Lateral Piping Projects along the Main Canal and South Branch Canal

Five laterals on the Main Canal (M4.9, M6.1, M7.7, M13.6, and M16.9) and five laterals on the South Branch Canal (SB9.9, SB13.8, SB14.3, SB16.7 and SB17.6) are candidates for replacement with pipe. The laterals would be converted to pressurized systems, reducing seepage and spill at the tail end of the lateral. The piping projects would free up capacity in the Main Canal and South Branch Canal to allow discharge directly to creeks or to supply water users diverting from the creeks. The volume of water that can be supplied by this option is not precisely known, but is estimated from existing reports to be approximately 20 cfs on average throughout the irrigation season.

Pumping near Tail End of Canal

This option would place a pump station on the Yakima River near the tail end of the South Branch Canal in the KRD and install a pressurized pipe system. The pump station would supply water users on the lower end of the KRD system (currently served by laterals SB14.3, SB16.7 and SB17.6), freeing up capacity for flow in the Main Canal and South Branch Canal that can either be discharged directly to creeks or to water users diverting from the creeks. The volume of water that can be supplied by this option is estimated to be 25 cfs on average throughout the irrigation season.

2.3.3.4 Complete the Wapatox Project

Reclamation acquired the Wapatox Power Plant and diversion in 2003 in order to use the associated 350 cfs water right to augment instream flows in 7.4 miles of the lower Naches River. The Wapatox diversion also supplies water to several irrigators so the diversion remains active. The conveyance system was designed for 400 cfs and needs approximately 110 cfs to provide sufficient head to run the system. This has reduced the amount of water Reclamation has been able to put to instream use. Modifying the conveyance system would allow irrigators access to their full water rights while allowing all of Reclamation's water right to be left instream. Consolidating the Wapatox and Naches-Selah diversions has also been proposed, which would address this issue, increase instream flows between the Naches-Selah and Wapatox diversions, and reduce constraints on Bumping Lake Reservoir operations.

Another possible option is to use the Wapatox diversion to supply the Yakima water treatment plant and the Gleed ditch, eliminating the need for those two diversions from the river, and allowing for restoration of flows in a large reach of the Naches River.

2.3.4 New Storage Element

Water storage facilities are an important element of the Integrated Water Resource Management Alternative. Opportunities exist to expand existing water storage facilities or construct new facilities. These storage facilities would provide an improved water supply for irrigation during drought years and for future municipal growth and improve flows for anadromous and resident fish. This element considers the potential for new or expanded storage in the Naches River basin, different approaches to filling Wymer reservoir, and an off-channel reservoir in the Ahtanum Creek basin. For the Naches

River basin and Wymer options, a discussion is included on opportunities to modify reservoir operations if new storage is provided.

2.3.4.1 Naches River Storage Reservoirs

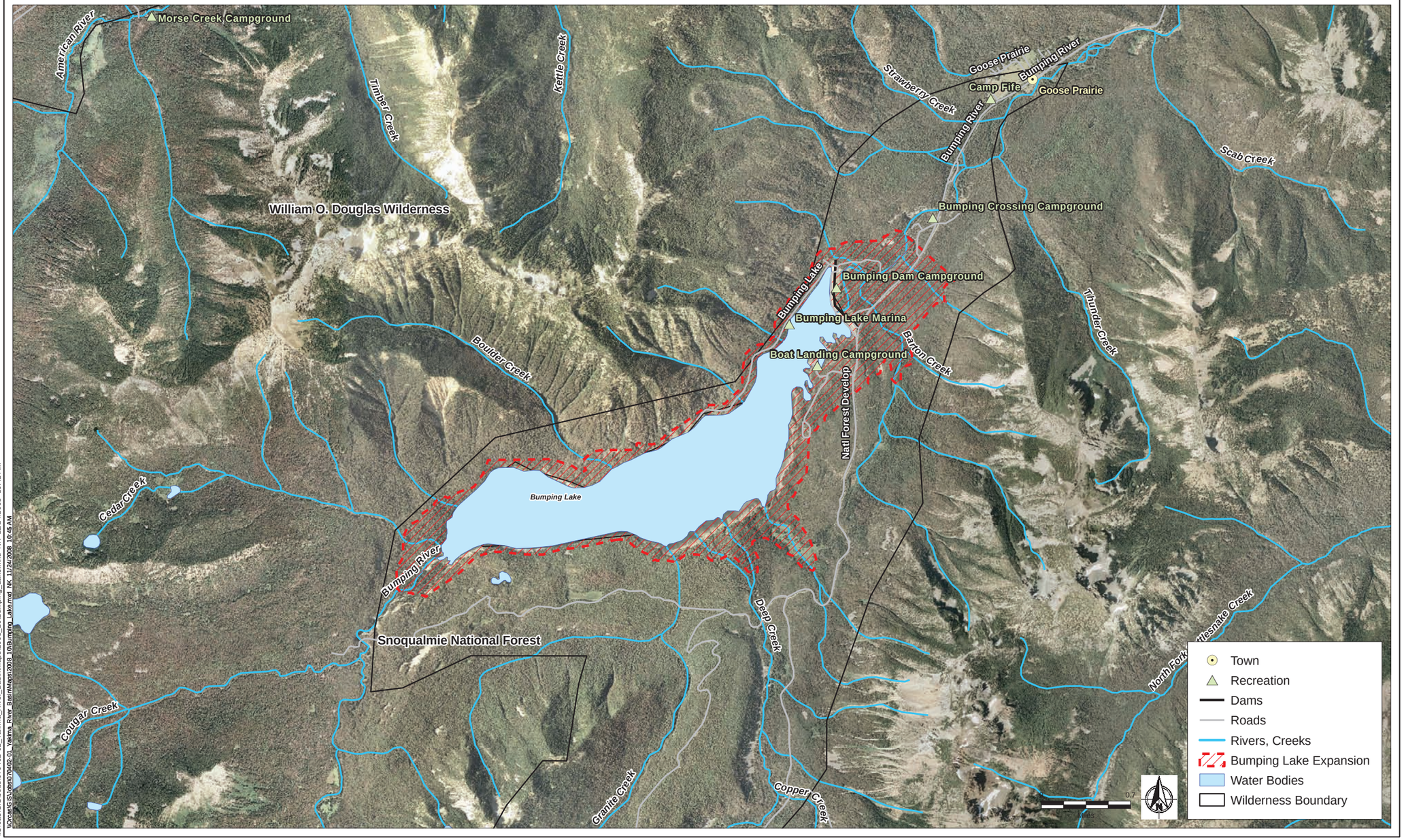
Additional storage in the Naches River basin would provide additional water to benefit proratable irrigators in dry years. Additional storage in the Naches River basin could also allow Reclamation to alter operation of the Yakima River basin reservoirs and reduce the "flip-flop" regime (see "Other Potential Water Storages Sites" below for an explanation of "flip-flop"). Ecology considered several options for providing additional storage in the Naches River basin. The most developed proposal at this time is expansion of Bumping Lake. The potential for other storage locations in the Naches River basin is also discussed.

Bumping Lake Expansion

Bumping Lake is one of the six storage reservoirs in the Yakima Project. It is located on the Bumping River 16.6 miles upstream of the confluence of the Little Naches River. The current reservoir has a 61-foot-high earth dam with a storage capacity of 33,700 acre-feet (Reclamation, 2006).

Enlargement of Bumping Lake has been evaluated in numerous studies (Reclamation and USFWS, 1966; Reclamation, 1979; Reclamation, 2006). The proposal consists of a new dam located approximately 4,500 feet downstream of the existing dam. Options for a 458,000 acre-foot reservoir (large option) and a 200,000 acre-foot (small option) are presented in this Supplemental Draft EIS. The large option is shown in Figure 2-4.

The additional water supply that would be captured and stored would be used to improve instream flow for fisheries and to provide irrigation water supply during drought years. The allocation of water to each purpose has not been set nor has the recipient(s) of the irrigation water supply been determined. The average annual runoff volume that could be stored was estimated to be approximately 124,000 acre-feet (Reclamation, 2006). That volume was estimated using a minimum flow requirement on the Bumping River of 130 cfs. Further study is required to define or confirm instream flow requirements on the Bumping River and downstream rivers.



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SOURCE: Anchor Environmental, 2008.

Yakima River Basin Water Storage Feasibility Study . 207369

Figure 2-4
Bumping Lake Expansion Map
Washington

Large option – 458,000 acre-feet

The large option is for an increase in storage of approximately 420,000 acre-feet to a total storage volume of 458,000 acre-feet. The large option was previously evaluated in the Bumping Lake Enlargement Joint Feasibility Report (Reclamation and USFWS, 1976) and Yakima River Basin Storage Alternatives Appraisal Assessment (Reclamation, 2006). The large option consists of constructing a 230-foot-high rockfill dam approximately 4,500 feet downstream of the existing Bumping Lake Dam. The reservoir surface area would be 4,120 acres. Reclamation performed hydrologic modeling of the potential effect of the large Bumping Lake on irrigation water supply and instream flows if the project were integrated into existing operations. Their conclusion was that the large Bumping Lake helps meet irrigation water supply goals in all years except during the last year of a 3-year drought. They also determined the reservoir would impact the Bumping River and Naches River hydrographs by decreasing and shifting the timing of flows in spring. Even though the project would partially meet irrigation water supply goals and meet municipal water supply goals, Reclamation did not carry forward the alternative in their Water Storage Feasibility Study because of the flow impacts and other potential environmental impacts.

For this study, the operating requirements for the reservoir are assumed to be different than those considered by Reclamation in the Yakima River Basin Storage Alternatives Appraisal Assessment (Reclamation, 2006). Water stored for irrigation would be used during drought years only. Water stored for fisheries benefit would be used to provide more flexibility in operations of the other Yakima Project reservoirs to provide more optimum flows for fisheries as described in "Modification of River Operations in Conjunction with Naches River Storage" below.

Small option – 200,000 acre-feet

The small option is for an increase in storage of approximately 200,000 acre-feet. This option was previously evaluated by Reclamation in its Planning Design Summary Bumping Lake Enlargement Dam (Reclamation, 1985). This option would be similar to the large option, but would be able to store less water and would provide less benefit to irrigation and fisheries, although its cost would also be less and it would have fewer potential impacts.

Other Potential Water Storage Sites

Reclamation and others have studied a number of additional potential water storage sites in the Naches River basin. Those sites, including Rattlesnake Dam and Horsetail Reservoir, were determined to be not feasible based on the criteria at the time of the studies. Additional studies are needed to determine the most feasible storage opportunities. The studies would include developing a water budget for the basin to determine how much water could be stored without affecting flow targets for fish. Once the amount of storable water is known, opportunities for providing storage would be evaluated to determine the most cost-effective and feasible type of storage and storage location. Those opportunities may include previously studied reservoir sites or may be new opportunities. New storage opportunities may include storage in the lower basin

using existing distribution facilities and piping water for storage in or outside the Naches River basin.

Modification of River Operations in Conjunction with Naches River Storage

Currently the Yakima River reservoirs are operated to provide for target flows and diversion entitlements downstream from the dams, meeting Title XII flows at Sunnyside and Prosser Diversion Dams. Cle Elum Lake serves as the primary water source for lower valley irrigation before Reclamation shifts operations in the fall by significantly reducing flows out of Cle Elum Lake and increasing flows out of Rimrock Lake in the Naches River basin. This operation is known as "flip-flop," so called because the source of water for irrigation flip-flops between Cle Elum Lake and Rimrock Lake. The flip-flop regime was devised in response to a court order to protect spring Chinook salmon redds in the upper Yakima and Cle Elum Rivers. However, the flip-flop flow regime results in high flows in the mainstream Yakima River throughout most of the summer, and this is hypothesized to be significantly reducing the rearing capacity for juvenile salmonids.

The majority of the streams within the Naches watershed have a relatively unregulated flow regime that is nearer to natural conditions than the rest of the basin. The flip-flop regime results in low flows in the Tieton River through most of the irrigation season and then high (essentially bank full) flows in the fall.

Construction of additional storage in the Naches River basin may provide the opportunity to modify operations in both the Naches River basin and the upper Yakima River basin to better meet fisheries needs. Examples of how additional storage in the Naches River basin could be used to benefit fisheries include:

- Increasing spring flows in the upper Yakima River;
- Decreasing summer flows in the upper Yakima River;
- Reducing September flows in the Tieton River;
- Increasing summer flows in lower Yakima River; and
- Adding pulse flows when needed.

2.3.4.2 Wymer Reservoir

Reclamation and Ecology evaluated constructing an off-channel storage reservoir on Lmuma Creek in the January 2008 Draft Planning Report/EIS. The proposed Wymer reservoir alternative that was evaluated included a 450-foot-high dam on Lmuma Creek with a storage capacity of 162,500 acre-feet filled by pumping from the Yakima River using a 420 cfs capacity pump station. This alternative was presented in detail in the January 2008 Draft Planning Report/EIS and will not be discussed further. This Supplemental Draft EIS considers an alternative of filling the same reservoir via gravity flow through either an expanded KRD system or a separate set of canals or pipes. Water would be directly supplied to the new or expanded conveyance system from Cle Elum Dam in order to bypass the Cle Elum River and the Yakima River from Cle Elum River to Lmuma Creek (near Roza Dam).

The alternative routes for water conveyance through the KRD system have not yet been studied in detail. The following alternative routes are proposed. These potential routes would require additional study prior to determining their feasibility.

North Branch Option

Water would be conveyed through the KRD canal system to near the end of the North Branch Canal in Badger Pocket, where a 3.6-mile-long tunnel would be constructed through Manastash Ridge to a point above Wymer reservoir. Water would be supplied by a new 6-mile-long canal and 1.4-mile-long siphon extending from Cle Elum Dam across the Yakima River to the KRD Main Canal. The KRD Main Canal and North Branch Canal would need to be enlarged to provide capacity to feed Wymer Reservoir. Approximately 14.8 miles of the Main Canal, 37.2 miles of the North Branch Canal, and 8.6 miles of the Turbine Ditch would need enlarging as well as 14 siphons and tunnels. The capacity of the KRD canals would be enlarged by 500 to 1,500 cfs depending on how much flow will be fed into Wymer reservoir. This option could convey flow from early spring throughout the summer into Wymer reservoir, bypassing the upper Yakima River which is currently affected by high summer flow. The hydraulic capacity of this option would be greater than the alternative studied in the January 2008 Draft Planning Report/EIS which had a pump station with a capacity of 420 cfs that would operate only in the winter and spring.

South Branch Option

Similar to the North Branch Option, a 6-mile-long canal from Cle Elum Dam would be constructed with a 1.4-mile-long siphon crossing the Yakima River to the KRD Main Canal. Approximately 14.8 miles of the Main Canal would need to be enlarged, as well as 18 miles of the South Branch Canal and 9 siphons and tunnels. A new 13-mile-long siphon from the end of the KRD South Branch Canal and a 3-mile-long tunnel under Manastash Ridge would be needed to deliver water to Wymer reservoir. The capacity of the KRD canals would be enlarged by 500 to 1,500 cfs depending on how much flow will be fed into Wymer reservoir. This option is shorter than the North Branch Option and would have the same operational features as the North Branch Option.

Pipeline Option

This option of filling Wymer Dam consists of installing a pipeline conveyance system between Cle Elum Dam and Wymer Dam. The pipeline system would be sized to convey the same flow as the other filling options. The pipeline system would begin at Cle Elum Dam and follow the east side of the Cle Elum River towards Cle Elum. The pipeline system could follow a route on the north side of Cle Elum and connect back to Highway 970 east of Cle Elum. The pipeline route could then generally follow Highway 970 to Highway 10 and Highway 10 to Ellensburg. South of Ellensburg, the pipeline system would be routed to the east along Thrall Road to the location of a tunnel under Manastash Ridge connecting the pipeline system to Scorpion Coulee Creek, a tributary to Wymer Reservoir. The route has not been optimized and it is not anticipated the pipeline system would be constructed within the Highway 10 right-of-way for the entire route.

The advantage of using a pipeline system instead of a gravity system is its ability to operate during the winter and fill Wymer Reservoir outside of the normal operating period of the KRD canals (March to November). Approximately 45.9 miles of pipeline would be required along with crossings of the Teanaway River, at least 11 creek crossings, two interstate crossings (I-90 and I-82 near Ellensburg), and five canal crossings (including the three KRD canals in Badger Pocket). A pipeline conveyance system that conveys 500 cfs would require two 8-foot-diameter pipes; a system that conveys 1,200 cfs would require two 12-foot-diameter pipes. The pipeline conveyance system would need to be pressurized because the route varies in elevation, making a gravity system more difficult and costly to construct. This option could convey flow year-round, which would provide additional flexibility in the operations of the upper Yakima River reservoirs and provide the opportunity to increase or decrease flows in response to fish needs in the Yakima River.

Modification of River Operations in Conjunction with Wymer Reservoir

Construction of Wymer reservoir could provide opportunities for Reclamation to modify operations of reservoirs to better meet fisheries needs. The additional storage at the Wymer location could allow reservoirs in the upper Yakima basin and Naches Arm to be operated to return the river to a more normative hydrograph. See Section 2.3.4.1 for additional information on potential uses of storage water to benefit fisheries.

2.3.4.3 Ahtanum Creek Watershed Restoration Program, Including Pine Hollow Reservoir

The Ahtanum Creek Watershed Restoration Program, including construction of Pine Hollow reservoir, was presented as Alternative 2 in Ecology's Final Programmatic EIS for the Ahtanum Creek Watershed Restoration Program (Ecology, 2005a). This alternative would create a coordinated watershed program with a storage reservoir, agricultural conservation, and habitat restoration. Pine Hollow reservoir represents an example of a subbasin approach to water storage. The Pine Hollow reservoir would not provide benefits to the basin's Total Water Supply Available (TWSA), but would improve irrigation delivery and salmonids habitat in the tributary. Similar projects could be constructed on other tributaries, but those alternatives have not yet been studied.

Pine Hollow Reservoir is a proposed offsite reservoir near Ahtanum Creek approximately 15 miles east of Yakima between Tampico and Wiley City. The dam would be 180 feet high with a total storage capacity of 24,000 acre-feet. The permanent pool would be 2,000 acre-feet. Operational characteristics include using the reservoir to provide out-of-stream water use for the irrigation season, removing all individual creek diversions within the reservoir service area, providing flow augmentation of Ahtanum Creek via the reservoir, delivering reservoir water through a piped system, evaluating the maintenance of flows in Bachelor and Hatton Creeks, and diverting reservoir water through the Johncox Ditch to meet instream flow targets.

Conservation measures in the Ahtanum Creek Watershed Restoration Program could include lining and piping of conveyance systems, developing conservation plans, water metering, system automation, and on-farm system improvements. Habitat restoration

measures could include fish screening, riparian restoration and enhancement, increased stream and wetland buffers, stream bank stabilization, property acquisition, floodplain restoration, adding channel roughness, bridge and road improvements, fencing of riparian areas, erosion control, higher development standards, pesticide and herbicide reduction programs, public education, and fish passage improvements.

2.3.5 Fish Habitat Enhancement Element

Anadromous and resident fish would benefit from habitat enhancements such as reconnecting floodplains, reestablishing side channels, restoring natural river and riparian conditions, and acquiring habitat for protection. This element includes proposals for habitat improvements on both the mainstem and the tributaries in the Yakima River basin. The habitat enhancements would provide greater benefits when integrated with the flow and fish passage improvements described in the previous sections.

2.3.5.1 Yakima and Naches Rivers

Habitat protection, restoration, and enhancement projects are proposed for the Yakima and Naches Rivers. The projects included in this element are based on projects identified in the Yakima Steelhead Recovery Plan (YBFWRB, 2008).

Proposed project types include:

- Reconnecting side channels and off-channel habitat to stream channels;
- Restoring wet meadows;
- Reconnecting floodplains to river channels;
- Relocating or improving floodplain infrastructure and roads;
- Placing stable wood and other large organic debris in stream banks;
- Restoring natural channel form;
- Restoring natural riparian vegetative communities; and
- Developing grazing strategies that promote riparian recovery.

Priority projects for specific reaches are described in the following sections.

Yakima River

Keechelus Dam to Roza Diversion

Spawning and rearing habitat in the mainstem of the upper Yakima River has been reduced as a result of channel confinement and the associated loss of high-flow refugia and spawning gravels. Efforts to restore floodplain connectivity and reestablish side channel connections through levee setbacks and other infrastructure changes will increase effective habitat area in the upper Yakima River. Proposed habitat protection, restoration, and enhancement actions in the upper Yakima River and its tributaries would be integrated with ongoing habitat actions and water storage/irrigation diversion improvement efforts. Priority projects proposed for this reach include:

- Reconnection of the Interstate 90 ponds at mile 101;
- Reclamation's Schaake levee pullback near Ellensburg;
- Restore sites associated with the Interstate 90 improvements above Easton;
- Actions throughout the reach that target opportunities to set back abandoned railroad levees and flood control levees on public lands;
- Protect and restore floodplain, riparian, and in-channel habitats; and
- Set back other levees in the area.

Additional funding is necessary to fully implement the protection of key floodplain and riparian reaches where there are willing landowners. Land acquisition and conservation easements implemented with the goal of protecting key fisheries habitat in upper Yakima River reaches and tributaries would include a land management element to maintain the existing level of habitat function. Acquisitions and easements would also include a restoration element where appropriate. Habitat restoration actions and management across ownerships would be integrated with the acquisition and conservation easement programs. The Upper Yakima Comprehensive Flood Hazard Management Plan (Yakima County, 2007), the Yakima Steelhead Recovery Plan (YBFWRB 2008), and the Yakima River Side Channels Project (implemented by the Yakama Nation under continuing BPA Fish and Wildlife Council funding) contain more detail regarding proposed habitat improvement projects in this reach.

Roza Diversion to Prosser Dam

Conditions in the middle Yakima River play a major role in migration timing for adult salmonids and survival of out-migrating smolts. Protecting and restoring mainstem and off-channel habitats (especially those that provide thermal refugia) are critical for these life stages. Work would include protecting habitat through acquisition, easements or cooperative agreements, and activities such as riparian plantings, reconnecting side channels, and winter irrigation to saturate floodplains. The Yakima Steelhead Recovery Plan (YBFWRB, 2008) and the Yakima River Side Channels Project (implemented by the Yakama Nation under continuing BPA Fish and Wildlife Council funding) contain more detail regarding proposed habitat improvement projects for this reach.

Priority projects proposed for this reach include:

- Restoration of floodplain function via the proposed Gap to Gap dike setback and associated projects;
- Protect and restore mainstem and floodplain habitats below Sunnyside Dam with an emphasis on restoring floodplain function in the Wapato reach where instream flows are not currently limited by severely altered flow and temperature regimes;
- Protect and restore mainstem and off-channel habitats between the Toppenish and Satus Creek confluences;
- Improve flows below Parker through irrigation system improvements; and
- Restore the gravel pits and Taylor ditch in the Selah area.

Prosser Dam to Columbia River Confluence

The Yakima River Side Channels Project (implemented by the Yakama Nation under continuing BPA Fish and Wildlife Council funding) and the Yakima Steelhead Recovery Plan (YBFWRB, 2008) contain more detail regarding proposed habitat improvement projects for this reach.

Priority projects proposed for this reach include:

- Protect and restore mainstem and off-channel habitats, particularly in floodplain reaches and documented cool water refugia areas; and
- Improve flows via irrigation system improvements (e.g. KID and Benton pump exchange proposals).

Naches River

Bumping Dam to Tieton River Confluence

Above the confluence with the Tieton River, Naches River flows are the least regulated of all the large rivers in the Yakima basin. Protecting functional habitat in the mainstem Naches and its floodplain upstream of the Tieton confluence is a priority. It would involve a combination of acquisitions, conservation easements, and cooperative agreements. Habitat restoration opportunities also exist in the upper Naches River reaches. Riprapped dikes, road embankments, and revetments confine the channel in places, cutting off historic side channels and spring brooks and reducing floodplain function. The Yakima Steelhead Recovery Plan (YBFWRB, 2008) contains more detail regarding proposed habitat improvement projects for upper Naches River reaches.

Priority projects proposed for this reach include:

- Protect habitat in Naches River mainstem upstream of the Tieton River confluence;
- Protect habitat in the Oak Flats and Nile areas; and
- Restore historic off-channel habitat by increasing floodplain function where feasible.

Tieton River Confluence to Yakima River Confluence

Confinement of the lower Naches River has reduced sediment transport efficiency, causing aggradation upstream and channel incision or avulsion downstream. Levees and dams located in the lower end of the alluvial valleys further reduce the amount of salmonid rearing habitat (i.e., side channels fed by ground water return). Improving sediment transport by modification of the dam structure and levee reconfiguration would improve habitat availability over the long term. The Upper Yakima Comprehensive Flood Hazard Management Plan (Yakima County, 2007), the Yakima Steelhead Recovery Plan (YBFWRB, 2008), the Yakima River Side Channels Project, and the

Lower Naches Reach Coordination Project Plan (Calvin et al., 2005) contain more detail regarding proposed habitat improvement projects in this reach.

Priority projects proposed for the lower Naches River are:

- Protection and restoration of complex floodplain habitats (e.g., across from Naches Wonderland within and downstream of Eschbach Park and Buckskin Slough); and

- Improve floodplain function and sediment transport by modifying Nelson and Gleed diversion dam structures and reconfiguring levees such as near Eschbach Park/Yakima Water Treatment Plant and the Powerhouse Road crossing.

2.3.5.2 Tributary Habitat Improvements

Habitat improvement in tributaries of the Yakima River could provide substantial benefits to salmonids. Habitat improvements include protecting, restoring, and enhancing channel and floodplain connectivity, riparian habitat, fish passage, instream flows, and instream channel complexity. Specific activities include protecting and planting riparian vegetation, placing large woody debris and engineered log jams in stream channels, reshaping banks and reconnecting side channels to improve floodplain function, restoring fish passage at man-made barriers, screening water diversions and securing commitments to increase instream flows.

Tributaries throughout the basin provide much of the spawning and rearing habitat for anadromous fish. In addition, because of the effects of flow regulation and artificial confinement of many reaches of the Yakima and Naches Rivers, the lower ends of tributaries provide important rearing habitat for juveniles originating from mainstem reaches. Reecer, Currier, Whiskey, Mercer, Wilson, Naneum, Coleman, Cherry, Manastash, Taneum, Swauk, Lmuma, Cowiche, Ahtanum, Toppenish, and Satus Creeks, the Bumping and Teanaway Rivers, and others are all candidates for habitat enhancements.

Table 2-1 summarizes proposed habitat improvements for specific tributaries. Development of this option is based on projects identified in the Yakima Steelhead Recovery Plan (YBFWRB, 2008).

Table 2-1 Tributary Habitat Improvements

Tributaries	Project Types					
	Fish Passage	Instream Flow Improvement	Floodplain/Side Channel Reconnection	Riparian Habitat Enhancement/ Restoration	Channel Complexity (Large woody debris, channel reconstruction, boulders, etc.)	Diversion Screening
Big Creek		X				
Cle Elum River			X	X	X	
Teanaway River		X	X	X	X	
Swauk Creek		X	X	X	X	X
Taneum Creek	X	X				
Jack Creek	X		X	X	X	
Indian Creek	X					
Manastash Creek	X	X		X		X
Reecer Creek	X		X	X	X	X
Wilson/Naneum Creeks System[1]	X	X		X	X	
Bumping River				X	X	
Tieton River			X	X	X	
Cowiche Creek	X	X	X	X	X	X
Little Naches River			X	X	X	
Ahtanum Creek[2]	X	X	X	X	X	X
Toppenish Creek		X	X	X	X	X
Satus Creek		X	X	X	X	

[1] Includes Wilson, Naneum, Coleman, Cherry Creeks which are all interconnected.
[2] Includes North and South Forks and Wide Hollow Creek.

2.4 Alternatives Considered but not Carried Forward

Ecology worked with interest groups in the Yakima River basin to identify a broad range of projects to improve water supply. Some of the projects that were recommended were considered by Ecology, but are not being carried forward at this time for the reasons described below.

2.4.1 Other Storage Projects

A number of other reservoir sites have been suggested and reviewed by Reclamation, but were not carried forward to a feasibility level study for further analysis. A listing of those projects is provided in Table 2-2, along with Reclamation's reasons for not further studying each project (Reclamation, 1984, Vinsonhaler, 2001). Although these storage projects were determined to not be feasible at the time they were evaluated, they may become more feasible in the future if they are evaluated under new criteria and circumstances.

Table 2-2 Potential Storage Sites Considered

Name	Stream	Location	Maximum Capacity (acre-feet)	Reason for Not Carrying Forward
Bakeoven	Tieton River, South Fork	1.5 miles NE of Grey Creek Campground	35,000	Cost
Casland	Teanaway River, North Fork	3 miles north of Casland	63,000	Cost
Cle Elum Lake Enlargement	Cle Elum River	Existing Cle Elum Dam	485,000 (50,000 new)	Not listed
Cooper Lake	Cooper River	Cooper Lake outlet		Cost, wilderness impacts
Cowiche	Cowiche Creek, South Fork	6 miles west of Cowiche	16,000	Cost
Dog Lake	Clear Creek	Dog Lake outlet		Cost, limited water supply
East Selah	Yakima River	Gravel pits at Selah	3,000	Cost
Forks	Teanaway River	1 mile downstream of North and West Forks junction	390,000	Cost, geology
Hole in the Wall	Dry Creek	2 miles NW Hwy 97 crossing	25,000	Cost
Horseshoe Bend	Naches River	3 miles upstream of Tieton River	80,000	Cost, geology, block anadromous fish
Hyas Lake	Cle Elum River	Hyas Lake outlet	Not listed	Cost, limited water supply, wilderness impacts
Little Rattler	Rattlesnake Creek	1 mile upstream Naches River	112,000	Cost, inundates big game winter range and high-quality resident fishery
Lost Meadow	Little Naches River	1 mile NW Naches Pass Forest Camp	30,000	Cost

Name	Stream	Location	Maximum Capacity (acre-feet)	Reason for Not Carrying Forward
Lower Canyon	Yakima River	Mouth of Yakima Canyon	350,000	Railroad relocation cost, block anadromous fish, other adverse impacts
Manastash	Manastash Creek	7 miles west of Ellensburg	50,000	Cost
Mile Four	Rattlesnake Creek	4 miles upstream from Nile	45,000	Inundates big game winter habitat and resident fishery
Minnie Meadows	Tieton River, South Fork	1 mile SW of Grey Creek Campgrounds	35,000	Cost
Naneum	Naneum Creek	10 miles north of Ellensburg	40,000	Cost
Pleasant Valley	American River	Near Thunder Creek Campground	150,000	Block anadromous fish, impact recreation
Rattlesnake	Naches River	Immediately below Rattlesnake Creek	85,000	Block anadromous fish, social effects problem
Rimrock Lake Enlargement	Tieton River	Existing Tieton Dam	270,000 (172,000 new)	Engineering concerns
Satus	Satus Creek	8 miles west of Satus	175,000	Yakama Nation site
Simcoe	Simcoe Creek – Toppenish Creek (require other sources to fill)	4 miles west of White Swan	95,000	Yakama Nation site
Soda Springs	Bumping River	At Soda Springs Campground	360,000	Alternative to Bumping Lake enlargement, higher costs, adverse impacts
Swauk	Swauk Creek	0.5 miles upstream from Yakima River	75,000	Wildlife impacts
Tampico	Ahtanum Creek	7 miles west of Wiley City	72,000	Yakama Nation site
Toppenish	Toppenish Creek	9 miles SW of White Swan	125,000	Cost
Upper Canyon	Yakima River	0.5 miles upstream from Swauk Creek	190,000	Major barrier to anadromous fish
Wapatox	Naches River	0.5 miles below Tieton River	100,000	Block anadromous fish
Waptus Lake	Waptus River	Waptus Lake outlet	Not listed	Cost, wilderness impacts

2.4.2 Operational Changes at Existing Reservoirs

Ecology received several suggestions that the "flip-flop" regime should be altered to benefit fish. Ecology considered this option, but determined that on its own, the regime cannot be changed because of Reclamation's obligations to provide irrigation water and meet fish target flows. However, it may be possible to modify the "flip-flop" regime in conjunction with storage projects. This option is considered in Sections 2.3.4.14 and 2.3.4.2.

2.4.3 Direct Pumping from the Columbia River

Suggestions have been made to pump water directly from the Columbia River to supply water for irrigation or to improve stream flows. Two of the suggestions were to pump water directly from the Columbia River to supply the proposed Wymer reservoir and to pump water directly into the Roza Irrigation District canal to supply water for proratable users. Ecology believes that pumping from the Columbia River to Wymer reservoir would not be feasible because of the uncertainty of water supply availability in July and August. Ecology also believes that pumping directly to the Roza canal would not be possible without a storage reservoir. Therefore, the direct pumping option is not feasible. Ecology has decided not to carry forward the direct pumping option at this time.