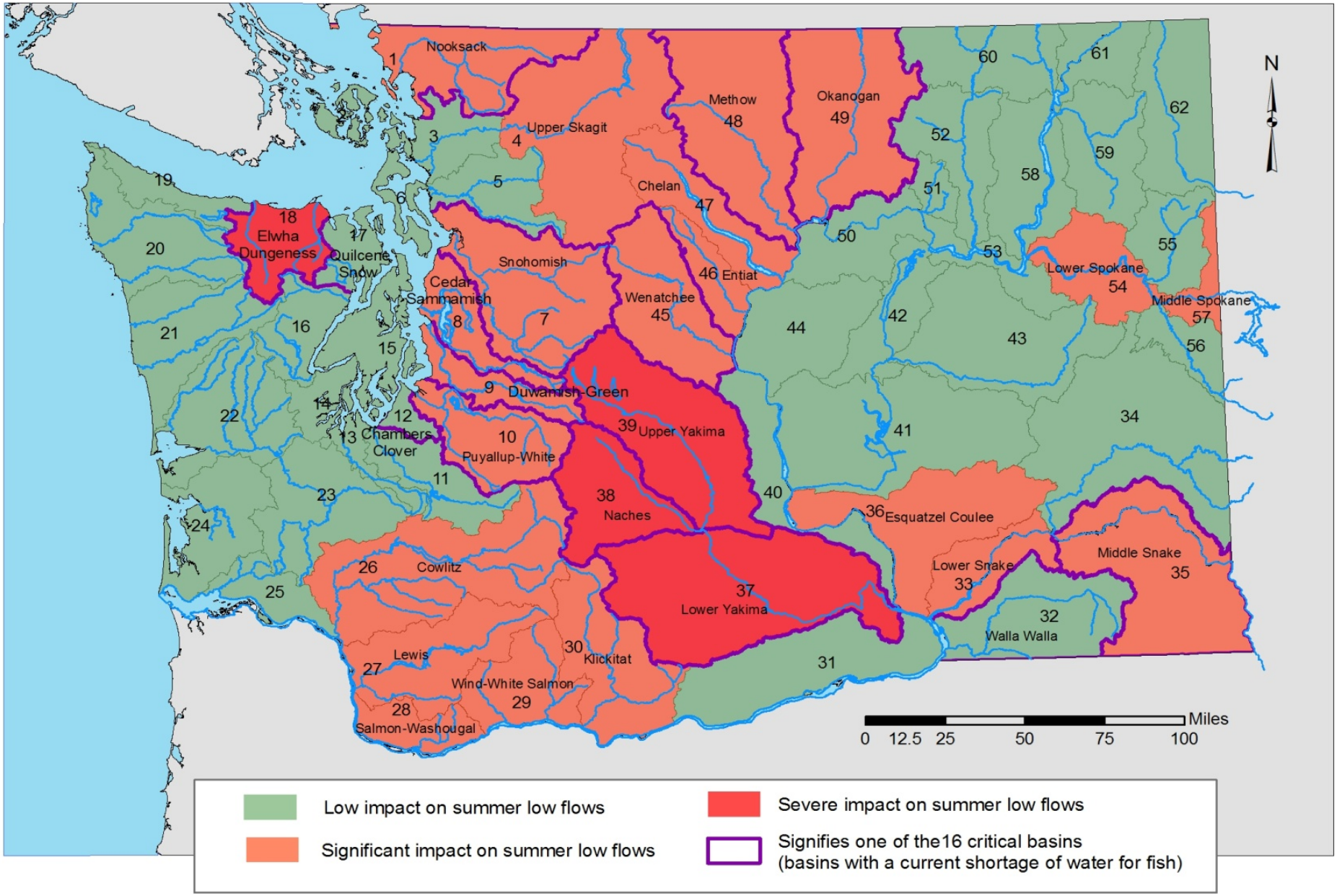
Drought Response in the Yakima Basin, WA

Kelsey Collins

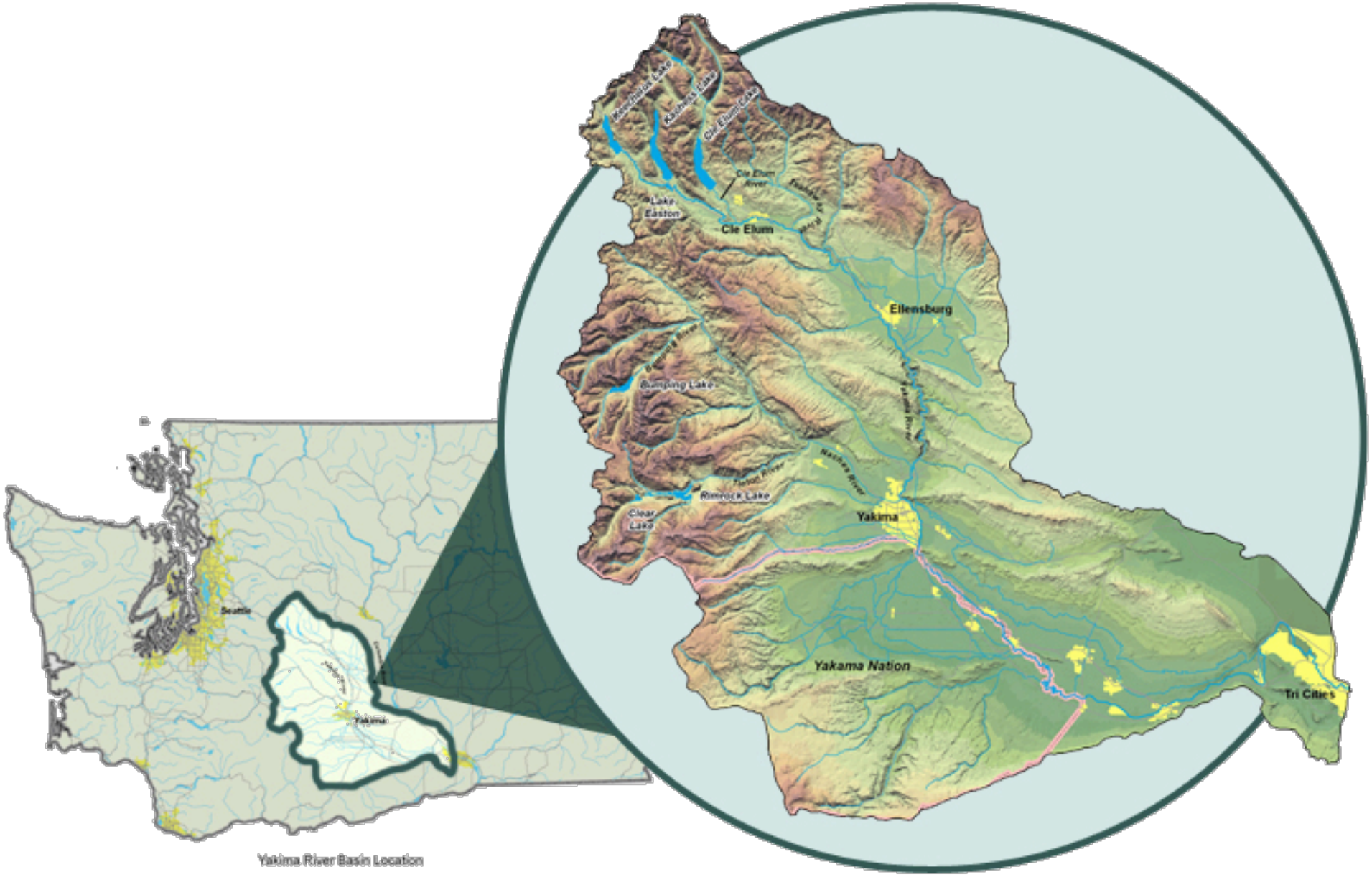
Statewide Trust Water Coordinator/Water Acquisitions

DEPARTMENT OF ECOLOGY
State of Washington

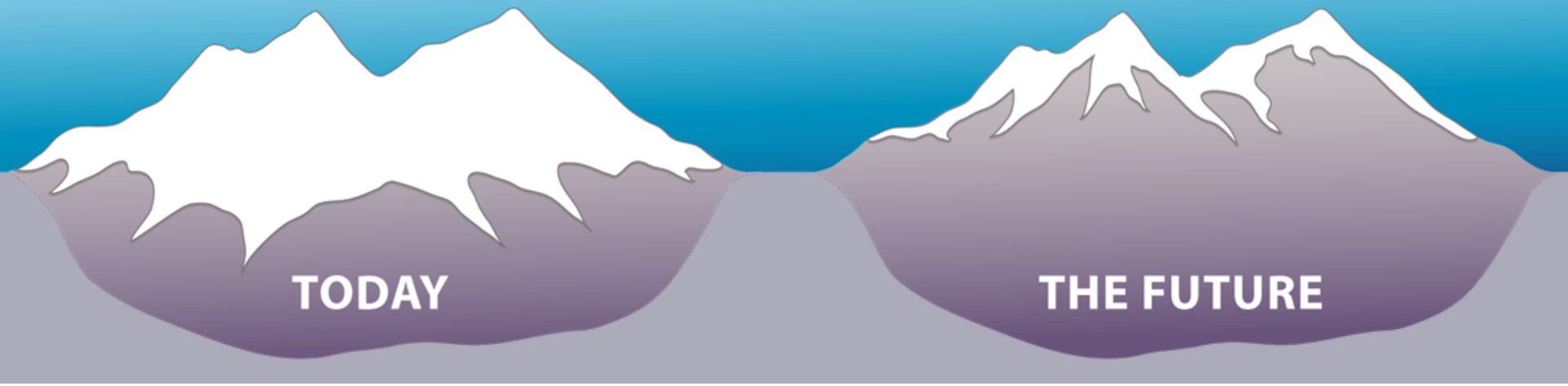
2040 Projected Climate Change Impact on Summer Flows by WRIA



Yakima Basin



CASCADE SNOWPACK – THE "SIXTH RESERVOIR"



Senior Water Rights

Pre-1905 priority date: receives full water right

Proratable Water Rights

1905 priority date: receives ~ 1/3 to full water right depending on supply

Junior Water Rights

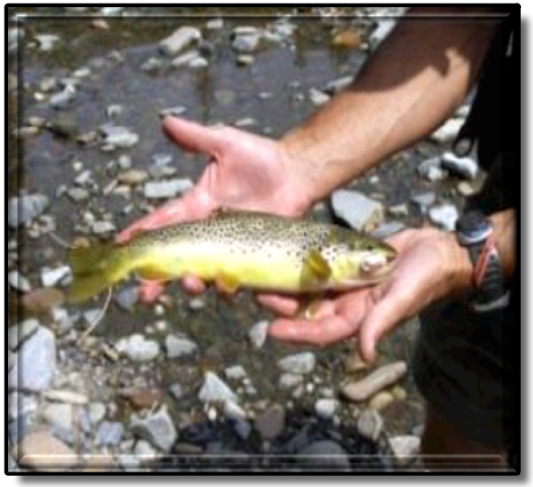
Post-1905 priority date: receives no water once rationing occurs

No Water Rights

Surface water use without a water right is unlawful

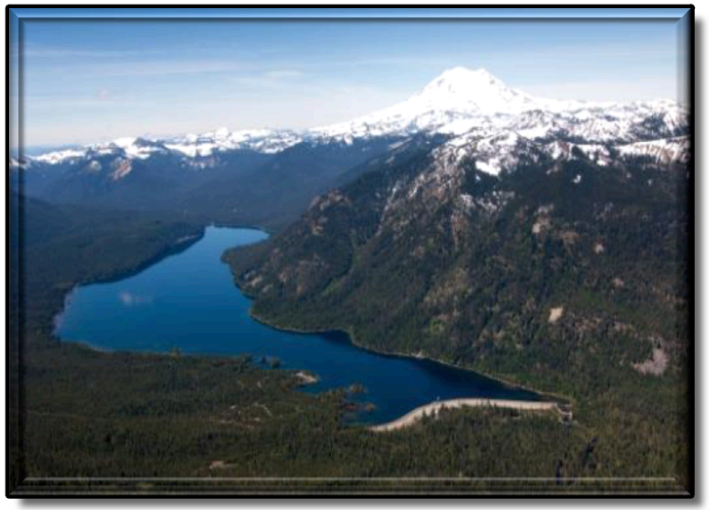
Drought Relief Efforts

- Reverse Auction: flows for fish
- Spill agreements with irrigation districts
- Emergency well permitting
- Acquisitions for flows and mitigation



Long Range Planning

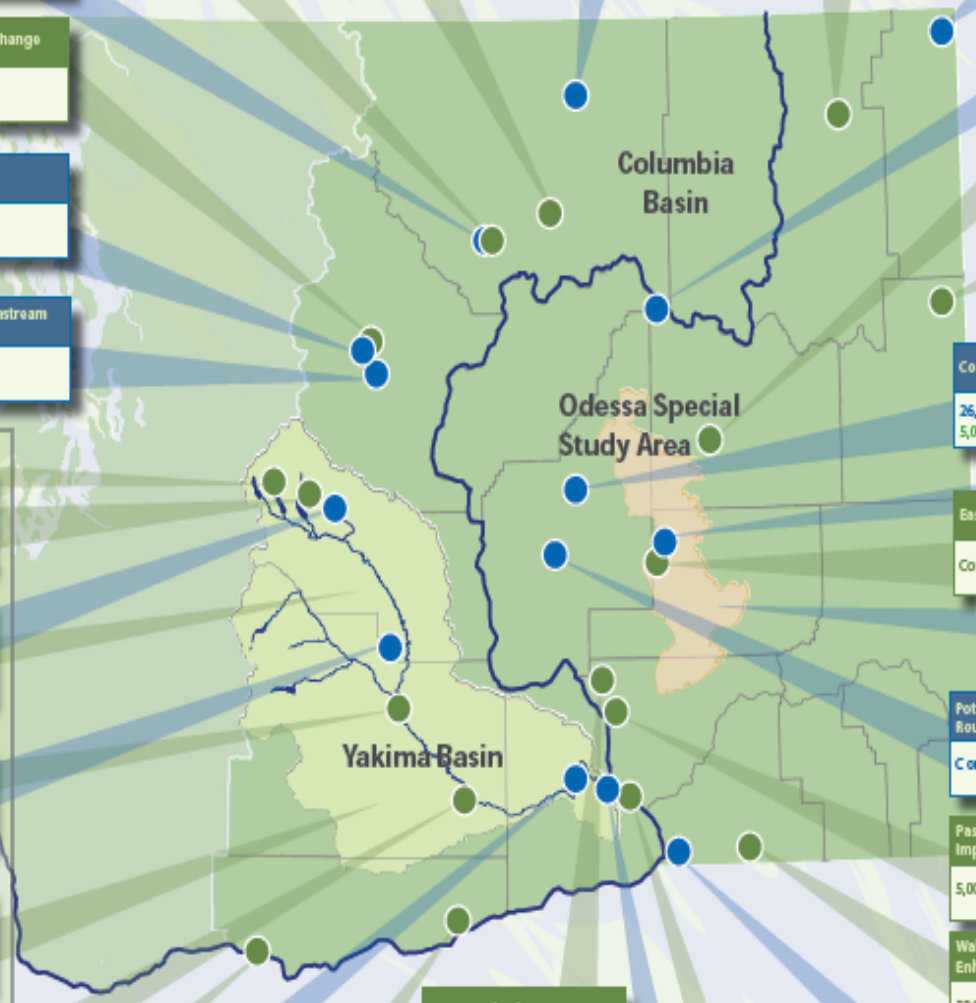
- Office of Columbia River Supply Development
- Yakima Integrated Plan
- Water Acquisition Program



OCR Water Projects 2014

- Completed, Developed
- Active, Under Development

Locations are approximate



Methow Trust Water Acquisition
52 ac-ft Out-of-Stream

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 Supply
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

Pashastin Pump Exchange
Ac-Ft TBD

Pashastin ID Piping
360 ac-ft Instream

Lower Wenatchee Instream Flow Enhancement
1,493 ac-ft Instream

Lincoln CD Passive Rehydration
Ac-Ft TBD

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

Columbia Basin ID Piping
26,000 ac-ft Out-of-Stream
5,000 ac-ft Out-of-Stream

Weber Siphon
Conveyance

East Low Canal Widening
Conveyance

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

Potholes Supplemental Feed Route
Conveyance

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

Walla Walla Flow Enhancement
30,000 ac-ft Instream

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

508.14 Rule Change
Ac-Ft TBD

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

Cle Elum Pool Raise
14,000 ac-ft Out-of-Stream

Basin-Wide Habitat Enhancement & Restoration
8 Obstructions Removed
83+ Miles of River Improved
1,174+ Acres Encompassed

Teanaway Acquisition
50,272 acres of Watershed Protected

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

Manastash Conservation and Tributary Enhancement
1,300 ac-ft Instream

Other Yakima Basin Integrated Plan Projects
226,000 ac-ft Instream & Out-of-Stream (Basin-Wide)

Yakima Basin Integrated Plan

Sunnyside Valley ID
7,815 ac-ft Instream

White Salmon ASR
145 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 ASR
3184+ ac-ft Instream

Region-Wide Projects

Conservation Commission Irrigation E ciency
Ac-Ft TBD

Conservation Commission Retiming
Ac-Ft TBD

Regional Aquifer Storage and Recover
Ac-Ft TBD

Donations
13,060 ac-ft ac-ft Instream

The Office of Columbia River
Department of Ecology
State of Washington
Water for Families, Farms, and Fish

Yakima Integrated Plan

- Secure 70% supply for proratables
- Improvements for fish
  - Fish passage at reservoirs
  - Improvements to existing structures and operations
  - Habitat/watershed enhancement
  - Surface storage
  - Groundwater storage
  - Market-based reallocation
  - Water conservation

Thank You

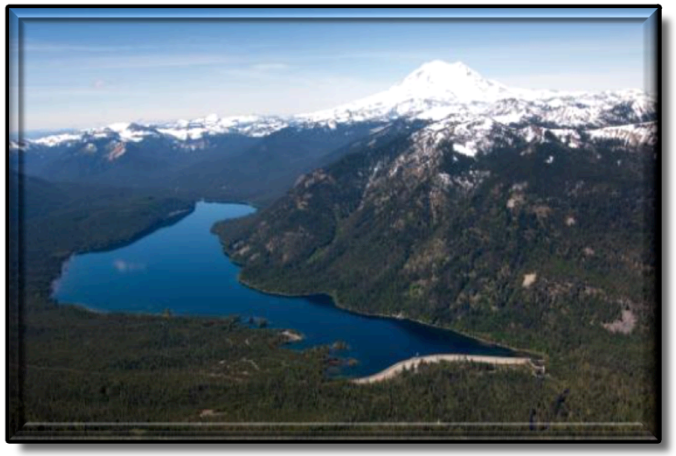
Kelsey Collins: 509-575-2640 kesi461@ecy.wa.gov

Water Supply

- No “new” water
- The challenge:
  - Retime and relocate

Current Water Supply Conditions

- Record low snowpack
- Below normal spring precipitation
- Record high temperatures



Yakima Basin Project

- First in time, first in right
- Federal Government 1905 withdrawal

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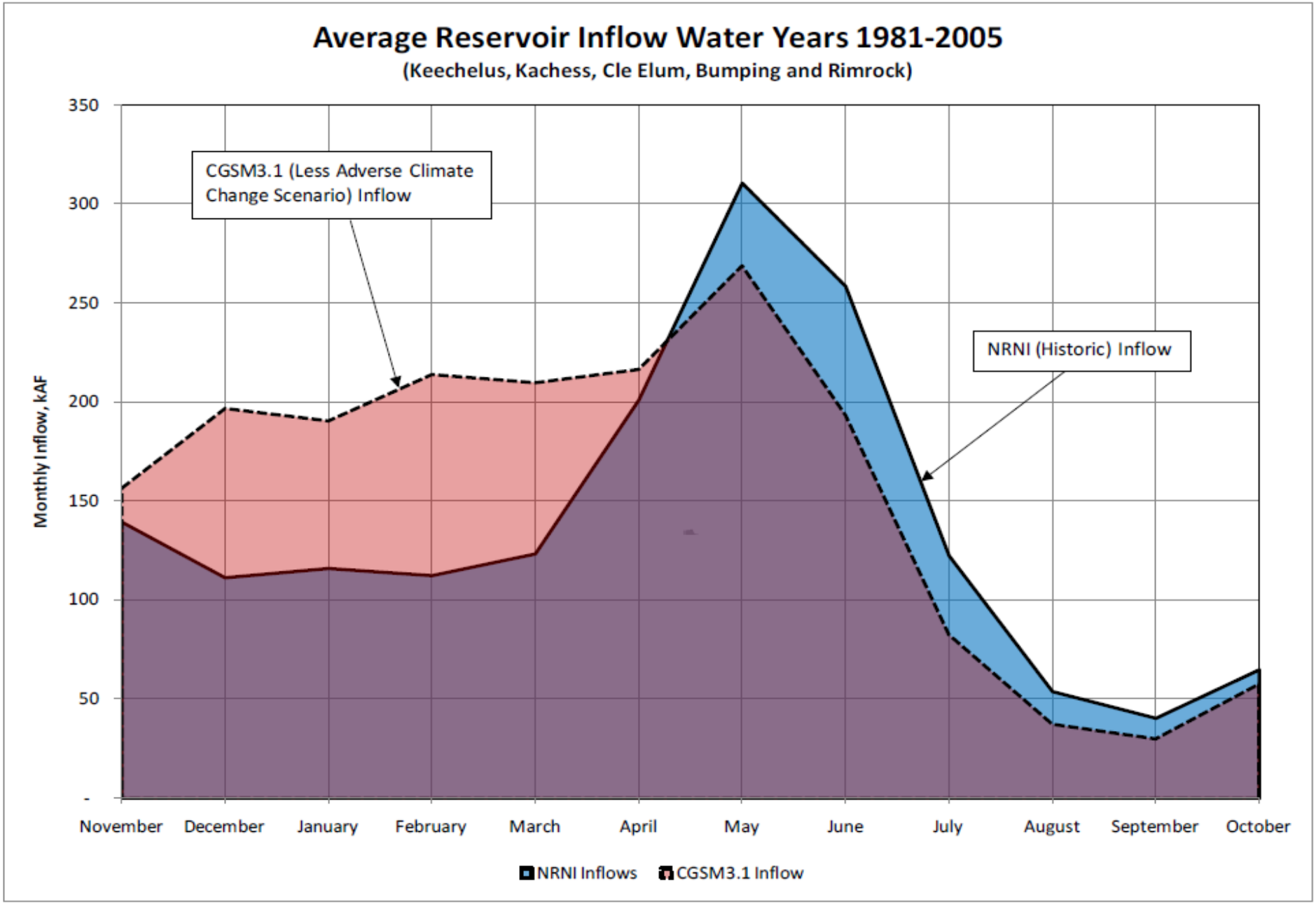


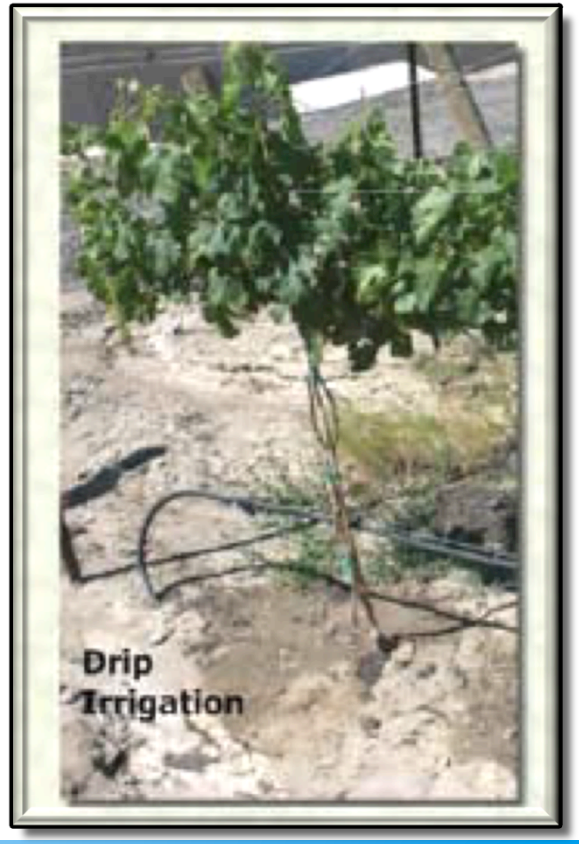
Figure 1. Comparison of Average Monthly Reservoir Inflows between Historically Based (NRNI) and Less Adverse scenario (Source: Reclamation and Ecology 2011b)

Drought Relief Efforts

- Emergency Well Pumping
  - Agreement with stakeholders
  - 50% cost share

Drought Relief for Farmers

- Fewer requests than in the past drought years:
  - Crop conversions
  - Well pumping costs
  - 50% Cost share



Relief for Fish in Yakima

- Critically low flows in tributaries
  - Summer fish habitat
  - Small catchments without snowpack
  - Rights for all creek water

Drought Relief for Fish

- Yakima Basin Reverse Auction
- Single and multi-year leases
- Agreements with irrigation districts

Drought Relief for Fish

– "It wasn't happening 20 years ago because we were all in court," (Urban Eberhart, KRD Manager, Yakima Herald Republic June 4, 2015)

Ecology's Long Range Planning

- Office of Columbia River
- Yakima Integrated Plan
- Water Acquisition

Office of Columbia River

- ***Mission Statement***
  - *Aggressively pursuing development of water supplies to benefit instream and out-of-stream uses.*

Market Reallocation

- Acquiring water rights for instream and out of stream purposes.
  - Value of water
    - Seniority of the right
    - Location, Location, Location

Summary

- 2015: Water for fish and farmers
- Long term efforts to retime and relocate our water

Yakima Integrated Plan

- 30 Years…$3 Billion
- Requirements
  - Funding requests
  - Project-specific environmental review
  - Public meetings
  - Website resources
  - Results back to Legislature

Reallocation

- Taking water where and when it's there to where and when you need it.

Trust Water Rights Program

- The toolbox provided by the Legislature:
  - RCW 90.38 (Yakima Basin 1989)
  - RCW 90.42 (statewide 1991)
    - Ecology acquires and holds water rights in trust through donations, leases, purchases, and other means

Project Development

Target

FINANCIAL CONSIDERATIONS

- Profitability
- Ecology's time and resources

PUBLIC BENEFIT

- Instream flow
- Mitigate new uses

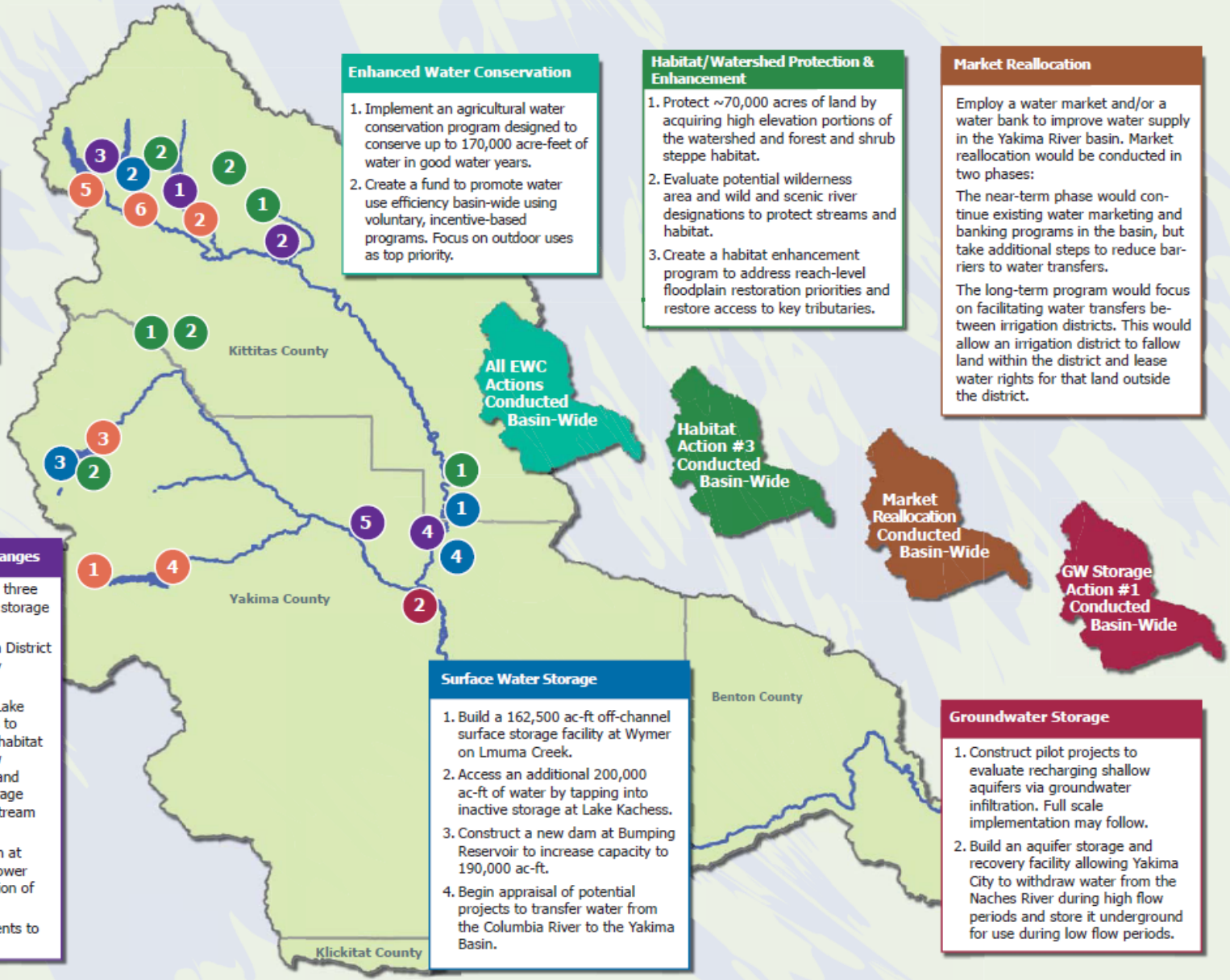
OPPORTUNITIES

- Partnerships
- Seller's goals for water right/land

Donations
(for instream and groundwater preservation)

Building A Future for Water, Wildlife and Working Lands

Yakima River Basin Integrated Water Resource Management Plan



Reservoir Fish Passage

Provide fish passage at:

1. Clear Lake
2. Cle Elum
3. Bumping
4. Tieton (Rimrock)
5. Keechelus
6. Kachess

Enhanced Water Conservation

1. Implement an agricultural water conservation program designed to conserve up to 170,000 acre-feet of water in good water years.
2. Create a fund to promote water use efficiency basin-wide using voluntary, incentive-based programs. Focus on outdoor uses as top priority.

Habitat/Watershed Protection & Enhancement

1. Protect ~70,000 acres of land by acquiring high elevation portions of the watershed and forest and shrub steppe habitat.
2. Evaluate potential wilderness area and wild and scenic river designations to protect streams and habitat.
3. Create a habitat enhancement program to address reach-level floodplain restoration priorities and restore access to key tributaries.

Market Reallocation

Employ a water market and/or a water bank to improve water supply in the Yakima River basin. Market reallocation would be conducted in two phases:

The near-term phase would continue existing water marketing and banking programs in the basin, but take additional steps to reduce barriers to water transfers.

The long-term program would focus on facilitating water transfers between irrigation districts. This would allow an irrigation district to fallow land within the district and lease water rights for that land outside the district.

Structural & Operational Changes

1. Raise the Cle Elum Pool by three feet to add 14,600 ac-ft in storage capacity.
2. Modify Kittitas Reclamation District canals to provide efficiency savings.
3. Construct a pipeline from Lake Keechelus to Lake Kachess to reduce flows and improve habitat conditions during high flow releases below Keechelus and to provide more water storage in Lake Kachess for downstream needs.
4. Decrease power generation at Roza Dam and Chandler power plant to support outmigration of juvenile fish.
5. Make efficiency improvements to the Wapatox Canal.

Surface Water Storage

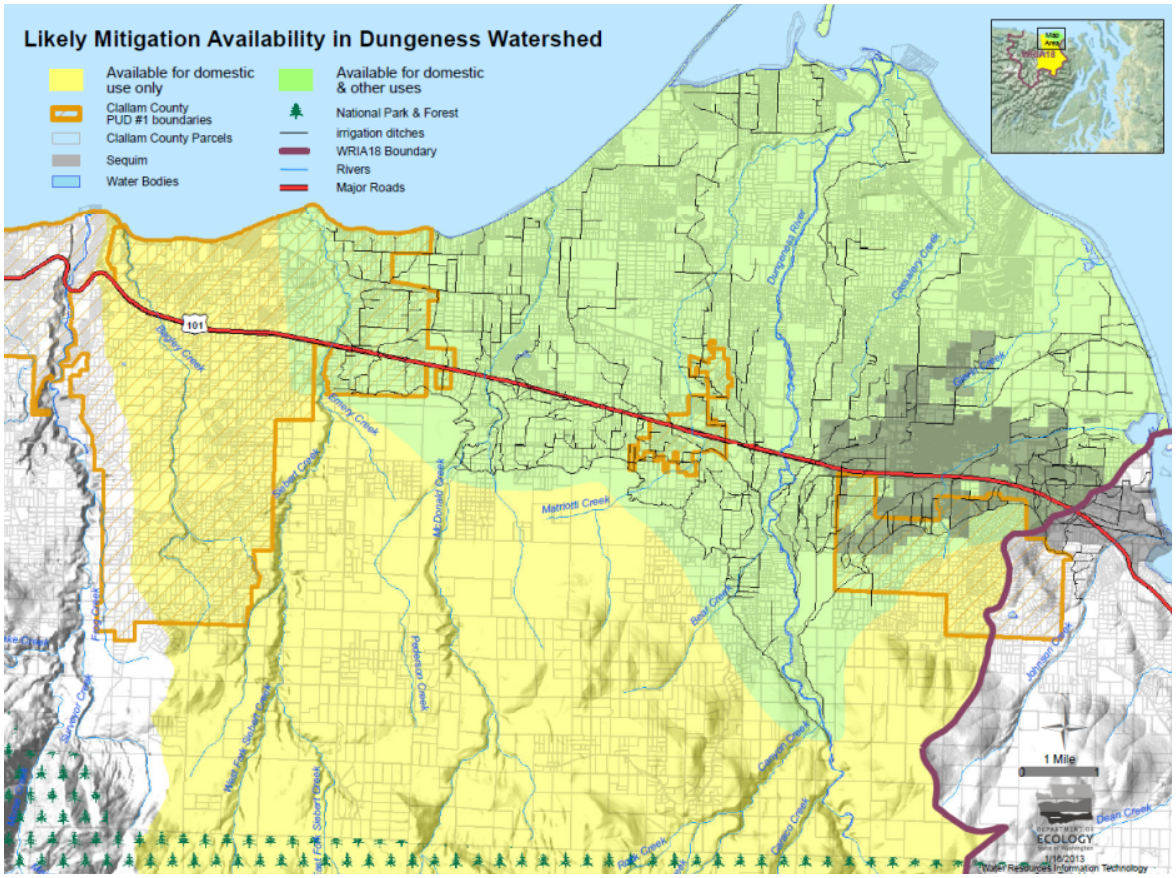
1. Build a 162,500 ac-ft off-channel surface storage facility at Wymer on Lmuma Creek.
2. Access an additional 200,000 ac-ft of water by tapping into inactive storage at Lake Kachess.
3. Construct a new dam at Bumping Reservoir to increase capacity to 190,000 ac-ft.
4. Begin appraisal of potential projects to transfer water from the Columbia River to the Yakima Basin.

Groundwater Storage

1. Construct pilot projects to evaluate recharging shallow aquifers via groundwater infiltration. Full scale implementation may follow.
2. Build an aquifer storage and recovery facility allowing Yakima City to withdraw water from the Naches River during high flow periods and store it underground for use during low flow periods.

Dungeness: Drought Relief for Fish

- 13 leases
- 1000 acres fallowed
- Spent 130K



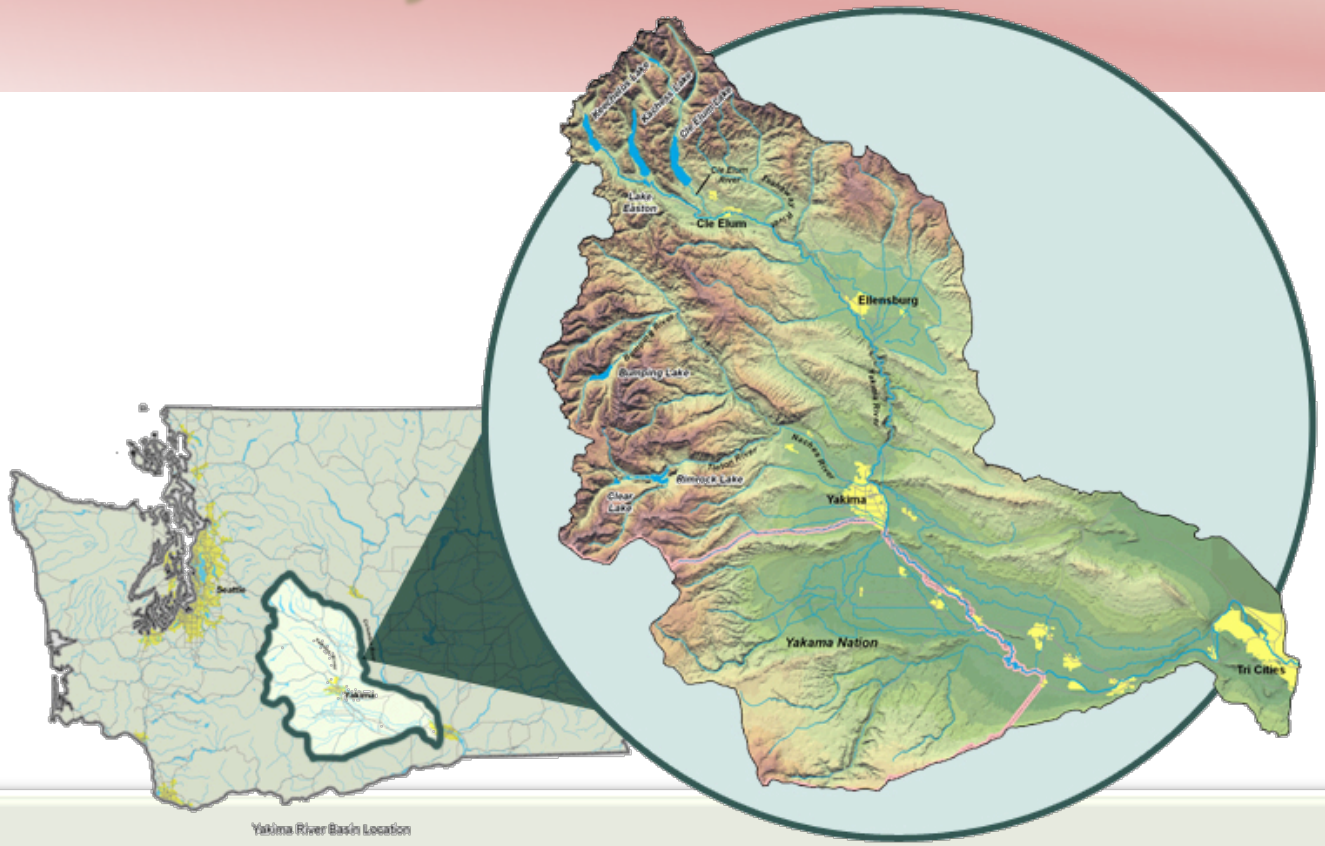
Lake Roosevelt Forum Conference 2013

Climate Change as a Variable to Natural Resource Management

November 19, 2013

Presented by
Derek Sandison, Director
Office of Columbia River
Washington State Department of Ecology

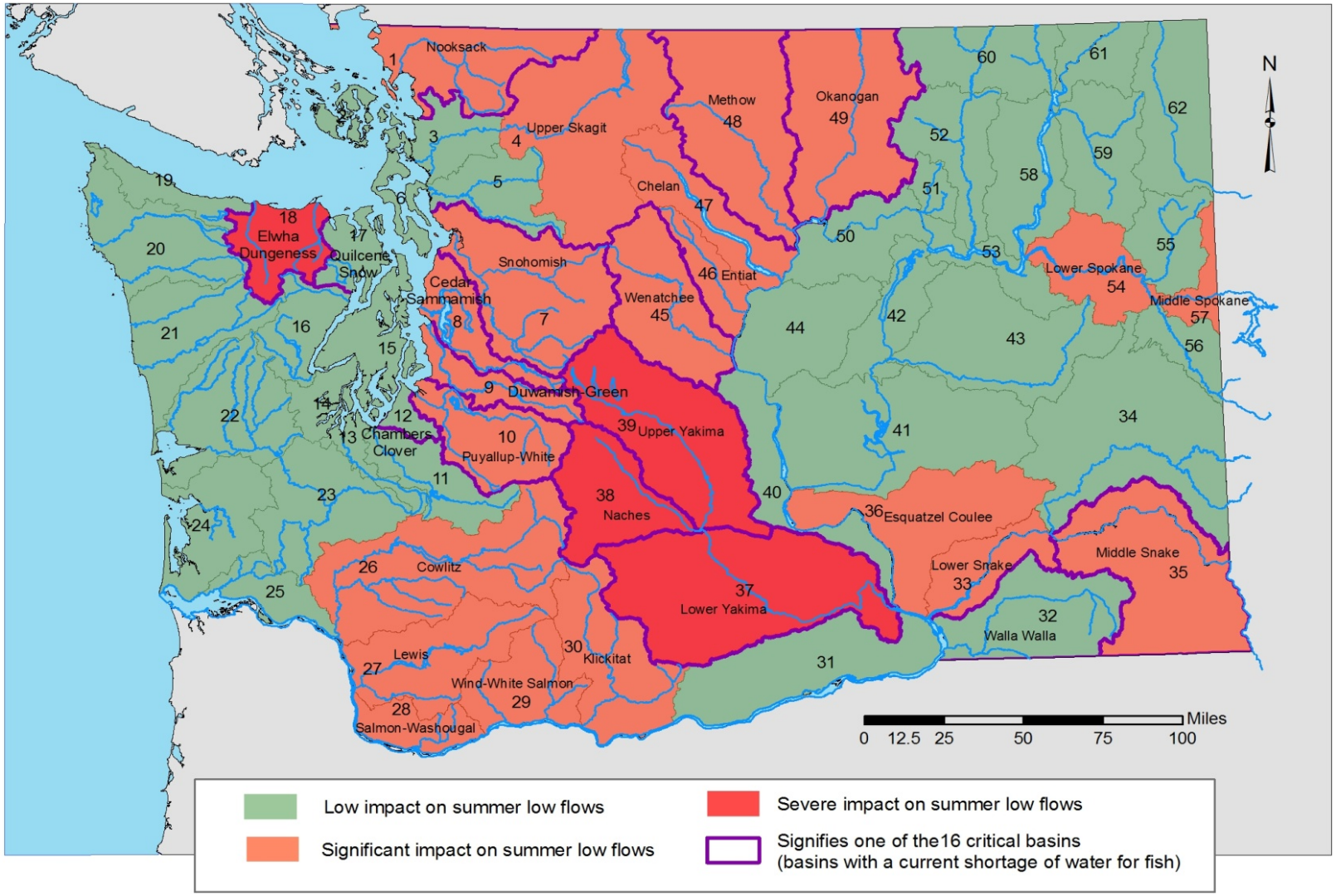
Case Study - Yakima River Basin



- 6,000 Square mile drainage basin
- East slopes Cascade Range
- Heavily developed for irrigated agriculture
- Historically, major salmon and steelhead producer
- Snowpack dependent

Climate Change Forecast

2040 Projected Climate Change Impact on Summer Flows by WRIA



Yakima River Basin Integrated Plan

- Partnership between Bureau of Reclamation and Washington State Department of Ecology
- Developed in collaboration with Yakama Nation and basin stakeholders
- Planning began in 2008 completed in 2012
- Plan Elements:
  - Habitat restoration and ecosystem improvements
  - Instream flow augmentation
  - Development of additional out—of-stream water supplies for municipalities, domestic users, and existing agricultural users

Yakima Selected by Reclamation for First Basin Study

Federal Secure Water Act (SWA) requires coordination between Reclamation, USGS, NOAA, and state water resource agencies to develop best available scientific information concerning potential impacts of global climate change on water resources

SWA requires assessment of risks associated with:

- **Changes in timing and quantity of runoff,**
- **Changes in snowpack,**
- **Changes in groundwater recharge and discharge, and**
- **Increases in the demand for water as a result of increasing temperatures and the rate of reservoir evaporation**

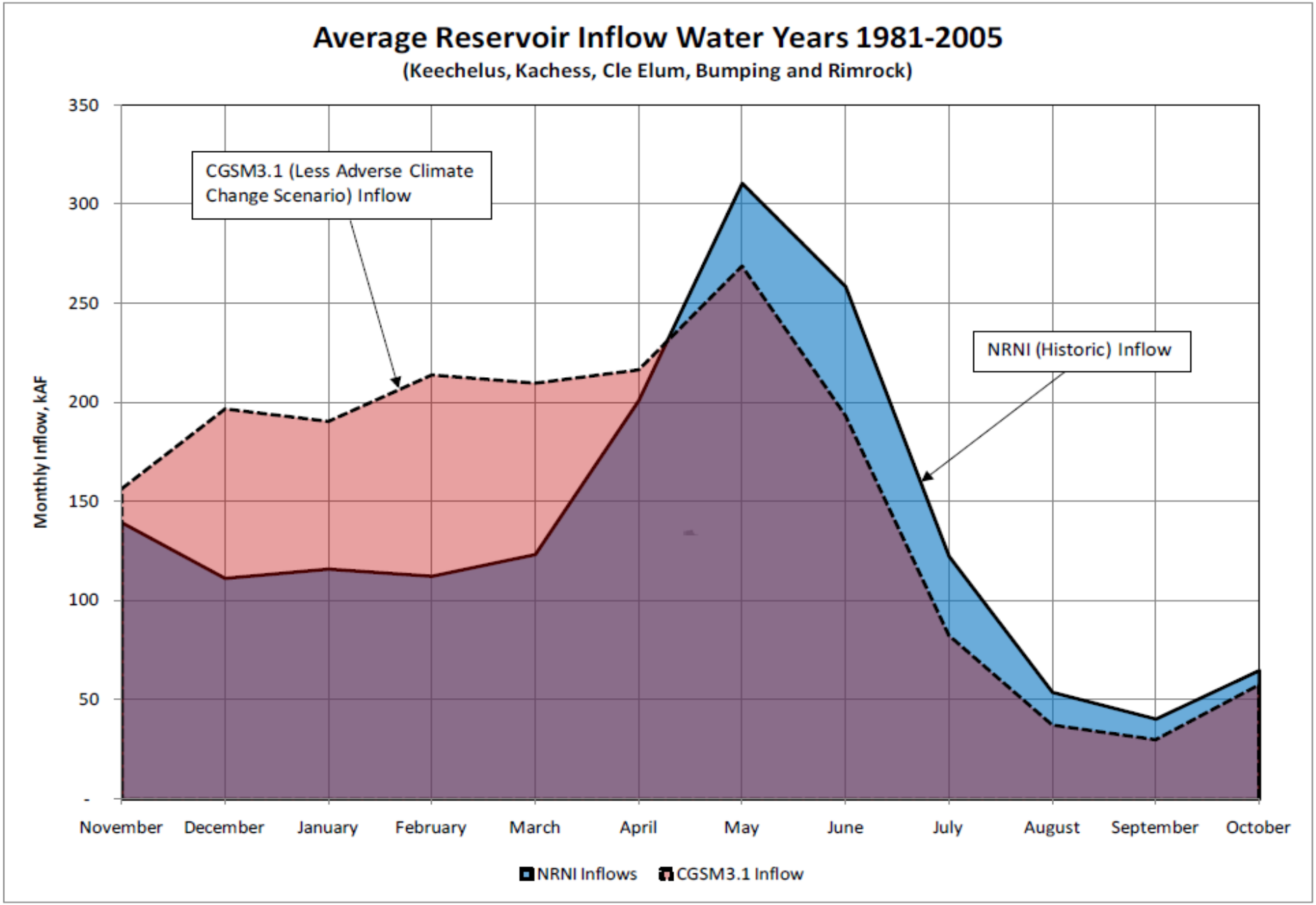
Mid-Century Climate Scenarios Modeled Using Yakima Riverware

SCENARIO	CLIMATE MODEL USED	AVERAGE TEMP. CHANGE	AVERAGE PRECIP. CHANGE	AVERAGE ANNUAL RESERVOIR INFLOW (acre-feet)
Historical record	n/a	0	0	1.66 M
Less Adverse*	CGCM3.1	1.8°C Average Increase	13.4% increase	1.86 M (+0.2 M)
Moderately* Adverse	HADCM	1.7°C Average Increase	3.7% increase	1.48 M (-0.18 M)
More Adverse*	HADGEM1	2.8°C Average Increase	2.5% decrease	1.38 M (-0.28 M)

*Data sets derived from climate modeling conducted by the U of W Climate Impacts Group (CIG) for the federal River Management Joint Operating Committee (RMJOC)

Projected Mid-Century Inflow Into 5 Existing Yakima Basin Reservoirs in Thousands of Acre-Feet

SCENARIO	FALL (OCTOBER-DECEMBER)	WINTER (JANUARY-MARCH)	SPRING (APRIL-JUNE)	SUMMER (JULY-SEPTEMBER)
Historical record	316	353	771	217
Less Adverse	412 (+30.4%)	615 (+74.2%)	679 (-11.9%)	151 (-30.4%)
Moderately Adverse	328 (+3.8%)	369 (+4.5%)	675 (-12.5%)	108 (-50.2%)
More Adverse	330 (+4.4%)	544 (+54.1%)	440 (-42.9%)	64 (-70.5%)



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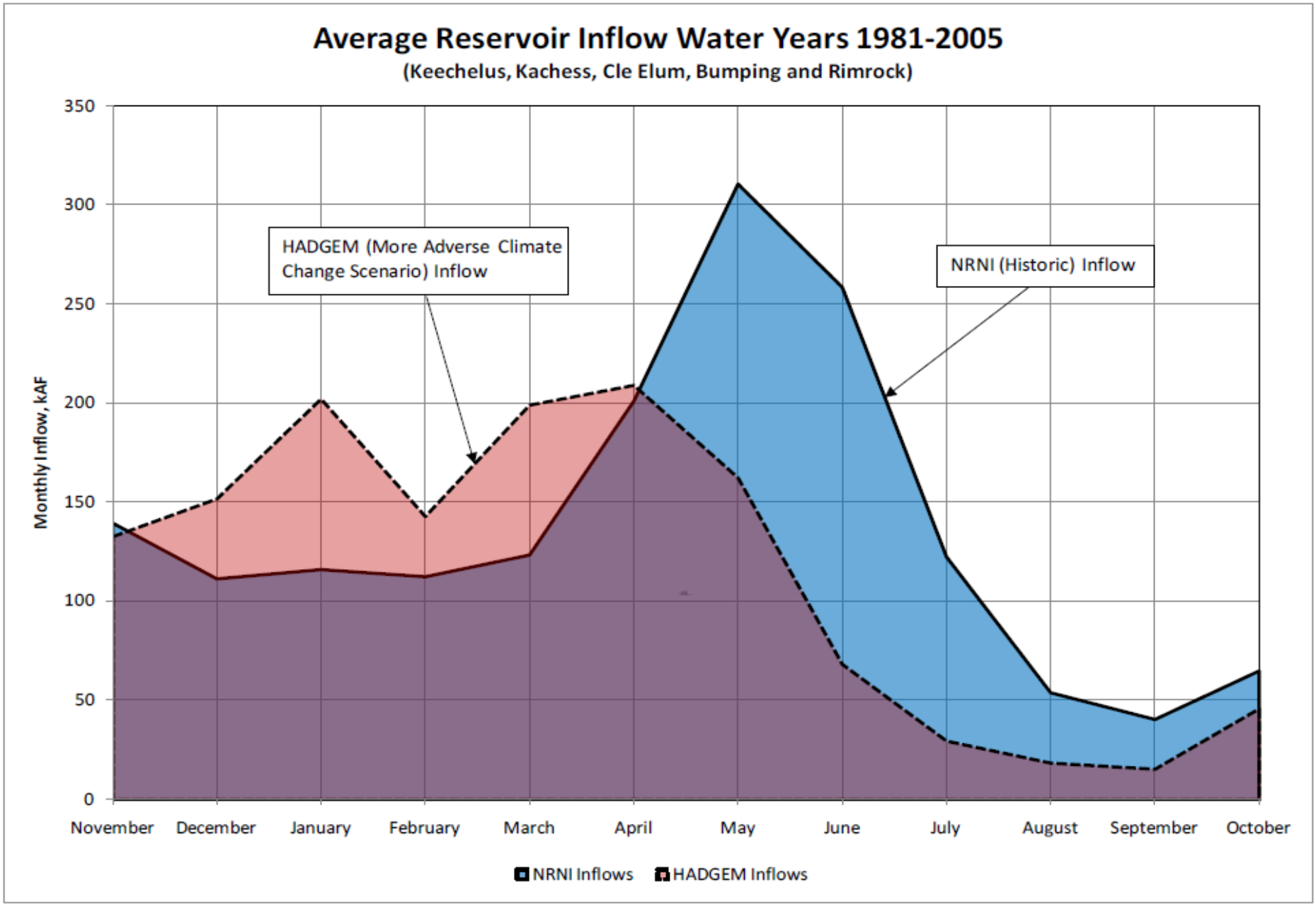


Figure 3. Comparison of Average Monthly Reservoir Inflows between Historically Based (NRNI) and More Adverse scenario (Source: Reclamation and Ecology 2011b)

Additional Mid-Century Climate Change Considerations

- 2°C increase in average temperature would result in a 27% decrease in snowmelt volume
- Groundwater recharge would be reduced as a result of increased evapotranspiration and reduced conveyance losses from agricultural infrastructure
- Crop irrigation requirements could increase 3% to 5% (up to 53,000 acre-foot increase)
- Anticipated reservoir evaporation increases 5.6% to 8.9%.

Adaptation to Climate Change with Integrated Plan

- **Adverse climate change impacts greatly reduced with Integrated Plan**
- **Annual water supply 150,000 to 180,000 acre-feet greater wit the Plan than without, under anticipated mid-century conditions**
- **Under severe drought conditions, water supply 500,000 acre-feet greater with the Plan than without, under anticipated mid-century conditions**

Integrated Plan Flow Improvement for Salmon Recovery

- In all years:
  - Additional 56,000 acre-feet to improve spawning and rearing conditions
  - 10-30,000 acre-feet to aid outmigrating fish
- In drought years:
  - Additional 87,000 acre-feet to improve spawning and rearing conditions
  - 52,000 acre-feet to aid outmigrating fish
- Benefits Yakima, Tieton and Cle Elum rivers, tributaries

Questions?

- **Ecology's Website**
  www.ecy.wa.gov/programs/wr/cwp/cr_yak_storage.html

- **Reclamation's Website**
  www.usbr.gov/pn/programs/yrbwep/2011integratedplan/index.html

- **Yakima Basin Conservation Campaign**
  www.yakimaforever.org

Ecology's Yakima Basin Drought Response - 2015

Tom Loranger
Program Manager, Water Resources Program

DEPARTMENT OF
ECOLOGY
State of Washington

Peace in the valley despite water shortage?

IMPOSSIBLE

Response Framework

- Water management: Collaborate or fight? USBR, Yakama Nation, and Ecology can only afford to do one
- Agreement among US Bureau of Reclamation, Yakima Nation, and Ecology
- Same spirit as agreements in 2001 and 2005 severe droughts; details vary because *this drought is different.*

2015 Yakima Basin – Drought Response Strategy

- Upper Kittitas Tributary Flow Augmentation
- Cowiche Creek flow augmentation
- Yakima tributary reverse auction
- Sunnyside Division transfers to Roza Irrigation District
  - Lease and crop fallowing program
  - Return flow capture program
- Roza, KRD, and KID emergency groundwater pumping

KRD Tributary Augmentation

April 2015 agreement provides Ecology will reimburse KRD for water it conveys and delivers to each of 5 upper Kittitas tributary stream it crosses. The water being carried is provided by USBR.

Creek	Flow addition, cfs
Tucker	1
Big	4
Little	2
Spex Arth	1
Tillman	2

Once KRD delivers the water to each creek, Ecology manages it as instream flow until it is back in the mainstem of the Yakima River and becomes part of TWSA. If it doesn't get back, Ecology will make TWSA whole by adjusting its instream flow right at Parker.

YTID Tributary Augmentation

Ecology is negotiating an agreement that would reimburse Yakima Tieton Irrigation District for water it conveys and delivers to the South Fork of Cowiche Creek. The water being carried will be made available by USBR.

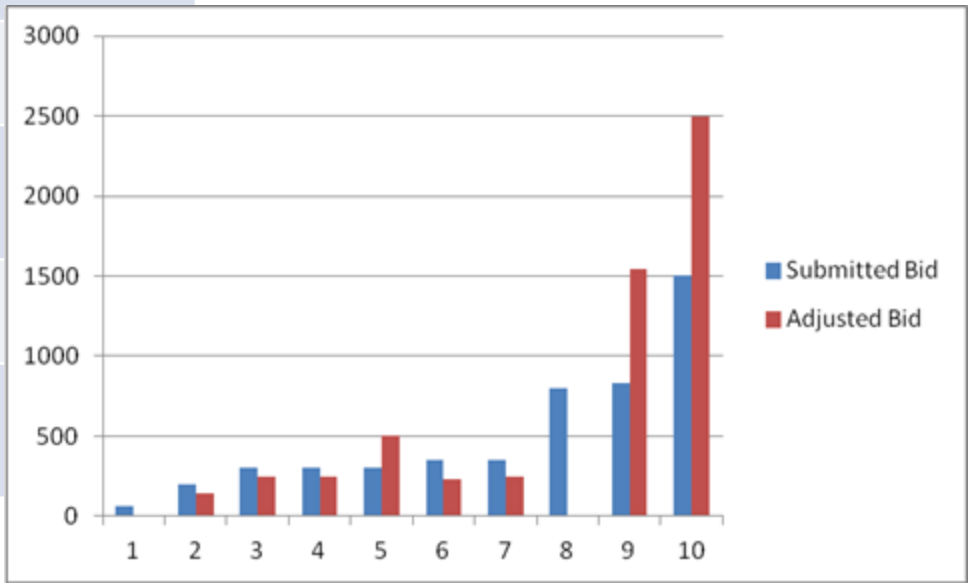
Once YTID delivers the water to South Fork, Ecology manages it as instream flow until it returns to the mainstem of the Yakima River and again becomes part of TWSA.

If it doesn't get back, Ecology will make TWSA whole by adjusting its portfolio of instream flow rights at Parker.

Yakima Tributary Auction

- Bid invitations and forms sent to 650 tributary water right holders
- 10 bids received in 1st round, 5 accepted, 2 disqualified
- 3 bidders above the 1st round reserve price,; they move into round 2

Event	Date
Bid invitation sent	March 20
Bids due	April 13
Bids accepted or rejected	April 22
Second round bids due	April 27
Bids accepted or rejected	May 4



Emergency Groundwater Pumping

This pumping results in long-term impact s to the Yakima River and therefore requires mitigation to offset that impact. In 2005 Ecology used drought emergency funds to provided mitigation for this impact. No cost share was required – 100% state fund

	Acreage	Amount to get to 70%*	Unit value of water	Total value of water
Roza Irrigation District	11007	7705 ac-ft	$275/ac-ft CU	$2118875
Kittitas Reclamation District	550	385 ac-ft	$275/ac-ft CU	$105875
Total Value of the 2005 Mitigation Obligation				$2,224,750

*2013 Yakima Policy Bill (2SSB 5367), 2013 Capital Budget (ESSB 5035)

RSBOJC Lease and Transfer Program

This program fallows land within Sunnyside Division and transfers an equivalent amount of water to Roza ID. In 2005 Ecology assisted this program by providing $1.4 million – a 37% of the total program cost.

	Leased water	Unit Cost	Total Cost	Roza Cost	Ecology Cost
2005 Program	27,701 ac-ft	$137/ac-ft	$3,800,000	$2,398,927	$1,401,073
2015 Program	5000 ac-ft	$275/ac-ft	$1,375,000	@25% $343750 **@50% $687,500**	@25% $1,013,250 **@50% $687,500**
2016 Program	24,000 ac-ft	$275/ac-ft	$6,600,000	@25% $1,650,000 **@50% $3,300,000**	@25% $1,950,000 **@50% $3,300,000**
2-yr cost				$1.99M - **$3.99M**	**$**2.96M - **$3.99M**

Yakima Basin Drought Relief Program Costs

- 2005 AG Water Lease Program = $3.8 million
  - 27,701 ac-ft leased @ $137/ac-ft
  - Roza Irrigation District's cost were approximately $2.4 million or 63%
  - Ecology costs were approximately $1.4 million or 37%
- 2005 Emergency Groundwater Pumping Mitigation = $1.3 Million
  - Private groundwater well users costs include electrical pumping costs but no cost for mitigation water
  - Ecology provided 100% funding for the required mitigation water costs

Yakima Basin Drought Relief Program Costs (2015 estimates)

- 2015 AG Water Lease Program
  - Ecology anticipates that the cost to lease water has risen and is estimating a $275/ac-ft cost to lease water this season
  - Approximately 5000 ac-ft due to mid-season timing
  - Ecology estimates a total costs of $1.375 million
  - Roza and Ecology will cost share roughly around 50/50 ratio or $687,500 each
- 2015 Emergency Groundwater Pumping
  - Approximately 11,557 ac-ft of groundwater for Roza/KRD is anticipated
  - Ecology anticipates costs of approximately $275/ac-ft of CU
  - Total costs of approximately $2.2 million (without cost share)

What's fair ?

- Ecology is seeking to use drought relief funding as efficiently and effectively as possible.
- Ecology is seeking feedback and input from the Legislative Drought Committee to determine whether applying a cost share ratio to the emergency groundwater pumping mitigation program is appropriate
- Ecology requires a cost share for public entities such as Irrigation Districts.

What's fair?

- Ecology is recommending some cost share amount (25%, 50%, 75%) from individual emergency groundwater well users to offset some of the mitigation water costs.
- For example, the 2015 emergency groundwater pumping mitigation costs of $2.2 million could be reduced to $1.11 million if a 50% cost share is required.
- For a 80-acre farm the 50% cost share mitigation cost is approximately $7,700 to the water user.

Questions?