

# The Challenges of Developing New (Storage) Water Supplies

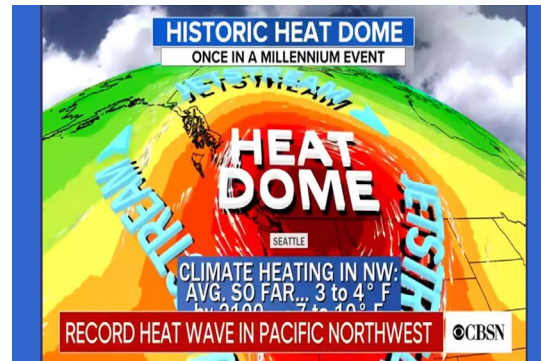
Melissa Downes, LHG  
Financial & Projects Section Manager  
Office of Columbia River

Washington State Potato Summit  
December 11, 2023



# Climate change impacts on water supply & availability

Decreased Snowpack



Ocean Conditions



Storm/Flooding



Hotter Summers



Aging Infrastructure





What does this mean  
for water supplies?

# How about salmon recovery?

STATE OF SALMON  
IN WATERSHEDS 2020

[Executive Summary](#)

[About](#)

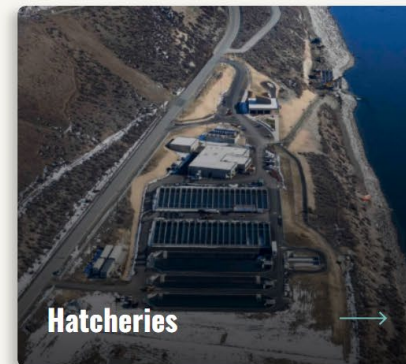
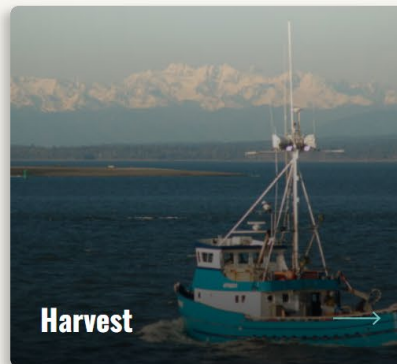
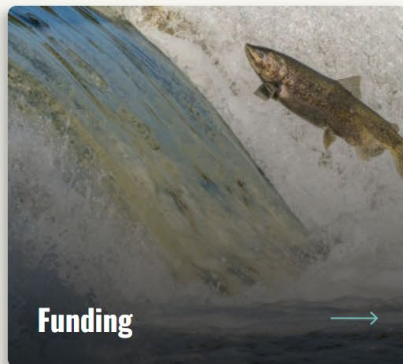
[Statewide Data](#)

[Regions](#)

[Stories](#)

[How to Help](#)

## Statewide Salmon Data



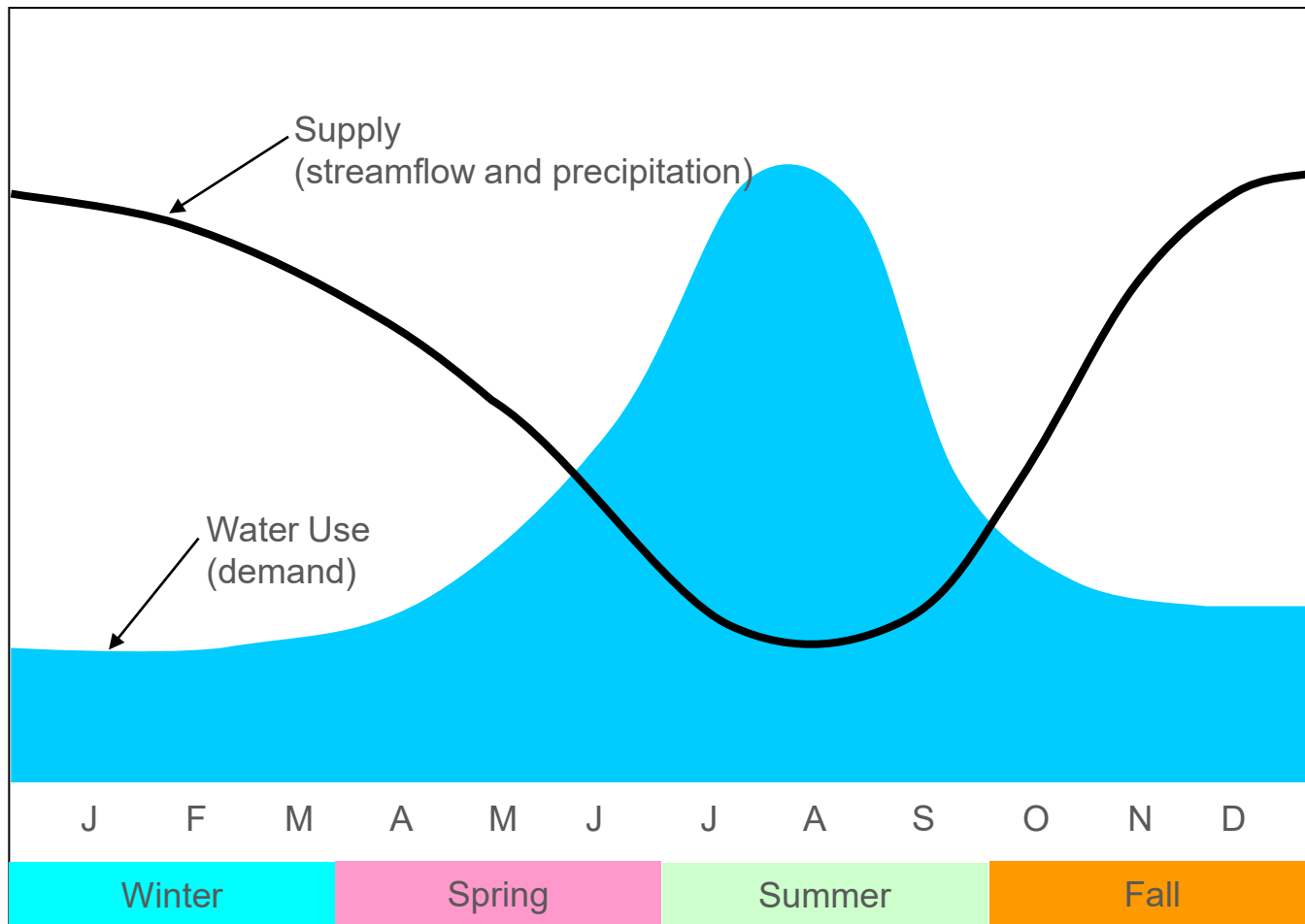
# State of our Water Infrastructure



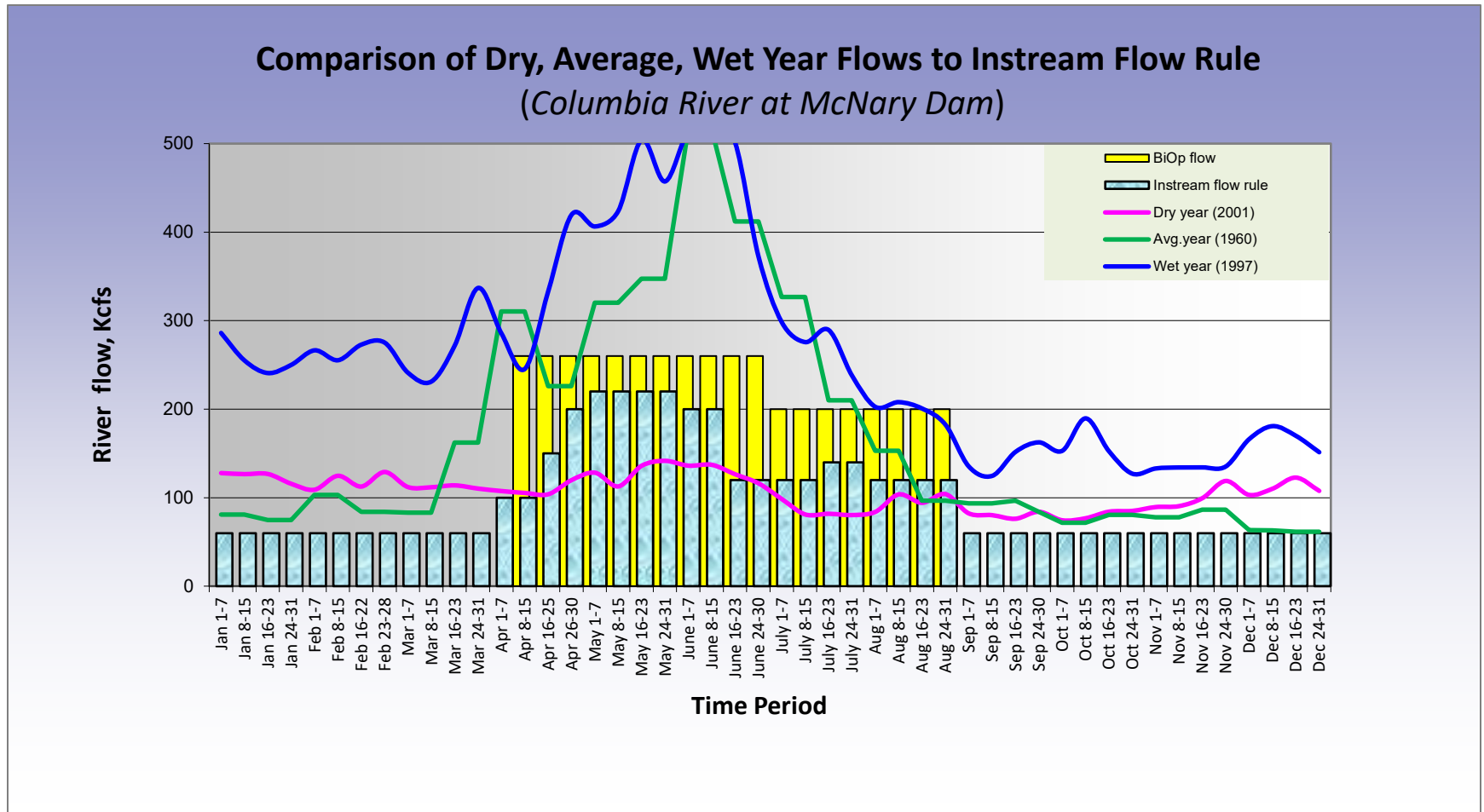
# Snake River Dam Removal?



# The General Eastern Washington Water Supply Situation



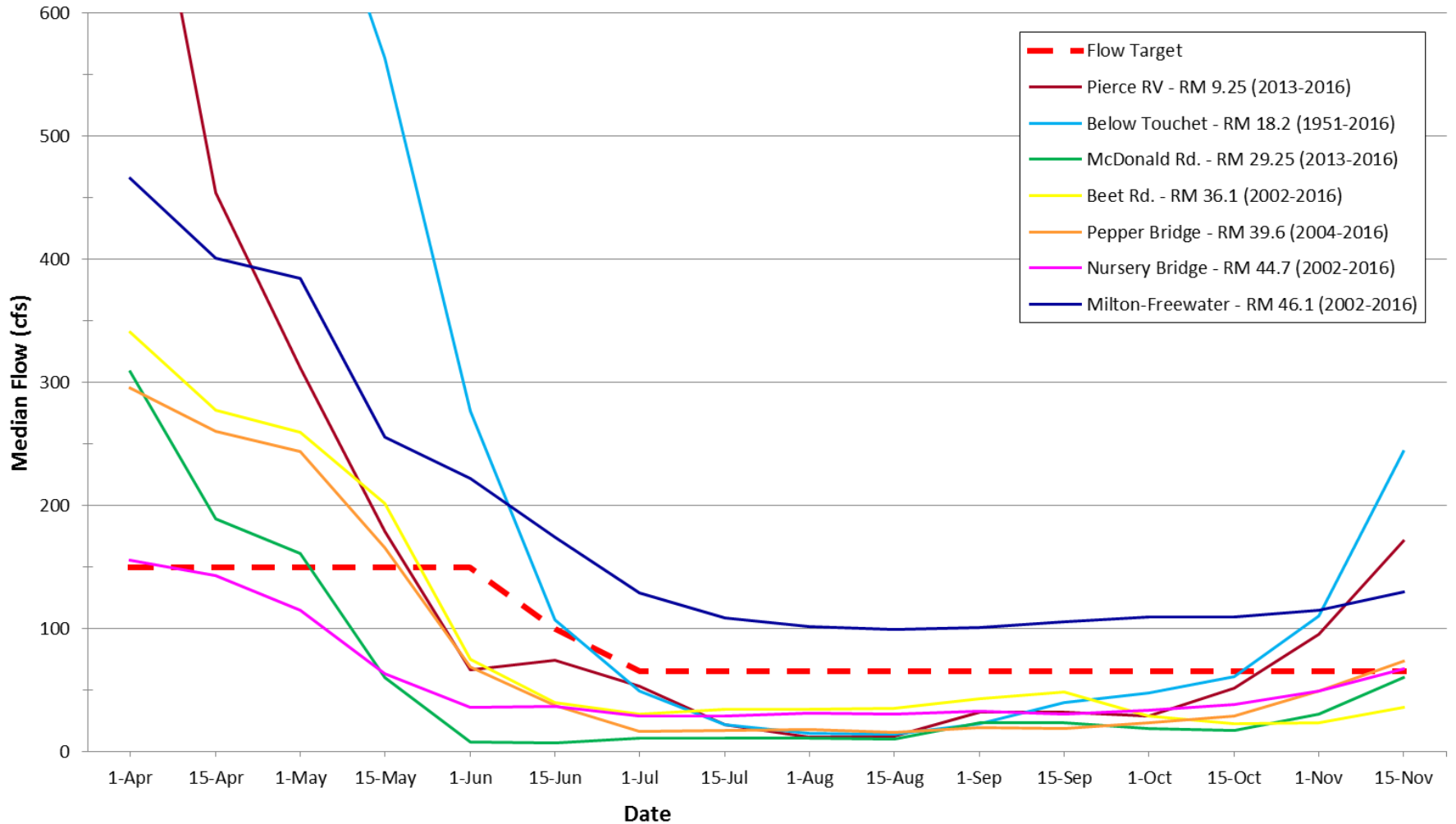
# Columbia River Instream Flows



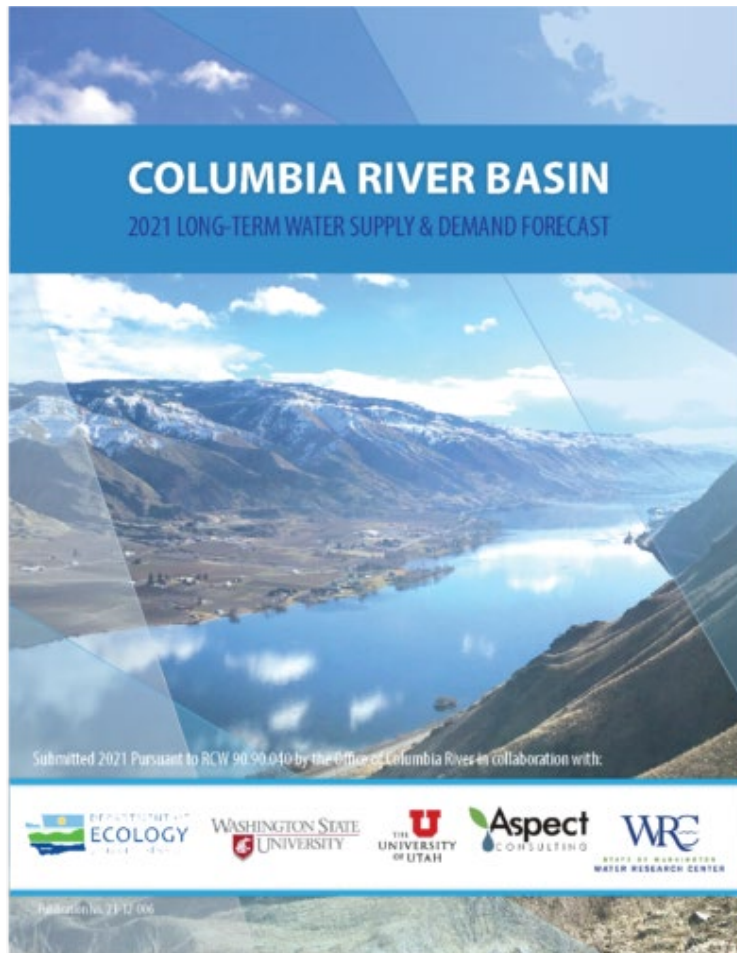


# Walla Walla Instream Flow

Walla Walla River  
Semi-Monthly Median Flow



# 2021 Columbia River Basin Long-Term Water Supply & Demand Forecast



- Every 5 years, the Washington State Department of Ecology's Office of the Columbia River (OCR) is required to submit a long-term (20-year) water supply and demand forecast to the State Legislature
- Washington State University (WSU) was assigned to develop the forecast for water supply and out-of-stream demand
- The forecast helps improve understanding of where additional water supply is most critically needed, now and in the future



# Columbia River System



# Trends from the Forecast

## Climate Change

By the 2040s, Washington can expect:

- Higher temperatures
- Wetter, warmer winters
- More rain and less snow
- Reduced snowpack, especially at low and mid elevations
- Earlier snowmelt
- Warmer, drier summers, deeper droughts
- Greater heat stress
- More frequent extreme weather events

## Population Growth

By the 2040s, Washington can expect:

- 17% higher population across the state
- Stable fertility rates and increasing mortality rates (as baby boomers age)
- Over two thirds of the state's population increase are due to net migration into the state
- 13% higher population across eastern Washington

## Trends in Agriculture

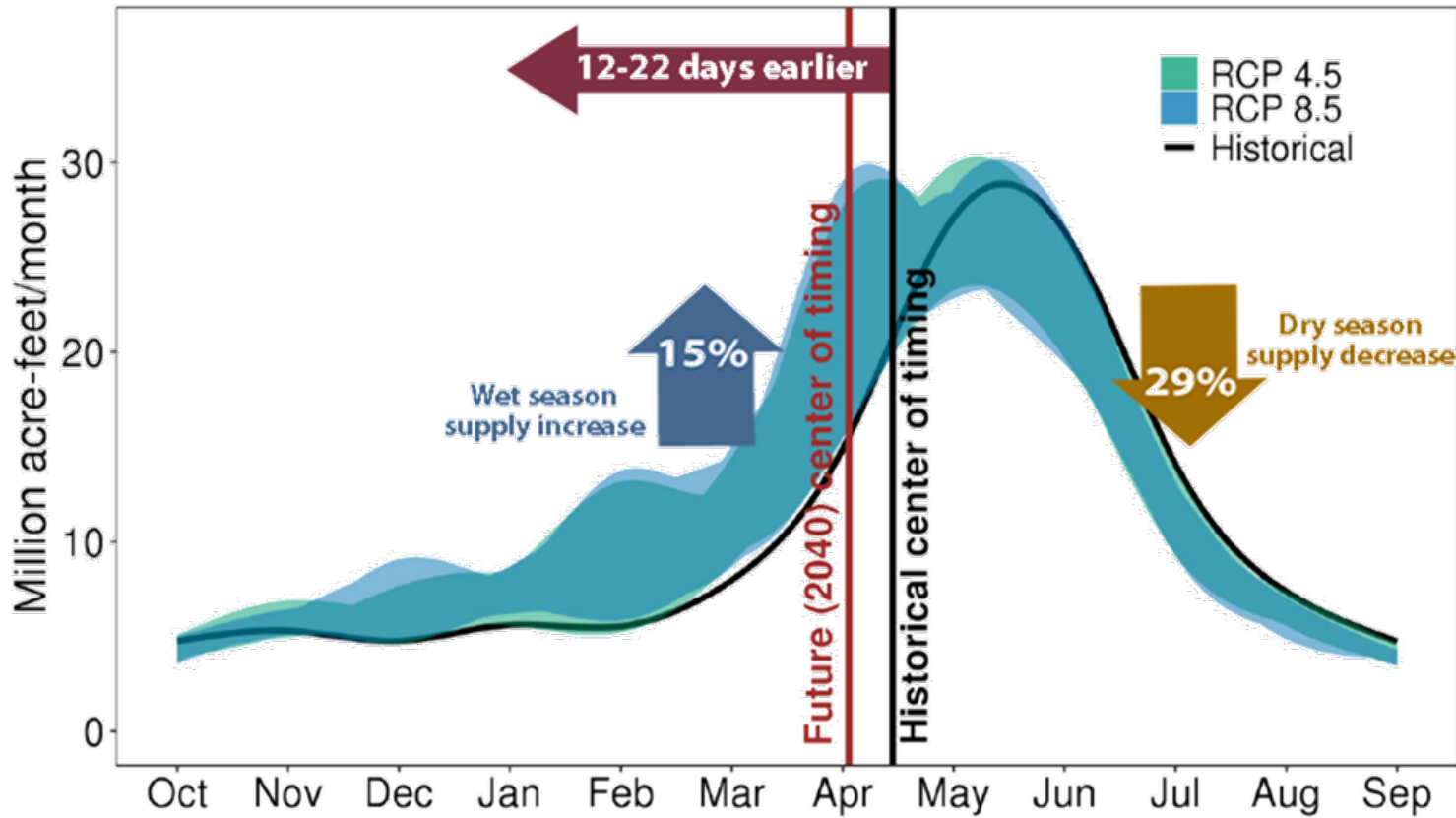
By the 2040s, Washington can expect:

- Longer growing season
- Greater rate of accumulation of growing degree days
- Increased photosynthesis in many crops
- Earlier planting dates
- Earlier flowering in tree fruit and specialty crops
- More frequent heat stress events in summer



# Key Finding: Timing of Water Supplies is shifting

## Median Flow Year - Future GCMs (2040)



## Eastern Washington Annual Water Supply

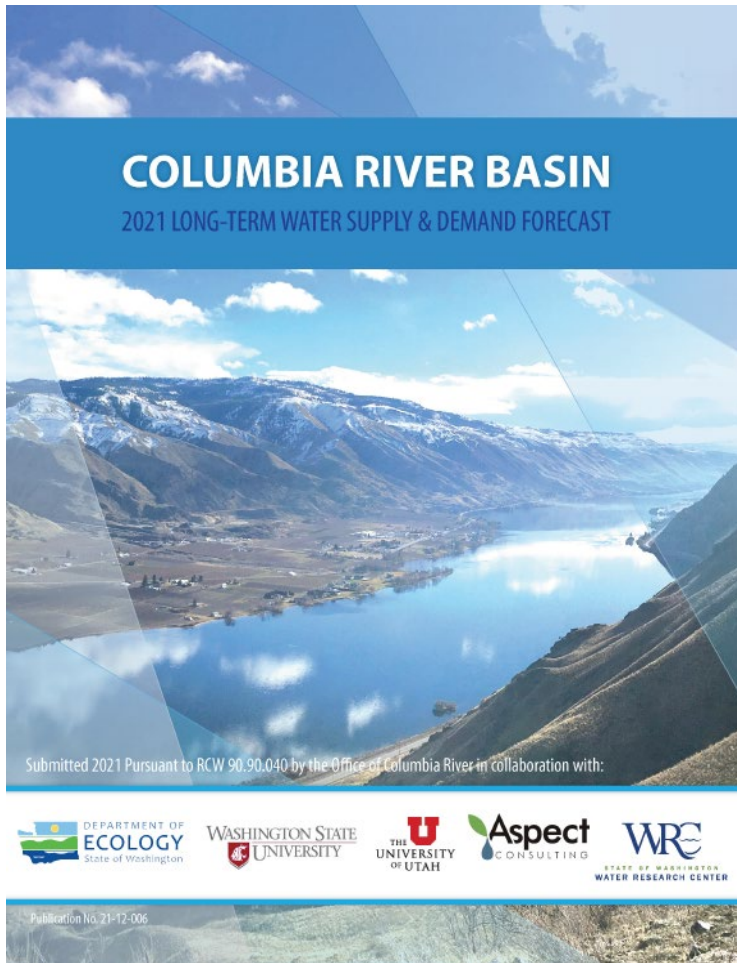
Historical  
(1986-2015)



2040s  
(2026-2055)



# 2021 Long Term Water Supply and Demand Forecast



- The Forecast suggests that eastern Washington is vulnerable to:
  - Water supplies increasing earlier in the spring, and decreasing late in summer;
  - More extremes in water supply from year to year;
  - Declining low flows, affecting important fish species;
  - Some watersheds with increases in out-of-stream demands.
- This combination of lower supplies at critical times and locally increasing demands leads to increasing frequency of instream flow deficits and resulting curtailments.





So how can we  
prepare for the future?

# OCR Background and History

- In **1991**, Columbia River salmon and steelhead listed under the Endangered Species Act of 1973.
- In **1992** Ecology places moratorium on new water right appropriations from the Columbia River.
- In **1997**, Ecology promulgates amendment to rules (WAC 173-563 & 173-531A) to address existing instream flows adopted in the 1980's that do not adequately address flow issues associated with listed fish stocks in the Columbia basin.
- In **1997**, Washington Legislature passed ESHB 1110, requiring consultation with respective water committees in the House and Senate before withdrawal of waters from the state for appropriation effectively ending the moratorium.
- In **1997**, Governor Locke initiates a “four corner” process to develop a salmon recovery plan.





# OCR Background and History (cont'd)

- In **2001**, Columbia Basin experiences its first drought since the 1980's instream flow rule was established resulting in curtailment of “junior water right holders”
- In **2001**, Governor Locke started the Columbia River Initiative that culminated in an MOU being signed in 2004.
- In **2004**, the National Academy of Sciences cautioned the state about allowing new water withdrawals from the Columbia River during low flows.
- In **2006**, Governor Gregoire is instrumental in the Columbia River Water Resource Management Act passing (RCW 90.90) to implement many aspects of the CRI MOU.
- In **2008** Ecology reorganizes the Columbia River Management Program and establishes the Office of Columbia River.



# Columbia River Partnership

December 2004

- Columbia River Initiative Memorandum of Understanding

February 2006

- State's Columbia River Water Resource Management Act



## Memorandum of Understanding Concerning the State of Washington's Columbia River Initiative

### PARTIES

This Memorandum of Understanding (MOU) is entered into between the State of Washington (State), acting through the state agencies which are signatories hereto; the Pacific Northwest Region of the U.S. Bureau of Reclamation (Reclamation); and the South Columbia Basin Irrigation District, the East Columbia Basin Irrigation District, and the Quincy-Columbia Basin Irrigation District (collectively referred to as the

### EFFECT

**Section 1.** This MOU is intended to advance the actions of the parties to a legally binding contract or arrangement in equity by any party against the parties to the jurisdiction procedures presently available substantive or procedural, on the parties. This MOU shall not constitute compliance or noncompliance

**Section 2.** Nothing in this MOU shall modify or alter the water rights for the Columbia River Project or the modification of the rights and obligations of the Project repayment contracts, the current operations of the Project as congressionally authorized obligations and operation contracts.

### PURPOSE AND OBJECT

**Section 3.** The parties will work together to secure economic and environmental federal Project and along the described in this MOU.

**Section 4.** Through the Columbia River Initiative, the mainstem of the Columbia

### CERTIFICATION OF ENROLLMENT ENROSSSED SECOND SUBSTITUTE HOUSE BILL 2860

Chapter 6, Laws of 2006

59th Legislature  
2006 Regular Session

COLUMBIA RIVER BASIN--WATER SUPPLY

EFFECTIVE DATE: 7/01/06

Passed by the House February 13, 2006:  
Yeas 34 Nays 4

FRANK CHIFF  
Speaker of the House of Representatives

Passed by the Senate February 14, 2006:  
Yeas 45 Nays 0

BRAD GRUBB  
President of the Senate

Approved February 16, 2006.

CHRISTINE GREGG  
Governor of the State of Washington

### CERTIFICATE

I, Richard Rafziger, Chief Clerk of the House of Representatives of the State of Washington, do hereby certify that the attached is ENROSSSED SECOND SUBSTITUTE HOUSE BILL 2860 as passed by the House of Representatives and the Senate on the dates herein set forth.

RICHARD RAFZIGER  
Chief Clerk

FILED  
February 16, 2006 - 2:45 p.m.

Secretary of State  
State of Washington

# OCR's Mission....

Aggressively pursue water supply development for both instream and out-of-stream uses.



# Columbia River Basin Water Management Act (2006)

- Significant investment in new storage and conservation
  - Capital: authorization for bonds of up to \$200 million
  - Operating: \$2.1 million and 15 FTEs
- 2/3 of funds for study & construction of new storage & pump exchanges
  - 1/3 of new storage for improving streamflows to benefit fish
  - 2/3 of new storage for new out-of-stream uses
- 1/3 of funds for all other water supply projects

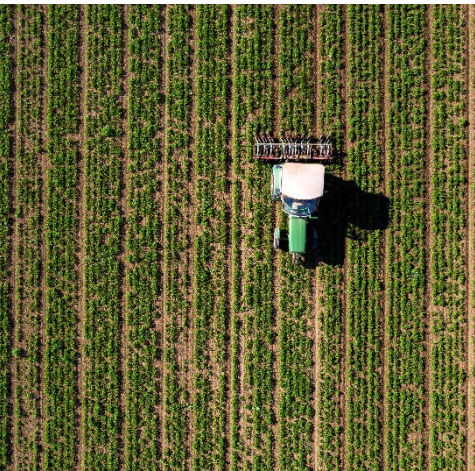


**Ecology was tasked with managing the funds & created the Office of Columbia River (OCR) to use these funds to develop new water supplies**

# Today's Challenges – Water for Economic Growth

- Water provides “fuel” to our state’s economy.
- Increase demand for water to support economic activity, yet in many areas of the state supplies are limited.
- Efficient and effective water management is critical to supporting economic growth while protecting senior water rights and the environment.





# Legislative Mandates

RCW 90.90.040

## *Develop water supplies for:*

- Alternatives to groundwater for the Odessa Subarea
- Pending water right applications
- Future water supplies for interruptible water right holders
- Future water supplies for municipal, domestic, industrial, and irrigation
- Instream Benefits



# OCR Water Projects 2023

- Completed, Developed
- Active, Under Development

**Methow Trust Water Acquisition**  
79 ac-ft Out-of-Stream

**Peshastin Pump Exchange**  
ac-ft TBD

**Peshastin ID Piping**  
360 ac-ft Instream

**Lower Wenatchee In-stream Flow s**  
7,823 ac-ft Instream

**Methow Projects**  
2854 ac-ft Out-of-Stream

**Goose Lake & Nine Mile Flat Storage**  
ac-ft TBD

**Pine Creek Acquisition**  
900 ac-ft Out-of-Stream

**Mill Creek Storage**  
11,000 ac-ft Out-of-Stream

**Sullivan Lake Water Sup**  
9,400 ac-ft Out-of-Stream  
4,600 ac-ft Instream

**Lake Roosevelt Incremental Storage Releases**  
All Years:  
55,000 ac-ft Out-of-Stream  
25,000 ac-ft Instream  
Drought Years:  
88,000 ac-ft Out-of-Stream  
44,000 ac-ft Instream

**Columbia Basin ID Piping**  
35,955 ac-ft Out-of-Stream

**Spokane-Rathdrum ASR**  
105,000 ac-ft Out-of-Stream

**Lincoln CD Passive Rehydration**  
ac-ft TBD

**Weber Siphon**  
Conveyance

**East Low Canal Widening**  
Conveyance

**Potholes Supplemental Feed Route**  
Conveyance

**Pasco Municipal Supply Improvements**  
5,000 ac-ft Out-of-Stream

**Walla Walla Water 2050 Water Supply**  
Strategic Planning

**Walla Walla Flow Enhancement**  
30,000 ac-ft Instream

**Kennewick ASR**  
>318 ac-ft Instream

**Port of Walla Walla Leases**  
4,761 ac-ft Out-of-Stream

## Region-Wide Projects

**Conservation Commission Irrigation Efficiency**  
7,823 ac-ft Instream

**Conservation Commission Retiming**  
ac-ft TBD

**Regional Aquifer Storage and Recover**  
ac-ft TBD

**Donations**  
4,396 ac-ft Instream

### ADA Accessibility

The Department of Ecology is committed to providing people with disabilities access to information and services by meeting or exceeding the requirements of the Americans with Disabilities Act (ADA), Section 504 and 508 of the Rehabilitation Act, and Washington State Policy #188.

To request an ADA accommodation, contact Ecology by phone at 509-454-4241 or email at [tim.poppleton@ecy.wa.gov](mailto:tim.poppleton@ecy.wa.gov). For Washington Relay Service or TTY call 711 or 877-833-6341. Visit Ecology's website for more information.



## Yakima Basin Integrated Plan Initial Development Projects

**Kachess Drought Relief Pumping Plant**  
200,000 ac-ft Out-of-Stream

**Cle Elum Pool Raise**  
14,600 ac-ft In-stream

**Cle Elum Fish Passage**  
Reservoir Fish Passage

**Teanaway Acquisition**  
50,272 acres of Watershed Protected

**Manastash Conservation & Tributary Enhancement**  
1,300 ac-ft Instream

**Managed Aquifer Recharge**  
600 ac-ft Out-of-Stream

**Yakima City ASR**  
10,000 ac-ft Out-of-Stream  
Instream ac-ft TBD

**Icicle Creek Water Management Strategy**  
20,000+ ac-ft Instream and Out-Of-Stream

**Odessa Subarea Groundwater Replacement**  
164,000 ac-ft Out-of-Stream

**Upper Kittitas Tributary Enhancement**  
Conveyance

**White Salmon ASR**  
145 ac-ft Instream

**Pasco Basin Water Supply**  
ac-ft TBD

**Switzler Off-Channel Reservoir**  
44,000 ac-ft Out-of-Stream

### Multiple Site Projects

**Habitat Enhancement & Restoration**  
33 Projects

**Enhanced Water Conservation**  
10,000 ac-ft

**Kittitas Distributed Off-Channel Small Storage**  
ac-ft TBD

**Other Yakima Basin Integrated Plan Projects**  
150,400 ac-ft Instream & Out-of-Stream

**Sunnyside Valley ID**  
7,815 ac-ft Instream

**KID/Red Mountain**  
11,005 ac-ft Instream

**Horse Heaven Hills**  
105,000 ac-ft Out-of-Stream

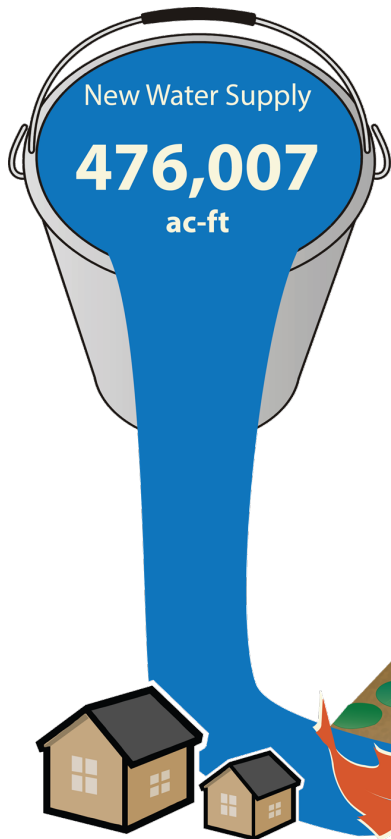
**Barker Ranch**  
6,436 ac-ft Instream

**Kennewick General Hospital**  
4,000a ac-ft Out-of-Stream

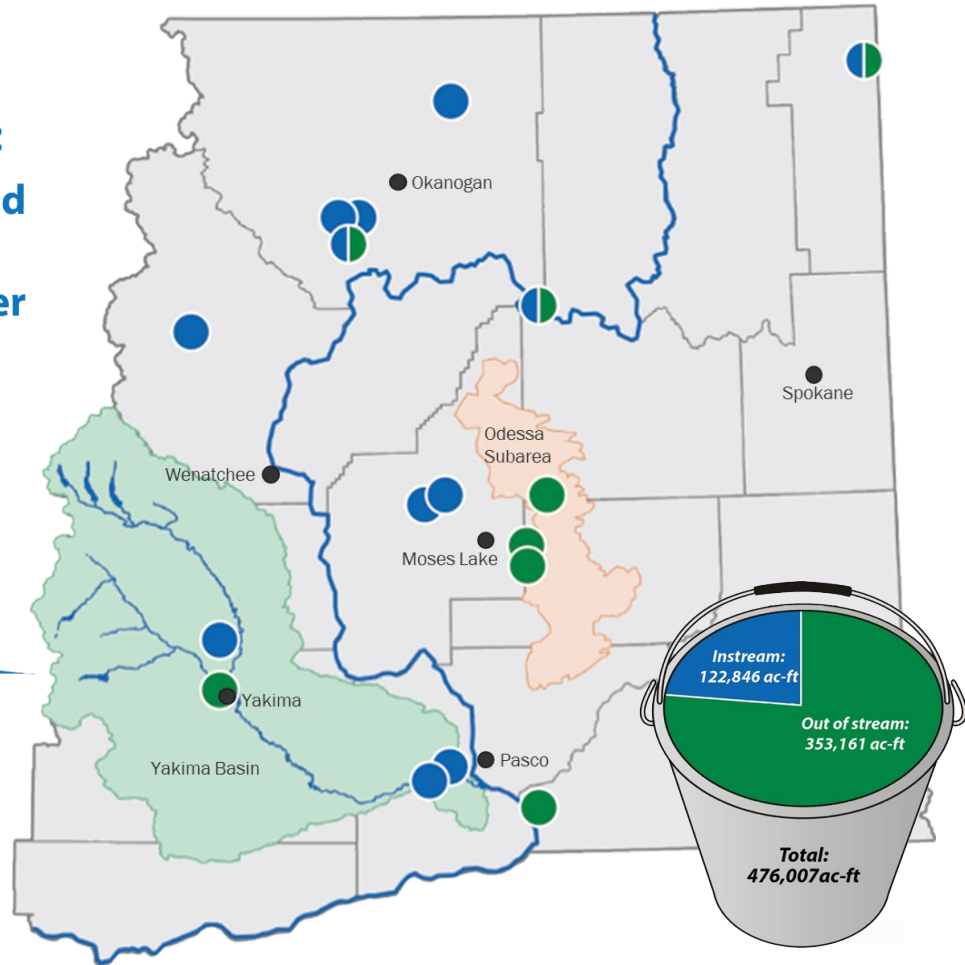
Locations are approximate



# Making progress



- Enough water to serve :
- 100,000 acres of farmland
  - 80,000 homes
  - Fish in the Columbia River and 17 tributaries



# Investments to Date

BIENNIUM	OCR	YBIP
2006 – 2013	\$ 96.5 million	Funded out of OCR budget
2013 – 2015	\$ 74.5 million	\$ 143.3 million (includes TCF)
2015 – 2017	\$ 19.0 million	\$ 30.0 million
2017 – 2019	\$ 33.8 million	\$ 31.1 million
2019 - 2021	\$ 40.0 million	\$ 40.0 million
2021 - 2023	\$45.0 million	\$42.0 million
2023 -2025	\$60.7 million	\$49.0 million
<b>TOTAL</b>	<b>\$ 369.5 million</b>	<b>\$ 335.1 million</b>

# Water Supply Development Tools



- Surface Storage
- Structural & Operational Changes
- Pump Exchanges
- Aquifer Storage and Recovery
- Shallow Aquifer Recharge (aka Passive Rehydration)
- Water Right Acquisition & Leases
- Conservation/Piping/Lining
- Water Banking



# Columbia River Mainstem Storage



## Appraisal Evaluation of Columbia River Mainstem Off-Channel Storage Options

Volume I of II



U.S. Department of the Interior  
Bureau of Reclamation  
Pacific Northwest Region



Washington State Department of Ecology

May 2007



# Lake Roosevelt Incremental Storage and Releases Program

## Lake Roosevelt Incremental Storage Releases

Operational change of 1 foot annually and 1.8 feet during drought

The Lake Roosevelt storage release would divert up to 82.5K ac-ft of water for:



### Instream Flows:

- low stream flows
- ESA listed
  - sturgeon
  - lamprey
  - bull trout
  - cutthroat trout
  - chinook salmon
  - chum salmon
  - coho salmon
  - sockeye salmon
  - steelhead salmon

27.5K (33%)  
Instream Flow

30K (36%)  
Odessa

25K (30%)  
Municipal Needs



### Odessa Farmers:

- declining ground-water supplies
- 10 foot drop per year
- 170,000 acres



### Municipal Needs:

- population growth
- increasing industrial demands

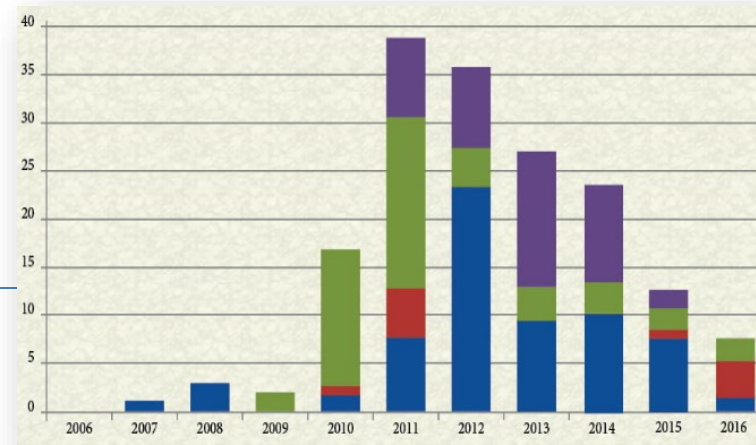
In a drought year an additional 50K ac-ft of water for:

17K (34%)  
Instream flow during drought years

33K (66%)  
Interruptible water right holders



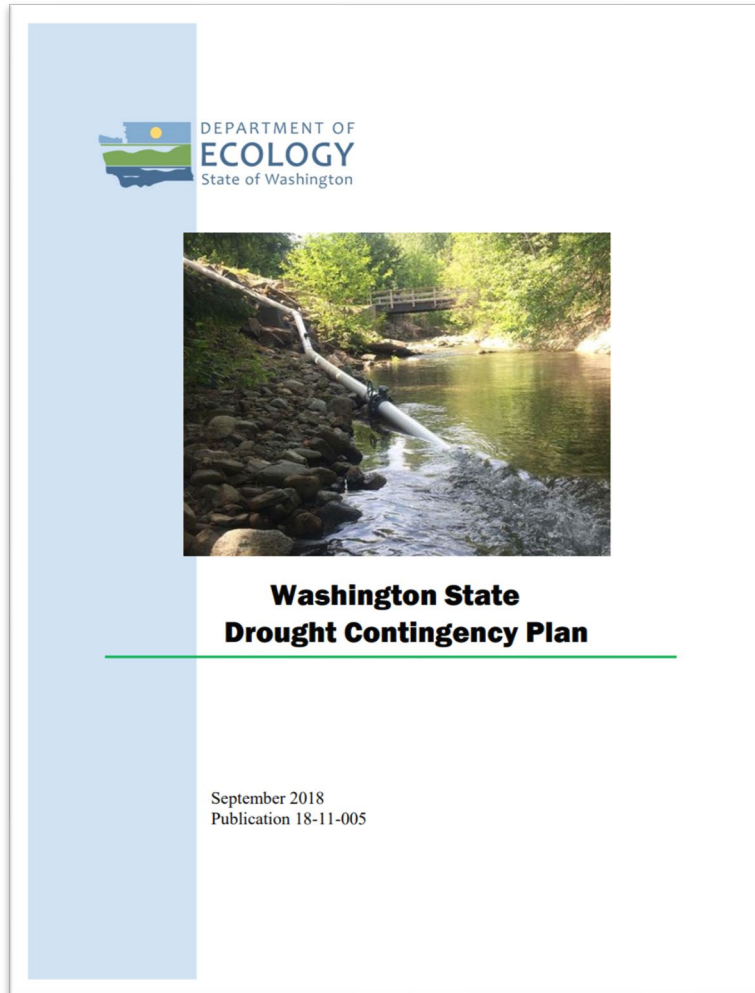
# LRISRP – M & I



- Ecology has issued **50** permits totaling approx. 21,000 ac-ft of water.
- Ecology has requested release of:
  - 22,000 ac-ft of M&I water
  - 11,000 ac-ft of Instream flow water
- Future Permitting



# LRISRP – Drought Relief



- Ecology received USBR drought contingency funds in FY15 to complete a Statewide Drought Plan
- State Drought Plan filed with Congress in 2020



# Sullivan Lake Reoperation



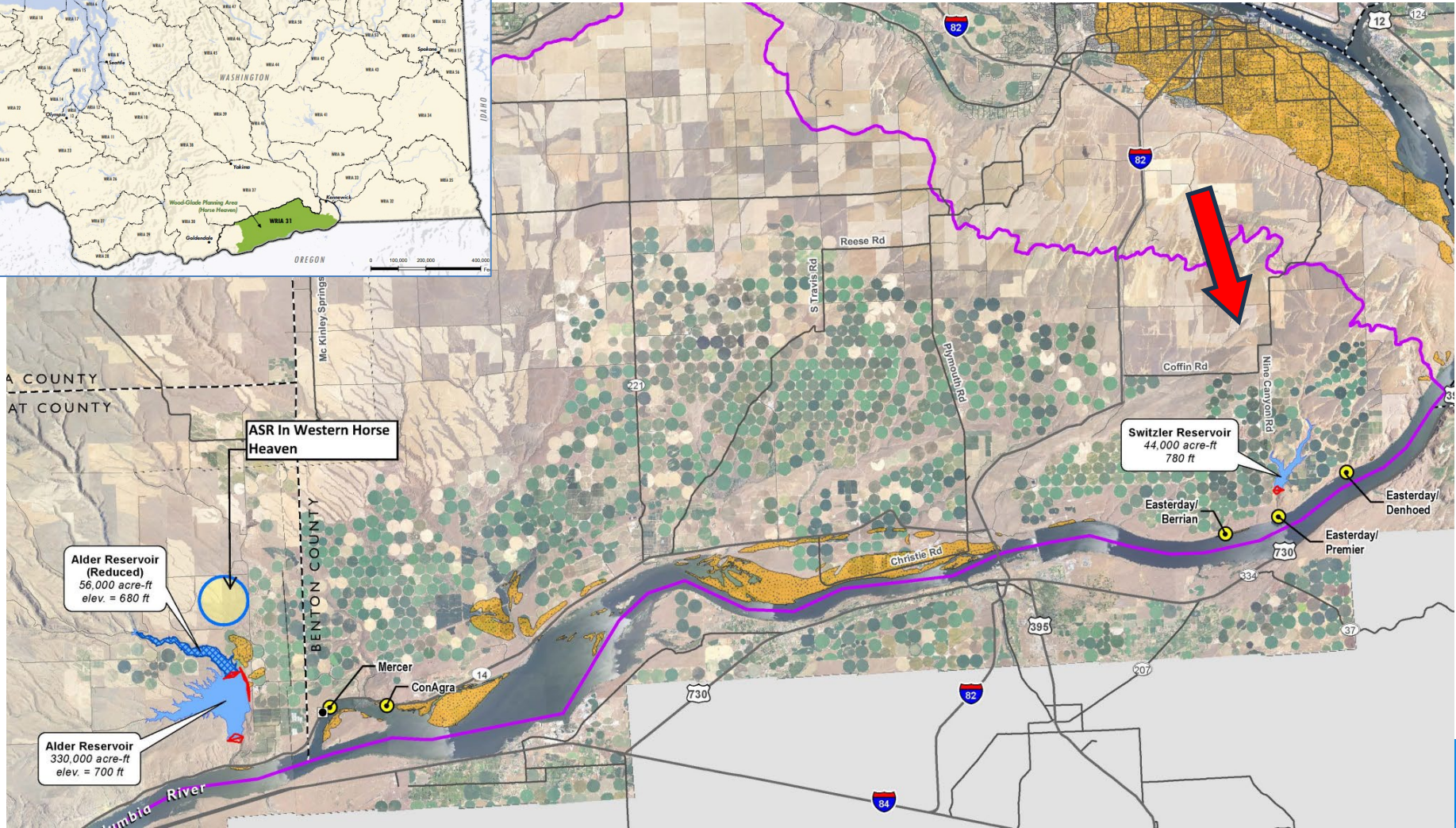


# Sullivan Lake Reoperation



- OCR agreement with Pend Oreille County PUD to convert former hydropower facility to water supply operation.
- Creates 14,000 acre-feet of additional supply in six (6) NE counties.
  - 9,333 acre-feet for out-of-stream uses
    - 50% Agriculture/Irrigation
    - 50% M&I
  - 4,667 acre-feet for instream uses
- Cost of water = \$60/ac-ft for 25 years

# Switzler Reservoir - Preferred Storage Alternative from pre-Feasibility study



# Switzler Reservoir Water Storage Project

## Water Storage Concept:

- Provide mitigation for new water rights
  - 1:1 mitigation for Columbia River diversions
  - Project provides new water rights; does not deliver water
- Pump from Columbia River when water is available (Winter/Spring)
- Pump into surface reservoirs (low elevation)
- Under new water rights, divert Columbia River water from same pool or anywhere downstream
- Discharge water from reservoir back to Columbia River to mitigate for diversion quantity



## Constructed Elements

Embankment Dam

Pipeline Conveyance

Pump Station

Environmental Mitigation

## Operational Elements

Peak Storage Volume  
(acre-feet) 44,000

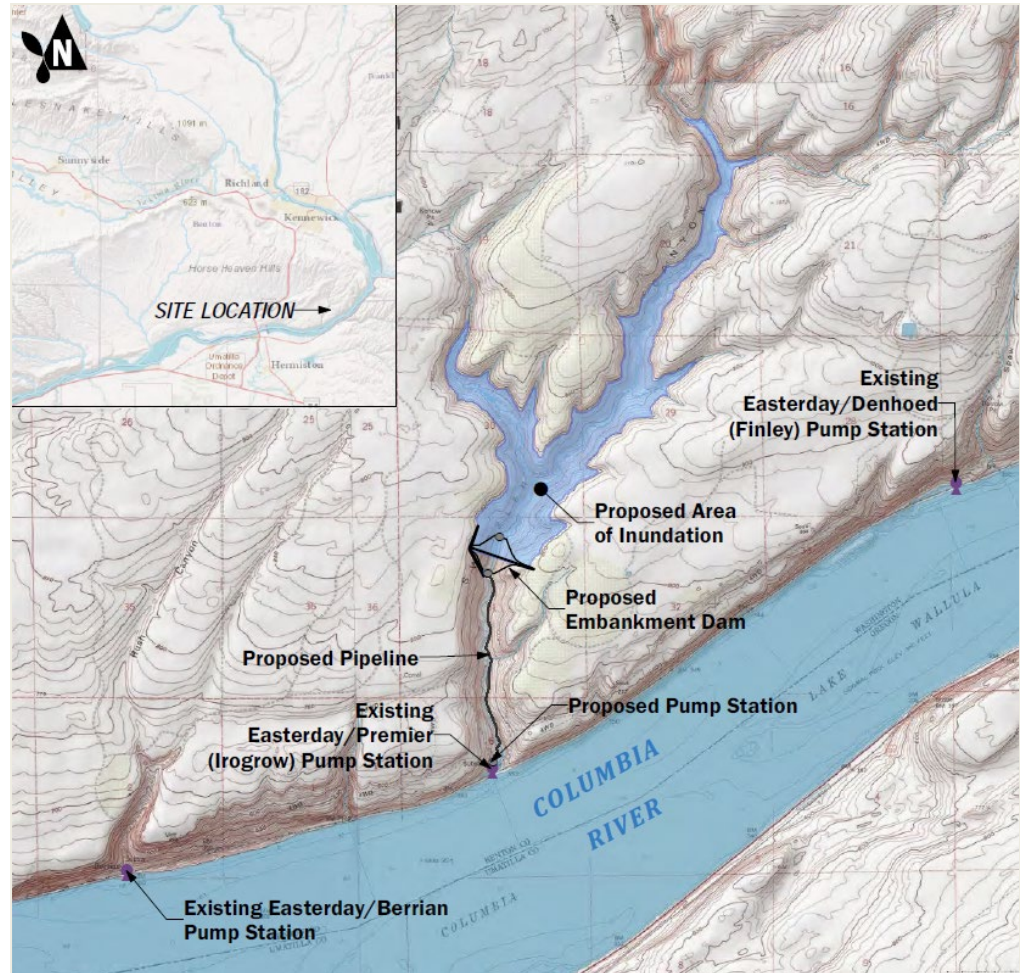
Maximum  
Instantaneous Filling  
Capacity (cfs) 200

Diversion Period  
When  
Columbia  
River Water is  
Available

Maximum  
Instantaneous  
Draining Capacity (cfs) 280

Release/Supply  
Period  
April 1 –  
October 30

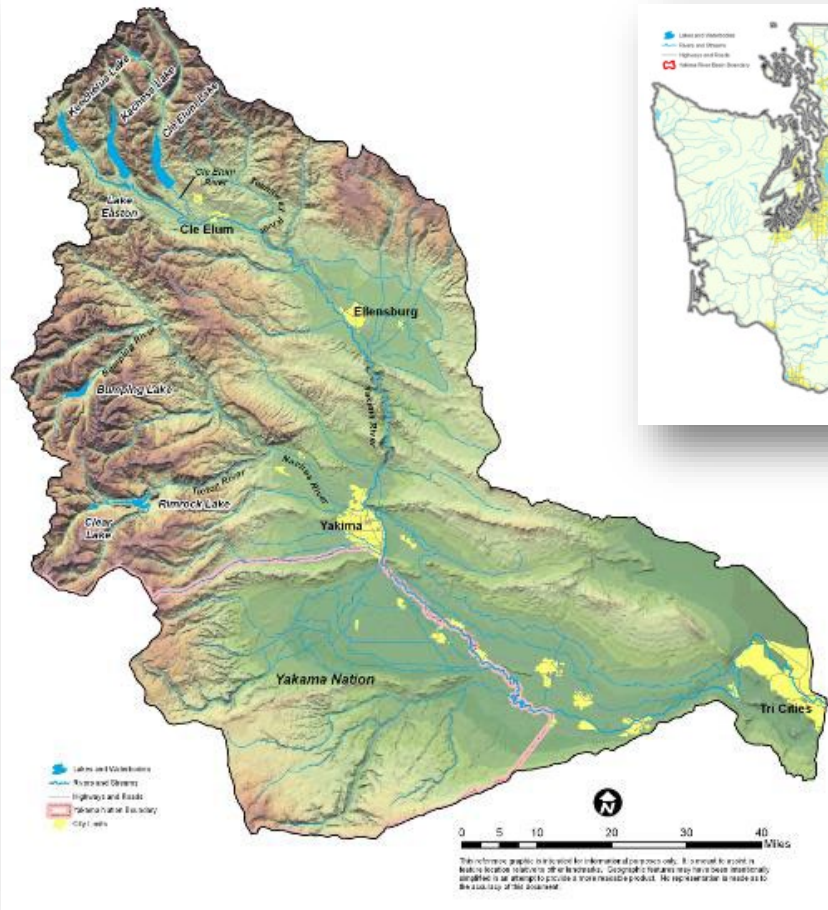
Surface Water Source  
Columbia  
River



## PROJECT VICINITY



# Yakima River Basin Overview



- 6,155 sq. miles w/ 464,000 irrigated acres
- 5 reservoirs w/ 1M AF capacity, irrigation deliveries 2.3M AF
- \$4.5 Billion agriculture economy



# Declining water supply

- Surface water is over-appropriated, ground water limited
- Droughts in 1992-1994, 2001, 2005, 2015, and 2019
- Proratable irrigation districts reduced to as little as 37% of allotments
- Snowpack melting earlier, projected to decline with climate change



# Yakima Basin Integrated Plan – 7 Elements









# Cle Elum Pool Raise

- Modify radial gates
- Shoreline protection
- Land acquisition



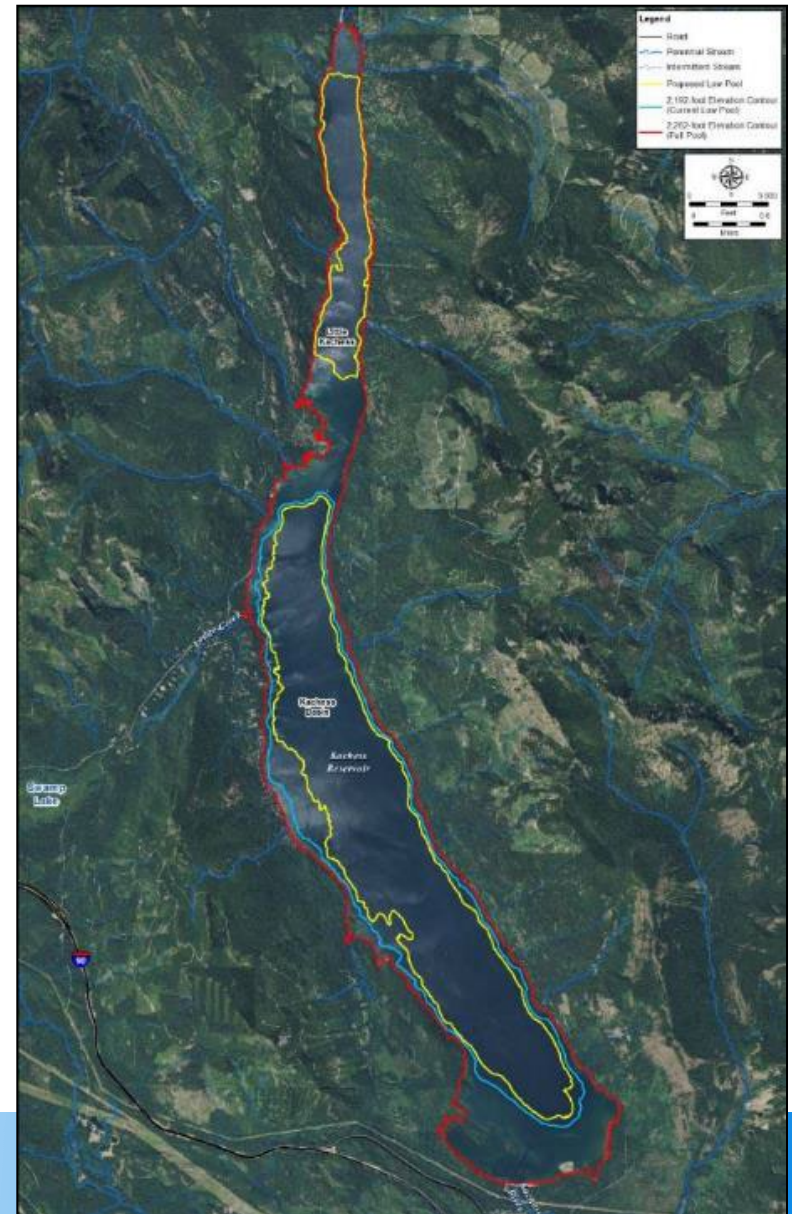
# Kachess Drought Relief Pumping Plant

## Floating Pumping Plant Option



# Kachess Drought Relief Pumping Plant

- **Water Supply:** Up to 200,000 acre-feet in a drought year
- **Drawdown:** Up to 80 feet
- **Surface Area:**
- Up to 20% less surface area than existing minimum pool



# Icicle Creek Subbasin



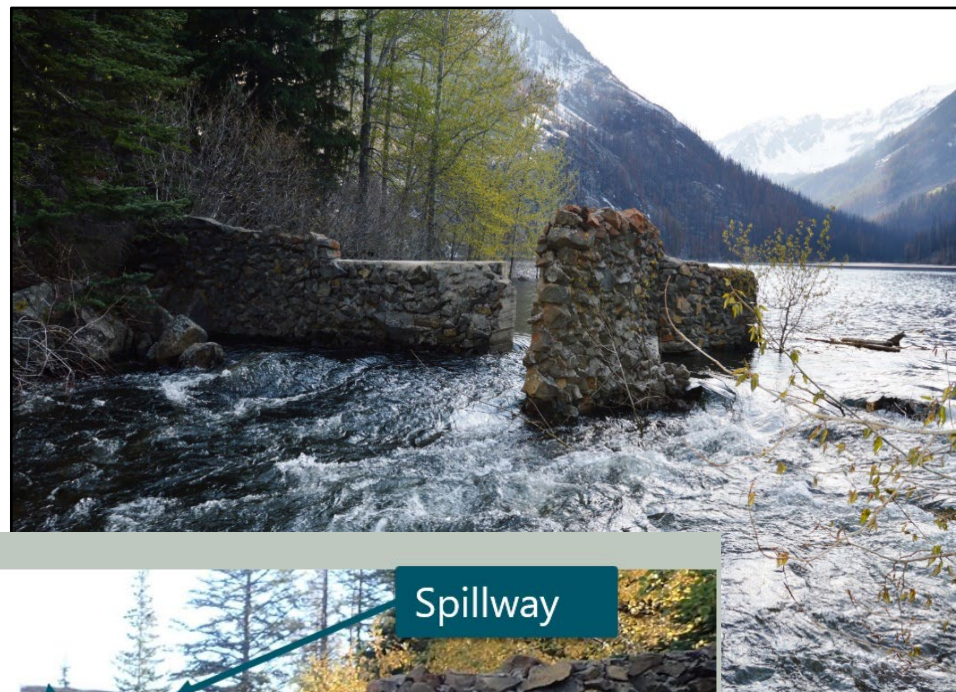
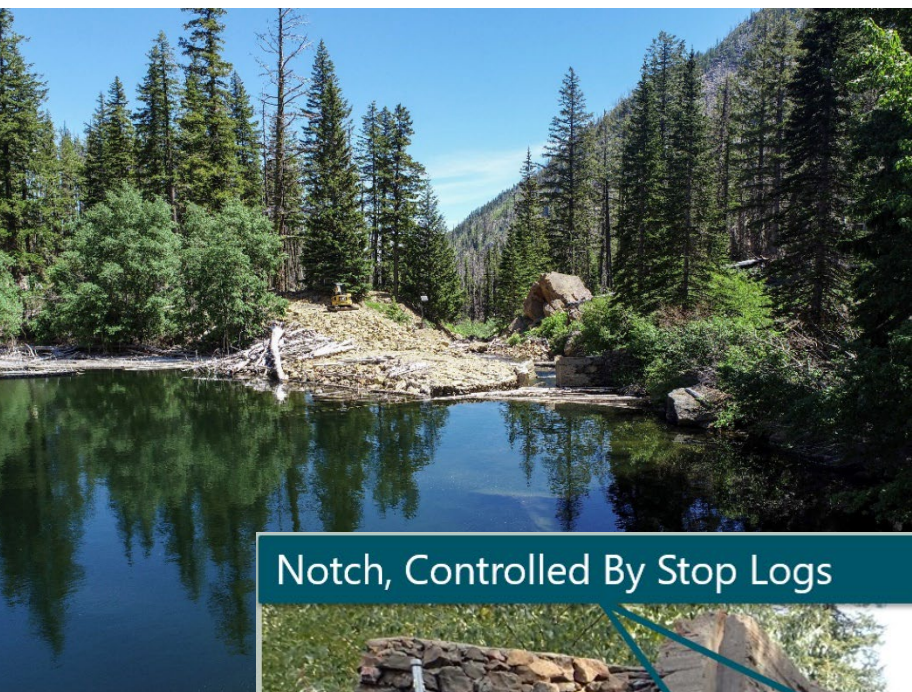
# Icicle Creek Water Resource Management Strategy



# What does flow in Icicle Creek look like?







Notch, Controlled By Stop Logs

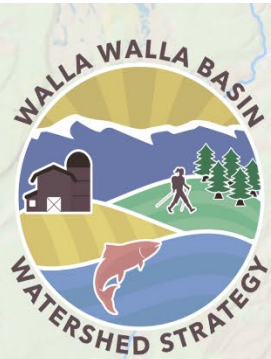
Spillway



Current High Water Surface Elevation ~ 4,667 Feet

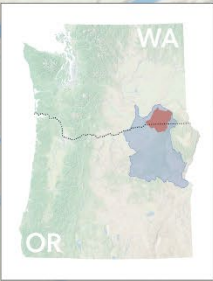
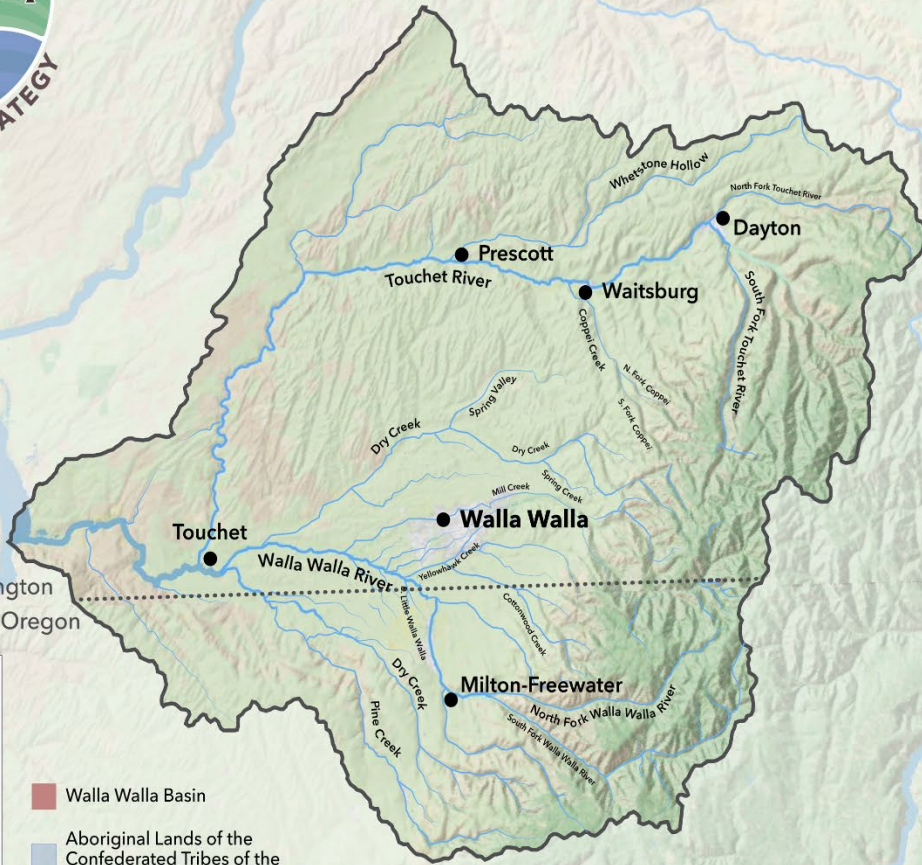
Historical High Water Surface Elevation ~ 4,671 Feet





# WALLA WALLA BASIN WATERSHED STRATEGY

## 2020-2050



■ Walla Walla Basin  
 ■ Aboriginal Lands of the Confederated Tribes of the Umatilla Reservation

### Near-Term Priority Strategies

#### FLOODPLAINS AND HABITAT

- Reconnect floodplain and restore channel complexity
- Improve fish passage in Mill Creek
- Protect and improve fish passage at Nursery Bridge on the WW river
- Improve flow and timing of fish passage through Hofer Dam on the Touchet

#### MONITORING AND METERING

- Develop an overarching monitoring strategy and adaptive management plan
- Expand and fund streamflow gages
- Improve water use metering and reporting

#### WATER POLICY

- Improve drought management
- Increase coordination of regulation and management
- Additional Bi-State coordination on water management

#### STREAMFLOW, GROUNDWATER AND WATER SUPPLY

- Ongoing analyses of the Bi-State Flow Study toward a preferred alternative
- Substitute for basalt wells during low flow periods
- Water rights acquisitions to restore streamflows
- Improve and expand managed aquifer recharge
- Expand and support aquifer storage and recovery

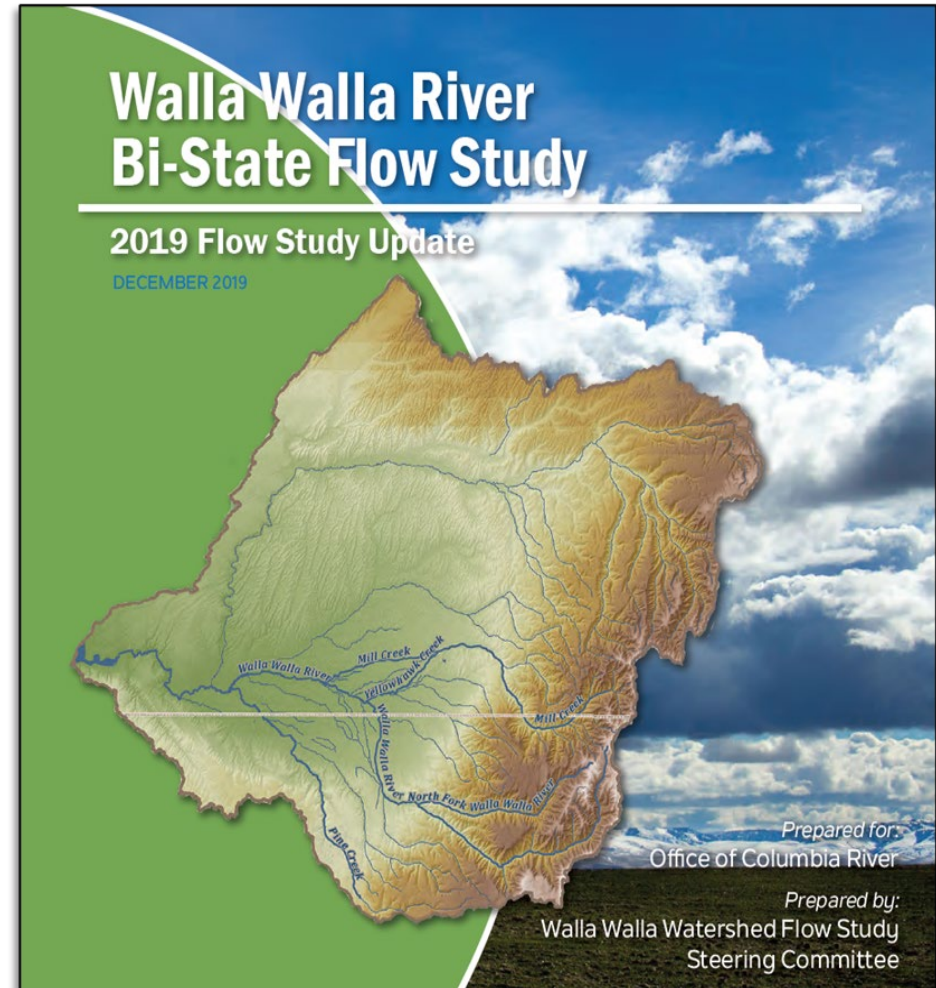
#### WATER QUALITY

- Increase infiltration of stormwater
- Upgrade Dayton wastewater treatment plant
- Implement conservation tillage and soil erosion Best Management Practices

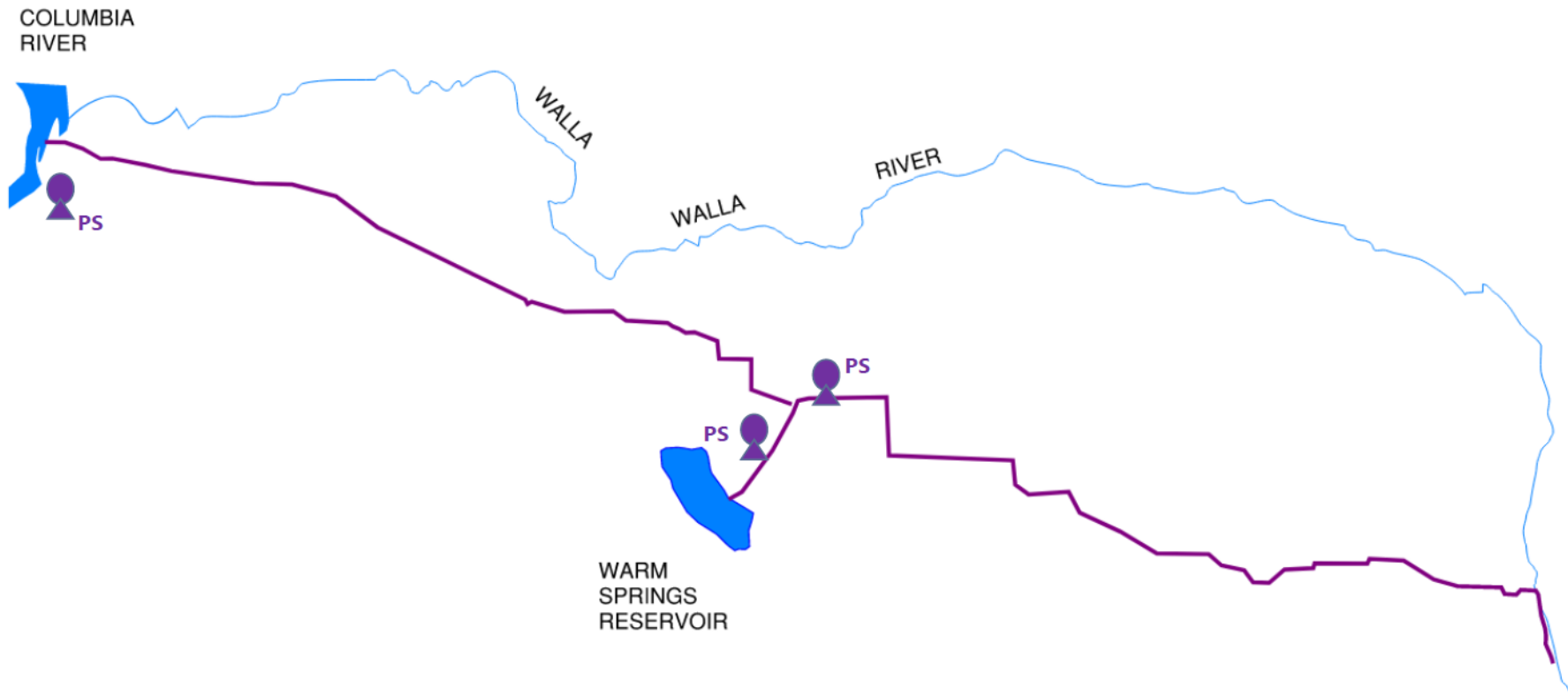


# Moving Forward in WWS

- Bi-State Flow Study
  - Evaluating water supply projects
  - Primary focus on restoring flow in the Walla Walla River
- Strategic Project Implementation
  - 23 Tier 1 strategies
- Water User Objectives
  - Work with irrigators and other water users to identify opportunities

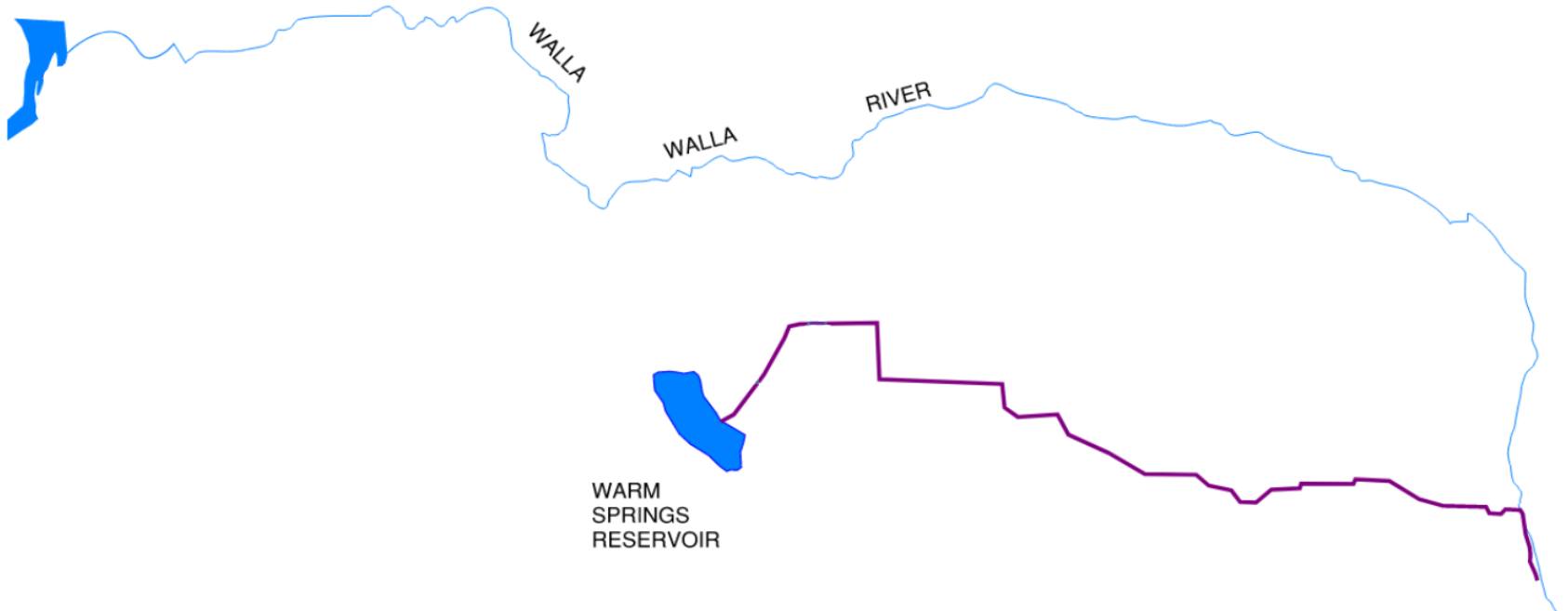


# WW – Columbia River Pump Exchange



# WW – Warm Springs Reservoir

COLUMBIA  
RIVER



# Aquifer Storage and Recovery

- Cities of ....
  - White Salmon
  - Kennewick
  - Yakima
  - Othello
  - West Richland
  - Quincy
  - Moses Lake



- Source Water Supply
- Appropriate Geology to Hold Water
- Water Quality
- Economical Infrastructure
- Enabling Permitting Environment



# Next Steps

Improved Forecasting



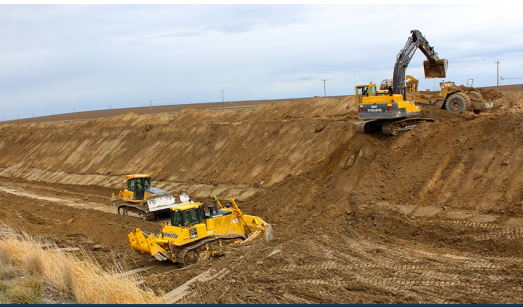
Integrate Modeling



Retiming



Infrastructure



Building Partnerships



Multi-Use Solutions





# Questions or Discussion ?

**Melissa Downes**

[Melissa.Downes@ecy.wa.gov](mailto:Melissa.Downes@ecy.wa.gov)

(509) 454-4259

