-term impacts could include the conversion of shrub-steppe and grassland habitats to agricultural uses and a shift in shrub-steppe associated wildlife species to generalist species.
Land and Shoreline Use *Short-Term* *Long-Term* *Mitigation*	Minor disturbances to land use could occur from construction. No long-term impacts to land use are anticipated.	Construction would require minor disturbances to land use in an area that is mainly non-irrigated shrub- steppe. No long-term impacts to land use are anticipated.	Minor construction is expected to be required along the existing canal and would not disturb adjacent land uses. No long-term impacts to land use are anticipated.	No short- or long-term impacts on land use are expected in the Moses Lake or Potholes Reservoir area.
Socioeconomics *Short-Term* *Long-Term* *Mitigation*	Final design and funding decisions would determine the levels of costs and benefits, impacts on jobs and income, distribution of costs and benefits, interactions with the socioeconomic structure, and levels of risk and uncertainty. Preliminary information indicates this alternative would have intermediate construction costs.	Preliminary information indicates this alternative would have the highest construction costs.	Preliminary information indicates this alternative would have the lowest construction costs.	Surface water would displace ground water used for irrigation. This could reduce, and perhaps reverse, depletion of ground water. Funding decisions will determine distribution of costs among water users and others. Reduction in users' costs will influence future feasibility of growing potatoes and other irrigated crops.
Cultural Resources *Short-Term* *Long-Term* *Mitigation*	Short-term impacts are anticipated to be moderate because of required construction modifications. Long-term impacts may include adverse effects to cultural resources because the stream would flow year-round	Short-term impacts are anticipated to have moderate to high potential to adversely affect cultural resources because this option would require construction of a new conveyance system. Long-term impacts	Short-term impacts are anticipated to be the lowest of all alternatives since the only construction proposed is expansion of existing road culverts. Long-term impacts would be similar to other alternatives but	Short-term impacts in the Potholes Reservoir area are anticipated to be low since the level of the reservoir would be within normal reservoir operations. A more reliable water supply may encourage crop

Element of the Environment	Crab Creek Route	W 20 Route	Frenchman Hills Route	Receiving Areas
	increasing the potential for erosion, changes in vegetation, and changes in land development. Mitigation measures should be identified during project-level environmental review.	would be less likely to include adverse effects because the canal system would minimize ongoing impacts to buried cultural deposits. It may be feasible to locate new construction to avoid cultural resources.	may be greater due to the length of the route and because the route is composed of undefined channels and pothole lakes which may have cultural resources associated with them.	diversification in the area south of Potholes Reservoir. Planting orchards and plowing could affect cultural resources.
Transportation *Short-Term* *Long-Term* *Mitigation*	Construction would be required at Stratford Road to improve culverts. Temporary traffic disruptions could occur.	Improvements to the Naylor Siphon could require construction under State Route 28 and BNSF railroad tracks, which could cause temporary traffic delays.	Minor construction for this route would include modifying two existing road crossings, which could result in traffic delays.	No short- or long-term transportation impacts are expected in the Moses Lake or Potholes Reservoir areas.
Recreation and Scenic Resources & Aesthetics *Short-Term* *Long-Term* *Mitigation*	The additional flows could benefit recreational users if they are also managed to enhance habitat value, such as for bird watching, hunting or fishing.	No impacts to recreation are anticipated.	The Frenchman Hills route would include only minor construction to improve crossings of the canal under roads. This route would deliver water to the west side of Potholes Reservoir in the Potholes Wildlife Area, which could enhance that area for recreational users by improving habitat value.	Providing a reliable water supply to the Potholes Reservoir would help to ensure that existing recreational uses, including the Potholes Wildlife Area, Potholes State Park, Desert Wildlife Area, and the reservoir itself, would continue to have adequate water in the future. These areas are also considered scenic resources, and could be enhanced by additional water supplies.
Public Services & Utilities *Short-Term* *Long-Term* *Mitigation*	Because the Crab Creek route is a natural drainage route, erosion could be more than under other alternatives, requiring higher maintenance costs. This route and the W20 route would provide the highest level of flood risk protection (Blanchard, personal communication, 2006).	The W20 route would have the highest initial costs, which would be borne by the irrigation districts and/or federal and state agencies. This route and the Crab Creek route would provide the highest level of flood risk protection (Blanchard, personal communication, 2006).	This route would provide better flood risk protection than the current routes, but slightly less protection than the W20 route or the Crab Creek route. (Blanchard, personal communication, 2006)	South Columbia Basin Irrigation District would benefit from a more dependable water supply from Potholes Reservoir.

5.3 Columbia-Snake River Irrigators Association Voluntary Regional Agreement

The Columbia-Snake River Irrigators Association (CSRIA) has submitted a draft VRA to Ecology. The CSRIA proposes to undertake conservation and other measures to create new sources of conserved water that can be used for new uninterruptible water rights on the Columbia River and lower Snake River (see Section 2.6.3). The draft VRA does not include specific projects, but proposes a framework for transferring saved water to the Trust Water Rights Program and allocating new water rights to CSRIA members. Implementation of some conservation projects may require additional environmental review. The impacts associated with those projects are expected to be similar to the impacts described in Chapter 4. This section discusses the potential impacts to water rights that would occur if the VRA were approved by Ecology.

Implementation of the agreement could stimulate farmers' adoption of agricultural best management practices, reducing pollutants in farm runoff and expanding streamside vegetation. These changes could increase fish populations and the supply of other ecosystem goods and services associated with improved quality of water in streams and aquifers. Funding for conservation and concerted efforts to promote adoption of best management practices could reduce farmers' perceptions of the risks and uncertainties associated with the adoption of conservation technologies and practices. Adoption of conservation technologies and practices may increase net earnings of some farmers (Schaible 2000).

The objective of the VRA filed by the CSRIA is to obtain new water rights, referred to as "supplemental drought permits," for their members who have interruptible water rights. Under the VRA, CSRIA would use best management practices to improve efficiency and would transfer the saved water to Ecology. Members seeking supplemental drought permits would submit information to Ecology to enable Ecology to "recalibrate" the water rights, if necessary, to reflect actual beneficial use.

The VRA appears to address potential impacts to existing water rights by providing that "[m]itigation through water savings resulting from water efficiency practices, or other means, must accrue either before or at the same time that water use under the supplemental drought permit occurs." The VRA also acknowledges that Ecology is bound by the *Hillis* Rule, WAC 173-152-050, in processing water right applications and that applicants may speed up processing by entering into a cost reimbursement agreement with Ecology (RCW 90.03.265).

The VRA proposes to add a new meaning to "municipal supply purpose." On page 3, the VRA states: "A municipal supply purpose shall also mean any requirements to meet mitigation conditions in an existing municipal water right permit."[4] This suggested meaning must be read against the definition of "municipal supply purpose water right" in RCW 90.03.015. If an entity holds a municipal supply purpose water right, then:

[4] It is not clear what the CSRIA means by this statement. The definition of "municipal supply purpose" is written in terms of types of beneficial uses of water. Therefore, it makes sense to read the sentence in the VRA as meaning any beneficial use of water required to meet mitigation conditions in an existing municipal water right permit.

> . . . any other beneficial use of water under the right generally associated with the use of water within a municipality is also for "municipal water supply purposes," including, but not limited to, beneficial use for commercial, industrial, irrigation of parks and open spaces, institutional, landscaping, fire flow, water system maintenance and repair, or related purposes. If a governmental entity holds a water right that is for the purposes listed in (a), (b), or (c) of this subsection, its use of water or its delivery of water for any other beneficial use generally associated with the use of water within a municipality is also for "municipal water supply purposes," including, but not limited to, beneficial use for commercial, industrial, irrigation of parks and open spaces, institutional, landscaping, fire flow, water system maintenance and repair, or related purposes (RCW 90.03.015). (Emphasis added.)

The "including, but not limited to" language appears to allow for inclusion of additional purposes and it would be within Ecology's discretion to include the purpose identified by CSRIA.[5]

The CSRIA VRA would have the same potential impacts as those of any VRA under RCW 90.90.030. Consultation would occur only on the VRA in general, but not on specific water right applications. Impacts may result from the presumption in RCW 90.90.030(3) that protecting instream flows during July and August in the Columbia River and during April through August in the Snake River is adequate mitigation for new water rights under a VRA.

5.4 No Action Alternative

Under the No Action Alternative for the Lake Roosevelt drawdown, no additional drawdown of Lake Roosevelt would occur. Water for municipal/industrial supply and streamflow enhancement would continue to be limited during non-drought years. No surface water would be provided to the Odessa Subarea to reduce ground water withdrawals. During drought years, interruptible water rights would not be met and streamflows would not be augmented. Under the No Action Alternative for the Supplemental Feed Route, feed water would continue to be supplied through the East Low Canal and the delivery system and reliability would not be improved. Under the No Action Alternative for the CSRIA VRA, Ecology would not process the VRA. For each of the early actions, other programs could be implemented to address the water allocation problems.

[5] The law provides further that:

Beneficial uses of water under a municipal water right may include water withdrawn or diverted under such a right and used for: (1) Uses that benefit fish and wildlife, water quality, or other instream resources or related habitat values; or (2) Uses that are needed to implement environmental obligations called for by a watershed plan approved under Chapter 90.82 RCW, or a comprehensive watershed plan adopted under RCW 90.54.040(1) after September 9, 2003, a federally approved habitat conservation plan prepared in response to the listing of a species as being endangered or threatened under the federal endangered species act, 16 U.S.C. Sec. 1531 *et seq.*, a hydropower license of the federal energy regulatory commission, or a comprehensive irrigation district management plan (RCW 90.03.550).

5.4.1.1 Earth

Short-term impacts

The No Action Alternative will not impact earth and earth resources. The alternative implies no construction activities and thus no earth disturbances, no new roads for new canals or storage impoundments, and no consumption of earth resources (i.e., gravel, sand, concrete).

Long-term impacts

The No Action Alternative will cause minimal impacts to earth. No new storage projects will be required to impound the increased water for municipal or industrial end users and thus construction impacts are unlikely. The construction required for the Supplemental Feed Route project would not occur and thus would not impact earth.

Mitigation

No earth impact mitigation will be necessary under the No Action Alternative.

5.4.1.2 Air

Short-term impacts

Under the No Action Alternative, short-term air quality impacts from construction associated with the early actions would not occur. Communities would not receive new water supplies from the Lake Roosevelt drawdown; therefore, there would be fewer construction impacts to air associated with such development.

Long-term impacts

Localized dust generation may increase if extended drought conditions occur.

Mitigation

No mitigation would be required for the No Action Alternative because no impacts to air would occur.

5.4.1.3 Surface Water

Short-term impacts

No short-term impacts on water quantity would result from the No Action Alternative.

The No Action Alternative short-term impacts on surface water quality are likely to be similar to the long-term impacts on surface water quality.

Long-term impacts

The No Action Alternative will not impact the surface water quantity or quality at Lake Roosevelt. The contaminant concentrations will likely remain the same and continue to be affected by the quality of the inflow and rate of outflow.

Mitigation

No mitigation of surface water quantity or quality impacts would be required under the No Action Alternative.

5.4.1.4 Ground Water

Short-term impacts

Under the No Action Alternative, the ground water levels around Lake Roosevelt will continue to be affected by the drawdown for flood control.

Long-term impacts

Under the No Action Alternative, no construction of new storage or conveyance facilities would occur. Ground water levels would not be reduced by construction dewatering.

Ground water levels in the Odessa Subarea would likely continue to decrease at approximately the same rate that they do today if surface water sources are not brought to Odessa to replace some ground water withdrawals. Ground water direction will not be further affected by the Potholes Reservoir.

Mitigation

No mitigation of ground water impacts would be required under the No Action Alternative.

5.4.1.5 Water Rights

Short-term impacts

If no additional drawdown of Lake Roosevelt occurs, there would be less water available for instream flow, municipal/industrial users, and interruptible water rights. If the CSRIA VRA is not implemented, new water rights for the interruptible water right holders would be subject to case-by-case consultation. There would be no automatic decision protecting the Columbia and Snake Rivers from impacts to instream flow during months identified as fish-critical as adequate mitigation for new water rights.

Not implementing the VRA may result in the possible loss of conserved water, although conservation can occur outside of a VRA. Ecology would lose the opportunity to examine the extent and validity of the water rights of the irrigators unless they apply for a water right change. Interruptible water rights would remain, subject to independently finding new water and providing mitigation for use of the water right without interruption during times of low flow.

Long-term impacts

Long-term impacts to water rights of no additional drawdowns of Lake Roosevelt or of not implementing the VRA would be the same as short-term impacts.

Mitigation

Appropriate mitigation for any impacts to water rights would be determined through Ecology's existing water rights approval processes.

5.4.1.6 Fish, Wildlife, and Plants

Short-term impacts

Fish. Under the No Action Alternative, no short-term impacts to aquatic resources would occur.

Wildlife and Plants. If no Supplemental Feed Route were implemented, plants and wildlife along the W20 Canal and Crab Creek Routes would not be impacted by noise and construction.

Long-term impacts

Fish. If the Lake Roosevelt drawdown were not implemented, no additional water would be available to supplement instream flows in the mainstem Columbia River downstream of Grand Coulee Dam. No long-term impacts to aquatic resources are anticipated as a result of not implementing the Supplemental Feed Route project.

Wildlife and Plants. If there were no additional drawdown of Lake Roosevelt, no related additional risk to nesting waterfowl or breeding amphibians such as spotted frog would occur. Reservoir operation would continue under existing schedules, and impacts to plants and wildlife due to annual drawdowns would continue to occur as described in Section 5.1.1.6. No additional water would be supplied to Crab Creek that could alter the vegetation communities within the corridor.

Mitigation

No mitigation to aquatic resources is required for the No Action Alternative.

5.4.1.7 Socioeconomics

Short-term impacts

Implementation of the No Action Alternative may stimulate short-term market responses, as it would induce irrigators and others to reverse decisions based on anticipation that the early actions would be implemented. Anticipation that the early actions would enable farms in the Odessa Subarea to receive surface water and avoid the high costs of pumping ground water, for example, may have persuaded the farmers to continue farming even while experiencing financial losses. However, a decision not to increase surface water supplies may induce farmers to cease their operations. Anticipation that the Voluntary Regional Agreement proposed by the Columbia Snake River Irrigators Association would boost the demand for conservation technologies could raise the market value of firms that sell the technologies, but a decision not to implement the agreement may lower their value.

Offsetting impacts may also occur. Anticipation that new surface water supplies would sustain the production of potatoes and other irrigated crops in the Odessa Subarea may have caused farmers elsewhere to plan to curtail their future production, for example, but a decision not to provide new water supplies in the Subarea might persuade them that production in the Odessa Subarea will fall and induce farmers elsewhere to initiate plans to expand their production to fill the gap.

Long-term impacts

The specific responses of private parties and public agencies to a decision not to implement the early actions would determine the levels and distribution of costs and benefits, impacts on jobs and income, interactions with the socioeconomic structure, and levels of risk and uncertainty. Without any other activity to provide surface water to the area, farmers in the Odessa Subarea would continue to experience rising costs of pumping ground water, which would diminish the feasibility of irrigation, especially for water-intensive crops. As the costs of pumping ground water rise, or if supplies become exhausted, some irrigators would shift to crops that require less water or cease operations entirely. Bhattacharjee and Holland (2005) estimated that, if declining water supplies caused the entire annual production of potatoes in the Odessa Subarea to cease and the economy did not adjust, the surrounding counties would lose $179 million in sales, 1,136 jobs, and $54 million in income. They also found that, if the loss of potato production induced the potato-processing industry to close and the economy did not adjust, the total impacts would be more than three times as great. They observed, however, that these worst-case scenarios would not materialize if only some farmers in the Subarea stopped producing potatoes, if farmers in the Subarea shifted to less water-intensive crops instead of potatoes, or if farmers outside but near the Subarea increased their production of potatoes for processing by plants inside the Subarea. Any overall decline in the production of potatoes and other crops would likely result in higher prices throughout regional and statewide markets.

Future droughts, similar to recent ones, could trigger responses by private parties and public agencies similar to those implemented in recent years. Long-run shortages of water, however, could trigger different responses. Irrigators might shift from growing water-intensive crops to those that require less irrigation or even to dryland farming. Some land may become infeasible to farm and be retired from the agricultural base.

Continuation of current flow regimes below Lake Roosevelt would extend current risks and uncertainties regarding fish populations and other flow-related issues.

Mitigation

Future droughts would trigger demands for mitigation programs and practices such as those that have addressed economic concerns during past droughts. Long-term water shortages may stimulate demands for emergency assistance, such as subsidized loans to promote the adoption of water conserving technology by irrigators and municipal/industrial users. Long-term mitigation also might include increased efforts to expand the economic opportunities for residents and businesses in water-short areas. Such efforts might include, for example, improvements in transportation infrastructure to increase the access of businesses and workers in water-short areas to new economic opportunities in nearby areas.

Future concerns about salmon, steelhead, and other at-risk species would extend current demands for compensatory and corrective actions.

5.4.1.8 Land and Shoreline Use

Short-term impacts

Under the No Action Alternative, none of the minor short-term impacts to land use from construction of the Supplemental Feed Routes would occur. No other short-term impacts would be expected.

Long-term impacts

If additional water supplies are not provided in the Odessa Subarea, potato farming could cease on farms where the cost of pumping ground water becomes too high. This could result in conversion to less water-intensive crops, dryland farming, or even to retiring some land from agricultural production (see Section 5.4.1.7, Socioeconomics) Crop conversion on land zoned for agriculture would be consistent with goals for preserving agricultural land.

The effects of not implementing the early actions would be similar to those described in Section 4.2.1.8.

Mitigation

Mitigation for land use impacts under the No Action Alternative would be provided by compliance with local plans and regulations.

5.4.1.9 Cultural Resources

Short-term impacts

No additional short-term impacts to cultural resources are anticipated under the No Action Alternative.

Long-term impacts

No additional long-term or operational impacts to cultural resources are anticipated under the No Action Alternative.

Mitigation

Because no additional impacts to cultural resources are anticipated, no additional mitigation measures would be necessary under the No Action Alternative.

5.4.1.10 Transportation

Short-term impacts

No short-term impacts are expected if the early actions are not implemented, since none of the associated construction would occur.

Long-term impacts

If the drawdowns at Lake Roosevelt were not implemented, current trends in traffic and transportation demand would continue. Not implementing one or more of the Supplemental Feed Routes would have no effect on transportation systems over the long-term.

Mitigation

No mitigation would be required for this alternative.

5.4.1.11 Recreation and Scenic Resources and Aesthetics

Short-term impacts

None of the direct construction-related impacts associated with the early actions would occur.

Long-term impacts

Water supplies from the early actions would not be provided to the receiving areas, and water levels at Lake Roosevelt would remain at their current range during summer months.

Mitigation

There are no impacts expected to recreation and scenic resources that would need to be mitigated if the Lake Roosevelt drawdowns were not implemented. The Supplemental Feed Routes that are currently used to feed Potholes Reservoir would continue to be used, and as long as they remain reliable no mitigation would be required for recreation and scenic resources.

5.4.1.12 Public Services and Utilities

Short-term impacts

Costs associated with construction of infrastructure to deliver water from the Lake Roosevelt drawdowns and the Supplemental Feed Route would not be incurred.

Long-term impacts

Municipal water supplies would not receive the water from the Lake Roosevelt drawdowns, which could limit their ability to accommodate expected growth in demand for water and water treatment.

Under the No Action Alternative, current maintenance costs would continue, which could affect long-term costs to irrigation districts. Risks of flooding from the current operation would continue, which affects emergency service providers in the area downstream from Potholes Reservoir.

Mitigation

Municipal water suppliers would need to find new water supplies to accommodate growth in their service areas, and could be assisted by existing Ecology programs.

5.5 Cumulative Impacts

The cumulative impacts of the early actions proposed under the Management Program would be similar to those described for the Management Program in Section 4.3. Funding used for the early actions would not be available for other social needs or for other areas of the state or region.

Although the proposed Lake Roosevelt drawdown is considered to be within the normal operations of the reservoir, prolonged additional drawdowns could compound the impacts of drawdowns to fish and wildlife, cultural, recreation, and other resources. Potential cumulative impacts to fisheries are described in Section 5.1.1.6. Furthermore, increased release from Lake Roosevelt could potentially affect total dissolved gas levels. These should be considered along with the cumulative impacts to total dissolved gas levels resulting from Canadian operations.

Water diverted to the Odessa Subarea would reduce ground water withdrawals in that area, but would not be available for other downstream uses, including instream flows and hydropower generation. Improved water reliability may cause farmers to change cropping practices in the Odessa Subarea, but is not intended to expand irrigated acreage in the Odessa Subarea. Water rights holders with interruptible water rights who receive a more reliable water supply could also change cropping practices and could expand irrigation. This could have additional impacts on the remaining shrub-steppe habitat in the project area. Improved municipal/industrial water supplies could cause expanded residential or industrial development.

The Supplemental Feed Route may provide increased water reliability for irrigators in the South Columbia Basin Irrigation District. These farmers may also change crops. The increased flexibility will allow Reclamation to use the East Low Canal for additional uses, including possible deliveries to the Odessa Subarea.

If state funding were used for conservation or storage projects under the Columbia-Snake River Irrigators Association VRA, that state money would not be available for other public uses in the state.

Ecology would minimize potential cumulative impacts of the early actions by continuing to coordinate with tribes and local, state and federal agencies. Any development that occurs as a result of more reliable water supplies would comply with local planning and zoning regulations. Ecology has determined that the early actions will require future threshold determinations under SEPA Ecology has determined that a Supplemental EIS will be prepared on the Lake Roosevelt Drawdown Project. Reclamation is preparing a NEPA EA for the Supplemental Feed Route Project. Ecology will develop an Implementation Plan for the CSRIA VRA that will be subject to SEPA review. In addition, specific projects proposed to implement the CSRIA VRA may also require SEPA and/or NEPA review. The additional environmental review will be used to refine impacts analysis, avoid impacts, and identify appropriate mitigation.