

## **CHAPTER 4.0 SHORT-TERM IMPACTS AND MITIGATION MEASURES**

This chapter describes the short-term impacts of the alternatives proposed in this Supplemental Draft EIS. Short-term impacts refer to those that are construction related or of limited duration. Possible mitigation measures for the impacts are also discussed. Because this is a Programmatic EIS and the details of construction and project implementation are not known, short-term impacts are discussed in general terms. Specific projects may be required to undergo additional environmental review when proposed to identify specific short-term impacts.

Impacts are evaluated for both the No Action Alternative and the Integrated Water Resource Management Alternative. The Integrated Water Resource Management Alternative includes seven main elements—fish passage, modifying existing structures and facilities, new storage, ground water storage, fish habitat enhancement, enhanced water conservation, and market-based reallocation of water resources. Impacts associated with the elements are presented individually first. Short-term cumulative impacts are presented at the end of this chapter.

### **4.1 Earth**

#### **4.1.1 No Action Alternative**

Under the No Action Alternative, various entities and agencies would undertake individual actions that could result in short-term impacts to earth resources similar to those described for the individual elements below. Construction associated with these actions has the potential to disturb the ground and increase the potential for erosion and delivery of sediments to the Yakima River system. Any resulting impacts would be evaluated separately. These projects would not be part of an integrated water resource management approach.

#### **4.1.2 Integrated Water Resource Management Alternative—Impacts of Individual Elements**

Short-term impacts of the individual elements would be primarily related to construction activities that may result in erosion and sedimentation. These elements are discussed in the following sections.

##### **4.1.2.1 Fish Passage Element**

Construction activities related to fish passage, including structural changes to the existing facilities, or improvements to fish habitat associated with the Cle Elum, Bumping Lake, Tieton, Keechelus, or Kachess Dams, or on the mainstem Yakima River and its tributaries, could require ground disturbance that would result in the potential for erosion and slope stability impacts. Construction activities may include adult fish upstream collection and transportation facilities, temporary cofferdams, new spillways, multi-level gated intake structures, and/or construction of spawning channels or riffles. Because all of the proposed fish passage elements would occur on or near streams, they have the potential to increase the delivery of sediment to surface waters.

#### **4.1.2.2 Modifying Existing Structures and Facilities Element**

Modifications requiring construction activities would cause short-term impacts similar to those discussed in Section 4.1.2.1. Construction activities for this element could include structural changes to existing water supply facilities such as modification of spill gates, outfalls, and canal/piping systems, and the installation of pump systems for pipe pressurization.

Operational modifications associated with construction activities would have minimal impacts on erosion and sediment supply to surface waters.

#### **4.1.2.3 New Storage Element**

The new storage element would have the highest potential for short-term impacts to earth resources. Creating new or expanded storage reservoirs would involve clearing and excavating for road construction, excavating along the shoreline, and constructing new dams or modifying existing dams. Excavation and fill activities would increase the potential for erosion during construction, although erosion could be minimized through the use of best management practices.

Expansion of Bumping Lake could cause additional soil erosion from construction activities within the borrow areas and construction of access roads. Exposed soils in the borrow area and on access roads would be subject to surface runoff during the fall, winter, and spring periods when precipitation occurs most heavily. Loss of soil during the construction period would contribute to turbidity in the river (Reclamation, 1979). However, the increased turbidity would likely be short-term and would not have long-term impacts on downstream water quality (Reclamation, 1993).

Impacts associated with the proposed Pine Hollow reservoir were evaluated in the Programmatic EIS for the Ahtanum Creek Watershed Restoration Program (Ecology, 2005). Because the proposed reservoir is off-channel, the potential for the delivery of sediments is less than for a reservoir located on a stream or tributary.

#### **4.1.2.4 Ground Water Storage Element**

Ground water storage elements requiring construction activities would cause short-term erosion impacts similar to those discussed in Section 4.1.2.1, and were described in Section 5.5.2.3 of the January 2008 Draft Planning Report/EIS. Construction activities for this element could include water treatment facilities, wells, conveyance facilities, and/or infiltration basins.

#### **4.1.2.5 Fish Habitat Enhancement Element**

Fish habitat enhancement projects could include reconnecting side channels, floodplains, and off-channel habitat to streams; restoring natural channels, riparian areas, and wet meadows; relocating infrastructure; and replanting and restoring riparian areas in the Yakima River and many of its tributaries. Enhancement-related construction activities may include placement of large woody debris and engineered log jams in streams, bank reshaping, channel reconstruction, and construction of fish passage facilities.

Enhancements requiring ground disturbance would cause the same type of short-term impacts discussed in Section 4.1.2.1.

#### **4.1.2.6 Enhanced Water Conservation Element**

Construction of canal lining, pipelines, pump stations, reregulating reservoirs or on-farm irrigation improvements could impact upland sediment resources by disturbing soils and could temporarily increase soil erosion.

#### **4.1.2.7 Market-based Reallocation of Water Resources**

Construction of new irrigation facilities that are needed to utilize transferred water could increase soil erosion. The impacts would be similar to those of the Enhanced Water Conservation Element, except smaller in scale.

### **4.1.3 Mitigation Measures**

Site-specific geotechnical studies would facilitate identification of subsurface issues, unstable slopes, and other local factors that can contribute to slope instability and increase erosion potential. These studies would be used in the design of project-specific best management practices and temporary erosion and sediment control plans in accordance with county and/or Ecology requirements. Requirements for each construction project would be defined through review by state and local regulatory agencies. The following measures could be included to minimize the potential for sediment production and delivery to stream channels:

- Timing construction activities to avoid earth disturbances during periods of high precipitation;
- Using straw bales, silt fencing, or other suitable sedimentation control devices;
- Washing truck tires to reduce tracking of sediments off of construction sites;
- Covering exposed soil stockpiles and exposed slopes;
- Using straw mulch and erosion control matting to stabilize graded areas where appropriate;
- Retaining vegetation where possible to minimize soil erosion;
- Seeding or planting appropriate vegetation on exposed areas as soon as possible after work is completed;
- Constructing temporary sedimentation ponds to detain runoff waters where appropriate;
- Using berms and other on-site measures to prevent soil loss;
- Monitoring downstream turbidity during construction to document the effectiveness of implemented measures; and
- Visually monitoring for signs of erosion and for correct implementation of control measures.

## **4.2 Climate Change**

Projects proposed in this Supplemental Draft EIS could both affect and be affected by climate change. Projects can affect climate change by increasing carbon emissions that

contribute to global warming. As noted in Section 3.2, climate change could affect precipitation, snowmelt and runoff in the Yakima River basin which could affect water management in the basin. For purposes of this Supplemental Draft EIS, the effect of proposed projects on climate change is discussed as a short-term impact and the effect of climate change on the projects is discussed as a long-term impact (Section 5.2).

#### **4.2.1 No Action Alternative**

The No Action Alternative would result in a continuation of currently planned actions, implementation of which would occur independently. Some of these actions may help to reduce effects associated with climate change, others may worsen the effects. Without a comprehensive evaluation of all the proposed projects, it would be difficult to assess. Piecemeal implementation would likely result in a continuation of current trends. Projects implemented under the No Action Alternative would undergo separate NEPA or SEPA analysis, if appropriate.

#### **4.2.2 Integrated Water Resource Management Alternative—Impacts of Individual Elements**

For all the elements of the Integrated Water Resource Management Alternative, greenhouse gas emissions could be generated during construction. The amount of emissions generated would depend on the amount of heavy construction and the duration of construction for specific projects. Since no project details are known at this time, the following sections discuss the extent and duration of construction for each element. Potential greenhouse gas emissions from construction projects would be estimated and potential impacts analyzed separately when specific project details are available.

##### **4.2.2.1 Fish Passage Element**

Construction work for fish passage elements would last two to three years. Most of the heavy construction work would last only a few months out of that time period. During the remainder of the construction period, increased emissions would primarily be limited to worker vehicles accessing the sites. Because potential storage sites are in relatively remote areas, workers would likely have to drive 20 to 50 miles to access the sites. Heavy construction equipment would be needed for excavating intake structures, cofferdam placement and removal, hauling materials, concrete pouring, and similar activities.

##### **4.2.2.2 Modifying Existing Structures and Facilities Element**

Most canal modification and pipe trenching work would be complete at any one location within a few weeks, with overall construction lasting a few months. Emissions would be generated by worker vehicles, trenching equipment, concrete pouring, hauling materials, and similar activities.

##### **4.2.2.3 New Storage Element**

The new storage element has the greatest potential for generating greenhouse emissions because of the duration and intensity of construction. Construction would last four to 6 years and would require extensive use of heavy machinery. Equipment would be required for excavation and grading, hauling materials, access road construction,

vegetation removal from inundated areas, and similar activities. Because potential storage sites are in relatively remote areas, workers would likely have to drive 20 to 50 miles to access the sites.

#### **4.2.2.4 Ground Water Storage Element**

Construction activities for Ground Water Storage Elements could last from a few weeks to several months. Facilities constructed for this element would cause the same type of short-term impact as those described in Section 4.2.2.2.

#### **4.2.2.5 Fish Habitat Enhancement Element**

Construction associated with this element would likely generate a limited amount of emissions. Most construction work for fish habitat enhancement elements would be complete at any one location within a few weeks. Heavy equipment would be limited to those needed for excavation and grading. Many of the areas where enhancements would occur are closer to populated areas, limiting worker vehicle miles.

#### **4.2.2.6 Enhanced Water Conservation Element**

Construction required for the Enhanced Water Conservation Element would cause the same type of short-term impact as those described in Section 4.2.2.2.

#### **4.2.2.7 Market-based Reallocation of Water Resources**

The element would generate the least amount of emissions. Construction of new irrigation facilities that are needed to utilize transferred water would result in impacts similar to those of the Enhanced Water Conservation Element, except smaller in scale.

### **4.2.3 Mitigation Measures**

Emissions from construction vehicles could be reduced by following best management practices to minimize emissions, such as maintaining engines in good working order and minimizing trip distances. Other measures to minimize emissions include coordinating project planning, combining workers' trips, and using local materials.

## **4.3 Surface Water**

### **4.3.1 No Action Alternative**

Several projects in the No Action Alternative may have a short-term impact on surface water. For example, YRBWEP water conservation projects would require construction of canal lining, pipelines, pump stations and other irrigation district improvements. Habitat restoration efforts would require construction of off-channel areas, removal of fish passage barriers, placement of large woody debris and other actions. These construction efforts may impact surface water through increased sediment loading. The potential would depend on the proximity of the project to a water body, the volume of sediment generated, the condition of vegetative buffers between the site and the water body, and the BMPs applied to control erosion. Sedimentation may increase turbidity and affect the substrate condition in streams until construction is completed. The level of impact would vary with the amount of sediment entering the water body. Other potential

short-term impacts could include an interruption in water service during construction of irrigation system improvements, and diversion of surface water around construction areas during dewatering.

### **4.3.2 Integrated Water Resource Management Alternative—Impacts of Individual Elements**

#### **4.3.2.1 Fish Passage Element**

This element may have a short-term impact on surface water bodies near the construction area of the project elements, including the Kachess River, Cle Elum River, Yakima River, Bumping River, and Tieton River. Because construction would take place in close proximity to water bodies, the potential for increased sediment load would depend on BMPs applied for erosion control.

There is also the potential for short-term draw down of reservoir water levels to facilitate the construction of structures on the dam or within the reservoir. The temporary draw downs would reduce the level of water in the reservoir and would affect stream flows downstream. The duration of those potential reductions is not known but would likely be several months.

#### **4.3.2.2 Modifying Existing Structures and Facilities Element**

Operational changes would not likely have a short-term impact on surface water. However, construction may increase sediment loading in the Yakima River. Piping of irrigation laterals in the KRD, or moving the water supply for part of the WIP to the Satus Creek area may cause temporary disruptions in water supply for the areas the laterals serve if the construction is during an irrigation season. This disruption would occur when switching service from the canal lateral to a pipe lateral. The disruptions would be short, a few days to a week to prevent damage to crops.

#### **4.3.2.3 New Storage Element**

Construction of an enlarged Bumping Lake may increase sediment loading in the Bumping River. The increase in sediment loading would likely be greater than for other projects elements because the magnitude of construction would be much greater.

Construction of Wymer Dam may increase sediment loading in the Yakima River, but because the construction location is off-channel and the construction effort would be smaller in magnitude, sediment loading would likely be less than Bumping Dam. The South Branch, North Branch, and pipeline options may cause temporary disruptions in water supply to the KRD during construction. Actual disruption would depend on construction timing.

The Bumping River would need to be bypassed around the construction area of the new Bumping Dam. This bypass would last the duration of the construction project. Similarly, Lmuma Creek would need to be bypassed around the construction area of Wymer Dam for the duration of the construction project. In addition, the water supply option for Wymer Dam may require similar bypasses of a number of streams between Cle Elum Dam and Wymer reservoir to allow construction of a canal or pipeline.

Implementation of the Ahtanum Creek Watershed Restoration Program and Pine Hollow reservoir may increase sediment loading, but construction of the reservoir is off-channel, so sediment loading would be less than for an on-stream reservoir such as the Bumping Lake expansions. Impacts associated with the Pine Hollow reservoir were described in the Programmatic EIS for the Ahtanum Creek Watershed Restoration Program (Ecology, 2005). Construction of new irrigation pipelines may temporarily impact water deliveries for the Wapato Irrigation Project and the Ahtanum Irrigation District depending on the timing of construction.

#### **4.3.2.4 Ground Water Storage Element**

The temporary impacts of the Ground Water Storage Element on surface water resources were described in Section 5.2.3.3 of the January 2008 Draft Planning Report/EIS.

#### **4.3.2.5 Fish Habitat Enhancement Element**

This element may have a short-term impact on surface water in the Yakima River and its tributaries at construction locations. When enhancing fish habitat, there is the possibility of construction occurring in-stream, which may temporarily increase sediment loading.

#### **4.3.2.6 Enhanced Water Conservation Element**

The impacts of the Enhanced Water Conservation Element on surface water resources were described in Section 5.2.3.1 of the January 2008 Draft Planning Report/EIS.

#### **4.3.2.7 Market-based Reallocation of Water Resources**

The impacts of the Market-based Reallocation of Water Resources Element on surface water resources were described in Section 5.2.3.2 of the January 2008 Draft Planning Report/EIS.

### **4.3.3 Mitigation Measures**

Mitigation for short-term impacts to surface water from construction activities would be similar to those described in Section 4.1.3. To mitigate short-term disruptions in surface water irrigation supply due to construction activities, the irrigation districts would coordinate with water users and construction personnel to ensure that construction activities are scheduled to minimize disruptions. To the extent possible, conveyance construction would occur outside the irrigation season. Mitigation for stream bypasses would be negotiated with fish agencies as part of permitting for individual projects.

## **4.4 Water Rights**

### **4.4.1 No Action Alternative**

Several projects included in the No Action Alternative have the potential to cause short-term impacts to water rights. Several projects included in the No Action Alternative include provisions to acquire water rights on a permanent or temporary basis to improve instream flows. Water rights acquired by lease for a one-year term would be considered to have short-term impacts. Impacts associated with short-term leases of water rights would be similar to those described in Section 5.2.5 of the January 2008 Draft Planning

Report/EIS. Impacts to water rights would be evaluated separately as those projects are carried forward.

#### **4.4.2 Integrated Water Resource Management Alternative—Impacts of Individual Elements**

The Yakama Nation holds a water right for instream flow for fish with a priority date of time immemorial. The water right is not quantified. The court in the Yakima Adjudication confirmed a right to the “minimum instream flow necessary to support aquatic life.” Alternatives that would result in an increase in stream flow would not change the water right confirmed by the court; however, for purposes of this analysis an increase in streamflow will be considered to have a positive impact on the Yakama Nation’s water right for fish.

##### **4.4.2.1 Fish Passage Element**

No short-term impacts to water rights are expected from the fish passage element.

##### **4.4.2.2 Modifying Existing Structures and Facilities Element**

###### **Operational Changes at Existing Facilities**

Operational changes at the power generation facilities at Roza Dam and Chandler Power Plant have the potential to cause short-term impacts to the ability to fully exercise the water rights for power generation. At Roza the proposal is to reduce or eliminate diversions for power production during smolt out-migration from April 1 to May 31. At Chandler Power Plant the proposal is to increase the threshold stream flow at which Reclamation reduces diversions from the Yakima River for power production. To the extent either of these proposals is implemented on a short-term basis Reclamation’s ability to exercise their full water right for power production would be temporarily reduced. The actions would increase stream flow in the Yakima River bypass reaches, 15 miles at Roza Dam and 12 miles at Chandler Power Plant. This increased stream flow would have a positive impact on the Yakama Nation’s water right for instream flow for fish.

###### **KRD Canal Modifications to Improve Tributary Flows**

Four tributaries in the KRD have been identified as having instream flow problems: Taneum, Manastash, Big and Little Creeks. One proposal is to modify the KRD Main Canal and South Branch Canal to provide water to water users who divert from the tributaries. In addition, it has been suggested that acquiring water from those water users now diverting from the tributaries could improve flows in the tributaries. To the extent water is acquired by lease, there would be positive short-term impacts to stream flow and to the Yakama Nation’s water right for instream flow for fish.

##### **4.4.2.3 New Storage Element**

No short-term impacts to water rights are expected from the new storage element.

#### **4.4.2.4 Ground Water Storage Element**

The impacts of the Ground Water Storage Element on water rights were described in Section 5.2.5.3 of the January 2008 Draft Planning Report/EIS.

#### **4.4.2.5 Fish Habitat Enhancement Element**

No short-term impacts to water rights are expected from the fish habitat element.

#### **4.4.2.6 Enhanced Water Conservation Element**

The impacts of the Enhanced Water Conservation Element on water rights were described in Section 5.2.5.1 of the January 2008 Draft Planning Report/EIS.

#### **4.4.2.7 Market-based Reallocation of Water Resources**

The impacts of the Market-based Reallocation of Water Resources Element on water rights were described in Section 5.2.5.2 of the January 2008 Draft Planning Report/EIS.

### **4.4.3 Mitigation Measures**

The potential negative short-term impacts to water rights would be to Reclamation's water rights for power generation at Roza Dam and Chandler Power Plant. These options would only be implemented with Reclamation's agreement and would not require mitigation. The other anticipated short-term impacts to water rights are positive impacts and no mitigation is required.

## **4.5 Ground Water**

### **4.5.1 No Action Alternative**

Construction associated with the ongoing efforts of the agencies and groups identified in Section 2.2 has the potential to result in temporary ground water impacts in the Yakima River basin. Those impacts largely relate to the need for dewatering during construction. Any resulting impacts would likely be minor and would undergo separate NEPA or SEPA evaluation as appropriate.

### **4.5.2 Integrated Water Resource Management Alternative—Impacts of Individual Elements**

Short-term impacts to ground water largely relate to the need for dewatering during construction. Construction dewatering activities may cause temporary, localized reductions in ground water levels and availability in the alluvial or sedimentary aquifer systems. The amount of necessary ground water withdrawals and the disposal method would be determined on a site-specific basis. Should dewatering be required, it would be conducted in accordance with Ecology requirements.

#### **4.5.2.1 Fish Passage Element**

If construction dewatering occurs, the construction of fish passage elements may impact short-term ground water quantity.

#### **4.5.2.2 Modifying Existing Structures and Facilities Element**

Construction associated with modifying existing structures may impact short-term ground water quantity if construction dewatering occurs. No short-term ground water impacts are expected during canal lining or piping.

#### **4.5.2.3 New Storage Element**

During excavation for pumping plants, tunnels, and appurtenant structures associated with storage options, dewatering may be necessary in some areas. The amount of dewatering necessary would depend on the site-specific conditions. Some provision for dewatering and disposal of pumped water would be necessary. Construction of an expanded reservoir at Bumping Lake or the Pine Hollow reservoir would have limited impact on ground water resources.

#### **4.5.2.4 Ground Water Storage Element**

The impacts of the Ground Water Storage Element on ground water were described in Section 5.3.2.3 of the January 2008 Draft Planning Report/EIS.

#### **4.5.2.5 Fish Habitat Enhancement Element**

No ground water impacts are expected from construction activities related to habitat restoration.

#### **4.5.2.6 Enhanced Water Conservation Element**

The impacts of the Enhanced Water Conservation Element on ground water were described in Section 5.3.2.1 of the January 2008 Draft Planning Report/EIS.

#### **4.5.2.7 Market-based Reallocation of Water Resources**

The impacts of the Market-based Reallocation of Water Resources Element on ground water were described in Section 5.3.2.2 of the January 2008 Draft Planning Report/EIS.

### **4.5.3 Mitigation Measures**

The following measures could be used to reduce the potential for construction-related impacts:

- Conduct site-specific hydrogeological studies prior to construction to determine impacts to short-term ground water levels and quantity from dewatering activities;
- Treat ground water withdrawn for dewatering prior to release to surface waters or ground water to reduce impacts to water quality; and
- Schedule construction during the dry summer months, when possible, to reduce the potential for generating stormwater that could enter ground water.

In addition, all dewatering would be conducted in accordance with Ecology and local requirements.

## **4.6 Water Quality**

### **4.6.1 No Action Alternative**

Construction associated with the ongoing efforts of the agencies and groups identified in Section 2.2 has the potential to result in temporary water quality impacts in the Yakima River system, including sedimentation, increased turbidity, changes in temperature, and contamination from spills or construction accidents. Any resulting impacts would likely be minor and would undergo separate NEPA or SEPA evaluation as appropriate.

### **4.6.2 Integrated Water Resource Management Alternative—Impacts of Individual Elements**

There would be short-term impacts to water quality from instream and near-stream construction activities. The required instream work may cause local, temporary increases in turbidity during installation and removal of cofferdams. These increases would likely be most intense near the construction activity itself and would decrease over time and distance. Short-term impacts to water quality could also result from near-stream soil disturbance; inadvertent release of fuel, oil, or other construction fluids; dewatering; and cast-in-place concrete work. Both sediment and contaminants can increase turbidity and affect other water quality parameters such as the amount of available oxygen in the water.

#### **4.6.2.1 Fish Passage Element**

Excavation for juvenile fish passage intake structures would be located in the drawdown zone of the reservoirs behind cofferdams. Excavation for the intake structures and placement of cofferdams would be done in the dry during normal reservoir drawdown, effectively isolating the construction activities within the dewatered cofferdams. Very little sedimentation or turbidity would result as cofferdam removal would also occur in the dry during reservoir drawdown.

Construction of adult fish barriers would typically be done in two phases by installing a cofferdam spanning one half the width of the river, completing construction of that portion of the barrier, removing the cofferdam, then repeating for the remaining half of the river. The cofferdams would consist of large sandbags, concrete blocks and gravel. The cofferdam itself is the primary measure ensuring that turbidity and sedimentation from construction activities do not adversely affect water quality. A relatively minor amount of sedimentation would occur during the installation of the cofferdam. Effects of the turbidity from placing the cofferdams are not anticipated to extend more than 200 feet downstream of the site during the typical 5-day construction period. Some turbidity and sedimentation would also occur during cofferdam removal (Reclamation, 2008).

Temporary minor increases in turbidity and sedimentation would occur during construction of the adult fish upstream collection and transportation facilities. Some disturbance of the streambanks would occur as fish ladders are constructed. Stockpile and staging areas would be isolated with a containment berm or physical structure to reduce erosion and sediment impacts to reservoir and river water quality. Access roads may also increase sediment input to the rivers during precipitation events.

The construction of some fish passage elements would likely require cast-in-place concrete, which could impact water quality by increasing pH or turbidity. The demolition of existing structures could also result in temporary water quality impacts.

Construction impacts would be temporary and could be minimized or prevented through the proper implementation of best management practices as discussed in Section 4.6.4.

#### **4.6.2.2 Modifying Existing Structures and Facilities Element**

Construction to support the modification of existing structures and facilities would cause short-term water quality impacts similar to those discussed above.

#### **4.6.2.3 New Storage Element**

Construction of new storage elements could impact short-term water quality. During dam construction, a cofferdam and bypass channels may be required to route the flowing water away from construction activity. Filling reservoirs would inundate new areas, and cause decaying vegetation to increase the availability of nutrients in the reservoir and downstream waters. This new source of nutrients would slowly decline over time.

Construction activities (e.g., excavation, trenching, drilling for pipe installation) could alter the interaction between surface water bodies and local ground water in systems where the two resources are hydrologically connected. In these circumstances, altering the water quality of one source could affect the water quality of other sources at downgradient locations. Best management practices would be used during construction to minimize the potential for contaminants to enter waters.

Constructing reservoirs in a new location would generally cause more extensive water quality impacts than modifying existing facilities. Constructing activities of a new reservoir and its associated water conveyance facilities would increase the potential for erosion and contamination over large geographic areas and therefore have the potential to cause substantial short-term water quality impacts. In contrast, construction to modify Bumping Lake's storage capacity would be localized and is expected to have less water quality impacts.

#### **4.6.2.4 Ground Water Storage Element**

The impacts of the Ground Water Storage Element on ground water were described in Section 5.6.2.3 of the January 2008 Draft Planning Report/EIS.

#### **4.6.2.5 Fish Habitat Enhancement Element**

Construction of habitat enhancements is expected to impact water quality on a short-term basis. The inundation of new land during floodplain reconstruction would increase the availability of nutrients to impounded and downstream waters. Degradation of surface and ground water could result from migration of soil contaminants from lands that are newly inundated. The levels of contaminants in inundated lands would largely be determined by historical land use practices. Agricultural areas are likely to have elevated levels of pesticides and herbicides, and areas near major roads are likely to have elevated

levels of metals and petroleum products. The migration of contaminants would decline over time.

#### **4.6.2.6 Enhanced Water Conservation Element**

The impacts of the Enhanced Water Conservation Element on ground water were described in Section 5.6.2.1 of the January 2008 Draft Planning Report/EIS.

#### **4.6.2.7 Market-based Reallocation of Water Resources**

The impacts of the Market-based Reallocation of Water Resources Element on ground water were described in Section 5.6.2.2 of the January 2008 Draft Planning Report/EIS.

### **4.6.3 Mitigation Measures**

Mitigation measures for short-term impacts to water quality would be similar to those described in Sections 4.1.4 and 4.5.4. Compliance with state and local water quality regulations would be required.

Contracts for construction projects would include language to protect water quality during construction. The contractor would be required to keep all heavy equipment clean and free of grease, hydraulic oil, and other contaminants. The contractor would also be required to prepare and implement a spill prevention, control, and containment plan and develop and implement a temporary erosion and sediment control plan. Turbid or contaminated dewatering water would be treated prior to discharge as necessary to comply with the requirements of the Washington Administrative Code, the construction NPDES permit, and/or the local grading permit. Appropriate measures for handling and storing construction materials, fuels, and solvents would also be required.

During construction, monitoring programs would likely be required to ensure compliance with the site erosion control plans and with regulatory requirements. The construction contractor could be required to measure parameters such as turbidity, temperature, and pH of surface water discharge, and visually monitor for signs of erosion and for correct implementation of control measures.

All in-water work would comply with the requirements of a Hydraulic Project Approval (HPA) issued by Washington Department of Fish and Wildlife (WDFW), including measures to avoid turbidity impacts.

Subsurface exploration for contaminants in floodplain areas prior to inundation would help identify problem areas. Contaminated soils and sediments could then be removed to minimize leaching and migration of nutrients and contaminants.

## **4.7 Hydropower**

### **4.7.1 No Action Alternative**

Short-term impacts to hydropower are not expected to occur in the No Action Alternative because no change in flow through a hydroelectric facility would occur.

#### **4.7.2 Integrated Water Resource Management Alternative—Impacts of Individual Elements**

Short-term impacts to hydropower are not expected to occur for any of the proposed elements because no change in flow through a hydroelectric facility would occur. Bypassing flows around the Roza and Chandler power plants may result in long-term impacts as described in Section 5.7.

#### **4.7.3 Mitigation Measures**

Because no impacts to hydropower are anticipated, no mitigation measures are proposed for short-term impacts to hydropower.

### **4.8 Vegetation and Wildlife**

#### **4.8.1 No Action Alternative**

Under the No Action Alternative, continued current trends or project implementation would occur and there would be no benefits from integrated implementation. Some of the individual actions undertaken by various entities and agencies that are currently funded and have a schedule for implementation could require removal of vegetation or could result in temporary displacements of wildlife. This includes projects for water storage, artificial supplementation programs, and fish passage and habitat improvement. These projects would undergo separate NEPA or SEPA analysis, if appropriate, and would comply with permitting requirements.

#### **4.8.2 Integrated Water Resource Management Alternative—Impacts of Individual Elements**

##### **4.8.2.1 Fish Passage Element**

Construction of fish passage facilities could result in the disturbance of vegetation at the existing reservoirs (where vegetation is present). Much of the disturbance would occur on lakebed substrate in the drawdown zone of the reservoir, which is absent of vegetation. Reclamation (2008c) provides approximate areas of disturbance for facilities located at Cle Elum and Bumping Lakes, but no similar detailed information is available for Kachess, Keechulus, or Rimrock Lakes.

In general, construction areas would be adjacent to existing spillways or dam abutments and embankments, where vegetation is limited to grasses or is nonexistent. The construction of a fish passage conduit may result in the removal of some second-growth conifer forest. Conifer removal would be minimized to the extent possible. Staging and stockpile areas, access roads, and dam crossings would be located in already disturbed areas with little existing vegetation.

On the west side of Cle Elum Dam, approximately 200,000 square feet of forest consisting of young Douglas fir, Ponderosa pine, and bitterbrush would be temporarily replaced by a stockpile and staging area (Reclamation, 2008c). The fish passage conduit would temporarily disturb about 640,000 square feet of Douglas fir, black cottonwood, lodgepole pine, and chokecherry along with the dirt roadway adjacent to the existing spillway facilities. The majority of these areas would be revegetated.

According to Reclamation (2008c), staging and stockpile areas at Bumping Lake would temporarily disturb about 200,000 square feet of second-growth Douglas fir habitat for the juvenile fish passage intake facility, as well as the flat disturbed area at the foot of the dam for the adult fish collection facility. The area at the foot of the dam is heavily disturbed with little vegetation and is of minimal value for wildlife. However, the stockpile area for the juvenile fish passage intake structure could remove second-growth forest habitat depending on the exact location, temporarily adversely affecting species such as deer and elk. This area would be revegetated after construction of the project is completed.

Any existing wildlife in the reservoir area, such as birds and small mammals, would be temporarily displaced by the noise and construction activities.

#### **4.8.2.2 Modifying Existing Structures and Facilities Element**

The majority of the proposed modifications would result in no impacts to plants and wildlife because construction would take place in already disturbed areas. Construction and noise associated with the piping of five laterals on the Main Canal and five laterals on the South Branch Canal of the KRD would result in temporary impacts to wildlife in the vicinity.

#### **4.8.2.3 New Storage Element**

Construction of new storage facilities would include the construction of new access roads, removal of vegetation in the dam area, and other construction activities that would remove vegetation and disturb wildlife. Construction of a new rock-fill dam downstream of the existing Bumping Lake Dam would require access roads that may result in temporary vegetation removal. Similarly, the construction of the new 180-foot dam for the Pine Hollow Reservoir would require the removal of vegetation in the dam area, which currently consists primarily of grasses and is void of shrubs or trees. Conservation measures would likely include vegetation removal along conveyance lines, including existing riparian vegetation along the Johncox Ditch, for lining or piping canals. Removal of riparian vegetation could affect wildlife using the habitat during construction. Habitat restoration projects would likely include the removal of non-native vegetation. Disturbed areas would be replanted with conifers and riparian vegetation after construction is complete.

Wildlife in the vicinity of new storage elements, including construction of water conveyance facilities for the proposed Wymer Dam, would likely be temporarily displaced by noise and construction activities. The restored riparian areas should provide improved habitat for wildlife.

#### **4.8.2.4 Ground Water Storage Element**

The impacts of the Ground Water Storage Element on vegetation and wildlife were described in Section 5.7.2.3 of the January 2008 Draft Planning Report/EIS.

#### **4.8.2.5 Fish Habitat Enhancement Element**

Construction of some habitat restoration projects could result in temporary impacts to existing vegetation. Projects that involve stream bank reshaping, channel reconstruction, and restoration of fish passage at manmade barriers would likely remove existing vegetation. These projects would also likely include the removal of non-native vegetation. Wildlife in the vicinity of the restoration project may be temporarily displaced by noise and construction activities. Habitat restoration projects are intended to provide improved native plant species diversity and habitat for wildlife; therefore, short-term impacts would be temporary.

#### **4.8.2.6 Enhanced Water Conservation Element**

The impacts of the Enhanced Water Conservation Element on vegetation and wildlife were described in Section 5.7.2.1 of the January 2008 Draft Planning Report/EIS.

#### **4.8.2.7 Market-based Reallocation of Water Resources**

The impacts of the Market-based Reallocation of Water Resources Element on vegetation and wildlife were described in Section 5.7.2.2 of the January 2008 Draft Planning Report/EIS.

### **4.8.3 Mitigation Measures**

Disturbance of riparian vegetation would be minimized during construction of the adult fish collection facilities and barrier dams. Where possible, vegetation that is removed for construction would be replaced with appropriate native plant species. Habitat restoration projects are expected to be an overall benefit to vegetation and wildlife.

No mitigation is proposed for the temporary displacement of wildlife because this is expected to be a minor impact. Wildlife is likely to return following construction, except in the area that would be inundated by a new reservoir or the expansion of Bumping Lake.

## **4.9 Fish and Aquatic Resources**

### **4.9.1 No Action Alternative**

Under the No Action Alternative, various agencies and other entities would continue to undertake individual actions to restore and enhance fish and aquatic resources in the Yakima basin. These actions would likely result in short-term impacts such as dewatering of instream habitat, disturbance of juvenile salmonids, disturbance of shoreline habitat, increased water temperatures, sedimentation, fish passage obstruction, and potential for accidental spills of hazardous materials (i.e., cement, fuel, hydraulic fluid). Piecemeal implementation of individual projects may result in localized improvements; however, broader restoration and enhancement goals are less likely to be achieved than with an integrated approach. Short-term impacts would be minimized and mitigated according to applicable local, state, and federal environmental review and permit requirements.

## **4.9.2 Integrated Water Resource Management Alternative—Impacts of Individual Elements**

Individual water storage and fish enhancement projects would be implemented over a period of years to decades as part of a comprehensive, integrated set of actions. These actions are intended to provide overall benefits to fish and aquatic resources. Short-term impacts of the individual elements are described below. Avoidance and minimization measures would be identified and implemented consistent with federal environmental review and permitting requirements.

### **4.9.2.1 Fish Passage Element**

Short-term impacts would be temporary and localized and could include dewatering of instream habitat, disturbance of juvenile salmonids, disturbance of shoreline habitat, increased water temperatures, sedimentation, fish passage obstruction, and potential for accidental spills of hazardous materials (i.e., cement, fuel, hydraulic fluid).

Construction of the fish passage facilities, which are intended to improve fish passage in the basin, may require temporary dewatering of stream channels. This could potentially have an adverse impact on fish habitat if not properly conducted. For example, fish in a dewatered stream section could die if not moved or could be harmed during removal. These types of projects would be subject to environmental review on an individual basis. In addition, if stream dewatering were required, fish would be removed from the stream section prior to dewatering in accordance with WDFW guidelines.

Construction could temporarily disturb habitats and shorelines where juvenile salmonids occur and could impact fish habitat in the short-term. These activities could require clearing along stream banks and grading of soils. Clearing of riparian vegetation could result in a reduction of stream shading that could increase stream temperature and decrease quality of shaded habitat used by fish.

Soils disturbed by grading could increase sedimentation and turbidity in the channel if not properly stabilized following the restoration activity. Sedimentation in fish-bearing streams is a concern because it can degrade fish spawning habitat, increase stream channel scour potential, foul rearing habitat, and alter the structure of riparian vegetation. Suspended sediment (turbidity) typically does not cause direct salmonid mortality unless extremely high levels occur (NOAA Fisheries, 1999). However, moderately increased turbidity and sedimentation may cause some downstream displacement of juvenile salmon because they instinctively avoid turbid water.

Although not likely, accidents such as spills of hazardous materials could occur that would degrade water quality and/or be toxic to fish.

### **4.9.2.2 Modifying Existing Structures and Facilities Element**

Short-term impacts would be temporary and localized and could include those discussed in Section 4.9.2.1 for the fish passage element. Depending on the action, short-term impacts of modifying structures/operations would likely be less than for the fish passage element. Modifying structures/operations would entail changing the flow regime and

would require less construction compared to the construction of new fish passage facilities.

#### **4.9.2.3 New Storage Element**

Short-term impacts would be temporary and localized and could include those discussed in Section 4.9.2.1. However, short-term impacts of the new storage element would likely be greater because there could be new construction and inundation of previously unimpounded areas of instream habitat.

In-channel projects that impound water in the existing channel can influence fish by:

- Restricting or adversely influencing upstream and downstream passage;
- Entraining or impinging juvenile species at points of diversion;
- Inundating channel habitat features that are important for spawning or rearing habitat;
- Altering water quantity (stream flow levels), flow rate, and water quality (temperature, dissolved oxygen, nutrients, pesticides, herbicides, suspended and bedload sediment levels) in the channel downstream of the reservoir; these changes could influence trophic relationships, shellfish beds, behavioral cues, and migratory timing of fish; and
- Partitioning stream habitat into flowing and impounded reaches, negatively influences habitat connectivity by disconnecting stream reaches.

#### **4.9.2.4 Ground Water Storage Element**

The impacts of the Ground Water Storage Element on fish and aquatic resources were described in Sections 5.8.2.4, 5.9.2.4, and 5.10.2.3 of the January 2008 Draft Planning Report/EIS.

#### **4.9.2.5 Fish Habitat Enhancement Element**

In addition to the impacts discussed in Section 4.9.2.1, disturbance of streambed materials could occur during the fish habitat enhancement projects. Disturbance of these materials might cause a decrease in prey production or otherwise influence fish to avoid these habitats in the short term. However, the goal is to provide streambeds more suitable for salmonid use over the long-term.

Short-term impacts of the fish habitat enhancement element are likely to be greater than the modifying structures/operations element, but similar to all the other elements. Habitat enhancement work would entail new construction along shorelines and in habitats where salmonids may be present.

#### **4.9.2.6 Enhanced Water Conservation Element**

The impacts of the Enhanced Water Conservation Element on fish and aquatic resources were described in Sections 5.8.2.2, 5.9.2.2, and 5.10.2.2 of the January 2008 Draft Planning Report/EIS.

#### **4.9.2.7 Market-based Reallocation of Water Resources**

The impacts of the Market-based Reallocation of Water Resources Element on fish and aquatic resources were described in Sections 5.8.2.3, 5.9.2.3, and 5.10.2.2 of the January 2008 Draft Planning Report/EIS.

#### **4.9.3 Mitigation Measures**

Appropriate mitigation measures would be identified through local, state, and federal environmental review and permitting processes and would therefore be project-specific. Typical mitigation measures for short-term impacts may include but not be limited to:

- Deploying silt screens,
- Using in-water containment screens to protect against accidental hazardous material spills,
- Working within appropriate instream fish work windows,
- Implementing native plant species revegetation/enhancement plans,
- Following a dewatering plan for constructability and sediment control, and
- Maintaining fish passage through work areas.

All of these measures are consistent with WDFW Stream Habitat Restoration guidelines (WDFW, 2004).

### **4.10 Recreational Resources**

#### **4.10.1 No Action Alternative**

The No Action Alternative would not result in direct short-term recreational impacts in the Yakima River basin. However, some of the individual actions undertaken by various entities and agencies that are currently funded and have a schedule for implementation could result in temporary construction impacts due to access limitations. To the extent that NEPA or SEPA analysis would be required for these actions, appropriate documentation of the recreational resource impacts from construction would be prepared separately.

#### **4.10.2 Integrated Water Resource Management Alternative—Impacts of Individual Elements**

Recreation activities that could be impacted include fishing, boating, camping, and wildlife viewing. Short-term impacts would be primarily related to construction activities that may result in temporary access restrictions or nuisance dust and noise. These elements are discussed in the following sections.

##### **4.10.2.1 Fish Passage Element**

Construction activities, heavy equipment, and temporary structures would be in evidence at varying intensities and durations during the construction period for individual projects. Access to and from some recreational facilities, such as parks, boat launches, trails, and campgrounds near the reservoirs, may be limited during this time. Construction for some elements, such as for the Cle Elum dam, could last several years. Fugitive dust and noise

could also reduce the ability of users to enjoy recreational facilities near construction activities. Potential impacts to recreational resources associated with construction of fish passage facilities would be short-term, minor, localized, and temporary.

#### **4.10.2.2 Modifying Existing Structures and Facilities Element**

Modifications requiring construction activities would cause short-term impacts similar to those discussed above for the fish passage element. Construction activities for this element could, however, be larger in scale, such as for the lateral piping projects. Impacts to access at nearby recreational facilities could last longer, but would still be localized and temporary.

Operational modifications associated with construction activities would not likely have an impact on recreational resources in the Yakima River basin as no significant construction would be involved.

#### **4.10.2.3 New Storage Element**

Recreational impacts at Bumping Lake would be extensive during the construction period for either the large or small expansion options. Existing recreation facilities such as swimming, boating, fishing and camping would not be available during construction. In addition to the recreational facilities that would be eliminated by the expansion of Bumping Lake (described in Section 5.10.2.3), access to others would likely be limited during construction. This may include nearby campsites, trails and trailheads, and access to the lake itself. Indirect impacts to recreational facilities in the vicinity of Bumping Lake from construction activities would be short-term and temporary.

Short-term impacts to recreational facilities for other storage options would be similar to those for the Bumping Lake expansion, though not likely as extensive. There are currently no recreation opportunities at the potential Wymer Dam site. Short-term impacts to recreational facilities at all potential storage sites would be localized and temporary.

#### **4.10.2.4 Ground Water Storage Element**

The impacts of the Ground Water Storage Element on recreational resources were described in Section 5.12.2.3 of the January 2008 Draft Planning Report/EIS.

#### **4.10.2.5 Fish Habitat Enhancement Element**

The greatest temporary recreational resource impacts would result from construction of projects involving stream bank reshaping, channel reconstruction, and relocating and improving floodplain infrastructure and roads. These impacts are related to the intensity of construction activities and access limitations that would likely occur. The primary types of recreation affected would be streamside activities such as fishing and wildlife viewing. These construction impacts would be temporary in nature and localized to the vicinity of construction.

#### **4.10.2.6 Enhanced Water Conservation Element**

The impacts of the Enhanced Water Conservation Element on recreational resources were described in Section 5.12.2.1 of the January 2008 Draft Planning Report/EIS.

#### **4.10.2.7 Market-based Reallocation of Water Resources**

The impacts of the Ground Water Storage Element on recreational resources were described in Section 5.12.2.2 of the January 2008 Draft Planning Report/EIS.

#### **4.10.3 Mitigation Measures**

Access to and from recreational facilities may be temporarily closed, or limited, during construction. To the extent possible, alternate access routes would be provided. To minimize the negative impact to users, informational signage and alternate directions should be posted along access routes, at the recreational sites, and on agency websites.

Construction best management practices would be implemented to minimize the impact on recreation facilities and their patrons from nuisance dust and noise during temporary construction activities.

### **4.11 Land and Shoreline Use**

#### **4.11.1 No Action Alternative**

The No Action Alternative would not result in direct short-term land use impacts in the Yakima River basin. Some of the other, currently funded actions undertaken by various entities and agencies, and that have a schedule for implementation, could result in temporary construction impacts due to access limitations. To the extent that NEPA or SEPA analysis would be required for these actions, appropriate documentation of the land and shoreline use impacts from construction would be prepared separately.

#### **4.11.2 Integrated Water Resource Management Alternative—Impacts of Individual Elements**

Short-term impacts to land use would be primarily related to construction activities that may result in temporary access restrictions. These elements are discussed in the following sections.

##### **4.11.2.1 Fish Passage Element**

Construction activities, heavy equipment, and temporary structures could limit access to and from adjacent properties. Potential impacts to land use associated with the construction of fish passage facilities would be short-term, minor, localized, and temporary. Individual construction projects would be subject to the regulations and permitting requirements of the presiding jurisdiction, which may include NEPA and/or SEPA compliance, permits required under the Shoreline Management Act, and regional building permits.

#### **4.11.2.2 Modifying Existing Structures and Facilities Element**

Modifications requiring construction activities would cause short-term impacts similar to those discussed in Section 4.11.2.1, and would be subject to the same regulatory requirements. Construction activities for this element could, however, be larger in scale, such as for the lateral piping projects. Impacts to access to adjacent properties could last longer, but would still be temporary in nature.

Operational modifications associated with construction activities would not likely have an impact on land use in the Yakima River basin as no significant construction would be involved.

#### **4.11.2.3 New Storage Element**

Construction associated with the proposed Bumping Lake expansion would be extensive for either the large or small expansion option. In addition to the property that would be inundated by the expansion of Bumping Lake (described in Section 5.11.2.3), access to other property outside of the direct impact area would likely be limited during construction. However, this indirect impact to property access would be short-term.

Short-term impacts to land use for other storage options would be similar to those for the Bumping Lake expansion, though not likely as intense. Short-term land use impacts at all potential storage sites would be localized and temporary and would subject to the same regulatory requirements, as described in Section 4.11.2.1.

Currently, the proposed site of Pine Hollow reservoir is privately owned. As discussed in Section 5.7.2 of the Programmatic EIS for the Ahtanum Creek Watershed Restoration Program, property would have to be acquired by the implementing entity for the reservoir and appurtenant facilities. Land at the reservoir site would be permanently converted from its existing land uses (primarily residential and agricultural).

#### **4.11.2.4 Ground Water Storage Element**

The impacts of the Ground Water Storage Element on land and shoreline use were described in Section 5.13.2.3 of the January 2008 Draft Planning Report/EIS.

#### **4.11.2.5 Fish Habitat Enhancement Element**

Fish habitat enhancement projects could include reconnecting side channels, floodplains, and off-channel habitat to streams; restoring natural channels, riparian areas, and wet meadows; and relocating infrastructure. Enhancement-related construction activities would mostly include instream work, including the construction of fish passage facilities. Enhancements requiring construction activities would cause the same type of short-term impacts and be subject to the same regulatory requirements discussed in Section 4.11.2.1.

#### **4.11.2.6 Enhanced Water Conservation Element**

The impacts of the Ground Water Storage Element on land and shoreline use were described in Section 5.12.2.1 of the January 2008 Draft Planning Report/EIS.

#### **4.11.2.7 Market-based Reallocation of Water Resources**

The impacts of the Market-based Reallocation of Water Resources Element on land and shoreline use were described in Section 5.12.2.2 of the January 2008 Draft Planning Report/EIS.

#### **4.11.3 Mitigation Measures**

Access to and from adjacent property may be temporarily closed, or limited, during construction. Properties impacted would likely be a mix of public and private with a variety of land uses depending on the exact location of the projects. To the extent possible, alternate access routes would be provided, and access to private property would be maintained at all times. To minimize the negative impact, informational signage and alternate directions should be posted along access routes, at the construction sites, and on agency websites.

### **4.12 Cultural Resources**

Short term impacts to cultural resources under these alternatives are defined as construction-related impacts. While these impacts would occur as a result of short-term construction activities, the impacts on cultural resources, or archaeological or historic sites would be permanent. Short term impacts to traditional cultural properties or sacred sites may be impermanent such as increased noise or construction activity, or permanent if a place is disturbed or inundated.

#### **4.12.1 No Action Alternative**

Short-term impacts to cultural resources are possible under the No Action Alternative, including impacts from ground disturbing activities associated with stream restoration, irrigation improvements, and structural improvements to historic structures. It is expected that these impacts would be addressed under separate environmental review processes regulating the individual actions proposed.

#### **4.12.2 Integrated Water Resource Management Alternative—Impacts of Individual Elements**

##### **4.12.2.1 Fish Passage Element**

Short-term impacts to cultural resources could include modification of historic dams and their appurtenances; while the actions would occur in the short term, these impacts would be permanent. Measures to avoid affecting cultural resources would be employed prior to construction to minimize these potential impacts.

##### **4.12.2.2 Modifying Existing Structures and Facilities Element**

Short-term impacts to cultural resources under this alternative would be similar to those described in Section 4.12.2.1.

##### **4.12.2.3 New Storage Element**

Construction of a storage facility could adversely impact cultural resources in the short term. Any ground disturbing activity, including removal of vegetation prior to

inundation, earthmoving, and use of heavy equipment, could adversely affect cultural resources in the area of the construction activity as well as in staging areas and construction access areas. Other impacts could include removal of historic structures prior to inundation. These impacts would be permanent. Additionally, construction for new storage could adversely impact access to traditional cultural properties, traditional use areas, and sacred sites.

#### **4.12.2.4 Ground Water Storage Element**

The impacts of the Ground Water Storage Element on cultural resources were described in Section 5.20.2.3 of the January 2008 Draft Planning Report/EIS.

#### **4.12.2.5 Fish Habitat Enhancement Element**

Short-term impacts to cultural resources under this alternative would be similar to those described in Section 4.12.2.3, although the scale of the activities would be smaller.

#### **4.12.2.6 Enhanced Water Conservation Element**

The impacts of the Enhanced Water Conservation Element on cultural resources were described in Section 5.20.2.1 of the January 2008 Draft Planning Report/EIS.

#### **4.12.2.7 Market-based Reallocation of Water Resources**

The impacts of the Market-based Reallocation of Water Resources Element on cultural resources were described in Section 5.12.2.2 of the January 2008 Draft Planning Report/EIS.

### **4.12.3 Mitigation Measures**

Under any of the alternatives, additional environmental review is expected to be conducted. Mitigation measures for the Integrated Water Resource Management Alternative would be similar to those described in Section 5.20.3 of the January 2008 Draft Planning Report/EIS.

## **4.13 Socioeconomics**

Consistent with the approach used in Section 5.14 of the January 2008 Draft Planning Report/EIS, the assessment of short-term socioeconomic impacts and mitigation measures considers potential effects on the supply and value of goods and services derived from the basin's water and related resources, resource-related jobs and incomes, resource-related uncertainty and risk, the distribution of resource-related costs and benefits, and the structure of the economy.

### **4.13.1 No Action Alternative**

Under this alternative, the current patterns and trends in the relationship between the basin's natural resources and the state's economy likely would continue over the short term. Over a short period of time, the overall changes in socioeconomic characteristics of the basin's water and related resources, and their interaction with the regional and statewide economies, likely would be negligible, unless the region experienced a catastrophic event, such as an extended drought period that wiped out economically

important crops or fish populations. Section 5.14.1.1 of the January 2008 Draft Planning Report/EIS describes the socioeconomic characteristics that would be affected by the No Action Alternative. The No Action Alternative is expected to result in little or no change to these characteristics and would be similar to the impacts described in Section 5.14.1.1 of the January 2008 Draft Planning Report/EIS.

#### **4.13.2 Integrated Water Resource Management Alternative—Impacts of Individual Elements**

Some of the individual elements of the Integrated Water Resource Management Alternative might have discernible short-term effects on the supply and value of some goods and services derived from the basin's water-related ecosystem. Project-related expenditures likely would have short-term impacts on jobs and incomes, and project-related activities might trigger short-term changes in uncertainty and risk. Short-term effects on the distribution of costs and benefits, and on economic structure, would likely depend on the mechanisms used to fund project-related activities. Detailed determination of potential effects would require site and project specific assessments for all elements of the Integrated Water Resource Management Alternative.

##### **4.13.2.1 Socioeconomic Characteristics**

###### **Value of Goods and Services**

All of the elements would require would require financial resources, volunteer resources, land, and other resources. These resources would not be available for use elsewhere. Short-term changes in other resource-related goods and services, if any, likely would not be discernible.

###### **Jobs and Incomes**

Short-term expenditures associated with elements of the Integrated Water Resource Management Alternative would likely generate jobs and incomes for some of the workers directly associated with these activities. The initial impacts would be dampened, however, to the extent that expenditures on these activities draw funding, labor, or other resources away from other activities.

###### **Uncertainty and Risk**

Projects proposed under the Integrated Water Resource Management Alternative would likely have little short-term effect on risk and uncertainty associated with the basin's water and related resources. The projects might have indirect effects, to the extent that a decision to proceed with a particular project would signal to private and public entities that specific investments will occur for a specific project and that the investments likely would alter the demand for and supply of related goods and services. Such signals might convince households and businesses that the risk and uncertainty associated with related investments have diminished, and induce them to make investments that otherwise would not occur.

###### **Distribution of Costs and Benefits**

In general, projects associated with the Integrated Water Resource Management Alternative would involve costs, concentrated in the short term, aimed at producing long-

term benefits. Therefore, the short-term impacts on the distribution of costs and benefits would be determined by each project's impacts on its source of funding for the project, and on the types of land and other non-financial resources it would consume.

#### **Socioeconomic Structure**

The socioeconomic structure is not like to change in the short-term under the Integrated Water Resource Management Alternative.

#### **4.13.2.2 Fish Passage Element**

##### **Value of Goods and Services**

Impacts would be similar to those described in Section 4.13.2.1.

##### **Jobs and Incomes**

In its assessment of proposed fish passage expenditures at Cle Elum and Bumping Lake Dams, Reclamation (2008c) estimated that the projects would create local jobs at the rate of about one job per \$64,000 to \$66,000 of local construction expenditures. It also estimated that the local expenditure of \$1 on construction would generate about \$0.60 of local labor income. These estimates do not, however, account for second-order effects that could significantly reduce the overall impacts on jobs and income. Such effects would materialize, for example, if fish passage projects would secure the services of construction firms and workers only by attracting them away from other projects, so that the net short-term impact on the overall level of local construction would be smaller than the fish passage projects in isolation.

##### **Uncertainty and Risk**

Short-term impacts would be similar to those described in Section 4.13.2.1.

##### **Distribution of Costs and Benefits**

Short-term impacts would be similar to those described in Section 4.13.2.1.

##### **Socioeconomic Structure**

The fish passage element is not likely to change the socioeconomic structure in the short term.

#### **4.13.2.3 Modifying Existing Structures and Facilities Element**

##### **Value of Goods and Services**

Short-term impacts of this element of the Integrated Water Resource Management Alternative would be similar to Section 4.13.2.1.

##### **Jobs and Incomes**

Short-term impacts of modifying existing structures and facilities would be similar to those described in Section 4.13.2.1.

##### **Uncertainty and Risk**

Projects to modify existing structures and facilities likely would have similar short-term impacts to those described in Section 4.13.2.1.

### **Distribution of Costs and Benefits**

Short-term impacts of this element of the Water Resources Management Alternative to the distribution of costs and benefits would be similar to those described in Section 4.13.2.1.

### **Socioeconomic Structure**

The socioeconomic structure is not likely to change in the short term under this element of the Integrated Water Resource Management Alternative.

#### **4.13.2.4 New Storage Element**

##### **Value of Goods and Services**

The short-term impacts to the value of goods and services under this element of the Water Resources Management Alternative would be similar to those described in Section 4.13.2.1.

##### **Jobs and Incomes**

The short-term impacts on jobs and incomes per unit of expenditure likely would resemble those for expenditures on fish passage activities, described in Section 4.13.2.1, or those described in Section 4.14.2.4 of the January 2008 Draft Planning Report/EIS, to the extent that a specific project to develop new storage would have similar scope and labor requirements.

##### **Uncertainty and Risk**

Projects to develop new storage likely would have little short-term effect on risk and uncertainty associated with the basin's water and related resources similar to those described in Section 4.13.2.1.

##### **Distribution of Costs and Benefits**

In general, projects to develop new storage would involve costs, concentrated in the short term, aimed at producing long-term benefits. Therefore, the short-term impacts on the distribution of costs and benefits would be determined by each project's impacts on its source of funding for the project, and on the types of land and other non-financial resources it would consume.

##### **Socioeconomic Structure**

The socioeconomic structure is not likely to change in the short term under the new storage element of the Integrated Water Resource Management Alternative.

#### **4.13.2.5 Ground Water Storage Element**

The impacts of the Ground Water Storage Element on socioeconomics were described in Section 5.14.2.3 of the January 2008 Draft Planning Report/EIS.

#### **4.13.2.6 Fish Habitat Enhancement Element**

##### **Value of Goods and Services**

Short-term impacts of this element on the value of goods and services would be similar to those described in Section 4.13.2.1.

### **Jobs and Incomes**

Short-term impacts on jobs and incomes associated with the fish habitat enhancement would be similar to those described in Section 4.13.2.1.

### **Uncertainty and Risk**

Projects to enhance fish habitat likely would have little short-term effect on uncertainty and risk similar to those described in Section 4.13.2.1.

### **Distribution of Costs and Benefits**

Short-term impacts to the distribution of costs and benefits under the fish habitat enhancement element would be similar to those described in Section 4.13.2.1.

### **Socioeconomic Structure**

The socioeconomic structure is not likely to change in the short term under the fish habitat enhancement element of the Integrated Water Resource Management Alternative.

#### **4.13.2.7 Enhanced Water Conservation Element**

The impacts of the Enhanced Water Conservation Element on socioeconomics were described in Section 5.14.2.1 of the January 2008 Draft Planning Report/EIS.

#### **4.13.2.8 Market-based Reallocation of Water Resources**

The impacts of the Market-based Reallocation of Water Resources Element on socioeconomics were described in Section 5.14.2.2 of the January 2008 Draft Planning Report/EIS.

### **4.13.3 Mitigation Measures**

The type and level of mitigation, if any, that would be appropriate for adverse, short-term socioeconomic impacts would be determined by future socioeconomic conditions and by the specific steps that would be taken to implement the projects. Mitigation typically would be warranted only insofar as projects would reduce the supply of one set of goods and services—to increase the supply of another—and the reduction would harm one or more individuals, businesses, landowners, or other interest group. For example, mitigation might involve compensation, by providing unemployment benefits if the fallowing of land to enhance fish habitat were to cause farm workers to lose their jobs.

## **4.14 Visual Resources**

### **4.14.1 No Action Alternative**

The No Action Alternative would not result in direct visual resource impacts in the Yakima River basin. Some of the individual actions undertaken by various entities and agencies that are currently funded and have a schedule for implementation could require construction, resulting in visual resource impacts. To the extent that NEPA or SEPA analysis would be required for these actions, appropriate documentation of the visual resource impacts from construction would be prepared separately.

## **4.14.2 Integrated Water Resource Management Alternative—Impacts of Individual Elements**

### **4.14.2.1 Fish Passage Element**

Construction activities, fugitive dust, heavy equipment, cofferdams, and other temporary structures would be in evidence at varying intensities and durations during the construction period for individual projects. Views of the construction sites would generally create an unattractive visual setting during the construction period. Viewpoints are generally limited to local roads and public access areas along the rivers and reservoirs. Some nearby residences may also have views of the construction. Potential visual impacts associated with construction of fish passage facilities would be short-term, minor, localized, and temporary.

### **4.14.2.2 Modifying Existing Structures and Facilities Element**

Modifications to spill gates, fish bypass systems, and canals would create short-term, minor, localized, and temporary visual impacts during the construction period of individual projects. Because access to and views of these facilities are limited, few people would notice the construction.

### **4.14.2.3 New Storage Element**

Visual impacts during construction of new storage facilities would be extensive during the construction period. Construction would require clearing, stump removal and grading of the reservoir area, and construction of an earth-fill or other dam. All of these activities would change existing landscapes, possibly block existing views, and create an unattractive visual setting. These activities could last several years. The extent of impacts would depend on how visible the construction site would be to the public.

Because of Bumping Lake's location in a popular recreation area, visual impacts during construction could be significant. Viewpoints around the reservoir construction area would primarily be from U.S. Forest Service roads and trails in the William O. Douglas Wilderness Area. Seasonal residences and recreation facilities along the existing reservoir would be removed and unavailable during construction (see Section 5.11.2.3 for information on residences). Impacts associated with the proposed Pine Hollow reservoir were described in the 2005 EIS on the Ahtanum Creek Watershed Restoration Program (Ecology, 2005a). Impacts associated with Pine Hollow are expected to be relatively minor because of the limited number of people who view the site and the lack of uniqueness associated with the scenic resource.

Construction activities associated with modifications to the KRD Main Canal and South Branch Canal, the new canal from Cle Elum Dam to the KRD Main Canal, and tunneling through Manastash Ridge could be visible from interstates (I-90 and I-82), local roads, residences, and recreational areas. These impacts would be of limited duration.

### **4.14.2.4 Ground Water Storage Element**

The impacts of the Ground Water Storage Element on visual resources were described in Section 5.19.2.3 of the January 2008 Draft Planning Report/EIS.

#### **4.14.2.5 Fish Habitat Enhancement Element**

Construction of projects involving stream bank reshaping, channel reconstruction, and restoring fish passage at manmade barriers would have the greatest temporary visual impacts of the fish habitat enhancement projects. Potential impacts would be related to the intensity of construction activities, presence of heavy equipment, and temporary impacts to vegetation. Construction areas could be visible from adjacent roadways and by boaters on the rivers. Visual impacts would be temporary.

#### **4.14.2.6 Enhanced Water Conservation Element**

The impacts of the Enhanced Water Conservation Element on visual resources were described in Section 5.19.2.1 of the January 2008 Draft Planning Report/EIS.

#### **4.14.2.7 Market-based Reallocation of Water Resources Element**

The impacts of the Market-based Reallocation of Water Resources Element on visual resources were described in Section 5.19.2.2 of the January 2008 Draft Planning Report/EIS.

#### **4.14.3 Mitigation Measures**

Specific mitigation measures would be developed for individual construction projects. The projects would comply with dust control requirements of the Yakima Regional Clean Air Authority.

### **4.15 Transportation**

#### **4.15.1 No Action Alternative**

The No Action Alternative would not result in direct short-term transportation impacts in the Yakima River basin. Some of the other, currently funded actions undertaken by various entities and agencies, and that have a schedule for implementation, could result in temporary construction impacts. To the extent that NEPA or SEPA analysis would be required for these actions, appropriate documentation of transportation impacts from construction would be prepared separately.

#### **4.15.2 Integrated Water Resource Management Alternative—Impacts of Individual Elements**

##### **4.15.2.1 Fish Passage Element**

The construction of the various fish passage elements could have minor, short-term impacts on highways in the Yakima River basin. There would be increased traffic on roadways with worker traffic, equipment, and deliveries. All the fish passage facilities would be located in areas served by local roads and Reclamation access roads with limited traffic. Only minor short-term impacts are anticipated. No roadways would be closed by the construction projects.

#### **4.15.2.2 Modifying Existing Structures and Facilities Element**

The construction of the various structural changes to existing facilities could have minor, short-term impacts on highways in the Yakima River basin. Where canals or other delivery systems are located adjacent to roadways, there could be temporary disruptions of traffic. Piping of canals could require that culverts be installed or replaced under roadways. There would be increased traffic on roadways with worker traffic, equipment, and deliveries. The degree of impact depends, in part, on the current level of service on potentially affected roads.

#### **4.15.2.3 New Storage Element**

Construction of new storage facilities would likely have the greatest short-term impact to transportation. Construction would cause increased traffic on roadways with worker traffic and equipment and materials hauling. Construction at Bumping Lake could have minor, short-term impacts on SR-410 and National Forest Development Road 1800. Construction of the new Pine Hollow reservoir could have minor, short-term impacts on Ahtanum Road and local access roads. The major impact would be increased traffic on the roadways. Construction at Bumping Lake could cause road closures during the construction period, which could last several years.

#### **4.15.2.4 Ground Water Storage Element**

The impacts of the Ground Water Storage Element on transportation were described in Section 5.16.2.3 of the January 2008 Draft Planning Report/EIS.

#### **4.15.2.5 Fish Habitat Enhancement Element**

The construction of the various fish habitat enhancement elements could have minor, short-term impacts on highways in the Yakima River basin. There would be increased traffic on roadways with worker traffic, equipment, and deliveries. The degree of impact depends, in part, on the current level of service on potentially affected roads. Only minor short-term impacts are anticipated.

#### **4.15.2.6 Enhanced Water Conservation Element**

The impacts of the Enhanced Water Conservation Element on transportation were described in Section 5.16.2.1 of the January 2008 Draft Planning Report/EIS.

#### **4.15.2.7 Market-based Reallocation of Water Resources**

The impacts of the Market-based Reallocation of Water Resources Element on transportation were described in Section 5.16.2.2 of the January 2008 Draft Planning Report/EIS.

### **4.15.3 Mitigation Measures**

Mitigation measures to reduce short-term construction impacts to transportation would include maintaining access to properties, installing signage, marking detour routes, and providing information to the public.