Piloting Utility Modeling Applications:
Planning for Climate Change at the Portland Water Bureau

Edward Campbell
Director, Resource Protection and Planning
PUMA Workshop, Boulder, CO
May 2, 2016
OVERVIEW

1. Background on Portland System and Climate Work
2. Hydrologic Model and GCM Downscaling
3. What We Learned from PUMA
Portland’s Water System

Portland Groundwater Pump Station
Climate Impacts

The Impacts of Climate Change on Portland's Water Supply:
An Investigation of Potential Hydrologic and Management Impacts on the Bull Run System

Dr. Richard N. Palmer and Margaret Hahn
Department of Civil and Environmental Engineering
University of Washington
Box 352700
Seattle WA 98195-2700

For
Portland Water Bureau
January 2002

2002 Study by Richard Palmer and Margaret Hahn, University of Washington
Climate Impacts:
Drawdown, Turbidity, Fire
Climate Impacts:
Water Quality & Temperature
Climate Impacts: Extreme Events Affecting Assets & Infrastructure
PUMA project at PWB
PWB Needs:
Build Internal Expertise & Capacity
PWB Needs: Strong Climate Science Partnerships

Image of logos:
- CIRC
- RISA
- OCCRI
- OSU
- University of Idaho
- University of Washington
PUMA: Customized tools for climate impacts analysis

1. Develop a hydrologic model for BR
2. Downscale climate data to BR
3. Build institutional expertise

Co-production & actionable science
PUMA: Customized tools for climate impacts analysis
Transition to UW Hydrologic Modeling & CIRC Model Evaluation and Downscaling
PUMA: PWB Lessons Learned

1. Recognize & share water system expertise with science partners

2. Learn from science partners about process of developing tools, and what tools and data can and cannot do

3. Existing historical datasets don’t always capture local observed conditions and may need to be customized for local water system dynamics
PUMA: PWB Lessons Learned

4. Important to generate internal support and trust in using modeling tools

5. Don’t need overly complex or costly model, but need it to be user-friendly and tested in previous climate change studies

6. Ongoing advice and support from science partners (CIRC) is invaluable to users like PWB
Applications: Long-term Supply Planning

Historical & future mean daily Mainstem streamflows by month

- Mean 1959-2005
- Mean 2039-2059
- Mean 2079-2099

Multi-modal median and range of percent change in future mean daily Bull Run basin streamflow by month

- Not statistically significant
Applications:
Water Quality & Stream Temperature

Distribution of historical & future daily Bull Run max temperature (20 GCMs)

- Mean 55
  - Max 100
- Mean 59
  - Max 112
- Mean 63
  - Max 122

Outflow Temperature, °C

- GCM 4 High Emissions Late-Century
- GCM 4 Low Emissions Late-Century
- GCM 6 High Emissions Late-Century
- GCM 6 Low Emissions Late-Century
- GCM 11 High Emissions Late Century
- GCM 11 Low Emissions Late Century

Date

Final Thoughts

• PWB is much better positioned to provide meaningful analysis of climate-related impacts to Portland’s water system

• Using these tools requires somewhat of a cultural change at PWB, and we are only in the earliest stages of educating our peers and colleagues about the benefits and the need to acknowledge future uncertainties

• Working with WUCA and climate scientists is moving us from traditional (linear) planning approaches to a new frontier in planning – both interesting and challenging
Questions?

Edward Campbell, Director, Resource Protection & Planning
Edward.Campbell@portlandoregon.gov

Kavita Heyn, Climate Science Coordinator
Kavita.Heyn@portlandoregon.gov

https://www.portlandoregon.gov/water/climatechange