

# RECLAMATION

*Managing Water in the West*



## TRUCKEE BASIN STUDY

# Technical Advisory Group Water Demand Workshop

August 26, 2013

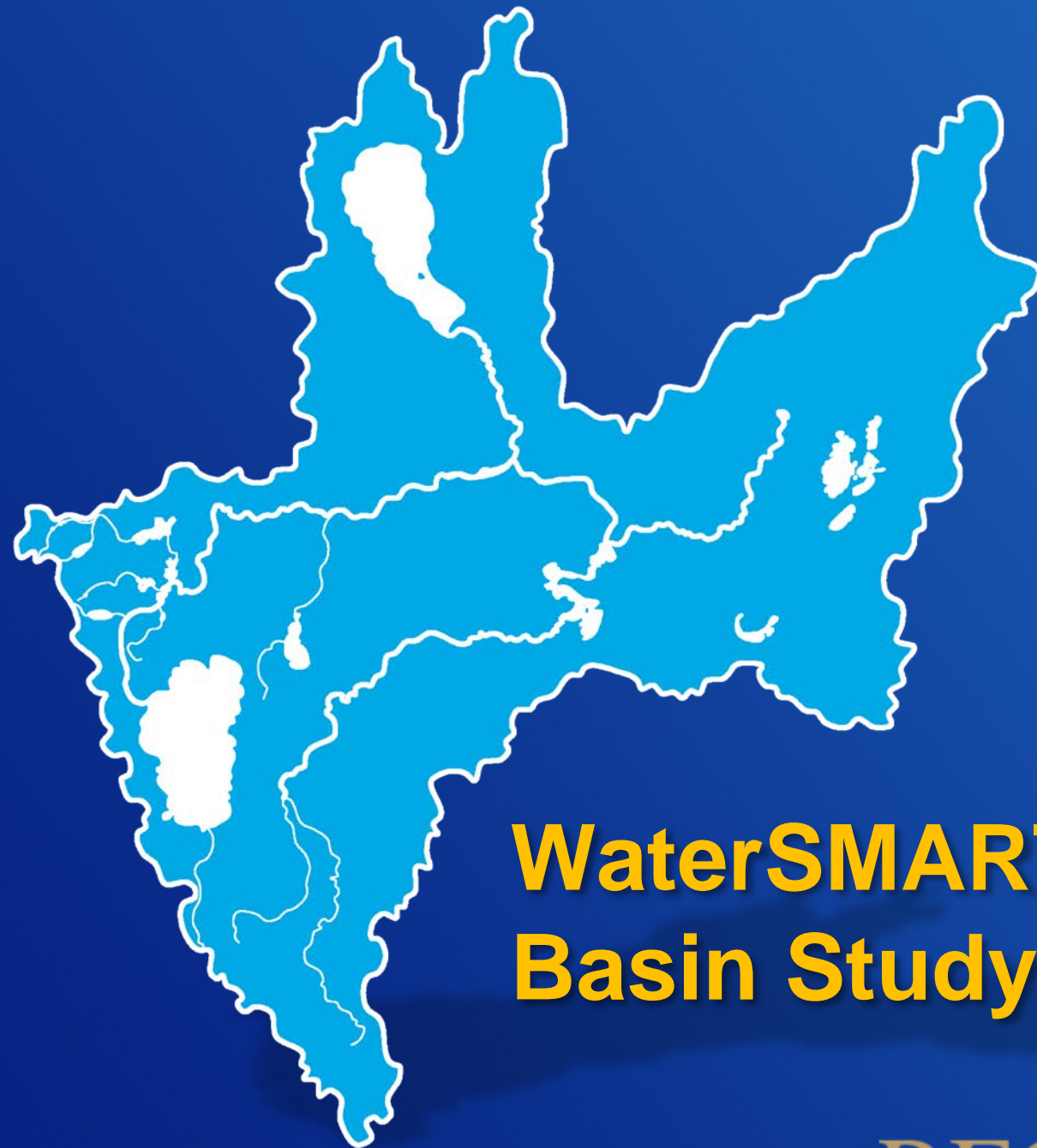


# Agenda

- **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**

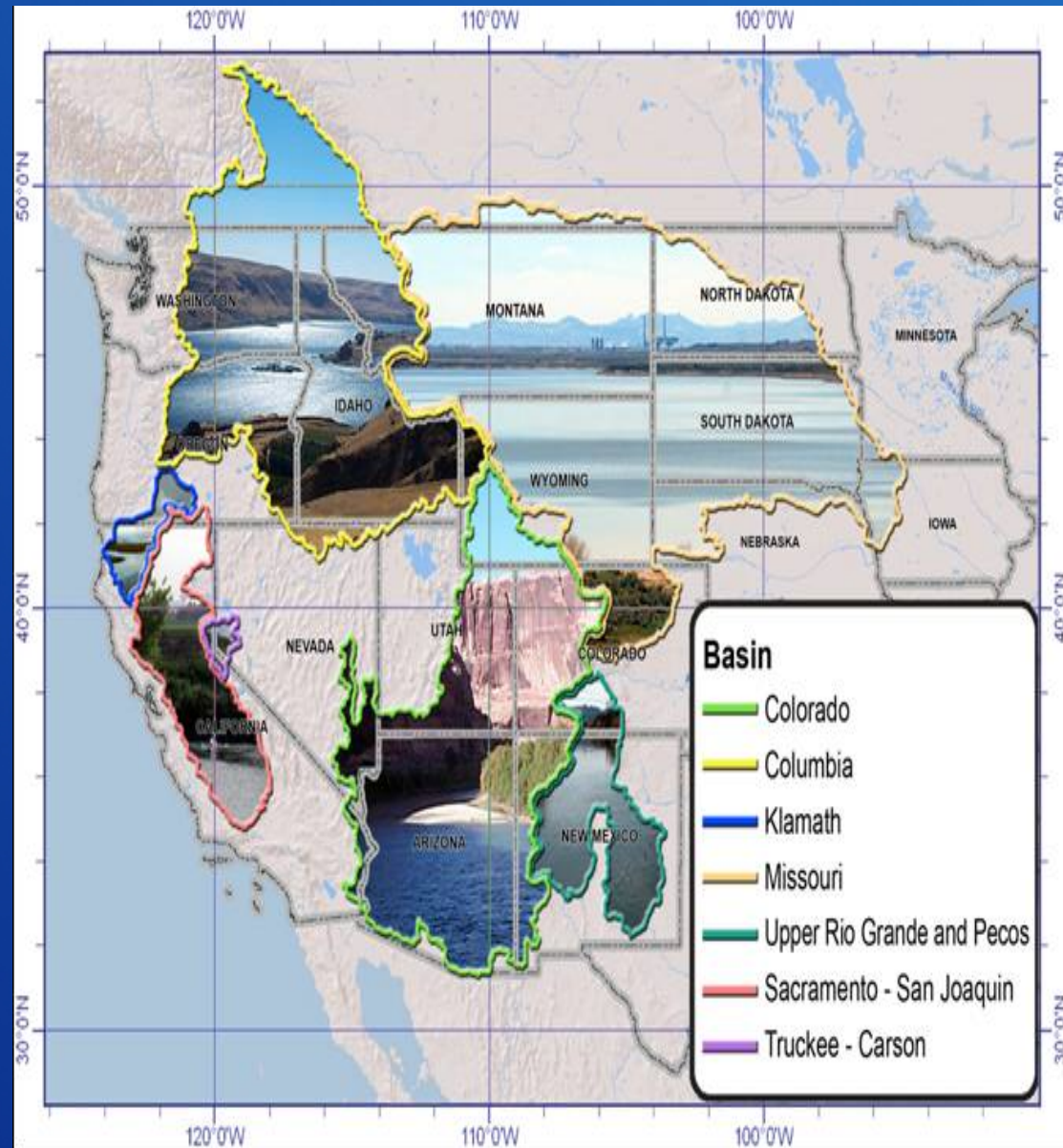


# West-Wide Climate Risk Assessments

- **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**



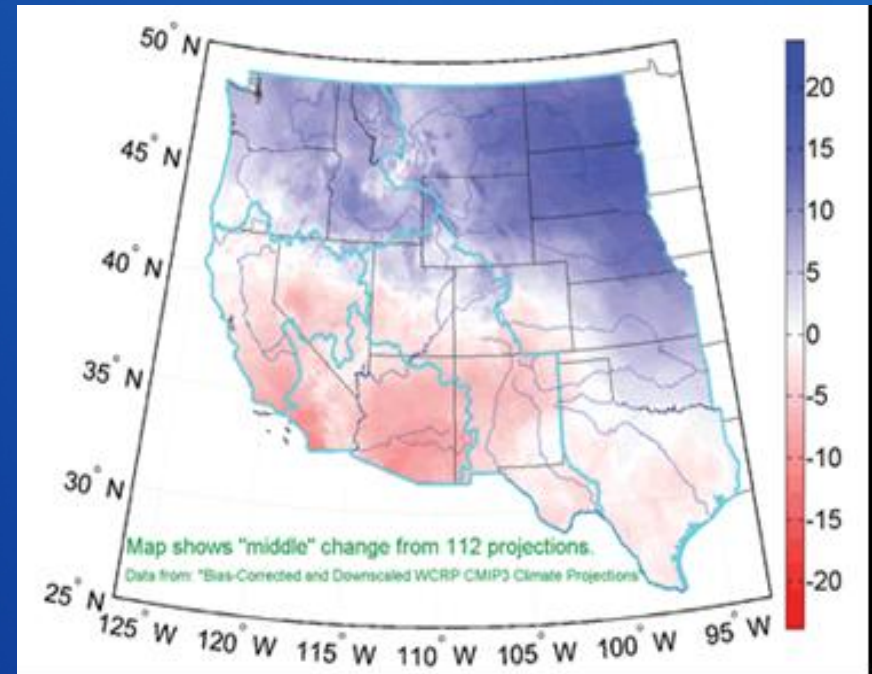
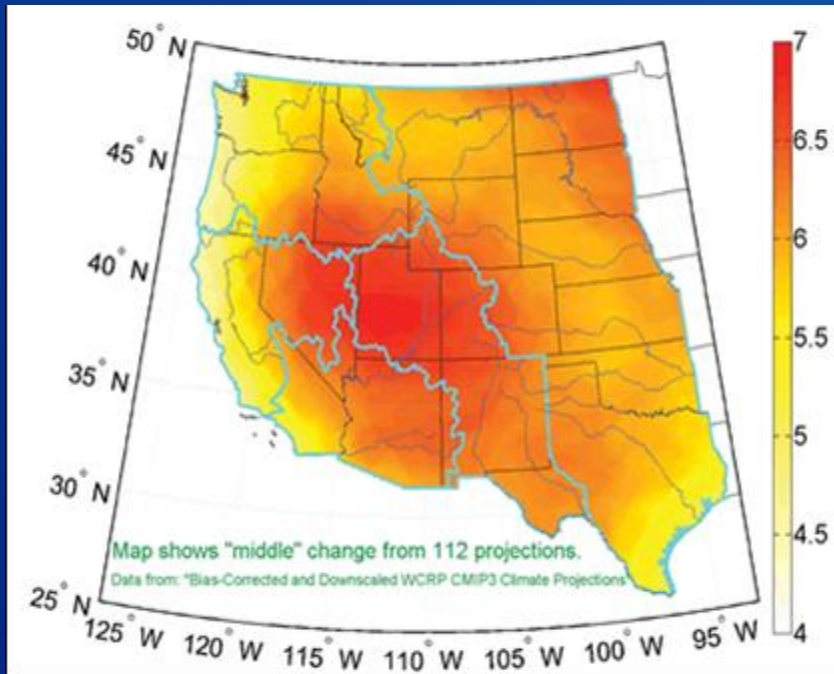
**SECURE Water  
Act Section  
9503(c) –  
Reclamation  
Climate Change  
and Water –  
April 2011**



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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 21<sup>st</sup> 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



### 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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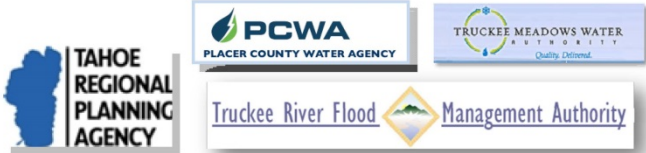
# Basin Study Phases

- **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



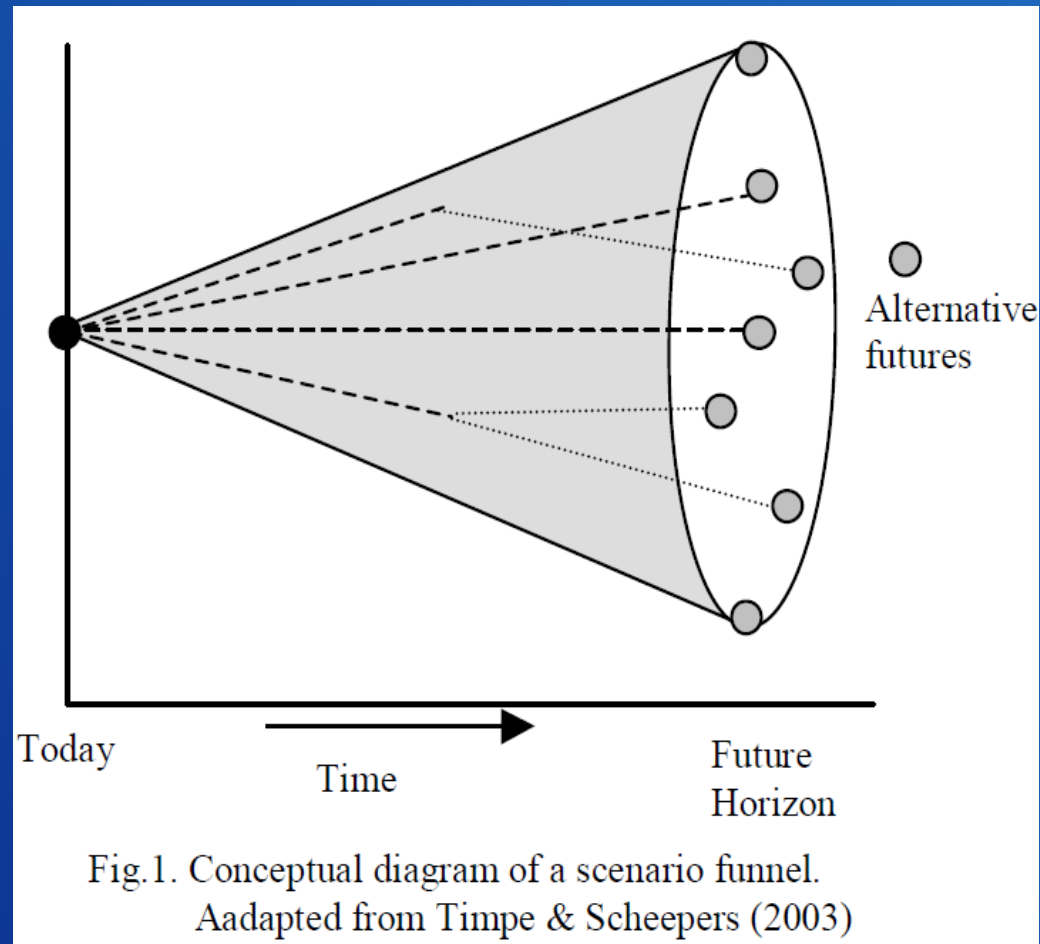
*With Cost-Share Participation by these Major Study Partners:*



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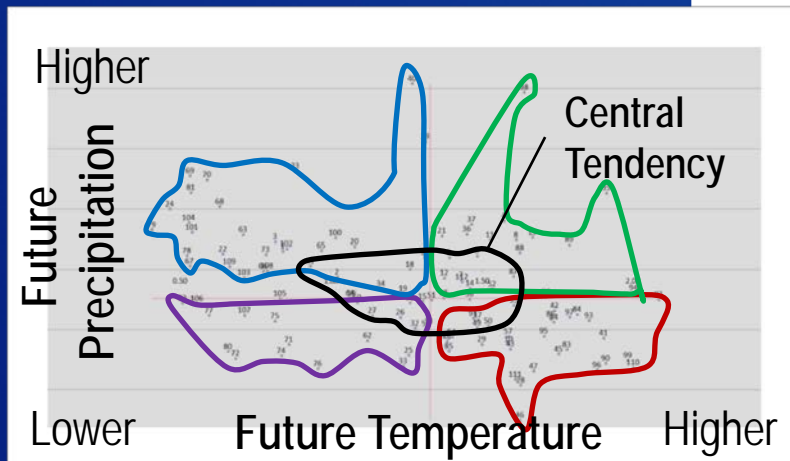
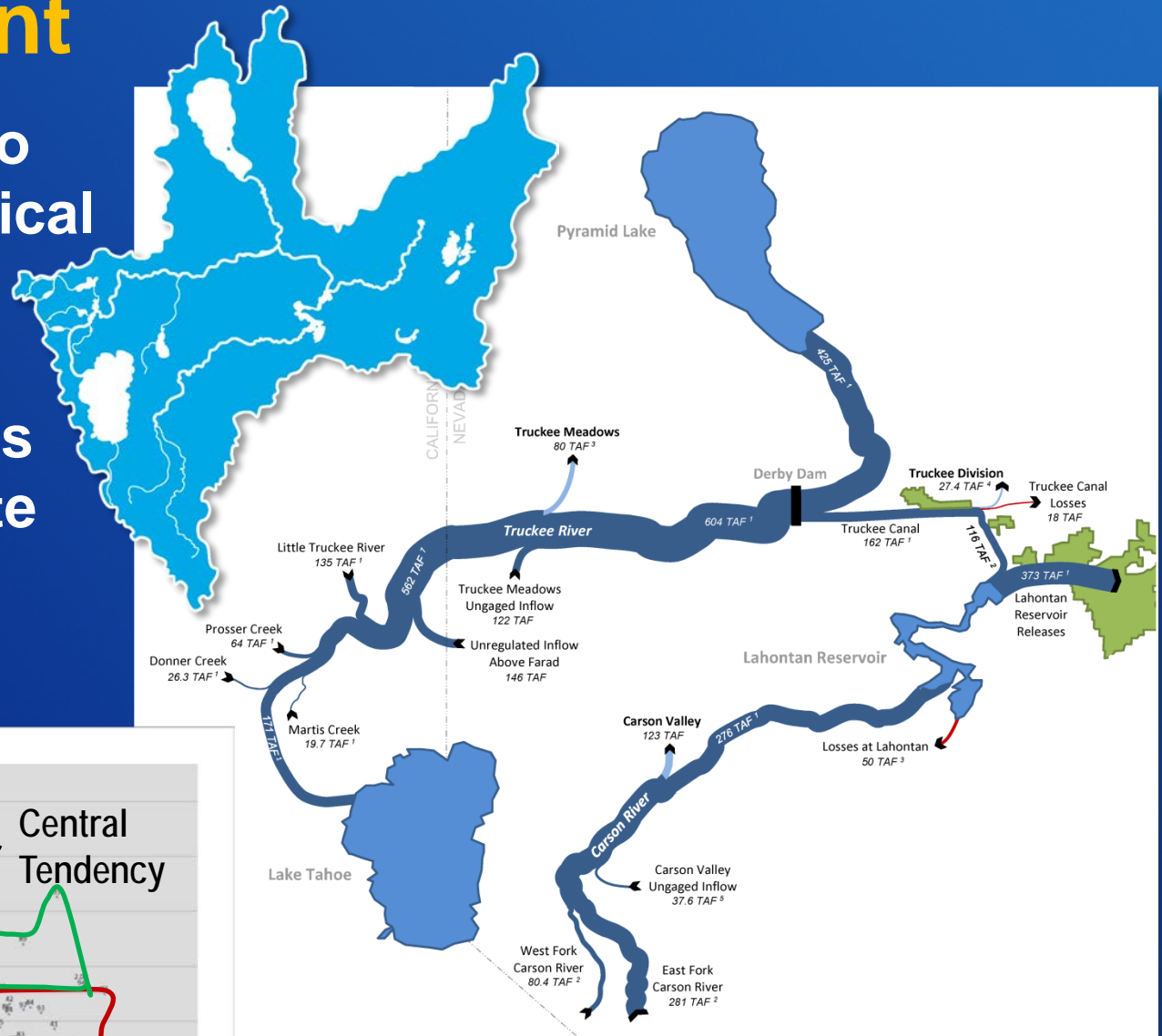
# Phase I & II: Scenario Development

- 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

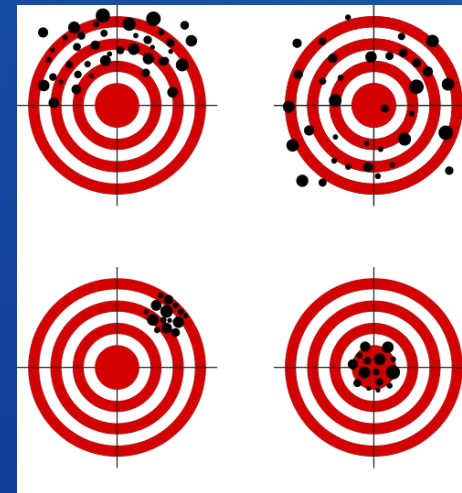
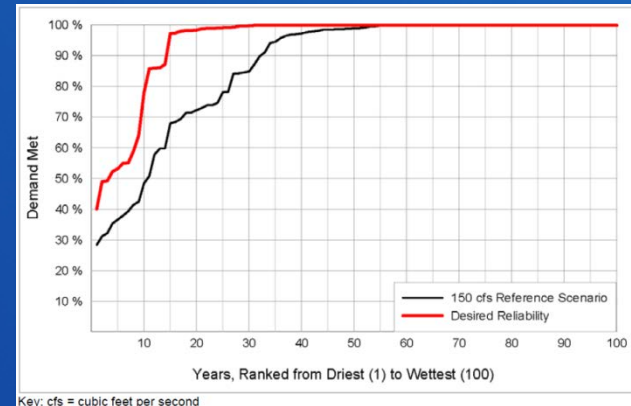
- Meetings with planning agencies to identify drivers of current and potential future growth in the basin



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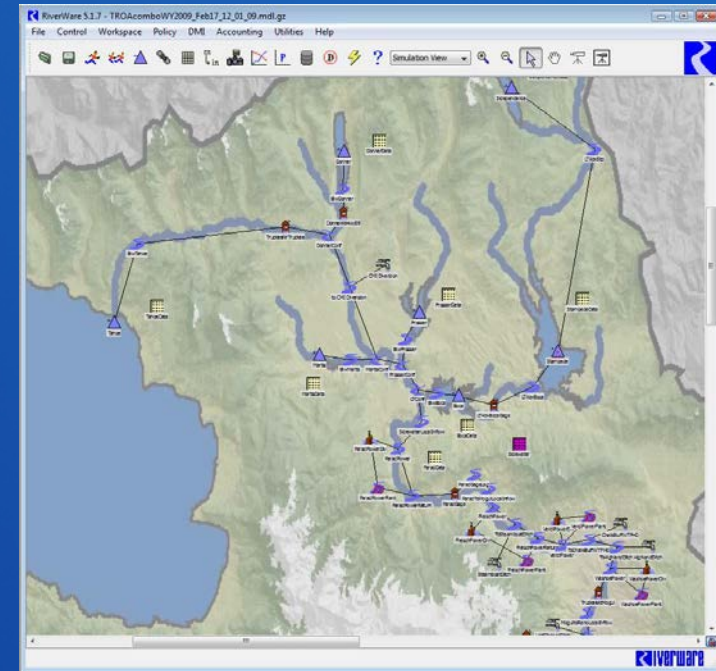
# Phase III: System Reliability and Risk Assessment

- 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)





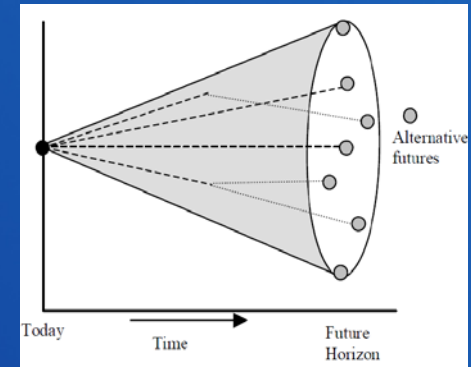


**Workshop Focus:  
Water Demand Assessment**

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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

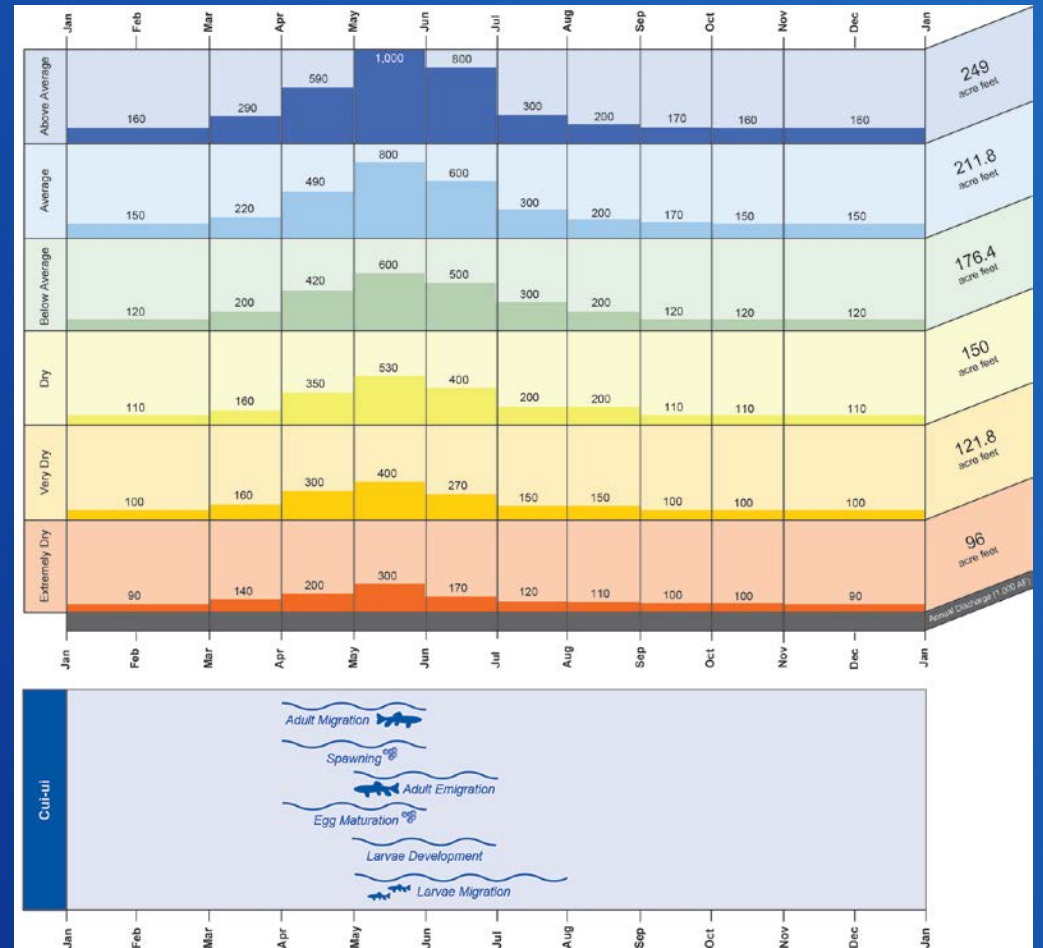


# Current Demand Estimates

- **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



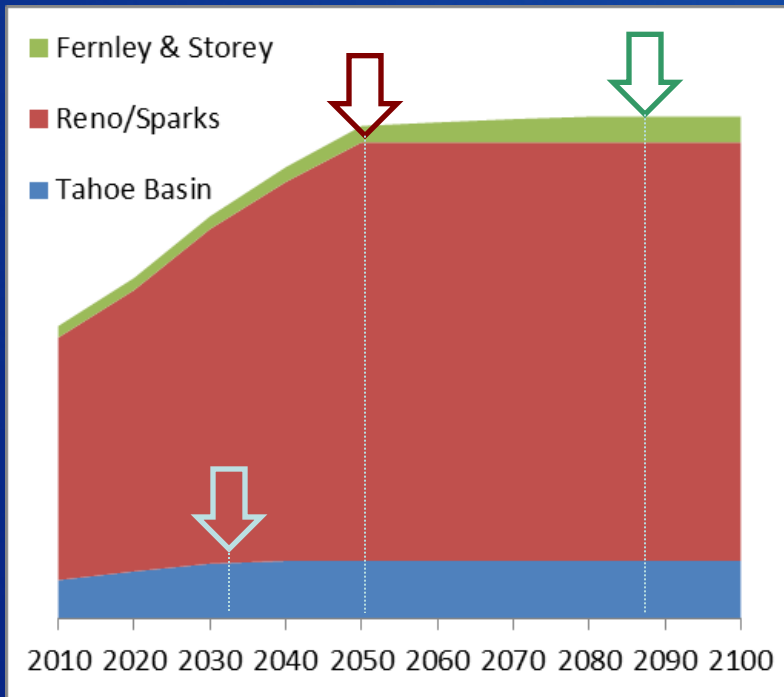


# Future Demand Storylines

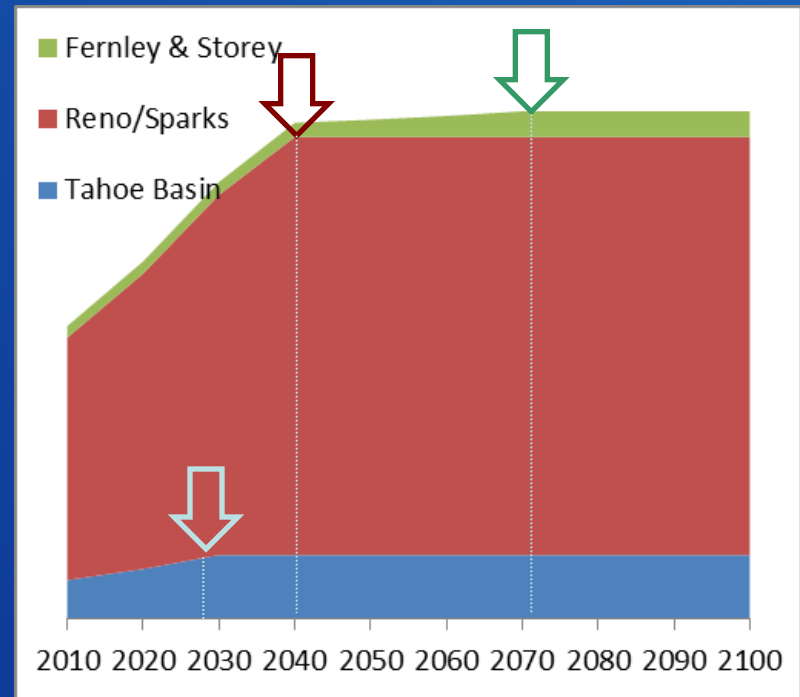
- **Plausible range of conditions that could develop in the Truckee River Basin between now and the year 2100, based upon several key factors:**
  - Economic and Financial
  - Institutional and Political
  - Natural Systems
  - Technological
  - Social Values and Pursuits
- **Conditions described influence 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

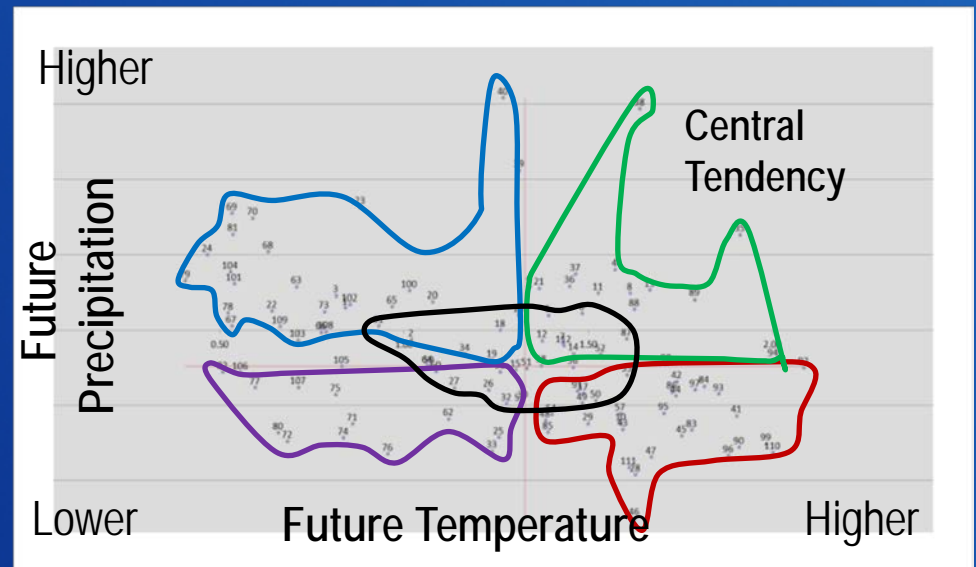
- **Natural Systems (same as current trends):**
  - Air temperatures increase and precipitation is more variable
  - Evaporative losses increase at Lake Tahoe
  - Peak river flows occur earlier in the spring
- **Technological (same as current trends):**
  - Reductions occur in per capita urban water 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

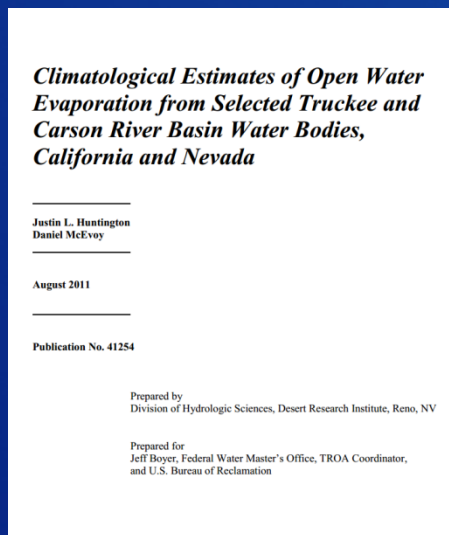
- Open water evaporation
- Irrigation Water Requirements for Agriculture
- Ecosystem needs





# 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)



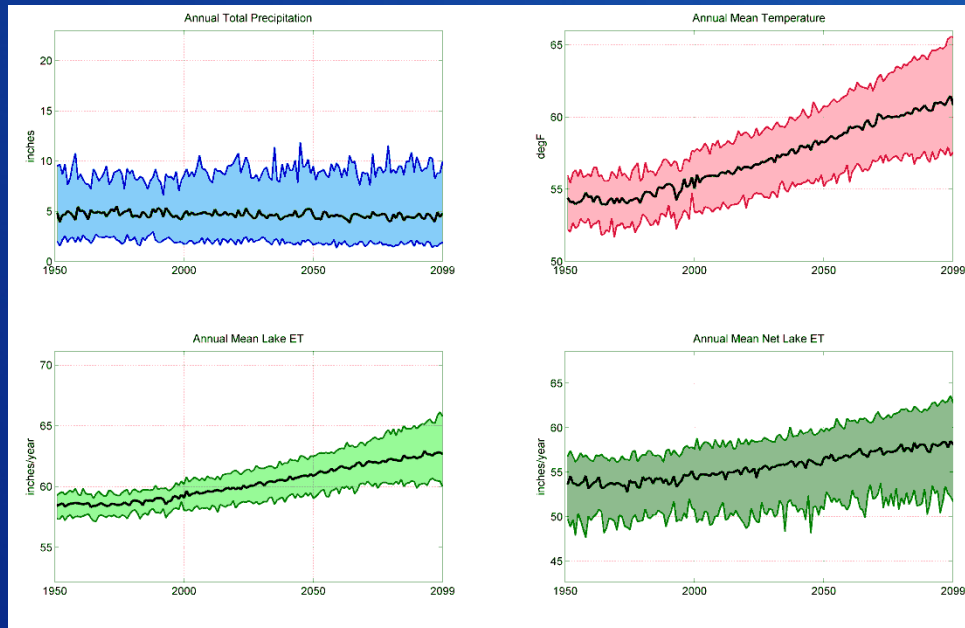
Historical Report available at:

[http://www.dri.edu/images/stories/divisions/dhs/dhsfaculty/Justin-Huntington/Huntington\\_and\\_McEvoy\\_2011.pdf](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

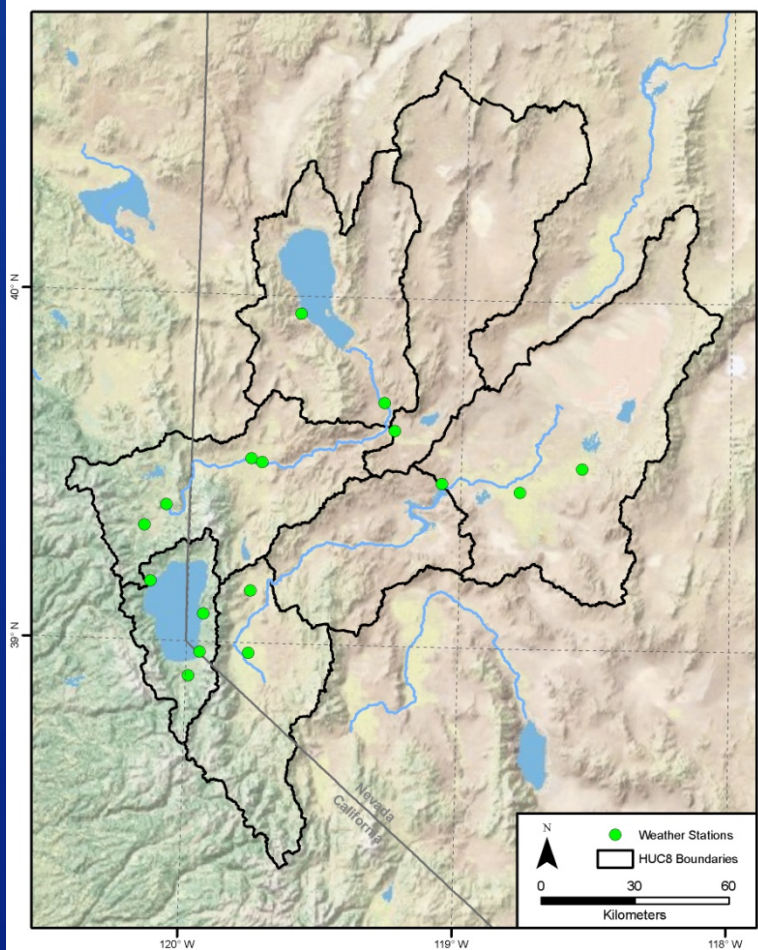


# Irrigation Water Requirements

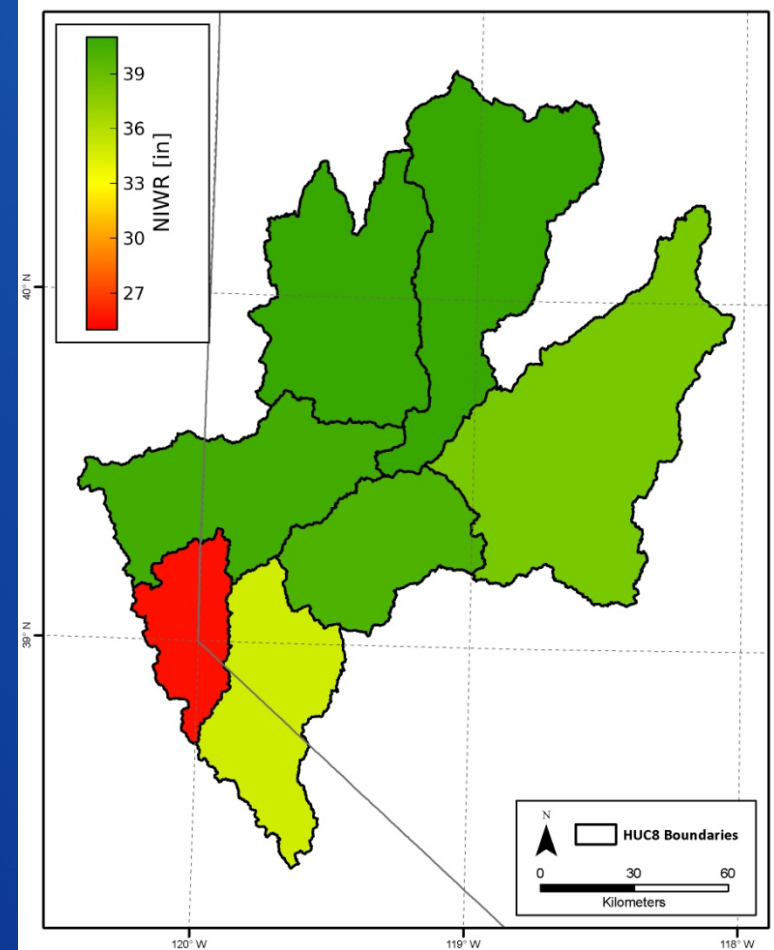
- Based on ASCE Standardized Reference ET equation, and crop and daily soil water balance models following FAO-56, recent State of Nevada irrigation water requirements report, and current WWCRA work
- Future WWCRA climate and irrigation water requirement estimates follow a period change approach, where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

# Current Irrigation Water Requirements

Stations Used to Simulate Crop ET and NIWR

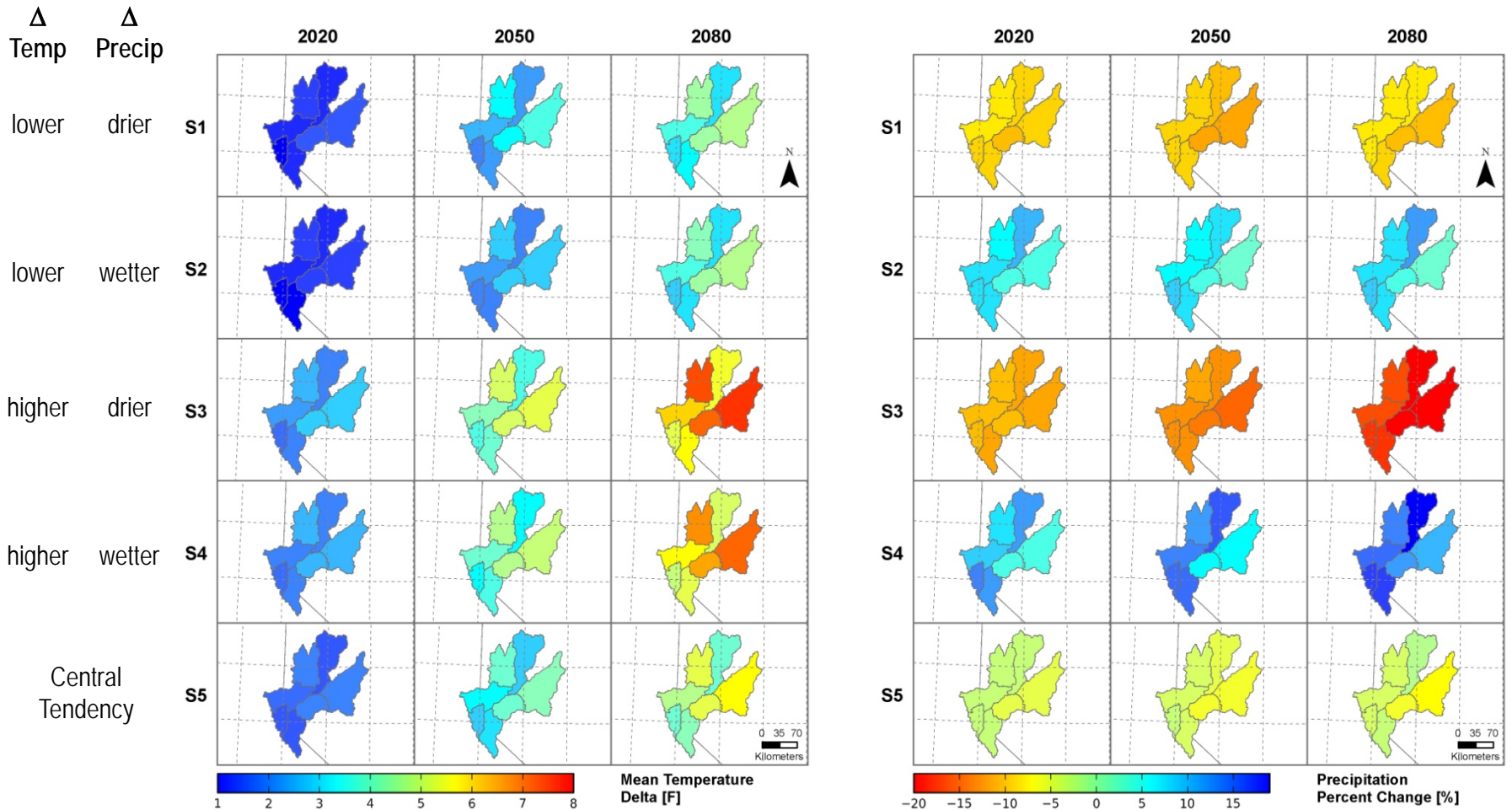


Historical Net Irrigation Water Requirement

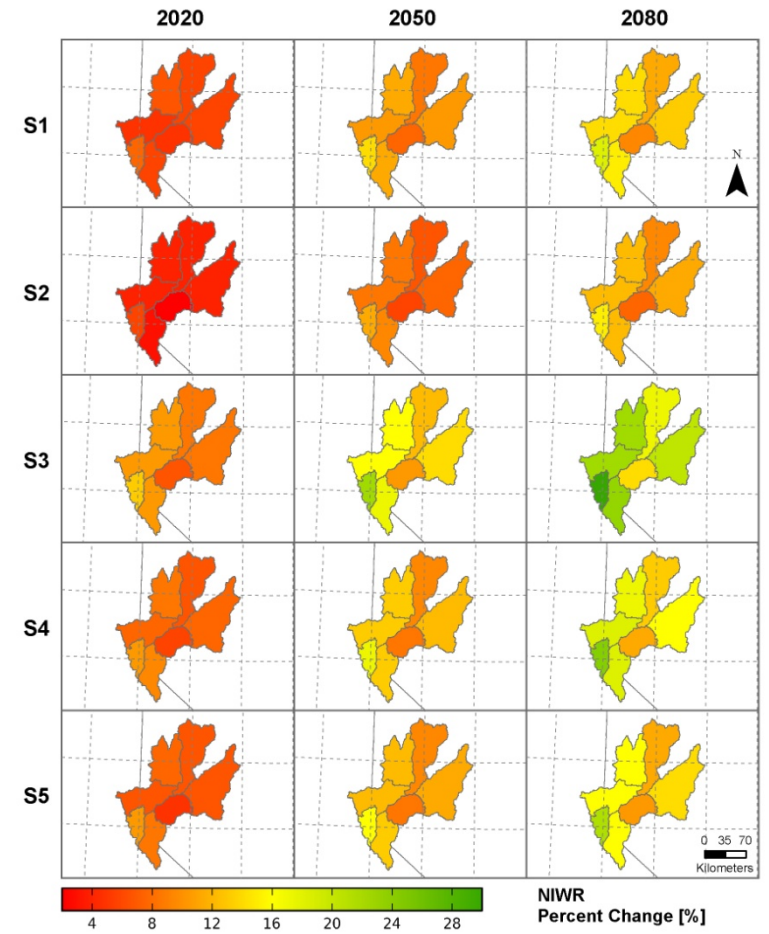
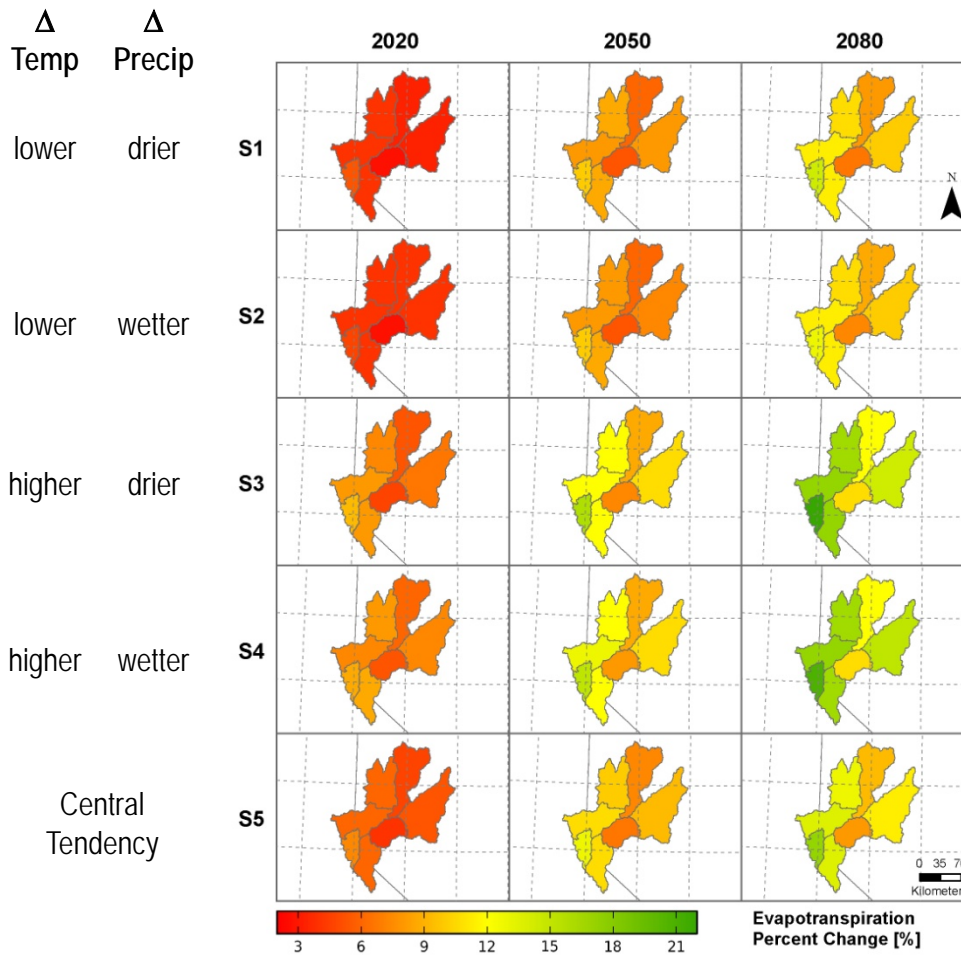




# Future WWCRA Climate and Irrigation Water Requirements (Preliminary Results)

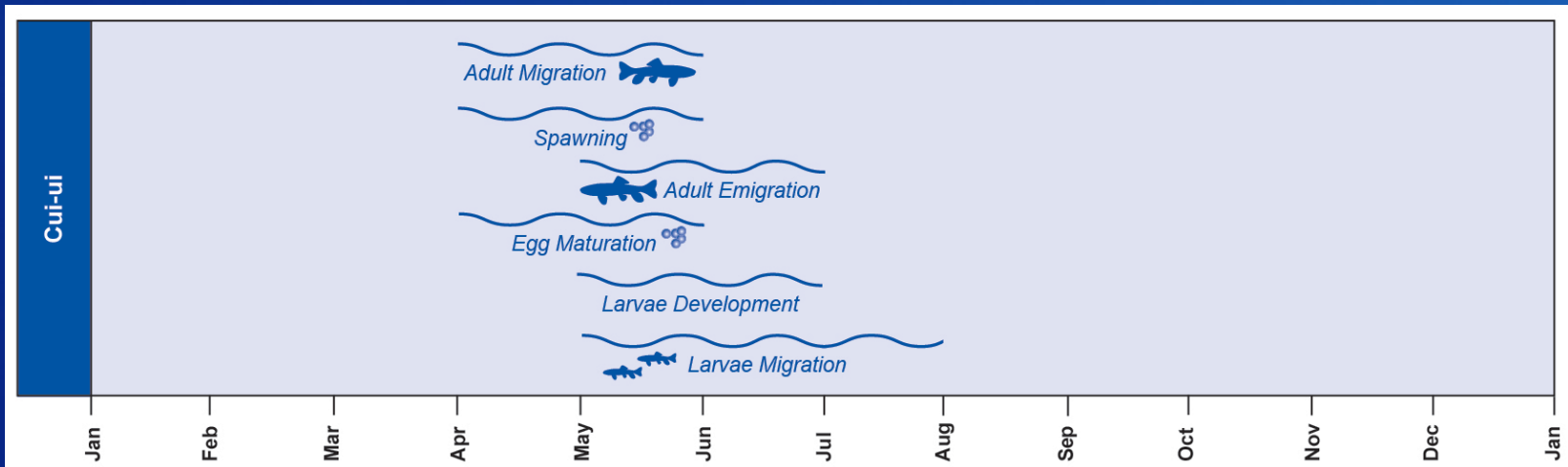


# Future WWCRA Climate and Irrigation Water Requirements (Preliminary Results)



# 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

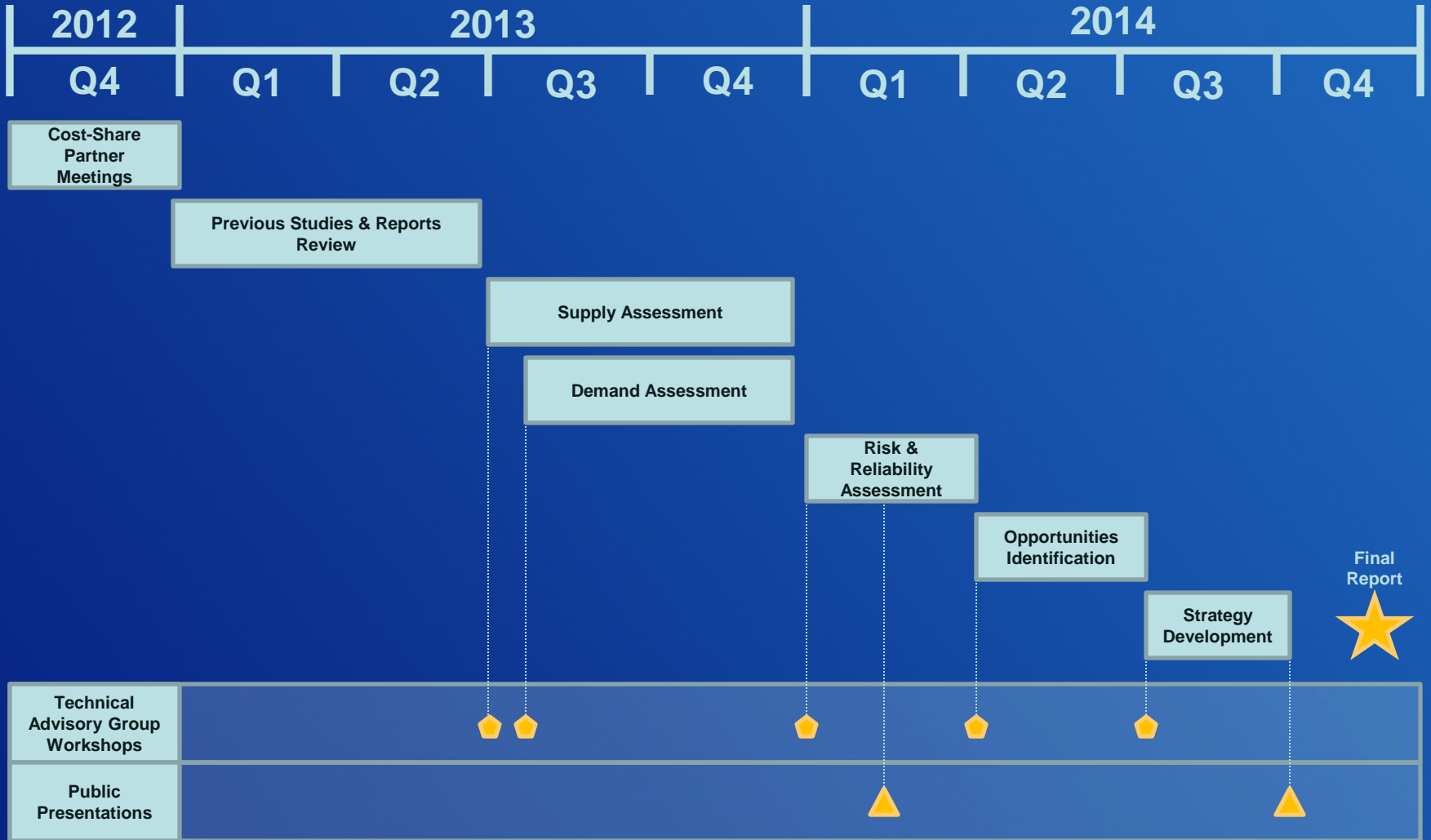
- Is this an appropriate and plausible range of future conditions?
- Are there other conditions that would result in a higher or lower demand for water over the next 100 years?
- Are there relationships between different water uses or the climate that are not appropriately represented in these storylines?
- 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](mailto:bor-mpr-truckeebasinstudy@usbr.gov)