# COLUMBIA RIVER BASIN 2016 LONG-TERM WATER SUPPLY & DEMAND FORECAST

**Presented by:**

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Aspect

WRC STATE OF WASHINGTON WATER RESEARCH CENTER

# Improvements For the 2016 Forecast

Forecast through 2035

Improved hydrology, cropping models, consumptive loss simulation

Utilized improved WSDA cropping data

Utilized improved climate change projections

Improvements in ability to capture water rights curtailment and Yakima Basin pro-rationing

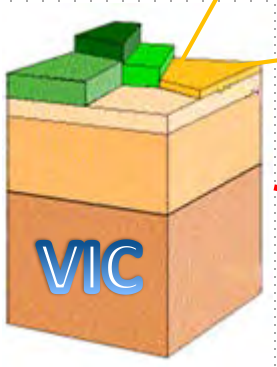
Include declining groundwater evaluation

Evaluate potential for the forecast to be extended to Western WA in 2021

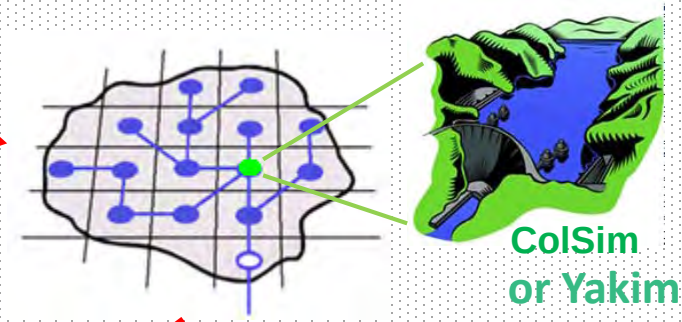
Evaluate policy issues necessary for program administration and investments

# Biophysical Modeling: Overview of Framework

I. Coupled simulation of hydrologic cycle and crop growth: all irrigation requirements met




II. Runoff, baseflow, and return flow routed through flow network; reservoir simulation accounts for irrigation diversions



ColSim
or Yakima-RiverWare

III. Irrigation and municipal diversions compared to water availability and instream flow requirements; curtailment in dry years

IV. Iteration of coupled simulation to account for reduced irrigation in dry years

# Economic Modeling: Forecasting Future Crop Mix

- Changes in crop mix can affect overall water demand due to differences in crop water requirements.
- Data on recent trends in the irrigated crop mix in Eastern Washington were used in a statistical model to forecast future crop mix.
- This approach has been shown to produce more accurate forecasts than complex economic models.

# Results

**Tier I**

**Columbia Basin**

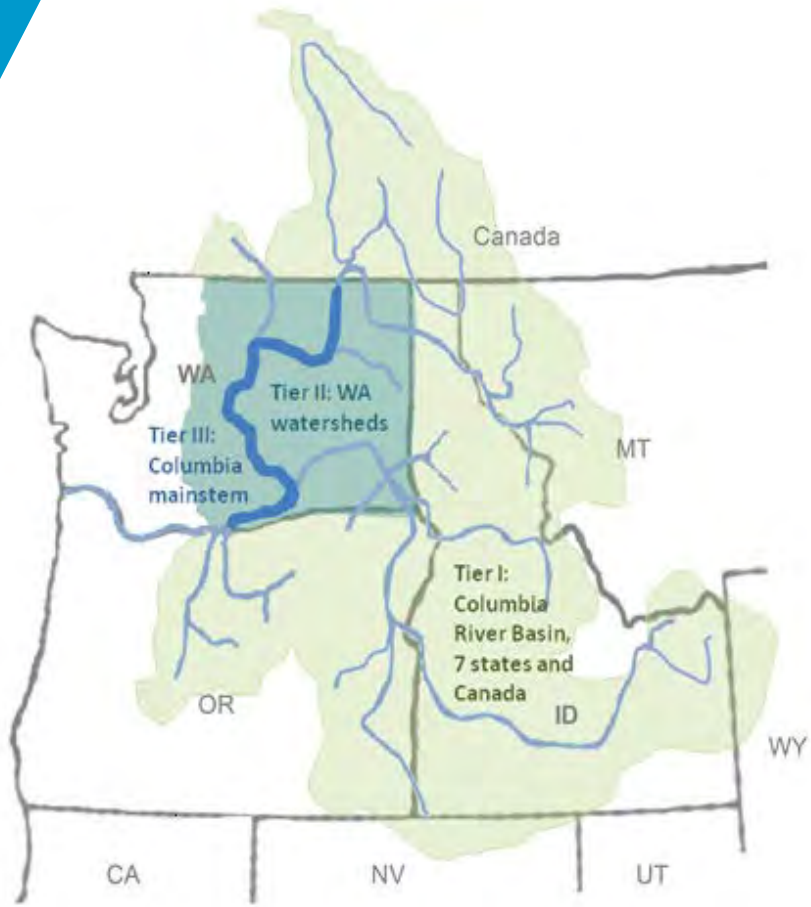
**7 States + BC Canada**

**Tier II**

**As or Watersheds**

**Tier III**

**Columbia River**



# Summary of Changes in Water Supply and Demand

**Supply:**

- **Average annual increase at Bonneville: +14.6%**
- **Average shift in seasonality:**
  - ↓ **-10.3%** between June and October
  - ↑ **30.8%** between November and May

**Demand:**

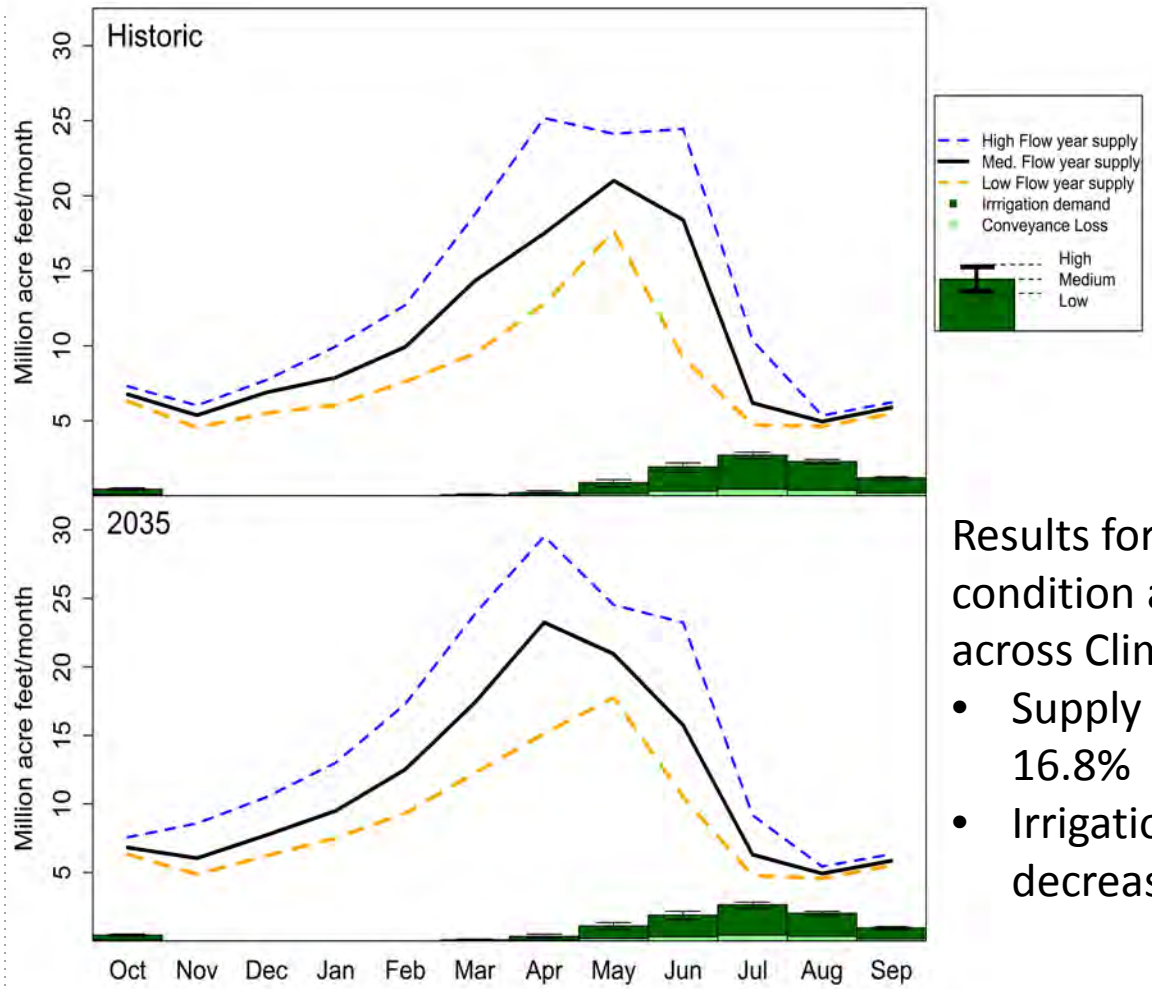
- **Average decrease in eastern WA irrigation demand:**
  - **-5.1% (historical crop mix)**
  - **-6.9% (future crop mix)**
- **Average shift in seasonality (future crop mix):**
  - ↓ **-13.3%** between July and October
  - ↑ **5.7%** between March and June

# Summary of Water Demand Results

| Water Use or Need | Estimated Volume (AF) (average of climate scenarios) |
|---|---|
| Projected changes in Eastern WA Agricultural Demand by 2035 | -332,837 to -250,027 |
| Projected changes in Agricultural Demand by 2035 with 10% Double Cropping | -272,837 to -130,027 |
| Projected changes in Agricultural Demand by 2035 with 10% Double Cropping and Planned Water Supply Projects | 27,163 to 169,973 |
| Projected changes in Eastern WA Municipal and Domestic Demand (including municipally-supplied commercial) by 2035 | 80,000 |
| Projected changes in CRB Hydropower Demand by 2035 | 35,000 to 75,000 |
| ***Water Use or Need to be Met with Surface Supplies*** | |
| Unmet Columbia River Instream Flows in 2001 at McNary Dam | 13,400,000 |
| Unmet Tributary Instream Flows (historical droughts) | 659,918 |
| Unmet Columbia River Interruptibles (historical droughts) | 40,000 to 310,000 |
| Yakima Basin Water Supply (pro-ratables, municipal/ domestic and fish) (from 2011 Yakima Report) | 450,000 |
| Alternate Supply for Odessa (from 2010 Odessa Report) | 155,000 |
| Declining Groundwater Supplies (other than in the Odessa Subarea) | 750,000 |

# Columbia River Basin: Regulated Supply and Demand

Note: Supply is reported prior to accounting for demands




Results for median condition averaged across Climate Scenarios:

- Supply increased by 16.8%
- Irrigation demand decreased by 4.9%

**Note that supply and demand results were quantified for low, medium, and high values due to year-to-year variability**

# Modules

1. Integrating Declining Groundwater Into The Forecast
2. Pilot Application of METRIC Crop Demand Modeling
3. Water Banking Update
4. Effects of User-Pay Requirements on Water Right Permitting
5. West Side Forecast Scoping

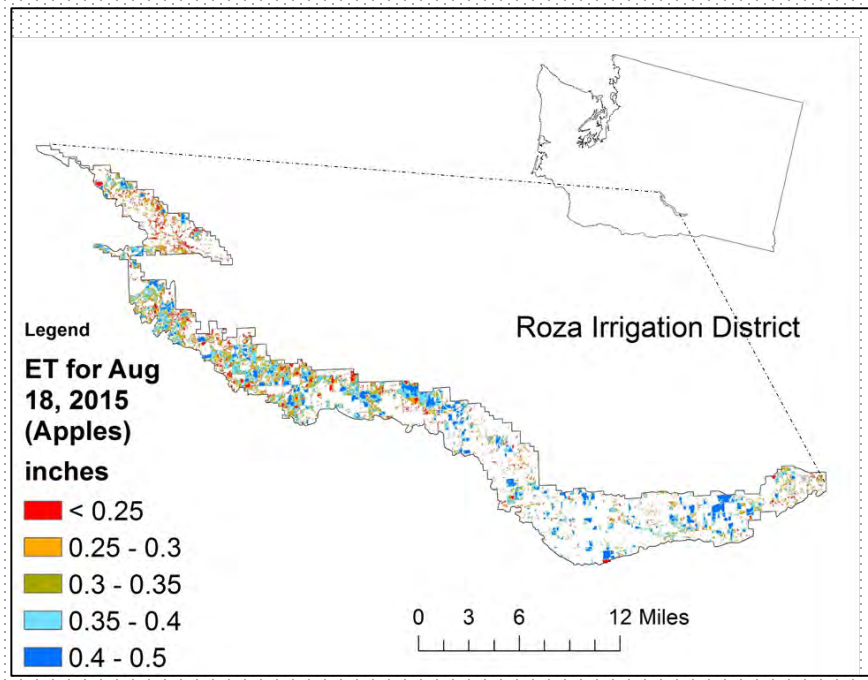
# Groundwater Integration
# New component for 2016 Forecast

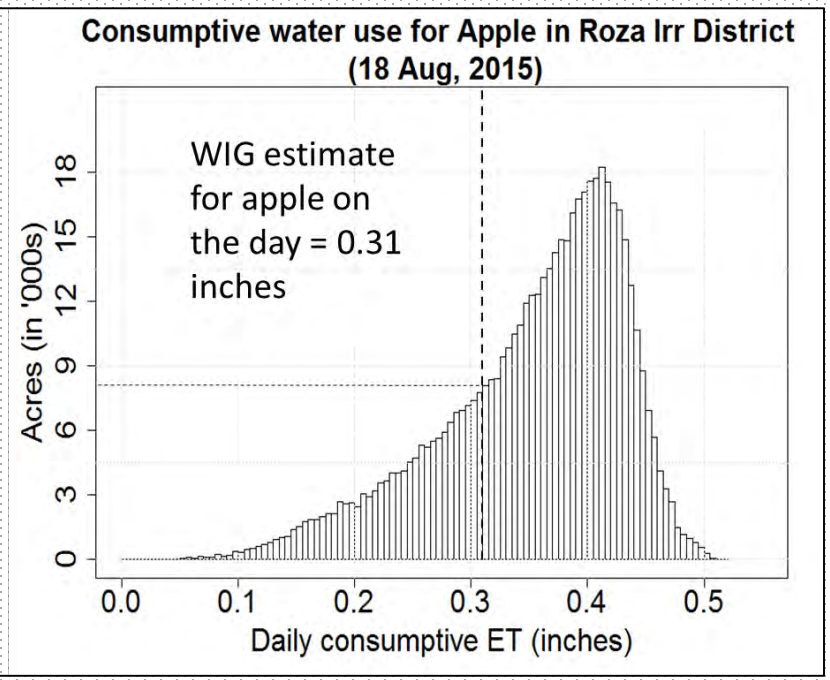
- **Why:**
  - 2011 Forecast did not evaluate effects of declining groundwater on demand
  - Users who rely on declining groundwater supplies may rely on surface water in the future
  - Surface and groundwater interactions can lead to water rights conflicts

Photo: Dept. of Ecology

# Pilot Application in Yakima – RESULTS

## Consumptive water use for apples in Roza using METRIC



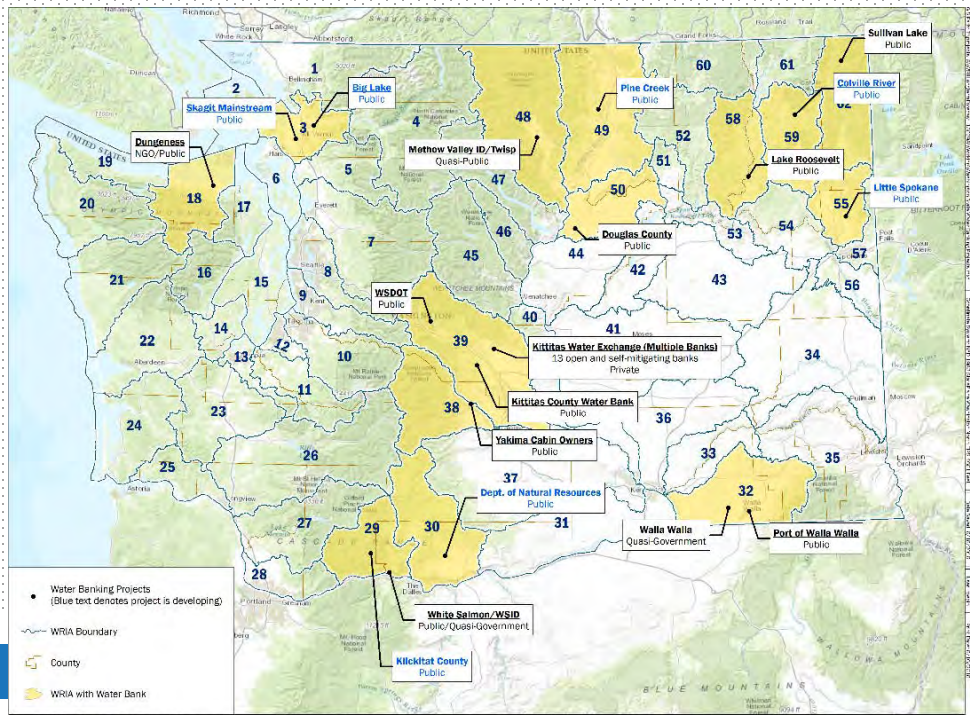

**Variability in ET estimates from METRIC could help in identifying differences in water use patterns for similar crops.**

# Water Banking

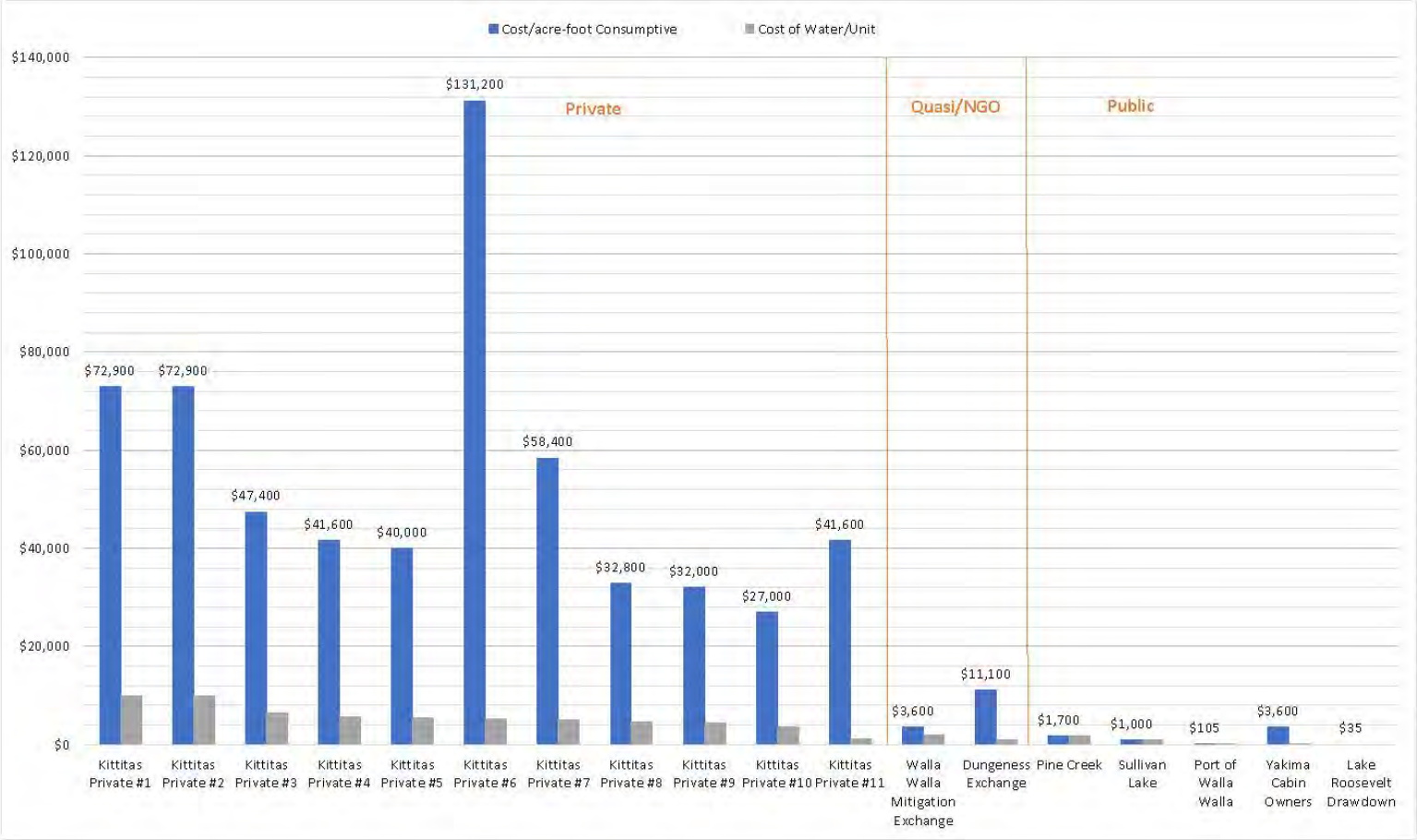
## Why?

- To update 2004 Water Banking Report
- To document Ecology impacts
- To document how bank design/operation affect costs
- To identify regulatory, funding, and operational barriers
- To develop recommendations and future visioning

Note: New pricing and transaction data became available on July 1st and will be integrated into the Final Forecast



# Water Banking - Recommendations



# Paying for Water – Survey Data (preliminary)

| LOCATION | Sample size | Number completed | Response Rate |
|---|---|---|---|
| Sullivan Lake | 8 | 0 | 0% |
| Lake Roosevelt | 214 | 58 | 27% |
| Wenatchee Basin | 37 | 2 | 5% |
| Yakima Basin | 383 | 85 | 22% |
| Port of Walla Walla | 6 | 1 | 17% |
| Yakima Cabin Owners | 37 | 22 | 59% |
| Overall | **859** | **168** | **19.5%** |

# Questions?