# 2016 Columbia River Basin

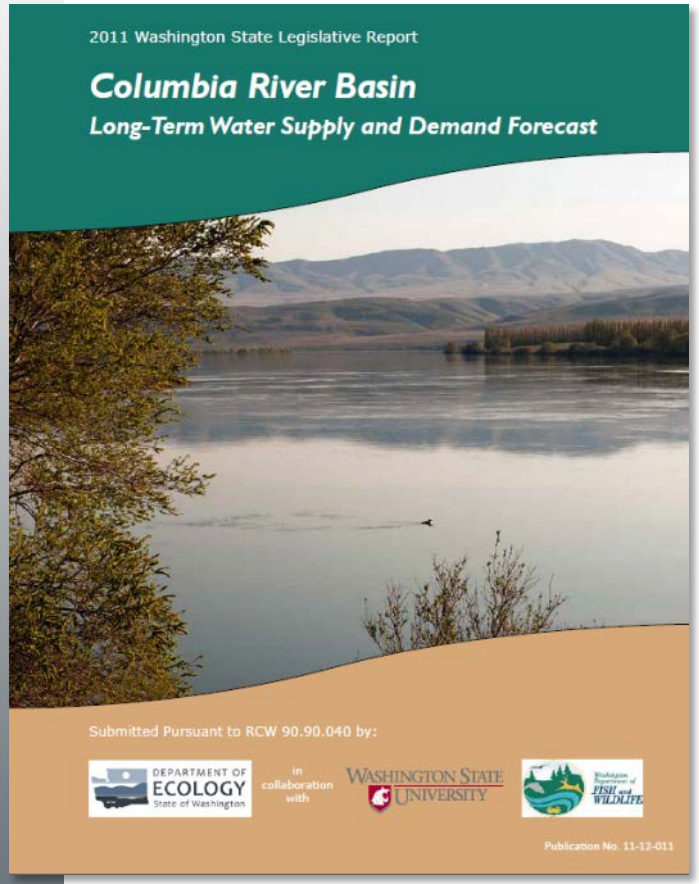
## Long-Term Water Supply and Demand Forecast

WASHINGTON STATE UNIVERSITY
WASHINGTON STATE DEPARTMENT OF ECOLOGY
WRC STATE OF WASHINGTON WATER RESEARCH CENTER
Aspect CONSULTING
THE UNIVERSITY OF UTAH

# Summary

- **Why are we updating the forecast?**
- **Summary of 2011 Forecast**
- **Summary of 2016 Forecast Approach**
- **Summary of Emerging Policy Issues**
- **Schedule and Input Opportunities**

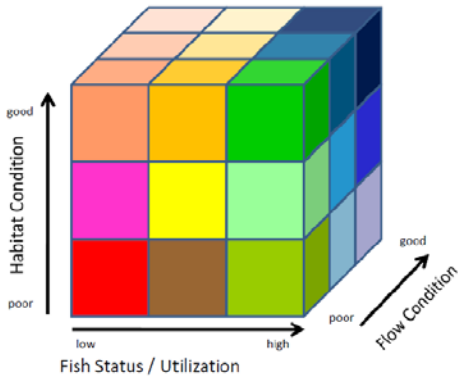
# 2011 Water Supply & Demand Forecast




- **Update required every 5 years**
- **Audience includes policy makers, water managers, general public**
- **Water and economic modeling**
- **Interviews with water managers**
- **Peer review**
- **Predicts agricultural, municipal, instream, and hydropower needs**
- **Guide for future investment**
- **Emerging policy issues**

# 2011 Forecast Findings: Supply

- **Water forecasted through 2030**
- **Modeled surface water supply / demand**
- **Did not forecast GW supply / demand**
- **Supply: surface water supplies estimated to increase statewide by 3% average**
- **Climate change: water supply projected to shift earlier in the year**
- **WDFW created an Instream Atlas to help characterize fish flow, habitat, and utilization**



# 2011 Forecast Findings: Demand

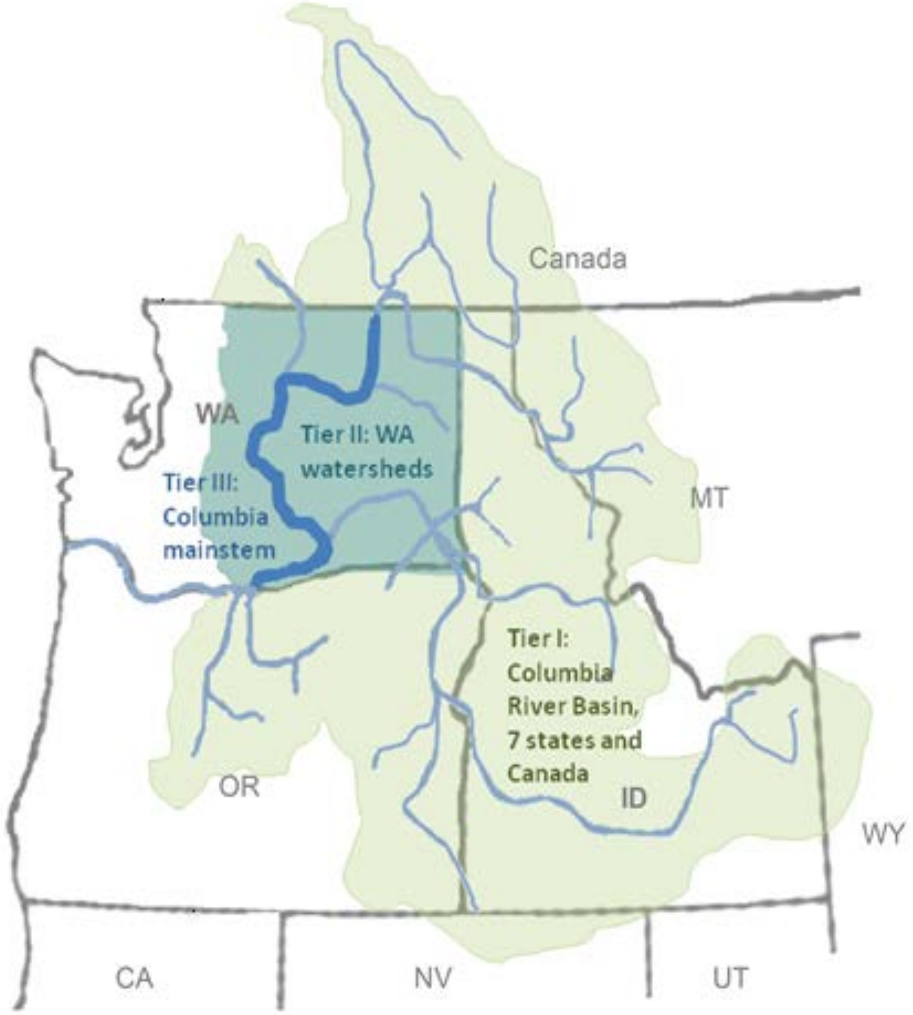
| Demand Type | Estimated Volume (acre-feet) |
|---|---|
| **2030 New Irrigation Demand** | 170,000 |
| **2030 New Municipal and Domestic Demand (including municipally-supplied commercial)** | 117,500 |
| **Unmet Columbia River Instream Flows** | 13,400,000 |
| **Unmet Tributary Instream Flows** | 500,000 |
| **2030 New Hydropower Demand** | 0 |
| **Alternate Supply for Odessa** | 164,000 |
| **Yakima Basin Water Supply (pro-ratables, municipal/domestic and fish)** | 450,000 |
| **Unmet Columbia River Interruptibles** | 40,000 to 310,000 |

# 2016 Forecast Analysis Will…

- **Forecast through 2035**
- **Include groundwater evaluation**
- **Improve hydrology, cropping models, consumptive loss simulation**
- **Include climate change predictions**
- **Forecast water right and reservoir curtailment**
- **Evaluate potential for the forecast to be extended to Western WA in 2021**
- **Evaluate policy issues necessary for program administration and investments**

# Forecast Approach: Geography

- **Geographic evaluation:**
  - 7 States and Canada
  - Washington WRIAs
  - Columbia River 1-Mile Corridor
- **Input from other states, watershed planning, sector experts, and the public**



# Forecast Approach: Modeling

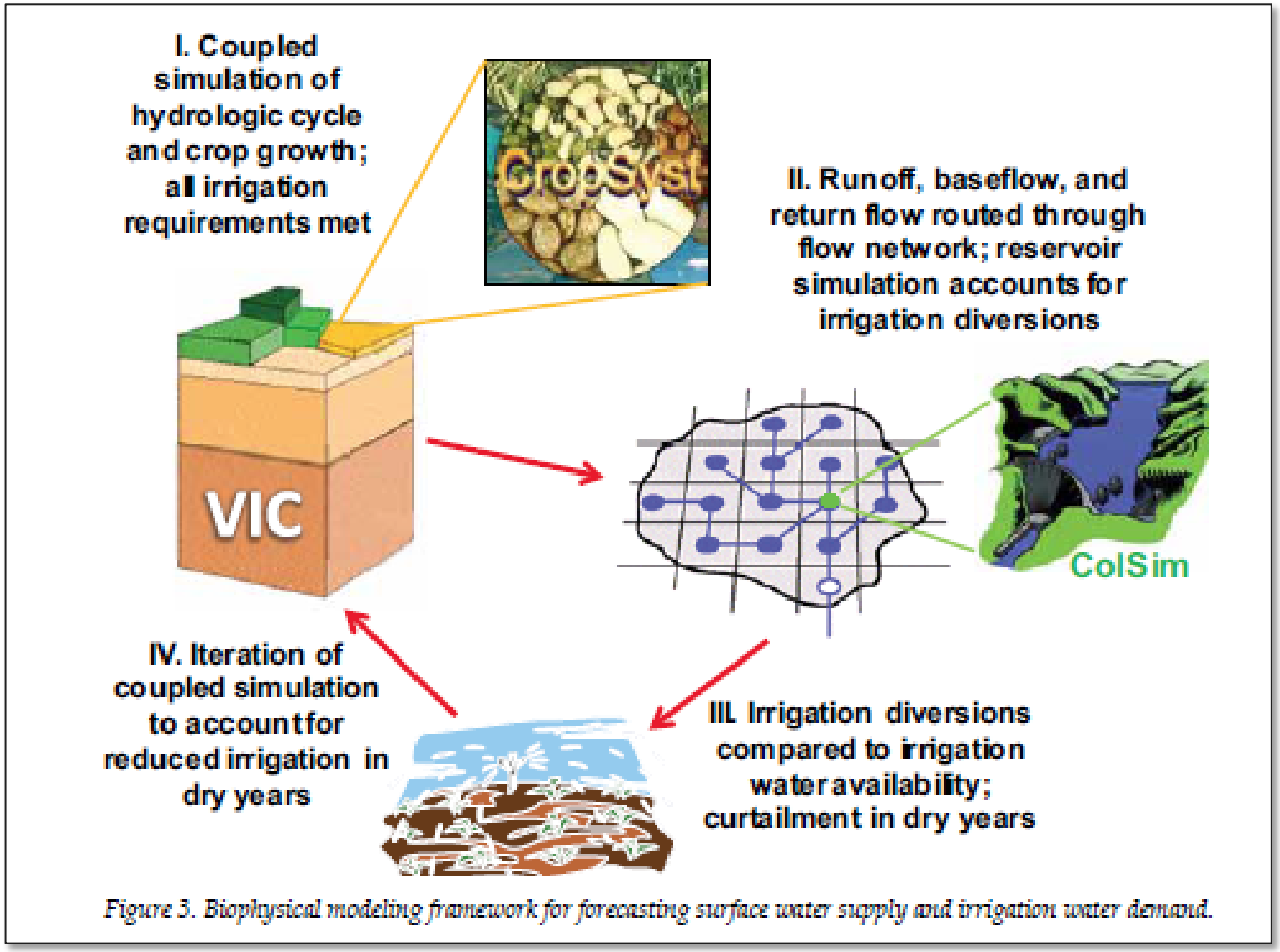
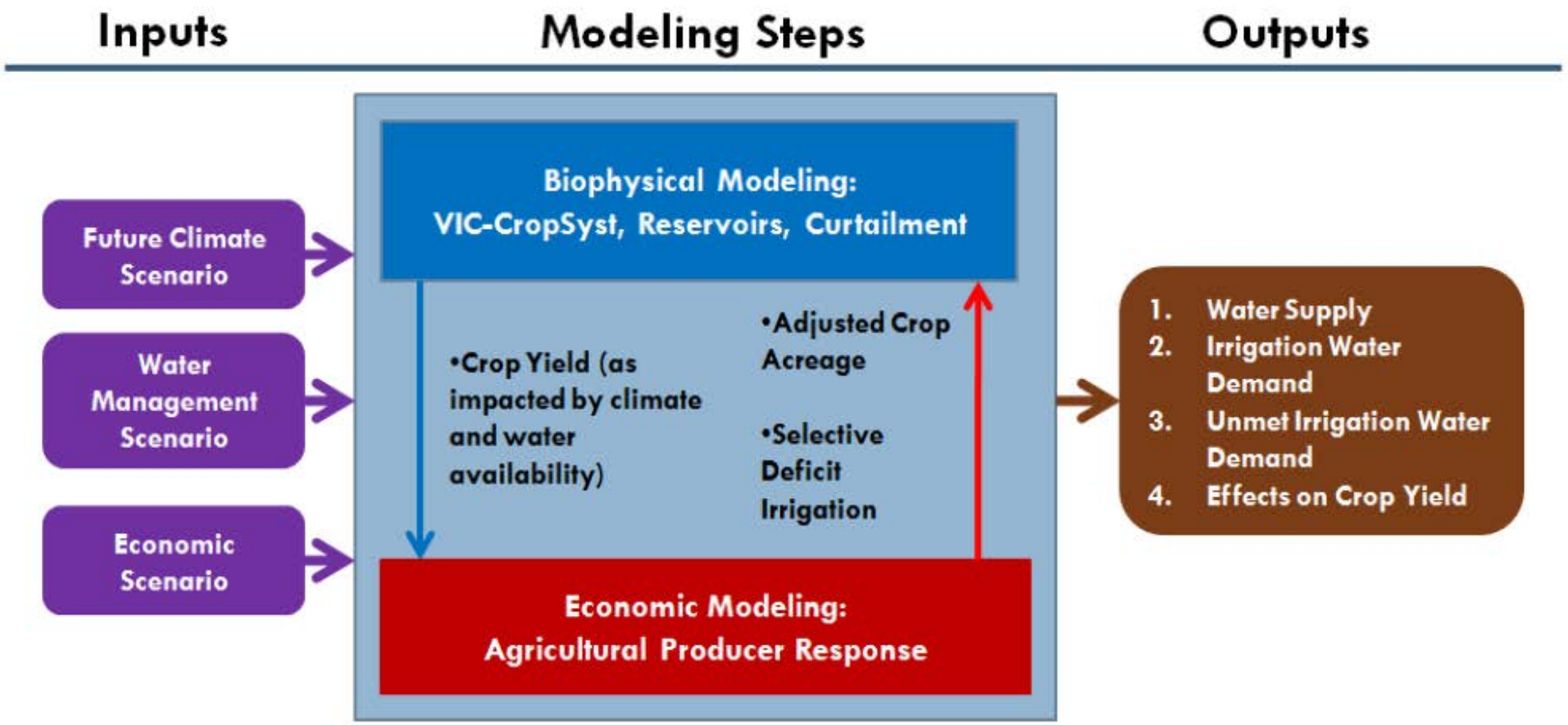



*Figure 3. Biophysical modeling framework for forecasting surface water supply and irrigation water demand.*

# Forecast Approach: Economics



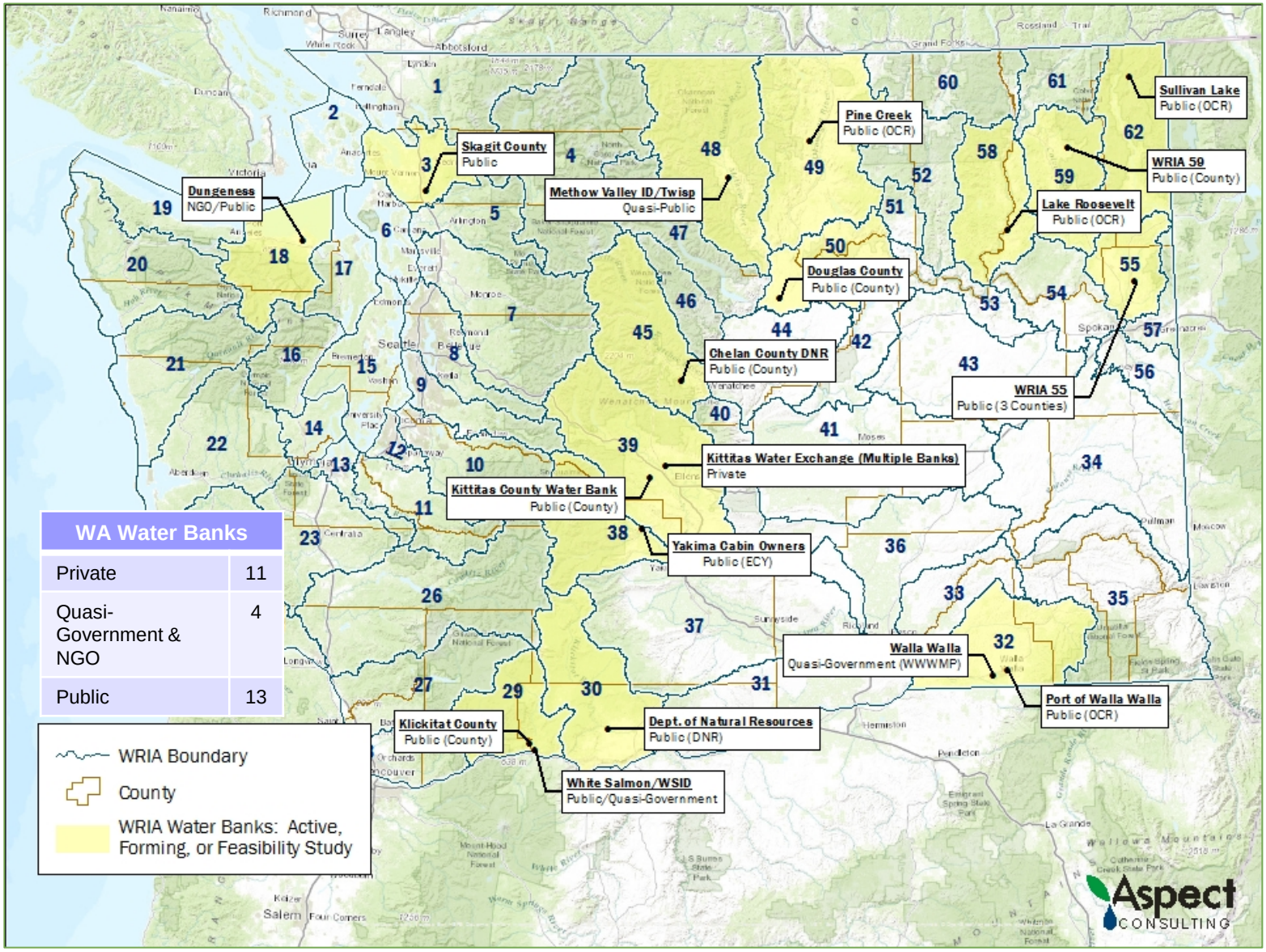
# Yakima Basin Additional Analysis

- **Relevant to 2016 Forecast because the state of the science in Yakima Basin is more advanced than most watersheds**
  - **Offers enhanced understanding of drought response**
  - **Quality of water data high (adjudication)**
  - **Active basin management (water masters, water right curtailment)**
  - **Active supply investment proposals in progress**
- **Further progression of supply and demand modeling**
  - **Economic implications of deficit irrigation, crop mix, and irrigation technology change**
  - **Updated climate and crop modeling**

# Policy Issues in 2016 Forecast

- **Water Banking**: How can water banking assist in meeting demand?
- **Cost Effects of Water**: How is an applicant-pays model affecting program participation?
- **METRIC**: How can remote sensing improve demand projections?
- **Groundwater Integration**: Where and how much will declining groundwater supplies affect demand?

# Water Banking In Washington



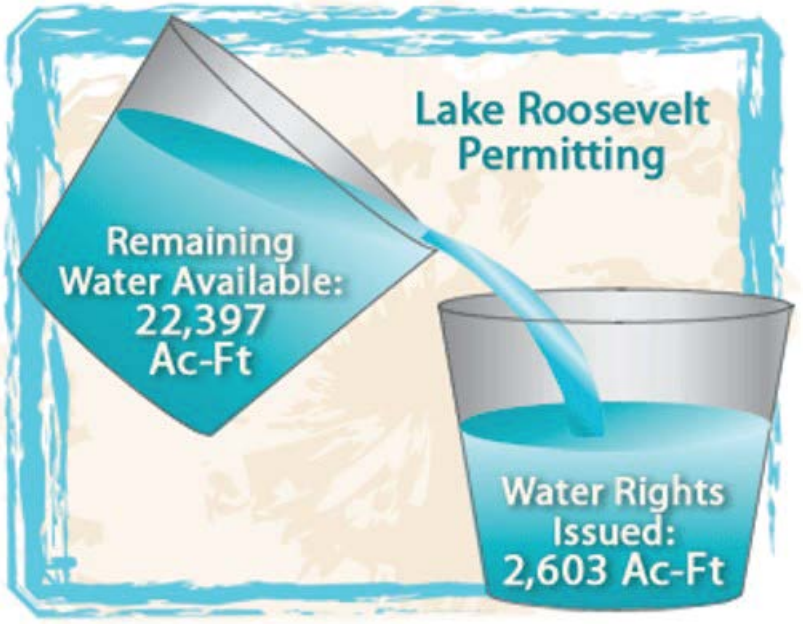
# Water Banking: Scope and Policy Considerations

- **Update 2004 Water Banking Report**
  - Survey/inventory water banks
- **Document Ecology impacts**
  - Roles – Regulator, Funder, Incentivizer, Banker, and Auditor
  - Quantify costs
- **Document how bank design/operation affect costs**
- **Identify regulatory, funding, and operational barriers**
- **Recommendations and future visioning**

# Cost Effects of Water

- **Legislature has moved towards an applicant-pays system**
  - Cost-reimbursement permitting
  - Recovery of water supply development costs
- **Some applicants are choosing to defer or postpone rather than receive new water rights when offered**
- **This study will survey 500 applicants from various programs (Lake Roosevelt, Wenatchee, Yakima, Cabin Owners, etc.) to understand how time and financial terms of a program are affecting processing and demand for new service**

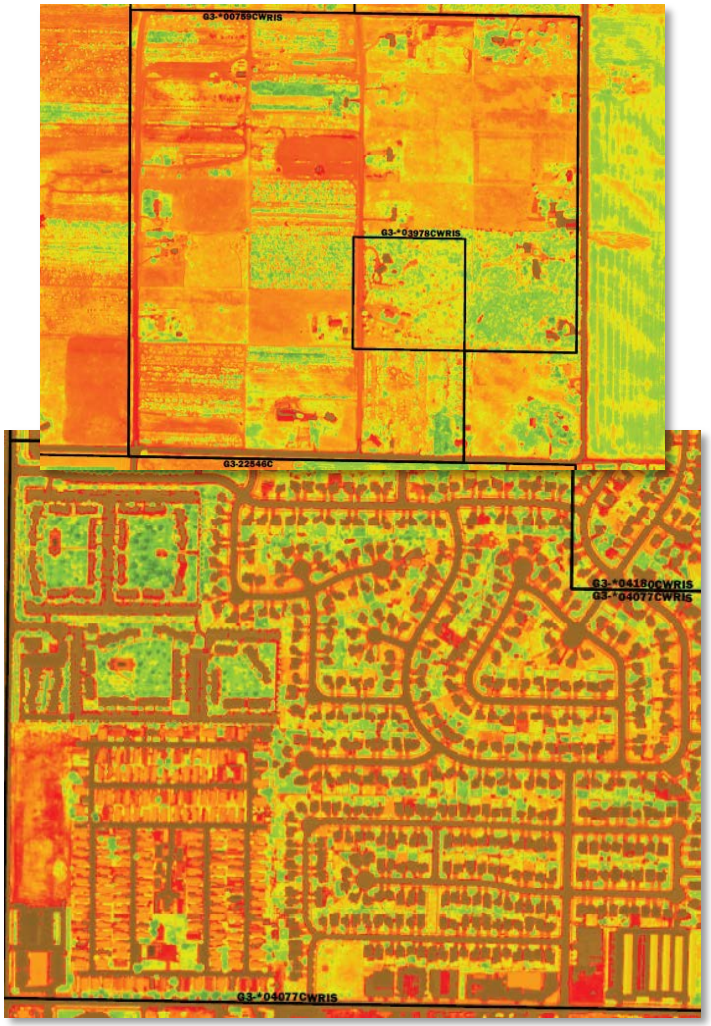
# Cost Effects of Water: Policy Considerations




- **What price points incentivize applicant participation?**
- **What other program criteria affect participation (e.g. lead time, water right type, purpose of use, location)?**
- **What should Ecology's reaction be to applicants that decline processing?**
- **Should application requirements be augmented to better reflect processing level of effort?**

# METRIC: Forecasting Irrigation Use

- **METRIC uses field-calibrated satellite imagery to improve consumptive use forecasting**
- **Predict agricultural crop consumption and return flows at the field and watershed scales**
- **Pilot 3 subbasins: Walla Walla Basin, Yakima Basin and Okanogan Basin**
- **Model inputs from volunteer farms:**
  - Soil moisture
  - Weather data (wind speed, temperature, heat flux)
  - Applied irrigation (Applied Water Duty)
  - Landsat flights



# METRIC Policy Considerations

- **Can it improve accuracy of demand estimates?**
- **Can it provide a surrogate or compliment to metering data?**
- **Can it assist in water right evaluations and adjudications?**
- **Can it assist in identifying areas of crop stress?**

# 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
- **Goals:**
  - Improve forecasting of groundwater shortages by identifying data gaps and use existing tools to predict the scope of the problem
  - Estimate surface water demand changes caused by groundwater shortages

# Research & Analysis


**Declining Groundwater Areas**

- Published reports
- Groundwater models
- Ecology well monitoring

**Groundwater Models**

- Coverage
- Robustness
- Limitations

**Groundwater Data**

- Water level monitoring
- Aquifer tests
- Cross sections

**Instream Flow Rules**

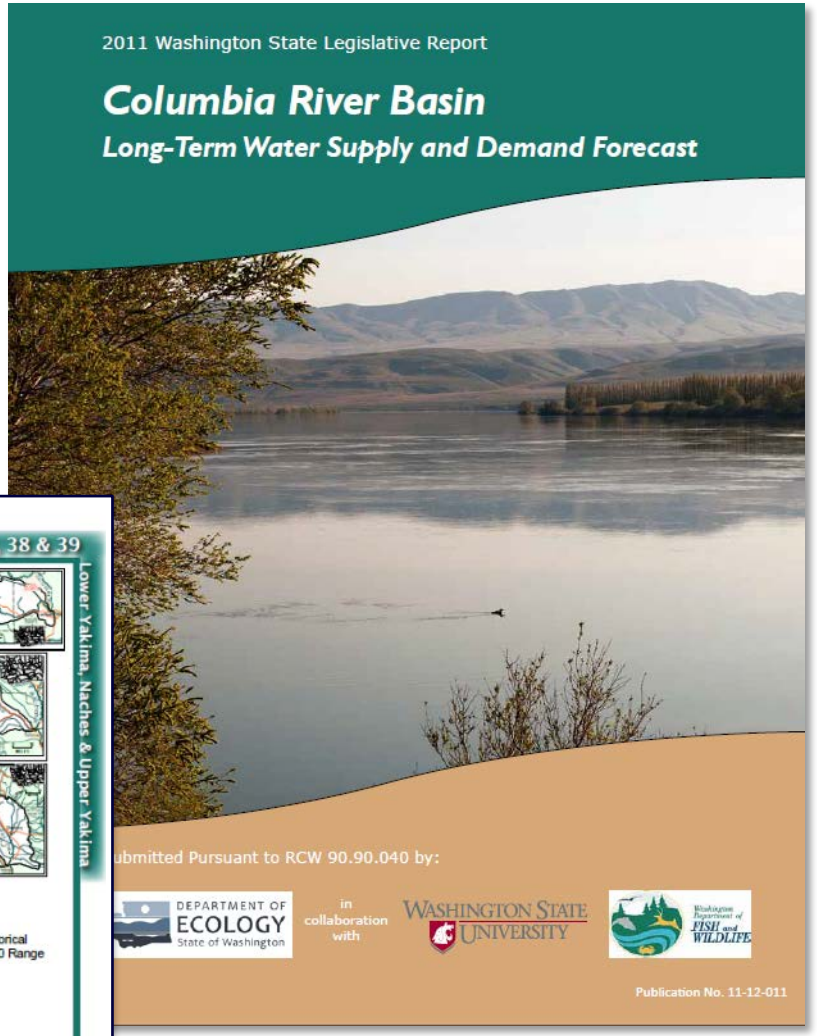
- WAC 173-5(WRIA #) Availability

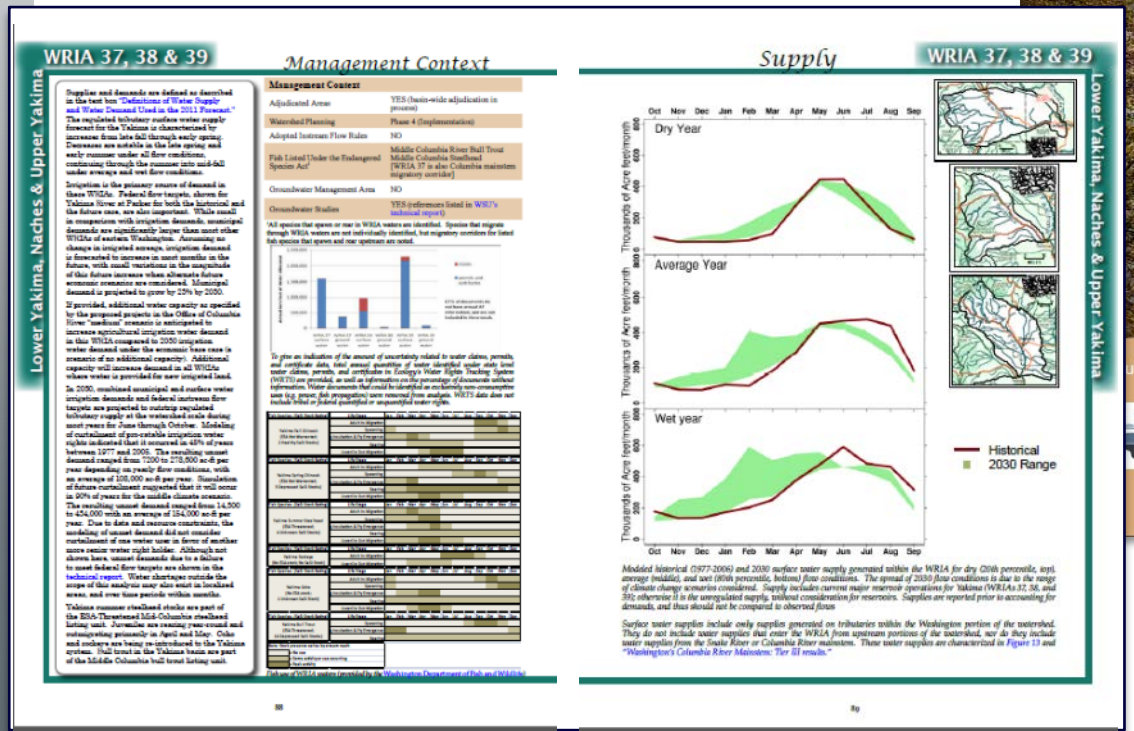
# Groundwater Integration Policy Considerations

- **What is the state of the science on declining groundwater areas?**
- **How can groundwater be integrated into comprehensive supply and demand forecasting?**
- **Where is demand on surface water likely to occur?**
- **What is the magnitude of that future demand?**
- **How does it compare to available water supply?**
- **What are the economic effects of not ensuring a firm water supply?**

# Forecast Report

- 50+ page Summary Report
- WRIA-focused pages
- Large Technical Report
- Web applications / content
- Instream Flow Atlas Update



# Schedule / Opportunities for Input

- **Data collection and modeling in 2015**
- **Presentations to PAG, WRAC, CCPAG, and stakeholder groups in 2015**
- **Watershed planning input in 2015**
- **Sector expert input in 2015**
- **Analysis and draft results in early 2016**
- **Public workshops and draft report in summer 2016**
- **Final Report Due November 15, 2016**