Oregon Water Supply and Conservation Initiative

Conservation Inventory and Water Demand Assessment

Final Stakeholder Meeting
September 18, 2008

Agenda

- Project objectives review
- Conservation inventory results
- Demand forecasting results
- “Tour” of Forecasting Tool
- Q&A and discussion

Project Objectives Review

- **Conservation Inventory**
  - Catalogue potential water conservation projects identified by water users/providers
  - Improve understanding of the nature and magnitude of conservation opportunities
  - Use inventory as a data source for identifying and prioritizing projects for possible state funding

Conservation Inventory Data

- 96 survey responses and 135 projects
  - Respondents: 18 agricultural; 79 municipal; 4 “other”
  - Projects: 36 agricultural; 99 municipal
- Data Processing
  - Geographic elements
  - Categorization fields
  - Interpretation of savings and cost information
- Final inventory in spreadsheet format

Conservation Inventory Data

- Geographic (basin/county)
- Categorization
  - Municipal/agricultural
  - Capital/programmatic
  - Supply/demand
- Project Focus
  - Hardware actions: rebates, replacement
  - Hardware action: reducing leaks
  - Incentives: educational, financial, regulatory
  - Reclaimed water
  - Minimizing low flow withdrawals
  - Other

Conservation Inventory Data

- Seasonality
- Implementation status
  - Not-, fully-, partially-implemented
- Implementation barriers
- Estimated future savings
- Estimated future costs

Conservation Inventory Findings

- Ag: capital, supply-side
- Muni: programmatic, demand-side
- Well-diversified project focus areas
  - Ag: minimize low flow withdrawals; canal lining/piping
  - Muni: equipment rebate; replacement hardware; education/financial incentives

Conservation Inventory Findings

- Implementation status
  - Ag: 75% not implemented
  - Muni: 18% not implemented; 34% partially
- Highly variable responses for cost and water savings data
  - Limitations on ability to calculate quantities
  - Ag: total annual water savings = ~220,000 ac-ft (~200 mgd); cost of up to $783M
  - Muni: total annual water savings = ~27,000 ac-ft (~24 mgd); cost of up to $122M

Data Needs and Future Applications

- Additional outreach
- Additional water use categories (self-supplied industry)
- Refined implementation status, water savings and cost data
- Incentives for submitting information
- Statewide “conservation potential assessment” – linkage to demand and future supply assessment
- Statewide “conservation best practices” resource

Conservation Inventory Conclusions

- “First cut” inventory that needs to be built upon
- Basis to identify viable projects to provide assistance and support for development
- Information sharing tool that can be used for transfer of knowledge
- Raises awareness of the state’s water planning goals, including a strong water conservation component

Project Objectives Review

- **Water Demand Assessment**
  - Improve understanding of water demands across the state (including factors affecting water uses/trends)
  - Develop a forecasting tool to examine alternative scenarios affecting future water needs
  - Assess data gaps and sources of uncertainty in water demand forecasting

Demand Forecast Components

- Out-of-stream uses
  - Municipal
  - Domestic wells
  - Self-supplied industrial
  - Irrigated agriculture
- In-stream uses
  - Ecological
  - Hydropower
- Planning period is to 2050

Water Demand Assessment

- Forecasting output
  - Reference Forecast (in Forecasting Tool)
    - “Best estimate”
    - Single outcome
  - Scenario Analysis
    - Base Case
    - Climate change
    - Conservation
    - Range of outcomes

Water Demand Assessment

Table 1. Scenario Summary

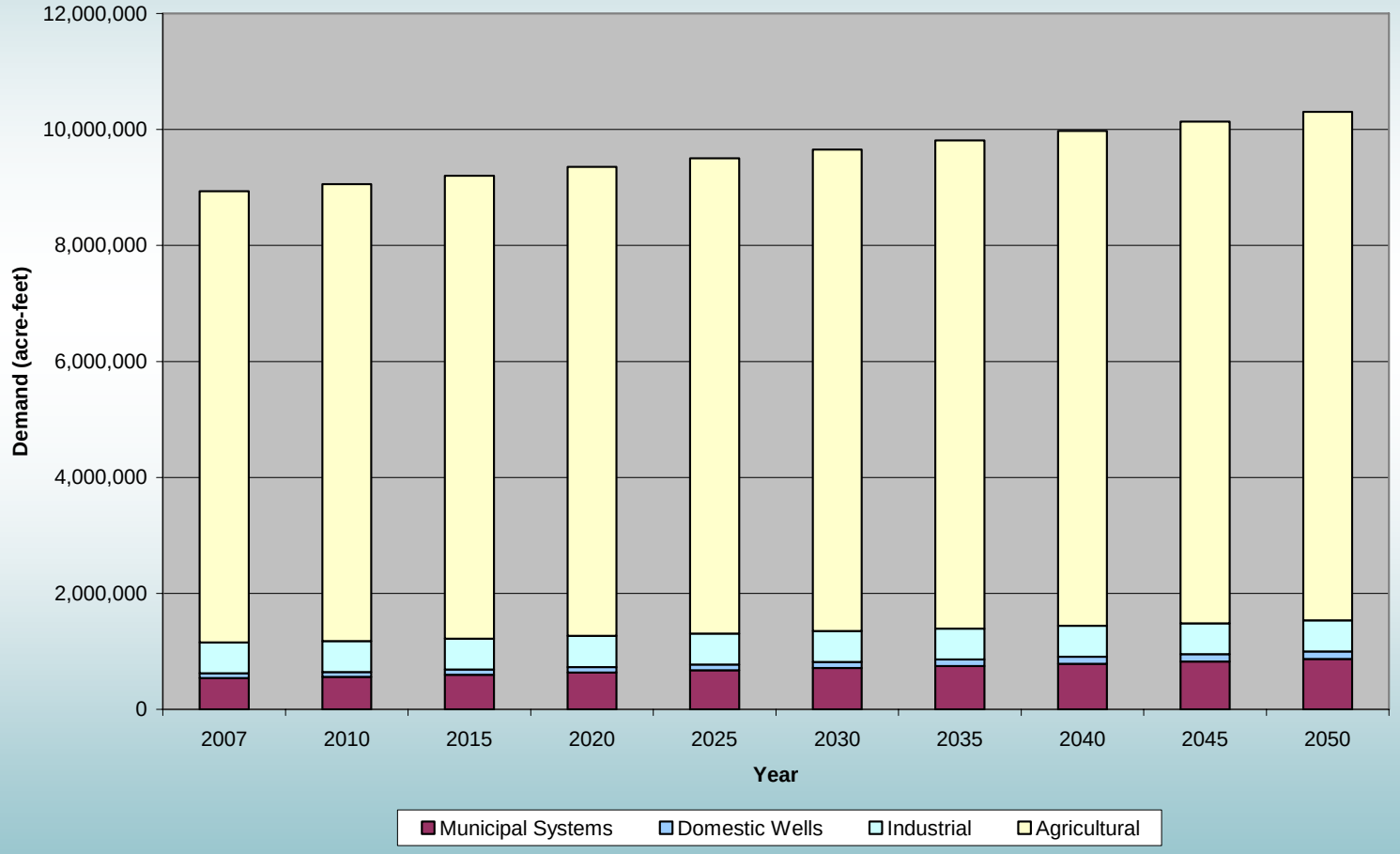
Forecast Input Variable	Base Case Scenario	Climate Change Scenario	Water Conservation Scenario
Municipal and Domestic Wells			
Population Growth Rate	Base estimate from data	Same as baseline	Same as baseline
Per Capita Water Use	Base estimate from data	Increased per capita outdoor use	Decreased total per capita use
Self-Supplied Industry			
Water Use by County	Base estimate from data	Same as baseline	Decreased total use
Agricultural			
Irrigated Acreage	Base estimate from data	Same as baseline	Same as baseline
Crop Irrigation Requirement	Base estimate from data	Increased irrigation requirement	Same as baseline
Irrigation Efficiency	Uniform assumed value	Same as baseline	Increased efficiency
Conveyance Efficiency	Uniform assumed value	Same as baseline	Increased efficiency
Monthly Water Use Pattern	Uniform assumed value	Uniform assumed value	Uniform assumed value

Water Demand Assessment

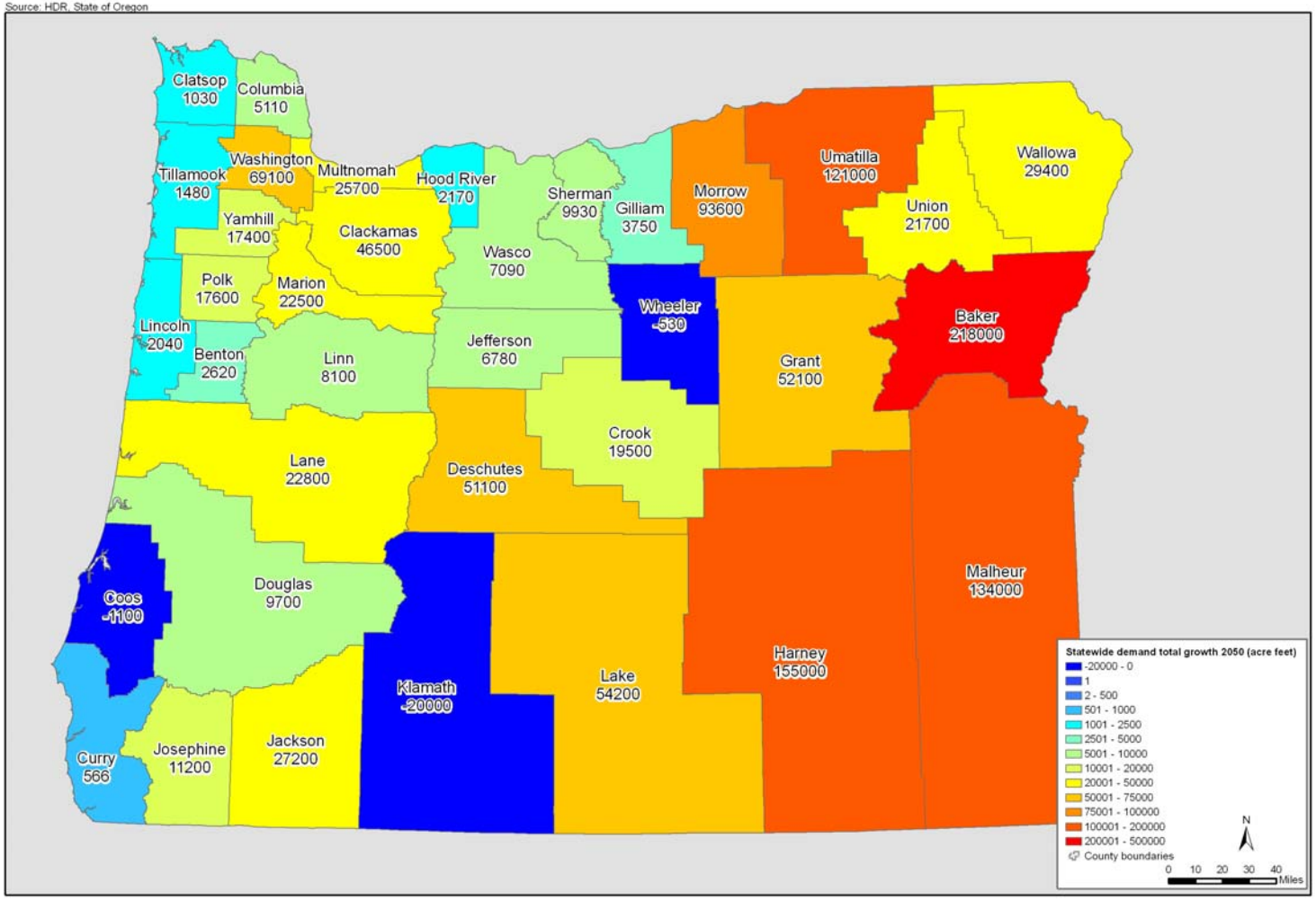
- Reference Forecast results (2010-2050)
  - 10.3 million acre-feet in 2050
  - Overall increase of 1.2 million acre-feet
  - Irrigated agriculture: ~75% of the forecasted increase in demand
  - Major Ag. increase: Baker, Gilliam, Grant, Harney, Morrow, Sherman and Umatilla
  - Major Muni/Dom increase: Clackamas, Deschutes, Josephine, Lincoln, Polk, Washington and Yamhill

Water Demand Assessment

Figure ES-1. Demand Forecast by Water Use Category - Reference Forecast



Source: HDR, State of Oregon



Statewide Total Water Demand Growth for 2050: Distribution by County

Figure 6

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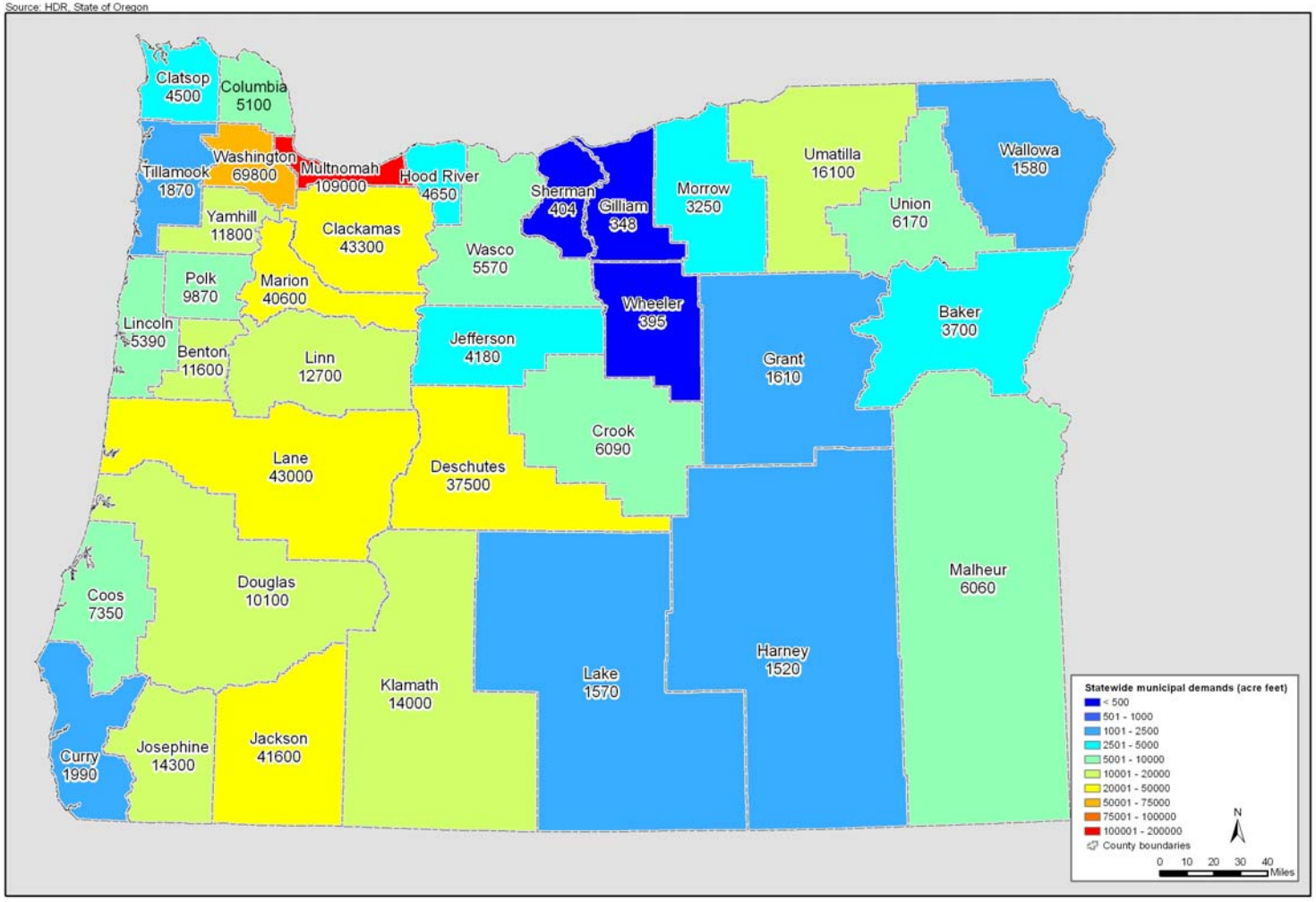
Source: HDR, State of Oregon



Municipal Water Demand by County - Reference Forecast (2010)

FIGURE 5

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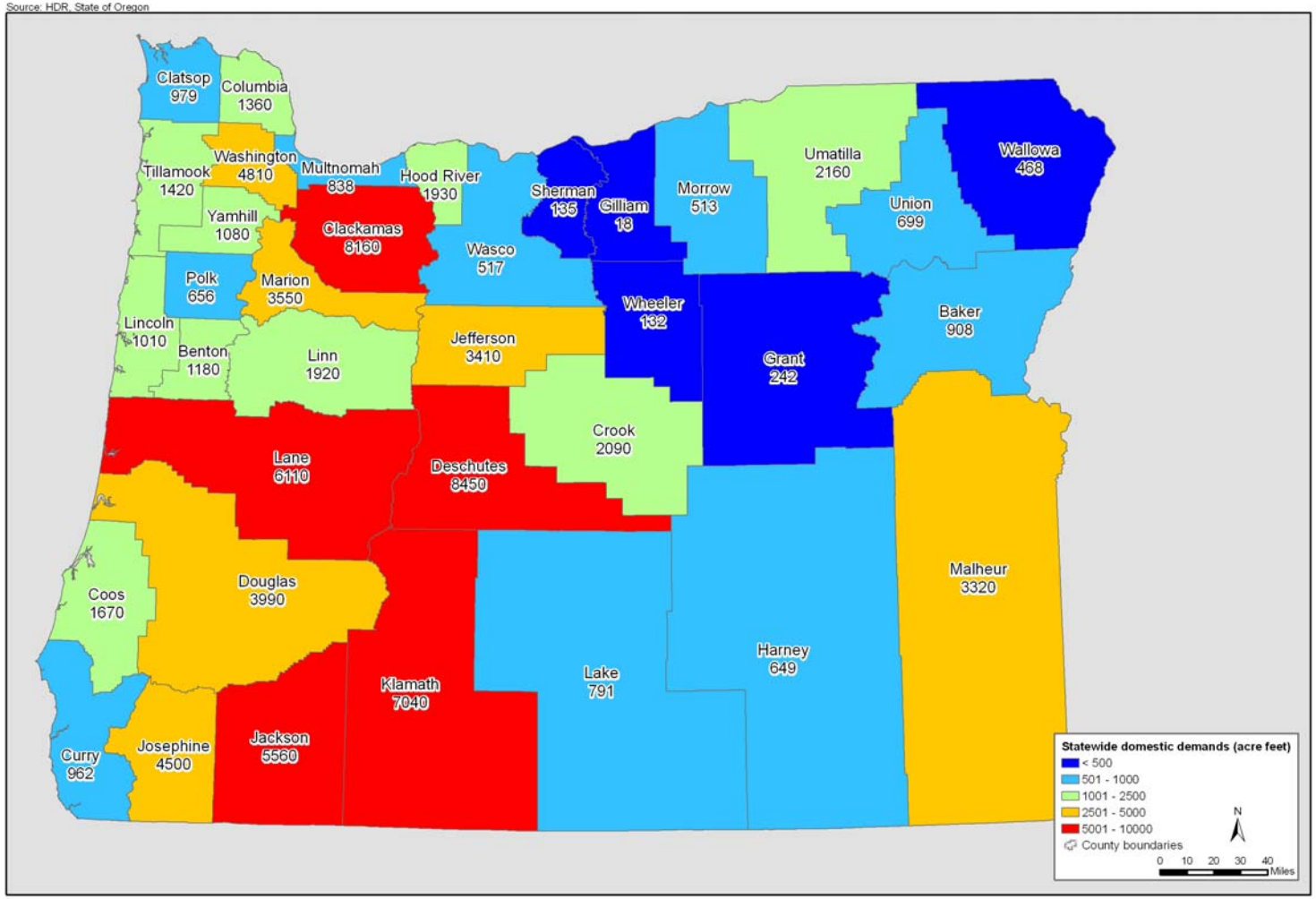
Source: HDR, State of Oregon



Domestic Well Water Demand by County - Reference Forecast (2010)

Figure 8

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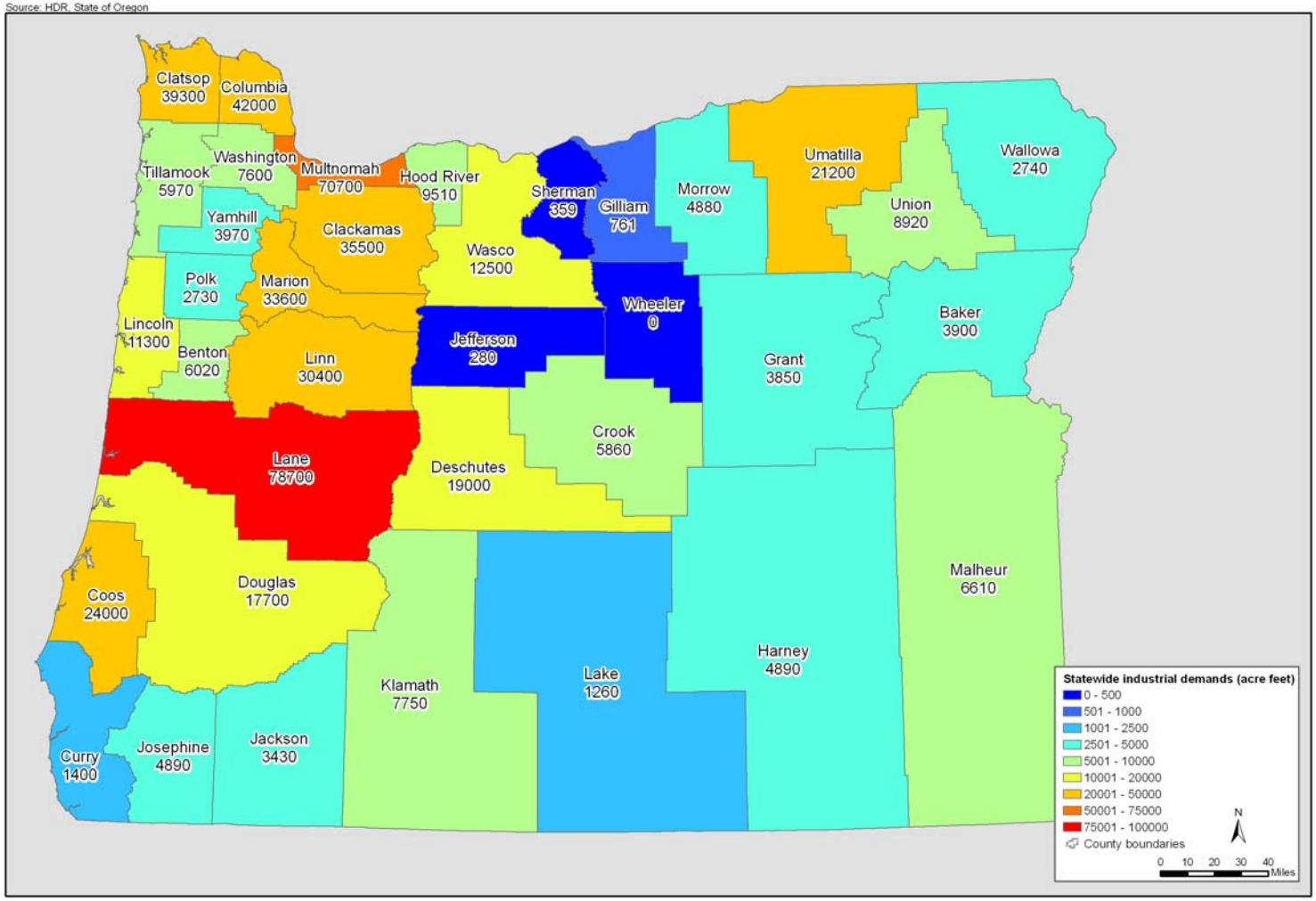
Source: HDR, State of Oregon



Self-supplied Industrial Water Demand by County - Reference Forecast (2010)

FIGURE 9

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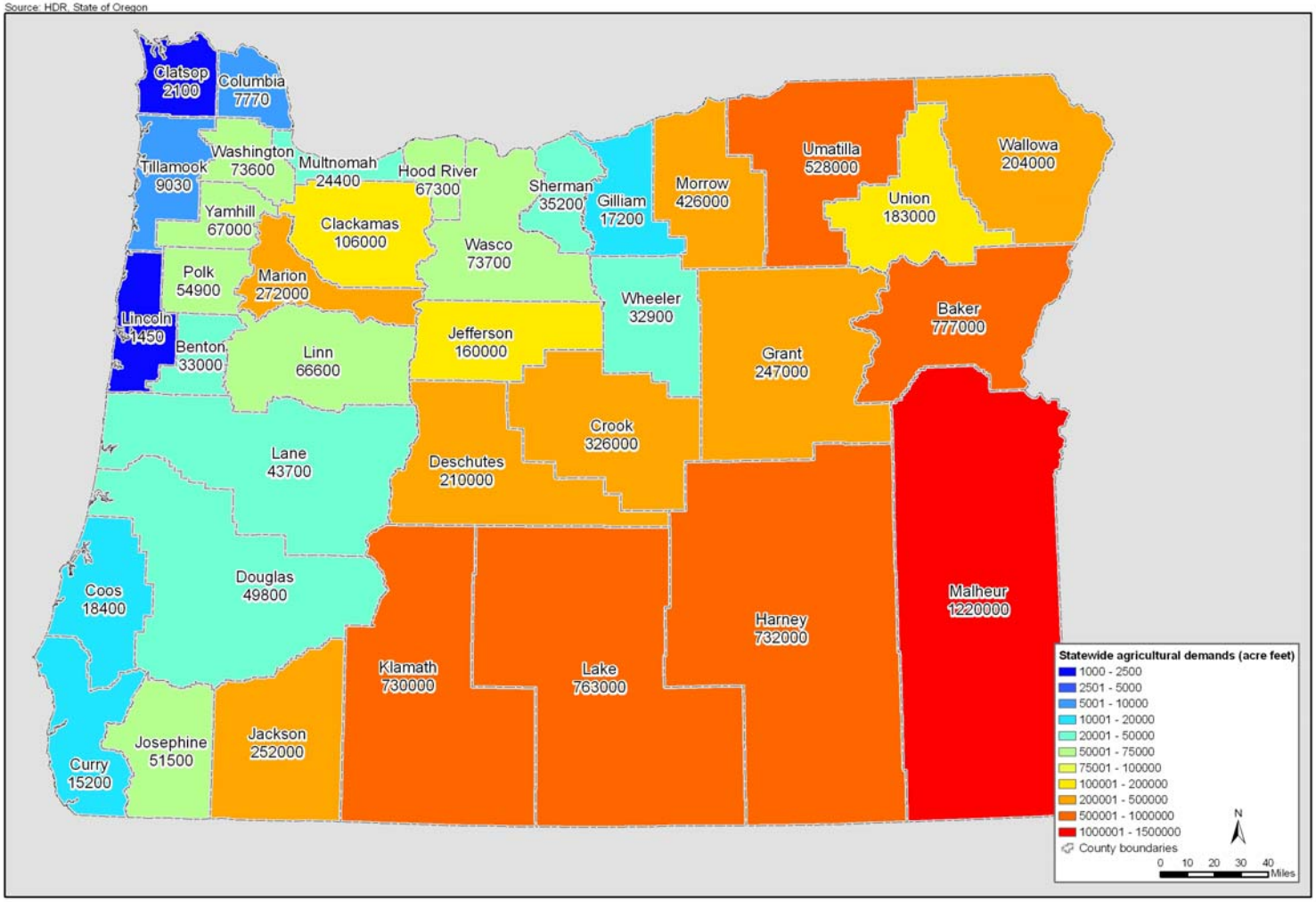
Source: HDR, State of Oregon



Statewide Agricultural Water Demand for 2010: Distribution by County

FIGURE 10

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Water Demand Assessment

- Scenario Forecast results

  Total Statewide demand (80% probability range in 2050):

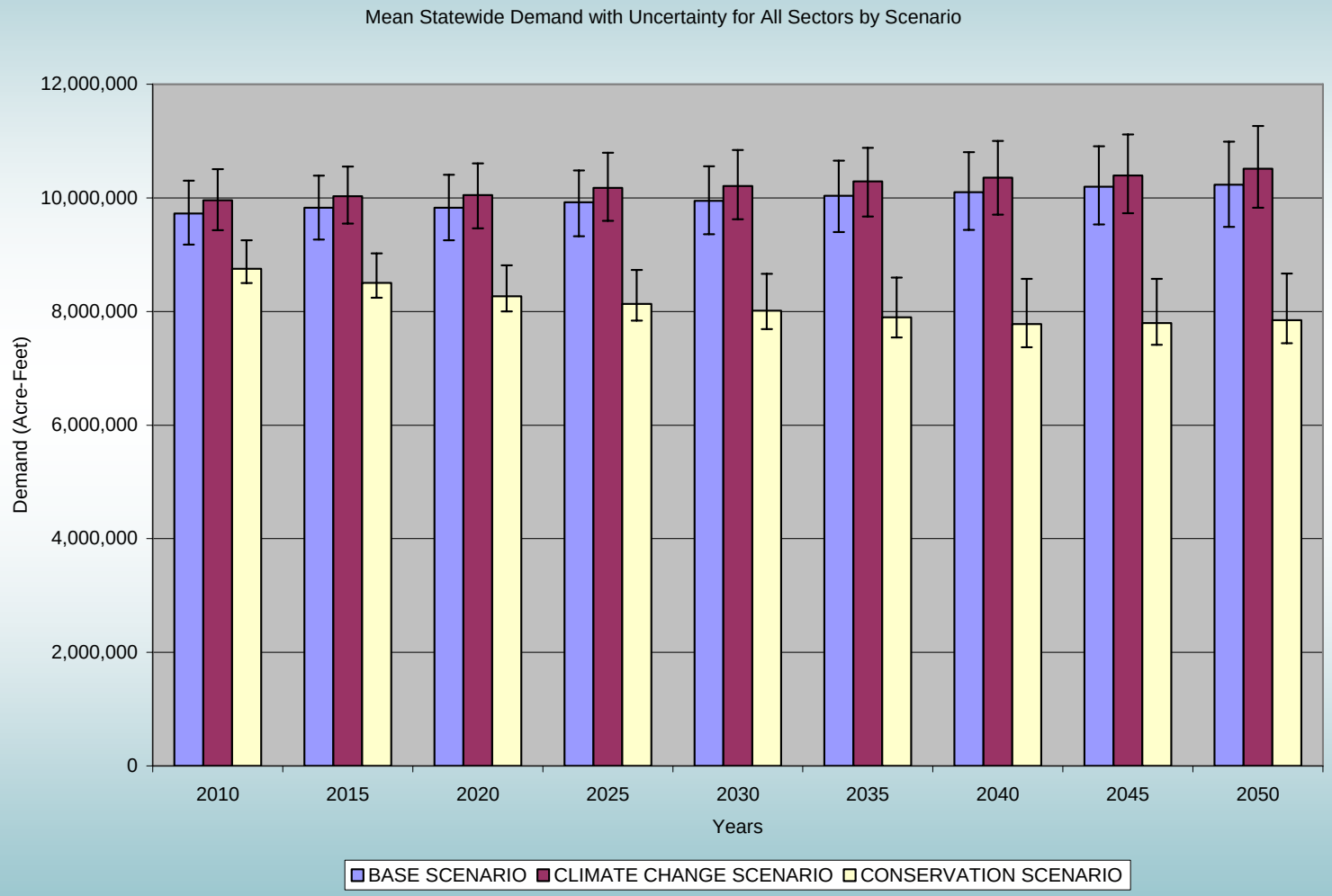
  – Base Case: 9.5 – 11 million acre-feet

  – Climate Change: 9.8 – 11.3 million acre-feet

  – Conservation: 7.4 to 8.3 million acre-feet

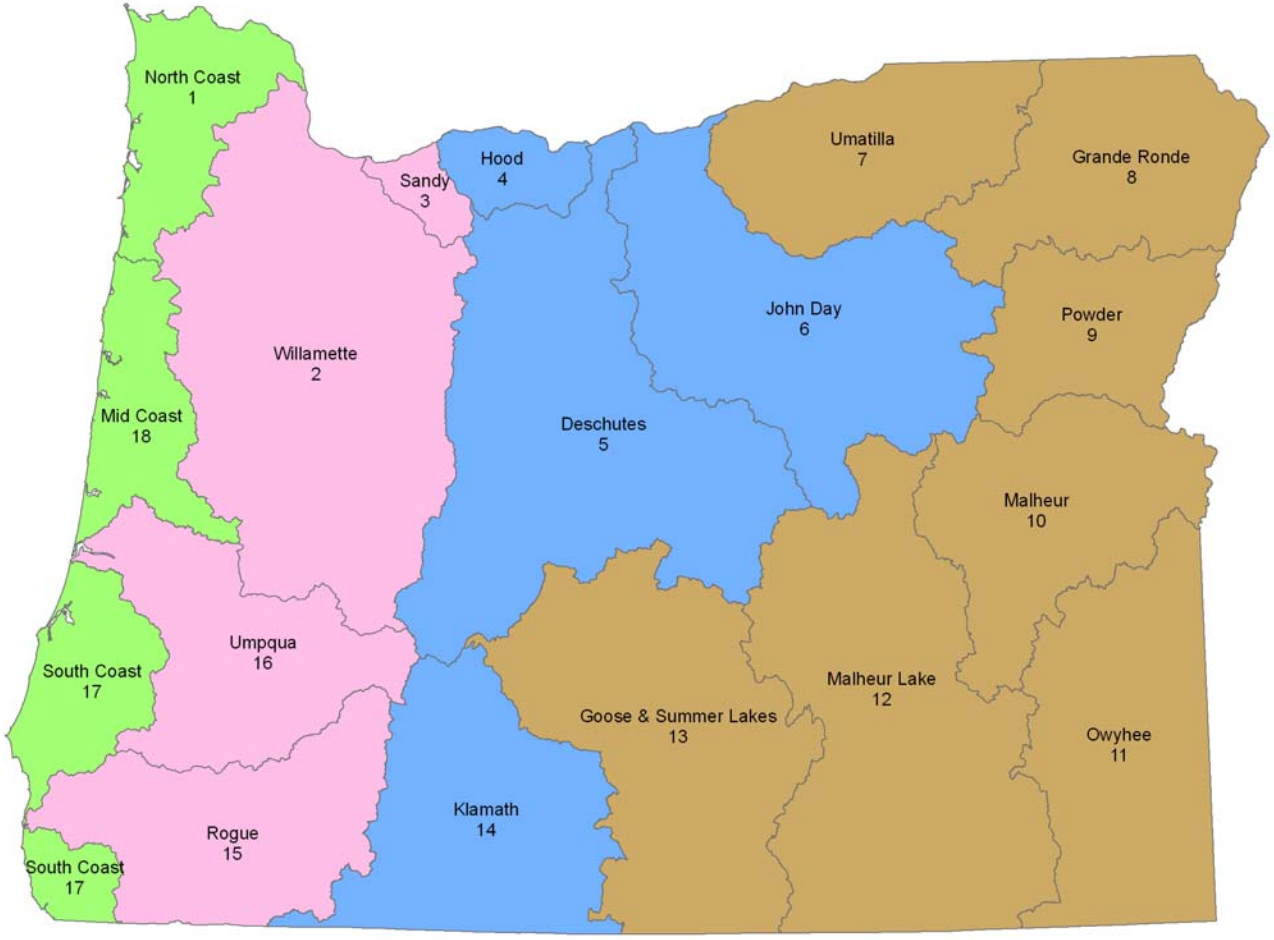
    - Requires substantial changes in how the public uses water, as well as significant investments

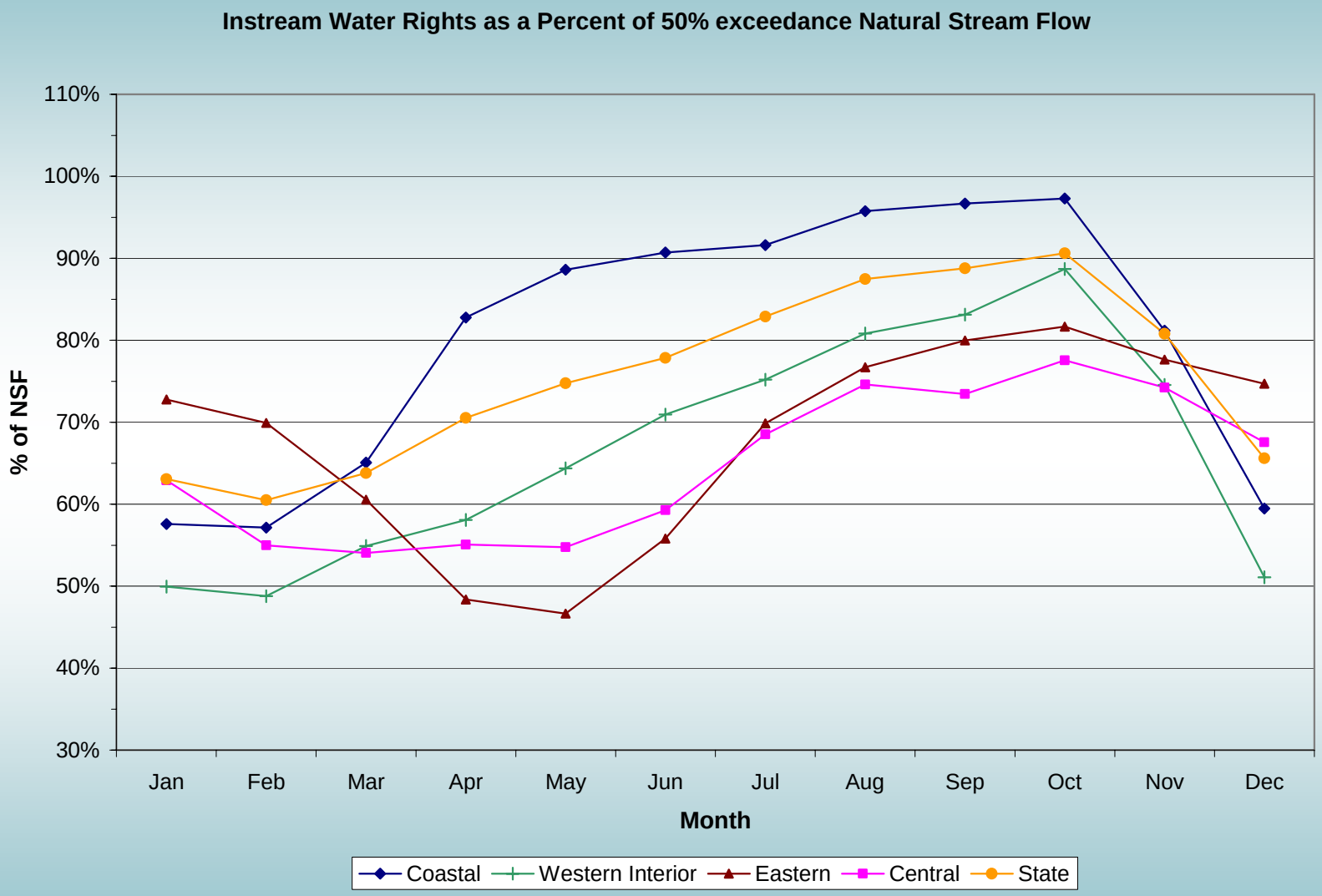
Water Demand Assessment



Water Demand Assessment

- Instream - Ecological
  - Demands based on:
    - Existing instream water rights and state scenic water way designations
    - Estimate of instream flow need is made using a fraction (or ratio) of the 50% exceedance natural flow levels in the same region
  - Sum total at discharge points for each administrative basin
  - Reported in annual volume basis


North Coast
1
Willamette
2
Sandy
3
Hood
4
Deschutes
5
John Day
6
Umatilla
7
Grande Ronde
8
Powder
9
Malheur
10
Owyhee
11
Malheur Lake
12
Goose & Summer Lakes
13
Klamath
14
Rogue
15
Umpqua
16
South Coast
17
Mid Coast
18
South Coast
17


Instream Water Rights as a Percent of 50% exceedance Natural Stream Flow
110%
100%
90%
80%
70%
60%
50%
40%
30%
% of NSF
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Month
Coastal
Western Interior
Eastern
Central
State

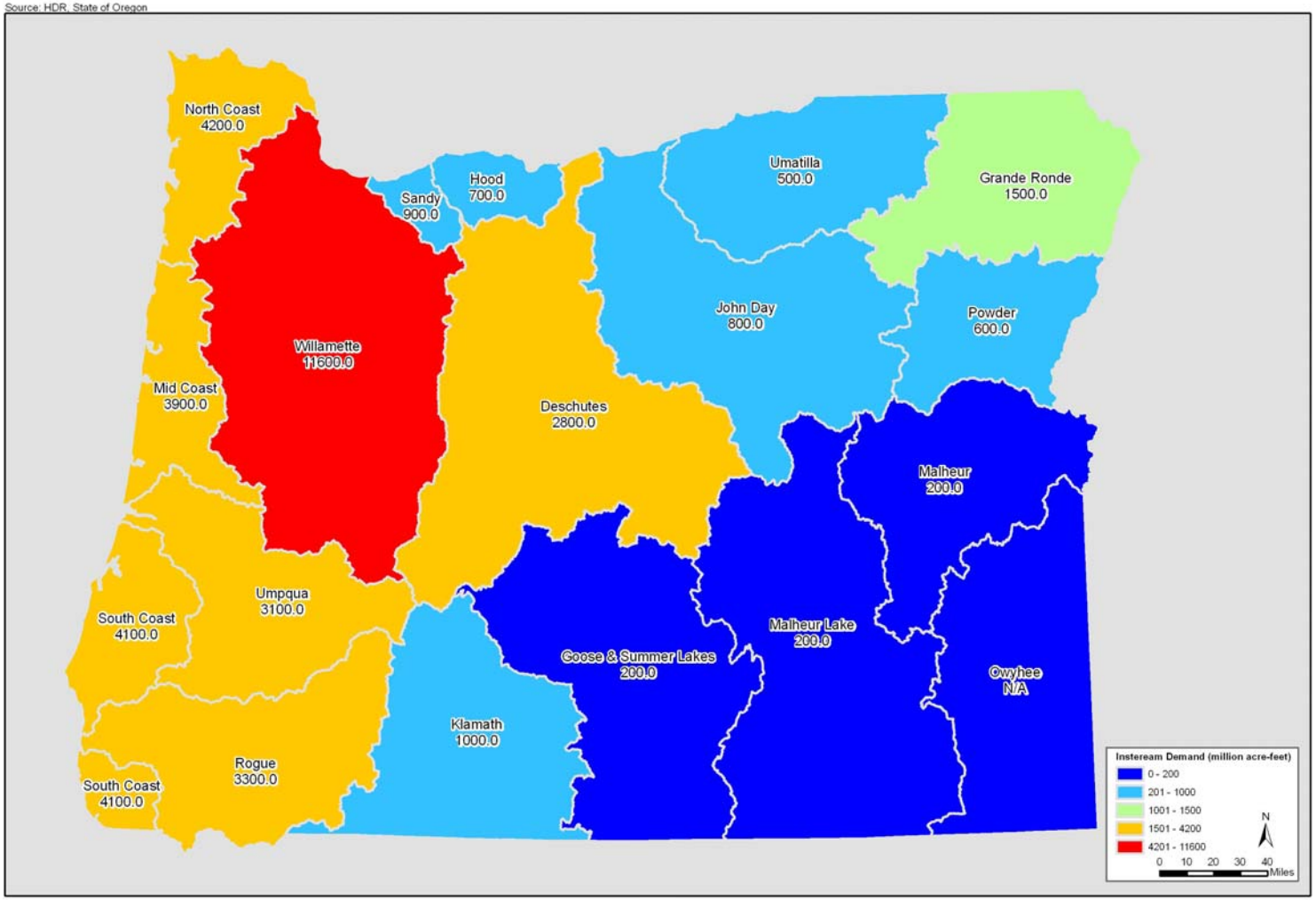
Water Demand Assessment

- Ecological
  - Willamette (11 million acre-feet)
  - Coastal basins (3-4 million acre-feet)
  - Deschutes, Rogue, Umpqua, Klamath and Grande Ronde (range from 1-4 million acre-feet)

Table 14. Total Instream Demand by Administrative Basin (acre-feet)

Administrative Basin	Annual	July	January	Ratio July/Jan	Annual Out-of-stream Consumptive Demand (2010)*	Annual Ratio (out-of-stream/ instream)
1 - North Coast	4,214,000	86,000	668,000	13%	620,000	14%
2 - Willamette	11,560,000	370,000	1,578,000	23%	2,558,000	22%
3 - Sandy	915,000	44,000	98,000	45%	38,000	4%
4 - Hood	670,000	38,000	79,000	48%	338,000	50%
5 - Deschutes	2,772,000	219,000	225,000	97%	232,000	8%
6 - John Day	794000	30,000	48,000	62%	966,000	119%
7 - Umatilla	459,000	15,000	48,000	32%	350,000	75%
8 - Grande Ronde	1,521,000	119,000	85,000	140%	207,000	13%
9 - Powder	575,000	40,000	28,000	143%	863,000	146%
10 - Malheur	203,000	8,400	11,000	73%	246,000	121%
11 – Owyhee**	N/A	N/A	N/A	N/A	62,000	N/A
12 - Malheur Lake	230,000	11,000	12,000	91%	70,000	31%
13 - Goose & Summer Lake	248,000	9,700	12,000	78%	51,000	21%
14 - Klamath	1,033,000	83,000	90,000	92%	780,000	75%
15 - Rogue	3,324,000	124,000	402,000	31%	974,000	29%
16 - Umpqua	3,064,000	86,000	442,000	19%	46,000	1%
17 - South Coast	4,096,000	69,000	655,000	10%	566,000	14%
18 - Mid Coast	3,860,000	82,000	622,000	13%	90,000	2%

Source: HDR, State of Oregon



Surrogate Instream Demand for Ecological Use by Administrative Basin

FIGURE 19

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Water Demand Assessment

- Hydropower assessment
  - Regional power demands outside the state impact the power generation needs within the state
  - New hydropower demands can be met by expanding the capacity of existing facilities or creating new facilities altogether
  - Water demand for hydropower discussed in terms of demand for hydropower.

Water Demand Assessment

- Hydropower assessment
  - INL survey, OWRD dam inventory, FERC licensing
  - Key basins: Willamette, Umpqua, Rogue, Deschutes
  - ~8,000 MW conventional hydroelectric capacity existing
  - ~2,000-3,000 MW undeveloped capacity at existing sites

Water Demand Assessment

- Issues affecting need for hydropower
  - Renewable energy source with limited impacts on climate
  - Susceptible to climate conditions
  - ESA: impacts to operations from biological opinions
  - Transmission

Forecasting Data Needs

- Enhanced water use reporting system
- Trends in irrigated agriculture; urban-rural development patterns
- Coordinated statewide population forecasting program
- Conservation potential assessment
- Local climate change impacts study
- Hydrological study for ecological needs
- Hydropower potential assessment
- Sources of supply

Demand Assessment Conclusions

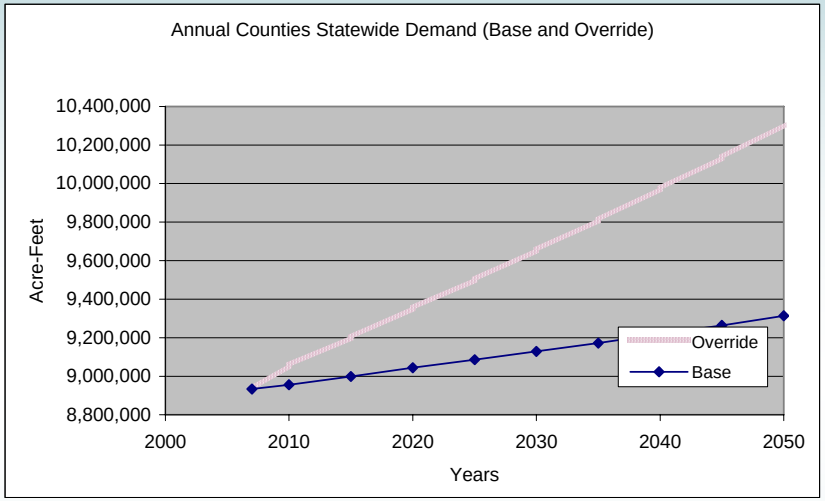
- Forecast scenarios and the forecasting tool are useful for
  - estimating the current magnitude and distribution of water demands
  - understanding demand trends for policy discussions
- Data gaps requires understanding of:
  - model limitations
  - uncertainties with the demand forecast

State/Regional Water Demand Model

(Forecasting Tool)

Graph and Table Parameter Selection	
Selected Geographic Area	Statewide
Selected Name	Counties
Selected Month	Annual
Selected Crop Group	TOTAL
Selected Municipal/ Domestic Well Demand Type	Total
Display Units	Acre-Feet

Chart Types (Choose Option)	
1. Demand	Line Chart
2. Demand by Major Sectors	Stacked Bar Chart
3. Demand for MDI Sectors	Stacked Bar Chart
4. Show Charts 1, 2, & 3	Show All
5. Base & Override Demand	Line Chart



Annual Counties Statewide Demand (Base) (Acre-Feet)

Years	Municipal Systems	Domestic Wells	Industrial	Agricultural	Total	Municipal and Industrial
2007	539,036	80,295	533,622	7,780,349	8,933,302	1,072,658
2010	559,123	83,242	533,622	7,780,349	8,956,336	1,092,745
2015	595,570	88,750	533,622	7,780,349	8,998,291	1,129,192
2020	634,641	94,600	535,084	7,780,349	9,044,674	1,169,725
2025	671,637	100,215	533,622	7,780,349	9,085,822	1,205,259
2030	709,440	105,917	533,622	7,780,349	9,129,329	1,243,062
2035	746,890	111,610	533,622	7,780,349	9,172,471	1,280,513
2040	786,675	117,749	535,084	7,780,349	9,219,857	1,321,759
2045	825,817	123,870	533,622	7,780,349	9,263,658	1,359,440
2050	868,885	130,566	533,622	7,780,349	9,313,423	1,402,508

Tour Highlights

- Overview of worksheets (tabs)
- Base vs. Override
- Output summaries
- Sorting features
- Override features

Questions?