Planning for drought in Utah and the Intermountain West

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Western Water Assessment
University of Colorado-Boulder, CIRES
University of Utah, GCSC
“Scientists and decision-makers collaborating to plan for drought in Utah/Intermountain West”
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Western Water Assessment (WWA): A NOAA RISA program

- NOAA: Funded by National Oceanic and Atmospheric Administration
- RISA: Regional Integrated Sciences and Assessment Program
- University of Colorado-Boulder
  - CIRES: Cooperative Institute for Research in Environmental Science
- University of Utah
  - Global Change and Sustainability Center
NOAA RISA program

- **Program goal**: to build and expand nation’s capacity to prepare for and adapt to climate variability and change
- Focus on working with users of climate information
  - Resource managers (water, range, forest)
  - Decision-makers (state, county, local, agencies)
- Connect climate research to practitioners
- Develop *usable science*
- *Coproduction* of research
• 10 regional programs
• Since late 1990s
• WWA funded in 1999
• WWA works in Utah, Colorado and Wyoming
• Recent focus on drought
• CIRC – Climate Impacts Research Consortium
Utah just experienced its driest year since scientists have kept records
Current Utah drought
And now it’s snowing...
The drought is over!

NO!!!
Typically: Short-term, reactive, poorly coordinated emergency responses to drought. This crisis response is often poorly targeted and ineffective at reducing underlying risk.
Partnership with NIDIS

National Integrated Drought Information Systems

https://www.drought.gov/drought/

- NIDIS is a division of NOAA
  - Provider of drought information
  - Resource for drought planning
- NIDIS has regional Drought Early Warning Systems (DEWS)
- WWA is funded by NIDIS for drought research, outreach and planning
- Intermountain West DEWS
- Focus on stakeholder outreach in Utah
Drought work in Utah

- Drought contingency planning with water providers
- Utah drought stakeholder meetings
- State of Utah drought response planning
- Drought Decision Ranching Model
- Drought decision analysis
Weber Basin WCD drought planning

- Bureau of Reclamation funded
- Develop a drought contingency plan
- Collaborative effort
  - Utah DWRe, USU, WWA, consultant
- Information about past and future drought to inform planning
Weber River systems model

Information on drought
- water supply
- reservoir storage

Weber Basin WCD Drought Contingency Plan
Drought stakeholder engagement in Utah

• Utah drought stakeholder meeting – November 2017
  — Water providers, state and federal agencies

• Utah Division of Water Resources
  — Collaboration on drought response planning

• Drought Response Plan workshop – July 2018
  — Drought planning expertise from Colorado, Arizona and New Mexico
Drought Ranch Insurance Response model

- Model provides annual ranching income
- Based on scenarios
  - Drought/ no drought
  - Ranch management strategies
  - Insurance/no insurance
- Available online: [http://www.ranching.io/](http://www.ranching.io/)

William Travis, University of Colorado-Boulder
Drought Ranch Insurance Response model

• Research questions:
  – Does insurance affect grazing intensity in larger herds?
  – Does insurance affect drought adaptation?
  – How does drought forecasting affect investment in drought adaptation?

• Available online: http://www.ranching.io/

William Travis, University of Colorado-Boulder
Five-year runs for a 600-head cow-calf operation accessing 8,000 acres in eastern Colorado with and without PRF insurance
Pasture, Rangeland and Forage (PRF) insurance program

- Insurance payments currently based on precipitation indices
- Comparison of current payment structure to one based on USDM
- What is the risk of non-payment of insurance during drought?
- Experimental comparison tool:
  - https://www.earthlab-riskappone.org/

William Travis, University of Colorado-Boulder
Helping towns/cities plan for climate risks

- Piloting VCAPS facilitation process
  - Vulnerability, Consequences and Adaptation Planning Scenarios (U. of South Carolina, CISA)
- Explores municipal vulnerabilities to changing climate risks
- Can serve as starting point and road map for municipal climate change planning
WWA VCAPS projects

• 5 workshops in summer/fall 2018
• Colorado (focus on drought)
  – Durango, Cortez, Carbondale and Routt County
• Utah
  – Springdale/Rockville/Hurricane
• One day workshops
• Provide climate information specific to community
• Facilitate brainstorming on climate risk/adaptation
Climate information
Intermountain West Climate Dashboard
http://wwa.colorado.edu/climate/dashboard.html

Recent Temperatures and Precipitation, and Current Snowpack

- **30-day Temp. Anomaly** (HPRCC)
- **30-day Precip as % Avg.** (HPRCC)
- **Water-Year Precip as % Avg** (HPRCC)
- **Current Snowpack as % Median** (NRCS)

Drought Monitoring

- **US Drought Monitor** (NDMC)
- **Westwide and State Drought Monitors** (NDMC)
- **Standardized Precip Index** (SPI) (HPRCC)
- **Evaporative Demand Drought Index** (EDDI) (NOAA PSD, WWA, DRI)

(Updated daily)
Evaporative Drought Demand Index (EDDI)

- Indicator for drought
  - “Flash” droughts
  - Long-term droughts
- Early warning for drought
- 2 weeks to 12 months
- Compares potential evapotranspiration (ET) to reference ET
- Compares to 30 year average
- Mike Hobbins (NOAA), WWA
Extreme weather event database

• High impact weather events
• 1862 - present
• Online, searchable database
• 166 total → UT = 46, WY = 62, CO = 58
• Includes: cold wave, drought, flood, hail, high wind, landslide, tornado, wildfire, winter storm
• UT, CO, WY
• http://wwa.colorado.edu/climate/extremes/database/
Questions?

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Weber River stream flow reconstruction
(Bekker et al. 2014)

PAST

- Paleo-streamflow from tree rings
- 450 years
- Downscaled annual streamflow to monthly streamflow (Jim Stagge, USU)
- More severe and prolonged drought than in historical record
- Used as input for a Riverware model of the Weber River
• Projections of future Weber River flows
• Temperature and precipitation sensitivity analysis of Weber River flow
• Scenario planning approach
• Input for Weber River systems model