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Managing Water in the West



TRUCKEE BASIN STUDY

Technical Advisory Group Water Demand Workshop

August 26, 2013



TRUCKEE RIVER FLOOD PROJECT



Agenda

- **Welcome and Introductions**
- **WaterSMART and Basin Study Programs**
- **Truckee Basin Study Overview**
- **Workshop Focus: Water Demand Assessment**
- **Technical Advisory Group Discussion**
- **Ongoing and Future Basin Study Activities**

Meeting Format

- Participants will be on “silent” mode, except during discussion period.
- Participants can ask questions at any time by using the webinar “chat” function.
- Reclamation will respond to questions during the meeting and may post follow-up responses on the Basin Study website.
- Technical Advisory Group discussion will follow a presentation on demand.
- Webinar, voice and chat are being recorded, and will be available by request from Reclamation. Questions and comments, handouts, and other material will be posted on the web.



WaterSMART and the Basin Study Programs

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WaterSMART Program

- Implements SECURE Water Act, Public Law 111-11
- Established in 2010 by Secretary Salazar to...
 - Help water resource managers make sound decisions about water use
 - Develop strategies to ensure sufficient water supplies for multiple uses
 - Develop adaptive measures to climate change
 - Improve water conservation
 - Promote sustainability



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Basin Study Program

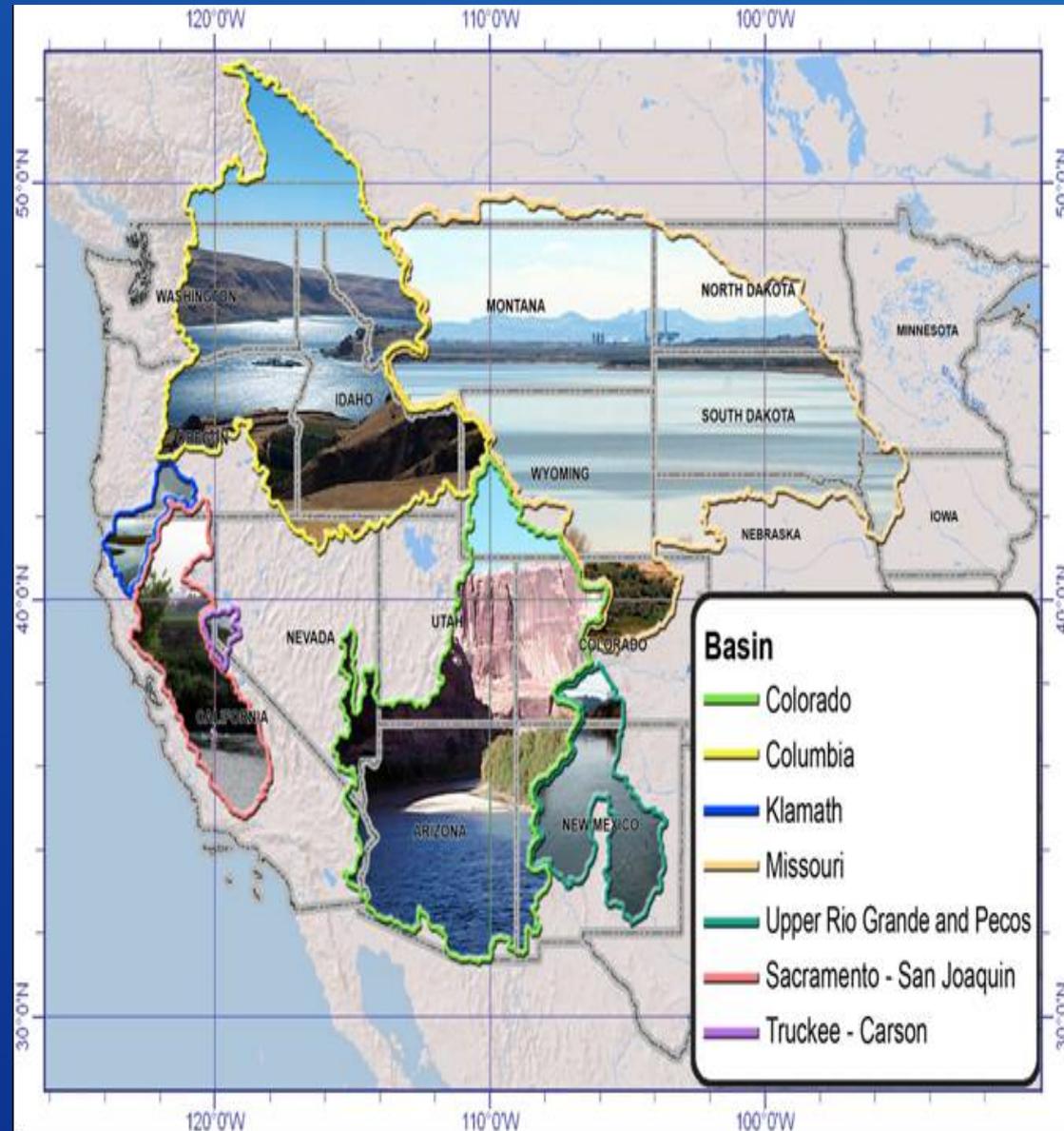
- **West-Wide Climate Risk Assessments**
- **Basin Studies**
 - Basin Studies to determine imbalances
 - Secure Water Act authorizes the potential follow-up with Feasibility or Special studies for promising strategies
- **Landscape Conservation Cooperatives**



West-Wide Climate Risk Assessments

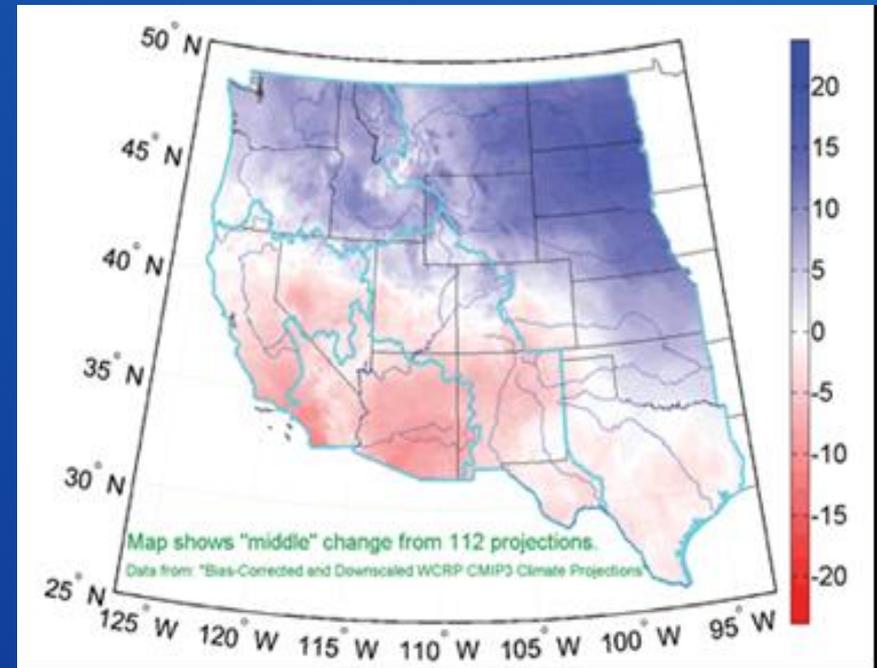
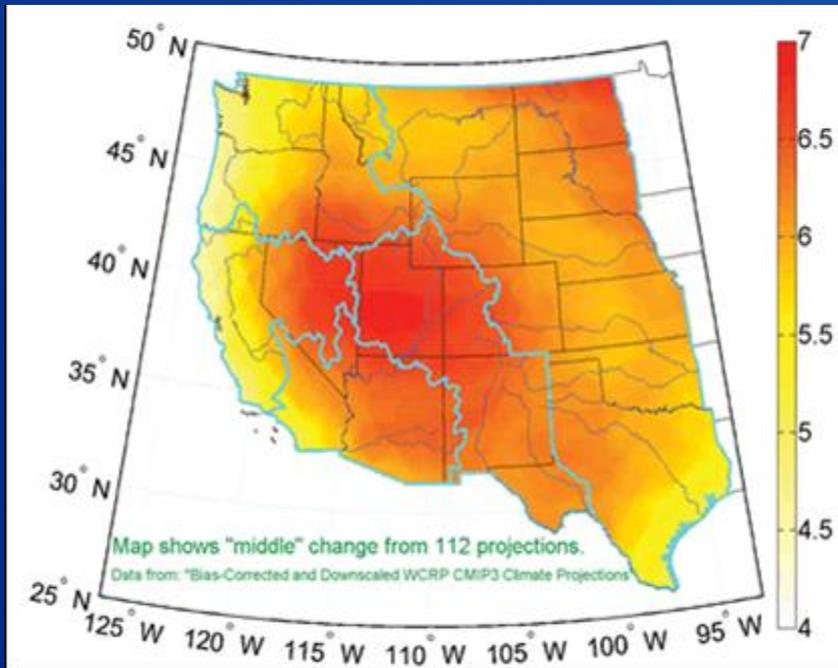
- **Conducted by Reclamation**
- **Reconnaissance-level water supply and demand analyses in eight Reclamation river basins**
- **Projections of climate change impacts to water supply and demand and baseline risk assessments to evaluate impacts of climate change to water uses**
- **Baseline for more in-depth analyses performed through Basin Studies**

**SECURE Water
Act Section
9503(c) –
Reclamation
Climate Change
and Water –
April 2011**



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SECURE Water Act Section 9503(c) – Reclamation Climate Change and Water – April 2011



Projected median temperature (°F) and precipitation (%) changes at the end of 21st century (2070–2099) relative to historic conditions (1950–1979)

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Truckee Basin Study Overview

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Basin Study Partners



50-50 cost share between Reclamation and partners

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Study Management Structure

Water Smart Basin Studies

Reclamation



Truckee Basin Study Project Steering Team



Reclamation
Mid-Pacific



Cost Share Partners
T M W A

Executive Committee



Study Team



Technical Advisory Group

Technical Experts & Regional Stakeholders

Workshop Topics

Supply Scenarios

Demand Scenarios

Metrics

Options

Strategies

Tribes

Public

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Basin Study Phases

- **Phase I & II**
 - Assess Basin Supplies
 - Assess Basin Demands
- **Phase III**
 - Evaluate Reliability
 - Assess Risks
- **Phase IV**
 - Review of Adaptation Options
 - Recommendation of Strategies

Truckee River Basin Study
Climate Change and Water Resources Assessment
Plan of Study



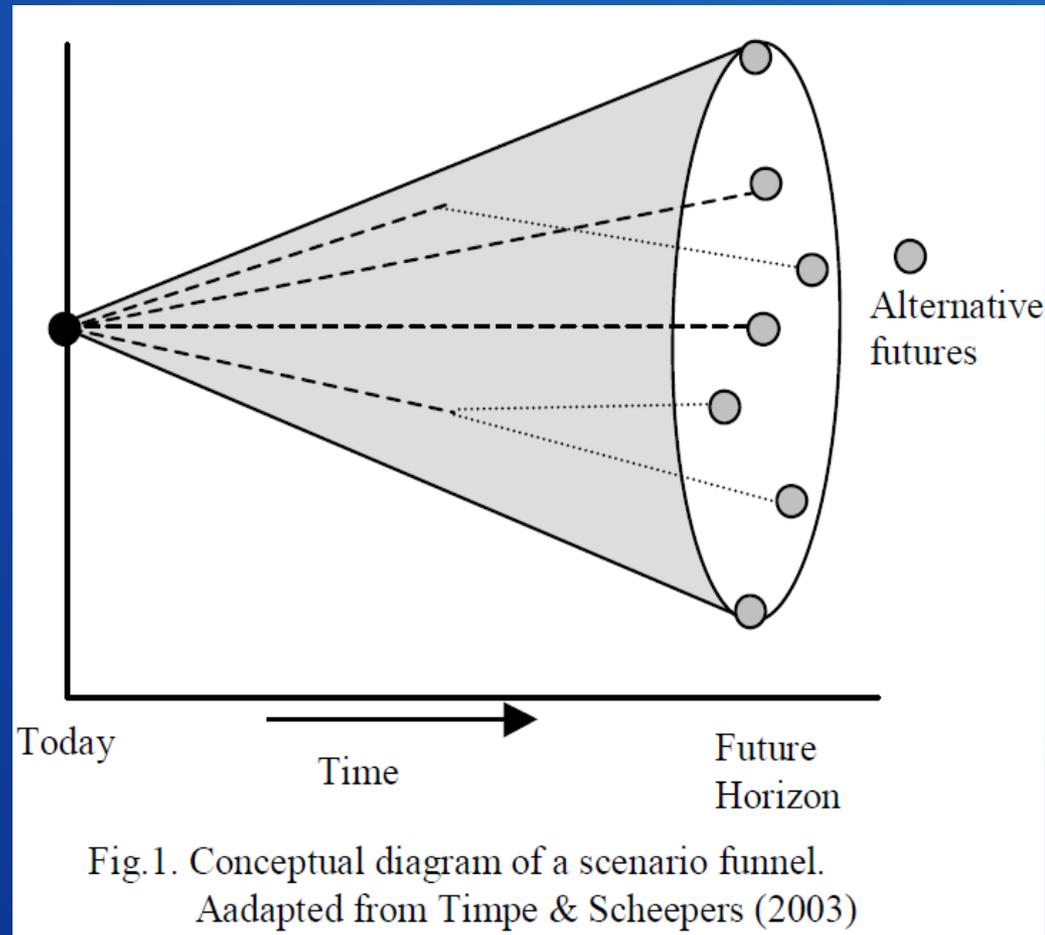
With Cost-Share Participation by these Major Study Partners:



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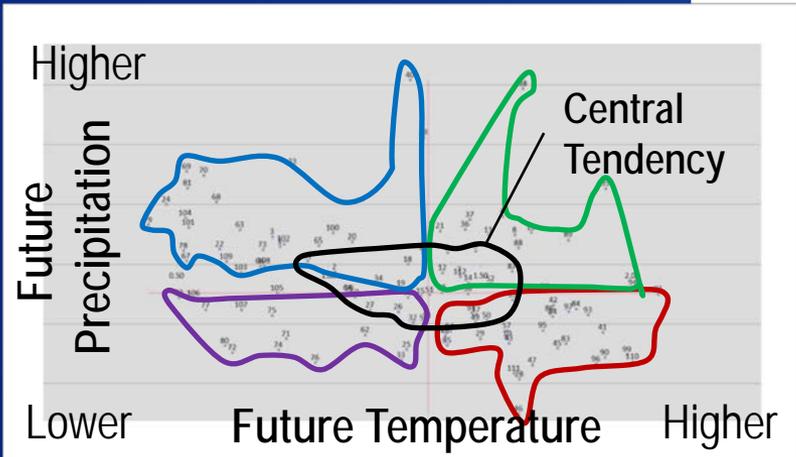
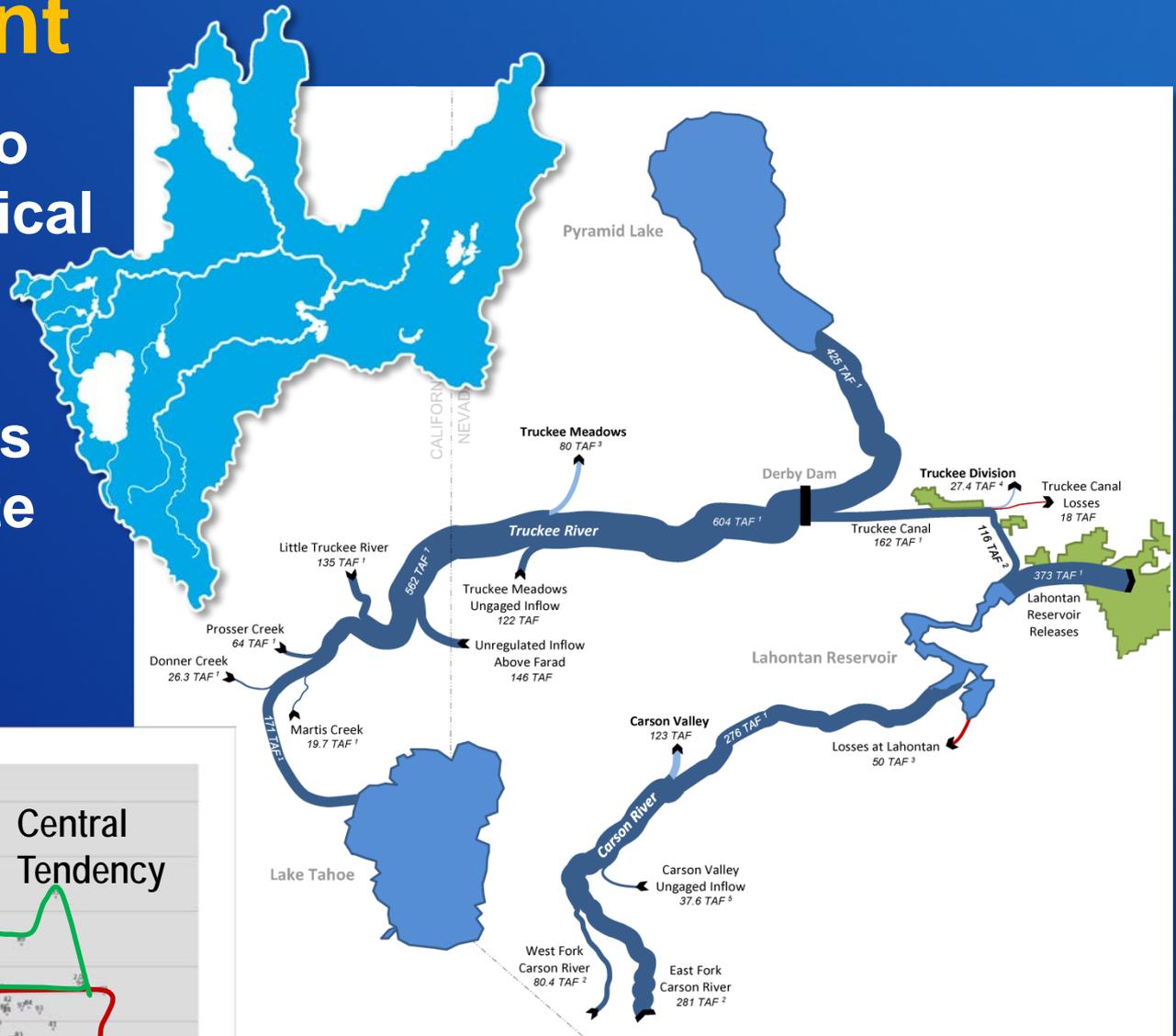
Phase I & II: Scenario Development

- Effective treatment of uncertainty is key to Basin Study
- Uncertainty is addressed through 'Scenarios'



Phases I & II: Water Supply Assessment

- Current scenario based on historical gage records
- Future scenarios based on climate projections



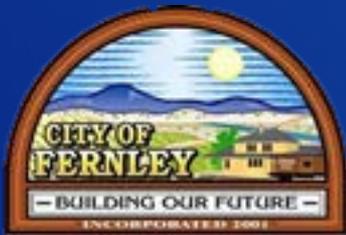
Phases I & II: Water Demand Assessments



- **Current Scenario based on information from a regional water supply Planning Model**
 - Developed collaboratively by regional stakeholders
 - Intended for use in TROA studies
- **Future Scenarios based on projections and input from regional planning agencies and stakeholders**
 - Regional Planning agencies have been interviewed over the previous months
 - Draft storylines will be introduced today for review and comment
 - Purpose of storylines is to bracket the plausible range of future demand

Input Obtained to Develop Demand Storylines

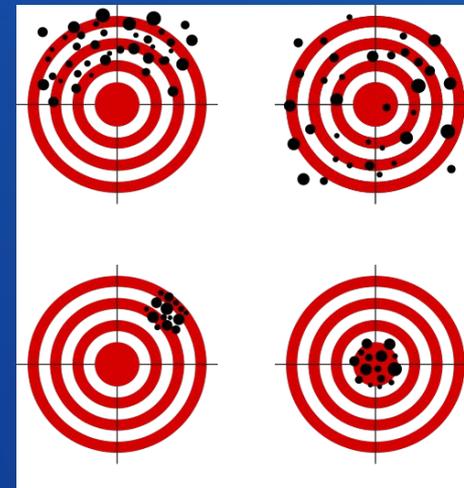
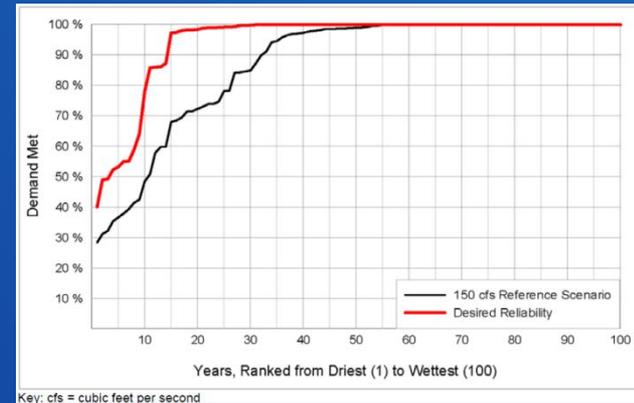
- Meetings with planning agencies to identify drivers of current and potential future growth in the basin



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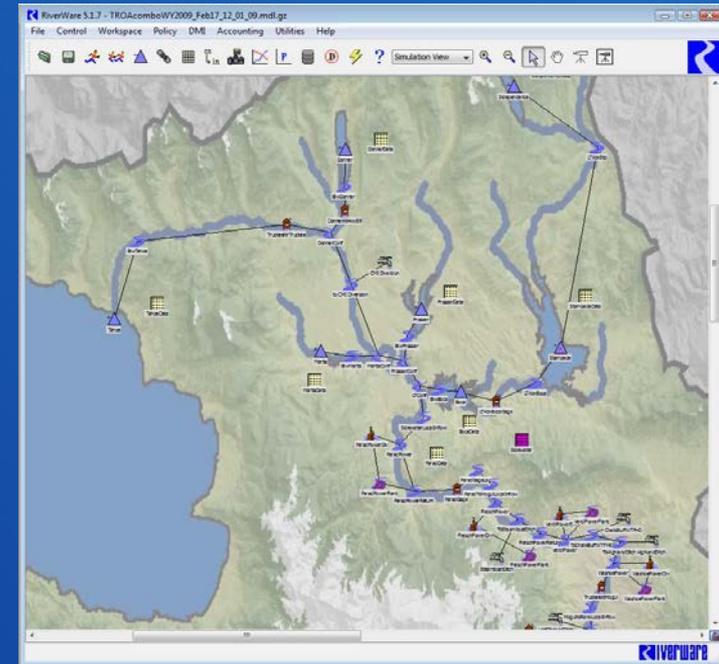
Phase III: System Reliability and Risk Assessment

- Evaluate reliability for metrics, across combination of Supply and Demand scenarios using existing metrics
- Review reliability metrics and results with Cost Share Partners and this Technical Advisory Group



Planning Model

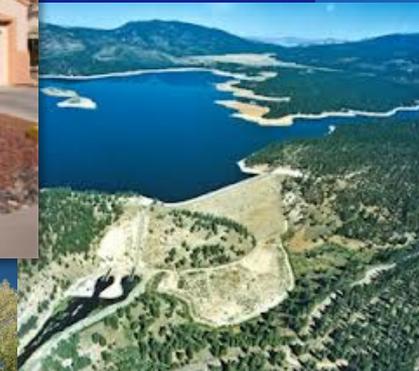
- **Platform – RiverWare**
 - 100+ years in extent
 - Has been used for Reclamation Studies
- **Collaborative Development (2009-present)**
 - USBR – Lahontan Basin Area Office
 - Truckee Meadows Water Authority
 - State of California (Dept. Water Resources)
 - State of Nevada (State Engineer)
 - Pyramid Lake Paiute Tribe
 - Federal Water Master
 - City of Fernley
- **Models all significant operations in the basin**
- **Appropriate for characterizing risks for Basin Studies**
 - Supply and Demand Scenarios are inputs
 - Can test strategies to reduce imbalances in supply and demand by
 - Changes in operations
 - Changes in infrastructure capabilities



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Phase IV: Development and Evaluation of Adaptation Strategies

- Identify and screen potential options
- Assess the multi-resource reliability of each short-listed options
- Evaluate the relative benefits of each option and portfolios of options (strategies)



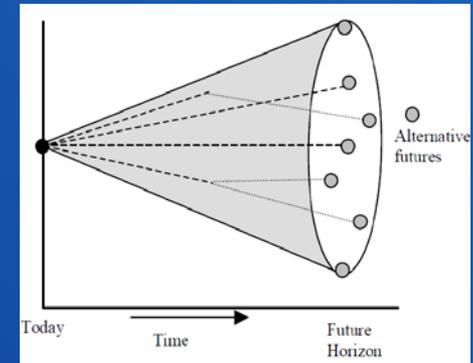


**Workshop Focus:
Water Demand Assessment**

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Water Demand Scenarios for the Truckee Basin Study

- **Current Demand Scenario**
 - Creates a basis for comparison
 - Based upon current formulation of TROA Planning Model
 - Includes variety of water users
 - Municipal and Industrial (M&I)
 - Agricultural
 - Environmental
- **Future Demand Scenarios**
 - Present plausible future conditions
 - Bracket how demand could change over next 100 years
 - Account for interdependencies between water users and the changing climate

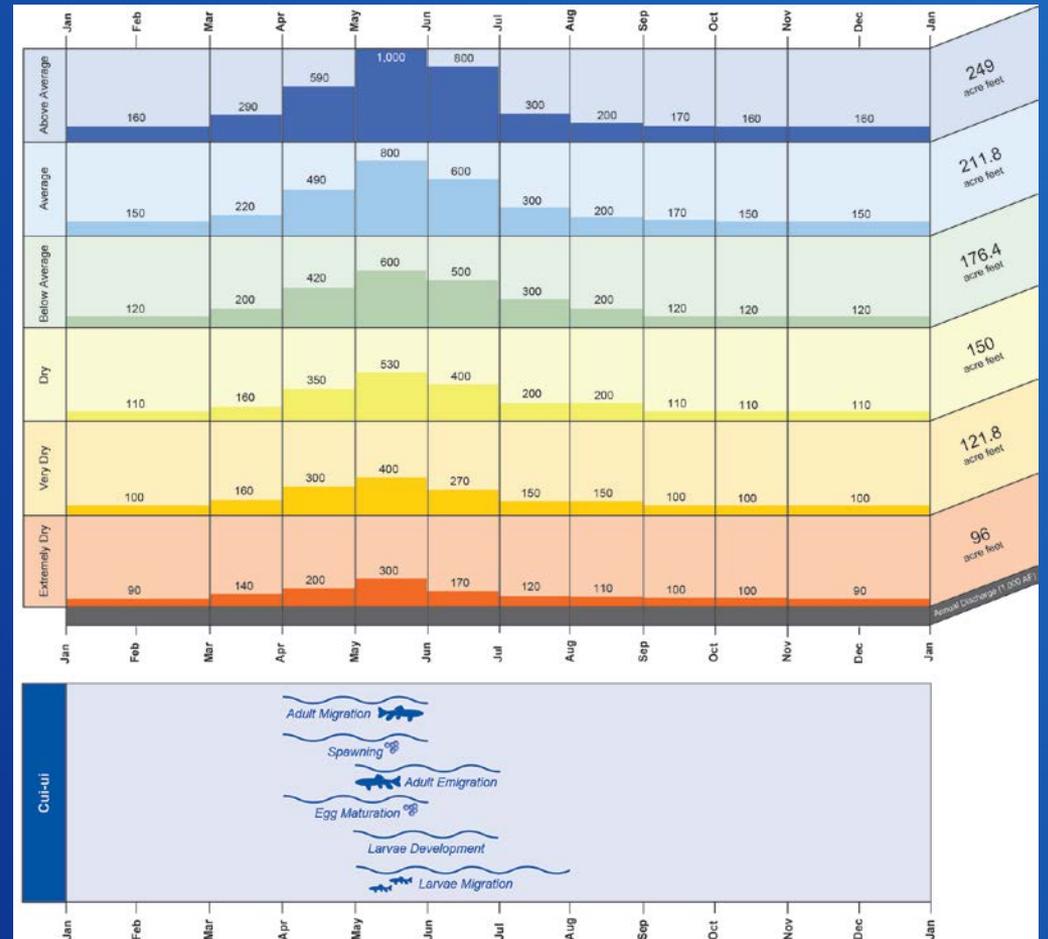


Current Demand Estimates

- **Municipal & Industrial Demands**
 - Reno area demands based upon TMWA planning estimates
 - Fernley demands based on Water Supply Master Plan
 - Tahoe drainage demands based upon TRPA and area utility estimates of recent demands
- **Agriculture**
 - Newlands Project demands based upon Reclamation records of acreages under cultivation in recent years
 - Truckee Meadows agricultural demands based upon recent acreages under cultivation, per Federal Watermaster

Current Demand Estimates (cont'd)

- **Environmental Demands**
 - Instream flow targets and bypass requirements
 - Six flow targets at Pyramid Lake
- **Evapotranspiration**
 - Historical losses at reservoirs and on Lake Tahoe

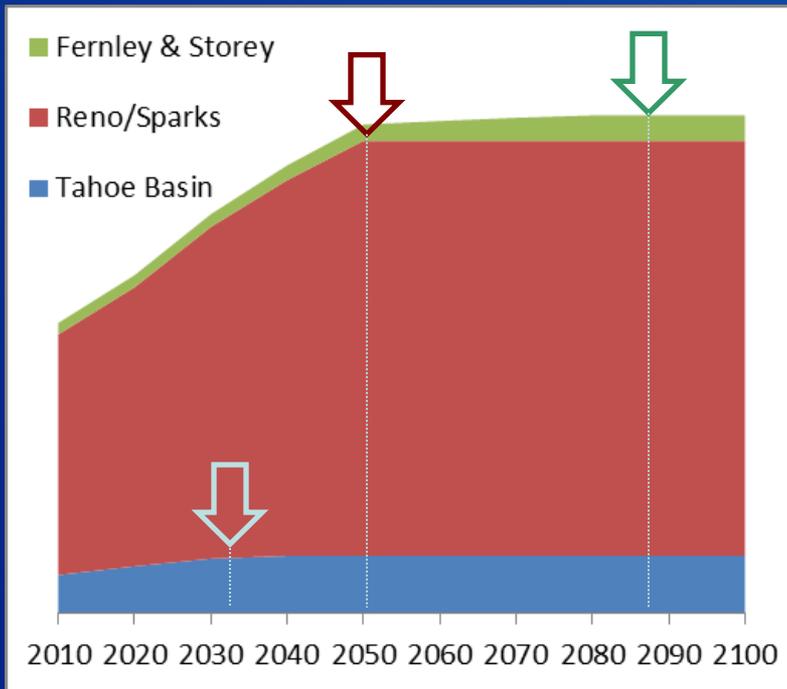


Future Demand Storylines

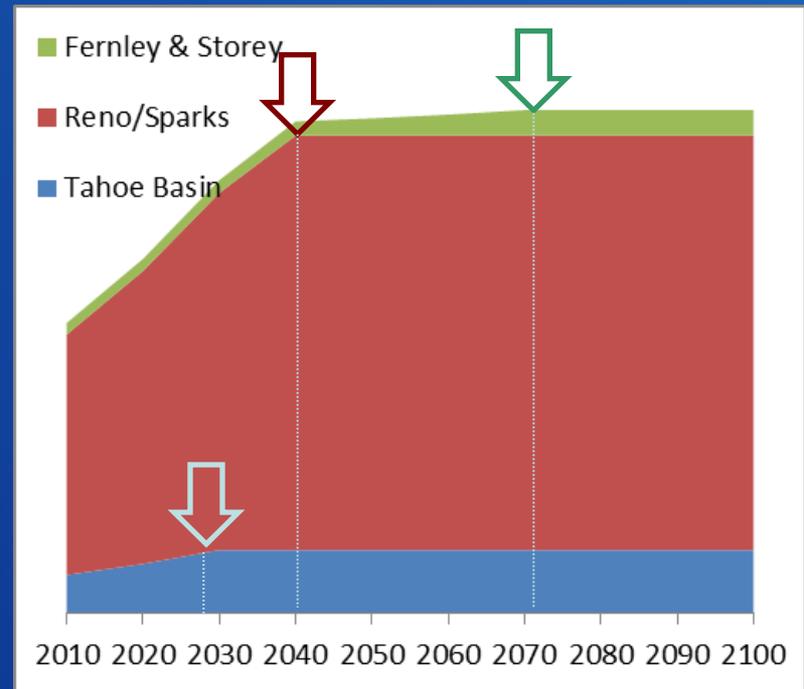
- **Plausible range of conditions that could develop in the Truckee River Basin between now and the year 2100, based upon several key factors:**
 - **Economic and Financial**
 - **Institutional and Political**
 - **Natural Systems**
 - **Technological**
 - **Social Values and Pursuits**
- **Conditions described influence demand for water.**
- **Storylines are qualitative descriptions that will be used to develop quantitative modeling inputs for calculating potential supply and demand imbalances.**

Future Demand Storylines (Cont'd)

Current Trends



Robust Economic Trends



Storyline 1: Continuation of Current Trends

- **Economic and Financial:**
 - Population grows at current rates
 - Urban/urbanizing areas reach full build-out between 2050 and 2100
 - Wastewater treatment costs limits development in Truckee Meadows by 2050
 - Irrigated crop land decreases long term, but non-commercial agriculture remains in production
 - Longer growing season
 - Industrial mix does not change
- **Institutional and Political:**
 - TROA is implemented
 - Periodic lawsuits to protect flow in the Truckee River water

Storyline 1: Continuation of Current Trends

- **Natural Systems:**
 - Air temperatures increase and precipitation is more variable
 - Evaporative losses increase at Lake Tahoe
 - Peak river flows occur earlier in the spring
- **Technological:**
 - Reductions occur in per capita urban water use
 - Cities implement higher-efficiency technologies
- **Social Values and Pursuits:**
 - Natural landscaping continues to be popular
 - Some self-sustaining habitat restored along river and in upper watershed meadows
 - Recreational uses continue, but with slight increases in ski resort footprints

Storyline 2: Robust Economic Trends

- **Economic and Financial:**
 - Population grows at increased rates
 - Urban/urbanizing areas reach full build-out between 2040 and 2070
 - Wastewater treatment costs limits development in Truckee Meadows by 2040
 - Irrigated crop land decreases long term, but non-commercial agriculture remains
 - Longer growing season
 - Industrial mix does not change
- **Institutional and Political (same as current trends):**
 - TROA is implemented
 - Periodic lawsuits to protect flow in the Truckee River water

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Storyline 2: Robust Economic Trends

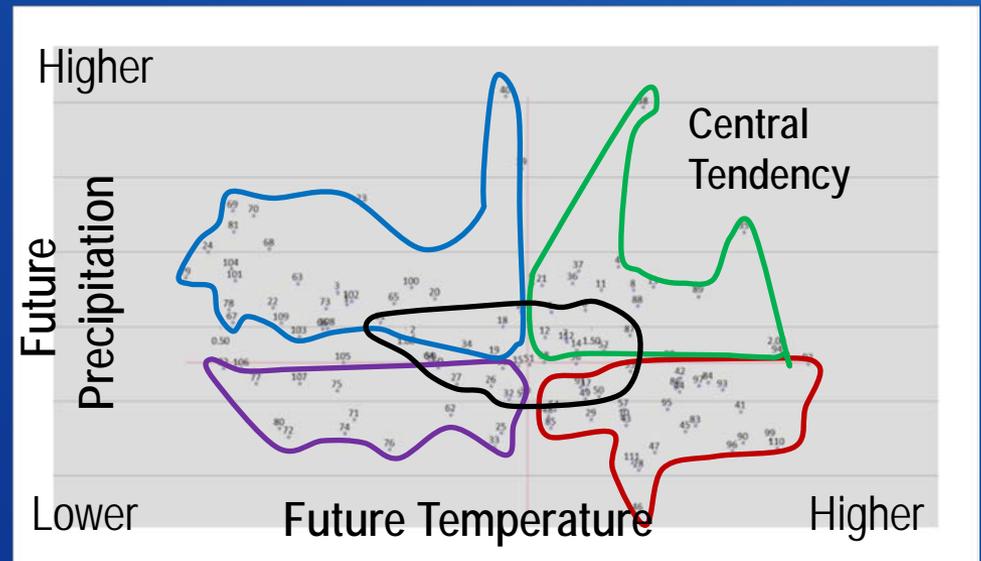
- **Natural Systems (same as current trends):**
 - Air temperatures increase and precipitation is more variable
 - Evaporative losses increase at Lake Tahoe
 - Peak river flows occur earlier in the spring
- **Technological (same as current trends):**
 - Reductions occur in per capita urban water use
 - Cities implement higher-efficiency technologies
- **Social Values and Pursuits:**
 - Natural landscaping continues to be popular
 - Increased attention/funding for preserving Lake Tahoe clarity, restore meadows, and constrain development
 - Recreational uses continue, but with slight increases in ski resort footprints

Sources of Information on Demand

- **Municipal & Industrial demand**
 - TMWA and TMRPA projections
 - Fernley Master Plan
 - Tahoe utility projections
- **Agricultural demand**
 - Reclamation
 - Nevada State Engineer
 - Federal Watermaster
- **Environmental Demands**
 - TROA Environmental Impact Statement / Report
 - Regional regulatory requirements
- **Evaporative Losses**
 - Estimated along with future hydrology, Desert Research Institute

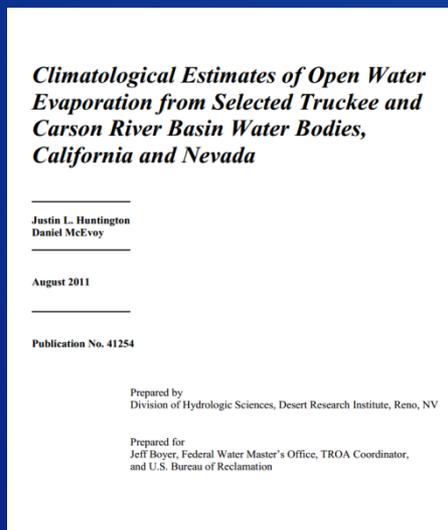
Changes in Demand Due to Climate

- Open water evaporation
- Irrigation Water Requirements for Agriculture
- Ecosystem needs



Open Water Evaporation

- Use Complementary Relationship Lake Evaporation Model (CRLE) and apply with weather data collected at or near lakes and reservoirs of interest
- Expansion of existing work modeling historical and future evaporation in the Truckee Basin (Huntington and McEvoy, 2011; WWCRA)



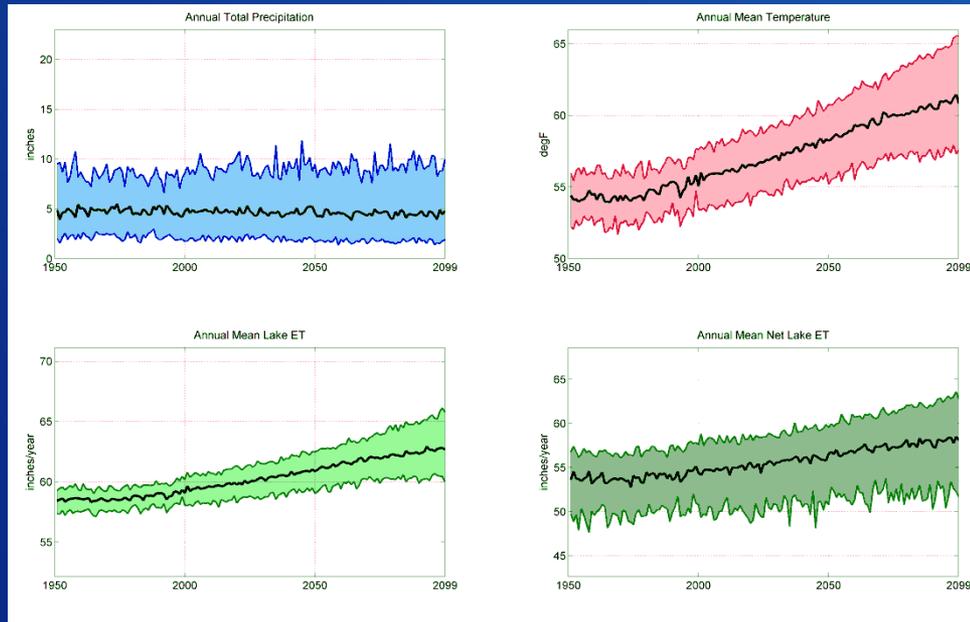
Historical Report available at:

http://www.dri.edu/images/stories/divisions/dhs/dhsfaculty/Justin-Huntington/Huntington_and_McEvoy_2011.pdf

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Open Water Evaporation

- Preliminary WWCRA future projections of evaporation and net evaporation (E – PPT)
- Example for Lahontan Reservoir
 - Upper and lower bounds are 5 and 95%tile of 112 future projections
- Will have similar results for all major lakes/reservoirs

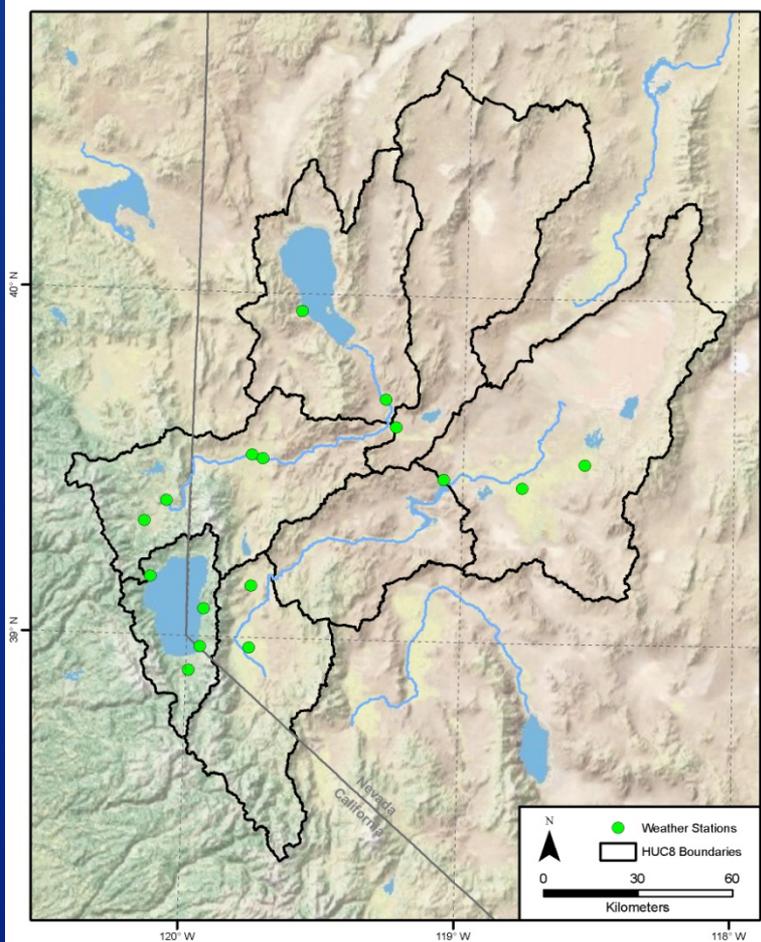


Irrigation Water Requirements

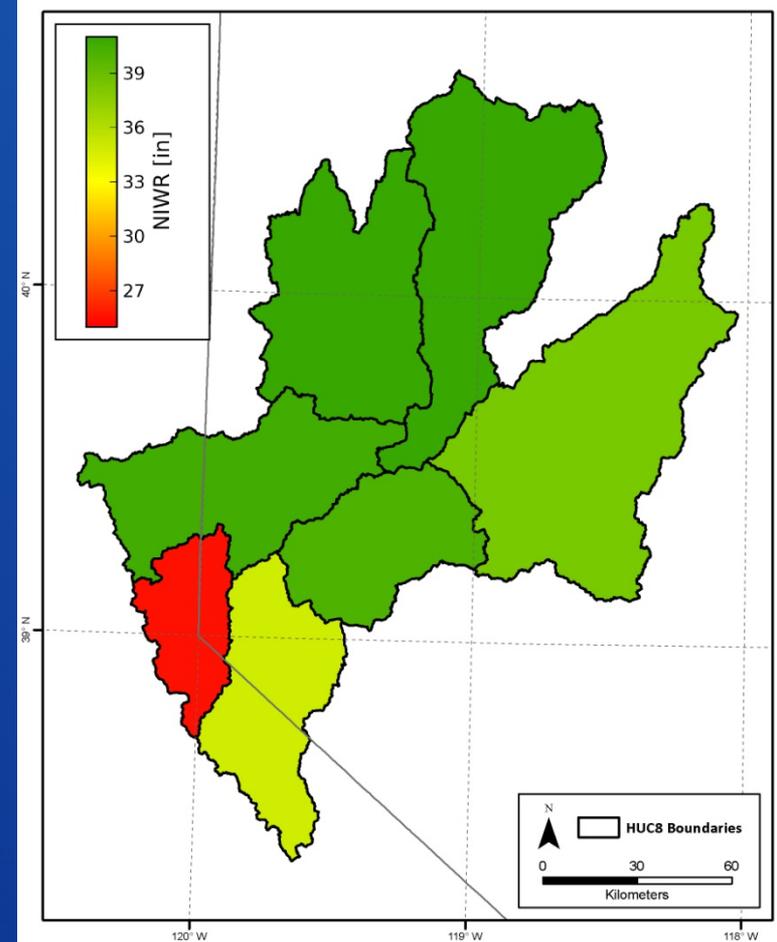
- Based on ASCE Standardized Reference ET equation, and crop and daily soil water balance models following FAO-56, recent State of Nevada irrigation water requirements report, and current WWCRA work
- Future WWCRA climate and irrigation water requirement estimates follow a period change approach, where the historical climate is perturbed by a delta T and PPT factor

Current Irrigation Water Requirements

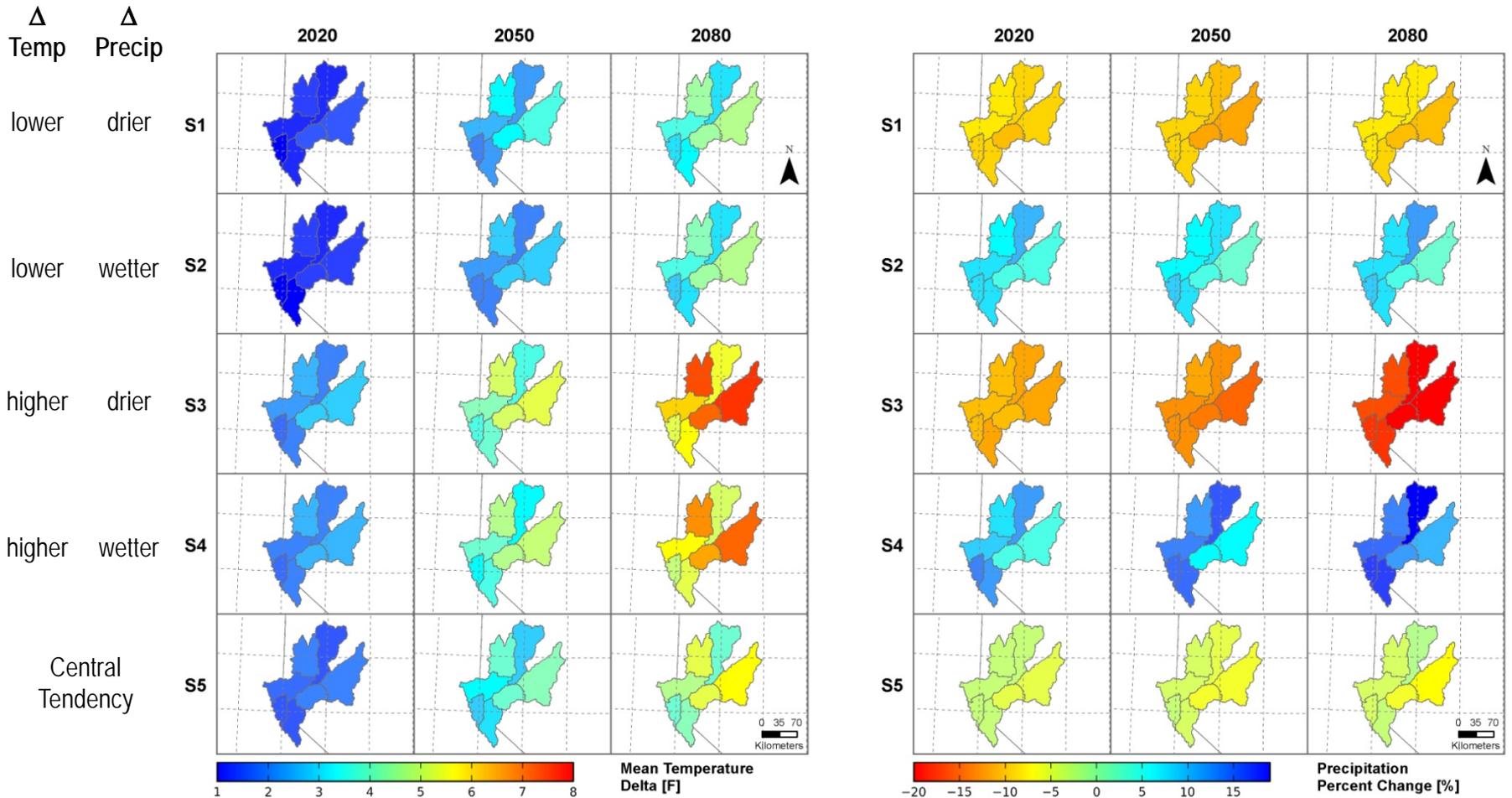
Stations Used to Simulate Crop ET and NIWR



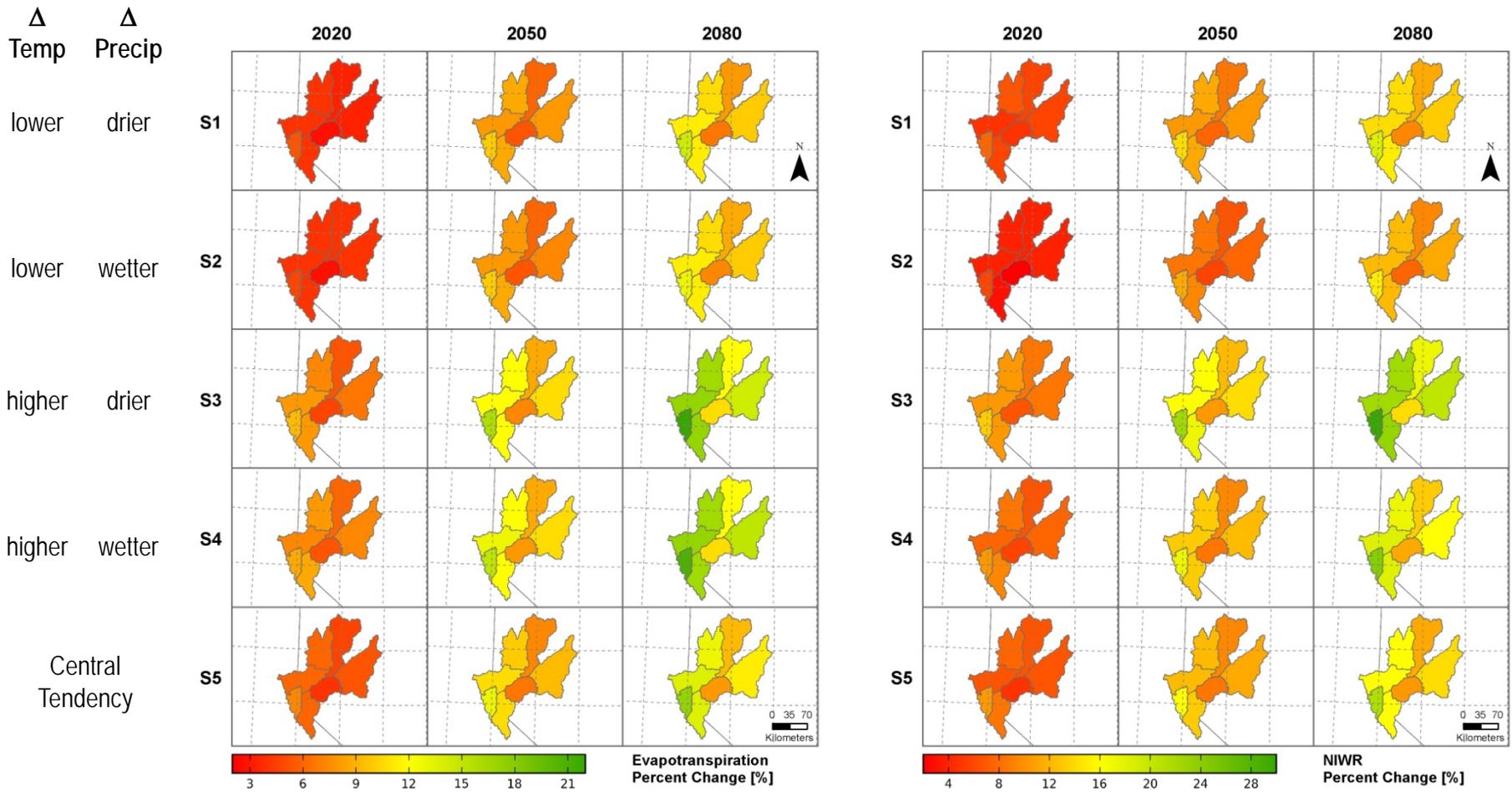
Historical Net Irrigation Water Requirement



Future WWCRA Climate and Irrigation Water Requirements (Preliminary Results)

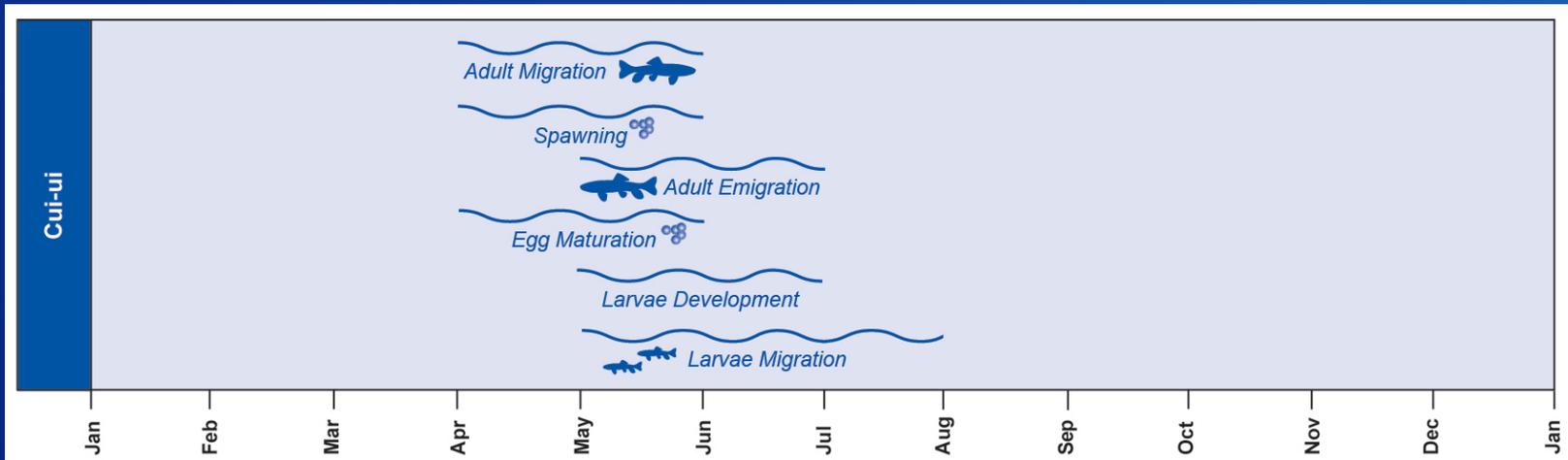


Future WWCRA Climate and Irrigation Water Requirements (Preliminary Results)



Ecosystem Needs

- Can we anticipate how fisheries might respond to climatic changes?
 - Changes in timing of peak runoff?
 - Changes in river temperatures?
- Should in-stream flow targets change to account for anticipated changes in hydrology and temperature?





Technical Advisory Group Discussion

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Demand Storyline Workbook

Questions

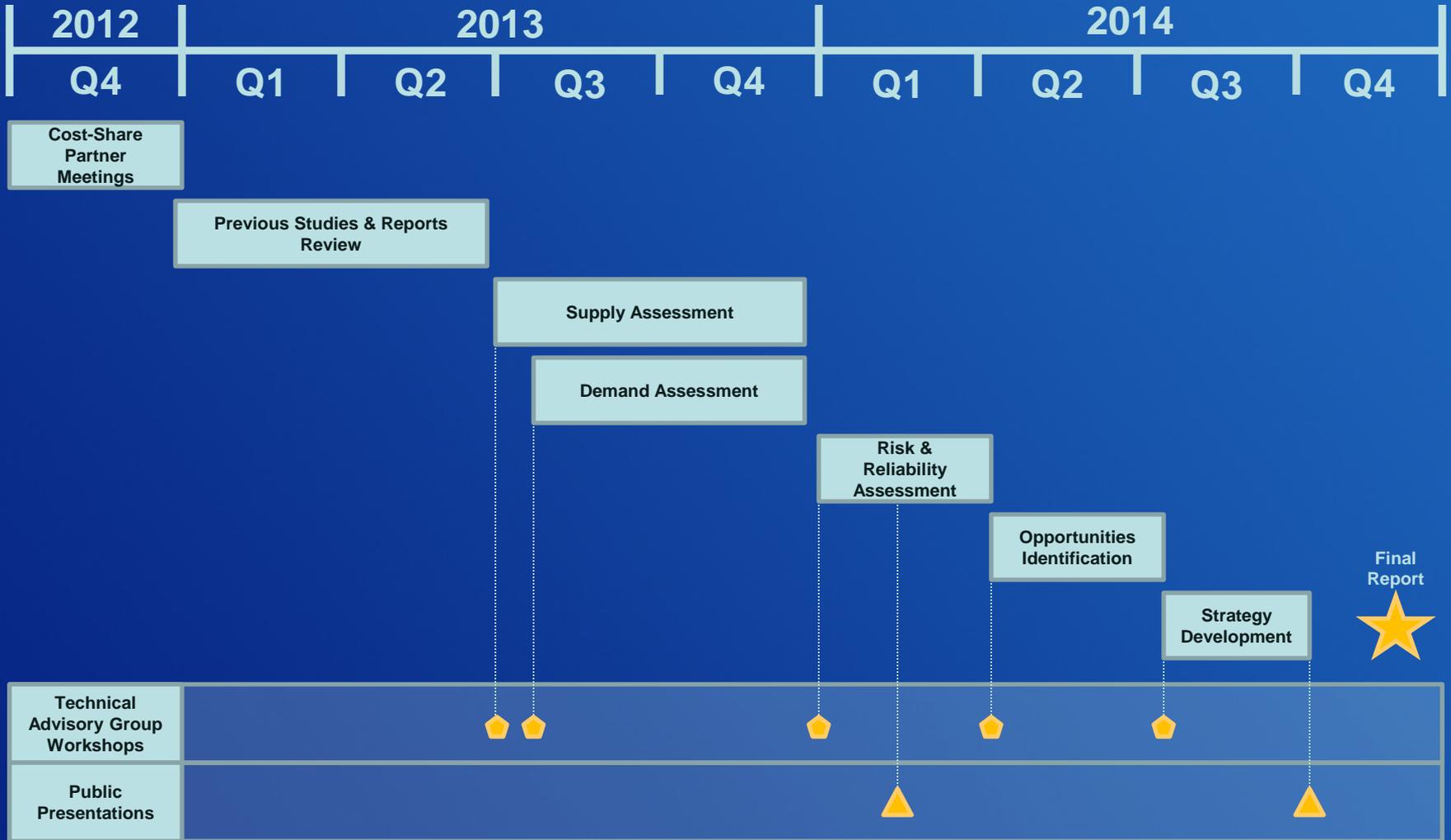
- Is this an appropriate and plausible range of future conditions?
- Are there other conditions that would result in a higher or lower demand for water over the next 100 years?
- Are there relationships between different water uses or the climate that are not appropriately represented in these storylines?
- Could existing information improve how demand is represented in elements of the storylines? If so, what are these sources of information?



Ongoing and Future Basin Study Activities

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Truckee Basin Study Schedule



Planned Workshops & Presentations

- **Technical Advisory Group Meetings**
 - Risk and Reliability Imbalance Metrics, Quarter 1 2014
 - Opportunities Identification, Quarter 2 2014
 - Strategy Development, Quarter 3 2014
- **Public Presentations**
 - Quarter 1 2014
 - Quarter 3 2014

Basin Study Information

- Reclamation's Basin Study Program Website
 - <http://www.usbr.gov/WaterSMART/bsp/studies.html>
- Truckee Basin Study Website
 - <http://www.usbr.gov/mp/tbstudy>
 - Public information related to Study
 - Public meetings will be archived on the site
- Additional Information, Questions, and/or Comments
 - Arlan Nickel phone: 916-978-5061 or Shelley McGinnis phone: 916-978-4349
 - email: bor-mpr-truckeebasinstudy@usbr.gov