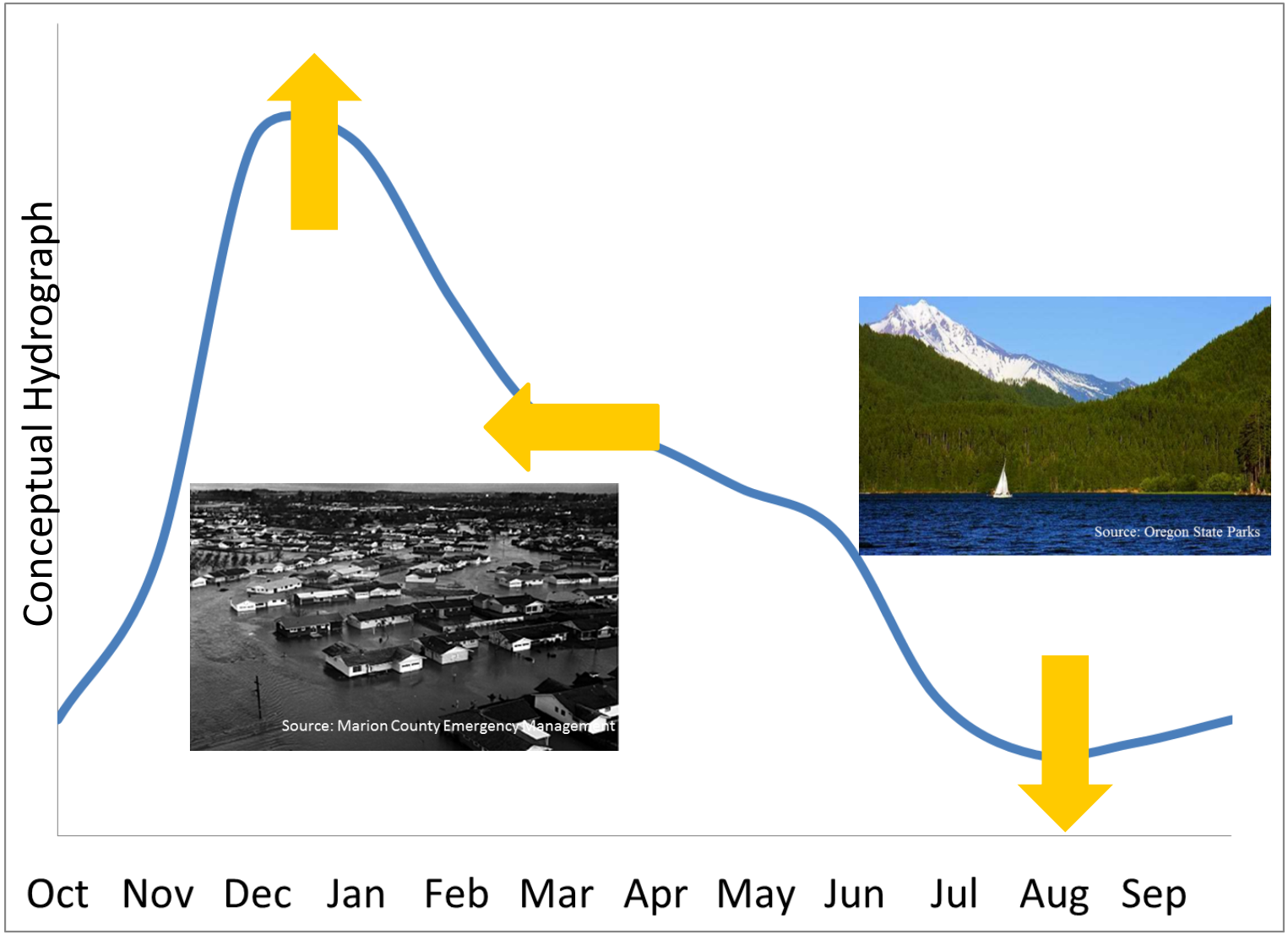
The Value of Stored Water to Summertime Reservoir Recreation

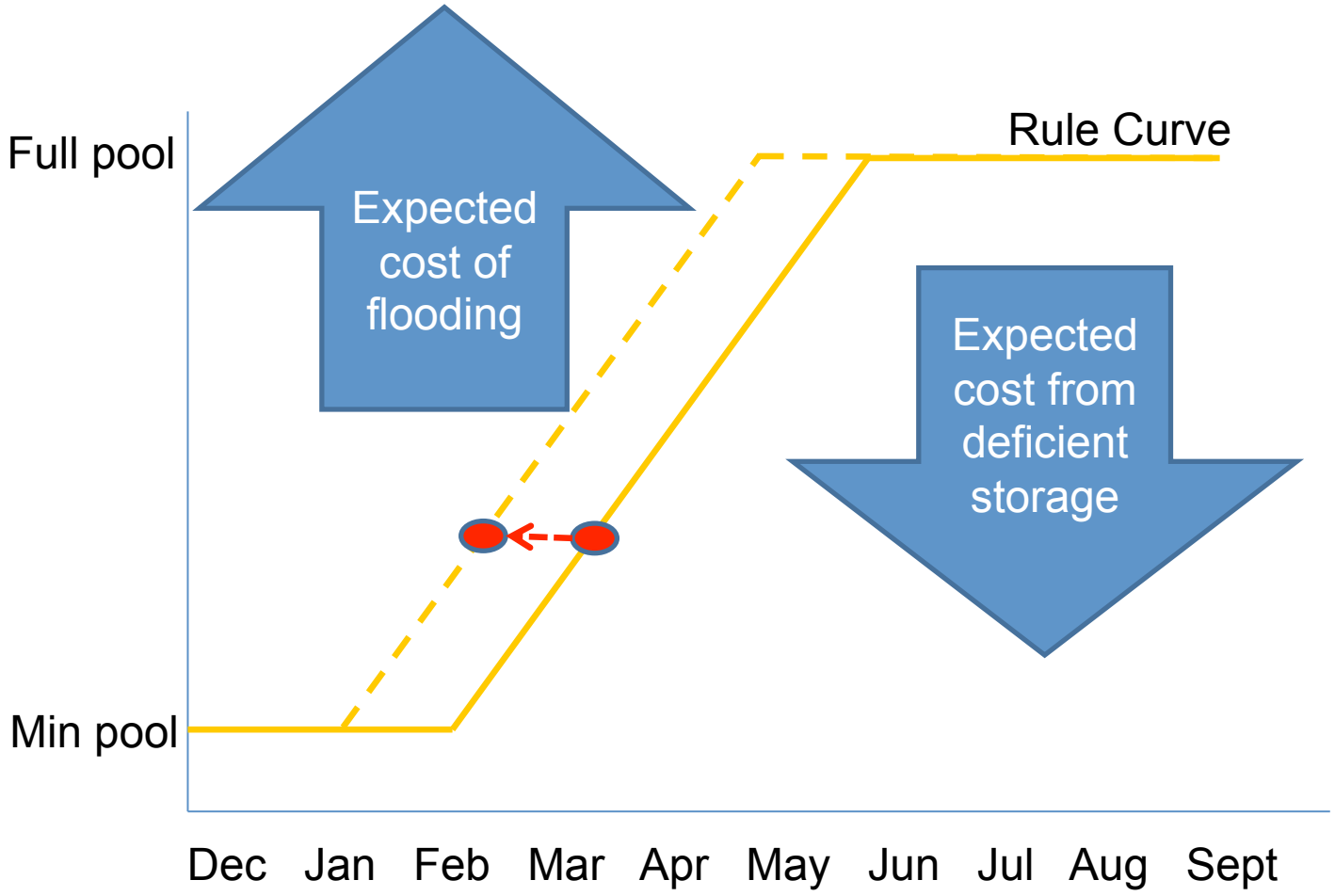
Kathleen Moore

Oregon State University

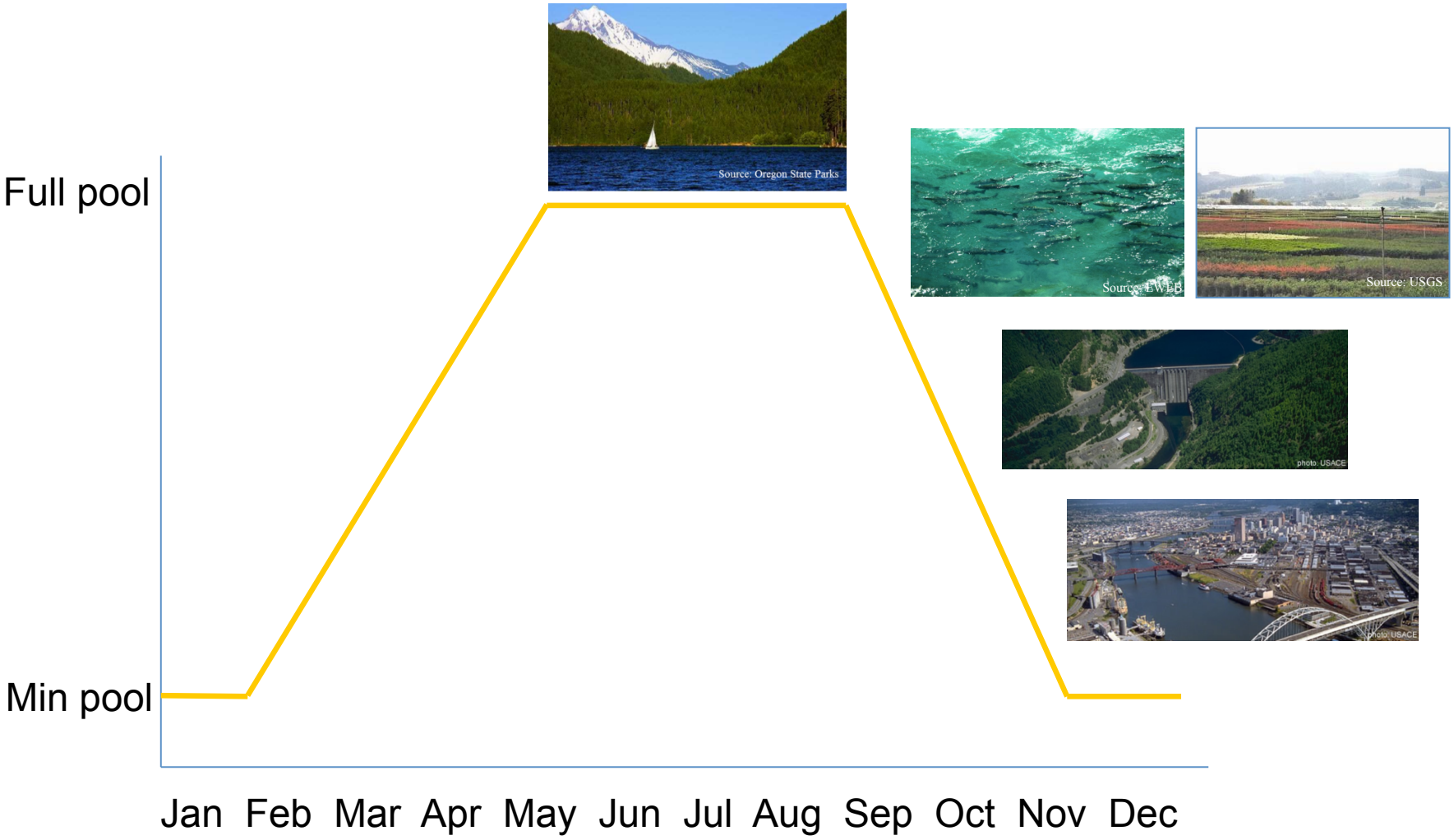
Balancing Supply and Demand



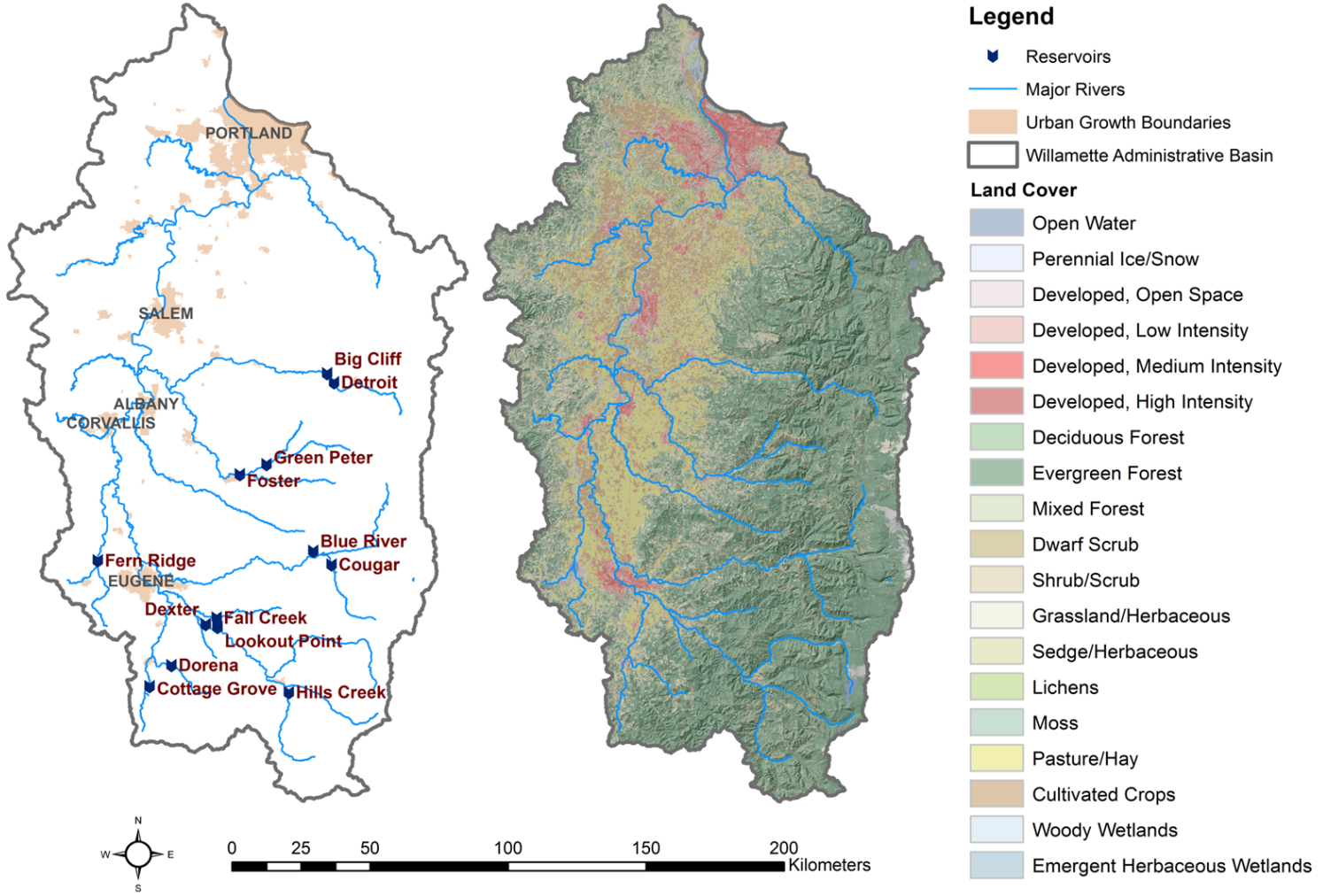
Reservoir Tradeoffs: Flooding vs. Storage



Reservoir Tradeoffs: Storage vs. Releases

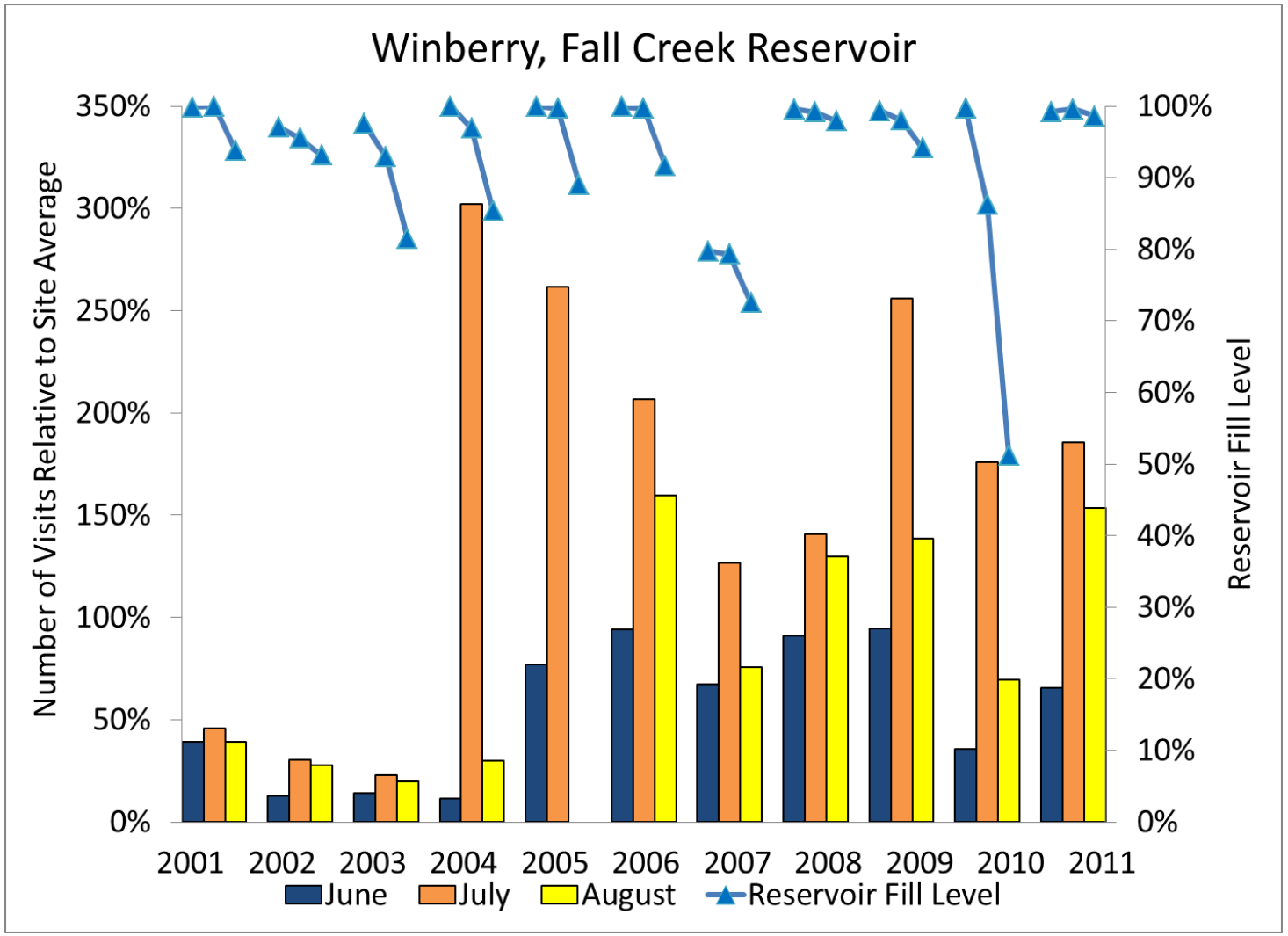


Willamette River Basin, Oregon



Data Sources: Hydrography simplified from USGS National Hydrography Dataset; Land cover from USGS National Land Cover Database 2006; Reservoir locations from USACE; Urban growth boundaries (2010), Willamette Administrative Basin, and 10m hillshade/DEM sourced from Oregon Geospatial Data Clearinghour.

Summertime Reservoir Fill Level vs. Number of Recreational Visits



Model Specification

- Panel analysis: monthly visitation by site, 11 years , 9 reservoirs (USACE data)
- Visitation response to changes in reservoir fill level:

$$Visits_{ij} = \beta_0 + \beta_1 Reservior\ Fill\ level_{ij} + \beta_2 Fill\ level{*}Reservoir_{ij} + \beta_3 Ramp\ Access_{ij} + \beta_4 Month_i + \beta_5 Precipitation_i + \beta_6 Temperature_i + \beta_7 Weekends_i + \beta_8 Population\ Gravity_{ij} + \varepsilon$$

Results: Effect of Fill Level by Reservoir

Explanatory Variable	Impact	Units % Change in Visits Per:
Reservoir Fill*		
Blue River	**0.3**	Foot below max fill
Cottage Grove	1.1	Foot below max fill
Cougar	0.1	Foot below max fill
Dorena	0.6	Foot below max fill
Fall Creek	**-1.0**	Foot below max fill
Fern Ridge	**-1.7†**	Foot below max fill
Foster	**-2.1†**	Foot below max fill
Green Peter	0.4	Foot below max fill
Lookout Point	-0.3	Foot below max fill
Average	-0.3	Foot below max fill

†p-value<0.1.

Results: Control Variables

Explanatory Variable	Impact	Units % Change in Visits Per:
Ramp Access	**-26.7**	Loss of ramp access
July	**33.0**	Relative to June
August	**18.9**	Relative to June
Precipitation	**-7.8**	/inch
Temperature	-0.7	/degree F
Weekends	-1.2	Months with 5 relative to 4 weekends
Population gravity	**0.7**	/1000 people normalized by travel time

Value Estimation

- Implicit value of water ($/acre-foot) to summertime reservoir recreation:

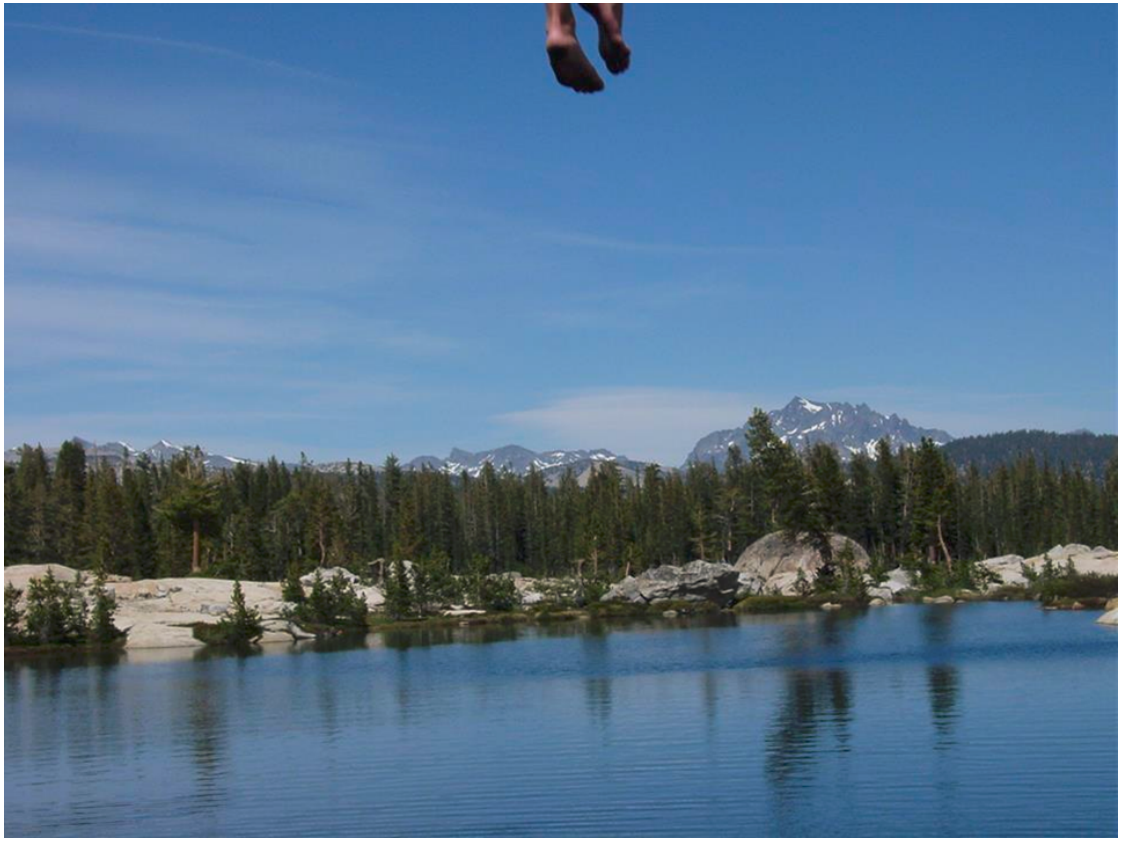
$$Marginal\ value\ of\ water\ for\ recreation = \frac{\left(\frac{\%\ Change\ in\ visits}{ft\ elevation}\right)\left(\frac{Average\ visits}{Month}\right)\left(\frac{\$\ Willingness\ to\ pay}{Visit}\right)}{\left(\frac{Reservoir\ volume}{ft\ elevation}\right)}$$

- Sources of uncertainty:
  - Relatively short time horizon for the panel data analysis.
  - Proportion of visitation captured by USACE data

Implicit Value and Implications

- The estimated value of stored water to reservoir recreation:
  - $10/acre-foot at Fall Creek
  - $11/acre-foot at Fern Ridge
  - $77/acre-foot at Foster
- The estimated value of water to irrigated agriculture in the basin is $17/acre-foot.

Questions?



Thank you!