



# Robust Agriculture & Abundant Salmon

The Yakima River in an Era of Drought

January 2019



## The Yakima Basin Integrated Plan

Building a Future for Water, Wildlife and Working Lands



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# The Yakima Basin



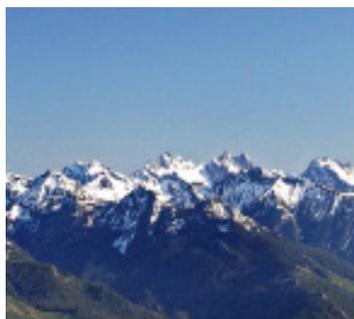


## The Demands of Growth

In eastern Washington's Yakima River basin, all the West's contentious water issues are concentrated in a 6,155 square-mile area:



The Yakima River Basin's \$4.5 billion agricultural economy<sup>1</sup> relies on five Bureau of Reclamation reservoirs and other irrigation infrastructure. These canals, diversions and delivery systems were built nearly a century ago, and many are in need of upgrades to deliver water more efficiently and effectively.



Mid-elevation Cascade Range snowpack serves as the sixth reservoir, releasing winter precipitation as spring runoff. Earlier snowmelt and precipitation projected to fall as rain rather than snow reduces reliable water supply and threatens agriculture, fisheries and recreation.



Dams, reservoirs, water diversion and development decimated salmon and steelhead populations. However, the Yakima River holds great promise for fishery restoration. The Yakama Nation holds treaty rights to both water and salmon harvest, and works with local agencies to accomplish restoration goals.



The Yakima River Basin is the most productive agricultural region in the state and among the most productive in the country, but it is not drought resilient. The basin has weathered 14 major droughts since the 1970s, a trend predicted to increase. Combined with a shift to perennial crops like wine grapes and tree fruit, droughts make water reliability a growing concern.



The Yakima River's proximity to large urban areas makes it an increasingly popular recreation destination. Anglers, hikers, campers, hunters and horseback riders all contribute to an annual \$1.2 billion recreation economy supporting more than 14,200 jobs<sup>2</sup>.

1. Washington State Department of Agriculture, "Top Crops & Food Processing Industries.

2. Briceno, T., Schundler, G. 2015. Economic Analysis of Outdoor Recreation in Washington State. Earth Economics, Tacoma, WA.

# YRBWEP to YBIP

Yakima Basin Integrated Plan

## HOW 30 YEARS OF STUDIES, PARTNERSHIPS, FISH PASSAGE AND CONSERVATION CREATED WASHINGTON'S MOST SUCCESSFUL INTEGRATED WATER MANAGEMENT PLAN.

### STUDIES AUTHORIZED

1979



After a devastating drought in 1977, Congress directed the Bureau of Reclamation to work with the State of Washington to conduct studies and develop a plan to provide water for irrigation, treaty rights, aquatic life and fish habitat. This effort was titled the **Yakima River Basin Water Enhancement Program (YRBWEP)**

Early studies identified fish passage issues. The Hoover Power Plant Act of 1984 authorized fish passage facilities throughout the Yakima Basin, partially funded by the Bonneville Power Administration. YRBWEP 1 designed and enacted fish passage basinwide.



1984

### YRBWEP 1 Fish Passage

### YRBWEP 2 Voluntary Conservation

1994



After the 1992-1994 drought, legislation authorized water conservation and instream flow projects. Costs for water conservation are shared by Reclamation, the Washington Dept. of Ecology and irrigators. 2/3rds of irrigation water conserved remains instream to help with flows, while 1/3 is retained by irrigators for use in drought years.

Following another drought in 2005, Reclamation and Ecology built on YRBWEP 1 and 2 by creating a stakeholder workgroup to address other elements of the water supply and fisheries issue. In 2009, this group began developing the **Yakima Basin Integrated Plan (YBIP)**, a watershed-scale approach to sustainable water supply for fish, families, farms and forests.

2009

### YBIP (YRBWEP 3) Yakima Basin Integrated Plan



YBIP is a 30 year package of actions divided into three 10-year phases of its own.

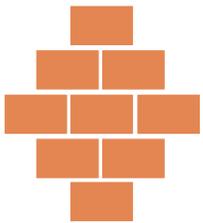


## Seven Elements

YBIP projects align with seven elements designed to work together. Many projects provide benefits for both water supply and ecosystem restoration:



**Fish Passage** - Upstream and downstream passage for anadromous and resident fish will be established at all Reclamation reservoirs, allowing access to high quality, cold-water habitat essential for restoring depleted runs of fish.



**Structural and Operational Changes to Existing Infrastructure** - Much of the Yakima River basin's federal and non-federal infrastructure is more than a century old. By implementing measures like increasing canal efficiency, balancing reservoir levels and making operational changes, water managers can benefit both agricultural supply and fish habitat.



**Increased Surface Water Storage** - YBIP will provide 450,000 acre-feet of new storage. The Initial Development Phase storage project accesses 200,000 acre-feet of inactive storage at Kachess Reservoir via a new pumping plant facility and 14,600 acer-feet from raising the level of Cle Elum Reservoir. Building new reservoirs and expanding an existing reservoir are proposed for later phases.



**Groundwater Storage** - Additional water supplies will be gained by intentionally storing water in aquifers, and then either pumping it or allowing it to return to the river to improve flows, meet demands, and reduce water temperatures.



**Enhancement of Habitat** - Fish and wildlife habitat enhancement in the basin includes floodplain restoration, flow improvement, removing fish passage barriers, screening diversions, and land and river corridor protection.



**Water Conservation** - Conserving up to 170,000 acre-feet of water per year is the goal of the agricultural side of this program, allowing better instream flows for fish and more precise delivery and use of water. Local governments actively encourage improvements in water conservation from individual homeowners for indoor and outdoor use.



**Market Reallocation** -YBIP proponents are developing short and long-term strategies to increase market reallocation of water.



## Initial Development Phase

Each of YBIP's three 10-year phases contain a balanced mix of the seven elements, ensuring that all stakeholder interests are addressed. Each phase includes a major storage project, fish passage at Reclamation reservoirs, operational changes to accommodate the new infrastructure, and projects for the other elements. YBIP's Initial Development Phase includes:

- Construction of fish passage at Cle Elum Dam and a second passage project.
- The Kachess Drought Relief Pumping Plant (KDRPP), which allows access to 200,000 acre-feet of water in inactive storage at Kachess Reservoir during severe droughts.
- Raising spillway gates at Cle Elum Dam by three feet to increase storage capacity.
- Water conservation projects, including some projects authorized by previous legislation, as well as an additional 85,000 acre-feet, extending conservation into tributaries and the upper basin.
- Studies for a major storage project in the next YBIP phase.
- Projects for the other elements, including: establishing the Teanaway Community Forest; floodplain restoration; fishery restoration; groundwater storage; market reallocation; Wild and Scenic river designation; and operational changes. YBIP partners have already completed dozens of irrigation efficiency, habitat restoration and water conservation projects.

See Appendix 1 for a summary of completed and ongoing projects.



## YBIP Funding

YBIP is predicated on an innovative federal-state-local-private funding partnership, which provides a collaborative model for other water projects:

- The irrigation districts propose to finance, construct and operate KDRPP, which will remain a part of Reclamation's Yakima Project.
- The State of Washington agreed to pay for up to half of the project, and has already invested \$205.9 million directly in YBIP through mid-2019.

Investment in YBIP, YRBWEP II and related projects is growing. The combined investment of the Yakama Nation, irrigation districts, three counties and conservation groups is at least \$39.6 million since 2013. The basin has received approximately \$218 million from federal sources since 2013, derived from agencies including: Reclamation, BPA, USFS, NOAA Fisheries, NRCS, BIA, USFWS, BLM and USACE.

**Appendix 2 presents estimated project costs and funding sources.**



## YBIP Benefits

### **The principal benefits of The Yakima Basin Integrated Plan include:**

**Drought Resiliency** - YBIP is a drought resiliency project, with the core goal of supplying proratable water users with 70 percent water supply during droughts. YBIP buffers loss of snowpack and keeps the Yakima River productive for decades to come. The plan is designed to support existing irrigated agriculture, but not expand non-Tribal irrigation.

**Economic Productivity** - Without investments in YBIP, the basin's \$4.5 billion agricultural contributions to Washington State's economy will be threatened by water shortages.

**Jobs** -Agriculture and food processing represent 44,300 jobs at risk from water shortage. Recreation, much water-based, adds 14,200 jobs. To keep people employed, more reliable water supplies must be assured.

**Fishery Restoration** - Yakima River salmon and steelhead have recovered from 3,000 returning fish in the mid-1990s to about 50,000. Fish passage at Reclamation's reservoirs, along with other YBIP improvements, could increase fishery runs to 300,000, which would support recreation and address federal treaty obligations to the Yakama Nation.

**Recreation** - The habitat enhancement and ecosystem restoration elements of YBIP support a robust outdoor recreational economy. Recreation has an economic value of \$1.2 billion, creating more than 14,200 jobs. Through habitat improvement and fishery restoration, those numbers will increase substantially.

**Municipal and Domestic Water Supply** - YBIP will directly and indirectly support growth and sustainability for the non-agricultural economy of the Yakima River basin by providing 50,000 acre feet of water for municipal and domestic development.



## What is Needed?

### **Federal support for The Yakima Basin Integrated Plan is needed in the following ways:**

**Continuing DC Leadership** - Federal agencies engaged in YBIP created a formal DC Leadership Team, designed to help agencies coordinate support. This collaboration led to better recognition of where agency resources could leverage results that might not otherwise be accomplished. We request continuing this important and robust collaboration.

**Supporting YBIP through Programmatic Funding** - YBIP receives support from many agency programs. We request continued prioritization of YBIP projects in programmatic funding efforts for Reclamation, BPA, and NRCS as well as appropriations and budget line items.

**Direct Support of YBIP Projects** - Important YBIP projects are currently in construction or pre-construction. Continued budget and appropriations support for the Cle Elum Reservoir storage increase and fish passage projects, as well as pre-construction environmental and engineering studies for KDRPP is requested.

**Support for YBIP Legislation** - Authorization is needed to construct KDRPP, the first major storage project, as well as other YBIP activities, including water conservation and feasibility studies for additional storage projects. We request support for this legislation in the 116th Congress.

**State support is needed through financial contribution and continuing state agency engagement.**

See Appendix 3 for more information about YBIP economic benefits.

See Appendix 4 for more information about YBIP water conservation and marketing.

See Appendix 5 for more information about KDRPP.





## Why now?

The Yakima Basin Integrated Plan builds on years of progress with a plan designed to avoid political gridlock and litigation. This is an opportunity to create and sustain jobs, build a sustainable environment and economy, and provide a collaborative model to be emulated in other regions of the country.

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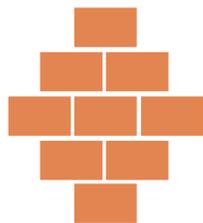
# The Yakima Basin Integrated Plan

Building a Future for Water, Wildlife and Working Lands



### Surface Water Storage

- *Kachess Drought Relief Pumping Plant* - Draft EIS.



### Structural and Operational

- *Keechelus to Kachess Conveyance* - Draft EIS.
- *Cle Elum Pool Raise* – Modify Cle Elum Dam radial gates which, when coupled with shoreline protection, will increase storage by 14,600 acre feet.



### Agricultural Water Conservation

- *Three Miles of Roza Irrigation Canal sealed* – Prevents seepage of 1,300 acre feet annually.
- *Manastash Creek Consolidated Pipeline* – Piped canal, 1,095 acre feet of water annually.
- *Anderson Diversion Irrigation Water Acquisition* – 894 additional acre feet saved through Manastash Consolidated Pipeline sold to Ecology's Trust Program for instream flows.
- *Sprinkler Conversion Project* – 154 acres of rill irrigation converted to efficient sprinklers.
- *WIP Lateral Piping* – Piped canal irrigating 476 acres, saves users 840 acre feet annually
- *WIP East Satus Lateral Piping* – Piped 6,600 feet of canal, saves 780 acre feet annually.
- *Kennewick Irrigation District Diversion Lining* – Lined 1.1 miles of open canal.



### Groundwater Storage

- *City of Yakima Aquifer Storage Recovery* – Completed construction on new aquifer storage and recovery facility in March 2015.



### Market Reallocation

- *Kittitas County Water Bank* – Kittitas County launched new water bank to offset groundwater wells with senior water rights in December 2015.



### Fish Passage

- *Cle Elum Fish Passage Phase I and Phase II* – Construction of access road, bridge, and secant pile vault.
- *Tieton-Rimrock Fish Passage* – Study of alternative passage systems.



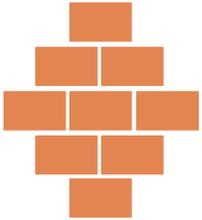
### Habitat Enhancement

- *Teanaway Community Forest* – 50,241 acres of forested headwaters protected as Washington's first community forest.
- *Cle Elum Side Channel Restoration* – Reconnected 7 miles of streams, 300 floodplain acres.
- *Teanaway Floodplain* – Placement of woody debris reconnects creek with floodplain.
- *Reed Diversion Removal* – Dam removal reopened access to 20 miles of fish habitat.
- *Coleman Creek Project* – Old diversion replaced with fish screen and bypass into creek.
- *Little Rattle Snake Road Decommission* – Five miles of road regraded and 2,470 native plants planted in old roadbed and stream bank to reduce sediment runoff.
- *Gap to Gap Outfall Relocation* – Reconnected 1,000 acres of floodplain by relocating waste treatment plant outfall.
- *KRD Tributary Supplementation* - Using irrigation canals to rewater tributaries.



### Surface Storage

- *Kachess Drought Relief Pumping Plant* – Supplemental Draft EIS incorporating floating pumping plant design.



### Structural and Operational

- *Keechelus to Kachess Conveyance* – Supplemental Draft EIS and Final EIS.
- *Cle Elum Pool Raise* - Shoreline protection to prevent erosion from 3-foot pool raise.



### Agricultural Water Conservation

- *KRD Pipeline Project* – Pressurized pipeline to replace 1 mile of earthen ditch.
- *WIP Piping* – Materials for 26,280 foot pressurized pipe and flow meter installation acquired.
- *WIP Upper and Lower Dam Rebuild/Removal* – Construction in process.
- *WIP Conservation Plan Update* – Water Conservation Plan modernization, funded by BIA.



### Groundwater Storage

- *Upper Kittitas Shallow Managed Aquifer Recharge* - Initial studies.
- *Toppenish Fan Managed Aquifer Recharge* - Initial studies.



### Water Marketing

- Basin wide studies driven by Washington State Department of Ecology.



### Fish Passage

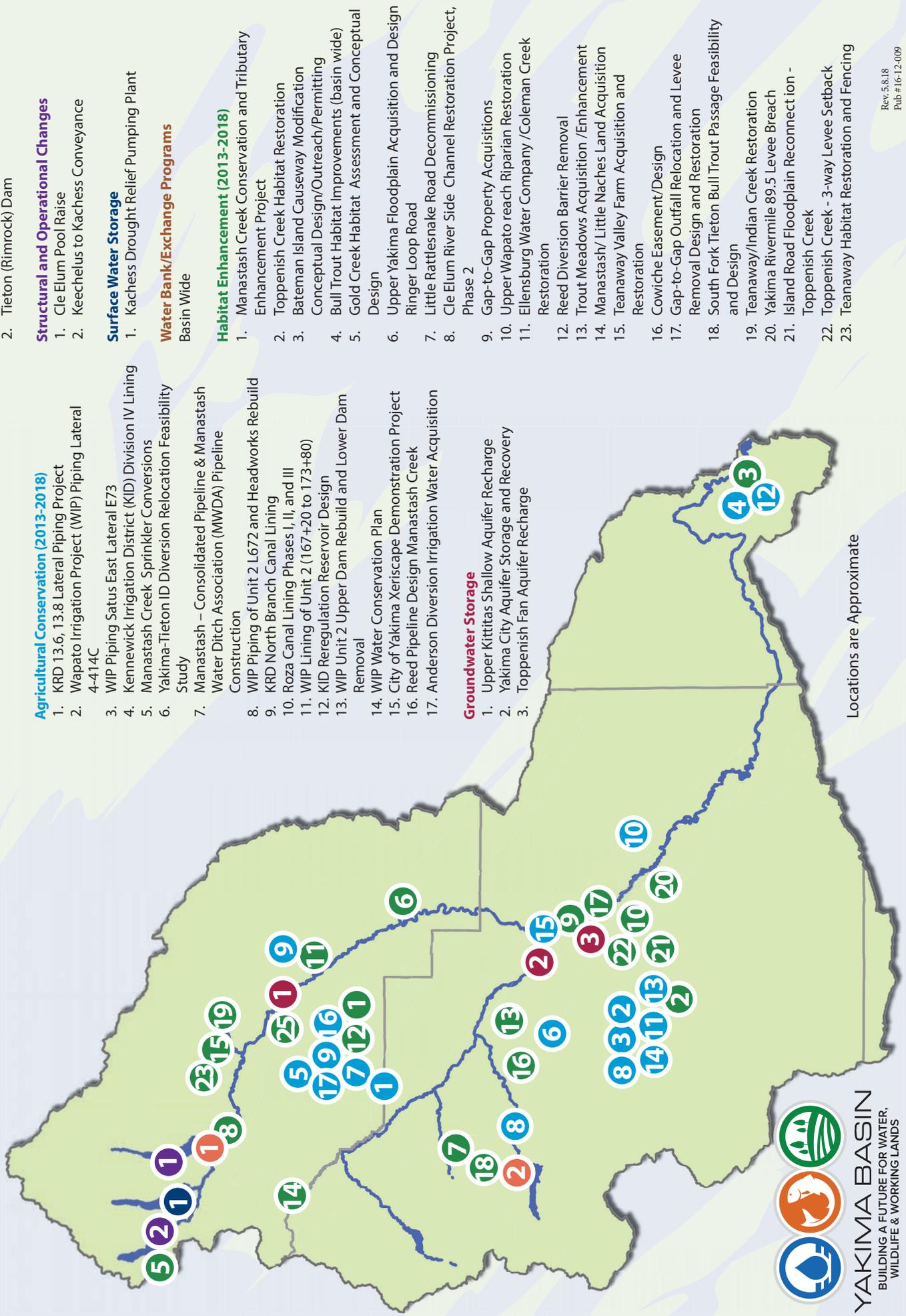
- *Cle Elum Fish Passage Phase III* – Construction of helix, gate, and intake.
- *South Fork Tieton Fish Passage* – New bridge design.
- *Bateman Island Causeway Reconfiguration*– Design alternatives proposed.
- *Nelson Dam* - Dam reconfiguration improves fish passage and flood control.



### Habitat Enhancement

- *Gold Creek Assessment and Design* – In-channel bull trout restoration.
- *Teaway Floodplain Restoration* – Woody debris placement links tributaries to floodplain.
- *Bull Trout Task Force* – Education about bull trout and recreational rock dam removal.
- *Ringer Loop Road Removal* – Property acquisition to remove road and restore floodplain.
- *Trout Meadows* – Property acquisition to control floods, restore floodplain and habitat.
- *Gap to Gap* – Property acquisition for levee setback, flood control and floodplain reconnection.
- *Island Road Project* – Reconnect 1,000 acres of floodplain and 100 acres of wetland.

# Yakima Basin Integrated Plan Initial Development Projects



## Agricultural Conservation (2013-2018)

1. KR D 13.6, 13.8 Lateral Piping Project
2. Wapato Irrigation Project (WIP) Piping Lateral 4-414C
3. WIP Piping Satus East Lateral E73
4. Kennewick Irrigation District (KID) Division IV Lining
5. Manastash Creek Sprinkler Conversions
6. Yakima-Tieton ID Diversion Relocation Feasibility Study
7. Manastash - Consolidated Pipeline & Manastash Water Ditch Association (MWDA) Pipeline Construction
8. WIP Piping of Unit 2 L672 and Headworks Rebuild
9. KR D North Branch Canal Lining
10. Roza Canal Lining Phases I, II, and III
11. WIP Lining of Unit 2 (167+20 to 173+80)
12. KID Reregulation Reservoir Design
13. WIP Unit 2 Upper Dam Rebuild and Lower Dam Removal
14. WIP Water Conservation Plan
15. City of Yakima Xeriscape Demonstration Project
16. Reed Pipeline Design Manastash Creek
17. Anderson Diversion Irrigation Water Acquisition

## Groundwater Storage

1. Upper Kittitas Shallow Aquifer Recharge
2. Yakima City Aquifer Storage and Recovery
3. Toppenish Fan Aquifer Recharge

## Fish Passage

1. Cle Elum Dam
2. Tieton (Rimrock) Dam

## Structural and Operational Changes

1. Cle Elum Pool Raise
2. Keechelus to Kachess Conveyance

## Surface Water Storage

1. Kachess Drought Relief Pumping Plant

## Water Bank/Exchange Programs

Basin Wide

## Habitat Enhancement (2013-2018)

1. Manastash Creek Conservation and Tributary Enhancement Project
2. Toppenish Creek Habitat Restoration
3. Bateman Island Causeway Modification
4. Bull Trout Habitat Improvements (basin wide)
5. Gold Creek Habitat Assessment and Conceptual Design
6. Upper Yakima Floodplain Acquisition and Design Ringer Loop Road
7. Little Rattlesnake Road Decommissioning
8. Cle Elum River Side Channel Restoration Project, Phase 2
9. Gap-to-Gap Property Acquisitions
10. Upper Wapato reach Riparian Restoration
11. Ellensburg Water Company /Coleman Creek Restoration
12. Reed Diversion Barrier Removal
13. Trout Meadows Acquisition /Enhancement
14. Manastash/ Little Naches Land Acquisition
15. Teanaway Valley Farm Acquisition and Restoration
16. Cowiche Easement/Design
17. Gap-to-Gap Outfall Relocation and Levee Removal Design and Restoration
18. South Fork Tieton Bull Trout Passage Feasibility and Design
19. Teanaway/Indian Creek Restoration
20. Yakima Rivermile 89.5 Levee Breach
21. Island Road Floodplain Reconnect ion - Toppenish Creek
22. Toppenish Creek - 3-way Levee Setback
23. Teanaway Habitat Restoration and Fencing

Locations are Approximate



**YAKIMA BASIN**  
BUILDING A FUTURE FOR WATER,  
WILDLIFE & WORKING LANDS

# Appendix 2



## YBIP Funding

### Initial Development Phase Estimated Costs and Funding (\$million) Projects and Costs Subject to Revision

Integrated Plan Elements	Projects	Projected Funding Requests from all Sources, 2013-2023	Anticipated Federal and Other Share 2013-2023	Anticipated State and Irrigation KDRPP Share 2013-2023
Habitat	Teanaway Forest Acquisition	99.3		99.3
	Teanaway Forest Planning & Operations	7.5		7.5
	Kittitas County impacts offset for Teanaway Forest	10	5	5
	Other State Lands Acquisitions	14	8.2	5.8
	NRCS RCPP - Yakama Nation Projects	22.6	22.6	
	NRCS EQUIP	20.5	20.5	
	NMFS Pacific Coastal Salmon Recovery Fund	20.4	20.4	
	USACE levee reconfig, setback, removal	13.2	13.2	
	BPA NPCC Fish and Wildlife Program	94.3	94.3	
	Tributary/Mainstem Habitat Restoration Projects	38.8	19.4	19.4
	Bull Trout Enhancement	13.6	6.8	6.8
	Federal, Tribal, Local Habitat Actions & Acquisitions	7.2	6.9	0.3
Fish Passage	Cle Elum Dam	131.6	71.9	59.7
	Tieton Dam	44.8	22	22.8
	Clear Lake Dam Passage	8	4	4
	Box Canyon Creek	TBD	TBD	TBD
	USFWS Fish Passage Program	0.8	0.8	
Structural and Operational Mods	KKC Project	89	43.7	45.3
	Cle Elum Dam Pool Raise	26.8	13.4	13.4
	Roza Power Subordination	0.2		0.2
	Chandler Power Subordination	TBD	TBD	TBD
	Kittitas Reclamation District Canal Modifications	TBD	TBD	TBD
	Upper Yakima System Storage	4.5	2.5	2
Surface Storage	KDRPP	236.2	17.6	218.6
	Wymer Dam and Reservoir	10.5	3.5	7
	Bumping Reservoir Enlargement	1	0.5	0.5
Groundwater Storage	Regional Storage Options	7	3.5	3.5
	Municipal Aquifer Storage Recovery Projects	0.4	0.2	0.2
Water Conservation	Agricultural Conservation Projects	57.4	28.7	28.7
	Municipal/Domestic Conservation Programs	1.2	0.6	0.6
	BIA WIP Improvements	7	7	
Water Marketing	General Market Support	3.1	1.5	1.6
<b>Total</b>		<b>990.9</b>	<b>438.7</b>	<b>552.2</b>
<b>Percentage Share</b>		<b>100%</b>	<b>44.3%</b>	<b>55.7%</b>

# Appendix 2



## YBIP Funding

### FY2011 - 2021 Federal Funding Table Includes YRBWEP II, currently authorized Integrated Plan projects, and related programs

Agency	Projects/Programs Supporting the Integrated Plan	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	Purpose of Funds
Reclamation	Yakima River Basin Water Enhancement Project (YRBWEP)	\$12.3M	\$10.9M	\$9.5M	\$9.3M	\$14.5M	\$22.1M	\$23.8M	\$17.1M	\$23.8M			Water Conservation, Tributary Habitat Restoration, Fish Passage, Water Supply, Water/Land Acquisitions and Restoration Note: \$1.3 M was appropriated in FY2010 for the Yakima Basin Study
Bonneville Power Administration	Northwest Power and Conservation Council Fish and Wildlife Program	\$22.7M	\$20.5M	\$20.0M	\$17.6M	\$18.6M	\$22.1M	\$20.4M	\$18.1M	TBD			Water Conservation, Tributary Habitat Restoration, Fish Passage, Water/Land Acquisitions and Restoration, Monitoring and Evaluation, Artificial Production
US Forest Service	Land and Water Conservation Fund	\$845k	\$2.6M	\$874k	\$3M	\$3.4M	\$22.1M	\$1.5M	\$5M	TBD			Purchase Property consistent with Land Acquisition areas identified in Yakima Integrated Plan
NOAA Fisheries	Pacific Coastal Salmon Recovery Fund	\$1.2 M	\$1.2M	\$1.2 M	\$1.2 M	\$1.2M	\$1.2M	\$1.2M	\$1.2M	TBD			Yakima Basin habitat projects
US Department of Agriculture, Natural Resources Conservation Service	Regional Conservation Partnership Program					\$105k	\$1.9M	\$1.5M	\$1.8M	\$2.3M	\$2.4M	\$1.6M	Water conservation and habitat restoration projects on Yakama Nation reservation and across the Yakima River Basin.
Bureau of Indian Affairs	Lining and Piping Wapato Irrigation Project	\$1.83M	\$1.36M	\$826k	\$1.37M	\$1.07M	\$2.6M			TBD			Irrigation efficiencies and fish habitat improvements on agricultural land
US Fish and Wildlife	Partners for Fish and Wildlife, National Fish Passage Program	\$190k	\$124k	\$190k	\$90k	\$55k	\$200k	\$256k	\$200k	TBD			Habitat Restoration/Fish Passage
Bureau of Land Management	Region Water Conservation Program												Water Conservation
Corps of Engineers	Flood Plain Restoration	\$6.6M	\$380k	\$100k	\$270k	\$170k	\$40k	\$700k	Levee Reconfiguration, Setback and Removal				



## YBIP Funding

### FY2013-2018 Other Federal, State, Tribal & Local Funding Contributions

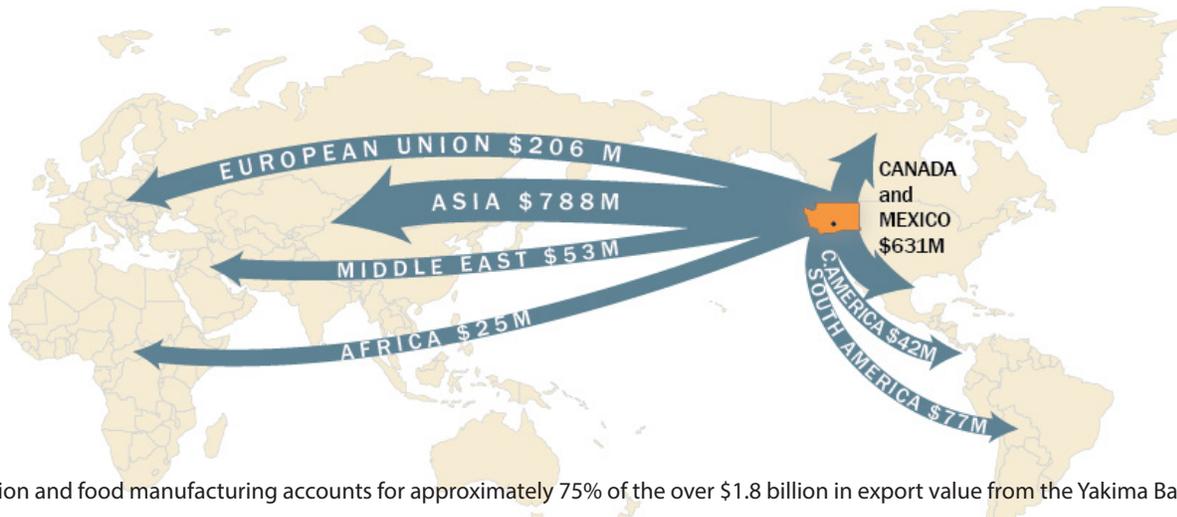
State Office of Columbia River				
	FY2013 -2015	FY2015-2017	FY2017-2019	Total
State of Washington	\$143,300,000	\$30,000,000	\$32,600,000	\$204,100,000
				Support in all 7 elements

Other State, Tribal and Local Funding	
Yakama Nation	Habitat restoration, implementation support
Wapato Irrigation Project	Water conservation
Washington Department of Agriculture	Implementation support
Washington Department of Fish and Wildlife	Habitat restoration, implementation support
Benton County	Implementation support
Kittitas County	Water bank, fish passage, flood plain and habitat restoration, implementation support
Yakima County	Water bank, fish passage, flood plain and habitat restoration, implementation support
City of Yakima	Aquifer storage, fish passage, habitat restoration,
Yakima Tieton Irrigation District	Water conservation
Roza Irrigation District	Water conservation, KDRPP support
Sunnyside Valley Irrigation District	Water conservation
Kittitas Reclamation District	Water conservation, tributary flow enhancement

## YBIP Economics

Washington's Yakima River Basin has an economy that is extraordinarily dependent on water:

- Over 96,000 jobs in the basin are water dependent, providing \$13.1 billion of economic output.
- In agriculture and food processing alone, over 44,300 jobs and \$4.5 billion in economic productivity depend on reliable water supplies.
- Recreation, much of it water dependent, supports 14,200 jobs and \$1.2 billion in productivity.
- During the drought of 2015, three of Yakima's Reclamation irrigation districts suffered \$122 million in lost crop value. Other districts and producers also suffered huge losses.
- Yakima exports \$1.8 billion, 75% of which is crop and food, providing wine, apples, cherries, hops and timothy hay to the world.



Crop production and food manufacturing accounts for approximately 75% of the over \$1.8 billion in export value from the Yakima Basin in 2015

## YBIP Financing Innovation

The 10-year Initial Development Phase lays out a framework for innovative federal-state-private partnerships that address aging infrastructure and meeting the future water needs of the basin:

- Water districts agreed to finance, construct and operate the first major storage project.
- The State of Washington agreed to pay up to half the cost of YBIP projects.
- This partnership helps in meeting federal responsibilities to the Tribe, for fish and wildlife conservation, and to the Reclamation water districts.

## YBIP Economic Analysis

A 2012 analysis of YBIP economics as a programmatic whole found an overall benefit-cost ratio of between 1.4:1 and 3.2:1. In 2012 dollars, the most probable cost was estimated at \$4.2 billion (range - \$3.2 to \$5.4 billion) with a present value of \$3.12 billion.

Under federal practice, each of YBIP's three major water projects will be subject to a project level economic analysis and environmental review prior to construction.

## Water Conservation & Water Marketing

Water conservation and water marketing are two of the seven elements of the Yakima Basin Integrated Plan. Neither of these elements are new to the Yakima River Basin; however, YBIP scales up the commitment to delivering water to farms and homes more efficiently, and better use of that water upon delivery.

### Water Conservation



YBIP is the third major step in updating the century-old USBR Yakima Project. The first effort, YRBWEP I, was authorized by federal legislation in 1979 and focused on fish passage at the basin's smaller dams and diversions. The second, YRBWEP II, was authorized by federal legislation in 1994 and emphasized water conservation. YBIP, as the third effort, extends water conservation and addresses many other needs.

Water conservation in the Yakima progresses under five independent efforts:

#### YRBWEP II

**Goal:** System conservation of 160,000 acre-feet.

**Framework:** Funding for these conservation projects is 65% federal, 17.5% irrigation districts, and 17.5% state. 2/3 of the conserved water stays instream to meet flow goals, while the irrigation districts can use the other 1/3.

**Status:** *Completed* – projects conserving 67,000 acre-feet.  
*Due for completion by 2023* – 59,000 acre-feet.

**Comments:** A Yakima surface water-rights adjudication involving almost 40,000 claims has been in process since 1977. During the first two decades of YRBWEP II many districts were reluctant to conserve, fearing they would damage their position in the adjudication. It is now in its final stages.

#### YBIP Programs

**Goal:** System conservation of 170,000 acre-feet, with half of that goal (85,000 acre-feet) accomplished in the first 10-year Initial Development Phase.

**Framework:** Conservation to improve tributary and mainstem flows, with more flexible financing and flow improvement targets.

**Status:** *Completed* - 7,000 acre-feet.  
*Due for completion by 2023* - 85,000 acre-feet.

**Comments:** YBIP conservation extends conservation into the tributaries and the upper basin, which were excluded from YRBWEP II.

#### Voluntary On-Farm Conservation

Producers have invested heavily in on-farm efficiency. In the upper basin where return flows quickly accrue to the river, pivots and sprinklers are common. In the lower basin where higher-valued orchards, hops and grapes are grown, triple-systems (drip, low and high sprinklers) are typical. These modernized methods use much less water than traditional rill or flood irrigation.



### Voluntary Irrigation District Conservation

Independent of federal programs, water districts have lined and piped canals, constructed reregulation reservoirs, and self-funded many projects, but have not always accounted for water savings. Examples include:

**Kittitas Reclamation District** – lined 32 miles of canals and laterals and updated components; projects planned by 2023 will conserve 34,000 acre-feet

**Roza Water District** – spent \$43M in district funds to conserve 31,900 acre-feet, and plans to spend \$33M over the next 15 years to conserve 8,500 acre-feet.

**Wapato Irrigation Project (BIA irrigation project)** – spent \$3.7 M to conserve 3,500 acre-feet and has many additional projects identified.

**Sunnyside Valley Irrigation District** – conserved 35,000 acre-feet through system improvements

**Kennewick Irrigation District** – lined 74 miles of canals and piped 40 miles of laterals

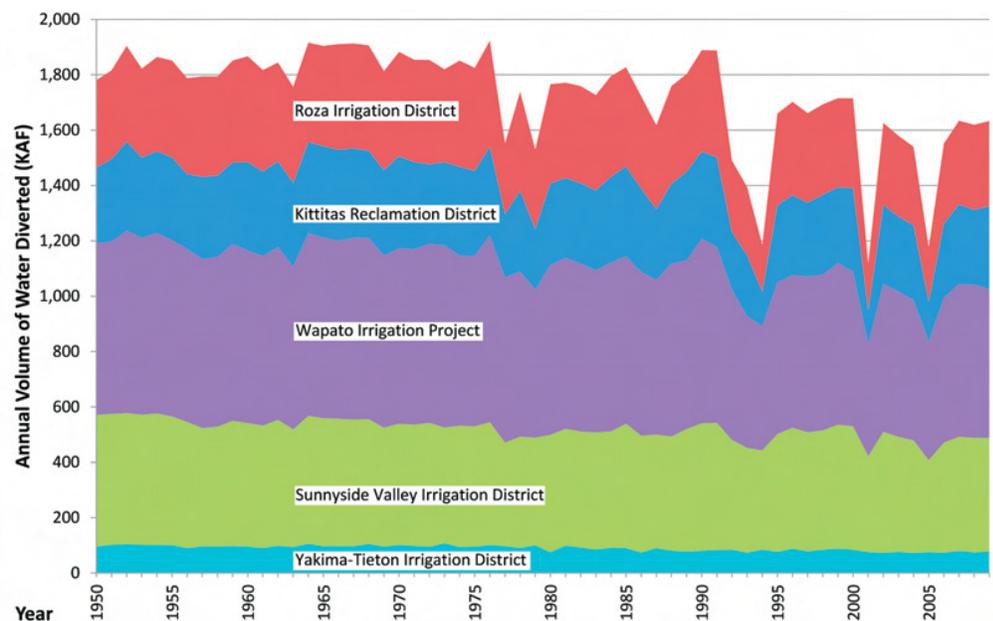
YBIP also conducts outreach to municipalities stressing the advantages and need for conservation efforts.

### State Trust Water Rights Programs

The State Trust Water Right program encourages county, state and federal efforts to improve diversions and efficiencies, create water banks and mitigation programs, and dedicate saved water for instream flows.

### Results

Water use in average years is dropping in the Yakima Basin due to these conservation programs and, in some places, a shift to less water-intensive crops such as wine grapes. YBIP's conservation and water supply development actions do not increase irrigated acreage, with the exception of the WIP Indian water project, where some irrigable land is not currently supplied.



### Limitations

Water conservation cannot be the Yakima Basin's only tool in building drought resiliency. Conservation efforts at the top of the basin may reduce water supply for downstream users, limiting their ability to exercise their water right. Lining or piping a canal reduces seepage, but seeping water eventually makes its way back to the river and the downstream users awaiting that water. Unless offset by managed aquifer recharge, reducing seepage may also limit groundwater infiltration, which recharges aquifers and helps cool stream temperatures during summer months.

Water conservation efforts are only one part of securing reliable water supply in the Yakima Basin. Combined with water marketing, increased storage capacity and habitat and floodplain restoration projects, we can adaptively manage the watershed as a complex, intertwined series of man-made and natural systems.

## Water Marketing



In the Yakima, water markets and temporary transfers are an essential part of the system and will be of growing importance in future drought years. Jurisdiction to approve or deny temporary water right changes rests with the Yakima County Superior Court, while the Washington Department of Ecology oversees permanent changes, transfers, and groundwater rights.

During drought years, most transfers are from senior right holders to the districts with the less reliable supply. Roza Irrigation District, with vulnerable rights and valuable crops, is the most active market participant.

Drought Year	Acre-Feet Leased by Roza	End of Season Water Supply Proration %	April Forecast Supply %	Roza Season End Date (typically Oct 20)
2015	4,534	47%	60% (then 54%)	Oct. 12
2005	28,381	42%	34%	Oct. 1
2001	16,818	37%	59%	Sept, 24
1994	2,971	37%	49%	Sept. 8

However, water markets are not a straightforward exercise in supply and demand; during drought years, even senior users may not have the water to spare. In 2005, Roza offered to pay \$300/ac and obtained 28,381 acre-feet of water. In 2015, Roza increased the offer to \$500/ac and obtained only 4,534 acre-feet.

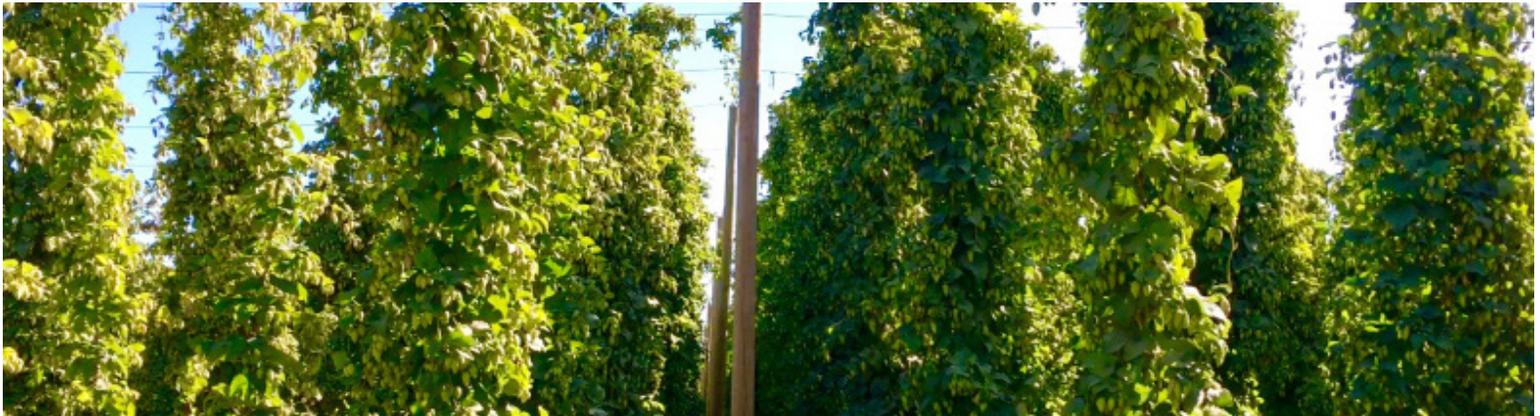
Water markets are legally and physically constrained. Moving water from some areas to others is limited by infrastructure and geology. The same water is used several times throughout the basin. It runs off an upstream farmer's fields, returns to the river, and is picked up again by downstream users. The only part of a water right that can be transferred is the amount needed by a farmer's crop, not the amount expected to return to the river.

YBIP efforts to boost water marketing in the basin involve review of process, technical, legal and contractual bottlenecks. A 2014 Washington State University report on YBIP identified water marketing as a potential alternative to some water supply projects. However, the report contained estimates of transferable water that may not be available. The Department of Ecology, working with irrigation districts and Reclamation, has commissioned a major review of water market opportunities and obstacles as part of an effort to increase water transfers.



### About Kachess Reservoir:

- Kachess Reservoir was created in 1912 by constructing a 115 foot high earthfill dam at the end of a natural glacial lake, flooding a larger area and connecting Big and Little Kachess lakes.
- Kachess is one of the Bureau of Reclamation reservoirs, and holds 825,000 acre-feet of water. The top 239,000 acre-feet are used annually to irrigate the Yakima Projects.
- The remaining 586,000 acre-feet is an “inactive pool,” which lies below the outlet of the dam. This 300 foot deep inactive pool cannot be released for irrigation purposes through the current structure.
- Pumping water from the inactive pool during severe droughts is the first water supply project of YBIP.



### KDRPP

The **Kachess Drought Relief Pumping Plant (KDRPP)** is a proposed floating station that would pump inactive pool water to reduce impacts of severe drought on Reclamation water districts with junior water rights.

### How much water will KDRPP use when operational?

KDRPP is designed to tap up to 200,000 acre-feet and would be used only in a severe drought – it would not be used in ordinary or moderate drought years. If there are a series of dry years KDRPP would not be able to supply all of that 200,000 acre feet.

- Using historic climate conditions, modeling projects an average increase of 15% in supply during severe drought years – an average of 158,000 acre feet for the 17 driest years of the 90 years modeled.
- Using an adverse climate change scenario, modeling projects an average increase of 9.3% in supply during severe drought years – an average of 99,000 acre feet for the 43 driest years of the 90 years modeled.

These results show that KDRPP is an essential part of solving Yakima’s water problems, along with additional storage, conservation, markets, groundwater, and the other YBIP elements.

### Will Kachess refill if the drought pool is used?

If the full 200,000 acre-feet is used from Kachess, the lake level is lowered by 80 feet. Even at that lowest point, the lake is 4 square miles in area, retains 386,000 acre-feet of water, and is over 250 feet deep. Refill is expected to take no more than 5 years under current climate conditions. Reclamation’s decisions about operations, districts’ requests for water, and new storage will affect refill rates. Irrigation districts have an incentive to speed refill because they have to pay for pumping costs when the reservoir is drawn down.

## KDRPP & Yakima Basin Water Supply

### How will this project be paid for?

Yakima Basin irrigation districts have committed to paying for all of the construction, financing, operation and maintenance costs of KDRPP.

The Bureau of Reclamation originally proposed a fixed pumping station which could have cost anywhere from \$300-\$600 million to build. The irrigation districts proposed to construct and self-finance a floating pumping plant option that is anticipated to cost less than \$200 million. Environmental review and engineering on this alternative is in process.

To construct KDRPP, the irrigation districts would pay about \$1000 in capital costs for every acre-foot of emergency drought relief water. This cost compares favorably to conservation projects and emergency drought well operations already paid for by the districts and their water users. Additionally, the capital cost of replanting perennial crops lost to drought is much more than the cost of constructing KDRPP.

<b>KDRPP Water</b>	+/- \$1000 per acre-foot (capital cost)
<b>Blueberries, hops, tree fruit</b>	\$25,000 per acre (capital cost)
<b>Grapes</b>	\$7,000 - \$15,000 per acre (capital cost)

### When will KDRPP be used?

KDRPP will be used only if water districts receive less than 70% of their Reclamation supply and call for the water. They may choose not to use KDRPP, leaving it as insurance against back-to-back droughts, or if they find other sources such as conserved, marketed or transferred water.

### Will recreation continue?

A new dock and extendable ramp will provide recreational access to the 4 square mile, 250-foot-deep lake during the lowest drawdown. Current operations already leave campground and community boat ramps stranded.

### What about ESA?

KDRPP is undergoing environmental review, including consideration of ESA listed species like bull trout and spotted owls. Enhancing the abundance and resiliency of bull trout populations is part of YBIP and the KDRPP project.

### Will the pump station be noticeable?

KDRPP is still under design and environmental review. Concerns about visual and noise impacts will be considered through that process.

### What about water markets and conservation efforts as a source of water supply?

See Appendix 4.

